Can / Am EMTP News

Voice of the Canadian / American EMTP User Group

Publishers and Mailers :
Drs. Kai - Hwa Ger and Tsu - huei Liu
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. 97- 2; April, 1997

Table of Contents

Salford Compiler and DOS Extender

Timesharing under Windows 95 seems to be yet another benefit of the anonymous DBOS that was mentioned in the two preceding issues. This discovery was made January 21st at BPA, as Fred Elliott piloted Dan Goldsworthy's new personal (not-BPA) 200-Mhz Pentium PC. Actually, the new DBOS was tried only after the old version 2.71 failed to run in a DOS window. But the new version 3.5 had no trouble, at which point Gerald Lee asked about the time-sharing. James Randall and your Editor also saw ATP output being produced in a small window as Mr. Elliott performed other Windows functions with the mouse. This is an important development for Win95 users, and it corrects the pessimistic report in the July, 1996, issue. The general public first was informed of the breakthrough as a footnote to public E-mail by your Editor on Super Bowl Sunday (January 26th). Details were explained three days later by Prof. Laszlo Prikler of T.U. Budapest in Hungary. This comprehensive, 12-Kbyte report included modified ATPSETUP.LIS as requested by your Editor.

The simultaneous simulation of two or more copies of Salford EMTP under MS Windows was the logical next step for public discussion. How quickly users become spoiled (joke) ! Prof. Prikler mentioned problems the following day in response to a private communication from Mr. Elliott, and your Editor summarized his understanding in public E-mail dated February 8th. This included a report of successful operation on Mr. Elliott's two computers (both at BPA using WfWG and at home using Win95). Yet, while the simultaneous simulation of DC-1 seemed to be possible, it required care; and possible instability might result. Your Editor concluded: *"Why would anyone want this potential aggravation? What would be the purpose of simultaneous execution? With a single processor, it seems likely that throughput actually is reduced. I.e., the two DC-1 simulations will complete in more than twice the time of a single case being simulated all by itself. This was true for all single-processor computers and operating systems*

with which this writer has had experience since beginning with DEC VAX-11/780 in 1979. It seems unlikely that any Windows from Microsoft would behave better."

IOUT = 1 (the printing of every time step) was used to produce the preceding quality time-sharing, it is important to add. Prof. Mustafa Kizilcay of FH Osnabrueck in Germany was having trouble reproducing the quality time-sharing of the first paragraph of this story. Whereas others of us were able to use MS Word in one window while DC-1 output scrolled by in another, Prof. Kizilcay reported that his simulations using different data files left MS Word practically unusable. On February 18th, the difference was traced to the difference between IOUT = 1 and 1000 (Prof. Kizilcay had been using the second of these in his data case). As your Editor concluded the following day, *"Bill G's time-sharing seems to be so bad you have to help him by making your own output interrupts. Oh, well, once you know the trick, maybe it is not too bad. Still, this is a crazy phenomenon."*

Windows for Workgroups (WfWG) does not seem to be handicapped the way Win95 is (the need for frequent output as described in the preceding paragraph). Using Prof. Kizilcay's same data file (here named BIG.DAT) , BPA's Fred Elliott was unable to demonstrate sluggish operation of MS Word when IOUT was set to 1000. After being informed of this on February 19th, Prof. Kizilcay responded as follows: *"This did not surprise me, because on my old PC I was using Windows for Workgroups 3.11 and I never have had time-sharing problems."* So, one more good reason not to be pleased with Bill G's work on Win95.

Sluggish response while Salford EMTP was waiting for input at the opening prompt: this was recognized during the testing of simultaneous simulation. It led to correction of input logic on February 7th as explained on comments that precede ENTRY SPYCAS at the end of FLAGER .

The former DEBUG.LIS was renamed February 10th after it was discovered that ERR= on its OPEN failed in the MS Windows 95 environment. This was reported in public E-mail the preceding day. For those who follow recommended standard practice of KTRPL4 < 0, the diagnostic file will have new file type .DBG and name parallel to the input data file. This will be for the normal case, when IPRSUP is zero. But there are other cases, too. Three negative values of IPRSUP are recognized, they have the following effects: Value -1 means diagnostic output should be minimal, and never should be seen in a file because the associated connection is to a scratch file. Value -2 results in minimal diagnostic like -1, but to the fixed file named DEBUG.LIS Finally, value -3 will result in normal diagnostic as value zero does, only to disk file DEBUG.LIS In all cases, a random file name of the form F$xxxxxx.TMP is created by TEMP_FILE@ of DBOS near the start of execution. This is disconnected, renamed, and reconnected at the time the .LIS file name has been read. The only obvious disadvantage is a new need for a minimum amount of working space for DBOS CISSUE@ (use of comspace d'100000' seems to work well for your Editor's Pentium running Win95). If this working space is forgotten, execution might be halted in SYSDEP with an error message followed by a local halt. The associated text explains: "Halt locally .... CISSUE@ needs more memory." That is using ver. 2.66 of DBOS. For the newer ver. 3.50, no such need for COMSPACE has been noted.

An integer number of seconds seems always to be reported at the end of .LIS files that are created using the new anonymous DBOS version 3.5 on Dan Goldsworthy's PC. This, too, was observed January 21st when DC-1 was simulated. Time spent in the time-step loop was 7.000 seconds for the 200-Mhz simulation. Previously, using the old version 2.71, James Randall recalled seeing 6.480 sec. Compare this with about 10 seconds for your Editor's 133-MHz Pentium. This is not progress, but it can be tolerated if no more serious problem is noted.

DBOS3P50.ZIP is the new DBOS archive to replace DBOS2P71.ZIP that has been used for several years. As the name indicates, older version 2.71 is being replaced by new version 3.5 (the anonymous DBOS). Creation was performed by BPA's Dr. Tsu-huei Liu after installing from the Salford floppy disk using a DOS window of her NT Pentium (which itself is DBOS-incompatible)! For delivery by E-mail, the change was made February 19th, when the .UU1 and .UU2 files were changed in name from DBOS to DBOS3P50. The former was in fact the full content of the Salford floppy disk, and required use of INSTALL on such a disk. This was unnecessarily complicated, and did not agree with ATPSETUP.LIS Well, now it does.

Your Editor's 133-MHz Pentium was the first guinea pig for DBOS3P50 (see preceding paragraph). January 24th all test cases were run, and are correct except for two minor observations. First, as found using Goldsworthy's P5, times of case-summary statistics always are integer seconds. Second, DC-35 hangs (the screen goes blank, and then Ctrl-Alt-Del is required to end the process) if DISK is used, but execution (including vector screen graphics) is correct if BOTH is used. Because of these two minor problems, the decision was made to switch to version 3.5 compilation using BPA's 90-MHz Pentium (the same PC that is used for Linux testing).

But DBOS3P50.ZIP occupies 1322 Kbytes compared with a mere 655 Kbytes for the 2P71 file that it replaced. This observation of an enormous difference first was complained about by Prof. Bruce Mork of Michigan Tech in Houghton. This was in private E-mail dated February 24th. Your Editor agrees that size now poses a serious problem. Note that this is installed size. The files before installation are substantially more compact (recall the 919 Kbytes mentioned in the preceding issue). Enormous DBOS.LIB is created during installation, and it now seems to be responsible for most of the expansion. Had the 1322

Kbytes been noted earlier, your Editor probably would have recommended against continued use of installed files. But procedures are now established, and there is little desire to change again. Note the ominous sign for future use, however: the 1.44-Mbyte limit of a floppy has nearly been reached. If it ever is exceeded, this will force the abandonment of installation files, and a return to a copy of the Salford DBOS floppy disk.

The Nobel Prize for DBOSing should go to Prof. Mork. Not only did he point out the problem of archive size (see preceding paragraph), he then largely fixed it after neither your Editor nor BPA's Dr. Liu could imagine the problem. The unexpected intelligence arrived in an E-mail message dated March 12th. *"The reason for the differences in size is that the DBOS.LIB file (1.35MB) has been specially compressed into a file called DBOS.CPR on the DBOS installation disk. In your DBOS subdirectory, you apparently have retained both of these files, making DBOS3P50.ZIP unnecessarily large."* Later that same day, your Editor responded: *"Well, you **do** see things that we do not. Of course, we saw DBOS.CPR, but assumed that it was retained by INSTALL for a reason." Apparently not (crazy, is it not?).*

FOURIER ON of batch-mode plotting was supported by a bar chart beginning January 11th. This would be for CALCOMP PLOT usage (for the PRINTER PLOT case there is no change). The feature is installation-dependent in that a new vector-graphic module VECBAR is used, as called by module FSERIE which computes the Fourier coefficients and outputs the harmonic table as character information. The new vector plot looks similar to the old SPY plot of harmonic content although the user has less control. Assumptions made include the following: 1) all harmonics of the table are plotted, and scaling will give the largest of these the same height as the Y-axis; 2) the 16 bytes of text from columns 49-64 of the plot card will be used if non-blank; 3) the multi-line case title comes next, if defined; 4) if no multi-line case title, this is replaced by the single line of text that follows the last card having "2" in column 2; and finally, 5) the number of the plot has been integrated with regular plots even though it is preceded by a different label ("Fourier").

FTN77 version 3.5 was first tested at BPA using ATP on January 25th. As expected, based on earlier use by TEPCO in Tokyo, Japan (see October newsletter), there were no surprises, and all standard test cases seem to produce comparable solutions. More next time.

Improvements to Salford TPPLOT

Disk file DEBUG.LIS is the diagnostic output file that was produced by TPPLOT until March 7th. Then, the name was changed back to DUMTPP.LIS as existed prior to that trial coupling of TPPLOT with ATP in the fall of 1994. Simultaneous execution of two or more Salford programs is the reason for the change. Although the preceding story mentioned two simultaneous simulations, equally or more likely as a source of conflict probably will be one simulation and one plotting session using TPPLOT. In order to allow the ATP user to retain the name DEBUG.LIS for simulation, this name is being removed from TPPLOT usage. This seems to be the simplest way to ensure no conflict while operating within two or more windows of MS Windows.

TPPDIR is a new DOS symbol that does for TPPLOT what ATPDIR does for ATP (see explanation in the April, 1996, issue). This is if TPPDIR is defined. If not, ATPDIR will be used as it has been in the past. So, for the user who was happy with the old scheme of a single symbol for the two programs, nothing will change. But for Marco Polo Pereira of Furnas in Rio de Janeiro, Brazil, a problem has been solved. He explained in E-mail dated April 9th that ATP and TPPLOT usually are placed in different directories. The single symbol ATPDIR then will work for one, but not the other, of the two programs. So, to accommodate two separate directories, the second symbol was added April 26th.

LOW is a new operation of the MATH command for the processing of input signals. Recall (see the April, 1996, issue) that 1 / S was the command to integrate. But integration corresponds to a low pass filter having a time constant equal to infinity. The LOW command, illustrated by a new MATH6 which runs MATH6.DAT, replaces the gain of 1/S by the reciprocal of the time constant. That is, the reciprocal of s + a is being represented, and parameter "a" is the primary floating-point number. The block gain G of G / (s + a) is a second floating-point parameter, however. If not one, G is to be keyed in columns 21-28. Alternatively, such a multiplier could be represented by a separate MUL operation immediately before the LOW operation. All such operation is to be found in any program dated March 7th or newer. About the .PL4 files used by @MATHx illustrations, these are to be created by the user using the parallel ATP data files of the plot archive. For example, DC38.PL4 of the first subcase of DC-38 can be created from DC38A.DAT as found in TPPLOT.ZIP

An IEEE COMTRADE file can be used as input to the EXPORT command --- to be converted into one of the several formatted alternatives that are offered as outputs. This capability began April 4th. In theory, it should have existed all along, as your Editor assured the world in public E-mail two days earlier. But Alex Carter of National Grid Company plc in Surrey, England, reported otherwise. So, a correction was made. There was trouble because the EXPORT command predated COMTRADE support, and the special, dedicated input for it provided only for C-like and UNFORMATTED input files. Within the TPPLOT archive will be found COMTIN which illustrates the conversion of COMTRADE.DAT and *.CFG (also to be

found in the archive) into FORMATTED PL4 file *.PL4 (also to be found in the archive).

