Can / Am EMTP News

Voice of the Canadian/American EMTP User Group

Publishers and Mailers:
Kwang-yi and Kwang-chien Ger
3179 Oak Tree Court
West Linn, Oregon 97068
United States of America

Authorized by Co-chairmen :
Dr. W. Scott Meyer, Editor
Dr. Tsu - huei Liu
E - mail : atp @ agora . rain . com
Vol. 93 - 4 ; October , 1993

Table of Contents

Salford Compiler & DOS Extender

Dynamic dimensioning of Salford EMTP suddenly was realized to be possible during the early morning hours of July 28th as your Editor was debugging Dr. Liu's LMFS for DC-51 (see July). Using F1 of the Salford debugger for on-line help, and looking under Dynamic Link Libraries (an unrelated story), it suddenly became obvious that we could do with the Salford compiler what computer expert David Szymanski had done some five years ago using standard Unix. It would be difficult to overemphasize the importance of this breakthrough. No longer is a separate TP3 created and distributed by the user group. Now, only TP20 is created and distributed to the general public. If the recipient wants TP3, he simply runs TP20 using the same dimensions that TP3 would have! For details, see a separate, later story.

NEW LIST SIZES (NLS) of dynamic dimensioning is illustrated by standard test cases DC-22 and 47. It is important to note that this is a practical use, rather than an artificial illustration. Previously, Gabor Furst's SVC modeling in the 4th subcase of DC-22 and Prof. Alfonso Capasso's Type-59 S. M. simulation of DC-47 would overflow TP3, resulting in KILL = 1 error messages. Beginning October 20th, these simulations were activated. The use for DC-47 is particularly interesting because total table size LTLABL actually is reduced from the beginning 206K words of TP3 to 162K words by the special table sizing! Like DC-1, DC-47 is a good, new test of faster computers. To simulate 1000 time-steps on your Editor's 33-MHz 486, 38 seconds are spent in the time-step loop. Of course, DC-47 is an ac rather than an hvdc simulation, so the repeated retriangularization of [Y] that dominated DC-1 is not important for 47.

Turbo table dumping is the name of the latest breakthrough to speed the dumping or restoring of tables as required for START AGAIN use (or the preceding MEMSAV = 1 data case), or more commonly for Monte Carlo (STATISTICS) studies, or SYSTEMATIC use. As explained in a separate, later story, this time and space-saving invention is the brainchild of Robert A. Schultz of New York Power Authority (NYPA) in White Plains.

It is not yet running in Portland, however.

The Salford DOS extender DBOS now goes with the compiler rather than being sold as a separate commercial product. This concerns the distribution of DBOS to others for the support of Salford EMTP and TPPLOT. It would seem that the market for DOS extenders has collapsed. That is the good news about the success of Salford competitors such as Lahey and Microsoft, which require no separate charges for DOS extenders. They seem to have forced Salford to drop its extraordinary charges. So, whereas a year and a half ago (see the front page of the January, 1992, issue) the user group agreed to pay a $75 annual maintenance fee, this has ended. On the other hand, the $150 annual maintenance fee for the compiler must be continued (a year ago, the intention of the user group to drop this was declared). Salford agent OTG Systems has changed this from FTN77 / 386 to FTN77/486 because the former is being withdrawn from the market (more good, long-overdue news). To conclude, the user group remains a Salford compiler licensee to guarantee future updates of Salford DOS extender DBOS --- the only item needed by program users.

600 by 800-pixel resolution is not incompatible with the graphic cursor even though this is a common problem. Your Editor observed correct operation for this resolution while adjusting the 486 of BPA's Jules Esztergalyos, which has a *"MouseMan, Bus"* mouse by Logitec. This was during early September, using DBOS Rev. 2.66 .

A Salford DBOS disk that does not rely upon the Salford program INSTALL for its use has resulted from the thinking of both Laurent Dubé and Prof. Bruce Mork. As explained to the world in E-mail of the Fargo list server dated August 17th, the idea is simple enough: files of the DBOS directory \DBOS.DIR can easily be distributed as a single ZIPped archive. What could be easier or quicker than unzipping this? During August and September, Mr. Dubé's archive of all files in the DBOS directory of a compiler user was distributed selectively to Salford EMTP users who complained of conflicts with networking (see opening paragraph of July issue). Since none of the guinea pigs complained, the decision to switch from DBOS Rev. 2.66 to Rev. 2.71 was made during early October. Previously, Professor Mork had observed that some unwanted and unneeded traces of the compiler appear in the \DBOS.DIR directory, however. By omitting these from the archive, substantial space was saved. E-mail from Prof. Mork on October 14th contained a list of just 24 files that guided Dr. Tsu-huei Liu's creation of the 716-Kbyte archive DBOS2P71.ZIP on October 18th. We have chosen to exclude the swap file since recipe ATPSETUP.LIS will direct the user to create this, anyway, if needed. The final distribution of Rev. 2.66 was October 20th. The 500 Kbytes of free space are a welcome fringe benefit of the change. It has been possible to restore Dr. Mustafa Kizilcay's simple but good MS-DOS (not Salford!) plotting program PCPLOT (removed some months ago due to a shortage of space), the 35 new MODELS test cases, and the five most recent WordPerfect disk files of these newsletters.

Error using 1024 by 1280-pixel screen graphics has been explained for the home computer of BPA's Fred Elliott. This is a continuation of the story that began with Prof. Riaz at the University of Minnesota (see the end of page 2 of the preceding issue). It concerns logic for the automatic recognition and use of the highest graphical resolution when NYMAX of disk file GRAPHICS is left blank (as distributed by the user group). Mr. Elliott's discovery is that your Editor's use of vertical pixels alone is not enough to recognize maximum resolution correctly. This is because his and other output cards support graphic modes that correspond to portrait rather than landscape orientation of the monitor. The Trident TVGA 8900C card used by Mr. Elliott supports 41 different display modes, and one of these has 1024 vertical and 768 horizontal pixels --- which is rotated 90 degrees from what Salford supports. So, logic was added to both Salford EMTP and also TPPLOT on October 2nd to check horizontal resolution along with vertical resolution. Any portrait mode now is rejected.

DBOS Rev. 2.71 works perfectly at BPA on the 33-MHz COMPAQ 486 used by Tsu-huei Liu. Micro-soft Windows, BPA networking (an Ethernet connection), and Salford DBOS Rev. 2.71 all coexist in complete harmony when Dr. Liu demonstrated progress on August 5th. When outside of MS Windows, the Salford disk cache (/DISK_CACHE) still does not work properly, but this is a different problem. Under MS Windows, all is well. Now, one can either: 1) run ATP directly by clicking on its icon, or 2) first click on the MS-DOS icon to open a DOS window, then run DBOS manually in it, and finally run Salford EMTP manually. The 386-based laptop COMPAQ of Shawn Begley, our latest EMTP visitor who comes from ESKOM in South Africa, also behaves perfectly this way as proven on August 30th. No longer is there any need for Dr. Liu to drop out of MS Windows and its network connection in order to run Salford EMTP or TPPLOT. Timing of the two modes of ATP simulation under MS Windows are not the same, however. Use of the ATP icon is substantially slower as the following table for the total time of DC-1 shows:

	DISK	Screen	BOTH
DOS icon	99.9	130.2	142.6
ATP icon	111.8	149.0	167.7

It is as though the burden of unused windows and icons is avoided when they can not be seen. One final limitation should be mentioned: graphics still do require full screen, though. Has any reader successfully produced Salford EMTP or TPPLOT graphics in a window that covers only a small part of the screen?

More expensive PCs are not necessarily more compatible with Salford EMTP, readers are reminded. A

recent example is provided by the H-P Vectra 486/33N of Prof. Armando Llamas of ITESM (Monterrey Tech) in Mexico. After initial frustration with graphics, Prof. Llamas finally reported success with Salford EMTP graphics in a letter dated September 1st: *"I bought a thirty-eight-dollar VGA card and (it) works fine with this."*

Use of $OPEN to connect a C-like .PL4 file can cause trouble if the file already exists. That is, there might be trouble overlaying an old file of the same name. Recognition of the potential problem came by E-mail from the Fargo list server on August 13th when Dr. Mustafa Kizilcay of Lahmeyer International in Frankfurt, Germany, alerted others to the problem at the end of an unrelated exchange about $OPEN usage. Trouble occurs if the old file is larger (i.e., is not completely covered by the new one). Curiously, the same problem was corrected some 17 months ago, but only for naming parallel to the input data file --- not for $OPEN usage. See column 1 on page 10 of the April, 1992, issue. Different code is used, so on August 14th a similar remedy was added to the code of $OPEN use. As long as **.pl4** is the file type, any old C-like file of the same name will be deleted before the connection of $OPEN is made provided there is no STATUS=APPEND (to add to the end), STATUS=OLD (to connect an old file without positioning), or finally, STATUS=OVERLAY (to position ready to read or write the first time step) request as illustrated by DC-49. Note carefully the lower-case file type, which must be maintained by a trailing exclamation point. News of the correction was broadcast by the Fargo list server on August 16th.

Microsoft Windows allows speedy linking of Salford EMTP, it has been found. For the 33-MHz COMPAQ 486 used by Dr. Liu at BPA, this was done within an MS-DOS window after first running DBOS manually. An amazing 16 seconds (12:01:59.73 - 12:01:43.42) of wall-clock time sufficed on September 26th when the experiment was performed. Of course, SMARTDrive is the disk cache being used by MS Windows, so this is a logical recipient of credit for speed of the I/O bound activity. Your Editor's computer, using Salford's disk cache, required slightly longer. But both are much faster than a year ago --- probably because numerous warning messages about COMMON block lengths now are being suppressed by Salford's **suppress_common_warnings** (recommended by Laurent Dubé).

ATP execution, too, is fast. The time for all standard test cases can be determined by subtracting the time at the bottom of the last (DCNEW-12) from the time at the top of the first (DC-1). Using the same environment as for linking (see preceding paragraph), Dr. Liu's 33-MHz 486 beat your Editor's! Under MS Windows, only 24:47 (13:39:39 - 13:14:52) was required whereas your Editor's AT&T 486 (no MS Windows; use /DISK_CACHE) takes 26:08 (10:30:43 - 10:04:35). Dr. Liu does use DBOS Rev. 2.71, so maybe this works better with MS Windows that before? Who knows. In any case, the former unavoidable penalty (see pages 14 and 15 of the January issue) no longer seems to be observable.

Diagnostic output during CALCOMP PLOT graphics now goes to DEBUG.LIS of I/O unit 46 rather than to the screen. This is for the case of LUNIT6 = 6 (from the STARTUP file) and no DISK use at the start of execution. Previously, diagnostic went to the graphic screen, creating a mess. Although the change was made many weeks earlier, it first became available to the general public on August 28th along with the PostScript graphics from Messrs. Schultz and Meredith of NYPA .

