
Can / Am EMTP News

Voice of the Canadian/American EMTP User Group

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Salford Compiler & DOS Extender

Version 2.60 of Salford FORTRAN was first used to support ATP by Harald Wehrend of the University of Hannover in Germany as reported in FAX dated November 7th. Because there is no report of trouble, one must conclude that no serious problems were experienced.

There was obvious disappointment about the lack of expected support for H-P LaserJet series II (see preceding issue), however. Mr. Wehrend is again thinking about adapting his own code for such support, which has been available in PCPLOT for a long time. Subsequent telephone conversation with Dr. Mustafa Kizilcay toward the end of November clarified that this should be possible now that interrupts are understood or can be used (previously, when a separate MS-DOS program was run from a Salford program, the memory or history of the screen had been lost). Users should be aware of one obvious, serious limitation, however: resolution can not exceed that of the screen.

Bruce Mork of North Dakota State University in Fargo is another individual who has suggested that we not wait any longer for Salford to support graphics directly on H-P LaserJet series II. Now preparing his doctoral dissertation, Mr. Mork has described how he directly produces his own graphics on a LaserJet series II without the help of a higher-level interface such as Salford would supply. Simply drawing a straight line from (X₁, Y₁) to (X₂, Y₂) is simple, he reports. Text certainly is more complicated, so this might well be missing from any first, stop-gap solution. Yet Mr. Mork has ideas about doing text, too.

DBOS / 486 license number 902 of the Can / Am EMTP User group is the replacement for the older number 582 of LEC. The plan is to switch during the Florida EMTP short course (see separate story) to which the new Salford DBOS / 486 disk is to be mailed by Salford distributor OTG Systems of Clifford, Pennsylvania. The

\$495 cost (plus \$75 for the annual update fee) was paid for by a check that was dated March 3rd. The added expense is a small but unavoidable complicating consequence of emancipation from LEC (see separate story). The need should be obvious: if the Can / Am user group no longer is affiliated with LEC, it can not very well act as LEC's agent in the distribution of DBOS ! To conclude, the distribution of DBOS under license number 582 will have ended by March 15th. Thereafter, users will see "CAN / AM EMTP USER GROUP" rather than "LEUVEN EMTP CENTER" on their computer monitors as DBOS execution begins.

Some Japanese MS-DOS computers sold in Japan are incompatible with Salford EMTP. Naoto Nagaoka of Doshisha University in Kyoto revealed this troublesome challenge to Salford EMTP use in a telephone conversation with the Can/Am Co-Chairmen on November 26th. The domestic version of a 386-based computer from NEC is incompatible whereas a comparable offering from Toshiba has no such trouble. Within Japan, it seems that Intel-based microcomputers do not all follow the IBM standard as such computers seem to throughout the rest of the world. Mr. Nagaoka referred to incompatibilities of not only Salford windows and graphics, but also the interrupt system (the most elementary program operation in text mode has problems). In a telephone conversation during the morning of December 2nd, David Vallance of Salford acknowledged that the problem was both known and fundamental, and he explained that Olga Vapenikova of the FTN77 team had been assigned to study whether any workable remedy might exist. Unfortunately, those in Portland were left with the impression that it would not be wise for anyone to hold his breath while waiting. Assuming the incompatibility is fundamental, relief seems unlikely. FTN77 can not be all things to all people. A fraction of the Intel market in Japan is unlikely to be viewed as a good investment by limited staff in England who also hope to continue pleasing the rest of the world.

DESQview use with DBOS Rev. 2.60 seems to have trouble for computers with little RAM. This report came during a telephone conversation with Mustafa Kizilcay of Frankfurt, Germany, on November 24th following experimentation with his home computer.

The dynamic dimensioning of COMMON blocks by a FORTRAN 90 compiler is a hope that was briefly mentioned in the preceding issue (see page 5, column 2, paragraph 3). The encouraging news now is that this is not an obvious incompatibility known to David Vallance during the telephone conversation of December 2nd. Upon hearing of the disappointment with Lahey, Laurent Dubé checked his ANSI standard on the subject and reported that COMMON is not mentioned in the requirement of dynamic dimensioning. To conclude, all hope is not yet lost.

1024 by 768-pixel screen graphics should be supported by Salford provided one does not pay too much! Bruce Mork in Fargo, North Dakota, stresses the importance of a cheap output card (e.g., from Tseng Labs) that should be Salford-compatible. Yet, the color WHEEL of Salford TPPLOT was *wrapped around* when Mr. Mork tested this.

The use of extra calls to RESTORE_GRAPHICS_BANK@ as suggested in Salford disk file SUPERVGA.DOC did not seem to correct the problem (such a special protected version was mailed to Fargo on January 6th).

Scratch files could be converted from disk to RAM using USE_VIRTUAL_SCRATCH_FILES@ (Section 16.2.9 of the compiler Reference Manual) were it not for an apparent bug in operation using Rev. 2.51. The idea is great. It provides yet another use of extra RAM (very few users have less than 2 Mbytes, and 8 Mbytes or more is not uncommon today). During testing, there was a clear gain of both speed and smoothness (less disk activity). Unfortunately, operation was not perfect for either EMTP (e.g., execution died on a bad input data card of the 5th of 6 data subcases of DC-59) or the translator that produces Salford EMTP FORTRAN (some of the COBXXX COMMON blocks had two extraneous bytes on the right). So, the planned switch to RAM storage has been delayed until a newer version of the compiler can be tried.

The VDISK feature of DOS can be corrupted if transfers are too large. Upon hearing of the Salford trouble with virtual scratch files (preceding paragraph), Bruce Mork in Fargo provided this interesting related information by telephone on February 12th. Is it possible that the Salford compiler somehow connects to the same imperfect MS-DOS feature?

The PATH command of DOS soon should be used to locate input data files the names of which are not preceded by disk or directory information (as indicated by either a colon or a backslash). The idea was proposed by

computer expert David Szymanski perhaps a year or two ago for use with Unix. At the time, Mr. Szymanski said he could do the same thing using MS-DOS if he still were involved with such programming. At the time, your Editor did not see how, but realization occurred suddenly on January 6th while advising Co-Chairman Liu about the "C data:" card image that begins the data listing. In the process, it was convenient to change that first card image (see the separate story about LMFS). Look in the next issue for more details (implementation has been temporarily stalled by other preoccupations).

