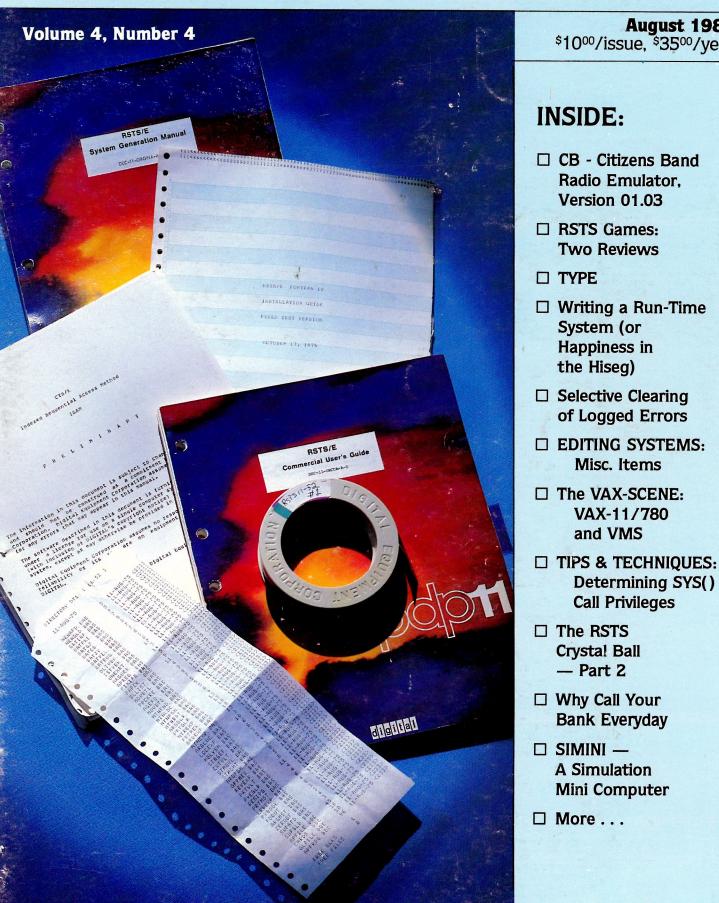
# RSTS PROFESSIONAL



**August 1982** \$1000/issue, \$3500/year

- ☐ EDITING SYSTEMS:
- Determining SYS()

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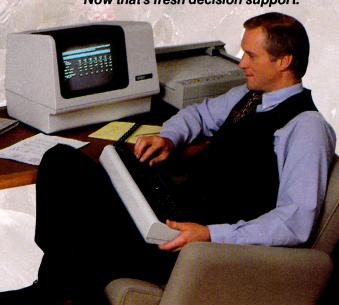
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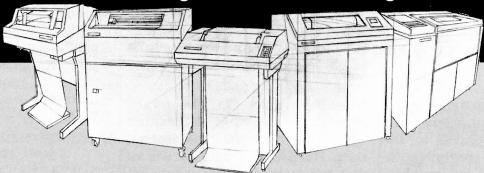
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#### **SYSTEM LINKS**

#### **HOOKING UP LOCAL OR**

#### REMOTE SYSTEMS

#### DYNAMICALLY

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Achieving Very High Transfer Speeds. CALOUT is limited to the transfer speeds supported by the communication hardware. It can be used with sophisticated high-speed hardware if required. You are not forced to buy such hardware with CALOUT.



How To Get More Information. Call Lisa at (801) 224-5306, or write: Clyde Digital Systems, Inc., 3707 North Canyon Road/Bldg. 3-E, Provo, UT 84604.

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#### From the editors. . .

#### **AUTHOR. AUTHOR!**

Dave Mallery

I had an insight recently while hanging around the press room at the Atlantic City COMDEX show. The room was populated with an unfamiliar breed — reporters. They were going on about how thay had been cruising the show floor 'getting stories' from various exhibitors. One reporter was especially vivid in his description of how the people in one booth had been falling all over each other to give him a demo and how he had curtly dismissed their efforts as unworthy of his attention.

My first reaction was: 'Boy, Carl, we ought to hire one of those. . .! Then I realized that we would start sounding like all the other magazines in the business because 90% of their content is banged out by those slick journalists using pure marketing hokum as input and slick formula as output. 'a tale told by a computer. . .'

Our magazines are really YOUR magazines. We do not employ a single professional writer or reporter. If you don't like our content, then do something about it. Most of our 'regular' contributors never dreamed that they would be publishing frequently. There's lots of room for you—over a hundred pages a month.

The RSTS pro was born in a SIG meeting in the Spring 1979 DECUS at New Orleans. Every time I look back at Vol 1, Number 1, I am amazed:

- a) that it happened at all
- b) how good some of the articles are.

When you look at Vol. 1, Number 1 of the Dec Pro, you will notice that we have learned something about publishing; that we have learned how to sell advertising; and that we have developed some financial strength; but I am still amazed:

- a) that it happened at all
- b) how good some of the articles are.

#### HOME COMPUTER

Carl B. Marbach At last. A home computer that is a real computer. It even runs RSTS. Maybe that is what makes it the first machine I am willing

MICRO-11 package just announced by DEC is what some of us have been waiting for. (Look for my article in the next issue.) It is also something some of us (Apple, TRS-80, PET?) have been hoping would never hap-

to call a 'home computer'. The new

pen: It did.

What is a 'home computer'? I will continue by asking, 'what is a mini-computer'? I would guess that a 'home computer' is a micro computer that can be bought for the home, or for home use (play?). That would mean it has to be cheap, small, reliable, use

ordinary power and require no special environment. I won't tell you what a mini-computer is because I don't know anymore (I used to know). So DEC has a real 'home computer' — not a micro, a 'home computer'. It is sort of a micro because it does use an 11/23, but it isn't really a micro because it doesn't use the new T-11 chip (PDP 11 on a chip).

It is not inexpensive, but probably affordable as a 'home computer' at just about \$10,000 complete. A friend of mine has about \$6,000 in his Apple and it isn't close to this in anything except game playing. . . oh yes, Apple and Atari win when it comes to games, but they lose big because they DON'T RUN RSTS. Add a VT-101 to this package and you have a real 10MB disk and 256K memory RSTS/E system! RSTS!

I recently read an article about what operating system was to become the 'standard' for the new 16 bit micro's. Was it to be CP/M-8 6 or PC-DOS or XENIX? I think not. It might be RSTS. In five years there will be two giants in 'personal computers': IBM and DEC. The others will go the way of Texas Instruments watches, Singer POS terminals, Xerox computers and other extinct species. These 'personal computers' will rule the roost of cheap software (you get what you pay for) and games. You want to play GAMES and do some computing? Buy a 'personal computer'. If you want a computer to do real commercial type work, manage your home finances, run budget models, follow the stock market, pay your bills, do word processing, teach the kids programming and have the full functions of a computer, you'll need a 'home computer'.

Are the micro based 'personal computers' friendly? Try one, it won't say "please say hello". Do they have RECORD I/O, OR RMS? How about TECO or EDT? GRIPE doesn't exist? Horrors! Is there a BATCH, or SPOOL? Can you run BACKUP or SAVER? Is there a REORDR and can they spell UTILTY? Did someone explain how the disks are organized, and how you can optimize them? Is there a SYSTAT or VT5DPY, and can you LOCK-11? When was the last time your system was down because of a bug in RSTS? Does the documentation take up a full bookshelf and change colors every year? Can a program written for a \$500,000 computer run on yours?

I hope my kids learn programming on a system whose lineage included a 28K computer that served 4 users in a school. That PDP 11/20 has grown to a \$500,000 128 terminal 11/70 and now to a \$10,000 'home computer'. What will be the "standard" 16 bit operating system? I'm using it right now, on my very own 'home computer': a PDP-11 running RSTS.

PLEASE SAY HELLO.



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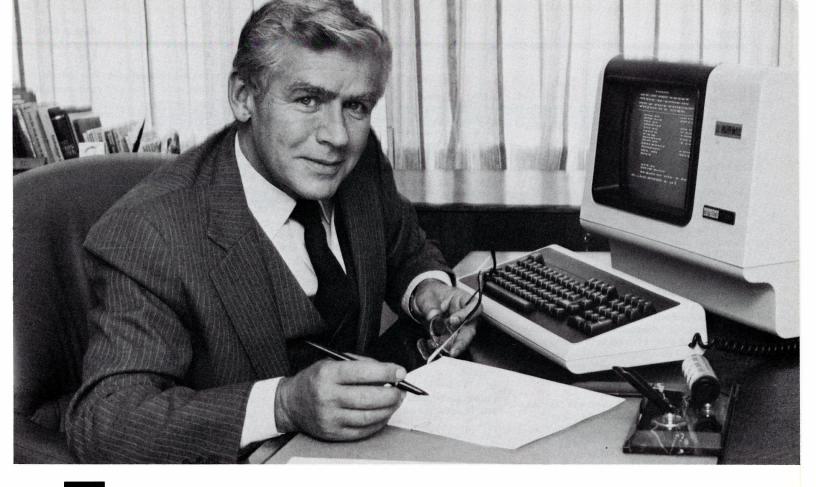
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Editorial Information: We will consider for publication all submitted manuscripts and photographs, and welcome your articles, photographs and suggestions. All material will be treated with care, although we cannot be responsible for loss or damage. (Any payment for use of material will be made only upon publication.)

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#### **LETTERS** to the RSTS Pro...

Send letters to: Letters to the RSTS Pro, P.O. Box 361, Ft. Washington, PA 19034-0361.

Dear Readers of the RSTS PROFESSIONAL:

The RSTS PROFESSIONAL was started by Carl Marbach and R. David Mallery a few years ago to fill a void left by the RSTS SIG newsletter, doing a better job than the SIG newsletter had done in recent memory. They recognized that the 'commercial free' environment enforced by DECUS tends to stifle the enthusiasm of the users.

I would, however, like to express my concern at what I perceive to be a lack of editorial policy in the RSTS PROFESSIONAL. To me, the RSTS PROFESSIONAL exists to provide a forum for the free exchange of good solid accurate technical information in a relatively commercial free environment. (Making Carl & Dave a few bucks in the process.)

I don't care for the commercially stifling environment provided by DECUS, but I care for selfserving sales literature masquerading as technical articles less.

Prime examples of what I mean are: "Que.11 User's Guide," "Conpax," "DEC Data Security, The Software Encryption Solution," and "Scrnio/11 and Vidio/11." The last article being a particularly blatant example. (Maybe DECUS isn't so bad after all.)

I feel that articles like these seriously damage the professional image of the magazine. (In our neck of the woods, it is referred to as the RSTS UN-PROFESSIONAL!) I sincerely hope I'm not the only one who feels that these types of articles have no place in a 'professional' journal.

OK, now that I've vented some of my frustration, what do I propose? Carl and Dave are smart business people who respond to market pressures. They realize that if they don't fill the void, someone else will. So please, exert some pressure, write a letter expressing your opinion on what you want your magazine to be.

Collectively, we can exert a tremendous force to determine the future of the RSTS PROFES-SIONAL. Let's make it something we can all be proud to be a part of.

In closing, Carl and Dave, thanks for having the insight to fill the need for a viable communications medium between RSTS users. Keep up the good work of disseminating information to the masses.

Sincerely, Steven L. Edwards Vice President, Technical Services Software Techniques, Inc.

Dear Steve: We have always had a policy about 'commercial' articles. It is: "Your article should (must) teach as well as sell!"

Sometimes, they err on the selling side. I have rejected a few.

Yes, this is your magazine. Carl and I have repeated this statement till we are hoarse.

I cannot write more than one quality article a year

If you guys (not you, Steve, but the rest) want your magazine to be the journal it ought to be, then you help by getting that article you always wanted to write WRITTEN!

I promise to publish it for you and pay for the privilege.

Meanwhile, the policy stated above stands. The PRO is a commercial venture. We sell advertising. Our page count = F (ad count).

I will promise to be more picky with the 'com-

mercial' articles. As long as I have pages to fill, I will always give preference to non-commercial material. As long as our policy is in force, I will print 'commercial' pieces that teach.

I really appreciate your letter. I hope every reader gets its message!

Thanks for your help.

— Dave

I would like to inform your readers that the articles entitled 'CCLMAN' [June 1982, v.4,#3, p.18] and 'CB' (this issue, p.8) are fully functional and debugged programs.

Updated sources of these programs incorporating many enhancements are available from me directly by sending a blank tape and \$15.00 FOR BOTH PROGRAMS.

The enhancements made are as follows:

CCLMAN — V1.3 — User may now leave line number portion of CCL command off which will default to a value of '0', which is chain to top of program.

CP — V1.8 — a) A command / CLOSE, / OPEN is now implemented which will allow privileged users to open and close CB from non-privileged users.

b) A command /XEQ is now implemented allowing a background job to be executed while in CB. Example: T19 /XEQ SY/A

This will display to the user a SYSTAT of active jobs WHILE STILL EXECUTING CB!!!

c) A command / CALL is now implemented allowing a set message to be set to a specific terminal.

d) A CB help file is now available

— and many others —

Thank you for publishing this letter.

Philip Hunt Columbus, Ohio

At one of the RSTS sessions during the Atlanta US Spring DECUS symposium, a user made a very good suggestion for an enhancement to the error handling package. As DEC seemed unenthusiastic, and I also share the same concern, I decided to try to do it myself. This note shares my success with any other interested RSTS users.

Paul DeBenedictis, Systems Manager Educational Communications Upstate Medical Center, Syracuse, NY

See Paul's article "Selective Clearing of Logged Errors" in this issue, p.34.

This is in regard to Joe Doyle's article on the DECWORD/DP freebie [v.4, #2, April 1982, p.11]. The only hardware I expected in the package was the keyboard. If you look at the line feed and backslash key tops carefully, you will see that they are molded for the rows on which they are placed. Someone did not just manage to do it wrong — they planned it that way. Also, the cardboard keyboard was the same way.

I found no indication that the advanced video option was coming — that was a surprise. The switch settings seemed to resemble those already set, by one interpretation of the positions, so I did not bother them. I followed the instructions exactly, replacing an old AVO as Joe did. But mine worked fine. This AVO also somehow switches the meaning of the linefeed and backslash keys, so the keyboard, as shipped, is right!

I gave my old AVO to a friend in another depart-

ment, who could not make it work. Two of the new standoffs broke, so perhaps a good connection was not made.

The software was intended to interface with the main DECWORD menu, and apparently just exists when the menu is not there to chain to. Therefore, it does not reset terminal characteristics. Include on its logical device a program WPSMEN which resets the desired terminal characteristics. WPSCBT will chain to it at line 30010.

A word processing specialist here went through CBT as an evaluation for a replacement or upgrade for a Lanier system. She did not like the Ruler in the WPS system, as it seemed too difficult to change (call it up, space out to the points to change, insert or delete the character(s), store the new Ruler, activate it and return to what you were doing). Anyone have experience with this?

Samuel B. Belk Allied-General Nuclear Services Barnwell, SC

Just a few notes on the response to my article on DEC WORD. Thanks for all the cards, letters and phone calls. It has been great exchanging ideas. One of the more interesting occurences had us trading our DEC Word keypad to a DCB Word user for a normal VT100 keypad. This was then enhanced with the WORD-11 VT100 keycaps that Richard Marino of DPD sent me. (Yes, VT100 keycaps are now available.)

Special thanks must go to Steve S. of Washington, Pa. (Because of my poor phone manners I never did get a spelling of his last name. — Sorry Steve.) Steve is an ex-pinball machine repairman who now is into computers. He said he experienced the same graphic display on his screen that I did when he tried his AVO option. He applied past experience and took a careful look at the board. He noticed that the plastic supports were longer on the new AVO than on another AVO he had. He took off the supports, mounted the AVO, and it worked. I tried the idea with my AVO. It worked. Thanks Steve!

Joe [Doyle]

I currently program a PDP 11/44 with 1.25 Mbytes of memory and I am keen to experiment with the data caching facility with a view to keeping large data files memory resident. Is there any RSTS buff out there who can tell me,

- a) the algorithm used for searching Xbuf?
- b) whether a file marked for replacement is only replaced when all other Xbuf is filled?
- c) will such a marked file be found if requested before it is physically overwritten?

I will be pleased to hear from anyone with data caching experience.

Yours hopefully, John Mulholland "Norend" Dunmore Village, by Airth

Stirlingshire, Scotland P.S. Great magazine, but how about a jobs section!!

As a newcomer to RSTS I found many of the RSTS sessions at the 1982 Spring DECUS, in Atlanta, very helpful. Having been a user of both Digital hardware and other software systems for a number of years has helped a great deal in the transfer to RSTS. However, I find the area that is taking the longest to master is the internals of ...continued on page 79

### BEFORE you add memory (or anything else) to increase system performance



#### You should add DOPTER!

DOPTER is an easy to use RSTS/E disk copying program which

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#### For More Information

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System Performance House, Inc.

## CB — CITIZENS BAND RADIO EMULATOR VERSION 01.03

By Philip Hunt, O.L.F.B.P., 6400 E. Broad Street, Columbus, Ohio 43213

#### Description:

CB is a very versatile program running in 2K of user space that will allow any users on the system to communicate with each other as they would on a citizen's band radio.

A 'Talk' channel is used to send messages to anyone currently 'Monitoring' that channel. A user may monitor any or all of the 40 'channels' available, but may only talk on one.

Commands are defined to allow the user to change talk channels, monitor and unmonitor channels, list users by user or by channel, set 'Restricted' messages that will only be received if the sender and receiver (or receivers) have the same password set, etc.

#### Program Entry:

When the user enters the program, he must enter a 12 character 'handle' that will be transmitted everytime he sends a message. The prompt for sending messages is a 'T' with the channel number you are currently talking on included, example: 'T19>' would mean you are currently talking on channel #19. If an extra bracket ('>') is included in the prompt, it would indicate that the user has a password set for his messages and that only people with the same password will receive them. For entry by CCL, see CCL/LOGGED-OUT formats.

As noticed, anything not beginning with a '/' is sent to other users on the users current TALK channel. The slash indicates a command entry.

Note: If a blank line is entered i.e.; a carriage return is struck with no items on the line AT ALL, CB will print its' version number and return for more commands/messages.

#### Commands:

#### /TALK Chnl#

This command will change the channel the user is currently transmitting on. When the user first enters CB, the channel will be set to 19. Valid channels are 01-40; any other entry will give an error message. The channel that is set for Talk will cause all messages sent to be received by any user currently monitoring that channel unless a password has been set (See /RESTRICT). Note: when changing Talk channels, the previously set Talk channel will still be marked for monitor.

#### /MONITOR Chnl#,Chnl#,...,Chnl#

This command will allow the user to monitor multiple channels. When the user first signs into CB, he will only be monitoring channel 19. Valid channels are 01-40; any other entry will cause an error message for that channel, but all other entries on the command line will be processed.

If the channel number is entered as negative, then the channel specified will be 'UNMONITORED'. Note: You cannot unmonitor your current TALK channel.

#### /RESTRICT nnnnnn

Restrict allows a user to set a password up to 6 characters long. When a password is set, the user's messages will only be sent to other users monitoring the channel who have the same password set. This allows private messages to be sent. Note: Privileged users can obtain Restrict passwords (See /List) and can receive Restrict messages (See /Spy). Messages with this set will have the word 'SECRET' appended to the message (See Message Formats).

#### /BROADCAST [Chnl#] Message Text

This command will allow a user to send a message to any valid channel ignoring the user's password protection. If channel is specified, then the message will be sent to that channel; otherwise, the message will go to your current Talk channel. This command is useful if you would like to send one message to everyone on your channel, but want to keep most of your messages 'Private'.

#### /CALL Kb#

This command will send a message to the specified terminal currently NOT running CB, to request that he do run CB. The message sent is of the form:

\*\*CB-User: Handle - Please enter CB on Channel #n\*\*

NOTE: If the specified job is already in CB, an error message is generated and the message is not sent.

#### /TIME

This command will display the current date and time. This is useful when using CB for an extended period of time.

#### /KB

KB will toggle a bit in the user flag word allowing him to receive KB numbers when a message is received by him (See Message Formats). The default for this is 'OFF'.

#### /PPN

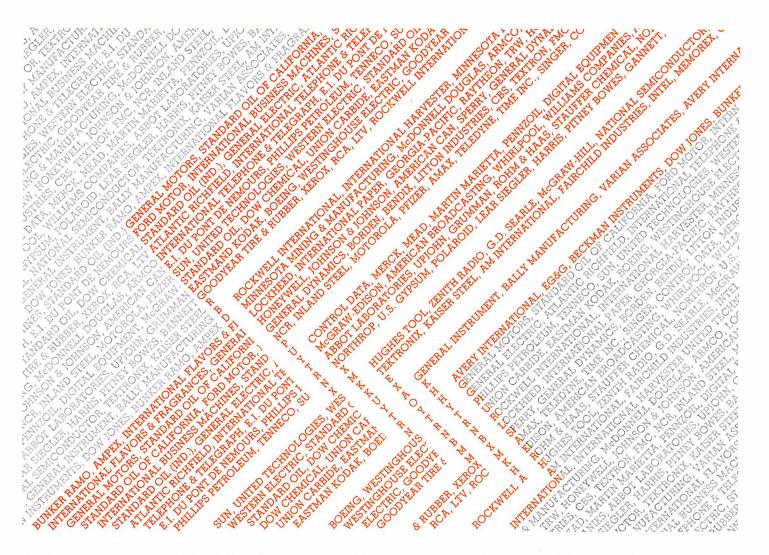
PPN will toggle a bit in the user flag word allowing him to receive user PPN numbers when a message is received by him (See Message Formats). The default for this is 'OFF'.

#### /JOB

JOB will toggle a bit in the user flag word allowing him to recieve JOB numbers when a message is received by him (See Message Formats). The default for this is 'OFF'.

#### /UPPER

Toggles the user flag word informing CB to start



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or stop translate all MESSAGES (sent or received) to UPPER case. The default for this is 'OFF'.

#### /LIST [Job#]

List all users currently using CB. A list of their TALK channel, channels they are monitoring, their 'Handles', Job #, KB #, User PPN and JOB attributes (See Attributes) are listed. If you are currently privileged, then any currently set Restrict password is also printed. Note: If Job# is entered, then the listing will be only for that Job#.

#### /WATCH [Chnl#]

This command will give a list of users currently monitoring a channel. Their KB#, Job #, Handles and Job attributes are printed. If Chnl# is not entered, then the list will be entered for the current Talk channel. Note: If /Watch is entered as a CCL command, then a Chnl# MUST be specified (See CCL/LOGGED-OUT formats).

#### /HELP

Prints a Help message for CB. It is very similar to the reference card in format.

#### /EXIT (†Z, †C)

Exit CB. Note: †Z and †C act as if an /EXIT command has been entered.

#### \* \* Privileged ONLY commands: \* \*

These commands, when executed by a non-privileged user, will generate an error message, and NOT be executed.

#### /SPY

Toggles a bit in the user job attributes that allows a privileged user to receive Restrict messages even though he might have no password or a different password set. The default is 'OFF'. A message received by /SPY being set will have '+SPY+' appended to it.

#### /CLEAR Job#

Clear the job specified from CB and kill the job. A check is made to be sure the job specified is in CB. A message is sent to the JOB (Unless detached) informing him that his job has been killed, and all users receive the 'Leaving CB' message with the phrase '(Involuntarily)' appended to it (See Message Formats). THIS COMMAND SHOULD BE USED TO KILL A CB JOB, NOT THE 'UTILTY' COMMAND OR THE CB LIBRARY WILL BECOME CORRUPTED!!!

#### /DETACH

Detach from current Keyboard. This allows a user to change keyboards or leave CB for a while without having to exit and then enter CB again.

#### /ALL text

Send a message to ALL CB users on all channels, the message part usually displayed as 'Cxx' or 'Bxx' indicating channel number is replaced by the string 'OPR'

#### Attributes:

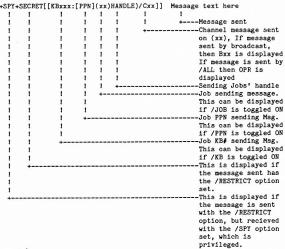
Job attributes associate special processing modes with a specific job. Special modes cause different forms of the broadcast header to be displayed upon receiving a message. The mode or attributes set cause different information to be displayed (See Message Formats).

#### Message Formats:

Messages received are displayed in different formats depending on the Job attributes set. See below for description:

#### Message Formats:

Messages recieved are displayed in different formats depending on the Job attributes set. See below for description:



#### System Messages

CB system messages are also sent when a user enters or exits CB. The format for CB system messages is:

CB data requests are not preceded by the '\*\*' characters. The format for CB data requests is:

< Request message > ? — Answer in response—

A complete list of possible messages/requests follows: %Initializing CBLIB Resident Library

This is an informative message that the resident common library has just been loaded and is being initialized to empty by the first user requesting CB. It will also occur if the internal /CLR option when Handle requested is invoked.

#### What is your 'Handle'?

CB is requesting the 12 character phrase to call your CB job when sending a message.

#### %%DEBUG MODE ENABLED

The internal option /DBG has been invoked. This will allow a programmer to see the internal workings of CB for debug purposes.

#### \* \* CB-Vx.xx\* \*

If in talk mode, and a carriage return only is entered, CB will display its version number x.xx where this represents a number.

#### \* \* Now talking on channel xx

A /TALK command has been executed and all future transmissions will occur on channel xx until another /TALK command is executed.

#### \* \* All channels except xx reset\* \*

A '/MON -' has been executed, resetting all channels currently being monitored. The channel xx is your current Talk channel and has not been reset.

\*\*Now monitoring channels:

xx,yy,zz...,nn



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When a /MONITOR command is executed, a display of all channels currently being monitored is shown.

No users on this channel

A /WATCH command has been executed in which no users are currently using the channel specified.

No users

A /LIST command has been executed, and there currently are no users on CB.

Really CLEAR job # xx?

A /CLEAR command has been executed, and the specified job 'xx' is currently using CB. This is a request to verify that you will kill that job.

/CLEAR aborted!

A /CLEAR has been executed, and anything but 'Y' has been entered to the verification request. The specified job has NOT been killed.

\* \*!!Your Job has just been KILLED by the operator!! \* \* A /CLEAR has been executed by an operator; kill this user's job.

\* \* Job # xx has been CLEARed \* \*

A /CLEAR has been executed and job xx has been cleared from CB and killed off the system.

\* \* CB—User: HANDLE—Please enter CB on Channel # xx\*\*

A /CALL command has been executed by a CB user transmitting under the name 'HANDLE' and currently transmitting on channel # xx. That user would like the user on the receiving job to enter CB and talk to him.

\* \* Request sent \* \*

A /CALL has been executed successfully and a message has been sent to the specified keyboard.

\* \* KB numbers will be printed \* \*

The /KB toggle has been set allowing a user to receive KB numbers on messages transmitted.

\* \* KB numbers will not be printed \* \* The /KB toggle has been reset.

\* \*SPY mode in enabled \* \*

The privileged /SPY has been set. This allows messages normally requiring a /RESTRICT password to be transmitted to this operator job even though no /RESTRICT is set for the operator.

\* \*SPY mode is disabled \* \*

The privileged /SPY has been reset.

\* \* PPN numbers will be printed \* \*

The /PPN toggle has been set allowing a user to receive PPN numbers on messages transmitted.

\* \* PPN numbers will not be printed \* \*

The /PPN toggle has been reset.

\* \* UPPER CASE only will be printed \* \*

The /UPPER toggle has been set. This allows a given user to send and receive in only UPPER CASE. Normal system messages though are not translated.

\* \* UPPER/LOWER case will be printed \* \* The /UPPER toggle has been reset.

\* \*JOB numbers will be printed \* \*

The /JOB toggle has been set, allowing a user to receive job numbers along with messages.

\* \*JOB numbers will not be printed \* \*

The /JOB toggle has been reset.

\* \* Your Password has been set \* \* A /RESTRICT command with a specified password has been successfully executed.

\* \* Password has been turned off\* \*

A /RESTRICT with no password has been executed, resetting any previously specified password.

\* \* Detaching from terminal \* \*

A privileged /DETACH has been executed, detaching a CB job from its' terminal.

\* \* dd-mmm-yy at hh:mm xm \* \*

A /TIME has been executed showing the current Date (DD-MMM-YY) and Time (HH:MM xM).

#### **Error Messages**

CB error messages are printed when an error is encountered in the execution of a CB command. Their format is as follows:

\* \* ??? < Error Message Text?? \* \*

A complete list of possible error messages follows:

\* \* ???You may not talk LOGGED-OUT?? \* \*

CB has been entered as a logged out command with a specified Handle. A logged-out user may only execute certain commands, but may not talk through Cb unless they login first.

\* \*??Invalid [CCL] command, Type '/HELP'??\* \*

An illegal command has been entered. Certain valid commands are invalid during CCL entry and these will be flagged with the 'CCL' specified in the message.

\* \*??Please enter up to 12 characters??\* \*

This message will occur if you enter more than 12 characters for your user Handle.

\* \*??That 'Handle' is IN-USE by Job #xx—Try again??\* \* A user entered a valid Handle to CB, but it is in use currently by job xx.

\* \*??!llegal TALK channel??\* \*

A bad channel number was entered on a /TALK command, i.e.; /TALK 42 or /TALK C.

\* \*??Illegal Channel??\* \*

A bad channel number was entered on a /BROAD-CAST command.

\* \* ???Already monitoring channel xx?? \* \*

A /MONITOR xx command was executed, but the user is already monitoring the channel xx specified.

\* \* ??Not monitoring channel xx??\* \*

A /MONITOR -xx command was executing trying to UNMONITOR the channel xx, but the user is not currently monitoring that channel.

\* \* ??Illegal MONITOR channel 'xx'?? \* \*

A /MONITOR xx command was executed with xx being a bad channel number, i.e. /MONITOR 42 or /MONITOR C.

\* \* ???Cannot UNMONITOR your TALK channel?? \* \*

A /MONITOR command was entered with the users current TALK channel specififed for UN-MONITOR. This is illegal.

\* \*??Illegal channel specified??\* \*

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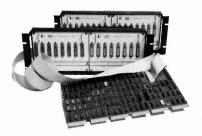
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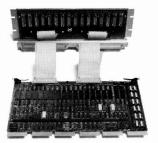
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A /WATCH command was executed with a bad channel number specified.

\* \*??Illegal user number specified??\* \*

A /LIST xx was specified with an illegal job number xx specified.

\* \* ??Illegal Job number?? \* \*

A /CLEAR command was entered with a bad job number, i.e / CLEAR 67 or / CLEAR C. Job numbers may only be 1-63.

\* \* ??Job specified not in CB?? \* \*

A /CLEAR was entered with as valid job number, but that job is currently not using CB, therefore, it cannot be CLEARED.

\* \*??Bad KB number specified??\* \*

A /CALL xx command was entered with a bad Keyboard number, it could be out of range 0-127 or it might not exist on the system.

\* \* ??KB specified already in CB??\* \*

A /CALL was entered with a valid keyboard number, but that keyboard is already using CB, so a /CALL would not be appropriate.

\* \*??Nothing to send??\* \*

A /ALL command was executed with no message specified to send to all users.

\* \*??Password too long??\* \*

A /RESTRICT password may only be 6 characters long. The password must be shortened and reentered.

\* \*??Privileged operation??\* \*

The specified command is legal but is a privileged command and the current user is not privileged. ([1, \*]).

#### ??FNOPEN.POSITION—NO OPENINGS

A fatal system error has occured, CB tries to recover by executing a /EXIT but recovery might not be complete. This error should never occur.

?CB—FATAL ERROR -< Error Text> AT xxxxx

A fatal system error has occurred, CB tries to recover by executing a /EXIT but recovery might not be complete. This error should never occur.

#### Sign-On/Off Messages

When a new user signs on to CB, all current CB users receive a message informing them of that fact. The CB signon messages appear as follows:

\* \* New User—Job #xx (HANDLE) has signed on to CB\* \*

= The new user's job number Where: xx Where: HANDLE = The new user's Handle

When a CB user signs off of CB, all current CB users

receive a message informing them a user has left CB. The CB sign-off message appears as follows:

\* \* User #xx (HANDLE) is [leaving] CB [(Involuntarily)] \* \* [ABORTING from]

> = The user's job number Where: xx

Where: HANDLE = The user's Handle

The message will contain either 'leaving' or 'ABORTING from' depending on the conditions of the user's exit. The 'ABORTING from' means a system error has occurred in that user's CB job and the library 'CBLIB' may or may not be corrupt. The 'ABORTING

from' message should never occur and it has not occurred since release V0.01. Due to improved recovery, even if it occurs, there is very little chance that it will affect any user but the one listed.

The '(Involuntarily)' part is only transmitted if the user is being KILLed by the operator with the /CLEAR command.

When the /CALL command is used, the following message is sent to the keyboard specified:

\* \*CB-User: HANDLE - Please enter CB on Channel # yy \* \* Where: HANDLE = The handle of the user using /CALL

> = The channel that user is curуу rently Transmitting on.

#### **CCL/LOGGED-OUT Formats:**

CB can be set up by the operator to be called by CCL for certain functions (see Installation for installation instructions). Commands that are valid through CCL are:

/LIST - list jobs on CCL

/WATCH n - Watch jobs on a certain channel. Note: For CCL, channel number MUST be specified.

- Display help message /HELP

/CLEAR xx - PRIV—Clear a job from CB, user must be privileged to do this.

- Display current Date/Time /TIME

CB may also be entered with the HANDLE in place of the command. Example:

CB LONESTAR

will enter you into CB with the handle set to 'LONESTAR'.

Note: If CB is set up to be entered logged-out (see Installation), all CCL commands are valid EXCEPT entering CB with a 'handle' set, which gives an error message.

#### Installation:

CB is designed to be executed by many users at a time. Therefore, the following method will allow CB to use the least amount of user memory possible, while sharing the code/ data areas that are non-volatile.

CB requires certain options be present in the RSTS environment to execute:

A) Resident library support be present

B) RSX monitor emulation be present in the monitor

If either of these options is not present, then CB will not run correctly. NONE OF THE FOLLOWING STEPS SHOULD GENERATE AN ERROR, IF THEY DO, A PROBLEM HAS DEVELOPED THAT MUST BE SOLVED BEFORE PRO-CEEDING!!!

1) Obtain the following files:

CB.B2S, CB.CMP, CB.CMD, CBLIB.MAC, ST2NM.MAC

If the command files are not available, the following files may be entered under the names specified:

\* \* CB.CMP \* \* \* \* CB.CMD\* \* CB,CB = CB,ST2NM,LB:BP2COMCB/MU,CB = CB,ST2NM,LB:BP2COM/LB TASK = CBBAD TASK = ..CB.. RESLIB = LB:CBLIB/RW UNITS = 12 11 UNITS = 12

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## HAMILION PRENTALS

Pearl Court, Allendale, N.J. 07401 415 Horner Ave., Toronto, M8W4W3 2) Macro assemble ST2NM:

RUN \$MAC MAC>ST2NM=ST2NM MAC>†Z

3) Compile CB using Basic-Plus 2:

RUN \$BASIC2 OLD CB.B2S COM/OBJ/LINE/CHAIN

4) TKB the resulting file:

TKB @CB.CMP

- 5) Look at the Task Builder map (CB.MAP) for the section marked BP2OTS, all names under this section will be built into CBLIB, the communications library. This causes all the BP2 code segments to be shareable. The names you find under the section above will be used later. SAVE THE MAP ON HARD-COPY!!
- 6) Macro assemble the communications library:

RUN \$MAC MAC>CBLIB = CBLIB MAC>1Z

Enter a file named CBLIB.CMD consisting of the following:

CBLIB/-HD/PI,CBLIB,CBLIB = CBLIB LB:BP2COM/LB:?????? LB:BP2COM/LB:?????? LB:BP2COM/LB:??????