News from Outside USA and Canada

Zimbabwe in Africa might have interest in ATP. This according to Dr. Warren Levy, who heads the South African user group. In E-mail dated January 6th, Dr. Levy asked *"whether there are any other EMTP user groups in Africa. I have just received a request from someone at the Zimbabwe Electricity Supply Authority asking how they can get ATP. .... Please let me know what the situation is ...."* Your Editor responded: *"No, yours is the only one. North Africa generally looks to Europe, and some others have turned to us. I lose track of some of these names. Zimbabwe is the former Rhodesia, I guess --- one of your immediate neighbors. If it is convenient for you to serve these people, and you want to, we encourage you to do so. Europe or the USA requires air mail, which doubles the cost (approximately). That printed Rule Book is $50 over here, and $100 overseas. You are substantially cheaper, I believe, probably because ESKOM subsidizes the service. You could raise the rates for those outside the country, if cost is a concern."*

Libya in North Africa represents a special case for the Can/Am user group, it should be understood. Years ago, BPA checked with the U.S. Commerce Department in Washington, D.C., and learned that an export license would be required for **any** package -- including one containing BPA's public-domain EMTP. So, no package was ever sent; and since then, Libyans have looked to Europe for their EMTP materials. Most recently, Bruno Ceresoli of ENEL in Milano, Italy, had inquired on behalf of Libyans for whom other services were being rendered, and your Editor's obvious advice was to check Italian law on the subject. The response on January 9th was as follows: *"... we have been told from people related in ENEL with foreign affairs that 'electrical' software is not included in the list of goods subjected to some form of embargo, as currently under way. So, no particular export license should be necessary. For instance, we also will supply GECOL with some home-written electrical software (load flow, stability, etc.) at the end of studies under way ..."* So, the Can/Am user group volunteered to do the licensing (just a piece of paper, which avoids the American restrictions).

South Korea would seem to have new contacts for ATP information. In E-mail dated April 16th, Dong-Hak Jung wrote the following from **dhjung@keri.re.kr** : *"Mr. D. W. Park was elected as new Chairman of Korean EMTP Users' Group late last year. Addresses are as follows: Dr. Dong Wook Park; Manager, Power System Research Division; KERI (Korea Electrotechnology Research Institute); ...."*

Anyone in Japan is permitted to have a copy of Can/Am newsletters, as explained in the July, 1992, newsletter. Recall the Japanese EMTP Committee, abbreviated JEC, was given copies *"for reproduction and the dissemination to anyone having interest."* This is worthy of clarification in two respects. First, the privilege is not limited to Japan, but rather it applies to the whole world: Any licensed user who has obtained a copy may pass this material to any unlicensed person. Second, note carefully that rights of reproduction are not being passed to unlicensed persons. The newsletter is not in the public domain. Ownership of the content remains with your Editor who allows any licensed user to obtain a copy, and pass a copy of that copy along to anyone, including commercial competitors.

More about Electronic Mail (E-mail)

An on-line course about ATP was proposed by Ali Yazdian Varjani of the University of Wollongong in New South Wales, Australia. This was on January 8th, in reply to a public announcement of the Florida short course (see separate story). Observing that distance and cost prevented many from attending such courses, why not instead bring the education to the student via the Internet? Mr. Varjani wrote: *"Having today technology, it is possible to offer on-line courses (even interactive ones) through the network (WWW, or even mailing list, virtual university). I've seen similar courses for Internet and C++ which have been presented by email and www. ... Even a temporary sub-mailing list can be very useful and everyone from different places can be responsible for some parts of courses. The material of such courses can be used again sometimes later for new student with a little modification."* Commenting on this, Dr. Jose Roberto Camacho of Universidade Federal de Uberlandia in Brazil approved of the concept while wondering about legalities and economics: *"I don't know if it is possible in light of current ATP-EMTP agreements. .... I know that ATP-EMTP is free of charge and some money will for sure be expended on a project like this."* Privately, Prof. Bruce Mork of Michigan Tech observed: *"I think that probably the first thing that should be done is to set up a FAQ section of the WWW page, so people could look there first for frequently asked questions. That would be useful for new users. We could add password security to the WWW site, and give out a special password to each one taking an on-line course."* FREEP (see separate story) is believed to have roots in this earlier public discussion.

That Japanese-language list server for ATP information was started by Masahiro Kan of the Hamakawasaki Works of Toshiba Corporation in Japan. This was explained in the January issue. There also is a bilingual (Japanese, but with some English) Web page, as explained in the October, 1996, issue. Well, as expected, usage has been growing, and there has been an effort to institutionalize the service, and improve the reliability. In E-mail dated March 23rd, Mr. Kan reported as follows: *"I plan to shift the ATP-Japan WWW server to two Universities (Osaka University and Kisarazu National College of Technology). One is for the west area and the other is for*

east area." So, a mere six months after first mentioning the introduction of this ATP Web page for Japanese ATP users, it must be explained that the Infopepper address is soon to be replaced. With E-mail, the revolution is fast.

An ISDN line now is used by Masahiro Kan for E-mail and Web surfing at home. Recall the explanation of ISDN in the April, 1995, issue. First, using Infopepper, the performance was not good. Quoting from E-mail dated April 27th, Mr. Kan received "two mails (1034232 bytes and 986119 bytes respectively). It took about 20 minutes to receive each of them. So, the effective speed is about 1kB/sec. The line (ISDN, 64kbits/sec = 8kB/sec) is fast, but the effective speed is not so fast (about 1/8 of the theoretical speed)." So, Mr. Kan tried another Internet provider: So-net --- the same service used by Dr. Taku Noda. The *So* is understood to indicate Sony. Results were satisfying. The following was reported by Mr. Kan two days later for *"these two mails:*

djgpp2.TXT 986,637 97-04-29 7:06
djgpp1.TXT 1,034,759 97-04-29 7:07

It took about 260 seconds, and the effective transmission speed is about 7.7kB/sec. It was satisfactory." To complete this progress, Mr. Kan is dropping his Infopepper usage. In E-mail dated May 3rd, he wrote Prof. Bruce Mork: *"I have changed my WWW home page address and my home address."* **http://www02.so-net.or.jp/~m_kan/** is the new Web page, and **m_kan@ya2.so-net.or.jp** is the new home address.

A *conceal* option exists for the Fargo list server as mentioned by Prof. Bruce Mork in E-mail dated January 24th. Considering the trouble with unlicensed subscribers (see story in preceding issue), anonymous subscribers are an obvious concern. Yet, there seems to be no problem to date. Prof. Mork responded with addresses of the two hidden (missing in the REVIEW output) subscribers on January 30th, and they correspond to two universities: one in Japan and one in Brazil.

Unannounced changes of E-mail address have plagued several persons this past year, and one is your Editor. On May 3rd, the Fargo list server rejected your Editor's first attempt as follows : *"You are not authorized to send mail to the ATP-EMTP list from your* ***atp@rdrop.com*** *account."* When questioned about this, owner/operator Alan Batie responded promptly that same morning: *"Sorry about that; I've changed it back. It sounded like a useful thing to do while I was changing the mailer, but I should have given some warning."*

Junk E-mail, sometimes referred to as *spam*, has been much in the news. *"Dealing with junk e-mail"* is the headline of a story on page D3 of the December 25th issue of *The Oregonian*. First, good news about AOL's legal struggle (see the October issue): *"Last month, America Online won a court case against Cyber Promotions, a Philadelphia-based Internet marketing company."* Has the reader thought about what would happen if he were to send junk mail? Fortunately, the consequences can be serious: *"Most providers expel customers who are caught sending the spam ... free filter programs that can weed out junk mailers one by one are available on the Internet."* It is hoped that both Prof. Mork and Rocoil are listening (is it not time to get tough with junk mailers who use **atp-emtp** for free advertising that merely upsets average recipients?). Steve Case, Chairman of AOL, is quoted as saying: *"Junk e-mail is the No. 1 complaint from our members."*

The address **someone@bpa.gov** first was seen in the "From:" line of E-mail from BPA on May 28th of last year. This is a serious problem for those who use a "Reply" button, since then mail is addressed to this mythical person, and it bounces. Why BPA's remote post office had amnesia this way is not known. In any case, after several days of such inconvenience, the postal employees corrected their mistake, and nothing more was thought about the problem for many months. But the trouble has reappeared on occasion. Most recently, in E-mail to Agora dated January 7th, Marco Polo Pereira of Furnas in Rio de Janeiro, Brazil, explained that he had this problem. So, readers are forewarned about this latest unwanted service from the BPA computer establishment: anonymous addresses!

"AOL asks subscribers to limit Internet use" is the headline of a story on page D6 of the January 17th issue of *The Oregonian*. The trouble seems to be traceable to the end of metered use (see preceding issue). Heather Green of Bloomberg News reports that AOL *"asked users to scale back their time on-line to help address the system failures, customer complaints and lawsuits prompted in part by its new flat-rate pricing. ... Use of AOL has surged, and the customer base swelled to 8 million since it began charging $19.95 a month for unlimited on-line time .... The Dulles, Va., company said the average AOL customer now spends 32 minutes a day on-line, more than double the daily time in September 1996. ... The company also will stop airing television advertising, distribute fewer free disks, and halt mailing ads in cities hardest hit by delays."* For a first-hand report, your Editor asked Tom Field of Nashville Electric in Tennessee. On January 27th, he responded: *"I am currently unable to access it most nights and weekends. Fortunately, I am able to make connections at work."*

Lawsuits? Yes, by persons whose duties include the prevention of fraud. Illinois Attorney General James Ryan seems to have *"led the efforts of 36 state attorneys general to hold AOL accountable."* This is explained in a front-page story of the January 30th issue of *USA Today*. The headline is: *"AOL offers refunds to angry customers"* and Mr. Ryan is quoted as saying: *"You can't offer something to a subscriber and then not be able to deliver."*

Insecure FTP storage at a university in the northeastern United States was reported by a cooperative contact who wrote as follows on February 14th: *"I was searching the internet with different search engines using EMTP today at lunch and came across a site that you can download*

DBOS, GIVE1, and GIVE2 from. I didn't download them, but it appears anyone can. The address is ...." Your Editor confirmed this appearance by downloading and dearchiving GIVE1 just before 19:00 that same day. So, of course the user group complained to the person who was believed to be in charge. He responded as follows on February 21st: *"I am surprised …. I was told by our computer operators that these directories are not publicly available. I cannot check the access to these files myself since I am authorized to use them, since these are my files."* Three days later, the real story was learned: *"I was told by our computer staff that indeed the ftp server had a temporary problem with security due to some recent change of hardware. How long had this situation been going for? Nobody can tell me but "recent" means that it was perhaps for a few weeks but not years. I was assured that this would never happen again."* To conclude, the breach of security was inadvertent. Because commercial competitors would have no obvious reason to check this site, most likely there was no actual loss. In any case, the story is being told to make a point about the need for caution. Those who place ATP materials on Internet-accessible servers are assuming added responsibility. Be careful with those passwords!