Minor updates of the program, by definition, involve the translation of only selected UTPF segments that have been changed. Assuming COMMON blocks outside the update segments are all unchanged, one would like to translate and compile only the UTPF segments that were changed. For computers that were used for program development in years past --- VAX/VMS, Apollo, and Sun --- this was possible. The idea is simple: one feeds the new compiler output (object files of the modified segments) into the linker ahead of all old object files, and the linker automatically would use the new code (handled first) in place of the old. But the Salford linker was not so accommodating; it would halt when it encountered a second module having the same name. Your Editor did not imagine that a switch might exist to prohibit this. He assumed that if such a switch existed, its default setting would correspond to that of other compiler writers. Yet, as Laurent Dubé learned in E-mail dated April 23rd from Guido Empereur of LEC, **permit_duplicates** is all the Salford linker requires. This valuable information finally was used on October 10th when the Salford translator was overhauled to avoid recompilation of neighboring code (all chunks of FORTRAN that contained modified segments).

Improvements to Salford TPPLOT

PostScript output for window plotting was added to TPPLOT during mid-August by Dr. Tsu-huei Liu. This parallels your Editor's addition of HP-GL output as described at the top of column 2 on page 5 of the April issue . That is, unlike the usage for non-window plotting, no separate POST subcommand of the PAPER command is issued after a pleasing screen plot. Instead, for window plotting, the desire for PostScript output must be declared **prior** to the screen plot. It is new binary parameter NOPOST of integer index 265 (for TPPARAM.DAT use) that either orders PostScript output (if zero) or prevents it (if unity) during the window plotting on the screen. Unlike Dr. Liu's code for non-window plots, which was an adaptation some 4 or 5 years ago of New York Power Authority (NYPA) code supplied by Robert Meredith, the latest addition has no labeling that is

rotated 90 degrees and placed on the right. Instead, like the HP-GL copy, the new PostScript output should approximate what is seen on the screen. Only the most commonly-used size, 8.5 by 11 inches with landscape orientation, has been provided thus far by the fixed configuration file HEADER4.DAT. Output files will be named TPPPOST.001 , etc. (the serialization of the file type has offset KNTPST of integer index 266). This parallels TPPHPGL.001 and KNTHPG (integer index 264) for HP-GL. Note that either or both can be produced at the same time as the window screen plot. As illustrations of the new PostScript, TPPPOST.TWO and TPPPOST.FIV were added to TPPLOT.ZIP beginning August 22nd. These were produced by execution of TWO.WIN and FIVE.WIN following a SET DATA 2 command for standard VGA initialization. Perhaps in a later issue someone who understands PostScript could summarize controls that have been embedded in the configuration file HEADER4.DAT (there is no time or space now, unfortunately).

The TAMPER subcommand of SET DATA was implemented to allow the interactive observation and modification of any parameters that would be changed by TPPARAM.DAT (see bottom half of column 2 on page 2 of the January issue). But what about the change of parameters within command files, where one can not use the mouse? Also, what about the few unfortunate users who have not yet discovered mouse power? On August 6th, the program was generalized to allow a character connection to the TAMPER command. As illustrated by THREE.WIN , this can be used within @-files whether or not a mouse is being used. Once within the command, each of an indeterminate number of lines applies to any one index. Fixed format is assumed, with four entries as follows:

Columns 1 - 8 : the index as I8 information;
Columns 9 -16 : the floating value as E8.0 ;
Columns 17-24: the integer value as I8 ;
Columns 25-32: the alphanumeric string as A8 .

Any field that is left blank is assumed to be unchanged. Most commonly, each line will consist of just a parameter index in columns 1-8 and its associated, revised value in one of the three remaining fields to the right. Such input lines are terminated by END in columns 1-3. Other key words are SAVE and RESTORE to make a copy of all parameters at any time, and later restore that copy, respectively. There is an implicit (hidden, automatic) SAVE as the TAMPER command first is entered, so any alter use merely overwrites the original storage. The illustration of THREE.WIN first omits the curve identification symbols by setting integer parameter NUMSYM to zero using index 11. This is for the first (the 3-window) plot. Then, RESTORE cancels this, and the horizontal axis is moved two units downward by a change of FHTAX from the default 0.5 to 0.75 using index 32. The vertical axis of the non-windowed final plot has 8 units, and the difference between 1/2 and 3/4 is two of these. The movement is downward rather than upward because Salford counts from the top down (this depends on computer). As each data line of TAMPER is processed, there will be one line of output confirming the change. For NUMSYM , this was : *"Change integer parameter named NUMSYM from 3 to 0"*

MWINDO of integer index 268 is a switch that has default value zero. If set to 5, WINDOW plotting with as many as 5 windows will be done automatically. Such an alternative to normal plotting was requested by Jules Esztergalyos, who is involved with relaying at BPA. Since Randy Suhrbier's plotting program for VAX / VMS had such a feature, why should TPPLOT not offer it? Good question (i.e., great idea)! As initially implemented, each curve is given its own window (up to a maximum of 5), and is scaled automatically. All windows are of equal size, and the screen is always filled. One big change is automatic use of the window title line to identify the type of variable, associated node names, and any scaling (factor and offset) that might be exceptional. Illustrations for 1 through 5 windows became a part of TPPLOT.ZIP beginning September 11th. Executed as @JULES1, ... @JULES5, these illustrate the handling of one through five windows (curves), respectively. One warning about MWINDO concerns manual use of the WINDOW command. Because the manual and automatic uses conflict, it was decided that automatic usage will be cancelled (i.e., MWINDO will be set to zero) whenever manual usage (the WINDOW command) starts. Later, more curves than windows might be allowed. But which two or more curves then should share the same window? Your Editor can not yet see what convention might be the most natural or useful.

News from Outside USA and Canada

A printed copy of the July newsletter was mailed by BPA to each of its primary EMTP contacts on September 17th as had been predicted in E-mail from the Fargo list server early that morning. Two other printed items were included: 1) 4-page newsletter dated January, 1990 (after conversion to WordPerfect and the use of DEC fonts); and 2) 36-page *"Amendment to the Final Report"* as described in the preceding issue. All of this photocopy was single-sided in order to minimize distortion. But double-sided, secondary reprinting continues to be encouraged for the recipients as a way of saving paper.

Registered letters probably will delay any message that is sent to Can/Am addresses in Portland, readers are reminded. Perhaps there is no trouble with the BPA address. But the Fontaine address guarantees trouble because typically your Editor will not be there when the postman attempts to deliver the letter. Eventually (after the second notice of non-delivery), the letter will be sent to another (not the closest) Post Office -- about a mile

away. Your Editor then can recover it on Saturday by expending about an hour's time. To date, this has always been done. But no promises of such service ever have, or ever will, be made. As your Editor returns on September 25th with such a letter from Bogota, Columbia, in hand, he is seriously considering that this might well be the last when we are busy (as now). Already a Federal Express letter has been returned to the sender because for some reason the driver required your Editor's signature (not normally the case).

The domestic mailing address that is used to forward ATP materials oversees must not be that of an existing, active, licensed user. Stated another way, a second or later copy of any ATP materials will not be mailed by the user group to any American organization for forwarding overseas. The last such acceptance was on September 25th when another Professor (not Ali Abur) in the Electrical Engineering Department of Texas A&M University was mailed Salford EMTP disks as the agent of Prof. Luis Moran of Universidad de Concepcion in Chile. In the future, if Prof. Moran wants any more or newer ATP materials, his agent can obtain them from Prof. Ali Abur just as anyone else on the Texas A&M campus would.

Prof. Akihiro Ametani of Doshisha University in Kyoto, Japan, visited BPA September 6th and 7th in order to talk about various aspects of his continuing research into cable modeling. He is the author of the CABLE CONSTANTS feature of EMTP, and it seems likely that this will change in important ways once again.

ATP FORTRAN for VAX / VMS was Air Mailed from BPA to Pacific Power in Sydney, Australia, on September 3rd. Details were provided in E-mail during the middle of the following week. The original request came in E-mail from Stephen Boroczky dated August 29th. Source code was desired because high-performance DEC Alpha was of interest. Although it is possible to execute conventional (non-Alpha) VAX/VMS programs on Alpha, performance seems to be abysmal: *"We have found a five fold increase in speed for code that was compiled on the Alpha ..."* Well, no problem in this case. BPA's Randy Suhrbier, who has DEC Alpha on his desk, reports that no changes to source code have been required. So this is what was sent, as ZIPped files on an MS-DOS floppy disk.

ATP reached Bangladesh via Dr. Sayeed Ghani of the University of Northumbria in England. A separate story summarizes the associated, unusual short course.

"Casual meetings of ATP users in Ontario and Québec" (Canada) are being considered by the University of Waterloo. Following discussion of the possibility with Prof. Raymond Ramshaw, the idea reached your Editor on September 22nd in E-mail from Robert Sarfi. *"These proposed meetings would permit users to discuss their own applications for ATP and .... allow for discussion of methods of improving the models that the users developed for simulation. .... The occurrence of any meetings and its minutes would of course be reported to the Can/Am ATP Users' Group."* Enthusiastic support for the idea was offered by your Editor. In addition to advertising any such meeting or workshop via E-mail (Prof. Bruce Mork's Fargo list server), your Editor suggested conventional mailing of an announcement to all ATP contacts of the region. Attached to E-mail dated September 28th, a list of 69 different institutional names and addresses was sent to Mr. Sarfi for this purpose.

LEC is ending all of its membership agreements at the end of the year as explained in a separate, later story. This is a continuation of the story in the preceding issue (see pages 11-13) about hidden LEC income and failure to uphold voting rights of the members.

More about Electronic Mail (E-mail)

The July issue was made available from the Fargo server as announced on September 21st by list server mail from Prof. Bruce Mork. Available at the same time was **steer01.zip** which is the WordPerfect disk file of the 28-page memorandum about LEC irregularities (see pages 11 through 13 of the July issue).

atp@agora.rain.com is the new E-mail address for the Can/Am user group as first announced in list server mail dated September 22nd. MODELS author Laurent Dubé used **dube@agora.rain.com** for a short period, but he has since moved to address **dube@csos.orst.edu** (more about this later). Readers who have not yet done so are advised to correct their records immediately since the former CompuServe addresses no longer are being used to receive mail.

Prof. Juan Martinez of Universitat Politecnica de Catalunya in Barcelona, Spain, finally has E-mail. The address is logical enough: **martinez@ee.upc.es**

Does the cost of E-mail depend on distance? Harald Wehrend of the University of Hannover in Germany was the first to suggest such possible dependence to your Editor. Specifically, he explained that transatlantic E-mail might cost more than mail that is confined to Europe. For this reason, he wondered whether Prof. Bruce Mork had considered the possibility of maintaining a copy (a *mirror* in E-mail terminology) of his ATP-related files somewhere in Europe. In list server mail dated September 17th, your Editor asked others to comment on the need. The first person to respond was Dr. Mustafa Kizilcay of Lahmeyer International in Frankfurt, Germany. In list server mail dated September 23rd, the informed opinion of the head of Lahmeyer's Central Data Processing Department, Hans-Joachim Koch, was offered. It seems that for FTP

transfers within Germany, Lahmeyer pays no additional cost other than standard ISDN-connection fees. But for international FTP use, EUnet charges Lahmeyer an extra 0.05 DM/kByte, so 100 kBytes cost about $3. Note this is 50% higher than your Editor had been paying expensive American CompuServe for batch-mode E-mail (the rate of 2 cents/Kbyte will be found at the bottom of column 1 on page 6 of the preceding issue). Unlike commercial users, universities and similar organizations are said to pay lump sums that are independent of the frequency and amount of FTP usage. As a result, a mirror of the Fargo files would benefit them less.