" LB:BP2COM/LB:RQLCB LB:BP2COM/LB:SAVRG

/ PAR = CBLIB:060000:110000 STACK = 0 Note: These ??????? are to be replaced by the names found in step 05 above. There are about 60 of them all starting with '\$' EXCEPT the last TWO.

NOTE: These MUST be entered in the same order as found on your CB.MAP from Step 05

8) TKB the library using the edited file from step 07 with the following:

TKB @CBLIB.CMD

Run RESSTB which is distributed on your BP2 installation tape.

RUN RESSTB

ENTER FILE SPECIFICATION FOR RESIDENT LIBRARY? CBLIB ENTER 3 CHARACTER CCL/MCR NAME? BP2
THE PSECT FOR YOUR LIBRARY IS BASOTS.

Note: Always enter BP2 whether or not that is the CCL name for your BP2 compilier.

10) Run MAKSIL to turn it into a resident library:

RIIN SMAKSII.

Resident Library name ? CBLIB

Task-Built Resident Library input file <CBLIB.TSK> ? <CR>
Include symbol table (Yes/No) < Yes>? <CR>
Symbol table input file <CBLIB.STB>? <CR>
Resident Library output file <CBLIB.LIB> ? <CR>
CBLIB. huilt in XX K-words, YYY symbols in directory

CBLIB.TSK renamed to CBLIB.TSK < 40 >

Note: XX above is 10 or 11 depending on BP2 compiler used, YYY should be a relatively large number (100-800).

11) Move CBLIB.LIB, CBLIB.STB, CBLIB.OBJ to LB:

PIP LB: < 40 > = CBLIB.OBJ,CBLIB.LIB,CBLIB.STB

12) Add library with Utilty:

UT ADD LIBRARY LB:CBLIB < 0 > /ADDR:xxx/RW/STAY

(xxx = memory address to located library, it is site-dependent. The <0> allows writing to the library).

Note: The /RW is important as it allows the communication between jobs by specifying the library is Read/Write and not Readonly.

If the library is not made permanent with the /STAY shown above, when there are no CB users and your system starts swapping, CBLIB will leave memory, causing the first new CB user to get a message stating the library is being re-initialized. This will not hurt anything, but may be annoying.

If the library is not ADDed with a protection code of <0>, then PROTECTION VIOLATION errors will occur when running CB.

13) Task build to CB program again using CB.CMD this time:

TKB @CB.CMD

14) Run MAKSIL to turn it into a resident library:

RUN \$MAKSII

Resident Library name ? CBCODE

Task-Built Resident Library input file < CBLIB.TSK> ? CB.TSK

Include symbol table (Yes/No) < Yes>? NO

Resident Library output file < CB.LIB> ? CB.TSK

CBCODE built in 2 K-words, 0 symbols in directory CB.TSK renamed to CB.TSK < 104 >

15) Move CB.TSK to execution account: Move CBCODE.LIB TO LB:

> PIP LB:=CBCODE.LIB PIP [PPN] < 232 > = CB.TSK

Note: [PPN] is the project, programmer that the task will execute from. Program MUST be set privileged (i.e. <232>)!!

FILES: CB.B2S,CB.OBJ,ST2NM.MAC,ST2NM.OBJ CB.CMP,CB.CMD

may now be removed if space is needed.

16) Add the second resident library CBCODE:

UT ADD LIBRARY LB:CBCODE/ADDR:xxx

(xxx = memory address to located library, it is site-dependent).

17) \*\*OPTIONAL\*\*

Add CCL to allow CB to run direct (See CCL Format):

UT ADD CCL CB-=[PPN]CB.TSK;PRIV 30000 Note: [PPN] is from step 15 above.

18) \*\*OPTIONAL\*\*

CB can also be entered from LOGIN by entering a statement into LOGIN.BAS and recompiling it into \$. The statement follows:

32256 DATA CB, "[PPN]CB",2, 4

This allows all commands that CCL entry allows except entry to CB with a specified handle.

Note: [PPN] is from step 15 above.

19) Execute CB by CCL or otherwise. A SYSTAT of the job should show "..CB.." as the jobname. If 'CB' or 'CBBAD' is the jobname, 1 or more installation steps were skipped. INSTALL CB again or it will not run correctly!!

NOTE: In the RSTS/E V7.1 environment, a CB user's terminal MUST have 'NO GAG' set or CB will not send any messages to his terminal.

#### Sample Run of CB:

A sample run of CB demonstrating most commands in regular as well as CCL formats follows:

# UILOG GOES WITH LSI-11, PDP-11, VAX-11\*

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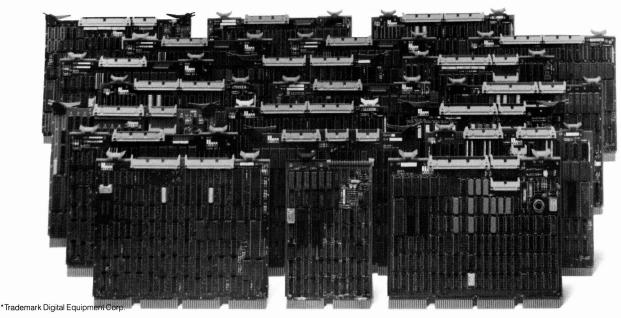
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DISTRIBUTED **NUMBER 1 FOR DEC-11** 



RSTSPROFESSIONALRSTSPROFES

```
Resident Libraries:
Name Prot
RMSRES < 42>
                                          Users
                                                    Comments
                      0,1
0,1
1,11
1,11
                                                    Perm, Addr:873
Perm, Addr:853
ED2
         < 42>
                                  20K
CBCODE < 42>
                                   8K
                                                    Perm, Addr:827
Perm, Addr:835, R/W
BASICS
                                                    Perm. Addr:845
CB - V01.03 RSTS V7.1-11 C OLFBP 11/70
What is your 'Handle' ? TEST PERSON
Current CB User list:
#24 [1,10] P2J20 TEST PERSON Talk: 19 Att: None
T19>
**New User - Job #15 (PHIL) has signed on to CB**
/LI
Current CB User list:
#15 [1,10]
               KB020: PHIL
                                        Talk: 19 Att: None
                Mon: 19
P2J20 TEST PERSON Talk: 19 Att: None
#24 [1,10]
T19>
[[PHIL/C19]] HELLO TEST PERSON
T19>HELLO PHIL
T19>/WA 19
Users on Channel # 19
                     P2J20
                               TEST PERSON
PHIL
                                                      Monitor, Talk
Monitor, Talk
#24 [1,10]
#15 [1,10]
                     KB020:
T19>/JO
JOB numbers will be printed
T19>/KB
KB numbers will be printed
T19>/PP
PPN numbers will be printed
[[KB020:[1,10](15)PHIL/C19]] HOW DOES THIS REAF
T19>LETS GO TO CHANNEL 23
[[KB020:[1,10](15)PHIL/C19]] OK, LETS
[[KB020:[1,10](15)PHIL/C19]] GO
T19>/TALK 23
##Now talking on channel 23
T23>/WA 23
Users on Channel # 23
#24 [1,10]
                     P2J20
                               TEST PERSON
                                                      Monitor, Talk
T23>/WATCH 19
Users on Channel # 19
                                TEST PERSON
     [1,10]
[1,10]
                     KB020: PHIL
                                                      Monitor, Talk
T23>/TIME
**16-Mar-82 at 12:33 PM**
T23>
**CB - V01.03**
T23>/WA
Users on Channel # 23
    [1,10]
[1,10]
                     P2J20
KB020:
                                                      Monitor, Talk
Monitor, Talk
                                TEST PERSON
#15
T23>
[[KB020:[1,10](15)PHIL/C23]] IM AM HERE!!!!!!
T23>/MON
**Now monitoring channels:
19 23
T23>/MON -19
 **Now monitoring channels:
T23>LETS GET SECRET USING YOUR LAST NAME
T23>/RES PLOMPR
[[KB020:[1,10](15)PHIL/C23]] OK, SOUNDS GOOD
T23>>/WA 23
Users on Channel # 23
                                                      Monitor, Talk, PSWD
Monitor, Talk, PSWD
                                TEST PERSON
T23>>I AM DONE
T23>> SECRET[[KB020:[1,10](15)PHIL/C23]] DO YOU READ ME???????????????
T23>>/WA 19
                                                      Monitor
                     KB020: PHIL
#15 [1.10]
T23>>/LIST
Current CB User list:
                KB020: PHII.
#15 [1,10]
                                        Talk: 23 Att: PSWD
                Mon: 19 23
P2J20 TEST PERSON Talk: 23 Att: JOB KB PPN PSWD
#24 [1,10]
```

Mon: 23

```
T23>> SECRET[[KB020:[1,10](15)PHIL/C23]] I AM LEAVING SEE YOU LATER
T23>>OK, BYE
T23>>
##User #15 (PHIL) is leaving CB##
T23>>/EX
CB/LI
Current CB User list:
No users
Ready
CB/G **Invalid CCL command, Type '/HELP'**
Ready
Users on Channel # 19
No Users on this channel
Ready
CB/CL 19
##??Specified job not in CB??**
T19>/LI
Current CB User list:
#24 [1,10]
              P2J20 PHIL2
                                    Talk: 19 Att: None
                 Mon: 19
T19>/EX
Ready
```

#### Questions or comments:

PERSON

PERSON

Questions or comments about CB? You may write or call directly to the following address: Philip Hunt, O.L.F.B.P., 6400 E. Broad Street, Columbus, Ohio 43213, (614) 863-3473.

A tape containing all command files, source code and documentation is available, send a tape and \$15.00 to the above address. . . . continued on page 20

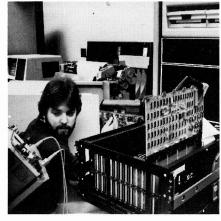
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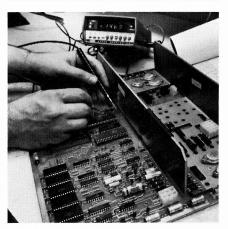
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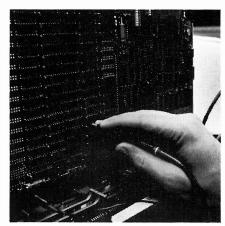


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		[4,8] CI	B.B2S		! JBNO≸ ! JBNUM≴	- Utility Variable &
### ### ### ### ### ### ### ### ### ##	10	1		£		
AUTOR   FRIED TOWN (1987)	10	Ī	4	4	! JOB.OPT%	- /JOB option bits values &
DOI: 100:00   1				x <b>L</b>		- /LIST formatted kb# hold &
Calles on year on NETTH system to connectate with the connectate				t.		
Called any war as a MENUT cycle to commission with a way after use on the same appear thereph as analytics of a way after use on the same appear thereph as analytics of a way after use on the same appear thereph as analytics of a way after use on the same appear thereph as analytics of a way after use on the same appear thereph as analytics of a way after use on the same appear there are analytically after a way after use on the same appear the same analytic and a way after use of the same appear to				Ł	I KBN≸	- FNKB.NUMBER\$ kb# decoded &
The control of the		!		& &		7/5/
any other case on the sease addition through an emulation of a contract of the contract of t		Ī		L.	! KILL.JOB\$	- /CLEAR kill job sys revr &
A		! CB allows any user on a RSTS. ! any other user on the same s	/E system to communicate with a ystem through an emulation of a	& &		
User matching the now elaboral. Builties users may be for construction as will peaked mode to an early refer to the construction of the peaked mode to an early refer to the peaked mode to an early refer to the peaked mode to an early refer to the peaked mode		! a citizens' band radio. Eacl	h user has a 'HANDLE' that is	<u>.</u>	I MSG\$	- FNBROADCAST\$ - msg to send &
Corporationation to well special modes to send/receive a company of the company		! user monitoring the same char	nnel. Multiple users may be	&		
Soly upper case, and message only to people knowing a company of the people knowing a province of the people knowing a large semant of a people knowing a large semant of a people knowing a		! monitoring any or all CB char	nnels. There are 40 channels ecial modes to send/recieve	& &		
State   PRINCE   Column   PRINCE   Column   PRINCE   Column   PRINCE   Column   Co		! only upper case, send message	es only to people knowing a	<b>L</b>	OTHER.USERS	- /CLEAR - Position of a usr &
There are special options that allow a privileged user to a private out, step   PRESS   PRES		! changeable password, etc.		s Ł		
All location on the content of the		! There are special options the	at allow a privileged user to	<u>.</u>	1 PPN\$	- FNBROADCAST\$ ppn formatted &
CB uses 2 resident libraries and uses only ZK of user   space to allow namy CB jobs from whise a large smooth of a second.   SERUICIT.			a Cb Job, send messages to	k k		
space to allow namy CB jobs from using a large amount of a		! CP ween 2 medidant libraries	and uses only 2K of user	t t	1 PS\$	- Utility Variable &
SBD   1005   Sand ang STS call rever   A   SBD   1005   Sand ang STS call rever   A   SBD   1005   SBD   S				<u>.</u>		- /RESTRICT opt bits value &
		! memory.	15 -	& &		
10		1======================================	=======================================	&	! SND.HDR\$	- FNBROADCAST\$ hdr build var &
MODIFICATION RISTORY	15	1	,	&		
TALES					1 ST\$(64)	- CHANNEL\$() array decoder &
Date						- Current usr talk chnl hold &
Date	.,			ı.		
O30628 V01.00 p)	16			&		- User attribute flag hold &
030562 vol.00 plb				& &		
1		1 030282 v01.00a pjh	Put BP2 threads into CBLIB.		! USER.POS%	- FNUSER.POS% utility var &
Pix CLEAR for Will on A						
Add ST2MM macro code for compared to the provision to speed up.   VERSIONS   C. O'S Persion number   A		1	Fix /CLEAR for kill on		1 USR%	- Utility Hold Variable &
033082 vol.03 plb HST Processional Bloace		!				
XX		1			! VERSION\$	
VARIABLE   DEFINITIONS		1		&		- Utility Index Variable &
		1======================================	=======================================	&		
21   ANGS	20	1				
1		! VARIABLE DE			! !===================================	& & ===================================
ANN_USERS\$		i		<del></del>	•	
ANY_USERS\$	21	1			1	
ANGS   Def argument Utility var &   ARGIS   Def argument Utility var &   SI   FNBROADCAST\$()   Broadcast to a channel func &   BGST.CHHL\$   Def argument Utility var &   SI   FNBROADCAST\$()   Display 2-digit no, ldng Os &   BGST.TFE\$   PNBRODCAST Typ:/P,/C, /OPR &   FNGET.CHAN\$()   Display 2-digit no, ldng Os &   BGST.TFE\$   PNBRODCAST Typ:/P,/C, /OPR &   FNGET.CHAN\$()   Get a chall \$ to int array &   FNBROCAST Sup:/P,/C, /OPR &   FNGET.CHAN\$()   Get a chall \$ to int array &   FNBROCAST sup:/P,/C, /OPR &   FNGET.CHAN\$()   Get a chall \$ to int array &   FNBROCAST superior   SPACE   S			- /		! USER-DEFINE	
ABG1\$					1	
BCST.CHBL\$					! FNBROADCAST%( )	- Broadcast to a channel func &
BFILAGY		! BCST.CHNL\$	- FNBRODCAST Msg channel hld		f FNCHAN\$( )	
BHTS\$			- FNBRODCAST Typ:/b,/c, /OFR	α &		
CB.PASS\$		! BITS%				
CB_PRO%(63)			- Currently parsed password	&		
CB.PRO%(63)						
CHANNEL\$(40)=64 CHN\$ - Hold Utility Variable & - Channel \$ hold var as int\$ & 40 CHN\$ - Channel \$ hold var as int\$ & 40 CHN\$ - Channel \$ hold var as str\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$		1 CB.PROJ%(63)	- CBLIB - User project nos.	&		
CHHM\$					! !===================================	& & ===================================
CHM\$		! CHHN\$	- Hold Utility Variable	&		
CMS			- Channel # hold var as str\$	&	1	
CMD\$						
COMMON_INITS		! CMD\$	- User entered Command/Msg	&	1	_
CRLF\$					•	COMMON DATA AREA IN CBLIB.LIB &
CTRL C.TRAP\$ - SYS Call reciever \$ &   CHANNEL\$(40)=64 - 40 channel user table &   CTYP\$ - Command entered (2 lettrs) &   HANDLE\$(63)=12 - User Handle Table &   HANDLE\$(63)=12 - User Handle Table &   TALK.CHAN\$(63) - User project number Tbl &   CE.PROJ\$(63) - User job attributes T		! CRLF\$	- CR/LF Hold string	&	common.in.use%	- Lock common flag &
CTYP\$						
DEBUG\$ - DEBUG\$ - DEBUG on flag & ! CB.PROJ\$(63) - User project number Tbl & ! CB.PROC\$(63) - User job attributes Tbl & ! CB.PROC\$(63) - User job attrib		! CTYP\$			<pre>! HANDLE\$(63)=12</pre>	
DUMNY\$			- DEBUG on flag	&		
DUMMY\$						
EDIT.VAL%		1 DUMMY\$	- Hold Utility Variable	&		
EN%					!	å 
FIF2#(30)		! EN%	- /LIST command utility var	&		
! FLAG\$ - Hold Utility Variable & ! SUBPROGRAMS CALLED & & ! SUBPROGRAMS CALLED &						
HANDLE\$(63)=12		! FLAG%	- Hold Utility Variable	&	I SUBPROGRAMS	CALLED &
! HLD.ARG\$ - FNBROADCAST\$ hold msg\$ & 51 ! ! HNDL\$ - Accepted HANDLE\$ & ! ST2NM.MAC ! HNDL.ENTERED\$ - Handle entered as CCL flag & ! NM2ST - CHANGE NUM ARRAY(64) TO ST\$ VARIABLE & ! I\$ - Utility Variable & ! ST2NM - CHANGE ST\$ VARIABLE TO NUM ARRAY(64) & & ! I2\$ - Utility Variable & !			- CBLIB - User handles	&	1	
! HNDL_ENTERED\$ - Handle entered as CCL flag & ! NM2ST - CHANGE NUM ARRAY(64) TO ST\$ VARIABLE & ! ST2NM - CHANGE ST\$ VARIABLE TO NUM ARRAY(64) & ! I2\$ - Utility Variable & ! ST2NM - CHANGE ST\$ VARIABLE TO NUM ARRAY(64) & &		! HLD.ARG\$				
! I% - Utility Variable & ! ST2NM - CHANGE ST\$ VARIABLE TO NUM ARRAY(64) & ! I2% - Utility Variable & ! &		! HNDL.ENTERED%	- Handle entered as CCL flag	&	I NM2ST - CHANGE NUM A	RRAY(64) TO ST\$ VARIABLE &
						&

```
60
                      RESIDENT LIBRARIES
 61
                      CBLIB .LIB/RO - COMMON DATA AREA/BP2 THREADS & CBCODE.LIB/RW - OBJECT CODE EXECUTED BY BP2 THREADS &
            COMMON.IN.USES.
 100
            COMMON (CBLIST)
                                           COMMON.INITS
                                           CHANNEL$(40%)=64%,
HANDLE$(63%)=12%,
                                           TALK.CHAN$(63%),
                                           CB.PROJ$(63$),
                                          CB.PROG$(63$),
JOB.FLAGS$(63$)
                                           CB.PASS$(63%)=6%
            ICOMMON DATA AREA FORMAT:
COMMON.IN.USE# = WHETHER ANOTHER CB JOB
                                O=NO, ANY OTHER VALUE = YES

(COMMON IN USE=JOB# LOCKING
INIT* = WHETHER COMMON HAS BEEN
                     COMMON.INIT%
                                INTIALIZED, IF YES = 376% ELSE GARBAGE

$() = ALL CHANNELS, PACKED JOB

NUMBERS CURRENTLY MONITORING THIS CHAN

CHANNEL$(0) IS SPECIAL, IT CONTAINS
                     CHANNEL$()
                                ALL JOBS USING CB CURRENTLY, THIS IS USED FOR BROADCAST PURPOSES
                     HANDLE$() = ALL JOBS USING CB HANDLES
TALK.CHAN$() = ALL JOBS USING CB CURRENT
                                CHANNEL THEY ARE TALKING ON
                     CB.PROJ%()
                     CB.PROG%()
JOB.FLAGS%()
                                        = PPN OF CB USER
= CURRENT OPTIONS A CB USER HAS
                               SET, CURRENTLY DEFINED ARE:
BIT 0 ON = PRINT PPN WHEN
                                          GETTING A MESSAGE
BIT 1 ON = PRINT KB# WHEN
                                          GETTING A MESSAGE
BIT 2 ON = PRINT JOB WHEN
                                          GETTING A MESSAGE
BIT 3 ON = THIS JOB HAS A
                                          SECRET PASSWORD SET
BIT 4 ON = SPY BIT SET. A PRIV
                                                    USER MAY RCV MESSAGES
RESTRICTED WITHOUT
                                         RESINCTED WITHOUT
REMOWING PASSWORD
BIT 5 ON = PRINT TO TERM IN UPR
CASE ONLY
BIT 6 TO 15 - NOT USED
= PASSWORD MULTIPLE USERS
MUST ENTER TO RECIEVE SECRET
                     CB.PASS$()
                                                    MESSAGES
110
          ON ERROR GOTO 19000
          DIM FIP%(30%),FIP2%(30%),ST%(64%)
          DEFINE JOB.FLAGS%() BITS:
          PPN.OPT%
          KB.OPT%
                               = 2%
          JOB.OPT%
SECRET.OPT%
                               = 4%
          SPY. OPT%
          UPPER.OPT%
                               = 32%
                                           ------
          DEFINE CURRENT USER ITEMS:
          USER.JOB%=(PEEK(518%) AND 255%)/2%
          PPN% = PEEK (PEEK (PEEK (520%)+8%)+24%)
                                                              IGET PPN
          USER.PROJ%=SWAP%(PPN%) AND 255%
USER.PROG%= PPN% AND 255%
          -----
          PRINT HEADER, PROGRAM IDENTIFICATION (IF NEEDED)
          VERSION$ = "01.03"
          PRINT "CB - V"; VERSION$, ERT$(0%) UNLESS CCL. ENTRY%
          PRINT
                                                     UNLESS CCL.ENTRYS
120
          GOTO 200 IF COMMON.INIT%=378%
                                                              INORMAL
INITIALIZE RESIDENT LIBRARY IF THIS IS THE FIRST USER SINCE LIBRARY WAS LOADED
          PRINT "%Initializing CBLIB Resident Library"
          COMMON.IN.USE%=USER.JOB%
                                                             JUST IN CASE
         CHANNEL$(X%)=STRING$(64%,0%)
FOR X%=0% TO 40%
         FOR X%=0% TO 63%
                    CB.PROG%(X%)=0%
                    CB.PROJ%(X%)=0%
TALK.CHAN%(X%)=0%
                    JOB.FLAGS$(X$)=0$
                   HANDLE$(X$)="CB.PASS$=""
          NEXT X%
         COMMON.INIT%=378%
                                                             ISET INIT FLAG
```

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CIRCLE 104 ON READER CARD

```
COMMON.IN.USE%=0%
                                                         IUNLOCK CORE
 GOTO 1000 IF (CCL.ENTRY$ <> 0$) AND (HNDL.ENTERED$ = 0$)
        GOTO 230 IF LOGGED.OUT ICANT ENTR NOT LOGED IN

ACCEPT USER ID UNLESS CCL ENTERED. CHECK FOR 'HIDDEN'
OPTIONS. '/DBG'= DEBUG, '/CLR' = FORCE CBLIB INIT
          LINPUT "What is your 'Handle' "; HNDL$
                            UNLESS (CCL.ENTRY%=-1%) AND (HNDL.ENTERED%=-1%)
         CCL.ENTRY$=0$
HNDL.ENTERED$=0$
         II% = INSTR(1%, HNDL$, "/DBG")
CLR% = INSTR(1%, HNDL$, "/CLR")
                                               IDEBUG MODE, HIDDEN
                                               ICLEAR LIB HIDDEN FUNC
         II% = 0% IF USER.PROJ%<>1%
CLR%= 0% IF USER.PROJ%<>1%
         IF CLR% THEN
                   COMMON.INIT%=0%
                   GOTO 120
205
         DEBUG%=0%
         IF II% THEN
                  HNDL$=LEFT(HNDL$, II%-1%)
                   PRINT "%%DEBUG MODE ENABLED"
1
                   DEBUG$ =- 1%
         GOTO 215 IF HNDL$="" OR LEN(HNDL$)>12%
210
         FOR X%=1% TO 63%
                  GOTO 220 IF HNDL $=HANDLE$(X%)
         NEXT X%
         GOTO 300
         PRINT "**Please enter up to 12 characters**"; CHR$(7%)
215
220
         PRINT "##??That 'Handle' is IN-USE by Job #";X%;
                                     " - Try again??**"; CHR$(7%)
١
         GOTO 200
         PRINT "##??You may not talk LOGGED-OUT??##";CHR$(7%)
230
         GOTO 32700
       SETUP THE USER ITEMS FOR THIS RUN , DEFAULTS=
TALK ON CHANNEL 19, MONITOR 19, NO FLAGS SET
**TELL THE WORLD WE ARE HERE**
        PRINT
         DUMMY#=FNLOCK.COMMON#
        CTRL.C.TRAP\$=SYS(CHR\$(6\$)+CHR\$(-7\$))
        DUMMY2%=FNGET.CHAN%(0%)
        DUMMY = FNOPEN. POSITIONS
        ST%(DUMMY%) = USER.JOB%
DUMMY2%=FNPUT.CHAN%(0%)
                                              ISETUP IN CUR USER LIST
```

```
ICHN TYPED?
                                                                                                                     12%=INSTR(STRT.ARG%+1%,CMD$," ")
          DUMMY2%=FNGET.CHAN%(19%)
                                                                                                                                                                        INO CHN SPECFD
          DUMMY = FNOPEN. POSITION $
                                                                                                                     GOTO 2810 IF I2%=0%
                                                                                                                     CHN$=MID(CMD$, STRT.ARG$+1$, 12$-STRT.ARG$-1$) IGET CHNL
          ST%(DUMMY%) = USER.JOB%
DUMMY2%=FNPUT.CHAN%(19%)
                                                  ISETUP CHAN 19 MONITOR
                                                                                                                                                                        ISAVE IT
                                                                                                                                                                                                   &
&
                                                                                                                     BRDCST%=VAL(CHN$)
                                                                                                                                                                        ILETS DO IT
          HNDL $=CVT$$(HNDL$, 128%)
                                                                                                                     MSG$=RIGHT(CMD$,STRT.ARG$+1$) | IGOTO 2950 IF BRDCST$<1$ OR BRDCST$>40$ | IILLEGAL, SORRY DUMMY$=FNBROADCAST$(BRDCST$,MSG$,1$) | ISEND, NO PSWD
                                                                                                           2810
         HANDLE$(USER.JOB%)=HNDL$
JOB.FLAGS%(USER.JOB%)=0%
          CB.PROJ%(USER.JOB%)=USER.PROJ%
CB.PROG%(USER.JOB%)=USER.PROG%
          CB.PASS$(USER.JOB%)=""
                                                                                                                     PRINT "##??Illegal Channel??##";CHR$(7%)
                                                                                                           2950
                                                  ITALK TO 19 FIRST
          TALK.CHAN% (USER.JOB%)=19%
                                                                                                                     RETURN
                                                                                                           DUMMY = FNUNLOCK.COMMON $
          CMD$="""New User - Job #"+NUM1$(USER.JOB#)+" ("+HNDL$+") has signed on to CB##"
                                                                                                           3000
                                                                                                                     ##MONITOR COMMAND##
          DUMMY%=FNBROADCAST%(0%,CMD$,-1%)
                                                            Itell everyone
                                                                                                                     GOTO 3500 IF STRT.ARG$=0$
CMD$=RIGHT(CMD$,STRT.ARG$+1$)
DUMMY$=FNLOCK.COMMON$
                                                                                                                                                                        IILLEGAL IF NO ARG
500
         PROMPT THE CURRENT USER WITH HIS TALK CHANNEL NUMBER ADD AN EXTRA '>' IF HE HAS A PASSWORD SET ACCEPT COMMAND OR MESSAGE, IF IT BEGINS WITH '/', THEN ASSUME IT IS A PROGRAM COMMAND
                                                                                                                     GOTO 3400 IF CMD$=""
                                                                                                           3010
                                                                                                                     12%=INSTR(1%,CMD$,",")
                                                                                                                     CHN$=CMD$
                                                                                                                                                              INO MORE
                                                                                                                                 IF 12%=0%
                                                                                                                     CMD$=##
          PRINT "T"+FNCHAN$(TALK.CHAN$(USER.JOB$))+">";
                                                                                                                     GOTO 3050 IF 12%=0%
CHN$=LEFT(CMD$,12%-1%)
                                                                                                                                                              IMUST BE LAST ONE
          PRINT ">"; IF JOB.FLAGS%(USER.JOB%) AND SECRET.OPT%
OPEN " KB:" AS FILE 1%
                                                                                                                     CMD$=RIGHT(CMD$, 12%+1%)
          LINPUT #1%, CMD$
          CLOSE #1%
                                                                                                                     GOTO 3100 IF CHN$="-"
CHN%=ABS(VAL(CHN$))
                                                                                                           3050
          EDIT.VAL%=8%
          EDIT.VAL%=40% IF JOB.FLAGS%(USER.JOB%) AND UPPER.OPT%
                                                                                                                     GOTO 3700 IF CHN%=0% OR CHN%>40%
GOTO 3110 IF INSTR(1%,CHN%,"-") IDELETE
         CMD$=CVT$$(CMD$,EDIT.VALF)
GOTO 1000 IF LEFT(CMD$,1)="/"
IF CMD$="" THEN
PRINT "BECB - V";VERSION$;"###
                                                             ING LDNG SPCS
                                                             INOTHING
                                                                                                                     DUMMY2%=FNGET.CHAN%(CHN%)
                                                             1..SO GIVE VERS
                                                                                                           3060
                                                                                                                     DUMMY%=FNUSER.POSITION%
                                                                                                                     DUMMY%=FRUSER:50=15

IF DUMMY%<>-1% THEN
PRINT "##??Already monitoring channel ";
FNCHAN%(CHN%); "??##"
Ido anot
                    GOTO 500
                                                             IAND GET MORE
1------ &
          IMESSAGE TO BROADCAST
600
                                                                                                                                                                        Ido another
           DUMMY%=FNBROADCAST%(TALK.CHAN%(USER.JOB%),CMD$,0%)
          GOTO 500
                                                                                                                      DUMMY%=FNOPEN.POSITION%
                                                                                                           3070
                                                                                                                      ST% (DUMMY%) = USER. JOB%
1000
                                                                                                                      DUMMY2%=FNPUT.CHAN%(CHN%)
          CTYP$=CVT$$(MID(CMD$,2%,2%),32%) !cmd in upper case UNLESS CCL.ENTRY%
                                                                                                                      GOTO 3010
         UNLESS CCL.ENTRY;

CTYP$=LEFT(CMD$,2$) IF CCL.ENTRY;

CTYP$=CYT$$(CTYP$,-1$)

CTYP$="LI" IF CTYP$="H" IALLOW LIST...

CTYP$="HE" IF CTYP$="H" 1...HELP TO BE ONE LTR ENTRIES

CTYP$="###" IF (LEN(CTYP$)<2>$)

OR (LEFT(CTYP$,1$)=".")

CTYP$="###" IF CTYP$=""^" ISNEAKY TO TRY ON CCL ENTRY
                                                                                                                     FOR WX%=1% TO 40%
                                                                                                           3100
                                                                                                                               GOTO 3105 IF WX%=TALK.CHAN%(USER.JOB%)
ICANT UNMONITOR "SERS" TLK CHAN
                                                                                                                                DUMMY2%=FNGET.CHAN%(WX%)
DUMMY%=FNUSER.POSITION%
                                                                                                                                GOTO 3105 IF DUMMY%=-1%
ST%(DUMMY%)=0%
          VALID$="TA.BR.MO.WA.LI.HE.CL.EX.CA.KB.SP.PP.UP.AL.JO.RE.DÊ.TI
VALID$="00.00.00.WA.LI.HE.CL.00.00.00.00.00.00.00.00.00.
                                                                                                                                DUMMY2%=FNPUT.CHAN%(WX%)
                                                  IF CCL.ENTRY%
                                                                                                           3105
                                                                                                                      DUMMY%=FNUNLOCK.COMMON%
PRINT "**All channels except ";
                                                   ICHECK IF LEGAL
          CM4-INSTR(14.VALID$,CTYP$)
                                                                                                                                          TALK.CHAN%(USER.JOB%); " reset **"
          CM%=INT(CM%/3%)+1% IF CM%
                                                   !OFFSET COMMAND
          GOTO 1010 IF CM%
                                                                                                                      RETURN
          TYP$=""CCL " IF CCL.ENTRY% ISAY CCL PROBLEM
PRINT "**??Invalid "+TYP$+"command, Type '/HELP'??**"
                                                                                                                      GOTO 3720 IF CHN%=TALK.CHAN%(USER.JOB%)
                                                                                                           3110
                                                                                                                                                    ICANT UNMONITOR TALK CHANNEL
           GOTO 32700 IF CCL ENTRY
                                                                                                                      DUMMY2%=FNGET.CHAN%(CHN%)
          GOTO 500
                                                                                                                      DUMMY%=FNUSER.POSITION%
          !DO DISPATCH, GO BACK FOR MORE
STRT.ARG$=INSTR(1$,CMD$," ")
ON CM$ GOSUB 2000,2800,3000,3800,4000,5000,5500,6000,
6500,7000,7500,8000,8500,8900,9000,9500,9800,
                                                                                                                      IF DUMMY%=-1% THEN
PRINT "##??Not monitoring channel
1010
                                                                                                                                                    FNCHAN$(CHN%);"??**
                                                                                                                                                                         ido another
                                                                                                                                GOTO 3010
                     9900
                                                                                                                      ST% ( DUMMY% ) = 0%
                                                                                                            3120
           GOTO 32700 IF CCL.ENTRY%
                                                                                                                      DUMMY2%=FNPUT.CHAN%(CHN%)
                                                                                                                      GOTO 3010
            1====
                                                                                                                      DUMMY % = FNUNLOCK . COMMON %
                                                                                                            3400
 2000
           ##TALK COMMAND##
                                                                                                                      PRINT "##Now monitoring channels: "
                                                                                                            3500
                                         IF STRT.ARG%=0%
                                                                                                                      MCNT%=0%
           CMD$=RIGHT(CMD$, STRT.ARG%+1%)
                                                                                                                      FOR X%=1% TO 40%
                                                                                                                                PRINT "MONITOR - CHANNEL CHECKING=";X%

IF DEBUG%
           TALK%=VAL(CMD$)
 2010
                                                                                                                                DUMMY2%=FNGET.CHAN%(X%)
           GOTO 2700 IF TALK$<1$ OR TALK$>40$
                                                                                                                                 DUMMY%=FNUSER.POSITION%
                                                                                                                                GOTO 3550 IF DUMMY% =-1%
           DUMMY #= FNLOCK . COMMON #
 2020
           TALK.CHAN%(USER.JOB%)=TALK%DUMMY2%=FNGET.CHAN%(TALK%)
                                                                                                                                 MCNT%=MCNT%+1%
                                                                                                                                PRINT FNCHAN$(X%);" ";
IF MCNT%>15% THEN
           DUMMY = FNOPEN. POSITIONS
           ST%(DUMMY%)=USER.JOB%
                                                                                                                                          MCNT%=0%
           DUMMY2%=FNPUT. CHAN% (TALK%)
                                                                                                                                          PRINT
           DUMMY = FNUNLOCK . COMMON %
                                                                                                                      NEXT X%
                                                                                                            3550
           PRINT "##Now talking on channel ";
 2500
                                                                                                                      PRINT
                                         FNCHAN$(TALK.CHAN$(USER.JOB$))
                                                                                                                      PRINT
                                                                                                                      RETURN
           PRINT CHR$(7%); "##??Illegal TALK channel??##"
 2700
                                                                                                                      PRINT CHR$(7$); "**??!llegal MONITOR channel '";
CHN$; "'??**"
                                                                                                            3700
 GOTO 3010
                                                                                                            1
 2800
                                                                                                                      PRINT CHR$(7%); "**??Cannot UNMONITOR your "+
                                                                                                            3720
           ##BROADCAST COMMAND##
                                                                                                                                           "TALK channel??**"
                                                              !ILLEGAL IF NO ARG
                                                                                                                      GOTO 3010
                                IF STRT.ARG%=0%
           GOTO 2950
                                                                                                            1------ &
                                                              IASSUME STD CHN
           BRDCST%=TALK.CHAN%(USER.JOB%)
```

```
3800
            **WATCH (USERS ON A SPECIFIC CHANNEL)**
            GOTO 3900 IF (STRT.ARG%=0%) AND (CCI.ENTRY%=-1%)
            GOTO 3805 IF STRT.ARG$<>0$
CHN$=TALK.CHAN$(USER.JOB$)
            GOTO 3807
 3805
            CMD$=RIGHT(CMD$,STRT.ARG$+1$)
            CHN%=VAL(CMD$)
 3807
            GOTO 3900 IF CHN$<=0$ OR CHN$>40$
            DUMMY2%=FNGET.CHAN%(CHN%)
ANY.USERS%=0%
            PRINT "Users on Channel #"; CHN%
 3810
            FOR CXX%=1% TO 63%
            GOTO 3850 IF ST%(CXX%)=0%
USR%=ST%(CXX%)
                                                       INOT IN THIS POSITION
            KBN$=FNKB.NUMBER$(ST%(CXX%))
GOTO 3850 IF KBN$="ILL:"
            PRINT "#"; NUM1 $(USR$); TAB(6$);
"["; NUM1 $(CB.PROJ$(USR$))+"."+
                      NUM1 $(CB.PROG$(USR$));"]";TAB(18$);
                      KBN$: TAB(27%):
                      CVT$$(HANDLE$(USR$), 128$); TAB(46$);
           PRINT "Monitor";
PRINT ", Talk"; IF TALK.CHAN%(USR%)=CHN%
PRINT ", PSWD"; IF (JOB.FLAGS%(USR%) AND SECRET.OPT%)
AND (TALK.CHAN%(USR%)=CHN%)
            PRINT
            ANY.USERS%=-1%
 3850
           PRINT "No Users on this channel" IF ANY. USERS #=0 #
            RETURN
           PRINT "##??Illegal channel specified??##";CHR$(7%)
3900
                                                                                              &
           RETURN
 4000
           **LIST (USERS) COMMAND**
           EN%=63%
ONE.USER%=0%
           GOTO 4010 IF STRT.ARG$=0$
                                                                 !CHK IF WE HAVE ARG
               =VAL(RIGHT(CMD$,STRT.ARG$+1$))
           EN%-ST%
GOTO 4600 IF EN%<1% OR EN%>63%
           ONE.USER% =-1%
4010
           PRINT "Current CB User list:" UNLESS ONE.USER%
           ANY. USERS%=0%
           PRINT
           DUMMY # = FNLOCK . COMMON #
           FOR X%=ST% TO EN%
                      GOTO 4500 IF CB.PROJ$(X$)=0$
                      KB$=FNKB.NUMBER$(X%)
                      GOTO 4500 IF KB$="ILL:"
                      ANY. USERS% =- 1%
                      PRINT "#"+FNCHAN$(X$);" ["+NUM1$(CB.PROJ$(X$))+
","+NUM1$(CB.PROG$(X$))+"]";
                                TAB(14%); KB$; TAB(21%)
                                CVT$$(HANDLE$(X%),128%);TAB(34%);
                                "Talk: ";
FNCHAN$(TALK.CHAN%(X%));
                      PRINT TAB(43%); "Att:
                     PRINT TABL(43%); "ALT: ";
FLAGS% = JOB.FLAGS% (%)
PRINT "JOB "; IF FLAGS% AND JOB.OPT%
PRINT "RB "; IF FLAGS% AND KB.OPT%
PRINT "PPN "; IF FLAGS% AND PPN.OPT%
PRINT "PSWD "; IF FLAGS% AND SECRET.OPT%
                     PRINT "SPY"; IF FLAGS AND SPY.OPT%
PRINT "SPY"; IF FLAGS AND UPPER.OPT%
PRINT "UPP"; IF FLAGS AND UPPER.OPT%
PRINT "None"; IF FLAGS =0%
PRINT TAB(73%);
                                CVT$$(CB.PASS$(%$),-1$);

IF (((JOB.FLAGS$(%$) AND

SECRET.OPT$) <>

AND (DEBUG$<>0$))
                                                              <>0%)
                                           OR (USER.PROJ%=1%)
                     PRINT
                      PRINT
                                TAB(16%); "Mon: ";
                      MCNT%=0%
                     FOR Y%=1% TO 40%
                                DUMMY2%=FNGET.CHAN%(Y%)
                                OTHER.USER%=FNOTHER.POSITION%(X%)
GOTO 4050 IF OTHER.USER%=-1%
                                                                           INOT ON CHAN &
                                PRINT FNCHAN$(Y%);" ";
                                MCNT%=MCNT%+1%
                                IF MCNT%>15% THEN
                                           MCNT%=0%
                                           PRINT \ PRINT TAB(21%);
                     NEXT YE
4050
                     PRINT
4500
          NEXT XX
          DUMMY%=FNUNLOCK.COMMON%
          PRINT "No users " IF ANY.USERS%=0%
          PRINT
```