Airline reservations is a growing on-line business as explained by Anthony Effinger in a Bloomberg News story that appeared on page G12 of the February 23rd issue of *The Oregonian*. Yes, Bill G is involved here, too, via the MS Expedia Travel Services, which is said to have been started October 22nd. The money involved is substantial: *"Microsoft earns about 12 percent of the price of each booking, and charges for advertising on the site. .... The address for Expedia is* ***http://expedia.msn.com****"*

The **Forward** button of MS Mail fails for large MIME-d messages, users at BPA have discovered. Even under WinNT on Dr. Tsu-huei Liu's computer (this is not the crippled Soup 95, note), truncation seems to be involved. This was discovered February 25th when a MIME-d copy of Prof. Mustafa Kizilcay's new PCPLOT version 6.50 was forwarded to Prof. Bruce Mork at Michigan Tech. Whereas the message is 120 Kbytes long, only 65 of those Kbytes were received by Agora (the "cc"). More of this crummy 16-bit software dating to a decade or more ago (Intel 286 days), from what your Editor can imagine. So, users of MS Mail must be careful. Upon noting the problem, a second transmission to Prof. Mork was made --- this one involving **Attach** of the 84-Kbyte PCPLT650.ZIP archive. This is the file that was obtained using MUNPACK on the incoming MIME-d message as sent to disk using **Save as** of the **File** menu.

European EMTP User Group (EEUG)

PCPLOT is the interactive plotting program of Prof. Mustafa Kizilcay of FH Osnabrueck in Germany. It is easy to use, and was very important in the world of MS-DOS ATP users prior to Salford TPPLOT, which broke the 640-Kbyte barrier. Might PCPLOT, too, be freed from DOS by conversion to run under MS Windows? This seems to be the plan, which was discussed at the meeting in Budapest. EEUG has the money to support student work, according to E-mail dated December 29th. Although not a strong supporter of MS Windows, your Editor strongly supported the concept as long as a good, MS Windows-competent student can be found. In fact, your Editor promised no competition (he explained that he, himself, has no intention of porting Salford TPPLOT to Win95 or WinNT) !

LISTSIZE.BIG is a file with larger program dimensions than are found in the .BPA file. It was received from Prof. Kizilcay on February 3rd, and was used to create current TPBIG that then was sent to both Prof. Kizilcay and also Prof. Laszlo Prikler of T.U. Budapest on February 6th. The new version 3.5 compiler was used, and it is VARDEEUG that performs the exceptional dimensioning.

TPBIG was updated, and sent to Prof. Kizilcay again, on April 18th. This followed EEUG interest in the new Type-58 S.M. model of Tokyo Electric Power Company (see separate story for details).

The TACS chapter of the Rule Book finally is available as computer-stored information. This important progress was announced by Prof. Mustafa Kizilcay in public E-mail dated April 10th: *"The EEUG Association has completely reedited the TACS section of the Rule Book .... (created using Corel WP 7.0 and Presentations 7.0). During this work, a new section III-H has been added, which describes the use of MODELS and TACS in the same data case. The EEUG members will receive this Rule Book update soon."* It is important to note that the TACS chapter is neither a small nor an easy one, considering its many diagrams. It seems likely that this difficulty was a dominant reason the TACS chapter was missing from LEC's storage using Lotus Manuscript. The EEUG storage is brand new and 100% original, then. With continuing enhancement of TACS, this documentation takes on added importance. There now is an easy way to document modifications.

Windows by MS and OS / 2 by IBM

"Not enough memory error with ATPWNT" was the subject of public E-mail from Michael Steurer of TU Vienna in Austria on January 8th. He began considerable discussion with the following observation: *"Unfortunately I experience a new 'wonder' of MS-win95 errors. When I try to run atpwnt (the 32-bit version from NYPA) I receive the error message: 'Not enough memory available, close other applications and try again.' But there are no other applications running, and until 2 weeks ago it worked perfectly!"* Prof. Laszlo Prikler of T.U. Budapest in Hungary then explained the need for disk space as follows, on January 10th: *" a significant part of the hard disk is used as virtual memory. ...At least 20 MB (unfragmented)*

free disk space should be available on that drive, which is used by Win 95 as virtual memory." Then your Editor responded three days later: *"While not disagreeing with such theory, this writer wants to add his voice to many others who complain about the way MS Windows (any flavor) handles resources that* ***are*** *available. Too often either BPA's Dr. Tsu-huei Liu or this writer has received that 'not enough memory' error while performing some negligible function .... Yes, even Dr. Liu's new Pentium with 32 Mbytes of RAM and WinNT has demonstrated such trouble. Yet, partition C: on which WinNT seems to be installed has 360 Mbytes of unused space, at the moment (no shortage here)!" Apollo Aegis ran well in 2 Mbytes of RAM, after all. Ten years ago, disks were always nearly full .... Why is MS Windows significantly less robust in this respect?"*

Memory leaks is the term used by a knowledgeable subscriber to describe this problem on January 17th. Since permission to use the contributor's name has not yet been obtained, the expert advice must remain anonymous for the time being. In any case, it follows: *"Windows NT will dynamically size the swap file within the limits set by the administrator. However, the defaults are usually too small. My current f:\pagefile is 209715200 bytes, but I have the upper limit set to 350 Mbytes. Many windows programs have memory leaks which fail to do memory housekeeping. These programs grab memory as needed but forget to release the memory when no longer needed. Increasing your swap file allows you to reboot less frequently, it does not fix the memory leaks."*

A crash of Win95 during booting left your Editor's P5 unusable for nearly a day. This seems to be yet another *new wonder* (see leading paragraph) of Win95. BPA's Fred Elliott deserves all the credit for restoring normal operation the following morning, but it took a lot of experimentation that involved changes to both the CONFIG and AUTOEXEC files. The hardware had been reliable, and your Editor had confirmed that this seemed not to be the problem by booting under DOS and running Salford programs (ATP translation, compilation, linking, and execution). But the computer refused to boot under Win95. Repeated attempts invariably ended with the following error message: *"A device or resource required by VFAT is not present or is unavailable. VFAT can not continue loading."* Somehow, the crash during booting had altered something. Booting in *safe mode* (choice 5 after F8) worked, but this was unsatisfactory because HyperTerminal as required for connection to Agora for E-mail was missing. Eventually, Mr. Elliott tried to boot with empty CONFIG and AUTOEXEC files, and this succeeded. He then reworked the old files line by line (a lot of trial and error). Previous references to old DOS or Windows were replaced by new ones in C:\WIN95), and operation has been normal ever. But it was frightening, that experience of February 13th and 14th.

Windows NT can be used to view Novell Envoy files (see explanation in following issue), but not yet to create them using WordPerfect 7 within Corel Suite 7. As your Editor observed in public E-mail dated May 7th, are there any other good reasons to avoid WinNT?

Watcom ATP for Robert Meredith and Robert Schultz of the New York City area has not been forgotten. But there has been apparent compiler trouble, as should be reported next time when there is more room.

Finding the Input Data File

FNDFIL was the name of an installation-dependent routine that had been suggested years ago by computer expert David Szymanski. Mnemonically, this *"find file"* was to modularize code that would produce a legal disk file name (including disk and directory information) for use with an OPEN statement. Dated December of 1991, the concept seems never to have been exploited beyond the standard Unix (System V, Release 3) then considered by Szymanski. But the concept has been resurrected, and today is available to the average user via Salford EMTP and TPPLOT for Intel-based MS-DOS PCs.

Szymanski's original idea was to use information of Unix environment variables to choose among two or more files of the same name but in different directories. Apollo Aegis seemed to do this, as best your Editor can recall. But MS-DOS did not. MS-DOS has PATH, as every user must know, but this serves only to locate executable files as named in DOS commands. It does not extend to data file names within a program. Yes, APPEND can be used as advocated years ago by Prof. Bruce Mork of Michigan Tech, but this can be tricky. Why not resort to lower-level reliance upon user-defined symbols? BPA's James Randall and Daniel Goldsworthy asked this question on January 21st while working with that new 200-MHz Pentium (see first story). Using DEC VAX / VMS or Open VMS, many symbols typically are defined in the initialization file LOGIN.COM that is processed by the operating system as the user logs in. An example was the symbol TP which can be found in the January, 1994, newsletter immediately before the VMS ":==" for name assignment as suggested by Randy Suhrbier. Why not give ATP this capability? The user then would establish and use his own, personalized abbreviations.

STARTUP has been extended to allow an arbitrary number of VMS-like definitions, which will be read until either a blank line, a software $EOF, or a real hardware end-of-file is detected. Comment cards also are allowed anywhere after the original (old) STARTUP lines. That much should be universal. But thereafter, little beyond the preceding paragraph can be said. File names are not standardized (e.g., the ANSI FORTRAN 77 standard), so logic can and probably will vary from operating system

to operating system. The new replacement logic for DOS is bound to be different from that for Unix because colons have special meaning for the former (e.g., A:) but not the latter. On January 23rd, Mr. Randall requested special meaning for a colon. For example, he anticipated use such as **jday:reclose5.** to refer to disk file **reclose5.dat** within some directory such as **c:\projects\johnday** But how is such usage distinguished from an absolute file name such as **d:\test\file.** ? Answer: for MS-DOS use, symbol names must be two or more characters in length, and repeated use (two or more symbols in a single disk file name) is not being allowed. Finally, the symbol must start the name (i.e., it can not be in the interior, or on the right). Such rules are not chiseled in stone, so if readers have strong feelings, public E-mail discussion might be appropriate. Change most likely will occur only in response to agreement among informed users.

Note that the original purpose of FNDFIL can still be used. The interface has not changed; only the use for DOS computers has changed. If Unix users prefer the idea of PATH-like searching, it still could be used --- either by itself or after the preceding symbol replacement. Another thought is about what to do if the resulting file can not be located. The user may misspell a symbol, or have so many symbols that he confuses them from time to time. One nice enhancement for Salford EMTP would be program output showing all occurrences of the disk file name on any disk and in any directory. But how might this be provided? Who has freeware that could be used for this purpose? Years ago, Laurent Dube supplied WHERE, but it failed if too many files and/or directories were involved (the case of your Editor's 486 at BPA).

News About TACS and MODELS

X**2 is not the same as X * X within supplemental variables of TACS for Salford EMTP, it is to be noted. Specifically, the multiplication is legal for almost any X whereas the exponentiation is defined only for positive X. Lionel Orama, a doctoral student at Rensselaer Polytechnic Institute, discovered the difference the hard way. On February 12th, he wrote that DBOS terminates execution with the complaint *"Error: Negative number raised to non integer power. .... I ran the code in the Unix version of EMTP that we have in Rensselaer, and the program runs very well. .... Do you know if this situation is possible?"* It certainly **is**, your Editor found. Other library functions may make an exception for the case of exponent 2, but Salford DBOS apparently does not. So, multiplication not only should be safer, but also faster. If what the user really wants to do is square a number, he is advised not to use ** to do it.

Laurent Dube's MODELS was shown to be extremely slow compared with TACS for some simulations. Recall that an order of magnitude difference in speed was documented in the preceding issue for the SVC simulation of Gabor Furst. But this does **not** mean that the old (non-compiled) TACS itself is efficient, note. How can one know? After more than two decades of speculation, your Editor decided it finally was time for an evaluation --- a comparison of the speed of free-format supplemental variables of TACS with the speed of the MATH command of TPPLOT. This would seem to be an apples-to-apples comparison in that both computations are programmed by the user in data (as opposed to the code of compiled TACS). The MATH command **is** lower-level, of course; it is more like computer assembly language. This is the whole idea : to use something simpler to estimate the inefficiency of Dube's implementation of high-level, free-format supplemental variables. This has been done using disk files named MAT*.* as described in later paragraphs.