Agora is just one of nine gateways to Internet in the Willamette Valley (Portland straddles the Willamette about 10 miles above its discharge into the Columbia). This is according to a table on page 24 of the October issue of Computer Bits, a local computer magazine. BPA's James Hall pointed this out to your Editor. The most interesting entry is *"OSU Computer Science Outreach Services"* in Corvallis. The main engineering campus of the state system of higher education is Oregon State University (OSU), and it has access to Internet, of course. That it would be offering such service to the general public at reasonable rates is most interesting. Laurent Dubé seems to be the first ATP user to try the service, and he has been impressed. Unlike Agora, this is a big operation. In E-mail dated October 24th, he provided the following summary: *"What OSU's PEAK account provides is:*

-- *login as a user on SunOS 4.1 on a Sparc 2;*
-- *full internet: telnet, ftp, email, news, search tools;*
-- *up to 7 MB of disk usage at no additional cost;*
-- *single phone number access with 96 lines;*
-- *14,400 bps modem connection with error correction and compression;*
-- *$5/month + $10/month if exceeds limit of memory or time (16 hours/month).*

... It looks like I'll be learning to use Unix again. It's like having my own Sun, and the response seems pretty good at night. The transmission is very fast. It runs at 14,400 compressed, and I have Procomm set up to send/ receive data to/from my computer at 57,600. I'm pleased so far."

This example offers hope for those who can not find Agora-like service in a smaller city that nonetheless has a university. Are you paying attention, Timothy Tibbles of Schweitzer Engineering Laboratory in Pullman (the home of Washington State University)? The OSU model might exist in many places across the country. If not, it should. The concept is superb for the general public that those state-supported universities claim to be serving.

Junk mail of the Fargo list server reached new heights on August 21st when two messages totaling about 700 Kbytes were received. More precisely, one of the two was being received when your Editor noted its size, and quickly aborted the reception. MODELS author Laurent Dubé reported a similarly quick rejection. Then came a well-deserved public lecture from Prof. Bruce Mork about the problems of such large communications: *"Please keep in mind that the list server is intended for small text files. Many system mail servers cannot handle large files. .... The local mailers of many of our 120-odd subscribers rejected the mail, and all of these bounced messages were sent back to me."* So, what was the content? Apparently it was advertising for a conference in the form of .PCX files! As Prof. Mork observed, if just the text had been sent, 15 Kbytes might have sufficed. *"An alternative would be to ZIP the files and put them on an anonymous ftp site, and then send out a short note announcing that the file is available to those who are interested."*

Harald Wehrend of the University of Hannover in Germany reported the greatest problem receiving the junk E-mail of the preceding paragraph. In his initial comment dated August 22nd, he began with some thought such as *"fortunate is the subscriber whose equipment rejected the files."* He went on to explain that the charge to his private mail box was $20. Your Editor then responded with an estimate of the cost for CompuServe subscribers in the USA: $14 = 700 Kbytes * $0.05 / 2.5 Kbytes. He further suggested that Prof. Mork should impose a limit on file size for the Fargo list server. Finally, on August 23rd, Mr. Wehrend added a frightening concluding comment. It seems that private networks use different and changing gateways to lead mail to its destination. Some gateways and subnetworks reject enormous files, so others (perhaps more expensive) are tried. The most expensive such possibility for Mr. Wehrend in Germany charges a rate of 0.30 DM/KByte, which implies a staggering $131 for the unwanted 700 Kbytes of E-mail. The operator of that private Germany mail box told Mr. Wehrend by telephone that it was his good *"fortune that the system found a cheaper way to transmit these files!"* Amen !

Agora uses **pine** rather than **elm** as its default program for handling E-mail. It would seem that the information 3/5ths of the way down column 2 on page 16 is dated. Since your Editor knew nothing about either as he began, he has used the default **pine** thus far. So, if any reader who can write in French wanted to demonstrate MIME for the handling of foreign languages, Agora would seem to have the same software on this end.

James L. Hall, who works on relaying (see story about Trondheim on pages 18 and 19 of preceding issue), succeeded in acquiring E-mail at BPA. It is amazing! Rather than beat his head against the wall of the computer establishment (the approach that has been used for the past two years or so by your Editor and Dr. Liu), Mr. Hall went to BPA's library. The result was an account to which he could charge E-mail (he was assigned numbers 74750,1110 within Compuserve). At least the librarians seem to understand information, and the importance of exchanging it by computer! For the record, Substation and Control

Engineering is the old name for the Division in which Mr. Hall works. Following reorganization about five years ago, Division of Electrical and Electronic Engineering is the correct, current name.

Disk files of reports that involve interesting EMTP simulation might be placed on the Fargo server for a limited time to allow access by others using FTP transfers of Internet. At least text could be (graphics are more of a challenge, admittedly). This was suggested by your Editor in E-mail dated June 8th to Roger Sha, who is a graduate student at Cal Poly in Pomona, California. Mr. Sha had written: *"Prof. Gerald Herder, our project advisor, has directed me to ask you if you have interest in receiving a copy of our report [on a current limiting fuse]."* While one printed copy would be adequate for BPA, it does not satisfy the needs of others around the world. Placement of a disk file on Prof. Bruce Mork's Fargo server would. Its existence would be announced by a short summary using the list server, of course. As far as your Editor knows, no one in Pomona responded to this suggestion. But the idea seems important for other report writers, and that is why it is mentioned here.

A total of 618 E-mail messages totaling 1996 Kbytes had accumulated during the first six months of 1993. Yes, content was comparable to that mentioned in column 1 on page 5 of the January issue. So, the pace of about one hundred a month seems to have continued. No messages were removed until October 30th, however, when 977 had accumulated. Your Editor wants to note that the computer remained responsive; there was no sign of sluggishness due to the file overload. For example, the response to DIR was instantaneous, and output was normally speedy. Such are the miracles of disk caching. Concatenation of the 977 messages into a single file of 2892 Kbytes using program OLDMAIL took 2 minutes and 40 seconds. This will no doubt be the last such big roundup of CompuServe mail messages, since the switch to Agora began early in October (Fargo list server mail was diverted to Agora beginning October 8th).

Yin Yuexin, the Chinese who worked with Universal Machine (U.M.) modeling for a couple of years in Leuven, has become a doctoral student of Prof. Dennis Carroll at the University of Florida in Gainesville. This is the good news that was received in E-mail at the end of August: Mr. Yin should remain in the West (as opposed to China), and available for Prof. Dennis Carroll's EMTP projects (including the annual short course), for several years to come. New E-mail address **yyin@admin.ee.ufl.edu** seems to work reliably, too (recall his former address in some other laboratory was unreachable)!

LEC misinformation via the server has been a continuing problem. September 8th, MODELS author Laurent Dubé wanted to respond to objectionable writing by LEC about his work, but he concluded that it would be better to keep this argument off of the server. Readers might find writing in the regular separate story about MODELS. Your Editor no longer is so tolerant. He has responded publicly more than once to hasty claims from Leuven. The moral is clear: to avoid embarrassing rebuttals, be sure of your facts before making public assertions involving the property or work of others.

Ghani EMTP Workshop in Bangladesh

Dhaka, Bangladesh, was the site of an unusual EMTP workshop taught by Dr. Sayeed Ghani, Senior Lecturer of the Department of Electrical and Electronic Engineering and Physics at the University of Northumbria in Newcastle upon Tyne, England. A summary was provided in E-mail dated September 22nd.

"Modern Computer-aided Analysis of Power Systems" was the course title, and The Institution of Engineers, Bangladesh (IEB) was the host --- six days a week for two weeks, between 17:00 and 20:30 with a half-hour break in the middle. *"In Bangladesh, the working week is from Saturdays to Thursdays. ... The course was received with great interest and appreciation by practicing engineers in the country. Facilities were limited, and only twenty-three participants could be enrolled. Those who attended the course were all of senior or principal level, and among 28 to 55 years in age. The course culminated in a certificate (IEB) awarding ceremony followed by a sumptuous dinner at a local hotel. The Hon. Aminul Huq, ... Minister of Establishment of the Government of Bangladesh, was the chief guest, and it was he who presented the certificates."*

21 ATP licenses were attached to letters from the IEB dated July 25th and the 28th. Your Editor approved these, and returned them by Air Mail on September 19th with a letter apologizing for the delay. The course must have been well received since plans already have been made to repeat it next summer.

A final note might be added about Dr. Ghani's work on the control of rotating machinery: *"On 14th August, 1993, I delivered a colloquium at the IEB entitled 'Vector Control Of Asynchronous Machines,' indicating how simple the design is with ATP."*

Three-Phase Transformer Modeling

"Multi-Terminal Thevenin Equivalent Circuits" is the title of a 3-page explanation by Prof. Hermann Dommel of the University of British Columbia in Canada. This can be found on pages 2-4 of the September issue of LEC's *EMTP News*. The first two sentences say it all: *"In the April 1993 issue of Can/Am EMTP News, Prof. Chen is quoted as saying that 'the multi-terminal Thevenin theorem*

involving more than one nonlinear element has never been rigorously validated'. A short proof is given here, which relies solely on matrix algebra." Recall that your Editor had made the following request: *"Can any reader come to the defense of Prof. Chen, and show your Editor the error of his thinking? If so, please do so."* For the record, not a word of support for Prof. Chen's contention has been received thus far. In fact, the only response has been Prof. Dommel's algebraic proof.

NSF, the National Science Foundation (an agency of the U.S. government), now is funding research into transformer modeling by Prof. Bruce Mork of Michigan Tech in Houghton. This is the good news that was contained in an official letter of thanks from Prof. Mork to Robert Hasibar of BPA on October 25th. Keyed some nine months ago, but delayed at Prof. Mork's request, was the following mention: *"On December 18th, a letter of support for such proposed research (in Houghton, under Prof. Mork's direction) was written by Robert M. Hasibar, Chief of the Systems Analysis Section at BPA. Although not necessarily directly , immediately , and explicitly involving EMTP, the proposed investigation might lead to improved mathematical models that later could be implemented in EMTP, it is believed by those in Portland."* The title of the proposal was *"Improvement of Transformer Modeling Techniques and the Application of Nonlinear Dynamics and Chaotic Systems to Power System Transient Phenomena."* In his latest letter, Prof. Mork provides the following summary information: *"Work on this project began on August 2, 1993, and will continue for 3 years. .... Research for the first year will focus on improvement of the magnetic core equivalent used in single phase distribution transformer models for transient studies. In the second and third years, focus will be shifted to three phase distribution transformers. These models are to be applied primarily for EMTP simulation of excitation, inrush, ferroresonance, and the effects of harmonics. Future work will be aimed at extending these models to larger power transformers, to enable simulation of synchronization transients, inrush, GIC situations, etc."* Wow (already, the project sounds more applicable to EMTP than when BPA endorsed it). Your Editor continues to wonder where the data for EMTP use is going to come from. On the other hand, unavailable data is not a problem that is confined to transformers !

LEC Financial and Political Problems

This is a continuation of the story that began on page 11 of the preceding issue. It documents the continuing unraveling of LEC (Leuven EMTP Center in Belgium).