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```
PRINT "##??Illegal user number specified??##";CHR$(7%)
  4600
  |-----
  5000
                      **HELP COMMAND**
                      PRINT "CB - V"; VERSION$; " Commands are: "
                      PRINT
                                                                                         Change talk channel to 'n'."
                                                                                         This is the channel that you "'Transmit' on."
                     PRINT P
                     PRINT " MONITOR n,m,.z - Monitor All channels specified" &
PRINT " If negative, Unmonitor channel." &
PRINT " If negative, with no number, then" &
Unmonitor ALL channels (Except TALK)" &
                    PRINT "/RESTRICT XXXXXX - Restrict sending message to" & any JOB having "XXXXXX as" & any JOB having "XXXXXX" as" & argument, then turn off password & argum
                     PRINT "/BROADCAST nn Text- Allows a message to be sent to everyone" & even if a password is set. This allows a" &
                     PRINT "
                                                                                        user to send text to everyone without" & having to reset his password, send a " &
                     PRINT #
                     PRINT "
                                                                                        message and then set the password again." & If 'nn' is included, then message is sent" on channel #nn, else it is sent on the & users' normal talk channel."
                     PRINT #
                     PRINT "
                     PRINT "
                     PRINT "/CALL Kbn#
                                                                                   - Send a message to specified terminal "&
                                                                                         requesting that they enter CB.
                     PRINT "
5005
                     IF USER. PROJ$=1% THEN
                    PRINT "/SPY
PRINT "
                                                                 (PRIV) - Allows operator to recieve Restricted" &
                                                                                        messages without knowing PASSWORDS." &
                     PRINT "/CLEAR n (PRIV) - Clear out job specified by 'n'." &
                                                                                        This removes job from tables and & KILLs job off system (Logs out). &
                    PRINT "
                    PRINT "/DETACH
                                                                 (PRIV) - Detach from the current terminal."
                    PRINT "/ALL Txt (PRIV) - Send a message to ALL users on CB." &
5010
                    PRINT "/KB
                                                                                   - Toggle KB on message switch"
                   PRINT "/PPN
PRINT "/JOB
PRINT "/TIME
PRINT "/UPPER
                                                                                  - Toggle PPN on message switch
                                                                                  - Toggle JOB on message switch"
                                                                                  - Display current Date/Time"

    Translate all incoming/outgoing" message characters to UPPER CASE."

                    PRINT "
                    PRINT "/LIST [n]
                                                                                  - List current users on CB. "
                                                                                        If 'n' is specified, then list"
                    PRINT "
                   PRINT "
                                                                                   only that user" &
- List all users WATCHING channel 'n'" &
                  PRINT "/WATCH [n]
PRINT "
                                                                                      If 'n' is not entered, then all" & users on current talk channel are"
                    PRINT "
                   PRINT "
                                                                                        shown."
                    PRINT "/HELP
                                                                                  - This message
                   PRINT "/EXIT
                                                                                  - Exit CB*
                   PRINT "Note: "Z and "C act like '/EXIT' was entered"
                   PRINT "
                                                   All commands may be abbreviated to 2 letters."
```

```
**CALL COMMAND**
1----- &
5500
                                                                                                       Send message of form:
                                                                                                        ***CB - User: Handle - Please enter CB on Channel #n**
         **CLEAR JOB COMMAND (PRIV) **
        GOTO 8950 IF USER.PROJ$<>1$
GOTO 5720 IF STRT.ARG$=0$
                                                                                                       GOTO 6600 IF STRT.ARG$=0$ IN
ST%=VAL(RIGHT(CMD$,STRT.ARG$+1$))
GOTO 6600 IF ST%<0$ OR ST$>127$
                                                                                                                                           INOTHING SPECIFIED
                                            IPRIV FUNCTION ONLY
                                            IWE MUST HAVE AN ARG
         CMD$=RIGHT(CMD$,STRT.ARG$+1%)
         JBNUM%=VAL(CMD$)
                                                                                                       DUMMY2%=FNGET.CHAN%(0%)
         GOTO 5720 IF JBNUM%<1% OR JBNUM%>63%
                                                                                                       FOR X%=1% TO 63%
GOTO 6550 IF ST%(X%)=0%
         DUMMY % = FNLOCK . COMMON %
         DUMMY2%=FNGET.CHAN%(0%)
                                                                                                                                                    INO JOB THERE
         OTHER.USER = FNOTHER.POSITION (JBNUM ) !USER ON CB????
                                                                                                                KB$=FNKB.NUMBER$(ST%(X%))
                                                                                                                                                    IGET JOB KB
         DUMMY % = FNUNLOCK . COMMON %
                                                                                                                GOTO 6620 IF KBN%=ST%
         GOTO 5730 IF OTHER.USER%=-1%
                                            INO, CANT KILL
         PRINT "Really CLEAR job #"; JBNUM%;
                                                                                              6550
                                                                                                       NEXT X%
         INPUT ANS$
GOTO 5502 IF CVT$$(LEFT(ANS$,1$),-1$)="Y"
                                                                                                       MSG$=CHR$(7$)+"##CB - User: "+
CVT$$(HANDLE$(USER.JOB$),16$)+" - '
         PRINT "/CLEAR aborted!"
                                                                                                                "Please enter CB on Channel # "+
NUM1$(TALK.CHAN%(USER.JOB%))+"##"
                                                                                                       MSG$=CHR$(13$)+CHR$(10$)+MSG$+CHR$(13$)+CHR$(10$)+CHR$(7$)

SEND.MSG$ = SYS(CHR$(6$)+CHR$(-5$)+
         KB$=FNKB.NUMBER$(JBNUM%)
GOTO 5504 IF KB$="ILL:"
                                                                                                       CHR$(ST%)+MSG$)
PRINT "##Request sent##"
        KB.SND%=FIP2%(4%)
GOTO 5504 IF KB.SND%<0%
                                                                                                       PRINT
         OR KB.SND$>127$ IDETACHED IN CB?? - NO SEND CRLF$=CHR$(13$)+CHR$(10$)+CHR$(10$)+CHR$(10$)
                                                                                                       RETURN
                                                                                                       PRINT ***??Bad KB number specified??***
         MSG$=CRLF$+
"**| Your Job has just been KILLED "+
"by the operator!| #*"+
CHR$(7%)+CHR$(7%)+CRLF$
                                                                                              6600
                                                                                                       RETURN
                                                                                                       PRINT "##??KB specified already in CB??##"
                                                                                              6620
         SEND.KILL.MSG$=SYS(CHR$(6%)+CHR$(-5%)+CHR$(KB.SND%)+
                                                                                                       RETURN
                                                                                                       7000
         FIP%(0%)=30%
5504
                                                                                                        **KB TOGGLE COMMAND**
         FIP%(XXX%)=0% FOR XXX%=1% TO 30%
FIP%(1%)=6%
         FIP$(2%)=8%
                                                                                                       JOB.FLAGS#(USER.JOB#)=JOB.FLAGS#(USER.JOB#) XOR KB.OPT#
DUMMY#=FNUNLOCK.COMMON#
         FIP%(3%)= JBNUM%
         FIP%(27%)=0%
                                                                                                       IF (JOB.FLAGS%(USER.JOB%) AND KB.OPT%) THEN
         FIP$(28%)=255%
                                                                                                                PRINT "##KB numbers will be printed##"
         CHANGE FIPS TO KILL JOBS
         KILL.JOB$=SYS(KILL.JOB$)
                                            UNLESS JBNUM%=USER.JOB%
                                                                                                       ELSE.
                 IF WE ARE KILLING OURSELVES, WE MUST ALLOW
                                                                                                                PRINT "##KB numbers will not be printed##"
                 US TO DELETE CHANNEL INFO BEFORE WE DIE
                                                                                                       RETURN
                                                                                               |-----
5506
         DUMMY % = FNLOCK . COMMON %
         TALK.CHAN% (JBNUM%)=0%
                                                                                               7500
         CB. PROGS (JBNUMS) = 0%
                                                                                                        **SPY TOGGLE COMMAND**
         CB.PRCJ%(JBNUM%)=0%
                                                                                                                ALLOW A PRIV USER TO WATCH RESTRICTED MESSAGES
         JOB. FLAGS (JBNUMS) = 05
         CB.PASS$(JBNUM%)=""
                                                                                                        GOTO 8950 IF USER.PROJ%<>1%
         HNDL $=CVT$$(HANDLE$(JBNUM$), 128$)
                                                                                                        DUMMY % = FNLOCK . COMMON %
         HANDLE$(JBNUM%)=""
                                                                                                        JOB.FLAGS%(USER.JOB%)=JOB.FLAGS%(USER.JOB%) XOR
         FOR YX%=0% TO 40%
                                                                                                                                  SPY.OPT%
                 DUMMY2%=FNGET.CHAN%(YX%)
                 OTHER.USER$=FNOTHER.POSITION$(JBNUM$)
ST$(OTHER.USER$)=0$ UNLESS OTHER.USER$=-1$
DUMMY2$=FNPUT.CHAN$(YX$) UNLESS OTHER.USER$=-1$
                                                                                                        DUMMYS = FNUNLOCK . COMMONS
                                                                                                       IF (JOB.FLAGS%(USER.JOB%) AND SPY.OPT%) THEN
PRINT "**SPY mode is enabled**"
         NEXT YX%
CMD$="##User #"+NUM1$(JBNUM%)+" ("+HNDL$+")"+
                                                                                                                PRINT "##SPY mode is disabled##"
         " is leaving CB (Involuntarily) ** "
DUMMY$=FNUNLOCK.COMMON$
                                                                                                       RETURN
                                                                                               7510
                                                                                               ·-
|------
         DUMMY%=FNBROADCAST%(0%,CMD$,-1%)
                                                                                               8000
         PRINT "##Job #"; JBNUM%; " has been CLEARed##"
5550
                                                                                                        **PPN toggle COMMAND**
                                            IF JBNUM%=USER.JOB%
         KILL.JOB$=SYS(KILL.JOB$)
                                                                                                        DUMMY% = FNLOCK . COMMON%
                                                                                                        JOB.FLAGS%(USER.JOB%)=JOB.FLAGS%(USER.JOB%)
         PRINT "##??Illegal Job number??###;CHR$(7%)
5720
                                                                                                                                  XOR PPN.OPT%
                                                                                                        DUMMY%=FNUNLOCK.COMMON%
                                                                                                        IF (JOB.FLAGS%(USER.JOB%) AND PPN.OPT%) THEN
PRINT "#*PPN numbers will be printed#*"
         PRINT "##??Job specified not in CB??###;CHR$(7%)
5730
        ------
                                                                                                                 PRINT "##PPN numbers will not be printed##"
6000
                                                                                               8010
                                                                                                        RETURN
         **EXIT COMMAND (^Z OR ^C TOO)**
**ANY FATAL OR WEIRD ERRORS COME HERE TOO**
                                                                                                       !=====
                  A FLAG 'RUNNING.IN.ERRORS' WILL BE SET ON THE LATTER &
                                                                                               8500
                                                                                                        **UPPER CASE toggle COMMAND**
         DUMMY%=FNLOCK.COMMON%
TALK.CHAN%(USER.JOB%)=0%
                                                                                                        DUMMY%=FNLOCK.COMMON%
JOB.FLAGS%(USER.JOB%)=JOB.FLAGS%(USER.JOB%)
         CB.PROG%(USER.JOB%)=0%
                                                                                                                                  XOR UPPER.OPT%
         CB.PROJ%(USER.JOB%)=0%
                                                                                                        DUMMY%=FNUNLOCK.COMMON%
IF (JOB.FLAGS%(USER.JOB%) AND UPPER.OPT%) THEN
PRINT "**UPPER CASE only will be printed**"
         JOB.FLAGS%(USER.JOB%)=0%
CB.PASS$(USER.JOB%)=""
         HNDL$=CVT$$(HANDLE$(USER.JOB$),128$)
         HANDLE$(USER.JOB%)=""
         FOR YX%=0% TO 40%
DUMMY2%=FNGET.CHAN%(YX%)
                                                                                                                 PRINT "**UPPER/LOWER case be printed**"
                  DUMMY#=FNUSER.POSITION#
ST#(DUMMY#)=O# UNLESS DUMMY#=-1#
DUMMY28=FNPUT.CHAN#(YX#) UN
                                                                                                        RETURN
                                                                                               8510
                                                                                                             UNLESS DUMMY =-1%
         NEXT YX%
                                                                                               8900
         TYP$="leaving"
TYP$="ABORTING from" IF RUNNING.IN.ERROR%
                                                                                                        **ALL (BROADCAST) COMMAND**
         CMD$="##User #"+NUM1$(USER.JOB$)+" ("+HNDL$+")"+
" is "+TYP$+" CB##"
                                                                                                        GOTO 8950 IF USER.PROJ%<>1%
                                                                                                                                            IPRIV FUNCTION
                                                                                                        GOTO 8940 IF STRT. ARG% = 0%
         DUMMY%=FNUNLOCK.COMMON%
DUMMY%=FNBROADCAST%(0%,CMD$,-1%)
                                                                                                        MSG$=RIGHT(CMD$,STRT.ARG$+1$)
                                                                                                        DUMMY #= FNBROADCAST # (0%, MSG$, 2%) ISEND IT
         GOTO 32700
                                                                                               8940
                                                                                                        PRINT "**??Nothing to send??**";CHR$(7%)
```

875

850

1,000

1,100

1,150

0050	RETURN	
8950 \ !=====	PRINT "##??Privileged operation??##";CHR\$(7\$) RETURN	; ;
9000 1	**JOB toggle COMMAND**	8
i	DUMMY\$=FNLOCK.COMMON\$	8
\	JOB.FLAGS\$(USER.JOB\$)=JOB.FLAGS\$(USER.JOB\$) XOR JOB.OPT\$ DUMMY\$=FNUNLOCK.COMMON\$	8
1	IF (JOB.FLAGS%(USER.JOB%) AND JOB.OPT%) THEN PRINT "##JOB numbers will be printed##"	8
	ELSE PRINT ****JOB numbers will not be printed***	8
9010 !=====	RETURN	å
9500 !	**RESTRICT (PASSWORD) COMMAND**	&
1	GOTO 9700 IF STRT.ARG\$=0\$ !TURN OFF PSWRD PS\$=CVT\$\$(RIGHT(CMD\$,STRT.ARG\$+1\$),-1\$) &	&
\	GOTO 9710 IF LEN(PS\$)>6\$ DUMMY\$=FNLOCK.COMMON\$ CB.PASS\$(USER.JOB\$)=PS\$	& &
<u>`</u>	JOB.FLAGS\$(USER.JOB\$)=JOB.FLAGS\$(USER.JOB\$) OR SECRET.OPT\$	&
\	DUMMYS-FNUNLOCK.COMMONS PRINT "##Your Password has been set##" RETURN	& &
9700	DUMMY = FNLOCK.COMMON\$ CB.PASS\$(USER.JOB\$)=""	å
,	BITS% - 1% XOR SECRET.OPT%   IFORCE ONLY   BIT OFF JOB.FLAGS%(USER.JOB%)-JOB.FLAGS%(USER.JOB%) AND BITS%	8 8 8
\	DUMMY%=FNUNLOCK.COMMON% PRINT "**Password has been turned off**" RETURN	&
9710	PRINT "##??Password too long??##";CHR\$(7%)	&
1=====	RETURN	&
9800 !	**DETACH (PRIV) COMMAND**	& &
1	GOTO 8950 IF USER.PROJ\$<>1\$	& &
,	PRINT PRINT "**Detaching from terminal**"	&
\	PRINT PRINT DETACH\$=SYS(CHR\$(6\$)+CHR\$(7\$))	8 8 8
1======	RETURN	&
9900	**TIME FUNCTION**	&
t !	PRINT "##"+DATE\$(0%)+" at "+TIME\$(0%)+"**"	8 8 8
\	PRINT RETURN	8 8
!======		å
10000 ! !	***USER DEFINED FUNCTIONS***	& &
1	DEF FNLOCK.COMMONS LOCK THE COMMON AREA SO OTHER USERS CANNOT	& &
1	UPDATE WHILE WE ARE PRINT "LOCK.COMMON\$" IF DEBUG\$	&
10001	SLEEP 1% IF COMMON.JN.USE%<>USER.JOB%	&
\	AND COMMON.IN.USE\$<0\$ GOTO 10001 IF COMMON.IN.USE\$<>USER.JOB\$ AND COMMON.IN.USE\$<0\$	& &
\	COMMON.IN.USE%=USER.JOB% UNLESS COMMON.IN.USE%<>USER.JOB%	& &
\	AND COMMON.IN.USE\$<05 GOTO 10001 IF COMMON.IN.USE\$<05 AND COMMON.IN.USE\$<05	8 8
\	PRINT "LOCK.COMMON% FINISHED" IF DEBUG% FNEND	& &
!======		&
10003 !	DEF FNUNLOCK.COMMON% UNLOCK THE COMMON AREA, WHEN WE ARE FINISHED	&
· \	PRINT "UNLOCK COMMONS" IF DEBUGS COMMON.IN.USES=0\$ IF COMMON.IN.USES=USER.JOBS	& & &
\	FNEND	& &
Marke of the		&
1	DEF FNOPEN.POSITION; FIND OPEN POSITION IN ST\$() ARRAY FOR THIS	& &
1	JOB PRINT "FNOPEN.POSITION%" IF DEBUG% FOR OPNX%=1% TO 63%	& &
\	IF ST%(OPNX%)=0% THEN	& & &
\	Anna	&

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```
NEXT OPNX%
10005
         PRINT "??FNOPEN.POSITION - NO OPENINGS"
         RUNNING.IN.ERROR% = -1%
         GOTO 6000
                                                    !TRY TO /EXIT
10010
         FNOPEN.POSITION% = OPEN.POS%
         PRINT "OPEN. POSITION FOUND = "; OPEN. POS% IF DEBUG%
         DEF FNUSER.POSITIONS
                 FIND A USER JOB SLOT IN THE ST$() ARRAY
IF NOT FOUND, RETURNS -1
         PRINT "FNUSER. POSITIONS" IF DEBUGS
        FOR USRX$=1% TO 63%

IF ST%(USRX%)=USER.JOB% THEN
                         USER.POS%=USRX%
GOTO 10040
10030
         NEXT USRX%
         USER.POS% =- 1%
                                           !USER NOT FOUND-LEGAL
        FNUSER.POSITION# = USER.POS#
PRINT "FNPOSITION - FOUND POSITION ";USER.POS#
10040
                                           IF DEBUG%
|-----
10042
        DEF FNOTHER.POSITION%(ARG%)
FIND ALTERNATE USERS JOB SLOT IN ST%() ARRAY
        RETURNS -1 IF NOT FOUND
PRINT "FNOTHER.POSITION%", ARG% IF DEBUG%
        FOR OUSRX%=1% TO 63%
                IF ST%(OUSRX%)=ARG% THEN
                         OTHER.POS%=OUSRX%
GOTO 10046
10044
        NEXT OUSRX%
        OTHER. POS% =-1%
                                          !USER NOT FOUND-LEGAL
        FNOTHER.POSITION = OTHER.POS PRINT "FNOTHERPOSITION - FOUND POSITION "; OTHER.POS 1
10046
                        IF DEBUG%
        FNEND
        DEF FNCHAN$(ARG$)
PRINT A NUMBER (USUALLY CHANNEL #) LEADING
ZERO FILLED
        PRINT "FNCHAN%", ARG% IF DEBUG% CHHN$=NUM1$(ARG%)
        CHHN$="0"+CHHN$ IF ARG$<10$
        FNCHAN$=CHHN$
        FNEND
|-----
       DEF FNBROADCAST% (ARG1%, ARG1%, BFLAG%)
                BROADCAST A MESSAGE TO ALL USERS ON THE
CHANNEL SPECIFIED BY ARG1%, IF FLAG% IS SET,
```

```
CHANGE ST% TO CHANNEL$(ARG%) (IN MACRO)
                THEN DO NOT APPEND A HEADER
                         BFLAG% VALUES:
                                                                                                                                                          IMAKE NON-LOCAL
                                   O =SEND WITH HEADER
                                   -1=SEND NO HEADER (SYS MSG)
1 =BYPASS PASSWRD CHECKS
                                                                                                           CALL NM2ST BY REF (CSTRG$, ST%())
                                                                                                                                                          ITO CALL
                                                                                                           CHANNEL$(ARG$) = CSTRG$
                                                                                                                                                          IPUT BACK HERE
                                   2 =ALL CMD (/OPR, NOT /Cnn)
                                                                                                 PRINT "FNBROADCAST% "; ARG1%, ARG1 $, FLAG% IF DEBUG%
                                                                                                  10300 DEF FNKB.NUMBER$(JBNO%)
                                                                                                                    FORMAT A KB NUMBER AS TO DET OR PSEUDO OR
       HLD.ARG$=ARG1$
                                                                                                                             REGULAR, IF NO KB ON JBNO% SPECIFIED, RETURNS 'ILL:'
       KB$=FNKB.NUMBER$(USER.JOB%)
       KB%=FIP2%(4%)
       JOB$=NUM1$(USER.JOB%)
       PPN$="["+NUM1$(USER.PROJ$)+","+NUM1$(USER.PROG$)+"]"
                                                                                                           CHANGE SYS(CHR$(6$)+CHR$(26$)+CHR$(JBNO$)+CHR$(0$))
       UFLAG%=JOB.FLAGS%(USER.JOB%)
                                                                                                                             TO FIP2%
       UFLAG; = JOB.FLAG; (USER.JOB;)
PS; = ((UFLAG; AND SECRET.OPT;) <> 0;)
PS; = 0; IF (BFLAG; = 1;) OR (BFLAG; = 2;)
                                                                                                           KBN%=FIP2%(4%)
                                            !USER DOING BROADCAST
                                                                                                           GOTO 10350 IF KBN%<0% OR KBN%>127%
                                                                                                           GOTO 10330 IF FIP2%(5%)<>0%
KBN$=NUM1$(KBN%)
                                                                                                                                                          IPSEUDO KB
       DUMMY2%=FNGET.CHAN%(ARG1%)
FOR CXX%=1% TO 63%
                                                                                                           KBN$="KB"+LEFT("000",3%-LEN(KBN$))+KBN$+":"
                GOTO 10200 IF ST%(CXX%)=0% INO JU
PRINT "LOOKUP OF JOB ";CXX% IF DEBUG%
KBS$=FNKB.NUMBER$(ST%(CXX%))
                                                      INO JOB SLOT
                                                                                                           KBN$="P"+NUM1$(KBN$-1$)+"J"+FNCHAN$((FIP2$(5$)-1$)/2$)
                                                                                                  10330
                 PRINT "KB OF ACTIVE CB JOB ";FIP2%(4%)
                                            IF DEBUG%
                                                                                                  10350
                                                                                                           FNKB.NUMBER$=KBN$
                 GOTO 10200 IF KBN$="ILL:"
                 KB.SND%=FIP2%(4%)
                                                                                                  GOTO 10200 IF KB.SND%=KB% AND DEBUG%=0%
                 GOTO 10200 IF KB.SND%<0%
                                                                                                  19000
                                                                                                           **ERRORS SECTION**
                                   OR KB.SND$>127$
IDETACHED IN CB?? - NO SEND
                                                                                                           DUMMY$=SYS(CHR$(0$))
RESUME 20000 IF ERR=28$
RESUME 6000 IF ERL=500 AND ERR=11
RESUME 4600 IF ERL=4000
                 FLAGS$ = JOB.FLAGS$(ST$(CXX$)) | IGET FLAG WORD
                 ARG1 $-HLD ARG$
                 ARG1 $=CVT$$(ARG1$,32$) IF FLAGS$ AND UPPER.OPT$
                 GOTO 10200 IF ((FLAGS% AND SECRET.OPT%)=0%) AND ((FLAGS% AND SPY.OPT%)=0%) AND
                                                                                                           RESUME 10350 IF ERL=10300
RESUME 2700 IF ERL=2010
                                                                                                           RESUME 3700 IF ERL=3050
RESUME 2810 IF ERL=2800
                 (PS$<>0$) ISEND RESTR, RCV, NO GOTO 10200 IF ((FLAGS$ AND SECRET.OPT$)<>0$)
                                                                                                                          IF ERL=2800
                                                                                                            RESUME 3900
                                                                                                                          IF ERL=3805
                                    AND (PS$<>0%)
AND ((FLAGS% AND SPY.OPT%)<>16%)
                                                                                                            RESUME 5720
                                                                                                            RESUME 5506
                                                                                                                         IF ERL=5504
IF (ERL=6500) OR (ERL=6550)
                                    AND (CB.PASS$(USER.JOB%) <>
CB.PASS$(ST%(CXX%)))
                 PRINT "BROADCAST - PSWRDS '";

CB.PASS$(USER.JOB$);"', ";

"'";CB.PASS$(ST$(CXX$));"',

"FLAGS SEND/RCV ";UFLAG$,FLAGS$

IF DEBUG$
                                                                                                           RESUME 32700 IF ERL=200 AND ERR=11
                                                                                                           PRINT "?CB - FATAL ERROR -"; ERT$(ERR); " AT "; ERL
                                                                                                  19900
                                                                                                            RUNNING.IN.ERROR% = -1%
                                                                                                                                                          ITRY TO /EXIT
                                                                                                            RESUME 6000
                                                                                                  |------
                 SND.HDR$="NL"

SND.HDR$=SND.HDR$+KB$ IF FLAGS$ AND KB.OPT$

SND.HDR$=SND.HDR$+PPN$ IF FLAGS$ AND PPN.OPT$

SND.HDR$=SND.HDR$+"("+JOB$+")"

IF FLAGS$ AND JOB.OPT$
                                                                                                           ICTRL/C TRAP REENABLE BEFORE EXIT
                                                                                                  20000
                                                                                                            DUMMY $=SYS(CHR$(6%)+CHR$(-7%))
                                                                                                                                                          !EXIT
                                                                                                           GOTO 6000
                                                      !CHANNEL
                                                                                                  BCST.TYPE$="B" IF BFLAG$=1$ IBROADCAST
BCST.CHNL$="/"+BCST.TYPE$+FNCHAN$(ARG1$)
BCST.CHNL$="/OPR" IF BFLAG$=2$ !ALL COMMAND
                                                                                                  30000
                                                                                                            ***CCL ENTRY POINT***
                 SND.HDR$=SND.HDR$+
CVT$$(HANDLE$(USER.JOB$),128$)+
                                                                                                            CMD$=SYS(CHR$(7))
                 CV1$$(HANDLE$(USER:JOEF,]720$)7
BCST.CHNL$*#]]"
SND.HDR$=" "IF (BFLAG$= -1$)
SND.HDR$="$DB6$"-SND.HDR$ IF DEBUG$<>0$
AND KB.SND$=KB$
SND.HDR$="SECRET"+SND.HDR$ IF PS$
SND.HDR$="$EY*"+SND.HDR$ IF (PS$<>0$)
AND (FLAGS$AND SPY.OPT$)<>0$)
MSG$=CHR$(10$)+CHR$(13$)+SND.HDR$4ARG1$+
                                                                                                           I%=INSTR(1%,CMD$,"/")
IF I% THEN
                                                                                                                     CMD$=CVT$$(RIGHT(CMD$, I%+1%), 16%+32%+64%)
                                                                                                                     HNDL. ENTEREDS = OS
                                                                                                  30010
                                                                                                            I%=INSTR(1%,CMD$," ")
                                    CHR$(10%)+CHR$(13%)
                                                                                                            GOTO 10 IF I%=0%
                  SEND.MSG$=SYS(CHR$(6%)+CHR$(-5%)+
                                                                                                            HNDL $= RIGHT (CMD$, 1%+1%)
                                    CHR$(KB.SND%)+MSG$)
                                                                                                            CCL. ENTRYS =- 1%
                                                                                                            HNDL . ENTERED% =- 1%
                                                                                                            GOTO 10
10200
        NEXT CXX
                                                                                                   1-----
                                                                                                   32000
***LOGIN ENTRY POINT***
       DEF FNGET.CHAN% (ARG%)
10250
                                                                                                                                                  ILETS CHECK THIS LATER
                  CHANGE CHANNEL$(ARG%) TO ST% (IN MACRO)
                                                                                                                                                  ITREAT JUST LIKE CCL
                                                                                                            GOTO 30000
                                                                                                           CALL ST2NM BY REF (CHANNEL$(ARG$), ST$())
                                                                                                   1=====
                                                                                                           !CLOSE-UP PROCESSING
|-----
                                                                                                   32767
       DEF FNPUT.CHAN%(ARG%)
```

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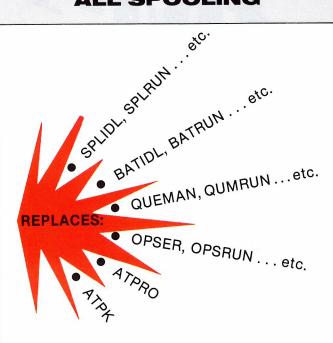
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#### EDITORS' NOTE

David Spencer of Infinity Software has written several RSTS Real-Time Games. When used "stand alone" they offer realistic performance. Here are two differing opinions on how they are:

# RSTS GAMES: ONE MAN'S (BOY'S) OPINION

By Bill Marbach

David Spencer and Atari have two things in common. They both make electronic games, and they both work hard on them. However, only David Spencer's games are challenging enough to make you want to come back again and again.