First consider ATP simulation of MATHATP.DAT, which is a modification of the second subcase of DC-18. The code to be represented is, if written in single precision:

```
TEST1 = 10 * ( 1.0 + TIMEX ) ** 2 + 50
TEST2 = 100 * COS ( 2.0 * 3.14159 * TEST1 / 100 )
TEST3 = 10 + 5.5 * TIMEX * SQRT ( ABS ( TEST2 ) )
TEST5 = 2 * 3.14159 * TEST1 / 100
TEST6 = 2 * SIN ( TEST5 )
TWOXX = .0002 * ( TEST2 ** 2 + 2500 * TEST6 ** 2 )
```

First, 10K steps between 0 and 2 sec were taken with minimal printout, with IPLOT set to -1 to suppress plot data, and DISK to minimize screen output. Second, the simulation was repeated with the preceding replaced by the single assignment TEST1 = 10. Both tests outputted the single variable TEST1. Taking the 5 fastest of 6 successive simulations of both cases leads to the following table. This was using Salford EMTP simulation in a DOS window of Win95 on your Editor's 133-Mhz Pentium:

```
Real :  1.978  1.923  2.033  1.923  1.978
Dummy:   .879   .934   .879   .879   .879
```

The difference of the averages is 1.077 sec --- an estimate of the time TACS requires to perform the math. Note the near-empty problem is needed to remove the overhead of ATP itself (there is a dummy electric network, and TACS still is being entered each time step, even though little is done there).

Next consider MATHPLOT.FTN -- a special program that was written to perform the exact same computation as those six supplemental variables. But this small, new program is **not** driven by TACS data, but rather by MATH-like data in MATHPLOT.DAT --- a file that was created using human intelligence (no program to do such compilation yet has been written). Execution of this requires an average of .2368 seconds (1% of the time taken for 100 executions within a loop). It is to be concluded that TACS supplemental variables are slow by a factor of about 4.59 (1.077 / .2368) compared with MATH-like processing. The interpretation is simple: TACS looks bad. Why no one seems to have bothered to consider this detail before is surprising. It is only when compared with MODELS that TACS looks good! In proper perspective, TACS looks bad, and MODELS looks worse yet (for basic mathematics). Using round numbers, TACS is slow

by a factor of 5, and MODELS might be slow by a factor of 50 --- compared with the simple, easily-programmed MATH-like logic. ATP should be able to do much better than it now does using programming that began with Laurent Dube.

Compilation provides the ultimate standard. Disk file MATHCOMP.FTN contains the previously-shown code after conversion to double precision. Execution of this requires an average of .03187 seconds (1% of the time taken for 100 executions within a loop). The ratio to MATH-like processing is 7.430 (.2368 / .03187) and the ratio to ordinary TACS is 33.8 (1.077 / .03187) . The conclusion seems obvious: compiled TACS never looked better --- not only as an alternative to MODELS, but also as an alternative to ordinary (non-compiled) TACS .

But is MATHPLOT itself efficient? No, the MATH command was merely a hurried addition to demonstrate a concept. Studying details of speed, your Editor created an improved version MATHPLT1.FTN early in the morning of March 15th. Data is unchanged, but elapsed time has been reduced significantly --- from .2368 to .1297 sec. This reduces the ratio between compiled TACS and the MATH-like processing from 7.430 to 4.070 (.1297 / .03187), which seems more believable. On the other hand, it widens the ratio of elapsed times separating ordinary old TACS and MATH-like processing. This grows from 4.59 to 8.304 (1.077 / .1297). That's right, for the arithmetic shown previously, one can speed execution by a factor of about eight simply by replacing Dube's 2-decade-old logic by simpler MATH-like logic. Do readers want to bet how much longer the Dube logic will last in ATP ? ! This looks like a second great improvement to TACS --- a nice alternative to compiled TACS (see a separate story for further discussion of this) for those unwilling to compile.

MATHPLT2 was an improvement made late in the evening of March 17th, following consultation with BPA's Walter Powell, who interpreted the assembly language created by the Salford compiler in response to /EXPLIST (a compilation qualifier). The reprogramming reduced the elapsed time from .1297 to .08626 sec. This reduces the ratio between compiled TACS and the MATH-like processing from 4.070 to 2.707 and it widens the ratio of elapsed times separating ordinary old TACS and MATH-like processing to 12.49

MATHPLT3 was an improvement made during the afternoon of March 18th. The original concept of MATH was to use a few **low**-level instructions. But why be so cheap (parsimonious)? Why not spend an extra hour or two to program higher-level math involving a second operand? There is some similarity to the competition between RISC and CISC (Reduced Instruction Set Computer and Complex Instruction Set Computer) processors. Reprogramming with fewer but higher-level instructions reduces the elapsed time to .06538 sec. The ratio between compiled TACS and the MATH-like processing drops to 2.051 and the ratio of elapsed times separating ordinary old TACS and MATH-like processing rises to 16.47 Of course, the product of these two is the 33.8 quoted previously. Look for more next time.

ATP Education on CD - ROM ?

Tom Field of Nashville Electric in Tennessee has been the driving force behind a bold and rapid initiative to offer ATP education on CD-ROM in the foreseeable future. This according to a proposal that was received in Portland by E-mail dated March 11th. Yes, this was the week of the Florida short course, and Mr. Field was there in Gainesville --- not only studying ATP, but also thinking about its future education. The remainder of this story has been pasted from a March 17th progress report that was E-mailed to some 35 addresses of persons having interest in the project. Bold face type has been used to replace the capitalization of section headings as one of several minor accommodations to shorter lines. Also, obvious spelling mistakes (signaled by the MS Word Spelling checker) have been corrected. In this issue, just the initial proposal will be shown. Look for reaction (there has been plenty) in the following issue. The present one already has overflowed.

Dr. Devgan should be distributing a modification of the first advertisement for FREEP student version to some 250 US University EE Department Heads this week.

------ EE Department Head Flyer --------

FREEP
Free Referenced EMTP Education Program

Introduction

While the ATP and other versions of the EMTP program have been available for a number of years, they have not been used in educational institutions to support the power engineering programs very effectively. Also, they are not very user friendly even for engineering graduates because of the lack of simple application examples and supporting theory. Most of the EMTP short courses, while very effective for experienced users of EMTP, are too expensive and too short for a beginner. There is a definite need for additional information that will complement traditional power courses in universities and introduce new users in an easy to follow and confidence building manner.

Goal

It is our goal to develop supplementary course materials with simple introductory examples and associated theory on all of the topics that will be useful for a beginning user of ATP and will complement the power systems analysis courses at undergraduate and graduate levels in our universities.

Objectives

1) Develop ATP supplementary material to ease understanding and enhance application of the ATP by June 1997

2) Beta test these course materials at utility and educational institutions test site by August 1997

3) Provide these materials in CD-ROMs that are easier for distribution and certification by ATP at a reasonable cost to at least 100 US schools

4) Offer short courses in introductory theory and provide easy to understand examples for better understanding of ATP and it's potential uses by the Fall of 1997

Activities

1) Develop ATP course materials and examples by May 1997

2) Test this material on a sample group of professors and practicing engineers by August 1997

3) Distribute the first CD to the professors to evaluate content and usage

3) Develop the multi-media presentation of this material

3) Beta test the material at other locations inside and outside the US

4) Prepare promotional CDs and a first set of sample problems for public reaction by June 1997

5) Distribute 2 CDs for power course by January 1998

6) Perform the first 5 steps for the electric machines course by September 1998

What is being taught in the first tutorial

The first student version of the tutorial will contain the following information and may or may not contain the comprehensive tutorial that is the ultimate goal of this project (e.g. frequency dependent line models, frequency dependent transformer models, lightning studies, etc.):

* Mechanics of Using the ATP version of the EMTP
  - installation and configuration of the ATP files
  - use of templates to write data files easily
  - a menu program which integrates various utilities with the ATP programs
  - various options needed for working with plotting programs
  - resources which are available for ATP and other versions of EMTP

* Steady State Circuit Analysis of Power Systems with:
  - sinusoidal sources
  - lumped parameter RLC line models
  - pi equivalent line models
  - symmetrical component representations
  - equivalent transformer models

* Real Time Simulation Analysis of Power Systems with:
  - 3 phase and single phase balanced and unbalanced circuit modeling
  - circuit breaker models
  - lightning arrestor models
  - switches for faults simulations

* Load Flow Analysis

These subjects are presented in a way that follows most undergraduate power books being used by Universities today. There are several exercises coupled with detailed theory and derivations. This tutorial, while covering much of the theory taught in undergraduate power courses, is a supplement and not a replacement for the undergraduate power book. There are homework problems and quizzes which are password protected. The professor has his choice as to whether or not he wants to assign any of the exercises by having control of the passwords. This tutorial is seen by those involved in it's development as a step forward in power education by giving the students the ability to see the phenomena that is being taught mathematically in the course with graphic waveshapes and printed data representing the implementation of the various theoretical points developed in the traditional power course.

What is FREEP ?

FREEP is a group of individuals that felt EMTP would find widespread usage in the power community if the mechanics and lower level theory was presented in a manner in which anyone with an undergraduate understanding of power could understand. After years of knowing of the advanced power modeling capabilities of using the EMTP program for both simple and complex power phenomena studies, these individuals decided that it was time to improve the power industry by presenting an educational tutorial on the program that anyone with no knowledge of the program could learn use on their own with a minimum amount of time. The term "FREEP" was given to the effort of these individuals since it is a free version of EMTP (if you are not engaged in EMTP commerce), called ATP, distributed by the Can/Am EMTP User's Group that the tutorial is based on.

Who we are

A group of professors, Universities, Research Institutions, and Power Companies in the US and abroad are writing a tutorial for the introduction of EMTP at the undergraduate level. The FREEP group will release the first CD in June which is similar to the EMTP primer distributed by EPRI in intent, but much simpler to understand.

How to contact us

We should have a website setup by one of the universities responsible for the multi-media production details of this effort on June 1, 1997. Until then, you can contact two of

the individuals handling academic contacts at:
Tom Field Dr. Satinderpaul S. Devgan
Nashville Electric Service Tennessee State University ...

Evaluating Analytical Functions

$INCLUDE files should be capable of mathematical processing of the arguments. This was mentioned briefly in the preceding issue. The subject is being explained now in considerably more detail, and in more general terms. Yes, $INCLUDE is a use of immediate interest. But the subject is much broader: how does the user specify mathematical formulas, and how does ATP respond to those demands?

The study of TACS (see preceding two issues), and its reliance upon functional evaluation, is what has made the difference for $INCLUDE now as opposed to years past. Before, it was viewed as a special need. Now, it is viewed as just another use of a general capability (the evaluation of functions). Supplemental variables and devices of TACS are just functions, after all, and GNUPLOT allows the user to represent functions analytically (see preceding issue). So, the consideration of dependent variables within $INCLUDE was viewed this same way : as a function. Yes, TACS supplemental variables could be used for this, with the model here being old CSP (concurrent sequential processing) from SPY of some 12 years ago. But this was a little awkward; a case of overkill. All that really was needed was a simple, self-contained, scientific pocket calculator. If GNUPLOT could do such mathematics, maybe we could borrow that code? When asked, BPA's Walter Powell volunteered his own code, which comes from BPA's Power Flow Program. As half a dozen *.f files beginning with TEST_PAR, this was first supplied January 8th, and was found to execute correctly using Salford DBOS as disk file WALTER.FTN

An analytical electric network source is one use of the new Powell pocket calculator. The thinking is as follows: Why have a different type code for each different function? This implies a fixed function, for which the user then supplies parameters in fixed data fields. But this is a low level of thinking. Why not instead allow the user to specify his own function of time analytically? Automatically, the Powell source would be free-format, just as supplemental variables of TACS are. The user simply supplies his algebra such as 303 * COS (OMEGA * T - ALPHA) where OMEGA and ALPHA typically would be constants, but more generally, might themselves be functions of time or other variables. Just as with supplemental variables of TACS , one function after another would be evaluated, with the latest value of each variable used at any time. Why use TACS or MODELS for such mathematics? Why not instead supply such functions directly on the electrical side? The new Powell memorial source will do this.