Section VI-B of your Editor's 28-page memorandum is entitled *"Can / Am Concerns about the honesty of K. U. Leuven Publications."* The first paragraph states the problem as follows: *"How much (if any) credit should Prof. Van Dommelen receive within his own university for research or development that is performed **not** by LEC staff, but rather by LEC members or contacts?"* Well, it was the corona modeling of Prof. Correia de Barros that was protested in Lisbon. That verbal dispute during June became written two months later when LEC Chairman Van Dommelen sent FAX dated August 12th to Steering Committee members. To those not familiar with details, this might have been convincing for a while. Then, on September 16th, Prof. Correia de Barros responded by sending 6 pages of FAX to Steering Committee members on August 12th. She ended by declaring that writing by LEC *"is nothing but misappropriation of other people's work."* To support her claim that Laborelec had not cooperated with LEC on corona modeling as those in Leuven had written, she attached one page of FAX from Vincent Vanderstockt of Laborelec, who wrote: *"Indeed, I am not aware of any such cooperation."* Well, no one should know better than Ir. Vanderstockt, since he **was** involved with the corona modeling!

The Secretary of the LEC Steering Committee, Guido Bortoni of CESI, submitted during the second week of September his minutes of the June meeting in Lisbon. In FAX dated September 14th, Chairman Van Dommelen declared that the fall meeting would be delayed until November 26th. Also, he wrote the following: *"We do not accept the minutes of the last SC meeting as the report is incomplete and not equitable. Due to the most recent developments, it appears furthermore useless and unnecessary to have another Steering Committee meeting."*

Leuven R&D notified all LEC members that existing agreements would not extend into next year. This was by means of Registered letters dated September 16th. But, on September 29th, your Editor used E-mail of the Fargo list server to point out 2 problems with this announcement: 1) a date for LEC's annual meeting had not been publicly announced; and 2) the termination of LEC membership agreements is not the same as the closure of LEC.

The Chairman of the Electrical Engineering Department of K.U. Leuven, Prof. R. Govaerts, was notified of LEC's problems by a conventional Air Mail letter from your Editor dated September 16th. Followed by the first three pages of your Editor's 28-page memorandum, this cover letter ended as follows: *"Since you have responsibility for proper operation of the department, you, too, should be informed directly."* Since a complete copy of the memo already had been mailed to Leuven R&D's Administrator, your Editor advised Prof. Govaerts that he *"should have no difficulty obtaining the complete report from Mr. Claes ..."* Reception was acknowledged by Prof. Govaerts in a letter dated September 28th, and a second short letter dated October 20th requested some clarification. Your Editor responded with a 6-page letter dated October 29th. There also were single sheets of FAX dated the 3rd and 12th of November.

A 5-page letter dated October 22nd seems to have been sent by LEC Chairman Van Dommelen to all members. It announced a November 26th meeting in Leuven that would be devoid of technical content: *"This meeting will have only one point on the agenda: the presentation of cost break-down and statement of income."* Most of the letter was devoted to an unconvincing attempt to answer your Editor's 28-page memo. As will be explained in the next issue, your Editor responded in a 10-page memo dated November 16 --- Part II (a continuation) of the original. This will be mailed to all LEC members.

Prof. Correia de Barros of IST in Lisbon is speaking on behalf of the Steering Committee with which Chairman Van Dommelen had refused to meet. This would seem to be the start of the replacement user group for Europe. Dated November 11th, a one-page letter from her to all LEC members announces that the Steering Committee and other interested parties will be meeting in Leuven on November 25th. The January issue should have details.

BPA : a Government Corporation ?

BPA has been one of the early targets of the Clinton Administration's talk about *"reinventing government."* In theory, this could change BPA operations drastically; in practice, most workers probably would not be affected noticeably. Whether the public-domain nature (i.e., FOIA) of work by BPA might be eliminated can not be predicted for sure, but one legal opinion solicited by Supervisor Robert Hasibar suggests that this is unlikely. Your Editor can understand this politically: those promoting the BPA change will have a difficult enough task without enlarging the fight by making opponents of public-interest groups. For those readers who have forgotten, 1967 FOIA was inspired by deception surrounding the Vietnam War, and then was fortified in 1974 following Watergate-era abuses.

The real reason BPA might be *reinvented* is unclear. Ignoring the predictable, inane rhetoric of the politicians, the skeptical observer must wonder about economics. One such powerful reason was learned from *Clearing Up*, a newsletter that is devoted to the Pacific Northwest's electric power industry. Published by NewData Corp., the September 13th issue has a lot of useful information on page 11. It begins with an explanation that higher electric rates seem to be a primary effect desired by the Clinton Administration. Why? Because the new BPA could be required to repay about half of its staggering, low-interest debt to the U.S. Treasury!

Released in Washington *"Tuesday of last week"* was a summary of the reinvention nonsense that included the following on page 106: federal power agencies such as BPA were *"mandated in 1944 to sell their power at low rates to help promote development in sparsely populated areas. Rates are still low today; in fact the Power Marketing Agencies (PMAs) sell power ... at below market rates."* True, true! BPA rates are kept low because the local politicians want it that way. This benefits the region and enhances the power of the controlling politicians, of course. Unfortunately, the rest of the country has been paying for it, and that is why the financially-strapped Clinton Administration is following the preceding Bush and Reagan Administrations in trying to force BPA to repay its low-interest loans to the U.S. Treasury. *"The appeal of a BPA reform package could include a federal debt reduction of $4 Billion."*

Ongoing for years has been a gargantuan struggle between BPA customers, who want lower rates, and so-called environmentalists around the country who see BPA and other federal agencies as convenient vehicles for social engineering. The magnitude of BPA's non-electric programs is made clear by the following quotation about recent concerns of influential local Congressman Peter DeFazio: *"The total BPA Treasury debt is $8.4 billion, of which $6.8 billion is older lower-interest borrowing. DeFazio is concerned that Wall Street might not like BPA fish and wildlife obligations (now costing an estimated $300 million yearly) which might accelerate and complicate repayment. He doesn't think current BPA obligations can be changed in the legislative process."* For foreign readers who might be unfamiliar with the term, Wall Street in New York City is the center of the nation's stock and bond markets from which a corporate BPA would be obliged to borrow money in order to repay the national treasury. But financiers dislike non-essential spending that might compromise BPA's ability to repay any new private loans. To understand the concern of private investors about government projects that do not enjoy backing of the U.S. Treasury (which prints money), all one has to do is remember the WPPSS debacle involving nuclear power plants a decade ago.

"BPA hastens to offer marketing plan before customers move on" is a continuation of this story in a following issue of *Clearing Up* dated October 18th. This article on pages 11 and 12 suggests that BPA's present financial troubles may be more fundamental than merely a shortage of water in the river. Of course, financiers (see preceding paragraph) sense such problems faster than anyone. A decade or two ago, customers were fighting for preferential access to BPA's power, which was the cheapest available. Of course, the entire federal system had an added advantage in that it had a near monopoly on hydroelectric generation of the Columbia River Basin, and it avoided taxes that had to be paid by competing private power companies. How could such a *cash cow* or *gold mine* be turned into a liability? The answer seems to be found in politically- and environmentally-correct politics. *"Cutting costs on existing programs will not bridge the $600 million to $800 million gap Bonneville planners believe may exist between the power marketer's costs and*

the revenue it will be able to pull in during the late 1990s, Bonneville assistant administrator Sue Hickey said last week. The gap will exist even after the agency cuts costs and makes productivity gains in the range of $200 million a year, as BPA administrator Randy Hardy has promised to do in the next four years. .... The problem appears too big for cost-cutting alone. Bonneville customers are being actively and successfully courted by independent power producers. Not only do customers forecast steep increases in BPA rates --- steeper than the agency itself expects -- they also complain that it is expensive to do business with the federal bureaucracy. 'Customers are adding a premium [to our rates] because we are a real hassle to deal with,' Hickey said."

News about Laurent Dubé's MODELS

A new set of 35 separate MODELS test cases were assembled and delivered to BPA by author Laurent Dubé during the afternoon of November 2nd. These then were put on the Fargo server for remote access (using FTP transfers of Internet) as announced by Prof. Bruce Mork to all subscribers in E-mail dated November 6th: *"The file is:* ***pub/atp/models/tutor/set1.zip*** *I am attaching the letter of explanation that Laurent Dubé sent to me."* Execution using RUNDUBE.BAT took just under 5 minutes on your Editor's AT&T 486 / 33 at BPA .

Quality of the telephone line used by Mr. Dubé was improved on September 4th when his local telephone company switched him to a line that was not being multi-plexed with any other customer. This was for the 6 or so miles into Cloverdale. The following day, Mr. Dubé reported success with data compression at 9600 baud (previously, even 1200 baud sometimes was too fast).

Does the Salford C-language compiler allow mixing FORTRAN and C for those having PCs (MS-DOS computers)? The application would be for user-supplied source code of MODELS. Some 6 or more months ago, Dr. Mustafa Kizilcay of Lahmeyer International in Frankfurt, Germany, had casually suggested this. The hope was confirmed by the May Salford newsletter named *Source File*. In the bottom third of page 2 is a listing of 7 technical bulletins about Salford software. The third of these begins: *"**3: Mixed language programming.** Covers calling between programs written in FTN77, Salford C and Sheffield Pascal."* This could be important.

MODELS and/or TACS initialization follows the phasor solution of the electric network, but it precedes any manual redefinition of its initial conditions of the electric network. This is the way it has been throughout the 18-year history of TACS and the 5-year history of MODELS. But, as recognized by Goetz Lipphardt of the University of Darmstadt in Germany (E-mail to Laurent Dubé dated April 21), this ordering has disadvantages. MODELS can pick up initial conditions from the electric network, of course. If these have been manually set by the user, it is the manual values rather than the phasor values that should be sent to MODELS. So, Mr. Dubé delayed the calls in question until after initial condition cards, if any, have been processed. Transfers to SSTACS and TACS2 , which prior to August 17th were found in OVER12 , now can be found in OVER13 .

$INCLUDE can be used to connect a digitized, external function of time to EMTP. An example could be some field measurement, or generator angles that might be determined by a transient stability program. MODELS can take such signals with different (arbitrary, even variable) intervals of time discretization and produce by interpolation or extrapolation the values required for the time instants of EMTP representation. It was in E-mail of the Fargo list server on October 22nd that author Dubé passed along this idea from Steen M. Munk of NESA A/S in Hellerup, Denmark. The POINTLIST function was mentioned along with a possible new READ1 that would be the opposite of WRITE1. Mr. Dubé wrote: *"now I realize that we could have a fully-functional read() function without any format specification, just doing list-directed input. I'm going to add this to the program, and give you credit for the suggestion. I'll try to make it possible to specify the file name directly in the read() function. I should add the file name specification to write() also, while I'm at it."* So, once again EMTP evolves to meet the needs of creative users.

Generalization of UM TO TACS

UM TO TACS is the request that indicates the user wants to connect arbitrary U.M. variables to Type-92 sources within TACS as illustrated by DCNEW-10. As the Rule Book clearly states in Section II-A-46, it has not been possible to pass the same U.M. variable from two or more machines. That was until August 9th, when the first complaint about this limitation arrived from Prof. Pragasen Pillay of the University of New Orleans in Lakefront, Louisiana. It would seem that a group of some 10 induction motors was being simulated, and the load torques for all of these were to be calculated within TACS using some mathematical functions of rotor speed and who knows what else. So, Prof. Pillay wanted to pass all ten of his U.M. variables OMEGM into TACS (for UM-1 through UM-10).