My favorite David Spencer game is called SUBS. This game takes extraordinary hand eye coordination and a little bit of luck. The object is to hit the enemy before he hits you by using only radar and keen eyesight.

In INVADE your objective is to stop the little alien attackers from landing or hitting you. The tempo of this game is very slow making this game the easiest of them all.

The last game is PACKER. We all know it as Pac-Man. However, this game is just as good as Pac-Man. This game even has an intermission where you can watch a little show. This game is very much like the real Pac-Man, and could show up ATARI any day.

When you compare the two you see ATARI has better color, sound, action, and graphics. However, David Spencer's games take more skill than Atari games which are usually easy. So David Spencer keep up the good work.

Overall Grade 1-10
David Spencer — 9.3
Atari — 8.5

#### NO CAUSE FOR EXCITEMENT

By Joel Schwartz, M.D.

The other day I got an excited call from our beloved editor telling me there were new games on the computer. The urgency in his voice caused me to have only two helpings of dessert instead of the usual three and I rushed right over to see them.

The first one I played was called PACKER. This is a real-time RSTS/E game for VT100-type terminals. The instructions tell you that until recently you have been employed as a packer in a robot manufacturing plant. However, there was an accident which caused robots to rebel and it is your mission, if you decide to take it, to deactivate the robots loose in the plant or be killed. My advice is to pass up the mission. I wish I had. This game is really a poor copy of the popular arcade game PAC-MAN. I really don't know if graphics can be done with the finesse that they are done on the smaller home computers, but being chased by an A and eating a @ so I can then chase and eat a A,B,C or D on a black and white screen with no sound effects just doesn't do very much for me. It's like driving in a Mercedes and then trying to get excited over driving in a Honda.

The second game I played was INVADE. You guessed it, this game was the main frames answer to the arcade game SPACE INVADERS. The object of the game for those of you who have been in hibernation for three years is to destroy the incoming wave of alien invaders without being killed by the bombs they drop. My objections were the same for this game. No graphics, no sound, no color, no fun.

The final game I played was called SUBS. This was billed as a real-time warfare game for two players on individual terminals. The two users compete against each other by attempting to destroy the other's submarine. Although the graphics were also poor on this game, it did have some unique features which made it worth playing. The monitor was divided into a bigger screen and a smaller one. The latter was a sonar screen used to locate the general vicinity of your opponent while the former was used to maneuver your sub close enough to your enemy to destroy him with your torpedoes. I liked the idea of a two terminal interactive game with a human opponent instead of pitting your skill against the computer.

On my way out Carl asked me how I liked them. I didn't want to hurt his feelings (he is extremely sensitive) so I told him they were great, and it was only because of the lateness of the hour (it was about eight-thirty) that I had to leave. I hope he doesn't read my article!

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A VAX version will be available later.

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By W. Franklin Mitchell, Jr., Computer Operations Supervisor Erskine College, Due West, South Carolina 29639

The addition of TYPE to Erskine's RSTS system has made the task of running a small college on a small computer somewhat better. TYPE is a program system that transfers information from a disk file to a user's terminal using a very small amount of main memory. All TYPErs share a 1K (words) run-time system and each TYPEr's job size is 1K. TYPE uses a 1,024 byte disk buffer.

A very large portion of the data processing at Erskine produces some kind of printable disk file such as reports, labels, program listings, etc. TYPE was created to lessen the impact of many users moving the contents of these files to printing terminals. TYPE also allows users to do new things.

In the beginning, all users used PIP to print reports on terminals such as LA-120s and LA-36s. Ten simultaneous file dumpers using PIP occupy at least 164K words of main memory. The first version of TYPE was written in BASIC-PLUS. Ten TYPErs in BASIC-PLUS occupy 20K (not counting the always present BASIC run-time system). As options and enhancements were added, the size of the BASIC-PLUS version of TYPE began to grow. Finally, TYPE was put into assembly language and worked into its own run-time system. Ten TYPErs now occupy only 11K of main memory!

#### TYPE User's Guide

The following TYPE help message shows the features built into TYPE:

File specs may contain wildcards. Several files may be listed together if they are separated by commas. Any switches apply to all files listed together. Switches must go on the end. Legal switches are

/F output form feed 1st

/R no "Ready" once done

/x x copies, where x is a digit 2-9

/N file name is printed 1st

/Q query mode

/B binary mode

Multiple switches may be used (e.g. /F/R)

The /F switch allows a user on a printing terminal with forms control to use one page for log in, listing directories, etc. and to form feed to the top of the next form for file out-

The /R switch suppresses BASIC-PLUS's "Ready" once TYPE is done.

TYPE will print x copies of all files specified if it finds a slash followed by a single digit 2 to 9. For example,

TY JUNK.LST/3

-prints 3 copies of JUNK.LST

TY A.LST,B.LST/2 -prints 2 copies of A.LST followed by 2

copies of B.LST

The /N switch prefaces each copy of each file printed with the name of the file.

The /Q query mode is like the /Q or /IN switch of better known file transfer programs.

The /B switch makes TYPE send the data in a file to a user's terminal in binary mode. This is useful when you want tab characters to remain tab characters (not groups of spaces), ESCapes to stay ESCapes (not dollar signs), etc. /B automatically sets /R. This mode can be used to send text that contains LA-120 "change the character size" escape sequencies.

The following examples demonstrate some happenings that are perhaps strange but expected:

TY C.LST, C.LST/9

-prints 18 copies of C.LST

TY Z.TXT/3/5

-prints 5 copies of Z.TXT, earlier /3 is

TY A.LST/2,B.LST/3

-prints 3 copies of A.LST only, "/"

terminates file spec scan. Switches

must be last!

If WORK.BAC has a protection code with bit 64 set (run only),

TY WORK.BAC

-prints nothing.

If RIDICU.LAS has a file size greater than 65,535 blocks,

TY RIDICU.LAS

-will not work properly. No attempt has been made to treat this as an er-

ror

#### TYPE installation

Installing TYPE on your system is very simple. A contiguous copy of TYPE.RTS must be placed in account [0,1], two other files are created in the TYPE account (the TYPE account can be any account on any disk), and the ADD TYPE and add CCL commands must be added to both your running system and to your start up files. (The CCL can be something other than TYPE if desired.)

# WRITING A RUN-TIME SYSTEM

(or, Happiness in the HISEG)

By Bob 'Macro Man' Meyer

Now that you've been reading this column for many months, and I know you've been keying in & testing all the neat little programs I've been publishing, it's time for a treat. This issue, not only are we going to write some more Macro code, we're gonna write a run-time system. A sample rts is included with this article; if you key it in as printed and assemble as instructed, it should work on your system. Keep in mind that its sole purpose in life is to demonstrate how to make an rts from scratch, and therefore has very little market value (in other words, if your caught playing with this thing on the job, you might not have one. . .). First I'll attempt to describe what a run-time system is, then I'll explain how to use OSCAR.RTS, the program in the example.

#### What is a Run-Time System?

A run-time system is basically a Macro program that has been linked to run at the high end of the user's address space (thus the term HISEG). If the rts is written with reentrance in mind, it can be made read-only (the monitor & memory managment hardware will enforce this) and shared by any number of users. This proves to be very economical on small systems where memory is limited; only one copy of a program need be resident for any number of users to access that program. As you're probably aware, that's how Basic-Plus is implemented; a read-only sharable interpreter & keyboard monitor (among other things) that can be used by many folks for many different applications, but only ties up 16K of memory at most. The low segment, or LOSEG, is the actual user job image: variables, instructions, buffer space, (push-pop code in the case of Basic-Plus) or in some cases, just raw data, depending on the run-time system.

#### The Psudeo-Vector region.

This 'vector' area is actually a block of words at the very end of the user job image. Each word contains an address of an entry point into the run-time system. The monitor accesses the psudeo-vectors so that the run-time system can be given control in the case of certain events; some of these events are shown below with their respective PV entry point names (see the code at the end of the example program for the PV layout (or refer to COMMON.MAC)).

Event	PV entry point used
User runs a program NAMEd to this rts.	P.RUN
User SWitches to this rts.	P.NEW
User types †C.	P.CC
Some code accesses an odd memory address (with	n
a WORD instruction).	P.BAD
Some user types 2 1C's before we get time to ser	<u>.</u>
vice the first one.	P.2CC



As you can see, the vector region has many uses, and provides the monitor with a path into the run-time system for a number of situations. If the coding is done carefully, the rts can become VERY secure, as even the wise-guy typing several control-C's in succession can't ever get past the P.2CC entry point until we decide what to do with him. The psudeo-vector region is the primary difference between a run-time system and an resident library; a reslib has no psudeo-vectors.

#### Assembling & Task building the example RTS.

Assembling the demorts is really no big deal. The code requires no outside help, with the exception of the PRINT module included in Figure 2. The following commands will assemble the required modules:

RUN \$MAC MAC>OSCAR = OSCAR MAC>PRINT = PRINT MAC> †Z

#### Task building is a bit more complicated.

As I stated previously in the article, the monitor requires that the rts has its pseudo-vector region at the very . . . . continued on page 54

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August 1982

#### SELECTIVE CLEARING OF LOGGED ERRORS

By Paul DeBenedictis
Educational Communications
Upstate Medical Center
Syracuse, NY 13210

When a device goes bad, it may generate lots of errors in a short time. If you want to log errors for the device after it has been repaired, you normally must re-initialize the entire error log file, even though it contains entries for other errors which you may wish to retain in order to monitor your system. The following patch to ERRDIS.BAS (V7.0) allows you to delete ALL entries for a specific device after you prepare a FULL report for errors for that device, if you tell ERRDIS that you wish to ZERO the error file. All error records for the type of device that you specify will be erased even if the report is for a specific range of dates. All ERRDIS messages are updated to reflect this option. Note that if you delete the records for a disk error, you simultaneously delete all BAD BLOCK errors for the same device. Thus, your hard copy report should include all BAD BLOCK errors if you erase the errors for a disk. The required patch, which may be applied manually with \$CPATCH, is shown at right.

To retain bad block records, a more complicated check for which records to skip on the new line 12065 is needed. Since bad blocks are a symptom of a head crash, I have assumed that I usually will want to delete these records when I clear error records for a specific disk type. A more reasonable modification might be to delete only those errors which fall in a specified range of dates, but this would complicate the patch considerably.

```
*G/21/V<cr>
21<tab><tab>PROGRAM<tab><tab>: ERRDIS<cr>
*H/REASON/ZAICcr>
<tab>! UNC MODE tab>21-MAY-82<tab>CLEAR SPECIFIC ERROR TYPE &<cr>
<tab>! UNC MODE tab>21-MAY-82</tab>CLEAR SPECIFIC ERROR TYPE &</tab>
      <tab>ELSE<tab>GOTO 19010 &<cr>
 *I(cr)
$$ = "s " &(cr)
{tab}\(tab)S$ = " File" UNLESS REPRT$ = 70$ AND ER.COD$>=0$ &(cr)
{tab}\(tab)Caso^**V(cr)
{tab}\(tab)Gaso^**V(cr)
{tab}\(tab)G070 19010 &(cr)
*G(Error\f5C)"*s$****(Vcr)
{tab}\(tab)F FNGCL$("Zero Error"+S$*" upon completion (Yes/No)","No")>0$ &(cr)
*4AV(cr)
*+Ab\(tab)F FNGCL$("Zero Error"+S$*" upon completion (Yes/No)","No")>0$
*4AV<cr>
<tab><tab>! ZERO$=-1$ MEANS ZERO THE FILE &<cr>
*I(cr)*
*I(cr)*
*Ctab>\(tab)=ZERO$=ZERO$ AND SWAP$(REPRT$)+ER.COD$ IF &<cr>
<tab>\(tab)=ZERO$=ZERO$ AND SWAP$(REPRT$)+ER.COD$ IF &<cr>
<tab>\(tab)=ZERO$=ZAI(cr)*
<tab>\(tab)= IZERO$>0$ MEANS DELETE SPECIFIC RECORDS &<cr>
<tab>\(tab)=ZERO$>0$ JEANS SERO$ S
*I(cr)
GOTO 12050 IF ZERO$ > 0$ &<cr>
(tab)\ (esc)*V(cr)
(tab)\ GET #5$, RECORD 1$ &<cr>
*G/(tab)&(vcr)
(tab)&(vcr)
(tab)&(vcr)

*AI(cr)

*cr)
        <er> 12050<tab>!<tab>DELETE SPECIFIC RECORDS &<er>
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             DONE(cr)
12090(tab)CLOSE 5%,6% &(cr)
             <tab>\ RETURN &<cr>
<esc>*EX<cr>
```

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#### **DEAR RSTS MAN:**

We are attempting to support a remote line printer run as a spooled device off a DH through asynch/ synch converter to modem and vice versa at the other end. It works fine except that since the printer is a serial device, if it is turned off, anything sent to it drops into the bit bucket. We solve(?) this by turning off the spooler at night before the batch processing starts. My question is: is there any way that we can allow a non-privleged user at the remote site to bring up the spooler in the morning without having to wait for someone at the host to arrive. We have tried changing the protection levels without much success as we don't want to compromise the system security, and we don't want to give privileges to the users at the remote location for the same reason.

Any ideas you might have would be appreciated. Thanks for listen-SPIDL. ina. Dear SPIDL: There is a way in QUE-11 V2.2 to load or unload a form in a remote printer from non privlege. Sorry about the DEC package.

#### DEAR RSTS MAN:

First I would like to thank you for the great magazine and the Carl and Dave shows at the spring DECUS symposia.

I have a question that even DEC technical support won't (can't) answer. I would like to create a .TMP file and have it deleted by LOGOUT. The system programs (i.e. EDT) seem to do it fine. Is there a bit set somewhere in the UFD that users can access or is it just some more RSTS magic?

Also, an article for consideration might be one concerning dynamic job scheduling. The DECUS session on the subject really got me excited. If anyone happens to have

a copy of the handouts at this session, I would certainly appreciate a copy of them.

Jim Carrigan Logon Systems

Dear Jim: System programs know the full name of the TMP file they create. They just 'kill' the file e.g.; KILL 'TMP' + NUM1\$(job.num%) + '.TMP'.

#### **DEAR RSTS MAN:**

I am looking for a set of BASIC + 2 or MACRO subroutines that will facilitate the handling of records with large numbers of variable length fields. It does not appear feasible in my application (because of the number of variable length fields in a record) to store each of these fields as separate records sharing a common control field as in a relational DBMS. Although I am capable of writing such a set of subroutines, I don't want to re-invent the wheel. Any ideas?

Dave Smith Dear Variable: The RSTS Man doesn't use variable length fields, but we know someone who does! Look for a feature length article in the next issue (we hope). Meanwhile we invite our readers to reply.

#### **DEAR RSTS MAN:**

We currently have a PDP 11/34A computer running RSTS/E V7.0 supporting 12 to 14 terminals, comprised of a mixture of both local and remote lines. Currently we have 460 Mbytes of disk storage provided by a mixture of CDC 9762 and CDC 9766 drives interfaced via a Xylogics controller. We are in the final stages of development of two new application packages we feel will significantly increase our customer base. As a result we are starting to contemplate the possibility of having to upgrade our system. Can you offer some thoughts on the relative speed and job capacity of PDP 11/34A's, PDP 11/44's and PDP 11/70's and the relative pros and cons of upgrading from a PDP 11/34A to either of these other systems.

Thanks for your suggestions and comments.

Jerry C. Forshee Computer Systems Analyst Green & Co., Inc.

Dear Jerry: Both the 44 & 70 when properly configured with at least 1

... continued on page 80



David Spencer, Infinity Software Corporation

### **MISCELLANEOUS ITEMS**

In this issue, I have four items of interest. First is documentation on the "mysterious" VT100 escape sequences. Next, for those who hate uppercase prompts, patches to change the Basic Plus II compiler and BP2COM prompts from "BASIC2" to "Basic2". Also, some useful patches for the BACKUP package. And last, a small and efficient TECO.INI file for those who are tired of all the overkill that the DEC supplied version performs.

#### 1.0 "Unknown" VT100 escape sequences

The VT100 terminal has some undocumented escape sequence "features". To invoke one of these features, set your VT100 in ANSI mode and send "<esc>[nq", where:

<esc> is an escape with parity (Chr\$(155%))

[ is a bracket character

n is one of the numbers in the next figure

q is the lower case letter "q"

These sequences seem to work on a stock VT100, with AVO, and with the printer option. I haven't been able to test VT101 series yet to see if it works on them. All VT100 emulators I have seen DO NOT perform these sequences.

The following figure lists the escape sequence number and what they do. Those sequences that light LEDs do not seem to affect the terminal's operation in any way, contrary to what the lights might say.

- 1. 133 Lights L3
- 2. 134 Lights L4
- 3. 135 nothing(?)
- 4. 136 Alarm bell
- 5. 137 Fast repeat key mode, even some control keys!
- 6. 138 Turns off "On Line" and lights "Local"
- 7. 139 Lights "KBD Locked"
- 8. 140 Lights L1
- 9. 141 Lights L2
- 10. 142 Lights L3
- 11. 143 Lights L4
- 12. 144 nothing(?)
- 13. 145 Alarm bell

The numbers 146 to 254 continue to repeat the sequence by nines over and over, as partially shown above. Anything from 255 and up turns off the "On Line" LED and turns on the "Local" LED.

#### 2.0 Changing the BASIC2 prompt

In previous versions of Basic Plus II, DEC made it easy to change your prompt to mixed case. With version 1.6, this was prevented. The following ONLPAT command file will change the "BASIC2" prompt to a more appealing "Basic2".

```
! Change the compiler prompt to "Basic2"
File to patch? $BASIC2.TSK
Base address? 26:660
Offset address? 0
       Offset Old
                       New?
Base
000660 000000 040502 ? "BA + 20000
000660 000002 044523 ? "SI + 20040
000660 000004 031103 ? "C2+40
000660 000006 000000 ? †C
! Change the keyboard monitor prompt to "Basic2"
File to patch? [0,1]BP2COM.RTS
Base address? ..RDY
Offset address? 10
                       New?
Base
        Offset Old
164466 000010 040502 ? "BA + 20000
164466 000012 044523 ? "SI+20040
164466 000014 031103 ? "C2+40
164466 000016 005015 ? †C
```

#### 3.0 Useful BACKUP patches

In the following figures, I have listed three very useful patches to the BACKUP package. All of these patches are intended to be installed after the application of the current patch kit. These patches were developed for the version 7.0 BACKUP package, but they also work on the version 7.1 copies as well.

#### **BACKTO**

BACKTO normally opens files mode zero. If BACKTO doesn't have write access, it prints the "data unreliable" message. ("?Protection violation" causes a re-open mode 4096.)

One of our clients has some very large data-base files that are opened in shared update mode. Their problem is sometimes when BACKUP is being done BACKTO will open one of the files when no one is using it. Chugging smoothly along, BACKTO keeps the file opened mode zero. This prevents ANY production job from opening that file until BACKUP is finished with it.

The following patch forces BACKTO to always open files in read-regardless mode (4096). This way, access to data files will never be denied. The disadvantage is the loss of the "data unreliable" checking. This, I think, is a small price to pay

This patch, and the next two, can be applied with the CPATCH program.

```
*G/2/V(cr>
2! <tab><tab>PROGRAM<tab><tab>: BACKTO.BAS<cr>
*H/M9%=2048%/V(cr)
<tab> M9$=2048$ &<cr>
*I/+4096$/V<cr>
<tab> M91=20481+40961 &<cr>
*EX<cr>
```

#### **BACFRM**

Often, I use BACKUP to transport files from one system to another. Sometimes I find a lot of space is wasted on small files when the disk clustersize of the output system is smaller than the input system. The happens because BACKUP has the "feature" of retaining clustersizes. The following patch creates files using the current pack clustersize by disabling the clustersize stored by BACKUP.

```
#G/2/V<er>
2!<tab><tab>PROGRAM<tab><tab>: BACFRM.PAS<er>
#H/CL:"+/V<er>
<tab><tab><tab>C$=C$+"/CL:"+NUM1$(Z0$(P0$,18$)) IF (Z0$ AND 2048$) &<cr>
*2G/Z/-DV(er>
<tab><tab>C$=C$+"/CL:"+NUM1$(ZO$(PO$,18$)) IF (O$ AND 2048$) &<cr>
*EX(er>
```

#### **BACDIR**

The performance of the BACKUP package can be helped considerably by compiling it against Basic Plus II (or CSPCOM). If this done, then you have gained some extra address space to add code to increase further the performance of some of the BACKUP components.

The following patch for BACDIR opens its files with a large recordsize. This large buffer reduces disk accesses and greatly improves BACDIR's elapsed time.

```
*H/2!/V<cr>2!<tab><tab>PROGRAM<tab><tab>: BACDIR, BAS<cr>
*H/1040<tab>/V<cr>
1040<tab>T0=TIME(0%) &<cr>
*G/OPEN W$/V<cr>
<tab> OPEN W$ FOR INPUT AS FILE 1% &<cr>
<tab><tab>,RECORDSIZE 4096% &<cr><esc>*V<cr>
<tab><tab>.RECORDSIZE 4096% &<cr>
<esc>*V<cr><tab> M%=12% &<cr>
*H/15010<tab>/V<cr>
15010<tab>/V<cr>
15010<tab>ON ERROR GOTO 15100 &<cr>
*G/OPEN FNUS/V(cr)
<tab><tab><tab><tab>OFF FNU$(P3$,N$,4224$,4096$) FOR INPUT AS FILE M$ &<cr>**AI<cr>
<tab><tab><tab><tab>.RECORDSIZE 4096% &<cr>
(tab>(tab>Z$=SYS(PRIV.OFF$) &(cr>
```

#### 4.0 Simple TECO.INI file

Below is a TECO initializer file modeled on the one supplied by DEC. It prints the version of TECO, job number, keyboard number, account logged into, date, time, and command to enter TECO. This initializer loads the VTEDIT macro by default. (Use of the "/NOVT" switch disables loading).

This simplified code is patterned directly from the source TECO.INS found on the distribution tape, but without all the silly messages, file-type checking, and other timewasting junk. I will admit it's cute, but it gets old when you're waiting for VTEDIT to load.

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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

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

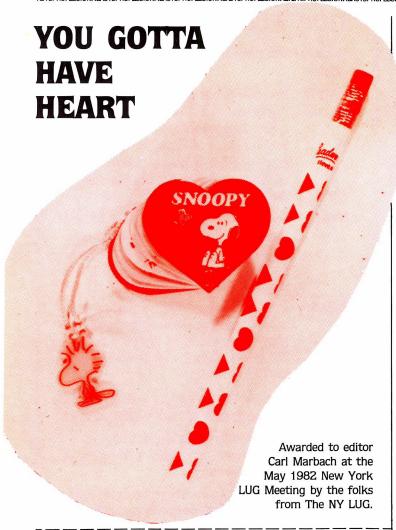
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```
TECO initializer
             (TECO.INI)
          0 $ This macro...
1 % Exit flags:
               +1 => Load VTEDIT
          1 $ Scratch
         2 % ET bits to clear:
+4 => No lower case
            $ Command on entry
          3 % /NOVT flag
! Insert /VT if not found
[3 6:S%/NOVT%"S ^SD < OA"A D > ' -1U3
| 6:S%/VT%"= 6:S% %"S R | ZJ ' 61%/VTEDIT% '
! Save registers, buffer
HX3 HK [1 [2
! Display version, job, KB, PPn !
  24< 13@1%% 10@1%% >
J 8L 1:W/2-12< @I% % > @I%TECO Version % EO\ -1W
2L 1:W/2-14< @I% % >
@I%Job % OEJ\
@I%, KB% 1EJ\
@I$:[$ 2EJ/256\ @I$,$ 2EJ&255\ @I$]$ J -1W
! What time is it?
1440- HU1 Q1/60U2 Q2*40+Q1U1
! AM, PM, noon, or midnight?
@^U1% AM%
Q1-1200"= @^U1% M% '
Q1-1200"> Q1-1200U1 @^U1% PM% '
Q1-100 "< Q1+1200U1 '
16L 1:W/2-9< @I% % >
Q1+10000\ 2R @I$:$ 3R -D ::@FS$0$ $"S R ' 5C G1
! Figure out the month
-2L 1:W/2-15< @I% % > 
^B/1000U2 ^B-(Q2*1000)U1
Q1-32"<
Q1-32" < @I% January % 
Q1-31U1 Q1-29" < @I% February %
                                       @O!FOUND!
                                       @O!FOUND!
Q1-28U1 Q2+2/4*4-Q2-2"= Q1-1U1
                   @I% February %
@I% March %
@I% April %
Q1"= 29U1
                                        POIFOUND! '
Q1-32"
                                        @O!FOUND!
Q1-31U1 Q1-31"< @I%
                                        @O!FOUND!
Q1-30U1 Q1-32"< @I%
Q1-31U1 Q1-31"< @I%
                           May %
June %
                                        @O!FOUND!
                                        @O!FOUND!
Q1-30U1 Q1-32"< @I%
                           July %
                                        @O!FOUND!
Q1-31U1 Q1-32"< @I%
                           August %
                                        @O!FOUND!
Q1-31U1 Q1-31"< @I%
                         September %
                                       FO!FOUND!
Q1-30U1 Q1-32"< @I%
                          October %
                                        @O!FOUND!
Q1-31U1 Q1-31" < @I%
                         November %
December %
                                        @O!FOUND!
Q1-30U1
                   @I%
Q1\ @I%, % Q2+1970\ J -1W
! Display command
@1%Command: % G3 -1W
Q3"= 4L @I%Loading VTEDIT macro% -2L -1W ' '
! Restore registers, buffer
!EXIT!
]2 ]1 HK G3 ]3
```

#### 5.0 Closing notes

That concludes this issue. If you have any suggestions for items that you would like to see covered in this space editing or otherwise — please feel free to contact me either directly or through the RSTS Pro. Until next issue, have a good edit.

XL (Adult Sizes Only)

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- COLINK, a package that links two RSTS/E systems together using DMC11s. Supports file transfers, virtual terminals, and across-the-link task communication.
- **DIALUP**, a package that uses an asynchronous terminal line to link a local RSTS/E system to a remote computer system. Supports file transfers, virtual terminals, and dial-out through a DN11.

(The performance-critical portions of the first five packages are implemented in assembly language for efficiency.)

#### Evans Griffiths & Hart, Inc.

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CIRCLE 29 ON READER CARD

#### CORRECTION! CORRECTION! CORRECTION! CORRECTION!

The following section was inadvertently omitted from "The Disk Inversion Map" by Michael H. Koplitz [RSTS PROFESSIONAL, v. 4, no. 3, June 1982, p. 37].

In addition, we have reprinted Mr. Koplitz' sample map, enlarged for clarity.

```
020
         ON ERROR GOTO 32000
                                                     !ERROR FLAGGING SET UP
030
         PRINT "MAPUFD V2.1
                                       Full disk map'
         PRINT
                                                     !PRINT BANNER.
035
         INPUT "Device"; DEVICE$
                                                     !GET DEVICE TO EXAMINE
040
         OPEN "MAPUFD.DAT"
                 FOR OUTPUT AS FILE #10%
                                                     10PEN OUTPUT FILES FOR OUTPUT
080
         OPEN "[1,1]"+DEVICE$
                 FOR INPUT AS FILE #1%,
                 MODE 8192%
                                                     IOPEN THE MFD READ ONLY
090
        PCS% = 16%
        CS% = 16%
FOR X% = 1% TO 7%
                 DISK.CLUSTER
                          = (MFD%(31%,X%) - 1%)
* DCS%/PCS%
                 DISK .CLUSTER$
                          = NUM1 $ (DISK .CLUSTER)
                 DISK CLUSTER$
                    STRING$ ((5-LEN(DISK.CLUSTER$))
                          ,48%)
+ DISK CLUSTER$
                 OUTPUT$ = DISK.CLUSTER$ + "
                         + "[ 0, 0]***MFD***,"
+ NUM1$(MFD%(31%,0%))
                 OUTPUTS = OUTPUTS
                          + SPACE$ (50%-LEN (OUTPUT$))
```

```
PRINT #10% OUTPUTS
                                                                                                510
                                                                                                         LINK% = UFD% (UFD.LINK%, 7%)
                                                                                                                                                       !RETRIVAL LINK TO SUBROUTINE
                            IF MFD% (31%,X%) <> 0%
                                                       IWRITE TO OUTPUT FILE THE ! MFD CLUSTERS
         NEXT X%
                                                                                                515
                                                                                                         COSUB 15000
                                                                                                         UAR.LINK% = LINK%
GOTO 900 IF UAR.LINK% = 0%
                                                                                                 1
                                                                                                                                                       IGET RETRIEVAL ENTRIES
100
         LINK% = MFD% (0%,0%)
                                                       ISET-UP FOR SUBROUTINE
                                                                                                520
                                                                                                         FOR X% = 1% TO 7%
105
          GOSUB 15000
                                                                                                                  GOTO 900
                                                       !GET FIRST NAME ENTRY, GIVE
! VALUE OF ARRAY INTO LINK%
         MFD.LINK% = LINK%
                                                                                                                     IF UFD% (UAR.LINK%,X%) = 0%
                                                                                                ١
                                                                                                                  UNSIGNED.TEST =
                                                         THEN RETURNED LINK% IS
                                                                                                                           FNUSI (UFD% (UAR.LINK%,X%))
                                                                                                                  DISK.CLUSTER = ((UNSIGNED.TEST-1)*DCS%)/PCS%
                                                       ! INDEX INTO ARRAY
         GOTO 120 IF LINK% = 0%
110
                                                                                                                  DISK.CLUSTER$ = NUM1$(DISK.CLUSTER)
DISK.CLUSTER$ =
         PROJ = SWAP* (MFD* (MFD*, LINK*, 1%))
AND 255%
PROG = MFD* (MFD*, LINK*, 1%) AND 255%
UFD*, CLUSTER = FNUSI (MFD*, (MFD*, LINK*, 7%))
                                                                                                                     STRING$((5-LEN(DISK.CLUSTER$)),48%)
+ DISK.CLUSTER$
                                                                                                                                                       IGET RETRIEVAL ENTRIES
         GOTO 1000 IF UFD.CLUSTER <= 0%
         GOTO 1000
                                                                                                                  OUTPUT$ = DISK.CLUSTER$+","+
FILE.NAME$+","+
                                                                                                525
                  IF (MFD%(MFD.LINK%,4%) AND 64%)
                            <> 64%
                                                                                                                            NUM1 $ (CLUSTER .SIZE%)
         GOTO 130
                                                       IGET PROG AND PROJ NUMBER
                                                                                                                  OUTPUT$ = OUTPUT$
                                                                                                                  + SPACE$(50%-LEN(OUTPUT$))
PRINT #10%,OUTPUT$
                                                       ! SKIP IF NOT MFD ENTRY
                                                       ! SKIP IF NO UFD EXISTS
                                                                                                                            IF INSTR(1%,DISK.CLUSTER$,".")
120
         PRINT "END OF PHASE 1"
                                                                                                                                     = 0%
         GOTO 32767
                                                       !END OF PHASE 1
                                                       IGOTO END OF PROGRAM
                                                                                                         NEXT X%
                                                                                                                                                       IPRINT OUT RETRIEVAL ENTRIES,
130
         PROJ$ = NUM1$ (PROJ%)
                                                                                                                                                       ! DISK.CLUSTER = ((DCN-1)*DCS)
         PROJ$ = SPACE$(3%-LEN(PROJ$))+PROJ$
                                                                                                                                                                            /PCS
         PROG$ = NUM1$ (PROG$)
PROG$ = SPACE$ (3$-LEN (PROG$))+PROG$
UFD.ACCOUNT$ = "["+PROJ$+","
+ PROG$+"]"
                                                                                                530
                                                                                                         LINK% = UFD% (UAR.LINK%,0%)
                                                                                                         GOTO 515
                                                                                                                                                       !GET MORE UNTIL ZERO IN LINK%
                                                       IFORMAT THE UFD. ACCOUNT
140
         LINK% = MFD% (MFD.LINK%,6%)
                                                                                                900
                                                                                                         GOTO 200
                                                                                                                                                       IGET MORE UFD ENTIRES
         GOSUB 15000
         LINK.TO.ACCOUNTING% = LINK%
         UFD.CLUSTER.SIZE% = MFD%(LINK.TO.ACCOUNTING%,7%)
                                                                                                         LINK% = MFD% (MFD.LINK%,0%)
                                                                                                1000
                                                       IGET NEXT UFD NAME ENTRY
                                                                                                         GOTO 105
                                                                                                                                                       !GET NEXT MFD
                                                       ! AND GET ACCOUNTING ENTRY
150
         OPEN LIFT ACCOUNTS+DEVICES
                                                                                                       15000
                  FOR INPUT AS FILE #2%,
                  MODE 8192%
                                                       !OPEN UFD
                                                                                                          THIS SECTION CALCULATES A LINK%
         GOTO 160 IF UFD.ACCOUNT$ = "[ 1, 1]" FOR X% = 1% TO 7%
155
                                                                                                        CLO.MASK% = 7% * 512%
ENO.MASK% = 31% * 16%
UL.BLO% = (SWAP%(LINK%) AND 240%)*2%
UL.CLO% = ((LINK%) AND CLO.MASK%)/16%)*CS%
UL.ENO% = (LINK% AND ENO.MASK%)/16%)
                  DISK.CLUSTER
                                                                                                15010
                  = FNUSI(UFD%(31%,X%))
DISK.CLUSTER =
                      ((DISK.CLUSTER - 1) *DCS%)/PCS%
                  DISK.CLUSTER$ =
                           (NUM1 $ (DISK.CLUSTER))
                  DISK.CLUSTER$ =
STRING$((5-LEN(DISK.CLUSTER$)),48%)
                                                                                                15050
                                                                                                         LINK% = UL.BLO% + UL.CLO% + UL.ENO%
                                                                                                         RETURN
                 1* THIS FUNCTION CONVERTS UNSIGNED INTEGER TO FLOATING PT.
                  OUTPUT$ = OUTPUT$
+ SPACE$(50%-LEN(OUTPUT$))
                                                                                                       PRINT #10%,OUTPUT$
                           IF UFD% (31%, X%) <> 0%
                                                                                                         DEF FNUST (USTNT%)
                                                                                                15110
         NEXT X%
                                                       !WRITE OUT CLUSTERS THAT ARE
                                                                                                         USTMP = USINT%
USTMP = USIMP + 65536 IF USINT% < 0%
                                                       ! UFD CLUSTERS, SKIP IF THE ! ACCOUNT IS [1,11] THE MFD.
                                                                                                         FNUSI = USIMP
                                                                                                         FNEND
160
         UFD.LINK% = UFD%
                                                       ISET UFD LINK
                                                                                                20040
                                                                                                         RETURN
200
         LINK% = UFD% (UFD.LINK%.0%)
                                                       IPREPARE FOR SUBROUTINE
                                                                                                32000 !****************************
205
         GOSUB 15000
         UFD.LINK$ = LINK$