A new Type-10 electric-network source first provided the just-described capability on January 29th as reported in E-mail to Mr. Powell. The analytical expression can be keyed anywhere in columns 11-60 with TIMEX (TACS notation, recall) used to indicate any occurrence of simulation time. If more than 50 columns are needed, a following continuation card carrying 30 additional bytes can be requested as illustrated in DCNEW-19. As with Dube's MODELS, execution is slow for large-scale usage. The first experiment involved 70. * COS (TIMEX) which required about 2/3rds of a msec per evaluation on your Editor's 133-MHz Pentium. But this is just the first try, with no memory between uses. Mr. Powell has indicated that he can speed execution significantly for repetitive evaluation of the same structure. Modules SUBR5 and SUBTS3 are the only ones affected.

$PARAMETER is a new $-card that precedes an arbitrary number of definitions of symbols that are defined by analytical functions. In fact, this preceded dependent variables of $INCLUDE because the details are much simpler. The same basic concept is involved, however. Why require $INCLUDE for math associated with input data? This is the question your Editor asked himself on January 29th during free time of that week-long wait for permission that never came (see separate story). The idea is as follows: For any data card, any character string can be replaced by the numeric evaluation of an expression. The character string, hereafter referred to as a variable of the usage, is defined using free-format FORTRAN such as : R-DAMP = .075 * "DELTAT" / CAP444 (inspired by formula 2.39 of BPA's EMTP Theory Book). Here the variable R-DAMP is 6 columns wide to fit in cols. 27-32 of a series R-L-C branch card, DELTAT is an ATP variable name (the time-step size), and CAP444 might itself be a symbol or a constant. Note that quotation marks are used to enclose program variables such as DELTAT. Walter Powell's pocket calculator will evaluate this variable R-DAMP once, and then will search for it, and replace it by the associated number, wherever it is found. This is the concept, and it is powerful. Logic is confined to new SUBROUTINE MATDAT. See the new test case DCNEW-19 for an illustration.

SPY APPEND has offered low-level mathematics for the past dozen years as illustrated by INCLSPY5.DAT (a parametric study). The new Powell pocket calculator could replace the existing low-level mathematics by high-level analytical expressions. For years, TACS supplemental variables or MODELS were considered as a replacement, but now thinking has changed. Why bother with such complexity when the Powell pocket calculator will suffice?

No replacement for TACS arithmetic seems likely, however. In the absence of changes, the Powell pocket calculator is too slow for heavy-duty use within the time-step loop. The separate story about TACS and MODELS reported that TACS was slow by a factor of 33.8 for a simple benchmark. Well, MATHWALT.FTN is the corresponding test of the Powell pocket calculator, and no

loop of 100 is required for accurate timing. For a single execution of 10K steps, just over 15 seconds were required.

New S.M. Model from Tokyo Electric

"Type-58 S.M. model is now available in ATP" was the title of a formal announcement that was made April 2nd by Dr. Hiroshi Okamoto of the Power Engineering R&D Center of TEPCO in Japan. His E-mail of the Fargo list server declared: *"We are very pleased to inform you that a new type-58 S.M. model is now available in ATP-EMTP. Tokyo Electric Power Co. (TEPCO) and Toden Software Inc. (TSI, a subsidiary of TEPCO) have been working on a phase-domain synchronous machine model in order to improve numerical stability of EMTP simulation. Mr. Xiang-lin Cao of TSI is the author of the new type-58 S.M. His new model has the following features:*

1) ***Numerical stability****. The type-58 S.M. is based on phase-domain machine modeling, whereas the type-59 is based on dq0-domain modeling. The conventional dq0-domain modeling requires prediction of electrical variables as well as machine variables in order to interface a synchronous machine circuit with the transmission network. We found that the prediction of electrical variables may cause numerical instability in some systems. Phase-domain modeling of the S.M. can get rid of prediction of electrical variables, and is expected to improve numerical stability. You can see this advantage by testing a new standard benchmark data case DCN20.DAT*

2) ***Input data compatibility with type-59 S.M.*** *Data cards for the type-58 S.M. are fully compatible with data cards for the type-59 S.M. All you need to do, to convert to the new phase-domain S.M. model, is replace 59 by 58 in columns 1-2 (the source type code). In addition, you can use both type-58 and type-59 machines in the same data case."*

This story began in the October, 1996, newsletter. Any reader wanting background is encouraged to consult this initial mention of the project. Included are illustrations of simulation speed. Referring to these, Dr. Okamoto's announcement explained: *"The disadvantage of the type-58 model is that simulation generally will be slower, since phase-domain modeling requires re-triangularization at each time step. However, we think that the difference usually is acceptable."*

The Type-58 source code was created and implemented entirely within Japan, it should be emphasized. Program developers in Portland simply supplied Salford translator output (non-commented source code), and it was returned with the new model installed. Although your Editor volunteered to answer questions about program structure, none ever was asked. Upon first seeing the modified source code, your Editor's reaction was as follows (from E-mail to Dr. Okamoto): *"First, my observation about structure and programming is this : there* ***is*** *no observation. Usually when we receive coding from others, there are many things that require changing. Most commonly, there are fixed-dimension arrays and COMMON blocks, or explicitly-typed variables other than COMPLEX. I was truly surprised to discover that there was no general need to change anything, in the case of your Type-58 S.M. code. Your implementation was as professional and as sophisticated as if Dr. Brandwajn (author of the Type-59 code) himself had done the implementation. You clearly do understand the details of Type-59 storage, and have merged your model with it in expert fashion. You are to be congratulated for a job very well done …"*

GNU ATP Runs Under DOS

Unix-like Linux was the operating system that supported the GNU FORTRAN compiler g77 during testing that was reported in preceding issues. But, as explained by Masahiro Kan of Toshiba Corporation in Japan, either real DOS or emulated DOS under MS Windows can be used via DJGPP --- the free GNU DOS extender that first was mentioned in the July, 1996, newsletter.

The GNU compiler g77, as used at BPA within a DOS window of WinNT of Dr. Liu's Pentium, came from Mr. Kan, who built it himself. On February 11th and the 14th, he reported: *"I struggled with gnu-win32, but could not obtain the executable file of g77. I received the patch to create g77 for gnu-win32 by using Linux (cross compiler) in the mailing list of gnu-win32, but I could not succeed. … I found g77 binary and source code for djgppv2. The version is g77-0.5.19. Because the latest version is g77-0.5.19.1, I recompiled it under djgppv2, and succeeded. …. I will send binaries of g77-0.5.19.1 for djgppv2 in another mail. Please tell me if you have any problems, and want its source code. Installation procedures are as follows …."*

The long Unix file names required shortening for use with DOS. Specifically, the .PL4 file name had the form plotyymmddhhmmss where "yy" are the two year digits (97), etc. But DOS names are limited to 8 bytes, so the Salford EMTP logic was used as a replacement. In fact, GNU ATP now contains both alternatives, and it decides at execution time which of these to use. The program knows which operating system is being used, and it remembers this detail in variable NEWPAG (a special use by the GNU translation).

RUNTP is the batch file that passes four parameters into ATP so as to avoid interactive specification (the opening prompt). A change was required here, too, for the switch from Linux to DOS. Recall the star of Salford EMTP needed to be replaced because Linux somehow treated it as a reserved symbol. So, the percent sign was used instead, as in the example RUNTP DISK DC6. % -R While this executed correctly from the DOS command line, it was impossible to bury such a command within a

batch file such as RUN.BAT to execute all test cases. It seems that the percent sign has special powers for DOS (at least as emulated under WinNT of Dr. Liu's computer at BPA). So, an attempt was made to return to the star used with Salford EMTP. But this, too, failed, because Walter Powell's C-language code in MAIN_ATP.C returns a bad command line GNU100 via /MAINARGS/ Your Editor does not claim to understand why, but Mr. Powell seemed satisfied that there was no easy cure, so the easier alternative of avoidance was adopted. Letter "s" (Dr. Liu chose this to indicate *same*) replaces * or % for RUNTP use.

G77 output will suppress a leading zero of an F-field number whereas Salford DBOS will not. For example, the LINE CONSTANTS output of DC-59 shows the first conductor resistance in ohms/mile is 0.07760 as created by Salford. But the GNU output under DOS is missing that leading zero, which then represents a difference to Mike Albert's freeware FC (on the GIVE2 disk). Well, there are a lot of such cases, with the more prominent and repetitive deserving treatment. What treatment? The addition of special logic to suppress the leading zero for all operating systems (including DBOS) that tend to produce it. So, a lot of output files have changed in this small, cosmetic way as a result of the GNU comparisons.

Speed of compilation and linking are slow compared with Salford software, but better than Watcom. For example, a complete compilation and linking required just over 13 minutes. Subsequent compilation of just the installation-dependent GNUMODS.F (which consists of just under 1700 non-comment lines), followed by linking, took about 20 seconds. Finally, just relinking required 9 or 10 seconds --- all of these times within a DOS window of Dr. Liu's 133-MHz Pentium. The resulting TPBIG without windows or screen graphics occupies 2853 Kbytes of disk space (compare with 4125 Kbytes for Watcom ATP using WAT4GW, which required just over 3:03 to link at 90 MHz with no internal text). The much quicker linking of the GNU software is advantageous for compiled TACS users, obviously.

A perfect set of benchmark solutions DC*.LIS ended the week on March 21st, following Dr. Liu's great idea to separate troublesome subcases. There had been some unexplained trouble with I/O units that were being used for temporary storage. Some LINE CONSTANTS, JMARTI SETUP, and SEMLYEN SETUP usage died with complaints about the I/O unit. For example, DC-29 terminated with the following error message: "do_us: end of file; apparent state: unit 2 named tmqaaaaa; lately reading sequential unformatted external IO; Abort!" No, this is not believed to be the trouble of ATP source code. It seems that the DJGPP monitor simply becomes confused, sometimes. Spirits were low, indeed, until Dr. Liu observed that trouble never occurred on the first subcase of a disk file. Trouble always occurred while working on the second or later subcase. So, data cases were split immediately before the trouble (this explains the use of DC29A. and DC29B. in RUN.BAT that applies ATP to all test cases). Where files have been split, it was out of necessity.

LUNIT4 in LINE CONSTANTS was one of those troubled I/O units of the preceding paragraph. Prior to Dr. Liu's miraculous observation about splitting, your Editor decided to try to remove some scratch storage of I/O units. This began with LUNIT4 in MAIN25 and SUBR25. This **did** help, allowing the full DC59.LIS to be generated without difficulty. On the other hand, it did not solve the problems with more complex SETUP cases such as DC-29. To conclude, some reform was made. The storage of LUNIT4 was transferred to the variably-dimensioned RAM used by LINE CONSTANTS.

GNUPLOT for New Universal Plotting

GNUPLOT is a freeware plotting program that can be downloaded from the Internet as explained in the preceding issue. The story now continues.

X-Y PLOT usage followed plotting of functions of time ("ordinary plotting") as described last time. The only thing that is different is the curve labeling in the upper-right-hand corner. Whereas plots vs. time require either one or two A6 names, the X-Y PLOT case involves a pair of them, and the two will be separated by "vs."