So, your Editor's original code dating to February of 1987 has since been generalized. The new rule of usage, documented on comment cards of test case DCNEW-10, is simple: The otherwise unused columns 41-52 of the TACS source can be used to name the U.M. variable that is to be connected as input. This is for the same 2A6 specification that would be used for branch quantities of the NAME command of Salford TPPLOT for Intel PCs.

For example, "UM-4 THETAM" would request the connection of THETAM from the 4th universal machine. An advantage of this more general connection is that the name of the TACS variable then is arbitrary (with the simplified, original procedure, it had to be the name of the U.M. variable). If columns 41-52 continue to be left blank, logic should remain unchanged from years past (i.e., the first match between the TACS source name and the second of two names of output quantities will be accepted).

August 15th, the final corrected copy of Salford EMTP was sent to Prof. Pillay. This follows an earlier, simpler modification that was demonstrated to be in error. The first time, your Editor had no data to test, so he did not see the shortcoming of his design. Prof. Pillay made sure the second revision would be tested, however: he sent his 10-machine data case by E-mail on August 13th.

NYPA Gives Salford EMTP PostScript

Adobe PostScript was added as an extra, auxiliary output for Salford EMTP plotting as mentioned in column 2 on page 1 of the July issue. This is the code from Robert A. Schultz and Robert E. Meredith of New York Power Authority (NYPA) in White Plains. Recall that PostScript was mentioned after HP-GL in the preceding issue (see the middle of column 1 on page 3). The PostScript output of EMTP is created at the same time as screen or PEN PLOT graphics of CALCOMP PLOT use if they have not been disabled by the new binary switch NOPOST of STARTUP (value unity suppresses such output whereas zero requests it).

ATPPOST.001, etc., are the disk file names of the new PostScript output. These parallel the other three possible graphical file names: 1) ATPHPGL for HP-GL; 2) ATPVIDEO for .PCX bitmaps; and 3) ATPPAPER for Epson or LaserJet bitmaps. All 4 now are serialized with .001, .002, etc. file types, where the counter is incremented for each batch-mode EMTP plot including character plots. This serialization applies to an entire disk file, not each individual data case within the disk file. That is, the counter is **not** reinitialized for a second or later data subcase to ensure that no plots are overwritten. At the end of each execution, it is the responsibility of the user to rename these files if he wants to save them. This is illustrated by the lines of RUN.BAT that are associated with stored vector plots of DC35.DAT :

```
CALL RUNTP DISK DC35. DC35. -R
RENAME ATPVIDEO.* DC35PCX.*
RENAME ATPPAPER.* DC35LJ2.*
RENAME ATPHPGL.*  DC35HPGL.*
DIR DC35*.*
```

Mr. Schultz's PostScript work applied to SPY plotting as well as batch-mode plotting. However, time was in short supply, so your Editor decided to delay the consideration of SPY , which is confined to a single SUBROUTINE VECPLT. Earlier HP-GL output (see the April issue) did not include SPY, either, so PostScript and HP-GL have comparable functionality at the present time.

Accuracy of the PostScript plot will not exceed accuracy of the screen plot because Mr. Schultz uses integer screen pixels for his coordinates. Readers who look at PostScript files produced by Salford EMTP may wonder why all (X, Y) coordinates are integers. This is the reason. Schultz is ingenious and sophisticated in many ways --- including labor-saving tricks! At some later time, when a lot more important tasks of development have been completed, your Editor might be inclined to go back and perform the mechanical conversion to provide full floating-point accuracy. But this is only a fine point for higher-resolution screens (those still using 350-pixel EGA graphics might take special note).

Disk file HEADPOST.LIS is a new structure that is used to contain data for PostScript header records. At NYPA, Mr. Schultz had generated such output from code. But it was the feeling of your Editor that Dr. Liu's scheme for TPPLOT was better suited for use at many different sites having different conventions. So, the header records have become data in order to allow the user to change them. Admittedly, modification does require some knowledge (PostScript is not the easiest language to read). Yet, most large companies will have someone who is familiar with it, and could advise a user in need. Also, there are many good books on the subject. If certain changes become common or popular, perhaps they could be published in future issues. Knowledgeable readers are advised to submit such suggestions.

Robert Schultz altered some of your Editor's practices that apply to conventional screen plotting, and these are worthy of note. First, there is the storage of all points of a curve prior to its drawing. The storage had been added for PostScript, anyway, so its exploitation for screen plotting probably makes sense (most likely it is faster to paint the single vector than each (X,Y) coordinate pair one at a time). Second, the labeling of each curve now uses the curve number rather than a letter. Third, curves no longer are being manually clipped on the right. That is, EMTP code does not protect against writing that will surpass the right edge. In a note, Mr. Schultz wrote that he preferred automatic Salford clipping, and at this late date your Editor must agree (he can see no problem with Salford protection against wrap-around of earlier days). Finally, location and frequency of the curve marking has been made intelligent. For example, Mr. Schultz will mark only the peak --- above a maximum or below a minimum. All of these refinements can be found in SUBROUTINE LINEXX .

Changes to LINE CONSTANTS

Stacked data subcases within LINE CONSTANTS were not always properly initialized for the second or later subcase prior to October 5th when Dr. Tsu-huei Liu moved 4 lines of initialization downward within the entry module MAIN25. Previously, the initialization was only done once --- at the beginning of the first subcase. Now, it is done at the start of each data subcase. The metric (or English) flag METRIK illustrates one of the four changes. Previously, the second or later subcase would not automatically begin as English. Of course, if the user explicitly requested ENGLISH in the subcase, he would receive it. But if he did not, and if the preceding data subcase used METRIC, those units would have continued into the following subcase. It seems less confusing to have each subcase begin with ENGLISH units --- always.

Following a SPECIAL DOUBLE CIRCUIT case, any other type of data could not be run correctly as a stacked data subcase within LINE CONSTANTS prior to correction on October 5th. Upon investigation, Dr. Liu discovered that the associated binary flag MSPEDB had not been initialized at all. Perhaps due only to luck, the initial state somehow seemed to correspond to no such modeling, so there never was trouble as long as subcases were not stacked after such use. But the 6th subcase of DC-59 was in error for this very reason. It had been added by your Editor as a trivial illustration, and the comment cards documenting the solution must never have been verified. So, the solution changed.

The punched branch cards for constant-parameter, transposed, distributed modeling involved English units prior to October 1st. This was always the case, whether or not the METRIC switch was thrown, as first pointed out by BPA user Robert Hasibar. Note that no error was involved; the line **was** being correctly represented. However, if input data has metric units, the user most likely would prefer metric units for the $PUNCH output, too. So, Dr. Liu made this change to SUBR25 --- for the transposed case only. Three of the numbers of each branch card required changes for metric users: resistance in [ohms/mile], velocity in [miles/sec], and distance in [miles]. For metric users, Dr. Liu converted miles to kilometers.

Value 44 for variable IPUN of columns 67-68 is a request for Pi-circuit computation, and this punched cards. But the punched output was not confined to the Pi-circuit. Instead, before October 14, it also included cards for constant-parameter, distributed representation. It seems that some user inserted both rather than just one or the other in his data case, and Dr. Liu sympathized with his plight. So now the distributed output is suppressed if IPUN = 44. More aid for the mentally-retarded.

LINE CONSTANTS had a limit of 20 bundles prior to September 11th when expansion to 100 was made by your Editor within LCMODE. This expansion was made in response to a letter dated September 8th from Jeff Bohn of Southern California Edison Company in Rosemead. It would seem that the Los Angeles area is crowded with wires as well as people: *"I have a situation with 10 circuits (30 phase conductors) in the same right-of-way."* Because Mr. Bohn did not know how to send his sample data via E-mail, a floppy disk was sent from SCE by Express Mail (overnight delivery). Following correction, this was returned with an updated copy of the program. Only at the end of the month did your Editor hear from another SCE employee, Jim McCabe, by E-mail. At your Editor's request, Mr. McCabe notified Mr. Bohn of his personal CompuServe capability. So, in the future, this could be used to send small files from Rosemead to Portland much faster and cheaper than the Post Office!

Florida Short Course March 7 - 11

Prof. Dennis Carroll again will be offering his 4.5-day EMTP short course during spring break at the University of Florida. The course will be even earlier this year. It has been scheduled for the first complete week of March : Monday the 7th through Friday, March 11th, 1993 .

Faculty this year is expected to be the same as last year, with Dr. Tsu-huei Liu representing program developers during the entire week. Dr. Fehrle again expects to be there the entire week as the voice of industrial usage (highly recommended).

Protection Against Blank Lines

$BLANK DATA, $BLANK HALT, and $BLANK COMMENT are three new $-cards that began to be serviced on September 5th. The are associated with the old, well-known problem of extraneous blank lines in $INCLUDE files --- most commonly at the bottom where they may go unnoticed if screen editing is done without a background color.

Of the three previous choices, $BLANK DATA corresponds to operation of years past (i.e., truly blank cards will be passed out of CIMAGE as legitimate EMTP data cards). If this is what the user wants, he need do nothing since this is the default choice.

$BLANK HALT, the second of two alternatives, provides protection against unintentional, extraneous blanks as illustrated by a new second data subcase of DCNEW-10. For years this writer has been urging others to avoid truly blank lines by instead using "BLANK " in columns 1-6 wherever EMTP requires a blank card. For those who have been following this advice religiously, a

truly blank card represents an error against which the user should want protection. Now, $BLANK HALT will provide it. First, when a true blank card is read, there will be a one-line error message: **"Input card number NUMDCD = XXXX is blank while $BLANK HALT is in effect. So, halt execution."** Next, if $LISTOFF is in effect when the true blank is read, an additional dozen non-blank cards will be read and listed before execution is halted. In this case, a second line of error text will precede the special listing: **"But first, cancel $LISTOFF and read a dozen cards to allow the user to locate the extraneous blank."** The special listing will be interpreted as follows in columns 1-51: **"$BLANK HALT shows input card. NUMDCD = XXXX |"**

$BLANK COMMENT instructs the program to treat any truly blank card as a comment card. In fact, "C " will be added in columns 1-2 prior to interpretation. Note that such use would be consistent with MODELS data, since Laurent Dubé ignores any blank lines that might be imbedded in his new control system modeling. Electric network data may not be free-format as MODELS data is, but if the user wants to use truly blank lines for visual separation, it now is possible.

The STARTUP file has new variable NOBLAN for those who want to control the choice about the treatment of blank lines outside of data files. As distributed by the user group, zero corresponds to the old way of years past (implied $BLANK DATA use). The other two other choices correspond to value one for $BLANK HALT and value 2 for $BLANK COMMENT.

Inspiration for the addition of these three latest $-cards came from recent troubles of James Randall, who had been assembling massive amounts of EMTP data as explained in the final story. Mr. Randall had intended to use "BLANK " everywhere EMTP called for a blank card. In fact, he did not even know that a truly blank line had meaning. Well, beginning September 5th, he had protection against such unintended usage.