Chinese language would seem to be compatible with Salford EMTP and TPPLOT according to two pages of FAX dated January 14th from Chun-Heng Chiang of Taiwan Power Company. Recall that the original, pioneering research concerning the use of Oriental language was done with the Lahey compiler using plain MS-DOS, so this extends those important ideas and procedures to the 80386 and its environment of extended memory that is used by the Salford compiler. Yet, graphics would provide added complexity (the previous consideration considered only text), it would seem.

FORTRAN 90 is an exciting story title from the front page of the newsletter from OTG Systems dated Winter 92. What it means for the future of those who use the Salford FTN77 / X86 FORTRAN compiler is far from clear, however. The new product FTN90 is not really from Salford at all, but rather from NAG (the Numerical Algorithms Group, Ltd.). Published questions and answers include this critical exchange: Question: *"I read an article in a 1991 edition of Fortran Journal which said that NAG's F90 'compiler' is really a preprocessor that converts Fortran 90 source code into C source code which can be compiled and executed. Is this how FTN90 works?"* OTG's answer would seem to confirm this: *"FTN90 takes the NAG F90 'front end' and couples it with the compiler 'back end' used for the Salford C Compiler."* Maybe if your Editor is lucky, he will be able to retire first (this does not sound very appealing at first thought).

The /DEBUG switch of the Salford compiler, which turns on the interactive debugger, first was applied to all 10 or 12 major chunks of EMTP FORTRAN on March 7th. Results were pleasing. The size of the resulting executable program did not increase by that much (from about 2.0 Mbytes to 2.5 Mbytes), and execution seems to be correct.

Improvements to Salford TPPLOT

Pop-down menus are another major structural change to TPPLOT as control increasingly is made available through a Microsoft-compatible mouse. This represents an extension and modification to the single pop-down menu that was described three months ago (see page 2, column

1, paragraph 3). The yellow MENU button on the left of the heading line remains. To the right of it have been added four new names: PL4, OUTPUT, CONTROL, and EXECUTE. All five buttons differ from the original design in that no clicking on them is either required or honored. Rather, the associated menu will pop down (become visible) automatically if the cursor is on one of the buttons. The menu will stay down as long as the cursor remains within the menu or its controlling button. This follows the design that was offered earlier in the year by Harald Wehrend of the University of Hannover (Germany) in his special demonstration program named PUDOTEXT.

The 4 new menus are properly called **submenus** because together they provide the same choices as the original. Whereas the first menu, MENU, has no information other than the names of all commands, the four following menus devote one 80-column line to each command. For example, the 14th row of the OUTPUT menu reads as follows: "BITMAP to manage color bitmaps (.PCX files) of vector screen plots;" The four new submenus were added for beginners who have trouble remembering the meanings of commands. The experienced user may prefer to avoid them, and this is easily done. The 4 submenus can be disabled either interactively (by clicking on the separator line of the 1st menu) or as part of SET DATA initialization.

In-line comments now are permitted in disk files of plot commands. The best-known example of such usage is @TPPLOT.BEG which always is the first command executed by the program. In-line comments first appeared in TPPLOT.BEG of TPPLOT.ZIP on December 5th. An in-line comment was added to LAB2 at the same time to demonstrate that nesting should not pose any complication.

The LABEL command has been modified for batch-mode (@-file) or non-mouse (MOUSET = 0) usage, the reader is warned. There now is one more item ---labeling for any X-Y PLOT --- that precedes the multi-line case title. The reader is referred to any new copy of LAB2 for an illustration. Normally, such late changes to data conventions are frowned upon. But in this case, there was a good reason: compatibility with the mouse-supported version of the command. In the long run, it was believed to be less confusing to have exactly the same data handled by both versions. Also, continuity of usage by the mouse user was improved by removal of the associated special prompt for horizontal-axis labeling. Or so it seemed to the Editor.

RELAY.LIS is the special, simplified, output file of the RELAY command. Provided all voltages precede the first current (true for real .PL4 files, note), such a file can be plotted using TPPLOT that is no older than December 8th. The new disk file type is recognized

automatically, so the interested reader is required to learn **no** new rules. But who cares whether TPPLOT supports yet another (the 4th) input file type? The new compatibility provides an easier way for TPPLOT to be used for the plotting of non-EMTP signals. A file such as RELAY.LIS is much easier to construct because the 3 lines of header are easily added by hand to any file of columns of numbers. Just be careful not to change any column positions or case of the opening line of six-byte column headings. These always begin with "Second" for the first column. All later columns use either "V-node", "V-bran", or "I-bran" (be careful of case). The column width can be between 6 and 17 bytes, although it must be the same for all columns including the first (time). The new disk file RELAY32.PL4 has been added to the distribution TPPLOT.ZIP to illustrate such usage. It also serves to illustrate wider (in this case, 13-column) output of the RELAY command, which was applied to 8 variables of DC32.PL4 over the truncated time interval (0, .017) following the execution of DC-49.

The 3 heading lines of RELAY.LIS can even be omitted; the result is still plottable! Of course, a few missing details must be assumed by the program. TPPLOT assumes that all variables are node voltages, and that names are NAME-1, NAME-2, etc.

Colored background for text within a Salford window now is being used in order to enhance the readability of key words, buttons, mouse position, etc. The control of background color often is under user control by simple generalization of the former rules. Previously, users were told to restrict their color numbers to the range of 1 through 15. Recall that 16 was to be avoided because it was black, which was invisible on a black background. For an illustration, use CURVE; WHEEL to produce the color wheel). In graphic mode, the restriction on color numbers remains. But in text mode, for use in Salford windows, there now is added flexibility. First, with the addition of a colored background, black no longer need be avoided. Second and more importantly, the colored backgrounds are obtained by adding multiples of 16 to the controlling color numbers. This is illustrated by the first such usage, which was for variable KOLHLP --- the color of highlighting of the command of interest on the left of the special, scrollable HELP window. Prior to December 21st, this color number was 13 for bright purple. Adding 96 for a light-brown background to 15 for bright-white lettering, the default value today is 111. The user is able to tailor such usage to his own proclivities: integer index 198 will access KOLHLP from within disk file TPPARAM.DAT of SET DATA usage. Other offsets that produce different background colors are: 16 for blue, 32 for green, 48 for aqua, 64 for red, 80 for purple, 96 for light brown, and 112 for white.

Flashing text on a colored background within a Salford window is obtained using even higher numbers for the

offsets. Use 128 for flashing text on a black background, 144 for blue, 160 for light green, etc. (this follows the same order as the original color numbers). Possible error messages of the CURVE window use this technique in order to command the user's attention.