FOURIER ON is brand new for batch-mode plotting. The .GNU output is essentially universal whereas screen graphics depend on computer. Initially, on January 10th, code is being added for Salford EMTP as explained in the first story of this issue. For GNUPLOT, *set data style boxes* is the command that switches from curves to bars, and *set boxwidth 0.5* results in bar width that covers half the screen (the SPY PLOT convention). The use of manual specification of axis limits is worthy of explanation. Take the case of 10 harmonics as illustrated in the first subcase of DC-42. Harmonics are numbered zero through 9, and the *plot* command begins with [-1:10] which will make the first and last data points interior points (i.e., there will be a left and right margin for the bars within the bounding box). Height of the bars is similarly constrained, but without any free space. That is, the vertical axis begins at zero, and will end at the peak of the dominant harmonic, with this bar touching the top of the bounding box. Since there is no grid, and no separate, special marking of the peak, this provides any easy way to estimate the peak. Finally, upon encountering FOURIER OFF, the command *set data style lines* will be generated, and this instructs GNUPLOT to return to conventional plotting.

QUARTER PLOT was the next extension to be honored in .GNU output. This resulted from the realization that one could offset, scale, and superimpose as BPA's Dr. Tsu-huei Liu showed your Editor on January 16th. The

commands are very simple. At the beginning, *set multiplot* and *set size* switch from full-screen use to quarter-size usage; and before each quarter, *set origin* selects the appropriate quarter. Finally, at the end (after the final quarter), *set nomultiplot* and *set size* cancel the special use. Of course, the two sizes are different: *0.5, 0.5* is used to enter and *1.0, 1.0* is used to exit. So, extension to GNUPLOT was very simple, and was an enormous success (results look great). Therefore, the reader might be wondering, why stop with four? Why not allow 16 panes of the plot window? The problem is text, which is **not** handled well by GNUPLOT when space is lacking. More than four plots are possible, but human intelligence is required for the text to be acceptable. The effect is not automatically good, as it is for QUARTER PLOT use.

Window plotting as used by Salford TPPLOT was the next extension to be considered for .GNU output. The idea seems logical enough in the abstract. But in practice, for four or more windows, quality of the Y-axis numbers varies between poor and garbage (the latter being applicable if text overlaps). The reason is as explained in the preceding paragraph. Note that QUARTER PLOT can produce 4 good-looking plots because each is scaled to 50% magnification. It could not produce 16 good-looking plots using 25% magnification. Yet, vertical magnification of 4 equal windows stacked vertically is this same 25% (about). It is true there is no trouble with the horizontal axis, but the vertical axis becomes unusable. So, this was a disappointment, and a good illustration of a disadvantage of higher-level plotting: lack of control over details such as axis numbers and their size.

Compiled TACS Speeds Simulation

Compiled TACS is the much faster, and also more flexible, way to simulate control system modeling. The story that began last time is being continued now.

Logical variables pose the greatest incompatibility for compiled TACS. The average user may not know that these involve floating-point numeric storage within Mr. Dube's old TACS code. Obviously, in FORTRAN, the variable type LOGICAL is a more natural choice. This is possible using AA and BB declarations (in columns 1 and 2) as first explained in public E-mail dated November 15th. The following description is close to this summary.

LOGICAL variables in compiled TACS are being left to the user. That is, no translation or conversion is being provided. In real FORTRAN, the user is able to declare and use whatever he wants, of course. At the end of any such computation, if he wants compatibility with old TACS, he simply defines the associated variable of old TACS to have value of either zero or unity. For example, from the 9th illustrative COMPILED TACS MAKE data case M9.DAT, there is the old TACS line:

```
AAVAR     = .NOT. ( TIMEX .GE. .010 )
```

The "AA" in columns 1-2 indicates that this is the old, interpretive half of a split definition. For execution, the AA automatically will be replaced by 88 to indicate an internal variable. But then Ma Renming's improved logic dating to 1984 should convert this to whatever is appropriate (i.e., possibly input or output types). In any case, this old TACS line of the first (AA) half of a split block is to be followed by a compiled half such as the following equivalent:

```
BB      LOGICAL  LOG1, LOG2
BB      LOG1 = .FALSE.
BB      IF ( TIMEX .GE. .010 ) LOG1 = .TRUE.
BB      LOG2 = .NOT. LOG1
BB      VAR = 0.0
BB      IF ( LOG2 ) VAR = 1.0
```

The AA / BB alternative was illustrated for LOGICAL variables, but in fact it has nothing particular to do with them. The technique is general and powerful. Any block of contiguous supplemental variables can be given an alternative this way. The AA records come first, and they are used to enter the time-step loop. They also are used within the time-step loop except for the case of COMPILED TACS USE in which case it is the BB alternative that is used instead --- automatically. The first BB line shown above is a variable declaration. Implicitly, variables that begin with letters A-H or O-Z will be type REAL*8 and I-N will be type INTEGER*4. Since LOG1 and LOG2 would violate this implied rule, they required the manual declaration shown. The complete list of declarations now being honored is: EQUIVALENCE, DIMENSION, LOGICAL, REAL, INTEGER, SAVE, and DATA, with the latter two automatically being separated from the preceding five to satisfy common rules of ordering of FORTRAN compilers.

A restriction on the AA / BB alternative should be understood. The AA statements not only are contiguous, it also is assumed that they are evaluated in order without intervening S-block backsubstitution.

Dr. Glenn Wrate of Michigan Tech in Houghton is the perfect example of why faster simulation still is critical to some. Using E-mail, there was a public debate about whether speed mattered. I.e., is the retardation that might result from the use of MODELS rather than TACS acceptable? In list server mail dated October 24th, Dr. Wrate reported 338905.220 for seconds spent within the time-step loop of one of his simulations. Later, Dr. Wrate answered your Editor's question of why, considering the problem with time, he chose slow MODELS rather than much faster TACS: His answer: *"Yes, I was using MODELS. Two features I used in MODELS that are not available in TACS are: 1) Branching to change the driving function during the simulation; and 2) Output files to obtain snapshots of the simulation waveform ...."* Of course, this was true for the old TACS. Using the new AA/BB structure, any sort of branching permitted by FORTRAN (e.g., IF, IF THEN, DO WHILE, ELSE IF, GO TO, etc.) could be placed in the B half. As for a change of driving functions, all TACS source names are immediately available, and any other program name could

be changed via the recent extension to provide SPY DEPOSIT capability from within TACS.

Note that output is a strength of compiled TACS . Rather than conform to whatever either MODELS or ATP might allow in the way of format and precision, the user could customize his own. For example, if Dr. Wrate wanted to connect a file of his choice on Step 1, he could add a statement such as:

```
BB      IF ( ISTEP .EQ. 1 )
BB     1 OPEN ( UNIT=44,  FILE='WRATE.LIS' ...
```

The file could be FORMATTED, UNFORMATTED, or random access (with the latter being most appropriate for a data base that might be updated). If Dr. Wrate wanted to save TACS variables during the simulation, he could declare whatever storage might be desired and perform the transfers himself. For example, to save the waveform of TACS variable ENDB, he could add:

```
BB      DIMENSION  TANK(50000)
BB      SAVE TANK
BB      TANK(ISTEP) = ENDB
```

When it came time to flush this signal to disk, Dr. Wrate would have the full power and flexibility of compiler I / O (e.g., WRITE statements). But prior to flushing, Dr. Wrate might want to perform a harmonic decomposition on the contents of TANK to see if some resonance were present. This would pose no problem, assuming he could supply the FORTRAN for FFT. Etc., etc.

The Type-67 TACS device dates to "M39." EMTP of July, 1984. Yet, as mentioned in public E-mail dated April 8th, no trace of any associated user instructions can be found. Your Editor asked: *"Is anyone using the Type-67 device in a practical engineering sense? If not, is there any need to continue supporting it? What reader knows when and where details of Type-67 usage might have been made available to others (if in fact this ever was done)? Unless someone is going to use it, this writer has no intention of supporting the Type-67 device for COMPILED TACS MAKE usage ...."* This is the end: the last of the TACS devices. All documented ones now are supported for compiled TACS use.

Minus signs should not be used in TACS variable names if compiled TACS is wanted. This is because of rules of FORTRAN. Each such usage will result in at least two FORTRAN errors upon compilation. The same is true for names that begin with numbers rather than letters: they will bounce off any FORTRAN compiler, unfortunately. For new data, there is no real problem, since the user simply names his variables to comply with FORTRAN rules. But what about old data such as DC-2, which generated some 80 error messages the first time it was tried? No general procedure has yet been devised for such cases. In order to simulate DC-2 using compiled TACS, hand editing and human intelligence were required. The resulting file MDC2.DAT was produced easily enough (perhaps half an hour to an hour of editing was required). The human intelligence was required because character strings were not unique. For example, TACS variables are named "4", "9", "14", "19", etc. (all left-adjusted with blank fill on the right). This illustrates another potential problem: lack of left-adjustment. Remember, ATP might take the data using fixed formats, but FORTRAN will not. Variables begin with a non-blank character, and any trailing blank will be ignored. So, interested readers had better start left-adjusting their names, if they are not yet doing so.

Florida and Other Short Courses

Prof. Dennis Carroll of the University of Florida in Gainesville gave his 4-day ATP short course March 11-14 as scheduled. Attendance was unexpectedly strong this year, with 18 paying students from the outside. The next issue should provide a summary paragraph, if one of the instructors wants to submit one for publication. Prof. Carroll was very busy moving to a new building shortly after the course, so your Editor chose not to burden him with the request during this trying period.

A Novell network and MS Win95 represented the dominant change to computers from years past. Prof. Laszlo Prikler of T.U. Budapest in Hungary provided the necessary advice in response to a request from Prof. Carroll on February 10th: *"The only problem might be the way the lab PCs are now set up: Windows 95, Novell networking, with no writing on the local PC hard disk. Can we run the ATP under these conditions?"* Obviously, your Editor did not have a clue. But he remembered Prof. Prikler, who, within hours of the call, provided 4.8 Kbytes of detailed advice: *"Yes, I have some experience with Novell and DBOS and Win95. It is not clearly understood why do not you want to write on the local PC hard disk. .... Anyway, with some limitation, I think it can be done. .... Our operating Novell server is still 3.11, but we also have a new 4.11 Intranetware under testing and setup, so both of that can be used for testing. So, if the job were mine, I would proceed this way: 1) Do not use DBOS swapfile feature ..... 2) Create separate working directories for each student on the network drive with RWCEMF rights. Create a system directory for ATP and one for DBOS (ver 3.5 is mandatory) files with RF rights to students and RWCEMF rights to supervisor. Install and configure ATP and DBOS in those directories. .... It is also necessary to complete the students workstation AUTOEXEC.BAT with SHARE and SET ATPDIR= .... 3) Configure the Win95 Properties settings as described in my installation guide ATPSET95.ZIP .... 4) Looking into your course program the name ATPDRAW is seen many times. This will cause some inconvenience for you because the present ATPDRAW does not support network use at all. It was discussed with Hans Hoidalen at the last EEUG meeting in Budapest. .... We agreed that better network support would be necessary and can be done, but it has not yet been. The best you can do in the meantime is install a complete copy of ATPDRAW in the working directory of each student. .... This is my present thinking, but if you have more questions, do not hesitate to contact me ...."*

Hong Kong was the location of one of the more inexpensive short courses of which your Editor has heard. From the power-globe list server via BPA's Robert Hasibar came the October 28th announcement of a 4-day course entitled "computer relaying for power systems." This is to be held January 7-10, 1997, at Prof. Felix F. Wu's Centre for Electrical Energy Systems on the campus of the University of Hong Kong. Instructors include two from the USA (later) and Qixun Yang of North China Univ. of Electric Power. The price? *"HKD $4,000 (USD $515) which includes course notes, lunches and refreshment. Lecture notes, MATLAB software, and a copy of the textbook, Computer Relaying for Power Systems, by A. G. Phadke and J. S. Thorp, will be provided."* Maybe the Hong Kong dollar is weak as the colony prepares for Communism (British rule formally ends in July)?