GOTO 200 IF UFD$(UFD.LINK$,4$) AND 64$

GOTO 1000 IF UFD.LINK$ = 0$
                                                                                                       I* ERROR SECTION.
                                                       IGO GET NEXT LINK
                                                       ISKIP IF MFD ENTRY
                                                                                                        IF ERR = 28 THEN 32767
                                                                                                32005
        FILE.NAME$ = UFD.ACCOUNT$+
RAD$(UFD*(UFD*LINK*,1*))+
210
                                                                                                        IF ERL = 150 THEN RESUME 1000
                                                                                                32010
                  RAD$(UFD%(UFD.LINK%,2%))+
                                                                                                32020
                                                                                                         ON ERROR GOTO 0
                  RAD$(UFD%(UFD.LINK%,3%))
                                                       IPRINT FILE NAME
                                                                                                32766 !*****************************
220
         LINK% = UFD% (UFD.LINK%,6%)
                                                                                                       1* EOJ
         UAA.UFD.LINK% = LINK%
                                                       !ACCOUNTING LINK
        CLUSTER.SIZE% = UFD% (UAA.UFD.LINK%,7%)
IF UAA.UFD.LINK% <> 0%
230
                                                                                                32767
                                                                                                         CLOSE #1%
         CLUSTER.SIZE% = 16%
                                                                                                         CLOSE #2%
                  IF UAA.UFD.LINK% = 0%
                                                       !CLUSTER SIZE
                                                                                                         END
```

\* \* \* FULL DISK MAP \* \* \*

CLUST RANGE FILE NAME	CLUST RANGE FILE NAME	CLUST RANGE FILE NAME	CLUST RANGE FILE NAME
C - 6 [ 0,0]***MFD***	7- 55 ****FREE****	56 - 56 [ 1,1 ]DIBOLR.STB	57 - 58 [ 1,1 ]DIBOLR.TSK
59- 59 [ 1,1]DBRTKB.CMD	60- 60 [ 1,1 ]DBRSRN.ODL	61 - 27805 ****FREE****	27806-27806 ****END****

## 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.

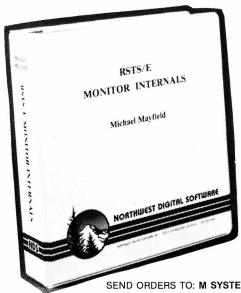
Information is available for all levels of users:

- 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.

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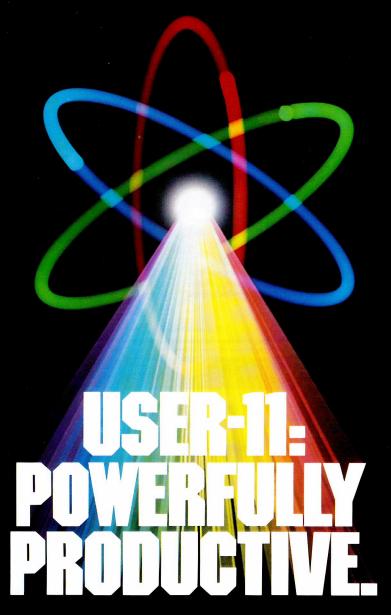
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\*USER-11 is currently available for DEC computers using the RSTS operating system.

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

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#### ☐ 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.

#### ☐ ENCRYPTION 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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## 11/74's NOW AVAILABLE

For internal use, the Internal Equipment Group (IEG) has 11/74 CPUs available for internal distribution in the New England area only. The 11/74 is functionally equivalent to the 11/70, supporting the same hardware as well as running the same software. The 11/74 is a viable alternative to the 11/70, and has significant reliability improvements designed in.

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- ☐ Increased EMI/ESD (FCC compliances) performance
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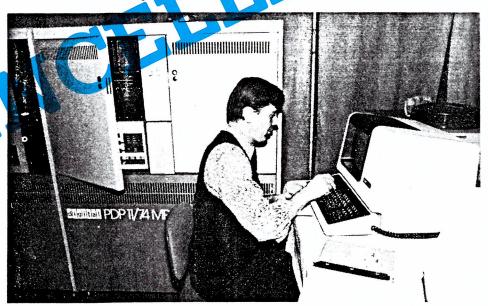
Field Service is committed to support 11/74 internal systems in the New England area.

If you are considering upgrading an existing 11/34, 11/40, or 11/45, the 11/74 CPUs and memory are available 80

days after receipt of order (ARO) from the Internal Equipment Group. Delivery for new system orders are dependent upon the availability of additional material on your order.

The internal PDP-11/74 cost and the field service basic monthly charge are the same as for the 11/70.

Any additional questions regarding ordering and delivery can be answered by your JEG Account Representative at DTN 265-1575.



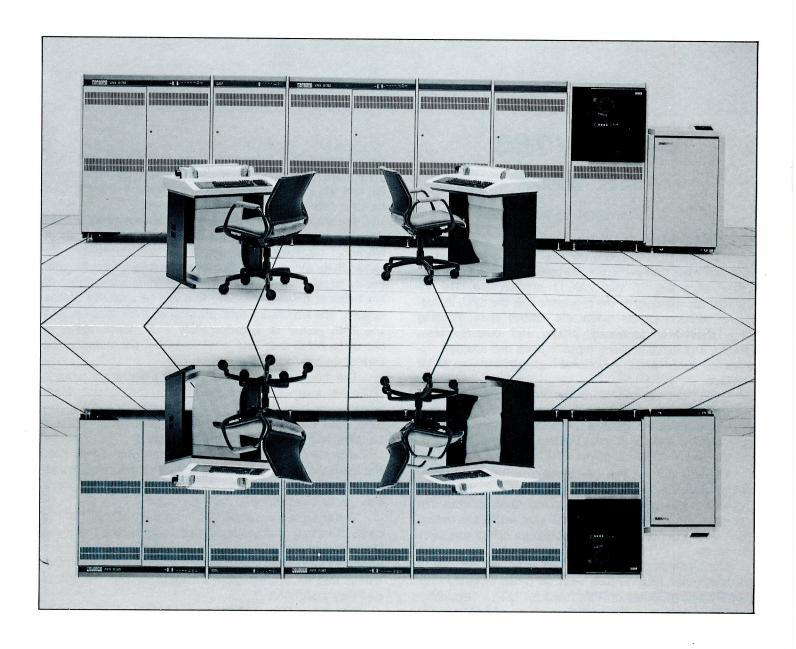
PRIOR TO INTERNAL DECUS SYMPOSIUM, FRED BRASSARD RUNS DIAGNOSTICS OF 11/74.

# The VAX-SCENE

Number 9

(RSTS PROFESSIONAL, Vol. 4, No. 4)

August 1982



#### **INSIDE:**

□ VAX-11/780 AND VMS

page 48 August 1982



## VAX-11/780 AND VMS

By Michael H. Koplitz

#### THE VAX-11/780 PROCESSOR

The VAX-11/780 processor (see figure A) is a set of hardware logic that performs the operations of a computer system according to the VAX-11 architecture. The integrated components of the processor are: the CPU, including its cache, writable diagnostic control store, floating point accelerator (optional), clocks and console; Main memory and its controllers; Input/output bus adapter; Optional multiport memory; Optional high performance 32-bit interface.

The CPU performs all of the logical and arithmetic operations requested by the computer system. The CPU contains sixteen 32-bit general purpose registers for data manipulation, and the Process Status Longword for controlling the execution states of the CPU.

The CPU also includes 12K bytes of writable diagnostic control store for updating the instruction set microcode. This area is also used for storing microcode diagnostics. The processor can also support 12K of user writeable control store, which the user can use to program the processor in microcode.

The VAX-11/780 console consists of an LSI-11 microcomputer (PDP-11/03) with 16 bytes of read/write memory and 8K bytes of ROM (used for LSI-11 diagnostics and LSI bootstrap), a floppy disk system, a hard copy terminal (LA120) and optional remote diagnostic port (RDC). The operator communicates with the VAX-11/780 via the console with a set of user oriented commands.

The VAX-11/780 memory interconnect (same as synchronized backplane interconnect (SBI)) is the system's internal bus conveying addresses, data, and control information between the processor and memory, and between memory and I/O controllers. The memory interconnect has a

cycle time of 200 seconds and can transfer 32 bits each cycle. Data transfers use two consecutive cycles to transfer 64 bits at a time. The maximum memory interconnect transfer rate is 13.3 million bytes/second.

The VAX-11/780 Main Memory consists of MOS RAM integrated circuits with a cycle time of 600 nanoseconds. A memory controller can access a maximum of 4M (4,194,304) bytes. Two memory controllers can be connected to the memory interconnect, yielding a maximum of 8M bytes of physical memory that can be available on the system. The maximum total physical address space is 2 to the 29th power or approximately 512 million bytes. It should be noted that data is fetched from the memory at a rate of 64 bits/access.

The memory controller will buffer a command while it processes another to increase system throughput. Main memory can also be interleaved. The memory system employs error checking and correction that corrects all single bit error and detects all double bit errors.

Memory Cache is the primary cache system for all data coming from memory, including addresses, addresses translations and instructions. The memory cache is an 8K byte, 2 way set associative, write through cache.

The address translation buffer on the VAX-11/780 is a cache of virtual to physical address translations. The cache contains 128 virtual to physical page address translations which are divided into equal sections; 64 system page translations and 64 process page translations. Each section is two-way associative.

The instruction buffer on the VAX-11/780 is eight bytes long and improves CPU performance by prefetching instructions in the instruction stream. The instruction buffer effectively eliminates the time spent by the CPU waiting for instructions to be fetched. The processor interfaces for a MASSBUS peripheral (high speed disks or tape drives) is the MASSBUS adapter. The MASSBUS adapter performs control, arbitration, and buffering functions. Up to four MASSBUS adapters can be connected to the memory interconnect.

Each MASSBUS adapter includes its own address/translation map that permits scatter/gather disk transfers. The MASSBUS adapter includes a 32 byte silo data buffer. Data are assembled in 64 bit quadwords (plus parity) to make efficient use of the memory interconnect bandwidth.

All devices other than the high speed disk drives and magnetic tapes are connected to the UNIBUS, an asynchronous bidirectional bus. These devices include all Digital, and user-developed real-time peripherals. The UNIBUS is connected to the memory interconnect through the UNIBUS adapter. Up to four UNIBUS adapters can be placed on the memory interconnect. The UNIBUS adapter translates an 18 bit UNIBUS address into a 30 bit memory interconnect address. The speed of data paths on the UNIBUS is 1.35 million bytes/second.

## THE VMS OPERATING SYSTEM VAX/VMS Operating System Overview

VAX/VMS is a general purpose operating system for VAX systems. VMS allows for a high-performance environment for the concurrent execution of multiuser timesharing, batch and real time applications written in BASIC, COBOL, FORTRAN, PASCAL, BLISS, CORAL, PL/1 and assembly language.

VAX/VMS features include memory management, event-driven priority scheduling, shared memory, file and interprocess communications, data protection based on ownership and application groups, user privilege and resource allocation control, and easy-to-use, easily extended command language.

VAX/VMS also includes multijob batch processing, program development tools, extensive file and record management services, programmed system services for process and subprocess control and interprocess communications, common run-time procedure library, and system maintenance utilities.

VAX/VMS also includes the following facilities: Operating system nucleus, including virtual memory manager, swapper, system services, and I/O device driver, user authorization control programs, job initiator, and symbiont manager, account manager, and operator communications manager.

Other special features include error logging and print utility, DCL command interpreter, MCR command interpreter, interactive and batch editors, macro assembler, linker with cross reference, library maintenance utility, common run-time procedure library, symbolic debugger for native programs, RMS, FILES-11, SORT/MERGE utility, user environment package, and software maintenance release update utility.

#### **VAX/VMS VIRTUAL MEMORY SYSTEM**

VAX/VMS consists of  $2^**32$  (two to the 32nd power) bytes of virtual address space divided into system and process spaces, each of which has  $2^**31$  bytes. Process virtual space is divided into a program region and a control region. The program region contains the image of the job currently being executed. The control region contains information

maintained on behalf of the process by the system, and it contains the user stack and the kernel, executive and supervisor mode stacks. Only a small amount of the control region is reserved for the system, the remainder is available to the user.

The virtual memory for a process is subdivided into pages. Each page consists of 512 bytes. The system and user virtual spaces are described in a data structure called the system page table (SPT) which contains one page table entry for each page of system virtual memory. When a virtual page is in memory, the page table entry contains the page frame number needed to map the virtual page to a physical page.

The process's virtual space is described in two page tables: the PO page table for the program region and the P1 page table for the control region. The hardware system base register (SBR) and system length register (SLR) provide the physical address and the length in longwords of the system page table. Given the contents of the SBR and SLR, it is possible to locate all system virtual pages.

Memory management uses page tables as the data base to contain the status and location of virtual pages of processes. A process contains an entry in the appropriate process page table to describe that page and its location.

The following are descriptions of the processes and services performed by VAX/VMS:

#### **WORKING SET**

The section of pages of a process that need to be in memory, remaining pages are kept on a secondary storage device.

#### **BALANCE SET**

The set of processes that reside in physical memory are termed the balance set. This set of processes has memory requirements that balance with available memory of the system.

#### **WORKING SET SWAPPER**

The working set swapper is a small process that returns process working sets into the balance sets and removes them from the balance set. The main function of this process is to provide memory residency for the highest priority executable processes so that they may be scheduled for execution.

#### PROCESS SCHEDULING

VAX/VMS operating system defines 32 levels of software for scheduling processes. The lower 16 levels are reserved for normal processes, while the higher 16 levels are reserved for real-time processes. The scheduler makes scheduling using the following policies:

- 1. Maintaining a queue for each state that a process can attain.
- 2. Reacting to system events.

System events are occurrences that causes the status of one or more processes in the system to change.

#### SYSTEM PROCESSES

There are three types of system processes:

- 1. Full process user processes.
- Small process no program region in their virtual address space, they must remain resident in memory when operating, for example the working set swapper is a small process.
- 3. Fork process they are defined by an abbreviated control block. Fork processes execute at software interrupts. An example is a device driver routine.

#### SYSTEM SERVICES

EVENT FLAG SERVICES — Allowing a process to read, wait for, and manipulate event flags.

ASYNCHRONOUS SYSTEM TRAP (AST) SERVICES — these traps are for interrupts caused by 1/0 completions. System services are provided so that a process can control the handling of the ASTs.

LOGICAL NAME SERVICES — generalized technique for maintaining and accessing character string logical names and equivalence name pairs.

I/O SYSTEM SERVICES:

- Perform physical, logical and virtual data I/O operations.
- 2. Format output lines, converting binary numeric values to ASCII strings, substituting variable data in ASCII strings.
- 3. Perform network operations.
- 4. Queue messages to system processes.
- 5. Create mailboxes, which are virtual devices for interprocess communications.

PROCESS CONTROL SERVICES — allows the user to create, delete and control the execution of a process.

TIMER AND TIME CONVERSION SERVICES — schedules events for a particular time of day or after a specified interval of time has elapsed.

CONDITION HANDLING SERVICES — procedures that can be designated to receive control when a hardware or software condition occurs during image execution.

MEMORY MANAGEMENT SERVICES — allows a process to control its own use of virtual and physical memory.

CHANGE MODE SERVICES — alter the access mode of a process to a more privileged mode to execute particular routines.

## INTERPROCESS COMMUNICATIONS AND SYNCHRONIZATION

Interprocess communications can occur using the following methods:

- 1. Shared data base
- 2. Mailboxes
- 3. Shared files

#### **VAX/VMS INPUT/OUTPUT**

I/O INTERFACES — I/O programming interfaces are RMS (record management services for general purpose file and general processing) and direct I/O processing.

I/O REQUEST PROCESSING — all I/O requests are generated by a Queue I/O (QIO) request system service.

#### **VAX/VMS REAL TIME ENVIRONMENT**

VAX/VMS has established the following attributes for a real time environment:

- 1. Highly efficient process scheduler providing 16 real time process priorities.
- 2. Rapid process context switching.
- 3. Rapid hardware process of interrupts.
- 4. Interrupts vectored to VAX/VMS device drivers.
- VAX/VMS support of PDP-11 peripherals and facilities to enable users to add support of their own devices.
- 6. Ease of use facilities to provide mapping of the I/O page and connecting to an interrupt.

#### I/O DRIVERS

A VAX/VMS device driver is a set of tables and routines that control I/O operations on a peripheral device interfacing to a VAX system. A VAX/VMS device driver:

- 1. Defines the peripheral driver for the rest of the VAX/VMS operating system.
- 2. Defines the driver for the operating system procedure that maps and loads the driver and its device data base into the system virtual memory.
- 3. Initializes the device (and/or its controller) at system startup time and after a power failure.
- 4. Translates software requests for I/O operations into device specific commands.
- 5. Activates the device.
- 6. Responds to hardware interrupts generated by the device.
- 7. Reports device errors.
- 8. Returns data and status from the device to software.

#### USER ACCOUNT SCHEME

Accounts for each user are used for the following reasons:

- 1. To denote the users of the system.
- 2. To define important relationships among users of the system. For example, groups of users who may share data files.
- 3. To grant some users privileges.
- 4. To set limits on the user of re-usable resources.
- 5. To give user priorities in using the system.

The User Authorization File (UAF) is used to designate the above possibilites. Each user has one record in the UAF. VAX/VMS examines the UAF whenever a process is running to ensure that the user's process can have access to a resource.

The UAF record contains the following:

- 1. User's identification
  - a. User's name
  - b. Password
  - c. UIC (user identification code)
  - d. Account name
- 2. User's default directory name and default device name

## RSTS/E ON VAX ROSS/V

(RSTS/E Operating System Simulator for VAX)

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

#### **ROSS/V supports:**

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

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

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

#### ROSS/V is available from:

(Eastern U.S.)

Evans Griffiths & Hart, Inc.
55 Waltham Street
Lexington, Massachusetts 02173
(617) 861-0670

(Central U.S.)
Interactive Information Systems, Inc.
10 Knollcrest Drive
Cincinnati, Ohio 45237
(513) 761-0132
CIRCLE 67 ON READER CARD

(Western U.S.)

Online Data Processing, Inc.
N. 637 Hamilton

Spokane, Washington 99202
(509) 484-3400

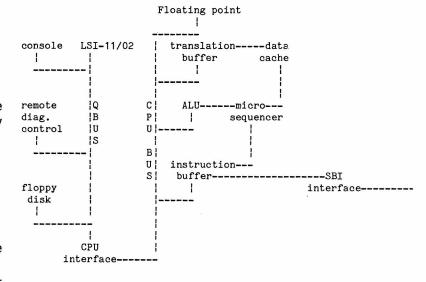
- 3. User's default command interpreter name
- 4. User's allotment of system resources
- 5. User's privileges
- 6. User's base priority

#### **DIGITAL COMMAND LANGUAGE (DCL)**

DCL is used to request some action to be taken by the operating system. There are many DCL commands so only the format will be discussed.

[label:] command-name[qualifier] [parameter-1]...[parameter -n] where:

- 1. dollar sign \$ must be in position one.
- 2. Brackets indicate and optional value.
- Labels used to transfer flow of control via the GOTO command.
- 4. Command names indicates the action the command is to perform.
- 5. Qualifiers used to modify the default action of a command.
- 6. Parameters either specifies what a command is to use when executing, or further defines the action a command is to take.



console

central processor

FIGURE A. VAX-11/780 PROCESSOR

August 1982

A Column For The Advanced RSTS/E User

Wef Fleischman, Software Techniques, Inc.

#### **DETERMINING SYS() CALL PRIVILEGES**

One of the most critical responsibilities a system manager confronts daily is protecting the security and integrity of his system. This column will explore a very simple monitoring technique that can help you pinpoint quickly one class of "trap doors": Privileged SYS calls that have been changed to be non-privileged.

The RSTS system manager's job is made easier by protection mechanisms that have been built into RSTS over many years. DEC originally targetted "RSTS" (and some predecessors) for the educational environment where protection from the curious and industrious student was a prime design criterion. Thus began the evolution of one of the most secure operating systems available today, tested by thousands of commercial users besides the generations of ingenious students that exposed numerous "holes" in the RSTS security blanket. Yet, now as your feelings of euphoria start to swell, with all this experience behind you (and your operating system), your confidence will surely be crashed by a repeated security breach. Why do such problems still arise?

Security breachers obviously prefer to maintain a low profile. They cannot use privileged accounts (very often) for fear of being discovered by a simple SYSTAT listing. A short interlude with privilege can allow running the ONLPAT program to modify the RSTS monitor .SIL file. Once the system is subsequently rebooted, any changes become effective (and will remain in your system until your next SYSGEN).

Extensive changes to the .SIL using ONLPAT are very unlikely. However, small changes can be made very quickly and unnoticably such as altering whether or not SYS() calls require privilege. A good example is for the intruder to make the UU.JOB ("create a job") UUO non-privileged. This allows any non-privileged user to run any program he wishes "logged-out". (Logged-out jobs are those that appear as [\*\*,\*\*] in SYSTAT.) These jobs always have privilege due to the JFNOPR bit in their keyword, therefore they have access to any system resources. The system manager can easily check for an alteration of this type and even make it automatically checked on system startup. The rest of this column shows how you can go about it.

When you issue a FIP SYS() call to BASIC-Plus or BASIC-PLUS-2, it is preprocessed and then passed to the RSTS monitor via the .UUO directive. Then the monitor finds an entry in the UUO function dispatch table, UUOTBL, based on byte 2 of the passed string. The dispatch table contains the addresses of the monitor routines which service each SYS() call

and also a bit (bit 15) to signify whether or not privileges are required. ONLPAT is quite efficient at locating and changing UUOTBL.

If someone modifies the UUOTBL entry for a privileged SYS() call to become non-privileged, a "trap-door" may be opened in the system.

The BASIC-Plus program UUOLST below is a very simple way of displaying whether or not UUO's are currently set up as privileged. The current setting is compared with the standard setting supplied with the distribution, and an asterisk is printed if a difference is detected.

There are many different ways of accomplishing the same end as UUOLST. It can certainly be implemented to run faster in MACRO or BASIC-Plus-2. You might feel more comfortable just running ONLPAT and displaying the contents of UUOTBL. Whatever your choice, make your procedure less obvious (or less conspicuously named) than "UUOLST" so that you lessen the chance that someone will figure it out and disable it.

For those that are interested, the use of the message send/receive SYS() call to do an .XPEEK is demonstrated in line 2000. If you have a RSTS V7.0 system or earlier, .XPEEK is not available. Just use PEEKs to fetch each word of UUOTBL rather than the single .XPEEK.

You could write a similar program to control system startup and issue UU.DIE if any discrepancies are detected. This is left as an exercise for the reader. Good luck 'til next time

#### SAMPLE PROGRAM

[4,8] UUOLST.BAS

```
000000 000000 000106 ? $UUOTB=
Value = #075072, 31290.
000000 000000 000106 ? ^C
          UUOTBL% = 31290%

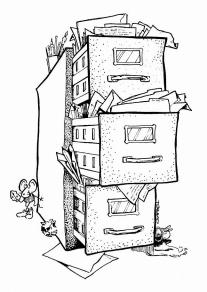
UU.MIN% = -29%

UU.MAX% = +28%

UUOSIZ% = (UU.MAX% - UU.MIN% + 1%) * 2%

OPEN "NL:" AS FILE #1%, RECORDSIZE UUOSIZ%
          SET SUUOTBL VALUES FROM THE .SIL ALLOCATE AN I/O BUFFER TO RECEIVE .XPEEK DATA
 2000
          X$ = SYS(CHR$(6%) + CHR$(22%) + CHR$(4%)
                       $(CHR$(08) + CHR$(228) + CHR$(08)
+ CHR$(UUOTBL$) + CHR$(SWAP$(UUOTBL$))
+ STRING$(4%, 0%)
+ CHR$(1%) + CHR$(0%)
+ CHR$(UUOSIZ%) + CHR$(SWAP$(UUOSIZ%)))
          XPEEK AT UUOTBL
         RESTORE
          PRINT #0%,
                       Description" &
         FOR N% = UU.MIN% TO UU.MAX%
READ UUO.SYMBOLS, UUO.SYS.NO%, PRIV.NORM$, UUO.DESC$
IF PRIV.NORM$ = "P"
THEN PRIV.NORM$ = "Yes"
ELSE PRIV.NORM$ = "No"
         RESTORE TO BEGINNING OF DATA PRINT REPORT HEADER FOR EACH POSSIBLE UUO SUBFUNCTION... READ IN ITS STANDARD INFORMATION CONVERT PRIVILEGED CHARACTER TO YES/NO
                      FNUUODSP%(N%) AND 1%
PRIV.HERE$ = "Yes"
PRIV.HERE$ = "No"
2015
        | CONVERT "PRIVILEGE REQUIRED" BIT TO YES/NO
                      PRIV.NORM$ = PRIV.HERE$
ALERT$ = ""
ALERT$ = "*"
          THEN
          ALERT THE USER IF PRIVILEGE SETTINGS DON'T MATCH .SIL
         PRINT #0%, USING "\ \ ### \\ \ ! \
                          UUO.SYMBOL$
UUO.SYS.NO%
PRIV.NORM$
                         , PRIV.HERE$
          NEXT N%
GOTO 32767
          PRINT A UUO SUBFUNCTION LINE CONTINUE IF MORE TO DO
        DATA STATEMENTS
```

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CIRCLE 152 ON READER CARD

#### SAMPLE OUTPUT

Symbol	sys	Privi Norm/C			Description
				-	
UU.TB3		No	No		MONITOR TABLES PART 3
UU.SPL		No	No		ONE-SHOT SPOOLING REQUEST
UU.DMP		Yes			ONLINE MONITOR SNAPSHOT
UU.FIL		Yes		*	FILE UTILITY
UU.ATR		No	No		READ/WRITE FILE ATTRIBUTES
UU.CCL	-23	Yes	Yes		CCL COMMAND ADD/DELETE
	-23	Yes Yes	Yes		RESERVED
	-21	Yes	Yes		RESERVED
	-20	Yes	Yes		RESERVED
UU.LOG		Yes	Yes		RESERVED SET NUMBER OF ALLOWED LOGINS
UU.RTS		Yes	Yes		RUN-TIME SYSTEM & RESIDENT LIBRARY CONTROL
UU.NAM		No	No		SET FILE'S RUN-TIME SYSTEM NAME
UU.DIE			Yes		SPECIAL SHUTUP LOGOUT
UU.ACT			Yes		ACCOUNTING INFORMATION DUMP
UU.DAT			Yes		DATE/TIME CHANGER
UU.PRI		Yes	Yes		PRIORITY, RUN BURST, MAXIMUM CHANGER
UU.TB2		No	No		2ND PART OF MONITOR TABLES
UU.BCK		Yes	Yes		BACKUP FILE ACCOUNTING CHANGER
0.0.0.000	-10	Yes	Yes		RESERVED
UU.HNG	-9	Yes	Yes		HANGUP/ENABLE A DATASET
UU.FCB	-8	No	No		GET FCB/DDB INFORMATION
	-7	Yes	Yes		RESERVED
UU.POK	-6	Yes	Yes		POKE MONITOR MEMORY
	-5	Yes	No	*	RESERVED
	-4	Yes	Yes		RESERVED
UU.TB1	-3	No	No		1ST PART OF MONITOR TABLES
UU.NLG			Yes		SET NUMBER OF ALLOWED LOGINS TO 1
UU.YLG		Yes	Yes		SET NUMBER OF ALLOWED LOGINS TO MAXIMUM
UU.PAS			Yes		CREATE AN ACCOUNT
UU.DLU			Yes		DELETE AN ACCOUNT
UU.CLN		Yes	Yes		CLEAN A DISK PACK
UU.MNT			Yes		DISK PACK MOUNT/DISMOUNT
UU.LIN			Yes		LOGIN
UU.BYE	5		Yes		LOGOUT
UU.ATT		Yes	Yes		ATTACH
UU.DET	7	Yes	Yes		DETACH
UU.CHU		Yes			CHANGE PASSWORD/QUOTA
UU.ERR		No No	No No		GET ERROR MESSAGE TEXT
UU.ASS UU.DEA		No	No		ASSIGN DEASSIGN
UU.DAL	12	No	No		DEASSIGN ALL
UU.ZER	13	No	No		ZERO DEVICE
UU.RAD	14	No	No		READ ACCOUNTING INFORMATION
UU.DIR		No	No		GET DIRECTORY INFORMATION
UU.TRM	16	No	No		SET TERMINAL CHARACTERISTICS
UU.LOK	17	No	No		WILDCARD DIRECTORY LOOKUP
OU. DON	18	Yes	Yes		RESERVED
UU.CHE	19	Yes	No	*	CACHE ENABLE/DISABLE
UU.CNV	20	No	No		CONVERT DATE/TIME TO ASCII
UU.SLN	21	Yes	Yes		SET/CLEAR SYSTEM-WIDE LOGICAL NAMES
	22	Yes	Yes		RESERVED
UU.SWP	23	Yes	Yes		ADD/REMOVE SWAP, OVERLAY, ERROR MSG FILES
UU.JOB	24	Yes	Yes		JOB CREATION
UU.PPN	25	No	No		WILDCARD PPN LOOKUP
UU.SYS	26	No	No		RETURN JOB STATUS INFORMATION
	27	No	No		RESERVED
UU.NME	28	No	No		NAMED DIRECTORY HOOK

## WRITING A RUN-TIME SYSTEM (or Happiness in the HISEG)

. . . continued from page 31

top end of the users address space. One way to do this is as follows: we put the psudeo-vectors in a psect called '.99998'. The faithful task builder (who loves putting psects in alphabetical order) will force this psect to the end of our partition, after all the other rts code. Now we have the vectors at the end of our code, but in order for the rts to work, the last word in the vector region must land at (octal) 177776. This means that the vectors must begin at 177732; so, we put a 'dummy' psect (with nothing in it) just before the psudeovector region. That psect is called '.99997.' Now we can use the EXTSCT (extend section) option of the task builder to force our psudeo-vectors to start at just the right place. Unfortunately, this method requires two task builds; one with an EXTSCT of zero, so we can calculate how much to extend the dummy psect, then another with the EXTSCT option plugged in to actually get the rts to line up. Next the entire mess is run through MAKSIL, which adds a symbol table to the code and through some other black magic, actually builds the rts. Since this task build procedure leaves lots of room for human error (and since I'm quite lazy) I use a system of 2 ATPK command files, and a TECO macro to build the rts. The first command file builds the rts with an EXTSCT of zero, then runs the TECO macro. The TECO guy looks at the TKB map of the rts, finds out where the psudeo-vector psect actually starts, and calculates what the EXTSCT parameter should be for the psudeo-vectors to line up. It then edits the SECOND command file, plugging in the newly figured EXTSCT value. (Please keep in mind that TECO isn't a supported product. . .) We then execute the second command file to task build the image with the new EXTSCT value, then run it through MAKSIL. Figure 1 shows the first command file, Figure 2 is the TECO macro, Figure 3 is the second command file.

#### Using the rts.

In order to enter the new rts, you can do one of two things; you could SWITCH to it with the switch cusp (or just execute the switch rts sys call), or you could run a program which has been NAMED to that rts. For example:

Ready

SW OSCAR Welcome to OSCAR [Exit]

Ready

. . . continued on page 56

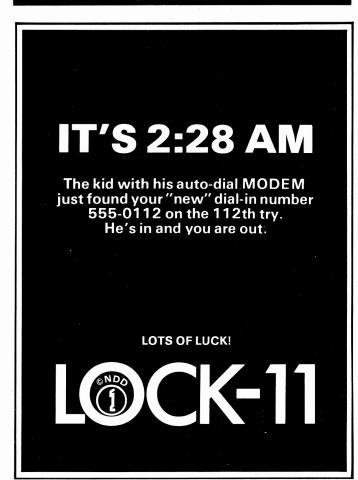
## IT'S 3:15 PM MONDAY

Tired of writing depreciation journals in 3,5;GL, your third assistant bookeeper just discovered the joys of 4,0;PAY.

He's on his way from the bank to the airport.

**LOTS OF LUCK!** 

L©CK-11



## Software Product Description

Product Name: LOCK-11 Version 2.3

#### Description:

Lock-11 is a security superstructure built upon the standard RSTS password structure that provides the following extensions:

- Full V7.1 support
- · USERID implementation for Dial-in, Packet and Concentrators.
- Macro DPY a rewrite of VT5DPY for VT100's, interfaced with security file and featuring a repertoire of 'UT' type commands for system managers.
- First release of SAFE-11, a 'menu' environment (KBM/RTS) that keeps non-privileged users where they belong.
- Absolute control of system access by keyboard. Manager may limit any keyboard to certain accounts or groups of accounts and control time as well as day of week access.
- Password knowledge is no longer carte blanche system access. System detects unauthorized use of passwords. Privileged passwords don't work on non-privileged keyboards. Non-privileged passwords work only on specified keyboards.
- Real time system surveillance. Manager specifies a list of alarm keyboards which log all infractions and probes as they happen. Opser is not required.
- Auto-login (with or without password) and chain with specified core common contents by KB.
- Manager may establish special priority/burst settings by KB. Manager may establish default output protection code, @ assignment and up to three specific user logicals for each KB. Default RTS is also selectable. All assignments are made at log-in.
- Manager specifies a list of console keyboards from which security file editor may operate.
- · Manager may define a KB-specific access-denied message.
- Manager may specify number of retries before access-denied and number of access-denied messages before line disable. Hangup on access denied is optional. All above may be specified on a per-kb basis.
- A macro DYNPRI program is included which performs the following functions:
  - Users may be dispatched into ten separate priority queues, separately tunable on-line. Each queue has ten levels. Queues are selectable by KR
  - DYNPRI detects hibernating jobs and announces the fact on ALARM keyboards. Privileged jobs hibernating cause extra loud and long alarms.
  - DYNPRI produces almost no load in operation and runs in 5K words.
  - DYNPRI will hold up to fourteen files open for performance purposes.
  - DYNPRI will kill hibernating jobs in up to ten [p,\*] or [p.pn]'s

#### Minimum Hardware/Software Required:

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

Support: See License Agreement

Installation: User Installed

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0% discount

Second thru Fourth license
Fifth thru Twentieth license

40% discount 70% discount

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#### License Fee

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Contact:

Dave Mallery Nationwide Data Dialog 215—364-2800 or:

PIP JUNK.TSK/RT:OSCAR (any executable program will do for now)

Ready

**RUN JUNK.TSK** Oscar doesn't RUN programs yet...

Ready

Next issue I'll attempt to show how to read the executable code (in this case JUNK.TSK) and even allow it to execute, and how to use the run-time system debugging tool, RTSODT. If you thought ODT was a blessing, wait till you see RTSODT. . .

Enjoy!

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```
[1,12] OSCAR.MAC
                                          a demo run-time system
  define some things in the loseg
 kbarea ==2000
                                                                                                                   ;kb buifer
  define some directives & rsts locations
                                                                                                                 ;address of xrb;address of firgb;exit directive;write directive
  ;detine some text
; spect text newmag: .asciz /Welcome to OSCAR/<15><12> runmsg: .asciz /Oscar dosen't RUN programs yet.../<15><12> eximsg: .asciz /[Exit]/<15><12>
                                                                                                                   ;setup user stack
;point to message to be printed
;and print it
;then exit
                                               #2000.sp
                                               #newmsg,r0
print
exit
 run::
                       m: ov
                                               #2000.sp
                                               #runmsg,r0
print
exit
                                                                                                                   ;point to message ;go print it
                       call
br
 exit:
                                               #eximsg,r0
  .page
.sbttl define pseudo-vectors
  ;
;bits in p.flag
  .asect
PF.KBM: BLKB
PF.NW: BLKB
PF.NER: BLKB
PF.NER: BLKB
PF.CSZ: BLKB
PF.SLA: BLKB
PF.EMT: BLKB
                                                                     ;RTS IS A KEYBOARD MONITOR
;RTS ALLOWS ONLY 1 USER (NO SHARING)
;RTS WANTS TO RUN MAPPED READ/WRITE
;RTS DOESN'T WANT ITS ERRORS LOGGED
;UNCONDITIONAL REMOVE FROM MEMORY ON EXIT
;RUN SIZE IS COMPUTED FROM FILE SIZE
;(SAVE THE LOAD ADDRESS, M. PHYA)
;RTS WANTS EMT CODE IN LOW BYTE AS A PREFIX
                                             at,to
ve+at-p.off
  .macro vector
                       .word
  .endm
  .psect .99997
  .psect .99998
ve::
                                                                                                                    ;say we're a keyboard monitor,
;and we don't wish to log any errors
;default runnable extention for this rts
;minimum size for jobs under this rts
;maximum size " " " " " "
                                               pf.kbm ! pf.ner
  o.flag ==
                                                ^RBOB
  o.dext ==
o.ms1z ==
  o.ms1z ==
o.size ==
                                               1
24.
                      vector p.flag,o.flag
vector p.dext,o.dext
vector p.dext,o.msiz
vector p.msiz,o.msiz
vector p.fis,exit
vector p.cras,exit
vector p.new,new
vector p.bad,exit
vector p.bet,exit
vector p.iot,exit
vector p.iot,exit
vector p.trap,exit
vector p.trap,exit
vector p.cras,exit
vector p.trap,exit
vector p.cras,exit
vector p.cras,exit
vector p.cras,exit
vector p.cras,exit
vector p.cres,exit
vector p.size,o.size
  pvend::
   .asect
                                               177776
                                                                     P.SIZE: BLKW
P.2CC: BLKW
P.CC: BLKW
P.FPP: BLKW
 P.CC: BLKW
P.FPP: BLKW
P.TRAP: BLKW
P.TRAP: BLKW
P.DOT: BLKW
P.BOT: BLKW
P.BOT: BLKW
P.BAD: BLKW
P.RUN: BLKW
P.FRM: BLKW
P.FRM: BLKW
P.FRM: BLKW
P.FISIZ: BLKW
P.STRT: BLKW
P.MISIZ: BLKW
P.MISIZ: BLKW
P.MISIZ: BLKW
P.STRT: BLKW
P.STRT: BLKW
P.STRT: BLKW
P.FISIZ: BLKW
P.FISIZ: BLKW
P.FISIZ: BLKW
P.FISIZ: BLKW
P.FISIZ: BLKW
BLKW
F.FLAGS: BLKW
BLKW
```