Dynamic highlighting of the 11-byte plot command that is pointed to by the mouse cursor within any of the five pop-down menus now is done conspicuously using bright white (color 15) on a light-brown background. This is another usage of the technique just described for the HELP window.

HPGL1.LIS dated 19 May 1990 has been part of TPPLLOT.ZIP for many months. However, early in December the Editor was shocked to discover that for some reason it could not be imported into WordPerfect as a graph. This was using Alt-F9, 4 for User Box, and 1 for create. Can any reader explain why the result was just a listing of the lines of text rather than a picture? To provide the missing illustration, a second HPGL file has been added: HPGL2.LIS as created by @CACHE on December 4th. This second file can be taken into WordPerfect as a graph without difficulty. Yet, what is the critical difference?

A color monitor is increasingly recommended as different colors are used in different ways for the pop-down menus and special editing windows (thus far only for LABEL and CURVE commands). Yet another use of color is for the commands themselves, as recorded (saved) in the scrollable dialogue window. Computer expert David Szymanski had suggested this months ago (page 2, column 2, paragraph one of the preceding issue). The development has worked out well. Color allows easy mental separation of the command itself from the surrounding context (the preceding prompt and the possible following in-line comment). For heavily-commented batch-mode usage (e.g., @CACHE to illustrate superposition), the result now is much more readable in the dialogue window. Yet, it must be remembered that color information is not retained in the disk file (JUNKTPP has none).

The FOURIER command of SPY PLOT now is available in TPPLLOT to provide harmonic analysis of periodic signals. The extension first was available early in November, 1991. Recall that since late July, "SPY @0" has provided an easy illustration of the bar chart of SPY . Because most details of the TPPLLOT implementation are provided by HELP , they will not be repeated here. However, it is worth emphasizing some advantages. Full mouse support in TPPLLOT is one, and scrollable graphics (the use of **Page Up** and **Page Down** on the associated bar charts of harmonic amplitudes) is another. Although it is not yet possible to use POST or HPGL to produce hard copy of the bar chars, EPSON (the former PEN command) can be used for dot-matrix

printers. For publishing software such as WordPerfect, at least one connection is possible: the COPY subcommand of BITMAP will create the associated .PCX disk file. More probably will be provided later, assuming there is sufficient demand to justify additional work on the feature.

The POST command produces PostScript output that might require modification by the addition of an exclamation point immediately after the first byte, which is a percent sign (indicating a comment). The need for this change has been recognized for the PostScript display utility of a DECstation window for many months. The need for other printers was learned from Prof. Ali Abur of Texas A&M University in College Station during a telephone conversation on February 4th. It seems that Prof. Abur was forced to make such changes manually prior to printing his disk files on a departmental DEC laser printer. Remember, users: PostScript output of TPPLLOT begins with constant records that can be found in disk files HEADER*.DAT. It is trivial for the user to edit these and add the missing exclamation points. Since the leading record of each header file is a comment (%), anyway, it does not hurt for everyone to have the extra exclamation point. This change was made February 5th.

Integer overflow in SUBROUTINE TEKPLT was corrected on January 3rd following a complaint from Laurent Dubé, who in turn had been researching a report by Bob Wilson about some other problem. In fact, MODELS was not responsible for the trouble Mr. Dubé observed, which was a plotting bug. It was found that, for very large or very small numbers (Mr. Wilson's were in the range of 1.E-10 to 1.E-20), the Y-axis scaling factor could not be calculated using 10** (integer arithmetic). But 10.0** works just fine! The improved code has been verified using the standard new, default saturation limit of FLTINF = 1.E19 .

Occasional extraneous streaking that began at the end of a curve was finally understood and corrected on January 12th. The symptoms were one extra, erroneous segment at the end of a curve, typically joining the end with the beginning. Usually this would be seen only when all points were plotted (SMOOTH, 0). It was found that, in fact, one too many point was being considered. The correction was trivial.

The HP-GL logic for X-Y PLOT usage has been generalized following criticism by relay modeler Bob Wilson at the University of Idaho in Moscow. For circle diagrams of impedance relaying (see one of Mr. Wilson's papers for the IEEE PES Summer Meeting in Seattle), it was important to have axes that pass through the origin, and also to have equal scaling for both directions. This now is possible ... or nearly so, anyway. As TPPARAM.HLP now explains, 8/11 is within about one percent of the desired 7200/10000.

LEC and Other EMTP User Groups

LEC (the Leuven EMTP Center of the university in Leuven, Belgium) no longer is the licensing agent for ATP as distributed by the Can/Am user group. As announced in the preceding issue, our North American user group now is proceeding with ATP development under its own authority in collaboration with BPA and other cooperating individuals and organizations.

The Can/Am user group will be sharing all of its ATP materials with other compatible and cooperating user groups. It also will recognize the licensing of such partners provided they reciprocate. Contacted thus far about this idea have been the user groups for Latin America, Europe, Taiwan, Japan, and Korea. It should be obvious that time will be required to learn the extent of such possible sharing. For example, Guido Empereur of LEC supported the idea in general terms while reminding your Editor that formal approval by the general membership would not be possible before next fall (the annual meeting typically is held during mid-October). Both parties would seem to have agreed to share informally in the interim. There is believed to be no problem at all with Latin America or Taiwan, although written agreements have yet to be exchanged (most communication on the subject has been by voice telephone). Sharing with all ATP users in Japan poses a unique problem because of CRIEPI's connection with DCG (this might take some time to resolve). Fortunately, there would seem to be no such trouble with the Korean EMTP Committee (KEC) if one can believe FAX dated February 12th. Tae Won Kwon of KEPCO (Korea Electric Power Corporation) writes that KEC wants "to work in close cooperation with uncommercial EMTP Groups ..." To conclude, the politics of global sharing are proceeding slowly.

LICENSE.ZIP is the disk file on the GIVE2 disk of Salford EMTP distribution that contains the new user group licensing. A new form letter dated January 30th replaces the old one dated 2 December 1987. The size is unchanged (4 pages of letter precede 2 pages of detachable licensing), but content is quite different. Whereas 4 years ago details of the MS-DOS version dominated, today such information has been reduced to a single paragraph. Today, considerations related to Salford EMTP dominate, and WordPerfect has been used. As this story is being keyed on January 31st, the user group is preparing to send copies to other user groups for their consideration (as mentioned in the preceding paragraph). It also is ready to use the form for the first time in response to continual inquiries. No longer is licensing restricted geographically. For North American use, there will be three sheets of paper as in the past -- easily mailed for one 29-cent stamp (the 1 ounce limit). But for international use, photo-reduction will reduce this to only 2 sheets in order to meet

the 1/2-ounce limit for a single 50-cent stamp. Low-density (360-Kbyte) disks no longer are supported, and 3.5-inch disks (1.44 Mbytes) have been added. Only an old MS-DOS version is available, and this may never be updated. Etc., etc.