Dynamic Dimensioning: Salford ATP

This is a continuation of writing about program development that was announced in the first paragraph of the front page. Unfortunately, it applies only to the most popular of program versions: Salford EMTP that runs under MS-DOS on Intel 80386- or 80486-based personal computers (PCs). Beginning the 18th of October, Salford EMTP as distributed to the general public is allowed to specify program table sizes at the start of execution. This is what is meant by dynamic dimensioning.

Dynamic dimensioning of EMTP was pioneered by computer expert David Szymanski of Wattsburg (near Erie), Pennsylvania. An early reference is the paragraph that spans pages 3 and 4 of the July, 1990, newsletter. Had Szymanski not previously conceived of, and then perfected, his own version of the procedure using Unix, it seems unlikely that your Editor's own mind would have been prepared for the latest inspiration. Szymanski's work was the critical foundation upon which your Editor has just now built to extend dynamic dimensioning to the simpler, cheaper, and much more available MS-DOS operating system of the PC world. Of course, the ubiquitous Microsoft Windows is compatible, too!

Our present use of the compiler, linker, and DOS extender from the University of Salford in England have simplified the task compared with what Mr. Szymanski did in 1989 using standard Unix (then System V, Release 3). Recall that Szymanski perfected his technique using two different hardware platforms: 1) Intel 80386-based computers from AT&T; and 2) Motorola 88000-based RISC workstations named Aviion from Data General. For either, using his inimitable magic, Szymanski would create COMMON blocks at the start of execution rather than at linking time. But the Salford software allows us to do even better. As already explained for TPPLOT (see the middle of column 1 on page 3 of the July, 1992, issue), Salford's DOS extender DBOS allocates space for COMMON only as the storage actually is used. The secret for Salford EMTP is to link with very large dimensions and then use the resulting program as though tables are smaller (whatever the user wants) . For standard test cases, neither time spent in the time-step loop nor total job time is noticeably different from the old figures for TP3. Now, we **can** have our cake and eat it, too --- if we use PCs to support EMTP.

New variable LISTSZ of STARTUP is a binary flag that is used to either accept or reject use of the new dynamic dimensioning. Value zero will reject dynamic dimensioning whereas value unity will accept it. The name comes from LISTSIZE.DAT which is the input data file of VARDIM --- now read at the beginning of each Salford EMTP execution if LISTSZ = 1. Of course, if dynamic dimensioning works perfectly in all cases, we should link with extremely-large dimensions and then always reduce these at the start of execution. But what if something has been overlooked for some case? To protect the user, avoidance is allowed. Initially, the user group will link using dimensions just a little larger than the old TP20 --- dimensions that are usable without reduction. It is disk file LISTSIZE.BPA that is VARDIM input to create TP20, and some of the smaller list sizes herein have been increased so that each is at least 5 times its default value. The total size of LABCOM tables now is 1 990 749 words, or just under 8 Mbytes. Later, after a reasonable amount of time (e.g., 90 days) has passed without any legitimate reports of trouble with dynamic dimensioning, the user group plans to switch from TP20 to TP99 (see column 2 on page 1 of the October, 1992,

issue) or some other such executable file that has enormous limiting dimensions. Because limiting sizes may change from time to time, no fixed number such as 20 or 99 will be used to name the executable disk file, however. Instead, the name TPBIG.EXE will be used.

The beginning of program execution now appears as follows when dynamic dimensioning is being used. The contents of disk file LISTSIZE.DAT (here, this corresponds to 3 times default dimensioning as found on the GIVE1 disk) are being documented on the screen as a reminder of the radical new capability. Later, when dynamic dimensioning no longer is news, such output probably will be shifted to the diagnostic file DEBUG.LIS :

```
D:\DATA>RUN77 TPBIG.EXE
 Default multiplier = 3.000      1DEFAULT      3.0
 1st card (Lists  1-10). 1BLANK
 2nd card (Lists 11-20).         1BLANK
 3rd card (Lists 21-29). 1BLANK
 Supplemental offsets.  1  240000        742
EMTP begins.  Send (SPY, file_name, DISK, .....
```

Table dumping and restoring of START AGAIN (or the preceding MEMSAV = 1 use) might be slower for the users of dynamic dimensioning. This is the only known disadvantage of the procedure: the LABCOM table transfers have been complicated. No longer will a single WRITE statement (or the faster WRITEF@ of the Salford library) dump all of LABCOM. Just as for some other EMTP versions (e.g., for Apollo or Sun), Salford EMTP now must dump each of the 110 or so COMMON blocks individually, and this generally will be slower (all other things being equal). Standard test cases DC-32 and DC-49 illustrate the slowdown. For tables that are sized at 3 times default, total job times from summary statistics on your Editor's 33-MHz 486 are as follows:

	DC-32	DC-49
Sec with fixed sizes	14.395	15.383
Sec with dynamic sizes	15.824	15.769

The difference is not enough to become emotional about, but it is real. The smaller difference for DC-49 probably is associated with disk caching: much or most of the file already is available in RAM (disk file RUN.BAT orders the simulation of DC-49 immediately after DC-32) .

STATISTICS and SYSTEMATIC data cases involve repetitive table restoration, so a reader might worry about them, too (see preceding paragraph). But it turns out that these have not been slowed by the new table dumping. On the contrary, the speed of STATISTICS and SYSTEMATIC simulations has been increased dramatically. This is best illustrated for your Editor's computer by DC-16 which involves 24 SYSTEMATIC simulations. Again using 3 times default dimensions in both cases, the total job time was reduced from 93 to 38 seconds. An explanation for the improvement can not be provided at this time, however; details remain an ATP secret.

NEW LIST SIZES (NLS) is a special-request word that allows a DOS user to imbed his dimensioning orders within EMTP data. Although this can be located at any point prior to the miscellaneous data cards, it is clearer and more practical to put the new data at the beginning immediately after BEGIN NEW DATA CASE (which every politically-correct user should have on line one). The contents of disk file LISTSIZE.DAT (exactly 4 numerical cards following one or more possible cards with key words such as DEFAULT) are to follow the NLS request word as illustrated by DC-47. Program output (the .LIS disk file of LUNIT6) then is a little unusual, so is worthy of some explanation. Execution begins as usual using the dimensions of LISTSIZE.DAT. But after the NLS data all has been read and interpreted, the program is redimensioned, and execution must be restarted. To summarize, the front end of one solution precedes the complete, desired solution. Yet, that front end is valuable since its interpretation documents actual use of the NLS data. During the following restarted simulation, NLS data is ignored, as the associated interpretation should make clear enough : **Skip previously-used dynamic dimensioning data .**

The size of LABCOM tables, LTLABL, is printed in the heading that begins EMTP output. October 17th, there was a correction to the contribution from the lone CHARACTER*1 vector. Previously, this storage for text of MODELS was erroneously counted as if it were COMPLEX*16, so the printed LTLABL was too large. The correct new value for TP3 is 205763 (previously, this was printed as 227363). The correct new value that corresponds to the limiting dimensions of TPBIG.EXE is LTLABL = 1 861 149. Neither value affected the simulation, it is important to emphasize. LTLABL is just a statistic that might interest the user; it was not used for the actual table dumping (which relied upon an independent, experimental determination of memory locations).

Historical note: the unfortunate delay between July inspiration and October perfection had nothing to do with technical details. Rather, it was LEC politics (most importantly, the need to write that 28-page memo dated September 10th) that prevented immediate exploitation. During some six weeks, communication with the general public was cut off, and this created quite a backlog of work that endured into October. But eventually this was processed sufficiently so that your Editor was able to think about what to work on next. This was Saturday morning, October 9th, at the start of the 3-day weekend (Monday was Columbus Day). After looking at TPPLOT (which never will be done), your Editor remembered the need to experiment with the idea of dynamic dimensioning, and the rest is history. By Tuesday morning when regular work resumed at BPA, success had been demonstrated for all

test cases that did not dump tables. That was one very exciting, demanding, and productive weekend!

But why did it take us four years (since Dr. Mustafa Kizilcay's 1989 demonstration that Salford EMTP worked) to implement such an important feature? Your Editor's original supervisor at BPA was William F. Tinney, who became famous for his pioneering work using sparse matrix elimination. He once offered an opinion as to why no one in the power industry had understood the significance earlier: *"If it were complicated, someone would have discovered the idea long ago."* The same would seem to be true for dynamic dimensioning of EMTP. For those unfamiliar with EMTP history, this was a 19-year-old problem as explained in *"Variable dimensioning in the T.P. --- a chronology of Walter and Scott's odyssey over the troubled waters thereof."* This 9-page memo dated 3 July 1974 was printed in Volume I of EMTP Memoranda with pages VDTP-1, etc. As now known, this problem had the simplest and easiest of solutions on the cheapest of computers --- something no one was expecting, it would seem.

Robert A. Schultz of New York Power Authority (NYPA) in White Plains must be credited with his own independent discovery of dynamic dimensioning. This startling revelation arrived at BPA during the morning of October 21st in 2 pages of FAX that described *"runtime dimensioning of ATP."* Your Editor rapidly responded by sending the preceding writing to White Plains by FAX. That afternoon, Dr. Liu and your Editor telephoned, and talked with Mr. Schultz for more than an hour about the subjects of his communication. Although some details differ, the underlying understanding and principles are identical; and general concepts of implementation seem to be surprisingly similar. This was a clear case of independent discovery of the same fundamental truth by two different researchers. Neither knew that the other was working on the problem. In fact, dynamic dimensioning was discovered in White Plains for a different reason than in Portland. Apparently Mr. Schultz's own realization occurred as he was researching another break-through: faster table dumping (see next story). Those 30 minutes for Apollo TP20 represented an improvement compared with 48 minutes, but still were far too large. The same simulation on Robert Meredith's 66-MHz 486 at home required about 15 minutes. Upon study to understand the disk thrashing, Mr. Schultz discovered the need for dynamic dimensioning! Meanwhile, your Editor had no idea what RLE was, and had not seriously pondered faster table dumping for years. As was written in the January newsletter, *"Bob Schultz is one talented and creative guy."* In this case, he clearly was way ahead of your Editor, who thought that dynamic dimensioning by itself was an earth-shaking development! For Mr. Schultz, dynamic dimensioning was just one of several important advances. Your Editor is in awe.

Turbo Table Dumping at NYPA

Robert A. Schultz of New York Power Authority (NYPA) in White Plains is the inventor of new code to speed the dumping or restoring of tables as required for START AGAIN (or the preceding MEMSAV = 1 data case), STATISTICS and SYSTEMATIC simulations. That same surprising FAX of October 21st (see the preceding story) mentioned *"turbo TAPSAV."* For those who are unfamiliar with program FORTRAN, TAPSAV is the name of the subroutine that dumps or restores COMMON blocks of the simulation code (not of the supporting programs). The *turbo* is slang that implies high speed. It is believed to have been derived from the turbocharging of fuel to increase the performance of internal combustion engines.