Dependent Variables of $INCLUDE

ABB use of $INCLUDE with dependent variables was summarized in public E-mail of the Fargo list server dated January 16th. The story now beginning is based on this announcement, and subsequent work within ATP.

Jeff Peggs of Virginia Power in Richmond is the one who most recently prompted consideration of the idea of dependent variables for $INCLUDE. The preceding issue ended with such a summary. Then, in 4 pages of FAX dated January 22nd, Mr. Peggs wrote: *"I have been told the calculation mode has been added in the latest EPRI/DCG version 3. Harry Mathews of ABB gave me permission to fax the sample transformer module to you so that you can see what it looks like."*

Question and problem: Are details of this modification to $INCLUDE usage secret? If so, this writer does not see how such ABB data legally can be made compatible with ATP. Yet, incompatibility would result in obvious, perpetual consequences for both ABB and its many customers. ATP can and will soon allow such dependent variables within $INCLUDE files. No one involved in EMTP commerce can prevent basic compatibility at the DBM (DATA BASE MODULE) input level since the ABB data seems to use standard FORTRAN language to define the variable dependence. In any case, standard FORTRAN is what **will** be used for ATP. This is the good news: DBM **input** data of ATP should be basically compatible. But what about DBM **output** data (those parallel KARD, ARG, NUM, and DUM pointers at the top of a data module)? Who within the ABB or the DCG/EPRI establishment is prepared to declare whether modifications to the rules of such variables remain a trade secret? In the absence of clear public permission to reverse engineer such usage, this writer is inclined to proceed with his own ideas of how dependent variables might best be represented. The result almost certainly would be incompatibility of the ATP DBM output with DCG / EPRI EMTP, of course.

Deadline: The implementation of dependent variables in DBM of ATP has been delayed for one week in order to give interested readers time to obtain public permission to make DBM output compatible. That is where matters were left on Super Bowl Sunday (January 26th). The story will be continued next time. It has been complicated by the discovery of how to write a much faster pocket calculator, as explained in a separate story.

Hoidalen Improves ATPDRAW

ATPDRAW is the graphical data assembler from Hans Kristian Hoidalen of EFI in Trondheim, Norway.

The need for reference branch capability was made by Carlos Mata of the University of Florida in Gainesville. His public E-mail on January 27th explained: *"When we model the lightning channel, some parameters are considered constant. To study the sensitivity of the response to changes in the values of the parameters, we have to change the value of the parameter in every section of the channel. For the return stroke I am working with 100 sections."* Author Hoidalen responded with an indication that the procedure was doable: *"1) A single phase reference object has four nodes (IN, OUT, REF1, REF2). 2) The reference nodes must be connected to the master nodes (or given equal names). 3) The reference object has besides a data field (typically a combo box) where the user can specify which type of branch to make reference to. The possible selections would be: RLC (type 0) .... Non. lin. L(i) (type 98). 4) In addition, an output specification would be required. .... In this way the Reference object is an independent object, but its reference node names are dependent. Besides, it will be relatively easy to implement."*

About MS Windows, author Hoidalen explained as follows on January 28th: *"Right now we are working on two parallel programs: the DOS version and the Windows version. The DOS version will be developed further until summer and some special features will be introduced which will not be in the Windows version on release. We will not give priority to adding new things to the Windows version right now but instead focus on making a more consistent code. Thus new Windows features have to come later."* In public E-mail dated April 23rd, author Hoidalen added the following: *"A Windows 95/NT version is soon available. If everything proceeds normal, it will be ready in June."*

MODELS and DATA BASE MODULE (DBM) are less than fully compatible for purposes of ATPDRAW data assembly, it would seem. Hong Tang at the University of Uppsala in Sweden had asked the original question in public E-mail, and then clarified it on January 17th as follows: *"It is comparatively easy to include TACS*

in DBM, does anyone know how to include MODELS in DBM?" Later that same day, ATPDRAW author Hoidalen responded. What Mr. Tang wanted to do *"is in general not possible. This is mainly due to the INPUT, OUTPUT section of MODELS which is handled by ATPDRAW automatically. There is no way for ATPDRAW so far to examine the .LIB file and identify the input/outputs."*

Missing Induction Motor Data

Missing data for induction motor modeling of ATP was the subject of a story in the preceding issue. This is a continuation, thanks to the creative work of Gabor Furst of suburban Vancouver, British Columbia, Canada.

INDMOT.EXE is the name of an executable program first seen in Portland on January 17th. Attached to E-mail, this was described by Gabor Furst as follows: *"I have developed an induction motor data pre-processor for generating coil data for type #3 U.M. induction motor simulation, from motor performance data. The motor performance data used is readily available from manufacturers and even from manufacturers' catalogues. The process is as follows: 1. Use the performance data to generate a T equivalent network of the induction motor. This technique is not new, it was described over 40 years ago, but some improvements were made in the 1980's, published in IEEE papers which were reported on the Server some time ago. 2. From the equivalent network, go back to re-calculate the motor performance data to make sure that these are consistent. (the user may specify data which are not realizable). Make some adjustments to the equivalent network, recalculate and print out the performance data. 3. Take the revised equivalent network and calculate resistance and inductance data for the coils of a type #3 motor. The program generates a data file, defaulted to 'mot.lis' in the subdirectory from which the program is run, giving the original input, the revised performance and the coil data. I did a few checks .... It seems to work OK. .... So far I have not added the required input data for inertia and load. This should also be done."* Availability of this program to the general community of ATP users was announced by Prof. Bruce Mork in public E-mail dated January 23rd. Subsequently, Mr. Furst explained privately that *"the data now includes load and inertia in the correct dimensions as used by U.M."*

For ATP use, there is a need for FORTRAN. Mr. Furst wrote: *"The program was written in QBASIC as I have no Fortran compiler, but in any event the coding is very similar to Fortran coding and if somebody wants to re-write it in Fortran, this should be very easy."* Of course, your Editor volunteered immediately, and the Furst source code was received by E-mail having date January 29th. Conversion to FORTRAN was easy enough, although it took several days of scrutiny in both Vancouver and Portland to produce identical answers --- apparently due to unusual effects of roundoff . The QBASIC code was single-precision, and this most likely made comparison more difficult. But author Furst made the final reconciliation on February 3rd so that answers became identical to 6 decimal digits using default data values. As expected, execution following FORTRAN compilation is fast enough: about 10 per sec using author Furst's default parameters (all blank responses to the prompts of the program) using your Editor's 133-MHz Pentium. For non-simulation use, speed is not an issue since conversion typically would be performed only once. But more is planned: a Furst data option for Type-19 U.M. simulation data (i.e., data conversion on the fly).

INDUCTION MOTOR DATA is the special request word to access Gabor Furst's data generator as a separate supporting program. Operation is to be illustrated by the second subcase of DC-15. Just as with most supporting programs, data for Gabor Furst's can be stacked until terminated by a blank card. So, the second subcase begins with just a single degenerate data set on February 4th., but will be expanded with more examples as they are received. Output is printed just as by Mr. Furst's separate program, and this is fine for the human mind. But punched cards of U.M. data are of more practical interest for most. Just as for other supporting programs, $PUNCH will flush these.

Ivano Bonfanti on Arc Modeling

Arc modeling in ATP was subjected to a strong dose of reality on January 24th . This was when Ivano Bonfanti of CESI in Milano, Italy, contributed his insight in the form of a long explanation of the challenges. After citing Prof. Kizilcay's published reference (ETEP, Vol. 2, no. 1, January/February 1992), there is valuable explanation of problems modeling the internal workings of a breaker : *"Arc equation parameters: the question is, who is using this model? If it is the case of a circuit breaker developer, that is a manufacturer, he is interested in physical arc models, where the interaction circuit breaker-circuit impacts on the* ***internal*** *dynamic of the circuit breaker system, that is SF6 pressure, temperature and many many other parameters. In short, for those users a simple arc equation (Mayr-Cassie type) is of no practical interest because it offers no help in designing an actual breaker. In addition a manufacturer will* ***never*** *disclose this kind of information ... unless a very clearly defined cooperation with a special client forces him to do so; this is because a detailed description of that breaker involves disclosure of his specific know how (or, if you prefer, opening of all of his most secret drawers)."*

An alternative is the system viewpoint, where rather than study of the arc itself, it is the effect of the arc on a particular system that is of interest. Dr. Bonfanti continues: "T*he question is, what is the purpose of using an arc model for your simulation? Is it really necessary? Does it increase the overall accuracy of your simulation results*

considering the uncertainties associated with your system parameters? Time constants of an arc are normally in the range of 0.1 to 1 microsecond (technology and current dependent); is your system description accurate enough up to 10 MMz? I am not saying that an arc model is unnecessary, but simply to state that the simulation results are ***not*** *dependent only on having a 'good' arc equation but also, and probably even more, on a good description of your system over a large bandwidth."*

News about Work of Taku Noda

Noda frequency dependence is being used productively by Prof. Mustafa Kizilcay of FH Osnabrueck in Germany. Quoting from his E-mail dated February 10th: *"For the past two days, I have worked intensively with ARMAFIT to produce network equivalents. I could successfully create frequency-dependent models using old frequency response data from my Ph.D. thesis. Both rational functions in S and Z transform worked well in subsequent ATP simulation of a 110-kV network. I summarized my test results in an Email including data cases and sent them to Taku Noda. Compared to the approximation program REDU_RP of the university of Bochum, the models created by ARMAFIT are in general of higher order (13th order vs. 6th order). But, this is all right, because of missing user interaction during the fitting process of ARMAFIT . Some user intelligence / experience is also required for ARMAFIT. Because weighting of the error in desired frequency intervals is not available, the density of frequency points around resonance frequencies should be increased, in other intervals decreased manually. This was the clue of my success."* Five days later, Mr. Noda communicated a new archive of ARMAFIT-related files, and he mentioned that a joint paper describing the latest success might be written.

Personalized Christmas cards took another big step this past season when Taku Noda supplied one that looked like it might have been purchased in a card shop. But it was not. In E-mail dated February 17th, Dr. Noda explained: *"I found that figure on a web page (I remember the site was a MIT page). I saved it as a JPEG file, and inserted in an MS Word 95 document. Then, I wrote greeting words using a nice font called 'Matura MT Script'. ... I remember the nice font came with Word 95."*

Graduation is the biggest change affecting Dr. Noda and his Z-transform-based frequency dependence. From E-mail dated March 25th: *"I have received my Ph.D. degree at the commencement of Doshisha University on March 21st. .... I plan to move to the above address on March 29th. The apartment is very close to the Komae Lab. of CRIEPI: about 3 minutes walk."* So, both good news and uncertain news. CRIEPI is a DCG member, so is denied free access to ATP information along with others engaged in *EMTP commerce*. Should Dr. Noda become involved in EMTP-like development for CRIEPI, and should information of such a project not be shared freely with others, there clearly would be a conflict. But as long as Dr. Noda is not involved in EMTP-like development for CRIEPI, and he wants to use ATP for personal (non-CRIEPI) work at home, your Editor sees no problem with a free ATP license. Concerning E-mail, Dr. Noda continues to use his same private address **noda@ka2.so-net.or.jp** (the service is national).

TPBIG.EXE with Noda frequency dependence was sent to EEUG (Prof. Kizilcay) on March 21st Included was Noda frequency dependence from new object files.