Approval of the EMTP writing of others is not one of the services that developers in Portland owe to LEC or anyone. This was clarified in FAX to LEC dated January 15th (remainder of this paragraph): "As a general policy, neither Tsu-huei, nor I, nor any other person in Portland plans to review LEC or any other writing for purposes of giving approval prior to publication. Your immediate interest was for publication in LEC's own journal, *EMTP News*, but the principle applies to any publication. We told you this verbally, and I repeat it here in writing to be sure that we have a record of the policy. One of the reasons we plan to resurrect *EMTP Memoranda* at BPA is to remove such complications of remote approval. We at BPA will do our own EMTP development, and we will publish accounts of it ourselves rather than in *EMTP News*. You in Leuven will do your own EMTP work, and you will publish your own accounts of it wherever and whenever you want. We are responsible for what we write and publish, and you are responsible for what you write and publish. We do not require your approval, and you do not require ours. We are willing to exchange published writings about EMTP with you (writing about EMTP is just another form of EMTP materials), but this will be after publication, not before."

EMTP Memoranda ended during the spring of 1984 with the onset of attempted commercial development of EMTP by DCG / EPRI. Well, memos once again are to be published and mailed by BPA. As in years past, the primary (original) distribution list will be small, and will consist only of foreign user groups and cooperating individual developers. The use of WordPerfect, and eventual (after accumulation) availability on floppy disks is another change. The first memo of the resurrected series will be dated February 11, 1992.

The relationship between *Can/Am EMTP News* and *EMTP Memoranda* is worthy of clarification. Size is a primary distinction. A convenient limit for the newsletter is 8 pages (4 sheets printed on both sides) because these are easily folded and mailed within the one-ounce limit of a single stamp. If paper is not heavier than usual, 10 pages can be handled (the present issue). Current thought is that the 10-page limit never will be exceeded. Overflow with minimal political overtones (meaning the DCG EPRI politicians are less likely to complain to BPA management about it) should be published in detail in *EMTP Memoranda*. Operationally, the procedure is to be as follows. As ideas occur to the Editor, they are inserted in the newsletter in outline or summary form. Later, as an

idea is refined or expanded, it might become too big for the newsletter, so would be moved to *EMTP Memoranda*. The newsletter will always contain a summary of any such moved story, however. As the publication deadline for the newsletter nears, there should always be final trimming to shorten the newsletter. LEC's journal *EMTP News* no longer is to be used much if at all for development information by either BPA or the Can/Am user group.

The UTPF finally was sent to LEC on January 14th, by Federal Express, along with available installation-dependent files for Salford, VAX/VMS, and Sun. This was documented in 3 pages of FAX on the same date.

Secondary Printing of EMTP News

EMTP News, the quarterly journal of LEC, should continue to be available to the Can/Am user group as in years past, so could continue to be reprinted and distributed to members as it was during the past 2 years (1990 and 1991). This assumes continued sharing of ATP materials with LEC as was discussed in the preceding story. The idea of such secondary printing and mailing was simple enough, and the cost was low enough (\$15/year was charged), to make this a valuable service for the serious EMTP user. The idea was great, and it remains unchanged.

But the procrastination of your Editor created a real problem. Although the March and June, 1991, issues were mailed rapidly enough, the September and December issues were delayed until earlier today --- the 18th of February, 1992. This is not acceptable, and will not be allowed to continue. Your Editor simply is preoccupied with many other ATP-related activities that are believed to be more important, and these have been given priority over subscribers to *EMTP News*, unfortunately. It is not likely that these priorities will change with time, either. In your Editor's opinion, it is not in the best interest of overall ATP development that his own time continue to be diverted from other more highly-skilled work to the photocopying, mailing, and associated bookkeeping that are required by our support of *EMTP News*. Clearly, any interested, careful person having normal intelligence could handle the job. Is anyone else interested?

Your Editor believes that the same logic should apply to Co-Chairman Liu, although it does not. She does not believe that the burden of continuing user group support for *EMTP News* is as great as your Editor claims. While not wanting to discourage any qualified reader from filling the gap, she herself has volunteered to take over the service for 1992. So, interested readers of *EMTP News*, do not look a gift horse in the mouth! The price remains unchanged: for the 4 issues of 1992, a \$15 check payable to Tsu-huei Liu is all that is required. Should LEC cut off our supply prior to mailing of the final issue, \$3.75 will be refunded to each subscriber for each missing issue.

Low Intel 486-based Computer Prices

Prices of 80486-based computers have continued to drop in the Portland area, making such top-of-the-line systems the obvious choice for any EMTP user who can exploit the excess power. Gerald Lee of BPA continues to keep track of such matters for us all (any BPA employee can use these negotiated prices). The following came to him in FAX that was dated January 16th. Interested readers are referred to the same suburban computer store that Mr. Lee patronizes: Ms. Mae Wu; FEI America; 15844 Upper Boones Ferry Road; Lake Oswego, Oregon 97035; USA. The voice phone number is (503) 620-8640, and the FAX phone number is 620-8520.

First consider a high-speed 386-based system, since the 486 is treated as an upgrade of this. Look at the complete computer that \$1695 will buy locally: 33-MHz 80386 with 64 Kbytes of cache, 4 Mbytes of RAM, 1024 by 768 color monitor and output card, 120 Mbyte hard disk, both 1.2- and 1.44-Mbyte floppy disks, keyboard, MS-DOS 5.0, and mouse. Add \$165 for a ULSI 80387.

Correction! Do not pay \$165 extra for the 80387. Instead, pay \$325 extra and obtain an 80486! This will simulate at least twice as fast! For more RAM, pay \$41 or \$46 for one Mbyte of 70 or 60 nsec chips (the motherboard holds up to 32 Mbytes), respectively. A 2400-baud modem is \$50. Etc. (good prices!).