#### FIGURE 1

STARTING ADDRESS OF THESE "VECTORS"

F.OFF:

.end

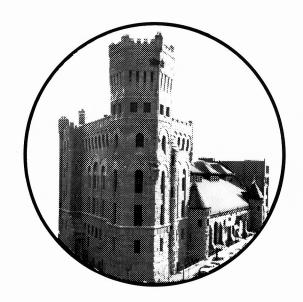
# Take a look at

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Boston Park Plaza and Plaza Castle October 4 - 6, 1982

Sponsored by Independent RSTS Users Society (IRUS) and Hardcopy Magazine



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[1,12] PRINT.MAC

```
.title print
.ident /1.0/
print.mac;print routine for oscar.rts
;to use:
                         #string,r0
print
            string is the address of the asciz string to be printed
                                                  get a register
                                                  save pointer to string
find null byte at end of string
                                                  ; calc length of string
; point to xrb
; put in length of string
; twice
; point to string
; channel to print to
; lab block (for disk files)
                                                  do the write
             .write
                                                  restore everything
                           (sp)+,r2
(sp)+,r1
                                                  return to caller
              .end
```

#### FIGURE 2

```
!primary tkb cmd file for oscar.rts
$allow no errors
mac oscar=oscar
run $tkb
oscar/-hd,oscar/-wi/ma,oscar=oscar
print
extsct=.99997:0
stack=0
par=oscar:160000:20000
run oscar.tec
```

#### FIGURE 3

```
[1,12] OSCAR.TEC
```

```
Iteco macro to align oscar.rts
1

$$@^a/Working.../

@er/oscar.map/

5<a>
:@s/.99999:/"u @s/.99998:/'

@s/^ed/ r
^o
\ua !save end of rts!
@^a/new EXTSCT is: /
177732-qa ua
 @eb/oscar2.cmd/
y
@s/extsct/
@s/:/
k
qa\
@i/
```

#### FIGURE 4

```
Isecondary tkb cmd file for oscar.rts
sallow no errors
run $tkb
oscar/-hd,oscar/-wi,oscar=oscar
extsct=.99997:17516
stack=0
par=oscar:160000:20000
$allow fatal errors
ut remove oscar
$allow no errors
run $maksil
oscar/rts
```



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## THE RSTS CRYSTAL BALL — Part 2

By Michael C. Greenspon, Integral Information Systems, Los Angeles, California

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Welcome once again. This month the Crystal Ball has news of interest to all RSTS programmers, so even if you don't use MACRO-11, read on. I'll be telling you how to use some of the new undocumented monitor features from BASIC. Also, you should be preparing to install RSTS version 7.2, and I have more notes and details on new structures in 7.1 and later.

#### **ERRATUM**

First, though, I'd like to correct a minor error in the last issue. In the disassembly listing of the .XPEEK code, the comments indicate that .XPEEK cannot be used to examine run-time systems or resident libraries. This is simply a case of "reading the wrong bit" (see the BIT BITWRD(R2),#14). What is really being tested there is non-existent memory or locked out memory. The .XPEEK call will peek at run-time systems and reslibs with no problem, but remember, you must check and make sure that they are resident. Even with such a check, timing problems could pop up, so this is not recommended for heavy use. The best application for .XPEEK is looking at monitor memory and other entities for which residency can be guaranteed. I'll have more on .XPEEK and its uses later in this article.

#### MONITOR FIXES

As I mentioned last time, there is a nasty bug in UU.TRM. I was assured at DECUS that the problem was "Fixed in the source in 7.2," however if you will be running 7.1 for any length of time, you may want to install this patch. As far as I know, it causes no problems, and we are currently running 7.1 with it. It is possible that it could conflict with future DEC patches; however, chances are there will be no more patches for V7.1.

Note that the command file installs two patches separately so that ONLPAT won't complain about a patch spanning OVR and another module. ALWAYS install the patch in the order listed. This patch replaces several lines of code which were "... accidentally deleted when the code was edited." The patch is as follows:

File to patch? < LF> Module name? RSTS Base address? PATCH Offset address? < LF> Offset Old New? Base ? MOV!0046 קקקקקק 000000 000000 ? BITB!2761 ?????? 000002 000000 ?????? 000004 000000 ? 1 ? DDJBNO ?????? 000006 000000

```
000010 000000
                          ? BNE!22
777777
ינינינינ
         0000012 0000000
                           ? MOV!0246
???????
         000014
                 000000
                          ? MOV!0346
         000016 000000
קקקקק
                           ? CLR!00
???????
         000020
                  000000
                           ? MOVB!6100
                           ? DDUNT
خخخخخخ
         000022
                  000000
222222
         000024
                 000000
                           ? ASL!00
         000026
                 000000
                           ? MOV!2737
??????
???????
         000030
                  000000
                           ? PR5
???????
         000032
                 000000
                          ? PS
                           ? JSR!537
         000034
                  000000
??????
??????
         000036
                  000000
                           ? CALLMI
??????
         000040
                  000000
                           ? SETPRM
                           ? KBDAP5
777777
         000042
                  000000
??????
         000044
                  000000
                           ? MOV!2737
לללללל
         000046
                  000000
                           ? PR3
??????
         000050
                  000000
                           ? PS
         000052
                           ? MOV!2603
??????
                  000000
יניניניל
         000054
                  000000
                           ? MOV!2602
ינינינינ
         000056
                  000000
                           ? MOV!2600
                           2 INCBI64
??????
         000060
                  000000
ינינינינ
        000062
                  000000
                           ? 20
??????
         000064
                  000000
                          ? RTS!07
                  000000
         000066
??????
File to patch? < LF>
Module name? OVR
Base address? TRM1
Offset address? 160
         Offset
Base
??????
         000160
                 105264
                           ? JSR!737
                           ? PATCH
         000162
                 000020
לללללל
ינינינינ
         000164
                 001020
```

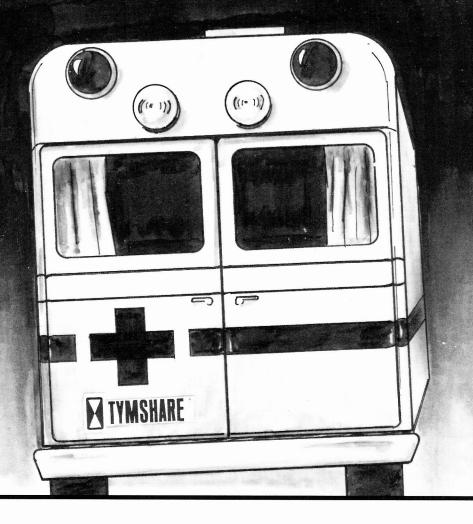
#### MONITOR OVERLAY TABLE

In the last issue, I mentioned the possibility of a monitor overlay table. I have since had the time to play with a running 7.1 system and confirm all of my suspicions about this phantom table. The definitions for the structure can be found in KERNEL.MAC, however I will detail it in a moment. First, a little history and explanation of monitor overlays.

Before version 7.1, modules were made resident or non-resident at link time. The FIP phase was linked before OVR, with any resident modules included. OVR was then linked against FIP's symbol table to resolve module addresses, etc. INIT's load routines loaded all of FIP at startup, and the resident modules along with it.

In 7.1 and later, CONFIG.MAC defines symbols in the form xxxRES where "xxx" is the name of the module to be made resident (SND, DIR, etc.) These symbols are globalized in TBL.MAC, and built into the overlay table at the beginning of the OVR phase. At link time, all modules, whether they are to be memory resident or not, are linked into OVR. All that determines if the module is resident is a bit in the

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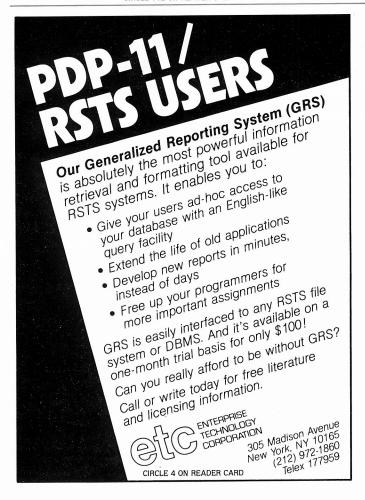
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overlay table. As I will demonstrate, this bit can be easily changed, and module residency can be modified without doing a new SYSGEN.

As I described in the last issue, startup under 7.1 is quite a bit different, due to the module residency scheme. INIT loads the permanently resident portion of the monitor. When RSTS gains control, it dispatches to an internal FIP function called STA. STA is hidden in the module LOD in the OVR phase. STA scans the overlay table and loads any modules marked as being memory resident.

STA makes no checks for what is normally allowed to be resident, therefore it is possible to make any module resident by patching the table. I brought up a 7.1 system with EVERY module (except LOD, which is only used once) resident, and the system ran just fine. True, I had a 62K monitor, but . . . In any case, the advantage in making modules other than the standard ones resident is minimal, except in special cases.

The overlay table can be found at the very beginning of OVR (base 2000 octal) and is comprised of a table header, followed by a list of module headers, one per module. Each module header contains the description of each of the overlays contained in the module. (Currently, this is only the length of the overlay.) The exact format is as follows:

#### Overlay Table Header

	Offset	
Octal	Mnemonic	Description
0	OTHFOR	Format number, currently 0
2	OTHREV	Revision number, currently 0
4	OTHSIH	Table header size, currently 12 octal
6	OTHSIM	Size of each module header, currently 6
10	OTHSIO	Size of each overlay entry, currently 2

#### Module Header (Immediately follows Overlay Table Header) (Table terminated with a fullword 0)

Octal	Offset Mnemonic	Description
0	OTMNAM	Module name (RAD50) or 0 for end
2	OTMFLG	Module flag word, see below
4	OTMNUM	Number of overlays in this module

#### **Overlay Entries** (OTMNUM of these immediately follow Module Header)

Offset Description Octal Mnemonic

> OTOLEN Length of this overlay

Currently, there is only one bit defined in OTMFLG. Its name is OTFRES, and, if set, indicates that the module is memory resident. This is the magic bit to toggle. Since the table is rather long, it can be a hassle to use ONLPAT to find the module name. I have written a program called ONLRES (listed at the end of the article) which can be used to change OTFRES for any module in the table.

Please note that although the changes can be made online to the installed SIL, they will not take effect until the

system is re-booted. Also, INIT is likely to give the message "Monitor size has changed from xK to xK." You should go through the TABLE sub-option of DEFAULT and fix up your memory allocation table. If you made your monitor larger (i.e. added resident overlays) INIT will reset the memory table, and you will have to go through DEFAULT.

#### HIDDEN MONITOR CALL

In the last issue, I documented the .XPEEK call, which allows for peeking at blocks of physical memory. Obviously, this is an extremely useful call, however since it is an EMT (as opposed to a UUO subfunction) it cannot be executed directly from BASIC.

While I was peeking through some 7.1 code, I discovered something rather interesting. The .MESAG handler (message send-receive EMT) has a hard-coded compare for a subfunction code of 4. I followed the branch, and guess where it wound up . . . just before the beginning of the .XPEEK code! Two move instructions transfer the physical source address from the FIRQB to the XRB, where .XPEEK expects it. This means that you can XPEEK by executing a .MESAG call. Message send-receive is of course usable from BASIC, and so is XPEEK!

In a conversation with the RSTS developer responsible for .XPEEK, I questioned him as to the hidden .MESAG subfunction. He said he implemented it so that he could easily debug .XPEEK from BASIC. He also added that XPEEK was intended for use by some DECnet utilities, in order to allow for XBUF peeking, and, unofficially, that the call was probably not going to go away in future releases.

The format of the call from BASIC for XPEEK via message send-receive is as follows: (Note that I have attempted to be consistent with the Programming Manual, so please tolerate the description of the first byte of the call  $\ldots$ )

#### Data Passed:

Bytes	Meaning
1	CHR\$(6%), the SYS call to FIP.
2	CHR\$(22%), the send/receive function code
3	CHR\$(4%), the .XPEEK subfunction code
4	CHR\$(M%), where M% contains the most significant six bits of the physical address to XPEEK at.
5-6	CHR\$(L%) + CHR\$(SWAP%(L%)), where L% contains the least
5-0	significant bits of the physical address.
	Bytes 4-6 form the physical base address to XPEEK at. This
	must be an area of memory which exists on the system, and is
	not locked out. You can only access memory which is in the
	monitor's MEMLST, therefore you cannot XPEEK at the I/O page.
	The physical base address is a byte address and may be odd, i.e.
	point to the high byte of a word.
7-10	Ignored.
11	CHR\$(C%), the channel number of the I/O buffer to return the data in.
	If C% is between 1 and 12, the system returns the data in the
	buffer for channel C%. The channel must be open.
	Channel O can be used for the I/O buffer (not recommended) if
	128 is added to the channel number; that is, CHR\$(128% + 0%).
	In general, CHR\$(128% + C%) allows channels zero through 12 to
	be used for I/O buffers.
12	CHR\$(0%) reserved—must be zero.

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P.O. Box 160 Plymouth, IN 46563 (219) 935-5121 13-14 CHR\$(L%) + CHR\$(SWAP%(L%)), where L% is the count of bytes to XPEEK at, starting from the physical base address in bytes 4-6. The count must be less than or equal to 8064.

This count must be an even number. Although bytes 4-6 may be odd, the transfer length must be a multiple of two.

A count of zero or one will cause unpredictable results.

15-16 CHR\$(O%) + CHR\$(SWAP%(O%)), where O% is the offset from the start of the buffer.

The offset field determines where in the buffer the data will be returned. The offset value is added to the location of the beginning of the buffer. The offset value must be in the range zero through < buffer size>-1.

17-40 CHR\$(0%) reserved—must be zero.

#### Data Returned:

No meaningful data is returned in the parameter string. The data contained in the physical memory locations described by bytes 4-6 and 13-14 will be returned in the I/O buffer passed in byte 11.

Possible Errors:	
Meaning	ERR Value
?PROTECTION VIOLATION  The described area of physical memory is non-existent or locked out. Also, the XPEEK subfunction is privileged.	10
?ILLEGAL BYTE COUNT FOR I/O  The count specified in bytes 13-14 is illegal, either because it is odd, or is outside the range of $0 < = L\% < = 8064$ .	31

Note that the call itself requires no I/O channels, etc., but that this is a kludge so that BASIC can define a buffer which the user can access. If you are using this call from BASIC Plus 2, the preferred way is by calling a macro subroutine to do the .XPEEK into a passed string or a PSECT (i.e. a MAPped or COM'd string.)

The .MESAG form of the XPEEK call from macro works (of course!) although it is not recommended since .XPEEK itself could be executed. The arguments are passed in both the FIRQB and the XRB as follows:

		FIRQB		
Octal	Offset Mnemonio		Octal	Offset Mnemonic
1		\//////////////////////////////////////	′I 0	
3		\////\/\//////////////////////////////	/  2	
5	FQSIZM	MSB of address   func. code=4	4	FQFIL
7		LSW of address	6	FQPPN
11		\//////////////////////////////////////	/  10	
		o o o	- <b>-</b>	
37		\//////////////////////////////////////	′l 36	

The XRB parameters are the same as for .XPEEK, except that XRBLK and XRBLKM are loaded from FQPPN and FQSIZM, and anything passed in these locations in the XRB is ignored.

If you are using XPEEK to examine your own job, other jobs, or portions of the monitor, there are some things you

should know about monitor memory layout. Most of this information can be found in a listing of TBL, which includes KERNEL. Generally, addresses in MEMLST are stored as physical address divided by 100 (octal). Unfortunately, BASIC does not have an ASHC function, and it is extremely clumsy with integers and bit operations. Long word integers in the next release of BP2 will solve this problem, but until then, you might consider coding part or all of your routine in MACRO-11.

#### **VERSION 7.2**

I still don't have much to tell you about version 7.2 of RSTS, except that you can expect to see some of the things promised but not delivered in 7.1. Probably the biggest item on the list will be clustered library support, although this is not a function of the monitor. Other than that, version 7.2 is really just a maintenance release for 7.1. The internals should be nearly identical.

In Atlanta, DEC announced the first release of a new spooling package which will be distributed with version 7.2. No details yet, sorry. Also, unofficially, according to the RSTS development team, named directories will not be supported any time in the near future.

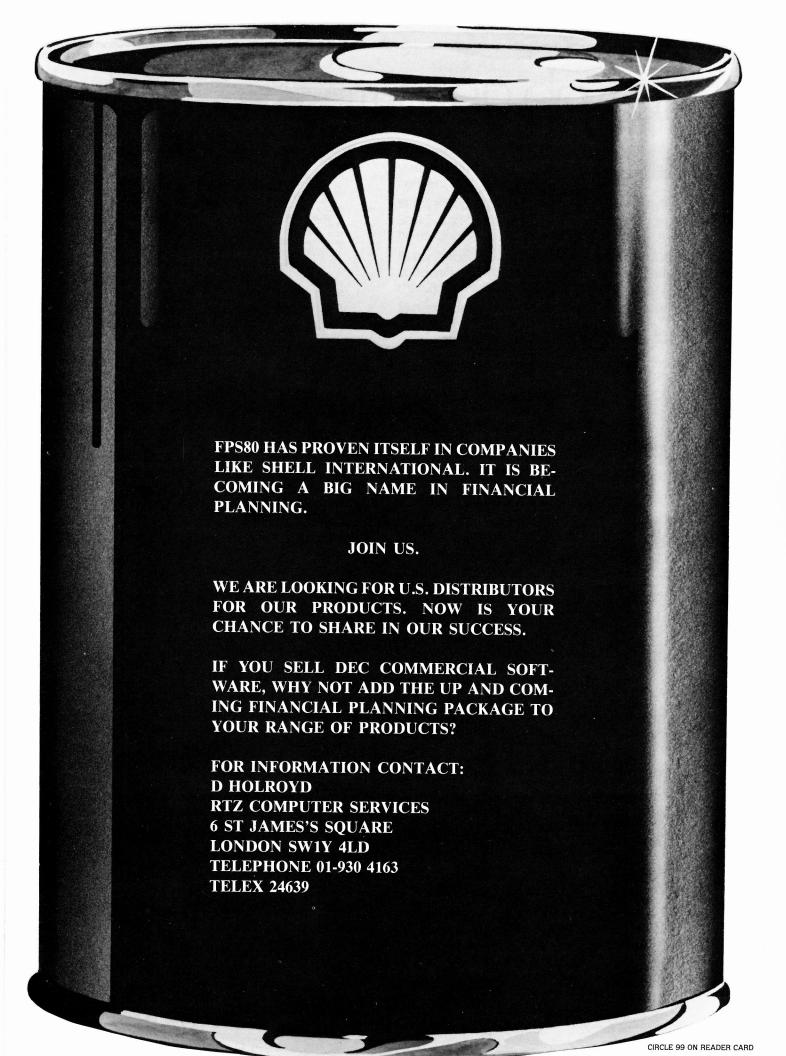
#### CONCLUSION

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

Also, the ONLRES listing is admittedly rather long to key, so if you would like a machine readable copy on magtape, send \$20.00 to IISI (Attn:MCG) and we'll get it out to you. I may decide to throw some other random things of interest on there too, perhaps some monitor feature patches. Please specify 800 or 1600bpi. Until next time, happy hacking!

[4,8] ONLRES.B2S

Program: Description: Version:	ONLRES Makes RSTS modules [non]resident X1.0
OS Version:	RSTS 7.1-11 [and later]
Package: Author:	Internal hacks Michael C. Greenspon
Edit date:	02 July 1982
 Title to and ownership	
 main with Integral Inf	s software is subject to change with
 main with Integral Inf	ormation Systems.



```
IF CCPOS(0%) ! Reset terminal to margin .IDENT% + HT + .VERSION% + HT + HT + "Integral Information Systems" + CR + LF + "Monitor overlay residency changer"
                       Modification history:
                                                                                                                                                         PRINT IF CCPOS(0%)
                                                Ver/Ed By
                                                                         Reason
                       Date
                                                                                                                                                         ! Print our header

! Print our header

M$ = SYS(CHR$(6$) + CHR$(-21$)) ! Drop priv's if we have them for some
! strange reason
                        02 July 82
                                                1.0/01 MCG
                                                                         Initial creation
                                                                                                                                                                                                          ! Set standard error trap
                                                                                                                                                         ON ERROR GOTO 10000
                                                                                                                                                                 "_SYO:[0,1]INIT.SYS" FOR INPUT AS FILE #.SIL.IO$, MODE 8192$
                                                                                                                                                         1 Open up INIT.SYS & find installed SIL
POINTER$ = INIT$(29$)/2$ AND 32767$
                                                                                                                                                          DEFAULT.SIL$ = EDIT$(RAD$(INIT$(POINTER$)) +
RAD$(INIT$(POINTER$ + 1$)), -1$) + ".SIL"
                        ONURES is a neat back based on the monitor overlay scheme in
                                                                                                                                                                                                         I Convert it to ASCII, etc.
                        ONLING IS a near nack based on the monitor overlay scheme in
RSTS V7.1 and 7.2 (and later, probably). It allows modules of
OVR to be made resident or non-resident after SYSGEN, on-line.
Note that the changes will not go into effect until the system
                                                                                                                                                                                                          ! Close in case it was open
                                                                                                                                                         CLOSE #.SIL.10%
                                                                                                                                              1010
                                                                                                                                                          PRINT IF CCPOS(0$)
                                                                                                                                                          PRINT
                                                                                                                                                                     "" ! Initialize this
LEN(SIL$) ! Until we have a SIL name
SIL$ = FNINPUT$("Monitor SIL to patch,", DEFAULT.SIL$)
! Find out which file to patch
                                                                                                                                                          UNTIL
                                                                                                                                                                     PRINT ERT$(2%) UNLESS LEN(SIL$)
! Do like INIPAT if no filename
                        Compilation instructions:
                                                                                                                                                              Simple ... ONLRES is self-contained, so enter BP2 and
                                                                                                                                                          ΙF
                        OLD ONLRES
                                                                                                                                                          THEN
                        BUI
                        RUN $TKB
                                                                                                                                                                      GOTO 1010
                        CONLRES
                                                                                                                                                          ELSE
                                                                                                                                                                                  STATUS AND 255% ! If not a disk
                                                                                                                                                                                 PRINT "?Device must be disk"
GOTO 1010 ! Error if abuser specified non-disk
                                                                                                                                                                      THEN
                                                                                                                                                                      ELSE
                                                                                                                                                                                 M%(5%) = .SIL% UNLESS M%(14%) AND .EXTENSION%
! Default extension to .SIL if none
M%(11%) = .FQDEV.SY% UNLESS M%(11%)
600
                                                                                                                                                                      ١
                        Compile time constants:
                                                                                                                                                                                                                                    if no device
                                                                                                                                                                                  ! Default to SY: is
SIL$ = "_" + CVT%$(SWAP%(M%(11%)))
                                                                                                                                                                                  ! Get the device name
SIL$ = SIL$ + NUM1$(M%(12%) AND 255%)
                        Various random definitions
                                                                                                                                                                      ١
                                                                                                                                                                                  IF M%(12%) AND .FQDEVH% | 1 Tack on unit number if explicit unit SIL$ = SIL$ + ":" + RAD$(M%(3%)) + RAD$(M%(4%)) + "." + RAD$(M%(5%))
            .DEFINE .EXTENSION%
                                                             -16384% ! FSS illegal logical device
             .DEFINE .BAD.LOGDEV%
                                                                       ! -1 High byte, 0 low byte
! ASCII word "SY"
! I/O channel for our SIL
! RAD50 of "SIL"
             .DEFINE .FQDEVN%
.DEFINE .FQDEV.SY%
                                                            -256%
22867%
                                                                                                                                                                                 + RAD$(M%(5%))
! Form the filename
S1L$ = S1L$ + "[" + NUM1$(SWAP%(N%(2%)) AND 255%)
+ "," + NUM1$(M%(2%) AND 255%) + "]"
IF M%(2%)
! Tack on the PPN if we have one
OPEN S1L$ FOR NPUT AS FILE #0.S1L.10%, MAP S1L
! Open the file, finally
             .DEFINE .SIL.10%
            .DEFINE .SIL%
.DEFINE .IDENT$
.DEFINE .VERSION$
                                                             307721
                                                            "Onlres"! Who we are
"V7.1-11"! What version we are
                        Bits, offsets, and lengths for overlay table header
                                                                                                                                                          GET #.SIL.10%, RECORD 1%
                                                                                                                                                                                                          ! Get the header block! Zero the checksum
             .DEFINE .OTHFORS
                                                                         ! Offset to format number
                                                                                                                                              1020
             DEFINE OTHREVS
                                                            2%
4%
6%
8%
                                                                           Revision number
                                                                                                                                                          CHECK%
                                                                                                                                                                    = 0%
I% = 1% TO 508% STEP 2%
            .DEFINE .OTHSIM%
.DEFINE .OTHSIM%
.DEFINE .OTHSIO%
                                                                         ! Size of table header
                                                                                                                                                          FOR
                                                                           Size of module header
Size of overlay entry
                                                                                                                                                                      CHECK% = CHECK% XOR SWAP%(CVT%%(MID$(SIL.ALL$,I%,2%)))
                                                                                                                                                                                                          ! Loop through header and checksum it
            .DEFINE .OTMNAM%
.DEFINE .OTMFLG%
.DEFINE .OTMNUM%
                                                                                                                                                                      CHECK% <> CHKSUM% OR
                                                            0%
                                                                          ! Module name
                                                                                                                                                          IF
                                                                           Flagword
Count of overlays in module
Set = module is resident
                                                             2%
4%
                                                                                                                                                                      R50SIL% <> .SIL%
                                                                                                                                                                      THEN
             .DEFINE .OTFREST
                                                             1%
             .DEFINE .OTFOR%
                                                             02
                                                                            Current format number
                                                                                                                                                                      GOTO 1010
                                                                          ! Current revision number
                                                                                                                                                          ELSE
                                                                                                                                                                                 FOR
86.0
                                                                                                                                                                                 GOTO 1030
IF EDIT*(RAD$(NAME1$) + RAD$(NAME2$),-1$) = "OVR"
! Get out if we found OVR
                        MAPs and COMMONs:
                                                                                                                                                                      NEXT
                                                                          Map for simple SYS() calls
                                                                                                                                                                      PRINT "?Module OVR not found in SIL"
            MAP
                        (SYSCAL)
                                                                                                                                                                      GOTO 1010
                                                                                                                                                                                                          ! Print error if OVR not found and loop
                                    M$(29%) =
                                                                         ! byte by byte
                                                            18
                                                                                                                                                                      LEFT$(EDIT$(RAD$(IDENT1%)+RAD$(IDENT2%),-1%).4%) < "07.1"
                                                                         ! Re-map this
! into integer words
            MAP
                        (SYSCAL)
                                                                                                                                              1030
                                                                                                                                                          IF
                                    M% (14%)
                                                                                                                                                          THEN
                                                                                                                                                                      PRINT "?Monitor SIL is pre-version 7.1"
                                                                                                                                                                                                          ! Do our best, without going out of our ! way, to insure that this is a 7.1 or ! later monitor
                                                                                                                                                                      GOTO 1010
                                                                                                                                                          1
            MAP
                        (SYSCAL)
                                                                         □ Re-man this
                                                             30%
                                                                         ! into one string
! Map for SIL header block
                                                                                                                                                          ELSE
                        (SIL)
            MAP
                                                                                                                                                                      OVR.BLK% = START% + 1% ! Get starting OVR block number
                                    SIL.ALL$=
                                                            512%
                                                                         ! MAP the WHOLE thing
                                                                                                                                                                      OVH.BLK$ = START$ + 1$ | Get starting OVH block number
OVH.ADD$ = ADDRESS$ | 1 and load address
CURRENT.BLK$ = 0$ | No current block for FNWORD$()

IF FNWORD$(OVR.ADD$ + .OTHFOR$) <> .OTFOR$
OR FNWORD$(OVR.ADD$ + .OTHREV$) <> .OTREV$

THEN PRINT "?Overlay table header is incompatible"
| GOTO 1010 | Insure that the OTH is of the same
| format/revision level
                        (SIL)
            MAP
                                    MODCNT%
                                    MODESC$(14%) =
                                                            32%,
                                                                            Module description blocks
                                                                            Uninteresting space
The checksum of the header
"SIL" in RAD50
                                     FILL$
                                    CHKSUM%,
                                    REOSTI &
                                                                            Module description layout RAD50 module name
            MAP
                        (STLMOD)
                                                                                                                                                                      FLSE
                                     NAME1%,
                                                                                                                                                                                  OTHSTH% = FNWORD%(OVR.ADD% + .OTHSTH%)
                                    NAME25.
                                                                            two words
RAD50 module ident
                                                                                                                                                                                 ! Get overlay table header size
OTHSIM% = FNWORD%(OVR.ADD% + .OTHSIM%)
                                     TDENT1%
                                    IDENT2%,
START%,
                                                                            two words
Starting block of module - 1
Starting block of STB - 1
                                                                                                                                                                                 ! Module header size
OTHSIO% = FNWORD%(OVR.ADD% + .OTHSIO%)
! and overlay descriptor size
                                    STB%,
SYMBOLS%,
                                                                            Number of symbols
                                                                            Load address of module
                                     ADDRESS%
                                     MODSIZ%,
                                                                           Module size
Nodule transfer address
                                                                                                                                              1040
                                                                                                                                                         MODULE$ = FNINPUT$("Module name? "."")
                                                                                                                                                                                                             Find out which module she wants to
                                    XFR%
                                                                                                                                                                                                            change residency of
Point past start of ovr table header
            MAP
                        (SILMOD)
                                                                            Re-map this mess
                                                                                                                                                         ADDR$ = OVR.ADD$ + OTHSIH$ ! Point past start of ovr table head
! (i.e. to first module header)
PRINT "Directory of overlay modules in OVR:" + CR + LF + "Name"
+ HT + "Length" + HT + "Ovr" + HT + "Status"
UNLESS LEN(MODULE$) ! Set up to print a directory
! Module name, total length of all
! overlays, number of overlays, and
| overlays, number of overlays, and
                                    SILMOD$ = 32%
                                                                             into one string
                                                                                                                                                          ADDRY = OVR. ADDY + OTHSTHY
900
                        Dimensionless statements:
                                                                                                                                                                                                             current residency status
            DIM #.SIL.IO%. INIT%(32767%) - ! Virtual array to peek through INIT
                                                                                                                                                                     FNWORD$ (ADDR$ + .OTMNAM$)
                                                                                                                                                         WHILE
                                                                                                                                                                                                          ! Until end of table,
1000
                                                                                                                                                                     OVERLAYS = FNWORD (ADDR + .OTMNUM) & .
! Get number of overlays in this module & LENGTH; = 0; ! Zero this & ...
                        And now, the code ...
```



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## WHY CALL YOUR BANK EVERYDAY?