Publishing Programs and Viewers

Acrobat Reader is the name of a freeware document viewer that can be obtained from Adobe Systems. In the preceding issue, a report on use of the new Corel WP Suite 7 was promised. But none can be provided. BPA's Dr. Tsu-huei Liu can find no mention of PDF creation in user documentation, and this was reported in public E-mail dated April 24th. Later that same day, Robert Meredith of the New York City area provided a surprising response: *"The process of making a PDF document involves little more than selecting the particular 'PDF printer driver' that creates the PDF format for the document. I have created PDF documents from Word 6 using this approach. I believe the PDF driver still resides on my work machine. The 'PDF printer driver' comes with the installation of various pieces of software from Adobe. Unfortunately, here at home I cannot recall the name of the program from which I obtained the PDF driver sometime last year. One can think of the driver as being very similar to a Postscript driver, but producing a format more tuned to the input needs of Acrobat. I do recall having to change my Postscript fonts to True Type to get Acrobat to work and thinking that such a requirement was truly strange for a piece of software from the creators of Postscript."* The following day, Dr. Glenn Wrate of Michigan Tech in Houghton explained: *"PDF is a superset of PostScript. It adds linking and file protection capabilities. The full version of Adobe Acrobat can convert word processing and CAD documents into PDF and add links and protections (academic price $49). The free version can only read PDF files. The most straightforward method to create PDFs within a word processor is as Bob describes - simply select the PDF 'printer' driver in the application. A PDF 'printer' driver comes with Adobe packages such as PageMaker, but I don't know where or if it's available otherwise. More information can be found at :* ***http: / / www.adobe.com / prodindex / acrobat / details.html****"*

More about Corel WP came from Prof. G. Corwin Alexander of Oregon State University in Corvallis. E-mail dated February 5th reported: *"I just finished reading the October Can/Am Newsletter. The comment about a very inexpensive source of Word (IM)Perfect 7.0 deserves some comment. First, the suite includes QuatroPro (which I like), a program to convert formats between IBM PCs and*

Macintosh machines (actually, the version available only allows viewing files, not conversion), Word Perfect 7.0 (either a Windows 3.11 or Windows 95 version) and some other goodies. Second, there are no manuals, only the meager on-line help of the programs. And, it is only available to a bona fide 'academic'. It's $39.00 at the OSU bookstore. I called Corel and found that a complete set of manuals for the suite is $79.00 (plus shipping and handling). A manual for Word Perfect or Quatro Pro is $29.00 (plus)." Two days later, Prof. Alexander added: *"The same package is available containing Word Perfect 6.1 and QuattroPro 6.0 for Windows 3.1. Shipping is $5.00 at the moment. The 6.1 suite contains Corel Presentations 3.0, Business Graphics and Netscape Navigator (for those who might not yet have it)."*

Novell Envoy is a competitor of Adobe Acrobat and PDF, as should be detailed next time. No room now.

Fargo News Not To Be Republished !

Warning! Those who subscribe to Prof. Bruce Mork's Fargo list server **atp-emtp@listserv.nodak.edu** have no general right of republication or disclosure. Material received from the Fargo list server is **not** in the public domain, and generally must not be disclosed to persons who are not ATP-licensed. Continued next time.

1 - Mbyte E - mail Limit at BPA

A 1-Mbyte size limitation on outgoing E-mail seems to be in effect at BPA , as noted in the two preceding issues.

William Veerkamp of Dow U.S.A. in Freeport, Texas, has provided the most memorable evaluation of the inconvenience of file segmentation. Quoting from E-mail dated January 5th : *"I have successfully reconstituted and extracted GIVE1. I suppose it's kind of like making a gallon of orange juice from concentrate--it works, but takes two cans and doesn't taste quite as good as the fresh stuff."*

January 3rd, Gerald Lee received the following E-mail from Jody C. Key of Route CIOS: *"We are in the process of testing a new SMTP gateway. However, until the new service is in production, we continue to request that users call when they would like to send out email >1MB so the gateway restriction can be removed after 5pm. When the new gateway is moved into production (i.e. the bugs are worked out) and if it appears it can handle large files in a timely manner, we will remove the restriction and inform you."* Yeah, right : *request* as in *demand* (i.e., your attempted shipment will be refused unless you comply)! Maybe CIOS writers study at the Internal Revenue Service? For those unfamiliar with incredibly - complicated U. S. income tax laws, the annual payment is supposedly voluntary. It **is** in the sense that one volunteers to spend time in prison if he does not comply with IRS rules !

Automatic, erroneous UUDECODE-ing seems to be the most serious problem with use of Japanese UUEX and UUDX (see preceding issue). The problem is simple: mail handling programs try to be helpful, and eliminate manual work for their users. So, when a UUENCODE-d message is received, and when this has a name ending in .ZIP, the program might automatically create the .ZIP file even though this is completely wrong. Take the case of DBOS, which is sent as DBOS.UU1 and DBOS.UU2 (the two halves produced by UUEX). The file DBOS.UU1 is only half of the total, so the conversion of it, by itself, to a .ZIP file is completely wrong. The best remedy is some sort of avoidance, probably. Prof. Prikler wrote the following to Prof. Kizilcay on February 7th: *"Yes, once I really had some problem with multipart uuencoded messages, but that now is history. I have found a perfect solution. It is called Wincode (ver 2.6.6). Do you know this windows program? If not here is some info: .... Wincode is a Windows 3.1x program .... which converts 8-bit BINARY (EXE, COM, GIF, etc) files to 7-bit ASCII (Text) files (and vice versa) through a process known as bit-shifting. Wincode currently supports UU/XX/Base64 (MIME 1.0 conformant) en/de-coding and BINHEX decoding (encode support will follow). ... our HomePage! at: http://snappy.globalone.net/ .... As you know Pegasus Mail is a really good mailer, but even with the latest version (2.52 January 1997) I have problems with the multipart attachments. But what is missing from WinPmail is included in Wincode. .... Thus far, Wincode has never failed with any encoded messages. Can you imagine how many variations of email attachments exists? MS Mail, MS Exchange and Netscape Mail are all using their own standards."*

But Prof. Kizilcay could not make this work with his AOL service, so he devised his own scheme. He reported as follows on February 7th: *"Thank you for TPBIG.EXE, which consisted of two parts. .... The first part was automatically downloaded as a ZIP file because the associated name was TPBIG.ZIP. Of course, it is only half of the real file. The second part was not recognized by AOL as a ZIP file, because its name extension was .TXT. So, it was downloaded normally, without conversion. At this point, I had the 1st part as an incomplete ZIP file and 2nd part as a text file (uuencoded). What would you do? I uuencoded the 1st part to gain the real uuencoded file and after editing beginning and ending lines of both uuencoded files, I could extract the TPEEUG.ZIP file."*

End of segmentation: April 4th, Dr. Liu was told by telephone (she had called the BPA computer establishment for help with an E-mail problem) that the 1-Mbyte limit on outgoing mail had been lifted. Also, she learned that the switch from UUENCODE to MIME was permanent. But this complicated our segmentation (preceding paragraph), so she asked what was recommended. Only then was she told that segmentation no longer was necessary.

Miscellaneous Intel PC Information

"IBM cuts off OS/2 for PowerPC" was the headline of a story that was mentioned a year ago. Now, it is the turn of Windows NT. PowerPC was being abandoned by both Microsoft and IBM. *"Microsoft drives nail in PowerPC coffin"* was the headline on page C1 of *The Oregonian* dated February 8th. The AP story said MS *"would stop making its Windows NT operating system for computers based on the PowerPC chip ... Last month IBM said it would stop making its PowerPC-Windows NT machines because of their small sales volume."*

Tupperware, the maker of plastic kitchen utensils that are sold at neighborhood parties, might have provided the model for PC sales by Hand Technologies of Austin, Texas. This according to a story on page 76 of the January issue of *Computer Shopper.* Of interest is the radical new way to sell computers. First, like Tupperware, the computer is demonstrated *"in your living room, at a local meeting place, ... If you decide to buy, the consultant places the order with Hand over the Internet, and the system is shipped directly to you. After you have opened the boxes, the consultant will revisit your home, make sure the system is up and running with no problems, and walk you through its features."* Yes, the PC salesman probably has more to do after the sale than the Tupperware salesman! Also, what if he is not really an expert with computers? As author Dan Costa observes, *"the potential for disaster is huge."* Some similarity to life insurance salesmen comes to mind, although in this case the problem is more a conflict of interest (the salesmen tend to push products with high commissions) than a lack of competence or knowledge. Who knows, Hand's idea might work.

Miscellaneous Small Items

Free printed copies of the 20-page July and October newsletters were mailed to subscribers of the USA and Canada on January 28th --- 8 days later than planned (see preceding issue). A total of 73 American and 7 Canadian addresses were involved in this final mailing as documented by disk file NEWSLETT.LIS

The Skyport Building immediately south of Portland's airport is the new home of ATP developers. At noon on Thursday, April 10th, all belonging of offices in the headquarters building were to be sealed in boxes. For snail mail, "Route TOP" should be expanded to "Route TOP/ SKY1" in order to avoid confusion. Otherwise, just remember "Portland, Oregon 97208-3621" (the final 4 digits of the 9-digit postal code are the 50-year-old number of BPA's post office box). E-mail addresses and voice telephone numbers should remain unchanged, but the old FAX number no longer will correspond to a nearby machine. However, developers do not encourage anyone to use FAX, anyway (instead, E-mail should be used). The final phone that should be avoided is 4402 (like the old FAX machine, this now is 6 miles away). For those needing a street address, the new 2-story building uses 7227 N.E. 55-th Avenue. This is 1 block south of east-west Cornfoot Road. Why did management rent a building next to the airport? Because no closer space for 100 or so employees could be leased economically for a short period (12 months or less). The occupancy rate for Portland office space is very high right now (Portland's economy has been good). This is a bad time for management to be playing games with location (the artificial separation as BPA is being broken up in order to fool regulators and customers).

Real-time relay evaluation seems to be yet another involvement of Prof. Bruce Mork and colleagues at Michigan Tech in Houghton. In E-mail dated January 9th, he informed BPA as follows: *"We have gotten funds to purchase a complete 3-phase relay test setup, allowing playback of EMTP and fault recorder waveforms. The equipment should be in place by March 1st. It will be used both for teaching and for utility research projects. Our first project will be to test a 345-kV line relay where ..."* Recall BPA's facility was mentioned in the July, 1991, issue.

Apple cafes are the latest attempt by the company to profit from its name recognition, which recently has been more successful financially than its computers. Page 66 of the February issue of *Computer Shopper* shows an artist's conception, below which the following explanation is noted : *"... the first (is) due to open in Los Angeles late this year. From every table, customers will be able to browse the Web, sample new CD-ROMs, and video-conference with customers at nearby tables and other cafes worldwide. Of course, there'll be food too"*

About God and blackouts (see the October, 1996, issue), your Editor is not the only one to whom BPA's excuse sounded insincere. Without naming names, BPA's own newsletter, *Between the Lines*, carried the following news summary from the north Oregon coast. From page 3 of the March issue: *"Blame it on fast-growing trees. ... 'There are many who believe that the western outages last summer had nothing whatsoever to do with grid operation and everything to do with trees that grew too fast.' (M. Kay Maxness, Central Lincoln Public Utility District, Newport, Oregon. Taken from Electrical World magazine, Feb. 1997)"* In other words, many actually believed BPA's official excuse. Amazing.

A change of fonts to produce this newsletter should be noted. MS Word for Windows continues to be used, but on a different computer (your Editor's Pentium). With the end of paper, there no longer was any good reason to continue using Dr. Liu's Pentium at BPA, which enjoyed a network connection to a quality laser printer. It also enjoyed special fonts for that printer, apparently. Your Editor's PC, supplied by Szymanski Consulting, has no external connection, so should use standard MS Word fonts. As usual, exactly 20 perfect-looking pages are involved.