Multi - Phase Transformer Modeling

North Dakota State University in Fargo and Seattle University in the state of Washington finally are about to begin work on low-frequency (magnetic only), multi-phase, nonlinear transformer modeling under separate contracts with BPA. Each contract involves about six man-months of work as described in unsolicited proposals that were received by BPA last summer.

Delays between receipt of the two proposals and mailing of the final BPA contracts have been aggravating for all concerned. No unusual or unexpected obstacle would seem to be responsible. For example, it was not necessary for BPA to renegotiate anything with either school. Paper work of the bureaucracy on the Portland end simply has been slower than anyone believed possible last summer. It is unknown whether the unsolicited nature of the proposals caused more than the usual delay. It is true that these two were the first unsolicited proposals involving EMTP development. As with competitive bidding some 15 years earlier (for the present hysteresis modeling in EMTP, which finally was awarded to Prof. Mohan at the University of Minnesota), the experience has not been satisfying.

The two contracts already are so far behind the original schedule, and writing for this issue of the newsletter already is so far in excess of the 8-page limit, it has been

decided to delay the detailed description of the work on transformer modeling until the next issue.

A letter dated February 26th from Nancy Anderson, BPA's Contracting Officer's Representative, says that Intergovernmental Agreement No. DE-BI79-92BP26700 with NDSU *"is effective February 10, 1992. That is the date when all items were discussed, clarified, and agreed upon."*

Static Var Modeling by Gabor Furst

Gabor Furst of the Vancouver area of British Columbia first delivered his modeling of a static var compensator (SVC) during his visit to Portland on November 6th. The 3 related data cases were stacked together and distributed rapidly as a disk file named FURST.DAT to those who had expressed interest.

A MODELS equivalent of Mr. Furst's TACS modeling has been provided by BPA's Jerry Almos. At first, execution was incredibly slow --- due to the use of **pastval** according to MODELS author Laurent Dubé. A new function **delay** has sped the execution greatly (see separate story about MODELS).

Dr. Kurt Fehrle of the Philadelphia suburb of West Chester, Pennsylvania, was the first reviewer to provide a detailed evaluation of Mr. Furst's SVC modeling. This was in a telephone conversation with Mr. Furst and your Editor on November 27th. Many readers may not know that Dr. Fehrle is something of an expert on the subject, having applied EMTP to SVC for years --- first with G.E. at its hvdc headquarters in Philadelphia, and most recently for its successor, the French manufacturer Alsthom. In an undated letter that carried a December 24th postmark, Dr. Fehrle wrote: *"I have started work to make the model suitable for unbalanced cases by adding the Steinmetz Algorithm. I will also suggest some other modifications ... My modifications at this time will not address the problem of transient performance optimization ... My intention is to use the new SVC model for the short course at the University of Florida in March 1992."* Addendum of January 24th: A phone conversation with Dr. Fehrle indicates that work is ahead of this schedule in spite of computer troubles (free of charge, the dealer replaced Dr. Fehrle's original system unit with a new one -- including a full, new warranty!). We in Portland received a copy of Dr. Fehrle's work on a floppy disk that accompanied a letter dated Feb. 5th. Look for a new, 4th data subcase of BENCHMARK DC-22 immediately following that famous rail gun of Wendell Neugebauer.

AVC, which stands for Adaptive Var Compensator, is a related technology that is based on research at the University of Washington. A commercial product with this name (AVC) was unveiled at the Dallas T&D show last September by Trench Electric of the Toronto area of

Canada. There are many questions such as: Can AVC be modeled as easily as SVC using EMTP? Will EMTP data for AVC modeling be equally elusive? It is hoped that the appropriate power electronics specialists can provide some answers before too long. Both Prof. Ned Mohan and Dr. Kurt Fehrle have offered their assistance (look for more information from these sources later).

Prof. Martinez Supports Type-59 S.M.

Prof. Juan Martinez of the Polytechnic University of Catalunya in Barcelona, Spain, has agreed to handle Type-59 S.M. modeling of ATP as part of cooperative work with developers in Portland. To make this work more efficient, the Salford FORTRAN compiler and linker were ordered from the Salford distributor in Madrid for use on Prof. Martinez's existing 33-MHz home computer. The user group paid by a check dated December 13th. Next, Salford EMTP FORTRAN was sent by delivery service on January 14th, and the following day a FAX note was received from Cadscan, the Spanish distributor of Salford, indicating that our Air Mail letter finally had been received (the delay had been worrisome), and that the order was being filled.

Doug Selin of Arizona Public Service (APS) in Phoenix and Dr. Gary Thomann of Power Technologies in Schenectady both have stumbled across the same Type-59 data rejection that seemed to provide erroneous and/or unwanted protection in the form of a KILL = 176 error stop that lists several constraints on electrical parameters of the machine. The APS disk reached Portland first, and was handed to Prof. Juan Martinez last summer in San Diego, during the IEEE PES Summer Meeting. In a 4-page letter of response dated September 16th, Prof. Martinez explained that *"a new KILL code should have been introduced with the new procedure but I did not know how to do it"* Well, it won't be long now!

Regular telephone conversations with Prof. Martinez begin Tuesday mornings at 09:00 AM Pacific time, which is 18:00 in Barcelona (we call the professor at home). Sometimes a week is skipped, but usually there is plenty of information to be exchanged, so the weekly schedule works well. In addition to BPA, the party line sometimes is shared by other EMTP developers such as Laurent Dubé or Bob Wilson (both with MODELS interest), or Yin Yuexin in Florida (U.M. interest), or experienced program users such as Doug Selin or Dr. Gary Thomann (who had Type-59 S.M. troubles). The point is this story is simple: Although BPA travel and contracting procedures pose serious obstacles, telephoning is easy; and more than ever before, this medium is being used constructively to attack EMTP problems by direct contact with the experts. In the case of Spain, conventional mail simply is too slow, and FAX has been found to be neither easy nor reliable, for some reason. Yet, our voice

telephone connections have been good, and have been used effectively.