By Dale L. Bargar, P.O. Box 1162, Frederick, MD 21701

```
1 EXTEND
                                                                                                                              \ PRINT 'A = AMOUNT OF LOAN'
\ PRINT 'N = NUMBER OF PAYMENTS'
            .....
                      AUTHOR:
                                     DALE L. BARGAR
                                                                                                                                 PRINT 'P = PAYMENT PER PERIOD'
                                      22-DEC-81
                                                                                                                               \ PRINT 'X = EXIT PROGRAM'
                      VERSTON:
                                     2.0
              THE FUNCTION OF THIS PROGRAM IS TO PROVIDE INFORMATION & RELATING TO LOANS AND INTEREST OVER VARYING PERIODS OF TIME.& THE AUTHOR OF THIS VERSION OF THIS PROGRAM ASSUMES NO &
                                                                                                                   200
                                                                                                                               \ INPUT 'ENTER UNKNOWN (A,N,P,X)';X$
                                                                                                                               \ X$ = CVT$$(X$,-1%)
\ GOTO 3500 IF LEFT(X$,1%) = 'X'
               RESPONSIBILITY FOR THE USE OR RELIABILITY OF THIS SOFTWARE. &
                                                                                                                              IF INSTR(1%.'ANP'.X$)=0% THEN 200
              This program will permit the user to input ranges of loan
                                                                                                                   250
               amounts and interest amounts and receive results based upon &
                                                                                                                              INPUT 'INTEREST PER YEAR IN PERCENT': 1$
               a specific loan period.
                                                                                                                   300
                                                                                                                                         I$ = CVT$$(I$,-1%)
                                                                                                                               \ S.I. E.I = 0%
               The user must first specify the unknown which they would like&
                                                                                                                              \ I.I = 1
\ Z% = INSTR(1%,I$,'-')
               the program to compute for them.
                                                                                                                               \ IF Z% = 0% THEN
S.I, E.I = VAL(I$) ELSE
               The user must then specify the interest rate per year.
               single amount may be entered (e.g. 18) or a range of amounts& may also be entered (e.g. 16-20). The program will compute & each of these interest rates against the loan amount specified.&
                                                                                                                               S.I = VAL(LEFT(I$,Z%-1%))
\ E.I = VAL(RIGHT(I$,Z%+1%))
                                                                                                                               \ INPUT 'INCREMENT PERCENT BY WHAT AMOUNT'; I.I
              The user may also specify a range of values when the program& requests the amount of the loan. A single amount may be & entered (e.g. 65000.00) or a range of amounts may be entered& (e.g. 65000.00-85000.00). The program will then compute the& previously specified interest rate into the loan values. &
                                                                                                                                  IF X$ = 'A' THEN 500
                                                                                                                              INPUT 'AMOUNT OF LOAN'; A$
                                                                                                                   450
                                                                                                                               A$ = CVT$$(A$,-1%)

\ E.FLAG%, S.A, E.A = 0%

\ CNT% = -1%
               The user may requesst the program to compute the interest-to-&
                                                                                                                                 Z% = INSTR(1%, A$, '-')
               date on the loan. The program will request which month the &
                                                                                                                               \ IF Z% = 0% THEN
               loan payments began, and then will compute the amount of interest paid each year for the life of the loan. This is
                                                                                                                                         A = VAL(A$) ELSE
                                                                                                                                 S.A = VAL(LEFT(A$, Z%-1%)
               helpful for determining interest deductions for income tax
                                                                                                                               \ E.A = VAL(RIGHT(A$, Z%+1%))
               purposes.
                                                                                                                                  IF X$='N' THEN 650
               The user may specify for the program to list each payment for the life of the loan. This enables the user to see how much the life of the loan.
                                                                                                                              INPUT 'NUMBER OF YEARS'; N
                                                                                                                   550
               of each payment is going to principal and to interest.
                                                                                                                               \ SAVE.N = N
              The output of this program may be directed to any source. & However, it should be noted that "NO TAB" should be specified& for line printers before directions output to them. &
                                                                                                                   600
                                                                                                                                  IF X$='P' THEN 800
               (Note: If using this program for computing home mortgage loans, & remember that Taxes and Insurance ARE NOT included. These &
                                                                                                                              INPUT 'PAYMENT FOR PERIOD'; P
                                                                                                                   700
               must be added to the monthly payment by the user.
                                                                                                                              INPUT 'COMPUTE INTEREST-TO-DATE (Y/N)'; YN$
                                                                                                                   800
                                                                                                                              \ YN$ = CVT$$(YN$,-1%)
\ IF YN$ = 'Y' THEN
            Happy Computing...
                                                                                                                                         INPUT 'NO. OF MONTH OF YEAR PAYMENTS START'; MONTH$
           PRINT * *** LOAN-INTEREST RATE PROGRAM ***
50
                                                                                                                              \ MON% = MONTH%
              CONTROL.C$ = SYS(CHR$(6%)+CHR$(-7%))
             ORIGIN OF THIS PROGRAM UNKNOWN - HOWEVER, IT HAS BEEN PROVEN ACCURATE WITHIN A DOLLAR OR SO,
                                                                                                                              \ INPUT 'LIST PAYMENTS (Y/N)'; Y$
                                                                                                                                         Y$ = CVT$$(Y$,-1%)
            ! ENTERED BY DLBARGAR 28-DEC-81
                                                                                                                   850
                                                                                                                              INPUT 'OUTPUT DATA TO'; Z2$
           ONERROR GOTO 3250
70
                                                                                                                                   Z2$ = CVT$$(Z2$,-1%)
IF Z2$='' THEN Z2$='KB:'
           X8$ = '####'+CHR$(9)+'$$##.##'+CHR$(9)+'$$###.##'+
                                 CHR$(9)+'$$####.##'
                                                                                                                                                                                ... continued on page 70
```

```
ELSE
                                                                          ! Otherwise, if no default
                                             PRINT "Illegal character
                                                                          ! Print the INIPAT type error and
! If abuser didn't just hit <lf>
                                            GOTO 15010
                             FNINPUT$ = EDIT$(I$,-1%) ! Then return input trimmed up
                                                                          ! Reset margin again if needed
15020
              PRINT IF CCPOS(0%)
                                                                          ! That's all for now
             DEF* FNWORD$(ADDRESS$)

OFFSET$ = ADDRESS$ - OVR.ADD$

BLK.OFF$ = OFFSET$ / 512$

OFFSET$ = OFFSET$ - BLK.OFF$ * 512$

! Now block offset from base address
! Now block offset from base block

! Now block offset from base block

Somm block number to get
15100
              BLK% = OVR.BLK% + BLK.OFF%
GET #.SIL.IO%, RECORD BLK%
UNLESS BLK% = CURRENT.BLK%
CURRENT.BLK% = BLK%
                                                                          ! Form block number to get
! Get the record
! If we need to
! Set up current block now
              CURRENT.BLK% = BLK% : Set up current back in the FNWORDS = SWAP%(CVT$%(MID$(SIL.ALL$,OFFSET%+1%,2%)))
! Now return the contents FNEND ! Dat's it (hope ADDRESS% is valid)
 15200
               DEF FNOCT$(ARG%)
                                                                          ! Return octal representation of ARG%
              TMP$ = ""
TMP$ = CHR$((ARC$ AND 7$*8$^TMP$)/8$^TMP$+48$)+TMP$
FOR TMP$ = 0$ TO 5$ I Reasonably hairy
FNOCT$ = TMP$
              FNEND
                                                                          ! All good things must come to an end
32767
              END
```

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CIRCLE 138 ON READER CARD

å

```
LENGTHS = LENGTHS
                             + FNWORD$(ADDR$ + OTHSIM$ + I$ * OTHSIO$)

FOR I$ = 0$ TO OVERLAYS$-1$
                                                           ! Tally up total space requirement
                        STAT$ = ""

STAT$ = "non-"

UNLESS FNWORD$(ADDR$ + .OTMFLG$) AND .OTFRES$
                        | I Decide if module is resident or not
NAM$ = RAD$(FNWORD$(ADDR$ + .OTMNAM$))
| Get module name
                        GOSUB 1050 IF NAMS = MODULES
                        I Ask about changing it if we found
I Ask about changing it if we found
I the module (and not doing directory)
PRINT NAMS + HT + FNOCTS(LENGTHS) + HT + NUM1$(OVERLAYSS)
+ "." + HT + STAT$ + "resident"
                                   UNLESS LEN(MODULE$)
                                                            ! Print the directory line
                                                              unless we aren't doing directory OTHSIO% * OVERLAYS%
            ١
                        ADDR% = ADDR% + OTHSIM% +
                                                           ! Advance to the next module header
! Finish up directory printing
            PRINT "?Module not found in OVR"
                UNLESS FOUNDS OR LEN(MODULES) = 0%
                                                           ! Error if we didn't find the module
! (and not doing a directory)
            GOTO 1040
                                                           ! Re-prompt for module name
           FOUND$ = -1$ ! Now we've found it
PRINT "Module " + NAM$ + " contains "
+ NUM1$(FNWORD$(ADDR$ + .OTMNUM$)) + ". overlay";
PRINT "s"; IF FNWORD$(ADDR$ + .OTMNUM$) <> 1$
PRINT ". Total size is " + FNOCT$(LENGTH$)
+ " (" + NUM1$(LENGTH$) + ".) bytes."
PRINT "Module is currently " + STAT$ + "resident."
! Print out status o
                                                           ! Print out status of module
! Junk this
           MAKRES$ = "" 1 J
OTMFLG% = FNWORD%(ADDR% + .OTMFLG%)
                                                           ! Get the module flagword
           MAKRES$ = "non-"
IF OTMFLG% AND .OTFRES%
                                                           ! We're going to make it non-resident
                                                          ! if it is currently resident
                       LEN(RESP$)
                       LEN(RESP$) ! Until we have an answer
RESP$ = FNINPUT$("Make module " + MAKRES$ + "resident? ","YES")
                       UNLESS LEN(RESP$) ! Print this if abuser hit <cr>
            RETURN IF LEFT$(RESP$, 1%) = "N" ! Do nothing if abuser said NO
           SIL.ALL$ = LEFT$(SIL.ALL$,OFFSET$) + CVT$$(SWAP$(OTMFLG$ XOR .OTFRES$))
                + RIGHT$(SIL.ALL$, OFFSET% + 3%)
! Change status of module (this is a
                                                           ! bit of a kludge)
           PUT #.SIL.IO%, RECORD CURRENT.BLK%
                                                             Write it back
10000
```

```
RESUME 10010
                                                      ! Resume to handle the error
                                                     ! Error reading INIT.SYS
le trying to read INIT.SYS - continuing"
! Print any errors and ignore them
10010
          IF
                      ERL = 1000%
           THEN
                      PRINT ERT$(ERR) + " while
                     GOTO 1010
           ELSE
                     TF
                                                     I Abuser hit "Z. etc.
                                ERI. = 15010%
                      THEN
                                GOTO 32767
                                                     ! Get out quickly
                                           ERL = 1010$ ! Error opening SIL
                                THEN
                                           IF
                                                     ERR = 5% AND M%(2%) = 0%
                                                       If NOSUCH and no PPN
                                           THEN
                                                     ERRORS = ERR
                                                     I Save error for right message
OPEN SIL$ + "[0,1]" FOR INPUT
AS FILE #.SIL.10%, MAP SIL
                                                     AS FILE #.SIL.10#, MAP SIL

! Try to open it on [0,1]

PRINT "File found in account [0,1]"

GOTO 1020

! Say we found it and go back
                                           ELSE
                                                     PRINT ERT$(ERR)
                                                     ! Error opening SIL
GOTO 1010
                                                     ! Try, try again
                                ELSE
                                                     ERL = 1020%
                                          IF
                                                     E Fror reading first block
PRINT "TNull length file?" IF ERR = 11% &
PRINT ERT$(ERR) UNLESS ERR = 11% &
GOTO 1010 &
                                           THEN
                                          ELSE
                                                                ERL = 10010%
                                                                PRINT ERT$(ERR) UNLESS ERROR$
                                                      THEN
                                                                PRINT ERT$(ERROR$) IF ERROR$
                                                                GOTO 1010 ! Error opening SIL
15000
                     Wizard-defined functions:
          DEF FNINPUT$(PROMPT$, DEFAULT$) ! Return line of input from terminal
          PRINT IF CCPOS(05)
                                                     ! Reset terminal to left margin
15010
          PRINT PI
                                                     ! Print our prompt
! Get a line from the terminal
          FIELD #0%. RECOUNT AS TA
                                                     ! Chop up the buffer
                     (ASCII(I$) AND 127%) = 10%
                               LEN(DEFAULT$) ! If abuser hit line-feed and defaults
                     THEN
                               FNINPUT$ = DEFAULT$ ! Then return the default
```

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CIRCLE 123 ON READER CARD

```
FOR INTR = S.I TO E.I STEP I.I
860
         \ SAVE.I, I = INTR/100
\ SAVE.I3, I3 = I*100
\ MONTH$ = MON$
                                                                                    å
                                                                                    å
         OPEN Z2$ AS FILE 1%, MODE 2%
870
                                                                                    &
         TE E.FLAG% THEN 3100 ELSE
900
         IF S.A<>0% THEN
                                                                                    &
                   CNT# = CNT#+1#
A = S.A IF CNT# = 0#
A = S.A+(CNT##1000#) IF CNT#>0#
                   MONTH% = MON%
IF A >= E.A THEN
                            E.FLAG$ = -1%
         I3 = SAVE.I3
950
            T = SAVE.I
                                                                                    &
                                                                                    &
             IF X$<>'A' THEN 1200
1000
1100
         N = N M
          \ I = I/M
          \ B = I+1
1120
         A = INT(P*((1-B^-N)/I)*100+.5)/100
1150
         PRINT #1%, CHR$(12%) IF S.A<>0 OR S.I<>E.I
1200
          PRINT #1%, STRING$(3%,10%) IF S.A=0
PRINT #1%, 'AMOUNT OF LOAN = $';A
                   IF X$='A' THEN 1350 ELSE
1220
                   IF X$<>'N' THEN 1340
          I = I/12
1300
          1320
          N = INT(N+.999)
 1330
          \ GOTO 1350
```

```
å
        N3 = N#M
1340
1350
         PRINT #15. 1
                            PAYMENT PERIODS=1: N3
         PRINT #1%,'
                                              ';INT(N3/12);'YEARS';
1370
                  ((N3/12)-INT(N3/12))*12; 'MONTHS'
                  TF X$<>'P' THEN 2000
1400
1450
         \ I = I/M
         \ B = I+1
         P = INT(A*(I/(1-B^-N))*100+.999)/100
                                                                                å
1500
2000
         PRINT
                           AMOUNT PER PAYMENT = $1; INT(P#100+.5)/100
          \ PRINT #1%, '
                           INTEREST PER YEAR = ';13;'$
TOTAL INTEREST = $': INT
          \ PRINT #15.1
          \ PRINT #1%, '
                                                = $^{1}; INT((P*N-A)*100+.5)/100&
         PRINT
2150
          \ C3$, ITD, OITD = 0$
         IF Y$='Y' THEN
PRINT #15, 'PAYMENT INTEREST APP TO PRIN
\PRINT #15, 'MONTH INT-TO-DATE'; IF YN$='Y'
2200
                                                                   BALANCE OF PRIN';&
          \ PRINT #1%
         L = INT(B*I*100+.5)/100
2250
          \ R = P-L
          \ B= B-R
                                                                                 å
          C3% = C3%+1%
2300
          \ LNE% = LNE%+1%
         IF Y$='Y' THEN
PRINT #1% USING X8$, C3%, L, R, B;
2500
          IF YN$='Y' THEN
 2510
                   PRINT #1$, CHR$(9$); NUM1$(MONTH$); CHR$(9$);
IF Y$='Y'
                   PRINT #1% USING '$###,###.##', ITD;
                                    IF Y$='Y'
                   MONTHS = MONTHS+1%
                   1
                                             C3%; IF Y$<>'Y'
                   C3%; IF Y$<>'Y'
PRINT #1%, TAB(66%);'(';
PRINT #1%, USING '$###,###.##', ITD-OITD;
PRINT #1%, ')';
PRINT #1% IF Y$<>'Y'
                   OITD = ITD
          PRINT #1% IF Y$='Y'
 2520
                   IF C3%+1% = N3 THEN 2600
                IF B < P THEN 2600
 2530
          IF Y$='Y' THEN
 2550
                   IF LNE% = 50% THEN
                            PRINT #1%, CHR$(12%);
                   GOTO 2200
          IF Y$='Y' THEN
 2560
              IF INT((C3$-50$)/57)=(C3$-50.0)/57.0 THEN
                   PRINT #1%, CHR$(12%);
                   GOTO 2200
 2580
          GOTO 2250
 2600
          IF Y$='Y' THEN
                                                                                  2
          PRINT #1% USING X8$, C3%+1%, B*I, B, O
                                                                                  2
          IF Y$='Y' THEN
 2700
          PRINT #1%, ' LAST PAYMENT = ';

\ PRINT #1% USING '$$###.##', INT((B#I+B)*100+.5)/100
 3000
          IF (S.A<>0% AND NOT(E.FLAG%)) THEN 900 ELSE
 3100
          CLOSE #1%
 3110
          NEXT INTR
          GOTO 100
 3150
          IF ERR=28 THEN
 3250
                    CONTROL.C$ = SYS(CHR$(6\%)+CHR$(-7\%))
                    RESUME 100
                    RESUME IF ERR<>48 AND ERR<>51 AND ERR<>53
 3260
                                               **LOAN NOT POSSIBLE**
          PRINT CHR$(7%);'
 3300
                        (INTEREST PER PERIOD EXCEEDS PAYMENT PER PERIOD)
 3500
          END
```

# SIMINI A SIMULATION MINI COMPUTER By John Cato

Why simulate a mini computer on a mini computer? After all, far more effective work can be achieved on the real thing. True. But consider novices beginning to understand basic concepts of computing; high-level language programmers getting to appreciate what happens behind the scenes; students of computer science. How can they obtain a smooth, simplified, yet complete introduction to the fundamentals of data processing? SIMINI, a simulation that is clear to follow and straightforward to teach. Displaying on a Visual Display Terminal, the machine actually registers in binary while the program is executing, giving an interesting introduction to the stored program concept, instruction cycles, low-level languages, boolean logic, representation of information and much more.

Presented in RSTS Professional this month is the first in a three part series describing SIMINI. This month is the index, introduction and specification of SIMINI. The following issue will contain details of use and the Appendices, and the final issue will contain the source listings. The first two parts form a self contained SIMINI user manual.

Much of the work within SIMINI was done some years ago, and grew from seeds planted by Mr. M.C. Williams, Computer Centre Director of Luton College of Higher Education, England. This is being published in order that it may now be of benefit to more people, and I have asked the Editor to send any payments for publishing to Mr. Williams to use as he feels is appropriate to computer education in the Luton area.

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- B.1 Memory Referencing Instructions
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# 1.1 SIMINI — Outline

SIMINI is a simulation of the operation of a mini computer. It is designed to be used as a visual aid for teachers of Computer Science.

The "Computer" is a dedicated, single user, single-programming, soft machine which has 8 operating system commands and incorporates an easy to use inter-active assembler.

During program execution the machine's registers are displayed in binary on the user's visual display terminal.

Assembled programs may be saved on backing store and program libraries maintained. The contents of store may be dumped out on to the user's terminal, or any other terminal linked to the host computer.

A complementary simulation is MINSIM which is completely compatible and offers a TRACE option but does not require a VDU.

# 1.2 SIMINI - Notes on the Design

SIMINI is for use as an aid to visually demonstrate machine architecture and as an introduction to assembly level programming. It appears to the user to be a simple single-user, stand-alone machine.

Random Access Memory (RAM) of 512 bytes is adequate to store the largest program that the user could wish to write, within the bounds of the purpose of SIMINI.

SIMINI's "hard-wired" operating system is simple and accepts commands chosen for their similarity to the PDP11 RSTS/E O/S commands (2.2).

The registers provided (2.5) should be sufficient to illustrate most important aspects of machine architecture.

Only integer arithmetic is provided for. This is for two reasons:

- (i) double precision and floating-point would possibly encourage the writing of applications programs instead of merely programming excercises. (Applications programs ought to be written in one of the languages implemented on the host machine.)
- (ii) it could be a good exercise to write floating-point routines in SIMINI assembler. (This would lead to a deeper understanding than could be gained fron any built-in implementation.)

In the interests of simplicity, assembler features such as symbolic addresses and literals are not used.

The assembler is therefore able to assemble line by line, and the stored program is runnable at any given point in time.

Octal numbers are used for addressing in SIMINI assembler, so that program instructions can be compared directly to the displayed register's bit-patterns.

The register instructions (Appendix B.2.), considered more usual, have high order function codes so that all the function codes that are used may appear complete.

The stack mechanism implemented in SIMINI allows the user to gain an understanding of this data structure in a relatively straightforward way.

# 1.3 Uses of SIMINI

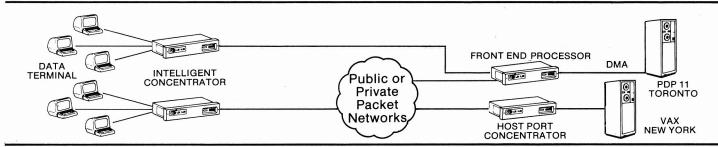
SIMINI is an educational "machine" for teaching some basic areas of computer science.

SIMINI may be used to illustrate:

- Representation of information:
  - i. Decimal, octal and binary number representation
  - ii. The idea of words, bytes and bits
  - iii. Integer representation
  - iv. Characters
  - v. Instructions
- The stored program concept.
- The instruction cycle the microcode required for one low-level instruction.
- The registers necessary for successful program execution, and the required data pathways.
- Logical operations AND, OR, NOT, XOR
- The basic concepts of an assembler.

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- Low level languages
  - Specifically a one-address order code, but with a range of zero-address order code instructions.
  - arithmetic operations
  - data transfer/manipulation operations
  - transfer of program control
    - unconditional branching
    - conditional branching
    - subroutine calls
  - addressing modes
    - direct
    - indirect
    - indexed
    - indexed indirect
  - the use of a stack
  - subroutine calling
    - data storage
    - arithmetic

SIMINI provides a base to many other areas of computer science including the use of backing store, and high-level language development, etc.

### 1.4 SIMINI Guide

RUN MINSIM O/S MODE Would you like a command summary(Y or N)? Y ASSEMBLER FORMATS STORE ADDRESS

then MNEMONIC & ADDRESS
or LITERAL Indexed addressins is achieved by specifying ADDRESSX Indirect addressing is achieved by specifying ADDRESSI

Addresses are specified by a 3 digit octal no. (000-777)

000	001 LDA	002	STO	003	ADD	004	SUR
005 MUL	OOG DIV	007	AND	010	DR:	011	XOR
012 JMP	013 JANZ	014	JALZ	015	INCH		JSR
017 CAHE	020 LDX	021	STOX	022	LDPC		STPC
024 JAP	025 JAZ	026	JXNZ	027	JXLZ		JXP
031 JXZ	035 JDA	033	YONL	034	JSI	035	CXHE
REGISTER IN	STRUCTIONS						
OOO STOP	001 CLA	002	INC		DEC		ADDS
005 SURS	006 SWAB	007	HOF.		HOPE	011	
012 HDPL	013 HDPG	014	NOT		NEG	016	INCX
017 DECX	020 SWAX	021	SWAR	022	ASL	023	ASR
024 RDR	025 ROL	026	CLV	027	SEV	030	
031 CLC	032 SEC	033	HOPC	034	CCV	035	SCV
036 SWAF	037 PUSH	040	POP:	041	RTS	042	
043 DIVS	044 PACC	045	RACC	046	PSTR	047	RSTR
050 NLIN							
OPERATING S	SYSTEM COMMANDS	ı					
RUN NNNN	DUM NN	SAV	XXXXXX	OLD	XXXXXX	AFF	XXXXXX

For this summary at any time, type 'HELP'

CAT

```
O/S MODE
  000 RACC
001 STO 010
002 RACC
003 ADD 010
  004 PACC
  006 JANZ 000
007 STDP
? DUM
PROGRAM NONAME.SIM
```

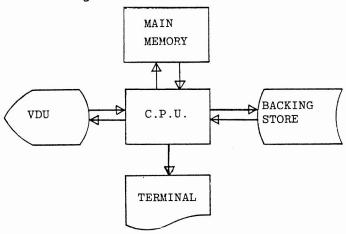
, KOOKAII	NOMINE VOIN
ADDRESS	CONTENTS
OCTAL	DECIMAL
	77

SSEMBLER
SOLIDLER
ACC
TD 010
4CC
(I) 010
ACC
_IN
ANZ 000

```
? 4
? 5
 9
? 1
? -1
0
0/S MODE
Control is being passed from SIMINI to RSTS/E
You may now issue any RSTS command
```

# 2. Specification of SIMINI

# 2.1 Block Diagram of the Main Functional Units



The Central Processing Unit (CPU) includes an Arithmetic Logic Unit (ALU), control unit, registers, and hard wired Operating System (0/S).

The Visual Display Unit (VDU) terminal is used for communication between the O/S and the computer user.; and also under program control, between the running stored-program and the user.

Main memory is 512 words of 16-bit semiconductor store.

Backing store is on disc and is used only by the O/S for program library maintenance.

Another terminal may be used by the system for dump program listings under O/S control.

## The Operating System

When the machine is under direct Operating System control, "O/S MODE" will be displayed upon the VDU on line 15. The O/S will prompt the user with a "?" in the lower left of the VDU screen when it is receptive to user commands. If a command is valid, no message will be output. For details of O/P messages see Appendix A. The machine is also in O/S mode when the assembler is being used.

The executive is hardwired, and so does not occupy any main memory.

# Operating System Commands

Command	Explanation
RUN (NNN)	RUN, followed by an optional 3 digit octal address passes control to the stored program starting execution from address NNN (default 0)

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all occurances of a specified file,

most recent backup of a file,

Allows user to indicate up to

first occurance of a file, or the most recent modification of a file.

CIRCLE 134 ON READER CARD

Note: the Stack Pointer (SP) is initialized as 512. Program execution may be terminated by a "STOP" program instruction or by the user with CTRL/C on the keyboard, both of which return control to the O/S.

SAV XXXXXX 4

SAV causes a file of name XXXXXX.SIM to be opened under the user's account number, and all store from 0 to the address pointed to by the SP-1 (and whose contents are non-zero), will be saved on that file.

OLD (XXXXXX)

OLD causes all store to be cleared. If no file name is specified this will be all that is done. Otherwise a file of name XXXXXX-.SIM will be searched for, and, if located, opened and the previously saved program will be restored.

APP XXXXXX

APP causes a file of name XXXXXX.SIM to be searched for, and, if located, opened and the previously saved program will have all non-zero locations restored. This effectively Appends the file program into store, the file program taking precedence over the stored program.

**UNS XXXXXX** 

TAPE-DEX II™

wildcard).

Backup listings.

UNS causes the file of name XXXXXX.SIM to be searched for under the user's account number, and, if located, the file will be unsaved.

DUM NNN-NNN NN DUM, followed by an optional range of

memory locations specified in octal, followed by an optional 2 digit decimal integer relating to a KB number, gives a core dump. Default is all memory onto the

user's terminal.

CAT CAT will result in a list of all program files

with a file extensions of .SIM to be dis-

played on the VDU.

**BYE** BYE will close down the machine, and

return control to RSTS/E.

# 2.3 System Software

### 2.3.1 General Outline

SIMINI includes a 512 word "ROM" containing system programs. These are a simple assembler and library instructions for PACC, RACC, PSTR, RSTR, NLIN.

### 2.3.2 Assembler

The assembler reads a line at a time from the terminal and assembles the corresponding machine code instructions. Each line starts with the address in which the instruction is to be located — this address is a 3 digit octal number. The instructions, separated from the location by a space, starts with a mnemonic. if the instruction is memory referencing, then and address part follows separated from the mnemonic by a space. The address, in octal, may be followed by an "X" to indicate indirect addressing and "I" for index modificatin.

Alternatively the instruction part may be a single octal number which directly corresponds to the machine code. This must be introduced by a symbol.

So that decimal numbers and strings of two characters can be loaded into locations, +, – and quote (") symbols are recognized in place of the mnemoic. Plus and minus introduce decimal integers. The quote must be followed by 2 characters and terminating quote.

The structures accepted by the assembler can be summarized by:

NNN —

NNN is a 3 digit octal number which specifies a store location into which the following data or instruction is to be loaded. The NNN must be followed by a space and then either:

# Examples:

001 "AB" a) "XX" where X is any ASCII character. 002 21 b) a decimal integer.

02.21 b) a decimal integer

003 #001007 c) #NNNNNN — a 6-digit octal number

<*1*77777.

004 ADD 007 d) XXXX NNN — a valid Memory Refer-

ence Instruction followed by an optional "X" or "I" or "XI" where "X" will cause indexed addressing and "I" will cause indi-

rect addressing. (Appendix B.1.).

010 INCX e) XXXX — a valid Register Instruction

(Appendix B.2.).

# 2.4 The Stack

The stack is used to store the return link (the PC) in the execution of a JSR. (Appendix B.1.), allowing virtually unlimited subroutine nesting.

The stack also allows users to gain an understanding of this data structure. As well as subroutine links other data can be stored on the stack and stack arithmetic can be performed.

The stack is normally stored at the top of the user's 512 words of "RAM" and referenced by the use of a stack pointer register (SP) which points to the most recently stacked item.

When "pushing" onto the stack the pointer is decremented before the accumulator's contents are stored. When "popping" off the stack the accumulator is loaded before incrementing the pointer. The stack expands downwards from location 511.

### 2.5 C.P.U. Registers

### 2.5.1 Control Unit

PC — Program Counter. The PC holds the 16-bit address of the current instruction being fetched from memory. The PC is automatically incremented after the instruction is loaded into the instruction register. When a program jump occurs, a new value is automatically placed in the PC, overriding the incrementer.

SP — Stack Pointer. The stack pointer holds the 16-bit address of the current top of stack located anywhere in main memory; the stack being organized as Last In, First Out (LIFO). Data may be pushed onto or popped from the stack by means of the execution of PUSH and POP instructions.

X — Index Register. The index register is a means by which to modify the address of an operation. The value in the index register is used as a displacement to be applied to the address before the instruction is executed. Instructions are provided for both modifying the contents of the index register and branching conditionally on the value in the index register.

IR — Instruction Register. As each instruction is fetched from memory it is placed in the instruction register and decoded. It is from this decoding that the necessary control signals are generated for data transfer and ALU control.

MAR — Memory Address Register. The memory address register is used to "point" to the address in memory which is next required, whether it be for loading as an instruction, or for loading of storage as data.

MDR — Memory Data Register. The memory data register forms a buffer area between memory and the CPU, and all transfers to and from memory pass through it.

# 2.5.2 Arithmetic Logic Unit

ACC — Accumulator. The accumulator holds the results of 16-bit arithmetic or logical operations.

R — Remainder Register. The remainder register holds the remainder after a divide operation while the accumulator holds the quotient.

OV — Overflow Flag. Set to indicate specific conditions after either an arithmetic or logical operation.

C — Carry Flag. Set to indicate carry.

# A note of thanks to DEC users and the entire DEC-compatible community...

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You didn't have to participate in DEXPO 82 to benefit from its immediate success. The strength of the first Show — held last May in mediate success. The strength of the first onow — neighbors in the Atlanta — assures support for more and bigger it means new opport future. For DEC users and compatible wendors. Atlanta — assures support for more and pigger DEATO snows in the future. For DEC users and compatible vendors, it means new opportunities to meet face-to-face and help shape a prosperous DECtunities to meet face-to-face and help shape a prosperous DECtunities industry.

Both visitors and exhibitors who were at the Show are quick to agree that DEXPO is now the single most important event for every member of the DEC-compatible community. And they are looking forward to an of the DEC-compatible community. And they are looking forward to an even higger DEXPO/Weet 27—at the Anabeim Convention Content December 29—at the Anabeim Convention Content December 20—at the Anabeim C compatible industry. of the DEC-compatible community. And they are looking forward to an even bigger DEXPO/West 82—at the Anaheim Convention Center, December 7-9. This time, many DEC users are planning to bring teams of cember 7-9. This time, many DEC users are planning to bring teams of cember 7-9. executives to see and compare the latest DEC-compatible hardware,

For their part, a large proportion of exhibitors are planning to return their part, a large proportion of exhibitors are planning to return their part, a large product innovations. software, services and supplies.

ror their part, a large proportion or exhibitors are planning to return with expanded exhibits and product innovations. They'll be joined by DEXPO/West 82 will be the most comprehensive exhibition of DECas many as 75 new exhibitors.

OFATO, West of will be the most comprehensive exhibition of DEC compatible alternatives, enhancements and special solutions the world become some the largest and once of DEC years over the largest and over the largest and once of DEC years over the largest and once over the largest and once over the largest and once over the lar tompannie anemanives, emiancements and special solutions me work has ever seen. It will serve the largest audience of DEC users ever to has ever seen. Most important of all you can be cure DEYPO/Most strict one show. Most important of all you can be cure DEYPO/Most strict one show. visit one show. Most important of all, you can be sure DEXPO/West 82 util most all your DEC-directed needs. visit one snow. Most important of all, you can be sure DEAPO/West 62 will one snow. Most important of all, you can be sure DEAPO/West 62 will meet all your DEC-directed needs...a tradition that will be continuil meet all your DEC-directed needs...a tradition that will be continuil meet all your DEC-directed needs...a tradition that will be continued at DEXPO/East 83, Kiel Auditorium, St. Louis, May 22-24, 1983. ued at DEXPO/East 83, Kiel Auditorium.

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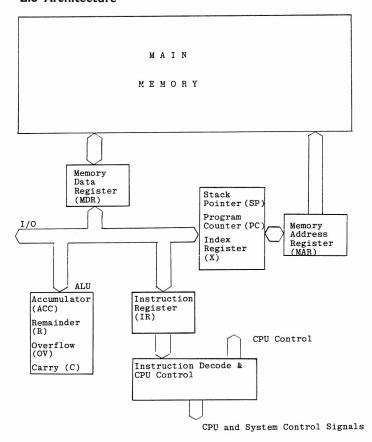
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# 2.6 Architecture



# IT'S 5:30 PM, FRIDAY

Your FORMER programmer just went home.

He dialed into a non-priv account, let himself in through a 'back door'. ([1,82] X.TSK  $\langle 232 \rangle$ )

He is now linking the bottom of [1, 2] to the top with ODT. He is planning a couple of custom monitor patches.

He is not mad anymore. . .

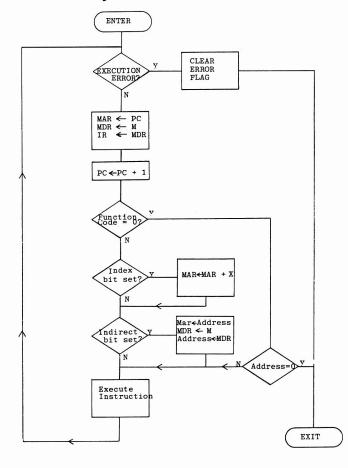
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# 2.7 Execution Cycle



# 2.8 Data Representation

# 2.8.1 Integers

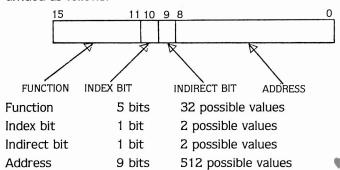
An integer is held as a 16-bit 2's complement signed integer in one word of store.

### 2.8.2 Characters

All characters are represented by their 8-bit ASCII code. Two characters can be stored in one word, instructions being available for byte manipulation.