Two things about the Schultz modification are very important. First, for cases where tables are mostly empty, the transfers have been sped enormously. Second, the modification should work on many or most computers. Mr. Schultz writes: *"Turbo TAPSAV uses a custom RLE (run length encoding) scheme developed here, and exploits several routines from my vector library on Salford (HP and Apollo provide the same vector routines in their libraries)."* To illustrate the acceleration, Mr. Schultz used standard test case DC-24 on two different computers with the 9-Mbyte dimensioning of TP20 . Yet, this was just the limiting (linked) program size, which could be reduced at the start of execution by dynamic dimensioning (to the 3 times default dimensioning of TP3 for this experiment). First, for Salford EMTP running on his own 33-MHz 486 with 16 Mbytes of RAM, Mr. Schultz observed:

TAPSAV	RAM size	Disk size	Time
original	TP20	9 Mbytes	197 sec
turbo	TP20	20 Kbytes	23 sec
turbo	TP3	20 Kbyes	13 sec

Second, for an Apollo DN3000 workstation having 8 Mbytes of RAM:

original	TP20	9 Mbytes	48 min
turbo	TP20	20 Kbytes	30 min
turbo	TP3	20 Kbyes	90 sec

For either computer, the original table dumping of TP20 created a disk file of size 9 Mbytes because each byte of COMMON (program tables in RAM) was copied to disk mechanically without consideration as to whether it had been defined. But with Schultz's turbo table dumping, although each byte of tables must still be considered, the vast undefined regions (between meaningful blocks of data in COMMON) are recognized and compressed. This is done in RAM. As a result, the volume of information that is written to disk is nearly independent of program dimensions. In effect, each undefined block is represented by one spacer which takes a negligible, fixed amount of disk space that is independent of table dimensioning. This

is why both TP3 and TP20 produce tables of size about 20 Kbytes on disk. Effectiveness of the compression does seem to vary slightly with computer in spite of identical word lengths, however. In later FAX, Schultz clarified this point: *"The Apollo file was approximately 28K to the best of my recollection."* The much longer times for Apollo (48 and 30 minutes) indicate another problem entirely: thrashing (DEC's 1979 name for wild, inefficient paging) during both the determination of undefined regions in RAM and also the actual table dumping. It was this observation that led Mr. Schultz to understand the need for dynamic dimensioning (previous story).

Computer expert David Szymanski was using standard Unix to compress tables much as Mr. Schultz now does for non-Unix computers. It is hoped that the next issue might have space enough to allow a comparison of the different approaches.

General Electric TCSC Modeling

BPA's Slatt Substation near Arlington, Oregon, is the site of a $19 million test of TCSC -- thyristor controlled series capacitors. This was dedicated September 15th as described in the main story of the October issue of BPA's own newsletter, *BPA Circuit. "The project was jointly developed by BPA, EPRI, and GE with cooperation and support from Portland General Electric. ... A three-month demonstration of the equipment is in progress. It will be followed by a year of testing that the entire power industry will be watching."*

ATP modeling of this TCSC comes from G. E. in Schenectady, New York. It has progressed considerably since previous mentions (see column 1 on page 20 of both the January and the April issues). Initially, executable versions of TCSC-enhanced ATP were supplied by Dan Baker --- first for PCs running Salford DBOS, and subsequently for DEC VAX / VMS . Since the interface from ATP to TCSC was documented, it seemed to be in everyone's interest that this be added to the UTPF. On June 18th, the required changes were made to TABLES, SUBR15, OVER16, and SUBTS3 with the 8 bytes SCH93JUN used as UTPF idents (the marking of columns 1-8). Of course, the SCH indicates G.E. in Schenectady, which owns the modeling. Now, the only difference between having and not having TCSC is input to the linker (to connect or not connect G.E.'s TCSC object code).

The need to explicitly declare COMMON block names to the Salford linker resulted in some confusing trouble for Wenchun Zhu of OSU. She had been using a 33-MHz 486-based computer at BPA to simulate TCSC successfully until late summer when, for no apparent reason, Salford EMTP died on some illegal number. It was impossible for us at BPA to help because trouble occurred in a G.E. subroutine for which source code had never been supplied. Eventually, new ATP FORTRAN was sent to Schenectady, and Mr. Baker was able to confirm the problem. Better yet, he rapidly discovered and revealed a needed change : addition of the names of 20 or so COMMON blocks that are associated with TCSC data to the linking instructions of LINKTCSC. A corrected version of Salford EMTP was mailed from BPA to Ms. Zhu on October 5th, and on the 15th she telephoned to indicate that all seemed to be well once again.

Isolated Corrections from LEC

Guido Empereur, the Manager of LEC, sent UTPF corrections to us via Laurent Dubé last July. The present story is a continuation of the one that began in column 2 of page 15 of the preceding issue. As the remainder of this story will summarize, both Dr. Tsu-huei Liu and your Editor have worked hard trying to reconcile most of the LEC complaints. These are considered in order, working from the 8-page line printer listing that accompanied two LEC floppy disks.

Tab characters were an easily-understood complaint by LEC. They should not be used. So, Vernon Buerg's shareware LIST was used to search the entire UTPF. After the file family *.spl has been entered but before the search is started, **Alt-H** was pressed to toggle the program into hex mode. Then the search is started by **\Tab<CR>** and **Alt-A** is used to continue after LIST stops to display any one occurrence. The offending module names are followed by the number of occurrences in parentheses: SUBR25 (24), LCMODE (3), OVER8 (5), ELEC (1), and UMDATA (29). Then using Quicksoft's shareware PC-Write, these segments were manually edited. One can respond to the prompt of **F9** (for searching) with **Alt-9** (the character code for a **Tab** character). Mr. Empereur had speculated that MS-DOS EDIT might have been the source of the unintended usage, and your Editor can agree. In some case, EDIT does seem to save space by replacing blank strings by **Tab** characters. Yet, the circumstances of this annoying behavior are not understood. Any reader who knows the full story is invited to send details to Portland.

MODELS modules PSTMT and ERRSTP are said to be in need of cosmetic changes. The first has an unused S.N. 2, which was removed. But an unreachable statement GOTO 5030 in ERRSTP can not be found (presumably author Dubé already had removed it).

The INTRINSIC statement is used to declare all library functions at the top of each module that uses them. This allows some compilers (including Salford FTN77/486 for MS-DOS) to place such functions in-line for faster execution. Somehow, LEC had determined that

functions ALOG1Z and ALOGZ had not been declared in SUBR25 and OVER11 , respectively, so the missing declarations were added. LEC annotation notes that the change is *"needed for Apollo."* Maybe to avoid warnings during optimized compilation?

In RSTART, the READ of ALPH80(1:32) had the (1:32) removed. Somehow, this was *"needed for Apollo."* The associated FORMAT had A32, so the difference might be new blank fill of bytes 33-80. Why this might be needed is unknown, but it causes no harm, so has been adopted.

START AGAIN use with TACS STAND ALONE was made operational by LEC. This is an extension rather than a bug. It is tricky because TACS code of the time-step loop (overlay 16) is not used for a TACS-only case. Developers in Portland choose to think very hard before making any such change.

REQUES and REQUE3 were not modified for *"LINE CONSTANTS (usage of 12 phases)."* The associated test case 12_4.TES seems to processed normally by Salford EMTP without any changes. SCE has been using LINE CONSTANTS for many more phases already (see later mention).

TDFIT involved a change of one line that was *"needed on Apollo because of compiler bug. This is tolerated by other systems, too."* Ok, we take it.

SUBR27 was to have *"all ANS144 changed into ANN144."* Instead, developers in Portland decided to blank ANS144 (now done always) only if there is no SEMLYEN SETUP or MARTI SETUP usage. So, the condition IF (LASTOV .EQ. 1) was added. This is easier than defining and using a new character variable.

A number of paragraphs (complaints; problems) were crossed out by diagonal pencil marks. The first of these is said to involve OVER3 and MAIN23. Developers in Portland can only conclude that somehow these involve old complaints that no longer are at issue. All of them are being ignored as extraneous, anachronistic information.

RFUNL1 had changes to "*avoid DEBUG.LIS file being a nonsense file."* In the right margin is written the following: *"maybe system dependent; I modified all but Salford."* True, RFUNL1 is installation-dependent, so if LEC is having trouble for computers other than PCs, the problem is in its own file of installation-dependent modules. This is not a UTPF problem, so nothing need be done about it.

OVER12 involved minor tampering as was explained on page 16 of the September, 1992, issue of *EMTP News.* Your Editor rejects this. Robert Schultz of NYPA has better understanding (later).

Changes to LABL23, MAIN23, and MISDAT are associated with the metric problem of FURNAS in Rio. Although not crossed out, this entry is accompanied by handwriting in the margin: *"this is resolved at BPA."* Indeed it was (see the story covering page 11 of the April issue).

FXSOUR , MAIN9 , SUBR10 , YINDEK , UMRENU , UMRNU2 , and UMRNU3 are the subject of about half a page of notes. Your Editor has known about this for a long time, and is not now interested in the change, which became too involved.

A couple of inches under the heading *"Added in May '93"* are being ignored because of handwriting in the right margin. This says: *"Scott, you already should have these, I guess."* Two more lines say *"Correction for $PUNCH and parallel naming on all platforms ; cimag3.ins_may , vax11et.com , rs6000et.com"* Since we at BPA do not recognize any problems with either DEC VAX/VMS EMTP or Salford EMTP for MS-DOS, we do not consider this worth studying to see what LEC has done. The listed files all are installation-dependent. It is to be reiterated that $PUNCH is not universal.

"Salford-specific" is a heading near the top of page 5. At this point, developers in Portland are beginning to lose interest rapidly. Entries begin with two lines that read: *"OK : In spytables.ftn : equivalence statements for LUNIT6 and LUNT10 are redundant, so should be deleted. Was already corrected by WSM."*

Next on page 5, black marking pen covers something that can not be read. This is followed by an entry that begins *"In function RFUNL1.SAL"* even though this file could not be found on either LEC disk by DIR RF*. There is a .SUM file, but it obviously is for Apollo (one can see %INCLUDE beginning in column 1). So we do not look further into this complaint about DEBUG.LIS .

Next on page 5 one sees the suggested omission of STATUS='DELETE' from the closing of LUNIT4 for the non-C-like case. *"This otherwise creates problems with stacked input for supporting routines (e.g., DCN3.DAT -- JMARTI SETUP)."* Of course, BPA normally uses the more efficient C-like .PL4 files, so trouble might have gone unnoticed. To test this, STARTUP was modified by the change of L4BYTE from 1 to 0 (to change from C-like to conventional UNFORMATTED files). The result was unaffected (verified by using Mike Albert's FC on old and new .LIS files). To conclude, another suggestion from LEC is being rejected in spite of the handwriting in the right margin, which says: *"this might be important!!"*

Next on page 5 is an entry that begins as follows: *"In file killcodes.mup (becomes blockd51.bin): refer to the date of UTPF and LEC corrections; refer to the LEC Rule*

Book." Following a blank line, this continues: *"Take all Apollo-nonspecific corrections to Salford too. pum.ftn --> pum.for ..."* These appear to be a reminders to LEC staff rather than any specific, isolated corrections for us in Portland. So, we ignore it.