Software to connect two computers using modems and a conventional telephone line is being researched by Laurent Dubé. Among the more logical recipients of such a connection from BPA would be the computer of Prof. Martinez in Spain. More than just ordinary file transfer is wanted. Ideally, one would establish the connection using human voices. Then, following some human conversation, one would switch to the computer connection. Each party could use the computer of the other and communicate with the other using some sort of interactive mail facility. Finally, at some mutually agreed upon time, the mode of the connection would be switched back from computer to voice. It is not yet clear how much of this goal is easily attainable using just MS-DOS (computer expert David Szymanski could promise this and more using Unix), but Mr. Dubé is looking. During the 2nd week of February, Mr. Dubé recommended PCREMOT2 by *PC Magazine* for our use. For a detailed description, read pages 309-314 of the January 28, 1992, issue. No, this does not do all that had been hoped for, but it does do a lot, it costs nothing, and is incredibly small and simple. As with other products of the wide world of MS-DOS, it looks as though KISS might win once again. Mr. Dubé already has installed the software on both his and our BPA computer in anticipation of testing later this 3-day weekend of the Presidents' birthdays, February 15-17.

A switch of the electric network can be identified within MODELS by either the 6-character component name (the switch name, as illustrated by data of BENCHMARK DC-32) or the 6-character name of one of the two terminal nodes. This has always worked as long as no node name is used as a switch name. If the same six characters were used for both, results were unpredictable. On February 23rd, the possible confusion of such names was removed by the introduction of an unambiguous hierarchy. Now, all switch names are searched before the consideration of any terminal node names. Clarity continues to suggest that switch names be different from node names, but no longer is this necessary for unambiguous results.

TACS data now can identify a switch the same way MODELS data can (preceding paragraph). This was not true previously. While searching for the connection following an explanation of the alleged capability to Prof. Martinez, your Editor was shocked to find no use of switch names at all! Well, the missing logic was added quickly, of course. As an historical note, it is interesting to remember that the just-stated progress in identifying switches resulted from an complaint by Prof. Martinez that proved to be without merit. Ambiguity of identification when using terminal node names was the cause of the trouble. Remember, readers, if two or more switches connect to the same node, TACS or MODELS

will select the first switch that its finds. Node names are tricky this way. Component names are not (they should be unique, always). It was while advocating such usage to the TACS-using professor that your Editor could find no trace of the connection!

ATP Available to DCG and EPRI !

It is true: commercial EMTP developers such as DCG, EPRI, and their collaborators finally have been granted access to ATP! This follows adoption of a new, generous policy of reciprocity as proposed to the 1990 annual meeting of LEC (see the October, 1990, issue of the newsletter, page 2, column 1). Whereas LEC Chairman Daniel Van Dommelen had refused to consider the matter 15 months ago, a new opportunity was presented by the recent emancipation of the North American user group from European control. It is this new chance that has been seized in order to end the holiday season on a note of accomodation and harmony with other developers around the world --- including our commercial competitors.

On many occasions in the past, DCG, EPRI, and some of their hired guns have complained that ATP was unavailable to them. It was alleged that somehow this was unfair. Well, no longer! Regaining the moral high ground of fairness in all things (including the treatment of competitors), the Can/Am user group has decided to approve the disclosure of ATP to any commercial developer of an electromagnetic transients program on the same terms as work of that commercial developer is made available to the general community of ATP users. This is reciprocity. What could be more fair and appropriate for those who, in the past, have complained that they were being discriminated against unfairly? Obviously, nothing! If many commercial developers have priced their work at \$50K or more per year (the latest rumor from Schenectady is that EPRI's current price might be about double this figure), certainly they should not complain about being asked to pay an equal amount for ATP. After all, ATP is better in many ways (e.g., it certainly runs better on Intel-based microcomputers of the greatest current interest!).

Realistic expectations prevent the Can/Am user group from planning on any such extra revenue in its budgeting, however, it must be admitted. Just as no one else seems willing to pay such absurd sums of money to EPRI (as has been stated many times in the past, the first customer who has purchased EMTP from EPRI at prescribed royalties has yet to be identified), so it must be assumed that the DCG / EPRI crowd will be unwilling to pay others --- despite their monotonous sales pitches about how reasonable the advertized price is (\$50K is not supposed to be much money for a big company). Yet, the offer is real (this is no joke), and the Can/Am user group already

has a contingency plan for dealing with any such windfall that later might possibly be received from commercial competitors: important cooperating developers would be contacted to decide how best to spend the money on further ATP development.

Royalty-free access to ATP also is a possibility for certain important organizations of the power industry that have engaged in EMTP commerce in the past, it should be emphasized. The electric utility operation of General Electric in Schenectady, New York, provides the model for this as was explained in the July, 1991, issue of this newsletter (see the top of column 2 on page 7). However, it is important for the reader to note carefully that this offer of an ATP pardon is for organizations; it does not extend to individuals. Also, it could be withdrawn at any time (although the user group has no intention of doing so at this time). Finally, the offer most likely would not be considered more than once for the same offender (concerning criminal law, has any reader ever heard of a repeated pardon for the same crime?).

Florida ATP Short Course March 9 -13

Prof. Dennis Carroll again will be offering his 4.5-day EMTP short course during spring break at the University of Florida. The course will be 2 days earlier this year: March 9-13. The Can/Am mailing list was sent to Gainesville on December 16th for last minute mailing of the new advertising brochure. Such a quality list will supplement Prof. Carroll's own quality list, and the much larger IEEE PES mailing list. Obviously concerned about the effects of dip number 2 of the ongoing recession, some 7000 brucures were printed and mailed.

Faculty this year will be smaller by one. Dr. Liu will replace Dr. Meyer as the representative of program developers, and she will attend the entire week (no change here). Dr. Fehrle again is scheduled for his full day of lecturing (Thursday) on power electronics, although he is scheduled to arrive Tuesday afternoon. This is the good news: additional time for Dr. Fehrle to answer questions and offer perspective based on his many years as an industrial user. The participation of Thomas Grebe of Electrotek Concepts, Inc., is believed to be unchanged: unfortunately, his highly-regarded appearance probably will not exceed 24 hours. Dr. Liu should be able to cover statistical overvoltage studies adequately (last year this was done by Robert Hasibar, who will not be returning in order to reduce costs).

Rotating machinery is to be covered for the first time --- by Prof. Carroll. This, too, is good news. The course clearly has matured by the addition of this final, important, missing piece of EMTP modeling.

An advertizing disaster seems to have resulted from the attempt to mail course brochures using the IEEE PES mailing list. If this were not so serious, it would be comical. Your Editor was told by Prof. Carroll on January

24th that his many thousands of bruchures apparently were mailed to the wrong addresses! Prof. Carroll first suspected trouble when he, himself, a PES member, did not receive his own advertizing! Of course, Prof. Carroll inquired of IEEE and was shocked by the answer: Rather than supply addresses of power engineers, it seems that IEEE supplied addresses from its *Spectrum* mailing list! The University of Florida may well refuse to pay IEEE for its *services*, but that hardly would repair the real damage, which is seen as lost opportunity (it now is too late to correct the mistake).