# 2.8.3 Instructions

Each instruction is contained in a single 16-bit word, divided as follows:



# **Letters to The RSTS PRO**

. . . continued from page 6

RSTS, and tasks that require some sophistication with its internal operation to make proper response or decision, i.e., system generation. As this is my background I found the Monday and Thursday evening "Carl and Dave Shows" at DECUS very helpful, but they didn't go far enough. Some of the handouts were helpful but where do I go if I need more details. How about some articles that cover RSTS internals, or if this has already been published how about a reference list of books or articles, in this or any other publication that can help the newcomer to RSTS.

You two gentlemen have made, and are continuing to make a very significant contribution to the user community with both this publication and your many contributions to DECUS, many thanks from a newcomer!!!

Sincerely, Jerry C. Forshee Computer Systems Analyst Green & Company Inc, CPAs Bloomington, IN

Welcome to the 'community', Jerry. We are soon going to try to develop a cumulative index of the RSTS PROFESSIONAL. In addition, RSTS internals expert Mike Mayfield has produced a manual (see page 43).

I was just leaving through the back issues of your magazine and I happened to see the reprint of the photograph labeled "How TECO? Why TECO? Can you tell us?" In the the letters to the Editor section. (Dec. 1980, p. 19, v. 2, #4) I realize this is a little late, but I am offering my answer anyway. I will leave it to you to question my honesty but I will assure you I am not copying down the real answer from a later edition, for even if you did print the answer to the puzzle, I would not know for several recent issues were lost.

Answer: It is obvious that the Tampa Electrical Companies truck is stuck! The sign says "Cars Only" and a truck is not a car!

What about it - do I get a shirt?

Yours faithfully, Joseph Yaffee Morgan Equipment Co. Papua, New Guinea

Joseph, 'the TECO affair' lasted several issues (ended June 1981, v.3, #2). Even with that your answer is unique — wrong, but unique. Because of that (and because we wouldn't mind being shown off in New Guinea), we might have sent a shirt — but alas we don't know your size.

Dear Carl & Dave,

I just read in the June issue of the RSTS Professional your editorials about "break-in artists" playing destructive games, and I quite agree with your evaluation (although I would have used the term "juvenile delinquents" rather than "children").

But tell me . . . how come that one of these "children" has just been added to your list of "contributors"? It occurs to me that you could have used better judgment.

Sincerely, Paul Koning Raymond, NH

CARL: Since you raised the subject, I might as well vent some of my feelings regarding the "Atlanta Break-in". First, some of the blame must rest on the persons who set up the RSTS demo system so that it could be compromised so easily; some might even argue that this was "entrapment", or making

it so easy to do that doing it was not a crime. Second, while I do not agree with or condone the actions of the breakers, I will defend their right to free speech. I will not publish articles which have no common good or redeeming qualities, and I would argue I have met that goal so far; specifically, all the articles in the June issue are of high quality.

The crime in question was not so much the break-in; it was the malicious things that happened once the "kids" were in. The 'POKING' of the monitor and the ensuing system crash were clearly not in the best interests of anyone at DECUS save the 'breakers' themselves. Clearly they should be reprimanded, and even monitored while at the demo machines, but to censure them would do further disservice to the RSTS community we are trying to serve.

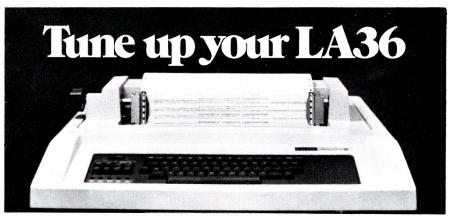
DAVE: I really appreciate your letter. I doubt I can publish it, or any suitable response without a libel suit.

I published the article and will publish the next after agonizing much — it's the sin we hate and not the sinner. The articles are quite good and show an upward trend...

[Want to switch jobs for a few weeks??]

# LETTERS to the RSTS Pro . . .

... is your column! Send us your comments, suggestions, photos, or notes of interest to the RSTS community. We'd enjoy hearing from you.



# The DS120 Terminal Controller makes your LA36 perform like a DECwriter® III.

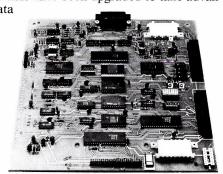
The Datasouth DS120 gives your DECwriter® II the high speed printing and versatile performance features of the DECwriter® III at only a fraction of the cost. The DS120 is a plug compatible replacement for your LA36 logic board which can be installed in minutes. Standard features include:

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- 110-4800 baud operation
- 1000 character print buffer
- X-on, X-off protocol
- Self Test

- RS232 interface
- 20 mA Current Loop interface
- Top of Form
- Adjustable Margins
- Double wide characters
- Parity selection
- Optional APL character set

Over 5,000 DS120 units are now being used by customers ranging from the Fortune 500 to personal computing enthusiasts. In numerous installations, entire networks of terminals have been upgraded to take advan-

tage of today's higher speed data communications services. LSI microprocessor electronics and strict quality control ensure dependable performance for years to come. When service is required, we will respond promptly and effectively. Best of all, we can deliver immediately through our nationwide network of distributors. Just give us a call for all the details.



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# **DEC**

# SYSTEMS & COMPONENTS

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CIRCLE 54 ON READER CARD

# DO YOU REMEMBER THIS?

(Photo contest, RSTS Professional, Vol. 4, #3, p.101.)



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

I am currently engaged in adding a room to my home. In the construction of this room I used some exterior grade plywood to brace the corners of the new room. This plywood has stamped on the back the symbol 'Teco Tested'.

Reference is now (finally) made to the photo contest. Although my 'Teco Tested' item is plywood, the item pictured in the photo appears to be composition board or pressed-wood.

My tee-shirt size is large. Joe Sanders
Metrodata Computer Systems, Inc.
Dallas, TX

The photograph shows a piece of Teco Tested particle or chip board.

We enjoy your publication very much and are looking forward to the DEC Professional.

Paul Bates, President RYO Theatre Services Ltd. Toronto, Ontario

Wood products, such as particle board are "Teco Tested." Looks like chip board in the photo.

Bill Van Vechten Hawaii Preparatory Academy Kamoela, HI

P.S. Size Medium T-Shirt. Thanks!

Joe, Paul, & Bill,

You are correct, you are the only respondees, you are receiving T-shirts. (We should have asked, "How? Teco Tested?"!)

# **Dear RSTS Man**

... continued from page 36

MB will provide an amazing improvement. The 70, however, will require that you upgrade your controller to Mass Buss compatible level. The 44 will provide you with a good 20-25 job system whereas a 70 should yield 45 jobs. Of course, these are ball-park figures stated in complete ignorance of your application. The improvement you should see first is relief from swapping. Always configure enough memory to hold your job max times your swap max plus monitor, runtime systems and resident libraries (after all, they are practically giving the megabytes away today). The above is true for both 44's & 70's. The next obstacle you hit will be either cpu or disk boundedness. (Note, small buffers are no longer a problem in V7.1.) This will be application dependent. Let's hope that by then, you can afford a second system.

# **DEAR RSTS MAN:**

There has been a lot of confusion about why RSTS/E limits programs to 31KW rather than 32KW. The reason for this limitation is quite simple. It's all for the lack of one byte.

Several routines within the monitor need to check that the user's buffer is within his program area. These routines do this by comparing the address just beyond the end of the buffer to the address just beyond the end of the job.

If the job is allowed to be 32KW, its highest legal address is 177777 (octal). Adding one to this number causes an integer overflow and a resulting value of 0. This says that all buffers must end before location 0, an obvious impossibility.

This problem can be corrected. In fact, I think not correcting it before now may have been an oversight on the part of Digital. Most of the routines within the monitor, including memory management and swapping, handle 32KW just fine.

I will work up a patch to RSTS V7.1 to allow handling of 32KW and send it to you for a future issue. Until then, I hope this explanation helps your readers understand the 31KW limitation.

Mike Mayfield Northwest Digital Software



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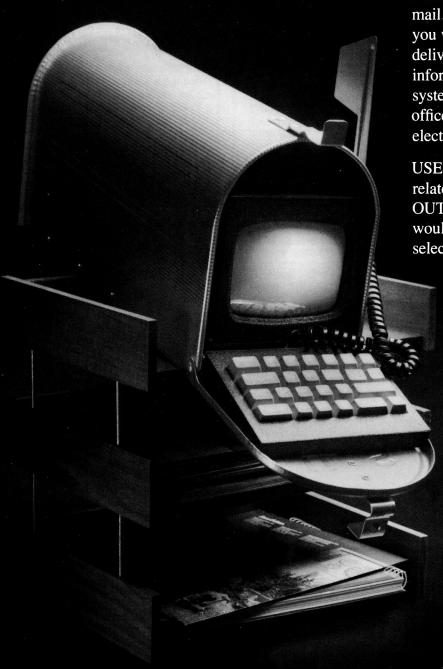
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SYSTEM MANAGER/PROGRAMMER/ANA-LYST — Rapidly expanding five year old service bureau seeking qualified, selfmotivated career professional to enhance existing medical group A/R software and manage two RSTS/E systems. 3-5 years experience RSTS/E, Basic Plus required. Excellent salary and benefits reflect high level of responsibility entailed in directing processing for over 100 clients. Excellent opportunity with growing company. Send resume, references and salary history to: Telecom Computer Systems, 7302 N. Richmond, Portland, Oregon 97203.

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FOR SALE: PDP-11/44, 256KW, RKO7's, DZ11, LA34, TJE-16 Mag Tape, RSTS/E and other licenses. George Arnold (414) 784-8250.

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For more information, contact Erskine Software, Dept. TYPE, Box 86, Due West, SC 29639 or call (803) 379-8816.

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WIGGIT is here on page 39! Keep looking for more Infinity Software games!



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

Fully formatted output (margins, justify, center, underscore, super-subscript, headers, page numbers, etc.), to typewriter, line printer or disk. Bidirectional driver for Diablo-Xerox 16-17.

code included. 9-Track \$200. RKO5 \$260. ppd T.F. Hudgins & Associates, Inc. P.O. Box 10946, Houston, Texas 77018 Woods Martin 713/682-3651

User's manual and source

\*TM Digital Equipment Corporation

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# NEWS RELEASES



Occasionally we are requested to print news that may be of interest to the RSTS community. We are happy to offer this feature to our readers. We reserve the right to print only as time and space permit. We cannot return photos or manuscripts. Send news releases to: RSTS News Release, P.O. Box 361, Ft. Washington, PA 19034-0361.

DEC USERS ATTENDING ANAHEIM DECUS MEETINGS TO GET FREE ADMISSION TO DEXPO/WEST 82, Anaheim Convention Center, Dec. 7-9 Anaheim, CA - Registrants for the DECUS (Digital Equipment Corp. Users Society) Conference to be held in Anaheim next December will be able to use their badges for free registration to the nearby DEXPO/WEST 82 exposition. DEXPO/WEST 82 - The Second National DEC-Compatible Industry Exposition - will be held at the Anaheim Convention Center, December 7-9, 1982. "This policy makes it even easier for DEC users to find the DEC-compatible products and services they need to improve their systems," said Larry Hollander, president of Expoconsul International, Inc., organizers of the DEXPO Show. Nearly 5,000 DEC users are expected to attend the DECUS meetings. "We're making it possible for all of them to visit the Show while they're here," Hollander added. DEXPO/WEST is expected to attract 8,000 DEC users.

At the same time, Hollander announced that demand for exhibit space in the

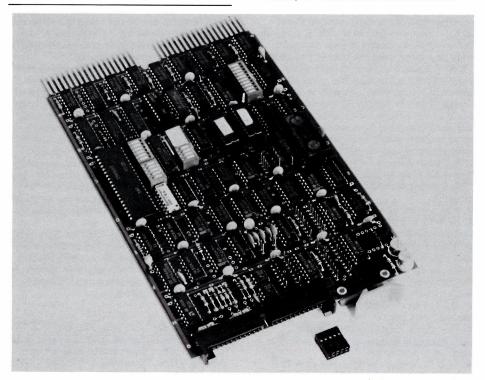
Show had forced the expansion of DEX-PO/WEST. The new floor plan will make DEXPO/WEST twice the size of the first DEXPO Show held last May. "A good number of returning exhibitors are doubling and tripling the size of their exhibitis," Hollander said. "And they are being joined by new exhibitors almost every day." Already the world's biggest exhibition of DEC-compatible hardware, software, services and supplies, DEXPO/WEST can now accomodate up to 250 exhibitors. Hollander expressed confidence that all space will be taken well before the Show opens.

DEC users and vendors of DEC-compatibles can get additional information on DEXPO/WEST 82 and DEXPO/EAST 83 — at the Kiel Auditorium, St. Louis, May 22-24 — by contacting Expoconsul International, Inc., 19 Yeger Road, Cranbury, NJ 08512; tele. (609) 799-1661.

NEW ASYNCHRONOUS SERIAL INTER-FACE FOR LSI-11 COMPUTERS, INCORPORATES THREE DIFFERENT INTERFACE CIRCUITS AND PRINTER BUSY DETECTION

Orange, CA — A new asynchronous serial interface for LSI-11 computers, from MDB Systems, Inc., the world's largest independent manufacturer of interface products, offers complete DEC DLV11-F compatibility plus the advantages of a unique "buffer ready" signal capability and RS-422 interface circuitry. The buffer ready monitor increases computer thruput when used with printers that do not provide X-on/X-off protocols, or the software does not monitor these protocols.

Printer Busy monitor circuit in the EIA modes. This feature allows connection to a variety of economical serial interface



MLSI-DLV11-FX, asynchronous serial interface with EIA RS-232-C, 20 MA current loop and and RS-422 interface from MDB Systems, Inc.

printers such as the TI810, Centronics 704 or Teletype 40 — printers which present the transition of a buffer-full status line from a SPACE (+12VDC) to a MARK (-12VDC) when the printer buffer is full and no further data should be sent. The Buffer Ready circuit allows the printers to be run at maximum speeds with no danger of buffer overrun. The RS-422 capability allows placement of printers, Video Display Terminals or other devices with corresponding circuitry at distances up to 4000 feet from the host computer.

Also unique to the MDB interface is the availability of four levels of priority interrupts (as compared to one level for DEC DLV11-F) which allows the assignment of priority to high speed devices. The MLSI-DLV11-FX offers a serial EIA-RS-232C/CCITT V.24, 20 MA current loop, as well as an RS-422 interface. Baud rates are programmable and switch selectable from 50 to 19.2K baud. Also switch selectable are the Word Character Format, the Address and Interrupt Vectors.

For further information: Jonnda Perry, Director of Marketing Administration, MDB Systems, Inc., 1995 N. Batavia Street, Orange, Calif. 92665.

Price: \$385.00 in single units. Delivery: 3 Days ARO,

# EEC SYSTEMS ANNOUNCES THE AVAILABILITY OF LEX-11

Wayland, MA — EEC Systems announces the availability of LEX-11, a multi-user word and data processing software package designed for use on DEC PDP-11, LSI-11 and VAX Computers. Designed under the RSTS/E operating system it also runs under the RT-11, RSX-11M, TSX-PLUS, UNIX, IDRIS and VMS in the compatibility mode. The complete system requires only 300 blocks of disk space and can be run on an LSI-11 with 32K of memory. The run-time system uses 8KW of memory and on multi-user systems LEX-11 requires less than 16KW per user. The system is re-entrant and common code has been used whenever possible.

LEX-11 can be used for such tasks as personalized mass mailing, contracts, standard forms, manuals and statistical tables. It can be utilized for invoice production, list processing, generating custom forms and data management. It can also be used in conjunction with a typesetting machine. All operations on LEX-11 have been designed to make things as easy as possible for the user.

Some special features of LEX-11 include:

- Full screen editing
- LEX-11 supports almost any terminal and different terminals
- It produces standard ASCII text files and can be interfaced with other DEC software
- Programmers can edit their own programs using LEX-11
- Users can reprogram terminal keys to perform any operation
- The visual calculator allows for mathematical operations to be incorporated in a document
- LEX-11 works the same way for the user on all operating systems
- Users can create custom forms for their own applications

- Users can define their own menus according to their application requirements
- Other features include graphics, 90,000 word spelling dictionary and list processing.

EEC Systems specializes in DEC PDP-11 based hardware, and software which runs on the PDP-11 and VAX computers.

For more information contact: Eric Dickman, EEC Systems, 286 Boston Post Rd., Wayland, MA 01778, 617-358-7782.

# EMULEX, CDC EXPAND PRODUCT SERVICE COVERAGE

Santa Ana, CA — Emulex Corporation and Control Data Corporatio have expanded their third party service agreement to include the Emulex CS11 series of communications multiplexer products.

Under the original agreement, Control Data's Engineering Services Organization provides complete maintenance and spares stocking for Emulex disk and tape controllers used with Control Data peripheral storage devices on PDP-11 and LSI-11 computer systems made by Digital Equipment Corporation. In the major service areas, maintenance service coverage is available for entire PDP-11 or LSI-11 systems, including the CPU, memory and other options.

This agreement has now been amended to include the CS11 series communications multiplexers made by Emulex. The change is significant because it adds Emulex products which don't involve Control Data Peripherals, according to Phillip (Flip) Begich, Emulex director of national marketing.

"The communications products have been added primarily because of demand from Control Data service customers for them to handle all Emulex products," Begich said. "Control Data has been doing an excellent job of providing total DEC system service at competitive prices for several years, and a big plus is that they offer maintenance of mixed vendor systems from a single source."

The Control Data service is available for complete DEC systems in 17 cities around the United States, with another five to be added during the first quarter of 1982. Service for subsystems-only is available in those same cities, with an additional 20 or more cities planned for addition in 1982. Subsystem maintenance of Emulex/Control Data products is also available in Canada, the U.K., and Germany. Control Data also supports Emulex's own System Group for end user installation and service in the United States.

Based in Santa Ana, Emulex Corporation is the leading supplier of disk, tape and communications controllers for use in interfacing a wide variety of peripheral devices to computers made by Digital Equipment Corporation.

INDEPENDENT USERS GROUP HOSTS FALL CONFERENCE AND EXPOSITION Warwick, RI — You will have to be in Boston, Massachusetts on October 4 - 6 to meet the best of the DEC-related community at IRUS '82, a Conference and Exposition for DEC users, sponsored by the

Independent RSTS Users Society (IRUS) and Hardcopy Magazine.

IRUS, a user-run, user-supported organization of RSTS, VAX and other DEC installations, began holding fall conferences three years ago. Due to their success attendance at the conferences has doubled every year. In addition to a seminar program, last year's conference, Access-11, included a large-scale DEC compatible trade show — the very first of its kind - with 20,000 square of exhibition space and an in-depth representation of compatible software, hardware and services. The IRUS tradition continues this fall at the Park Plaza Hotel and Exposition Castle in Boston with an expanded series of seminars, workshops, panel discussions, and an exposition that covers the range of DEC compatible products.

"TRUS'82 is much more than a DEC-compatible trade show," explains Monica Collins, chairman of the group. "TRUS'82 is the one and only conference for the DEC-related community and will offer its participants an unrestricted view of the entire marketplace — ideas and products. The information and contacts made at IRUS'82 will benefit users and vendors alike."

Last fall's successful conference held at the Hartford Civic Center in Connecticut was truly a national event attended by people from 22 states, Canada, England and Israel. The Boston location this October provides vendors access to the heart of the East Coast market, and with an international airport; and extensive accomodation facilities, travel to IRUS '82 from anywhere in the world will be convenient.

The conference includes a program of seminars, workshops, and panel discussions that follow the theme of "Options for the '80s". Topics include technical and managerial concerns and aspects of RSTS, VAX, VAX conversions, the influence of micro-computers on the DEC user, communications and distributed processing for the DEC user and more. Sessions have been planned that compare many of the operating system software available for PDP-11 computers including UNIX.

Monica Collins sums up the goal of the conference: "IRUS has been built on the free flow of information, and it is in that spirit that IRUS'82 will convene the widest variety of informed viewpoints available in the DEC world."

Some exhibition space is still available. Contact Dame Associates, 51 Church Street, Boston, MA 02116; (617) 482-3596.

Since seminar space is limited, people interested in attending should preregister before September 10th. Contact IRUS '82, 3657 Post Road, Suite 4, Warwick, RI 02886. (401) 738-4430.

### CALOUT CATCHES ON

Provo, Utah — Clyde Digital Systems, Inc. reports a large and rapidly growing user base of its communication utility program CALOUT. Users report that they are particularly pleased with the ease of use provided by this package. In comparison with products such as DECNET users

are also discovering the remarkable cost effectiveness of CALOUT.

With CALOUT a separate license is not required for each correspondant computer. Users license their own computer and then dial up any system they desire. There is no additional costly licensing as with DECNET and similar products. This kind of cost break, together with the powerful file transfer features included from the beginning, are clearly responsible for CALOUT's first choice rating among users today.

User's also note the advantages of CALOUT's unique error detection and correction capability. It is particularly good at handling communication problems that result in data that is dropped or lost in transmission. This is in addition to correcting data that is transmitted in error.

Experience to date with this product indicates a popular misconception about transfer speeds. Basically, a product of this type is only limited in transfer speed by the baud rate of the hardware link employed. DECNET has enjoyed the reputation of fast transfer largely because of the bundling of special high speed hardware with the product. CALOUT may also be used with special high speed hardware for the same speed advantages. Actually speed is found not to be a relevant issue in product comparison.

For further information call or write: Lisa-(801) 224-5306, 3707 N. Canyon Rd., Provo, Utah 84604.

### SOFTWARE TECHNIQUES, INC. ANNOUNCES NEW EDITION OF RSTS PERFORMANCE TOOLS

Los Alamitos, CA — Software Techniques, Inc. today announced the latest version of DISKIT, the popular disk management "tool kit" for DEC RSTS users. DISKIT version 5.0 includes 5 software products:

- DSU Disk Structuring Utility optimizes disk directories and improves system performance (often by as much as 35%). DSU also performs fast disk-to-disk backup.
- RDR High-Speed Directory Re-Order program which improves system performance by reducing the number of disk accesses required to find and retrieve files. RDR is 30 times faster than the DEC-supplied utility REORDR and provides many additional features.
- DIR Ultra-High Speed Directory utility which searches directories at the rate of 400 files/second. DIR supports all of the functionality of Digital's DIRECT and can be used as a replacement for DIRECT in all applications. In addition, DIR provides a large number of features not found in DIRECT, including powerful tools for improving system security.
- DUS Disk Utility Subroutines package allows system managers to develop their own special-purpose disk utilities. DUS interfaces to BASIC-PLUS-2 and CSPCOM programs.
- OPEN Open Files Display Program monitors file accesses on a job-by-job basis.

The major improvements in version 5.0 include new features in DSU, a complete re-write of DIR to improve speed and add

significant new features, improved documentation, and the inclusion of RDR.

DISKIT version 5.0 is licensed for single CPUs for a one-time fee of \$1,350 (U.S., quantity 1). Multi-CPU, OEM, educational, and quantity discounts are available. DISKIT is supplied with comprehensive documentation and a 90-day warranty.

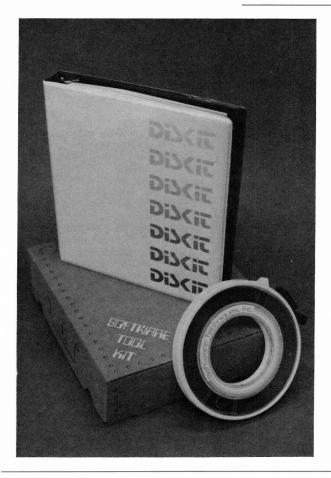
First shipped over a year ago, DISKIT version 4.0 pioneered RSTS system management utility market. Since its release, DISKIT has sold more copies than all other RSTS disk management utilities combined.

Software Techniques, Inc., headquartered in Los Alamitos, California, is one of the world's leading minicomputer consulting groups. Specializing in Digital's RSTS/E and VMS operating systems, Software Techniques provides products and services world-wide, ranging from business accounting software packages to high-technology consulting services.

"C" programming language, C-CALC hs been engineered for optimum machine efficiency and ease of use. C-CALC is extremely user-friendly with an extensive ON-LINE HELP feature and built in training procedure. Even those with little or no computer experience are able to take advantage of computer assisted decision making.

C-CALC lets you experiment with any number of financial alternatives and determine their results in minutes. Plans can easily be tested, evaluated, and modified. Boardroom quality reports are available in seconds. C-CALC helps you answer "What if" questions with ease, speed, and accuracy.

An added feature of C-CALC is its transportability between most different types of computer systems. If your company has more than one type of computer, data may be easily transported between them. System upgrading poses no problem. C-CALC does not require



Software Technique's, latest version of DISKIT, the disk management "Tool Kit" for DEC RSTS users.

# INTRODUCING C-CALC — A GREAT IDEA PERFECTED!

Kirkland, WA — First came Personal
Software's VISICALC, the first generation
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some of the "big" machines. Now,
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is proud to announce the third and finest
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Written in the extremely CPU-efficient

use of particular terminal types and takes advantage of the characteristics of individual terminals — most terminals may be easily accommodated.

C-CALC offers many advanced features not available in the earlier spreadsheets. Use of 'menus' rather than confusing multi-level function keys makes C-CALC much easier to use. A comprehensive worksheet consolidation feature allows consolidation by label, by entire worksheets, and consolidation of 'percentages' of amounts into other worksheets — great

for overall corporate planning. Some of C-CALC's other advanced features are: computed coordinates, support of up to 120 labels, choice of alpha or numeric coordinates, variable column widths, if-then-else, text is allowed in equations, and cells may be set to blink, bold, or underline on a specified condition. C-CALC's most striking feature is, without a doubt, its speed and CPU efficiency. More users may simultaneously use C-CALC without taxing your system.

without taxing your system.

All DIGITEC Software Design, Inc. products include a full year of cost free maintenance and extensive customer support. Regular update releases provide our users with a constant source of the most advanced, state-of-the-art products on the market. DIGITEC is currently seeking distributors for all markets. For more information, please contact: DIGITEC Software Design, Inc., 14125 108th Avenue N.E., Kirkland, WA 98033, (206) 821-7507.

ENGLISH COUNTRY HOUSE BECOMES MARKETING AND SUPPORT CENTER Irvine, CA — ABLE Computer has moved its English Marketing and Support Center into a country house about 45 miles west of London. The new center will be the focal point for all sales, service, repair and training in the United Kingdom, Belgium and the Netherlands.

The building was chosen partly for quaintness and location but primarily for size, according to Bob Jones, International Director of Marketing. Jones said, "We really needed the room. We had already outgrown our original office and decided to get excess space now rather than move soon again to accommodate the growth which is anticipated. That's why we bought a two-story brick house with 1500 square feet of floor space on a half-acre lot in the English countryside. This gives us a one hundred and seventyfoot frontage on the A-4 leading into Newbury and offers our customers a real sense of company presence in the United Kingdom.'

Roger Scarlett has been Marketing Manager of the English office for the past two years and will continue in the same capacity at the new facility. Under his direction the building has been remodeled to contain offices, a display area and repair facilities on the first floor and guest quarters on the second. The address is ABLE Computer, ABLE Computer House, London Road, Newbury, Berkshire, England RG13 2QJ. The telephone number is 44 (0635) 32125, and the TELEX is 848715 ABLE G.

ABLE is the world's largest independent supplier of enhancement interfaces for the VAX, PDP-11, System 20 and LSI-11 series of computers. The company manufactuers an extensive line of communications, memory and general-purpose products all of which are hardware compatible with and software transparent to the host machine. They are supported and serviced worldwide with offices and plants located throughout the United States and Canada, as well as England, Germany and Puerto Rico.

NEW DMA INTERFACE MODULE WITH USER IMPLEMENTABLE THROTTLE TO OPTIMIZE COMPUTER PERFORMANCE FROM MDB SYSTEMS

Orange, CA — MDB Systems, Inc., the world's largest independent manufacturer of computer interface modules, has developed an improved version of a DR11-W module for DEC Unibus and VAX computers that maintains full operating and diagnosite transparency to DEC software.

The MDB DR11-W has in addition to all of DEC's capabilities, a switch selectable DMA throttle that controls the peak rate problem by allowing optimum data transfer without affecting overall CPU performance.

MDB marketing manager, Stan Margulis says the DMA throttle feature lets the system designer specify the average thru-put rate of the DMA Link or Port so that a smaller CPU can perform the same job as a larger unit, or a user can get more from an existing system.

Another of the unit's features is that it uses on-board self test diagnostics. Micro sequencer driven, the switch selectable test features monitor DMA read/write cycles to and from memory and generates 16 unique data patterns for read/compare testing. Edge mounted LEDs indicate to the user any error conditions.

All operating parameters of the MDB-DR11-W are selectable from edge mounted switches, thereby precluding the powering down of the system to remove the board to change modes or operation. Eight addresses and interrupt vectors are stored in PROM and are independently switch selectable, including DEC recommended assignments.

Bus control and DMA cycle timing are controlled by delay lines for high speed and precise cycle timing.

All of the MDB unique features which are not available on DEC's DR11-W, will assist the user in quick fault isolation and reduce the cost of ownership and maintenance.

The MDB-DR11-W is priced at \$1,500

in single quantities. Delivery of units is scheduled for September.

RSTS/E: VMS USERS INSPECT BEFORE THEY BUY

Bedford, MA — Clyde Digital Systems has recently announced that by means of its new computer to computer communication software CALOUT, actual product will be transferred to user sites previous to purchase. Through the imaginative use of the CALOUT utility, CDS is attacking historic apprehensions surrounding the acquisition of packaged softwre from non-local vendors.

CDS can transfer the following packages to RSTS/E and VAX users equipped with a dial in line. Serious buyers then have the opportunity to inspect and evaluate these products before a 30 day latch is executed. CALOUT permits user to dial up a second CPU and exchange data files of any kind. CONTRL provides remote interactive training and user support. Complete log file of season may be kept.

DOC makes 4 logical terminals out of 1 physical terminal. Complete log files of each job session may be kept.

IMAGE allows DOC log file to be played back intelligently, one frame at a time.

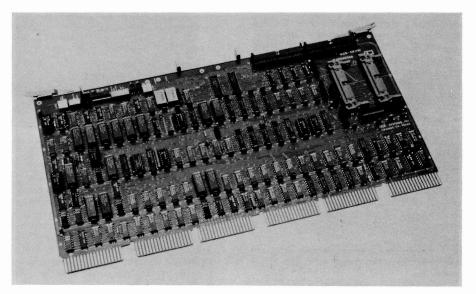
MONITR records entire dialog of selected job session in a secured log file. This is invisible and unintrusive to users being monitored.

LOCK simplifies and generalizes menu creation. Limits user to authorized menu. Records tasks run.

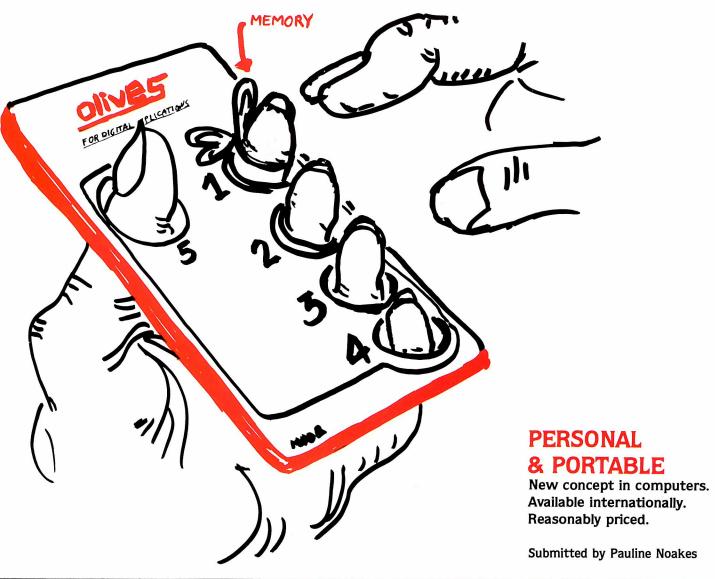
VAX users please note that CALOUT is the only package presently available on VMS. All others will be announced shortly.

Full support and all necessary documentation is provided to ensure success during and after the approval period.

For detailed information on this offer or for information on how to use CALOUT in similar fashion contact: Clyde Digital Systems, P.O. Box 348, Bedford, MA, (617) 275-6642.



MDB-DR11-W — Direct Memory Access Interface Module for UNIBUS and VAX Computers



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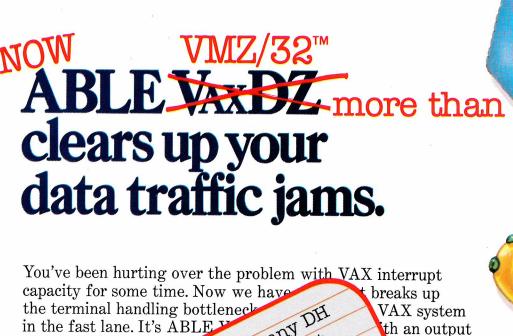
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CONTROLLER	DESCRIPTION	COMPATIBILITY	
C03	Cartridge disk controller	RK05	
C33	Cartridge disk controller	RK05	
T03	NRZI mag tape controller	TM11/TU10	
T04/C	Mag tape streamer coupler	TM11/TU10	
T04/N	NRZI mag tape controller	TM11/TU10	
T04/D	Dual density mag tape controller	TM11/TU10	
T34/C	Mag tape streamer coupler	TM11/TU10	
T34/N	NRZI mag tape controller	TM11/TU10	
T34/D	Dual density mag tape controller	TM11/TU10	
T36	Dual density mag tape controller	TM11/TU10	
T34/T	GCR mag tape controller	TM11/TU10	
S03/A, S04/A	80 MB/300 MB SMD controller	RM02/RM05	
S03/A1, S04/A1	80 MB/160 MB SMD controller	RM02	
S03/B	80 MB/300 MB SMD controller	RK07	
S03/C	200 MB/300 MB SMD controller	RP06	
S03/D, S04/D	96 MB CMD controller	RK06	
S33/A	80 MB/300 MB SMD controller	RM02/RM05	
S33/A1	80 MB/160 MB SMD controller	RM02	
S33/B	80 MB/300 MB SMD controller	RK07	
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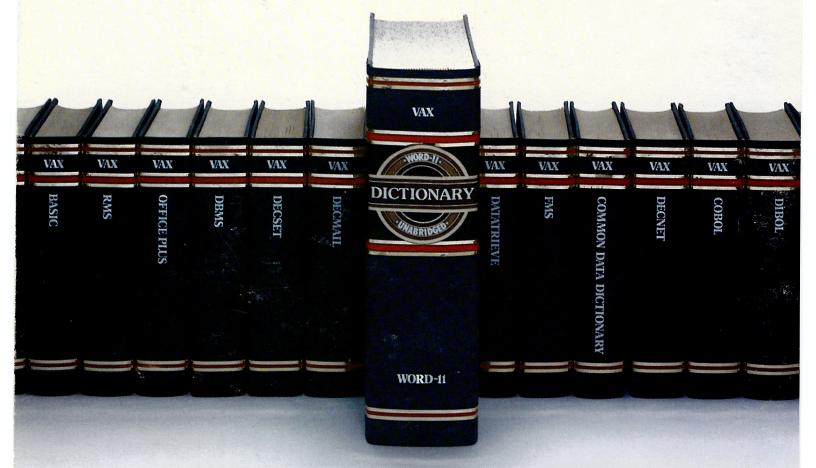
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