Next on page 5 is an entry consisting of four lines that suggest changes to four .INS files. But since these are translator output (i.e., rederived during a translation) rather than translator input, such changes have no meaning for the way work is done in Portland. Nonetheless, it is educational to note the second of the four lines : *"labl23.ins (delete METRIK) . "*

The final item on page 5 consists of 7 lines that follow the introduction *"Small code corrections needed for the following:"* First, in TABLES, N18 is said to be undefined. But no trace can be found in our current UTPF. Lines 2 and 3 merely repeat the complaints of page 1 about ERRSTP and PSTMT (see paragraph 3 of this story). Line 4 mentions that S.N. 2753 is never referenced in FXSOUR (true; it reminds your Editor that this work is not yet completed, as already stated). Line 5 mentions that the statement iprspy=9 is never executed. True, but again, this is deliberate (the preceding STOP was temporary, to prevent unproven, attempted recover, apparently). Line 6 complains that variable METRIK *"has no initial value"* in MISDAT. This is not surprising when one remembers that LEC removed the variable from COMMON (see end of preceding paragraph)! Finally, line 7 makes the same complaint about MEMLOC.

That ends the first 5 of the 8 pages of line printer output from LEC. Your Editor has seen enough, and readers probably have read enough about it. To summarize, most of the LEC communication is not what your Editor had agreed to consider during a telephone conversation on July 1st. Neither does it give significant modifications that interest us. As a summary of nearly 3 years of LEC work on ATP, this reinforces your Editor's 1991 contention about ATP development: *"LEC employees, who work at the University in Leuven, have not played a dominant role in the past"* (see column 1 on page 3 of the October, 1991, newsletter). The two intervening years have not improved the situation, either --- clearly! Beyond that, your Editor resents LEC advertising about these changes. Well, after this detailed consideration of the first 5 of 8 pages from LEC, it is hoped the reader understands better why developers in Portland refuse to accept LEC judgements in matters related to EMTP. As with the benchmarking of 2 years ago (see pages 10-12 of the July, 1992, issue), it unfortunately is necessary from time to time to look closely at LEC work in order to explain to others why both BPA and the Can/Am user group do not work more closely with LEC.

Miscellaneous Intel PC Information

Intel recently replaced IBM *"as the most valuable computer electronics company in America"* as measured by the value of its stock. This startling statistic can be found on page E1 of the August 21st issue of The Oregonian --- in a Knight-Ridder News Service column by Rebecca Smith. There also is an interesting description of the dominance of personal computers: *"An estimated $100 billion worth of PCs are expected to be sold this year, making the market twice the size of the market for all other computers combined. And 70 percent to 80 percent of those desktop machines will contain Intel micro-processors."*

Computer City is a division of Tandy Corp. (the Radio Shack people) that is opening stores described as computer supermarkets. Founded in 1991, the chain of 23 stores just opened its first in Portland as described on page B16 of *The Oregonian* dated September 28th. The company hopes to open 35 more stores next year, and have sales of $1 billion/year, so this is a trend to watch. Unlike Radio Shack stores, Computer City sells products from Apple, AST, Compaq, H-P, IBM, Packard-Bell, and U.S. Logic --- all in addition to Tandy products. The story quoted a Seattle analyst as predicting: *"one effect of the store's high-volume, low-price format could be to force other computer dealers to lower their prices."* Except during rush hours, access by automobile is easy for most. The new store is just north of Portland in the Jantzen Beach shopping center --- just off the Interstate 5 freeway to Seattle.

"PCI Local Bus" is the title of a special 4-page pullout following page 144 of the September 14th issue of PC Magazine. It describes PCI, which seems to be the officially-authorized flavor: *"It was in 1991 that Intel's Architecture Lab, along with leading computer vendors, began work on a design specification for PCI. The PCI specification has now been adopted by 168 companies."* So how fast is it? The PCI bus is 32 bits wide and runs at 33 MHz, which implies maximum throughput of 132 Mbytes/sec (compare with 5 for the original ISA bus of an IBM PC AT) .

A DC2120 cartridge tape is being considered for backing up EMTP-related information on Dr. Liu's COMPAQ 486/33. Smaller than a package of regular cigarettes, these mini cartridges seem to be the common new standard of the PC world. They are what MODELS author Laurent Dubé uses --- both for backup at home and also for traveling (he now carries to Europe only his tape drive, which connects to a parallel port, rather than his entire portable computer). Without compression, 125 Mbytes are stored, whereas with data compression the storage approximately doubles. The DC2120 cartridges are cheap enough from MEI/Micro Center of Columbus, Ohio. A catalog from the end of last year shows a price of $14 in lots of 5 or more.

Miscellaneous Small Items

Using FREQUENCY SCAN to create an UNFORMATTED .PL4 file is not possible according to Dr. Mustafa Kizilcay of Lahmeyer International in Frankfurt, Germany. This was learned during an unrelated telephone conversation on August 14th. Yes, the preferred C-like alternative does work properly, and this is what Dr. Kizilcay normally uses. But when he was teaching at the short course in Leuven during July, it seems LEC wanted to use its own LECPLOT rather than TPPLOT to produce graphs, and LECPLOT could not accept C-like .PL4 files. Yes, the UNFORMATTED alternative could be added if anyone else needs it. Educational use by LEC probably has occurred for the last time, note.

$PREFIX and $SUFFIX can change the location of $INCLUDE files. But prior to corrections on August 18th and August 31st, these declarations did not always work dynamically (i.e., at the point of appearance). The changes were made to support ATP use by James Randall, a student at Oregon State University who has been assembling large quantities of EMTP data this summer for Dan Goldsworthy. Yes, that same overflow value of 32768 input data cards that was surpassed by Hatch in Toronto (see the January issue) now has been exceeded at BPA. On September 10th, 33973 input data cards were being counted at BPA by ATP, and the total eventually exceeded 36K. A VAX / VMS translation is being used for this work, so naturally the card cache had to be expanded. The original 20K (see bottom of column 1 on page 12 of the April issue) is now 80K, and LIMCRD = 75K was set in STARTUP.DAT (the VAX STARTUP file) .

Imitation Type-59 data input of the U.M. (Universal Machine) was found to have no protection against a blank name for a rotor mass. Readers are reminded that each mass card of the U.M. differs from real Type-59 S.M. (Synchronous Machine) data in that a 6-character node name is to be keyed in otherwise-unused columns 71-76. Dan Goldsworthy of BPA discovered that the resulting simulation is correct if columns 71-76 are left blank, but the associated variables (e.g., angular speed) appear without labeling in the .LIS and .PL4 files. In fact, the name of the associated node is blank! To help a little, for the case where mass number XX is given no name by the user, the name MASSXX will be supplied by the program. This is illustrated by DCNEW-10 in which the original name of mass 2 was erased, so the new name MASS02 replaces the old BUSM2 in output files. In case users want to computer-search their disks for such data cases, the key word SMDATA appears in columns 3-8 of the second card of U.M. data. Finished on August 24th.

The .PL4 file of a START AGAIN data case will have the usual header information written on it if there is no preceding $OPEN on the I/O channel of LUNIT4 (or its negative). This change was made on August 26th in response to a request from Randy Suhrbier of BPA, whose plotting program for VAX / VMS supports the UNFORMATTED files produced by production users who work under Robert Hasibar. Years ago, our own TPPLOT used the REFILE command because the header of the second .PL4 file was missing. Well, $OPEN on LUNIT4 will inhibit the new addition of the header. For Salford EMTP, this is nicer than STATUS=OVERLAY which is risky if the old file is not fully covered by the new one.

CABLE CONSTANTS had an erroneous punched transformation matrix [Ti] for 7 or more conductors prior to correction on September 8th. The problem was illustrated for the Can/Am Co-Chairmen by the CABLE CONSTANTS author, Prof. Akihiro Ametani of Doshisha University in Kyoto, Japan, during his visit to BPA September 7th and 8th. Corrections were made in CCEIGN as demonstrated by a new, fourth data subcase of DC-27 --- data from Prof. Ametani.

Very sophisticated changes to TACS have been made in Japan. Prof. Ametani brought them. But they are not simple corrections. See next issue.

Gabor Furst enhanced his SVC (static var control) modeling for the July short course. This is the 4th of 4 subcases of DC-22, which now offers substantially more comments. Also, variable names within TACS now better indicate which voltages are line-to-line as opposed to line-to-neutral. Finally, for Salford EMTP there is the addition of NEW LIST SIZES to dynamically size tables (the total LTLABL = 283K words is far short of the nearly 2 million words of the former TP20 that was required). Any archive ALLDAT.ZIP created on or after October 20th should have these improvements.

FAULTS TO GROUND (FTG) continues to be modified to handle exceptional data structures. For background of the feature, see the story in column 1 on page 12 of the April issue. Since then, BPA's Jerry Almos has identified two general deficiencies: 1) the presence of MODELS or TACS data was not allowed; and 2) $VINTAGE was not allowed as the first branch card. Well, on October 9th as this note is being keyed, both have been corrected. The first error was corrected September 13 for MODELS, but not for TACS data. A month later, restructuring moves the call to ENTRY FAULT1 from the bottom SUBR1 to MAIN10 as the error for TACS is realized. Variable MOLDAT of $VINTAGE is saved, too, so FAULTB can restore it (for the second and later solutions) to whatever value began the first. If readers discover any other cases that remain a problem, they are advised to inform your Editor.

"Power Electronics Modeling and Simulation Using

General-Purpose, Low-Cost Tools on PCs" is the title of Prof. Mohan's next short course. In addition to EMTP, six other programs are to be illustrated during two days (November 19 and 20) in Hawaii. The other programs are: PSpice, SIMNON, POWER 4-5-6, MAXWELL, MATLAB, and LEVEL5. Immediately below the location (which is the Hyatt Regency on Maui) on the advertising brochure is the following extra advice: *"Don't let the location fool you. This is a serious course."* A summary was sent by the Fargo list server to E-mail subscribers on August 10th.

A regular EMTP error message (with KILL code) is held on the screen until the user sends a **<CR>** to indicate that he has read the information, and is ready to allow execution to continue. The pause occurs if and only if output does **not** go to disk. That is, if and only if neither DISK nor BOTH was issued at the start of execution. For users of workstations (e.g., Apollo) with scrollable windows, this change probably is undesirable. But most ATP users are running DOS without scrollable windows, and the pause was added to help this majority. High-speed 386s and 486s are so fast, a user typically would be unable to hold an error message on the screen manually (e.g., using CTRL-S). Yet, there remained possible confusion about what to do next. So, a final line of advice was added July 31st: *"Output goes only to the screen. Send <CR> to end this pause for reading:"*

The end of CDC EMTP support by Harald Wehrend and associates of the University of Hannover in Germany now is in sight. In E-mail dated September 28th, he reports that the computer center of his university plans to pull the plug at the end of 1994. What is to be the replacement? Apparently a network of Sun Unix work-stations. So, this is the end of an era in Hannover, and the end of an era for EMTP. A year or so ago, LEC decided to discontinue support for its IBM-compatible mainframe. To your Editor, the disappearance of true mainframe computers for the support of EMTP is not at all a sad story. After transitions have been made, this is cause for celebration! Recall that EMTP users at BPA abandoned CDC nearly a decade and a half ago (that original, 1-MIPS DEC VAX - 11 / 780 was installed at BPA during March of 1979). Today, BPA's fastest computer for simulation is sitting on the top of Randy Suhrbier's nearby desk : DEC Alpha .