Successful Purge of Mailing List

The number of former subscribers who were purged is not known because of the way records are kept. What is known is this: whereas there were nearly 150 subscribers for the previous issue, the number had shrunk to just under 100 by January 31st. More than the difference (50) were purged, however, because there is a continual expansion as new users subscribe for the first time. In any case, the purge was a success (100 copies are more manageable than 150), and there probably will be a need to repeat the operation a year from now. So, readers, be sure to scan every headline (as was the case last year, any such future purge will be clearly advertized at least once).

Editor's note: The remainder of this story was contributed by the publishers and mailers in West Linn (Kwang-yi and Kwang-chien Ger):

As you may remember, in the two preceding issues of this newsletter, the Editor suggested that subscribers economize by writing their renewal requests on old brown paper bags with crayon. Since then, we have received a number of creative responses on carbon paper, notebook paper, graph paper, and a variety of stationery ranging from yellow to blue to pink. However, only one subscriber, from Pennsylvania, actually utilized the brown paper bag as suggested, and even he failed to use a crayon.

Two responses came in the form of re-used envelopes -- one from Cleveland, Ohio, reading "Please don't purge me!" Another subscriber in Anchorage, Alaska, sent a typed request apologizing for his "lack of crayon/brown paper bag."

We appreciate all of your responses -- especially those that creatively satisfied the unusual request of preceding issues.

Microsoft FORTRAN 5.1 for Windows

Microsoft FORTRAN version 5.1 for Windows 3.0 has not yet been deemed worthy of attention by ATP

developers. Just as real virtual memory management seemed to be lacking for OS / 2 (see column 1 on page 3 of the October, 1989, issue), so there now is doubt about this critical ingredient for Windows 3.0. John Samuel (see preceding issue, page 5, column 2) remains unconvinced, and Microsoft's competitor Lahey Computer Systems provides even more damaging information on page 3 of its *News File* dated November, 1991. The indictment begins with an explanation that "*Microsoft Fortran Version 5.1 is a 16-bit compiler capable of running under Windows 3.0 and accessing up to 16 MB of memory.*" Lahey goes on to explain that its own compiler has no such limit, and will page to disk if RAM is exhausted. This carries the obvious implication that Microsoft lacks such virtual memory management.

Numerical speed would seem to be even more embarrassing for Microsoft. Lahey presents a table of results for the double-precision Linpack benchmark using some 20-MHz, 80386-based computer. While one might excuse the slow compilation (44 sec for Microsoft vs. 10 for Lahey) as being important only to developers, such generosity should not extend to execution speed, in which Lahey is said to beat Microsoft by a factor of three: 196.2 vs. 65.4 Kflops.

EPRI's shockingly slow EMTP simulation using OS / 2 just might be fully attributable to Microsoft inefficiencies after all! The following question was asked on page 4, column 2, of the April, 1991, issue: "*But is OS / 2 really responsible for the 76% loss of simulation speed?*" Although the loss of speed for Linpack is only 67%, this is close enough to 76% to make full Microsoft responsibility believable. Whether faces at EPRI should be any less embarrassed as a result of this latest information is unclear. Faces at Electrotek Concepts, the contractor that did the work for EPRI, clearly should not be!

Transients is the newsletter of the commercial competition (DCG and EPRI). The winter, 1992, issue carries the front-page headline "*EPRI funds new PC workstations.*" Without acknowledging even a hint of trouble with the OS / 2 EMTP execution, it is explained that there now is interest in other operating systems such as MS-DOS (remember this antique? It was what OS / 2 was supposed to have replaced!) and Unix. About MS Windows, the newsletter says: "*Users are finding that Windows 3.0 is much more convenient to install and use than the whole OS / 2 operating system. As a result, EPRI/DCG is funding development of a Windows version of EMTP.*" It looks to your Editor as though EPRI finally realizes it bet on the wrong horse (OS / 2) when it decided years ago to consider personal computers. EPRI won't admit this publicly (Has any EPRI spokesman ever publicly acknowledged its quarter-speed simulation? Your Editor is aware of none), but EPRI finally might be trying to correct the mistake, it would appear.

News About .PL4 Files

FLTINF of STARTUP is the user-declared limit on floating-point numbers (mnemonically, floating-point infinity). Beginning January 12th, FLTINF is being used to clip output values for .PL4 files that are not FORMATTED. This was the result of yet another observation by relay modeler Bob Wilson in Moscow, Idaho: conversion from double-precision to single-precision for writing the .PL4 file might sometimes lead to overflow. Well, no longer. The conversion now is protected by saturation at value FLTINF.

CHANGE PLOT FREQUENCY is a new request that now controls the frequency of plotted output the same way CHANGE PRINTOUT FREQUENCY has controlled the frequency of printed output for years. Although the idea has been talked about for a long time, the immediate inspiration for change was a letter from Dr. Kurt Fehrle dated Oct 16th. Work was done during the weekend of November 23rd and 24th. For an illustration, the reader is referred to a new copy of BENCHMARK DC-3 to which the variation has been made before the pulse arrives physically at the receiving end. As a result, the plot is not changed noticeably. Concerning abbreviations, CPRF and CPLF now are used for the two just-described declarations. This represents a change (previously, CPF was used, with "P" indicating PRINTOUT that now conflicts with PLOT).

News about Laurent Dubé's MODELS

A new **delay** function provides much faster response for many problems than the original **pastval** function (see page 27 of the 54-page rules marked as section III-F). First available to BPA on December 18th, Jerry Almos immediately provided a favorable reaction. The improvement is great for the simulation of Prof. Ned Mohan's disk file 1PHVCINV.DAT: the original 129 seconds of total job time (on a VAXstation 3100) using **pastval** were decreased to 34 seconds using the new **delay**. A big improvement, but still slow compared with the original TACS usage (which requires only 12 seconds).

Corona modeling provided the inspiration for a recent extension of MODELS to allow user-supplied FORTRAN. This feature has been working in the separate (stand-alone) version of MODELS for about two years, but it had not previously been installed in EMTP. Laurent Dubé made these changes during October, 1991, and carried the result with him to Europe immediately prior to the annual LEC meeting on October 28-29. The application to corona is being jointly pursued by Vincent Vanderstockt of Laborelec (Brussels, Belgium) and Prof. Teresa Correia de Barros of IST (Lisbon, Portugal) with

whom Mr. Dubé spent October 30th at Laborelec. A telephone conversation with Mr. Vanderstockt during the morning of January 16th failed to uncover any reportable progress. The ball would seem to be in the court of Prof. Correia de Barros (the corona expert) at the moment, and the separation between Brussels and Lisbon has made it difficult for the other participants to follow what is being done at IST. So, be patient, readers.

Jerry Almos of BPA has converted from TACS to MODELS the set of 64 proprietary data cases by Prof. Ned Mohan that illustrate power electronics. The new disk files were copied onto a floppy disk and mailed to Prof. Mohan in Minneapolis on December 4th following a verbal recommendation that the MODELS alternative be distributed to new customers by the University of Minnesota. That's the good news. The bad news is that Mr. Almos has disappear on some training assignment (one of the hasards faced by all new employees of BPA).

BENCHMARK DC-47 represents yet another conversion from TACS to MODELS by Jerry Almos. As will be distributed by the user group, the MODELS alternative is bounded by \$DISABLE and \$ENABLE immediately following the TACS data. Using his VAXstation 3100, Mr. Almos reports that total times are not much different: 1848 seconds for TACS and 2263 seconds for MODELS. No, this is not an indication that the speed of MODELS has improved. Rather, it seems likely that the frequency-dependence of the network has dominated, so control system modeling is only a small part of the total. The two solutions are not identical due to differences of initialization. Later, Prof. Martinez probably should comment on this detail, which is far from trivial.

Many more changes to MODELS have been made by author Dubé in recent months. Although too voluminous for reproduction here, a complete list was communicated to employer BPA in a disk file named DISK22:[SCOT]MDLSCORR.LIS of the VAX / VMS cluster. It also will be passed along to cooperating contacts and user groups in the first of resurrected *EMTP Memoranda* (mentioned elsewhere in this issue). This file is understood to be a newer version of what was published in the Sept., 1991, issue of *EMTP News*.

No /MODELS declaration yet exists to sort MODELS data by class. Somehow, ATP developers never thought of this until the oversight recently was pointed out by Prof. Juan Martinez of Barcelona, Spain. Most likely, recognition of /MODELS will be added eventually (it will be needed when TACS and MODELS data are able to coexist in the same data case). But that will take a while. The simplest correction to the immediate problem was to sort MODELS data using the same technique as for TACS. The simple, 2-line UTPF correction to allow this was made on November 18th. Since then, BPA's Jerry

Almos has supplied a 2nd subcase of DC-33 to illustrate the usage while at the same time providing further, machine-readable, self-explanatory illustrations of MODELS usage.

MODELS input data finally is being interpreted in columns 1-50 as other input data cards always have been.

This change, made around November 20th, has two important consequences for the user. First, the user of BOTH (in response to the opening prompt of the program) will see MODELS input data cards on the screen. Previously, such output was sent to the disk file, but was missing on the screen. Second, the interpretation of columns 1-50 no longer will be blank. Although no intelligence yet is used, at least the constant, indented explanation "MODELS data card." now will be seen.

MODELS usage is to be described in several technical papers that have yet to be published. Scheduled for publication in the January/February issue (Vol. 2, No. 1) of ETEP (the *European Transactions on Electric Power Engineering*) is a paper by Laurent Dubé and Dr. Ivano Bonfanti of CESI (Milan, Italy). Bob Wilson of the University of Idaho in Moscow has written 2 papers --- both submitted to IEEE PES for presentation at the upcoming Summer Meeting in Seattle (July, 1992). Both papers concern the EMTP simulation of distance relays, as the titles clearly indicate: 1) "Steady-state and dynamic EMTP modeling of distance relays;" and 2) "EMTP transient modeling of a distance relay and a comparison with EMTP laboratory test." Prof. Juan Martinez is working on the description of recent innovative simulation of SVC and relays, although no precise forum or publisher has yet been selected. Prof. Martinez already has submitted one paper to IEEE for presentation at the Seattle meeting. This is entitled "Transient Analysis of Rotating Machines Using EMTP Models."

The University of Pisa in Italy has creatively used MODELS to simulate the electro-chemical dynamics of storage batteries. This was described to Laurent Dubé in FAX from Massimo Ceraolo on October 11th (3 pages) and November 13th (13 pages). The usage in Pisa is particularly interesting because it is unclear who might have introduced the use of MODELS there. If MODELS use there has been self-taught, this should provide inspiration for others.

Compiled MODELS using C-language is one possible means suggested by author Laurent Dubé to speed the present sluggish execution (compared with TACS). Most readers know about BASIC language for programming PCs. As commonly used, this is interpretive. Yet, one can purchase a BASIC compiler, and programs that result from it will execute much faster. The analogy to MODELS is a good one because both TACS and MODELS now are largely interpretive. Well, during December and January,

the feasibility of compiled MODELS has been investigated under the BPA contract as research. However, by mutual agreement, any later implementation will not precede other work that is of higher priority to BPA such as variable dimensioning, the use of KILL codes, and coexistence of both MODELS and TACS in the same data case.

Is the name of Laurent Dubé's new control system modeling written **MODELS** or **Models**? I.e., is every letter of the name capitalized? Or, is just the first letter capitalized? Since day one, your Editor has written **MODELS**. He was startled to discover that relay modeler Bob Wilson wrote **Models** in his papers for the PES Summer Meeting. Your Editor complained to Mr. Dubé on February 11th, and was shocked to receive no sympathy whatsoever. It seems that author Dubé, himself, prefers **Models** and Mr. Wilson was merely following this lead! On the other hand, Mr. Dubé reported the following day that the Dubé-Bonfanti paper in EPEP uses **MODELS** -- presumably due to the influence of Dr. Bonfanti! *"If you really wanted **Models**, why did you not criticize my writing of **MODELS** during the past two years?"* your Editor asked? *"Because I did not notice the difference"* was Mr. Dubé's reply. Incredible! It now seems too late to change, and this newsletter will not. Besides, **model** is a common English word, so the new control system modeling is easily confused with it. **MODELS** provides better visual distinction than **Models** does.

LINE MODEL FREQUENCY SCAN

Co-Chairman Liu has been moving the code of her LINE MODEL FREQUENCY SCAN (LMFS) from BPA's EMTP to ATP. For an explanation of this feature, see the March, 1990, issue of *EMTP News*. The work is complicated by concerns of universality (use of the BPA code has been restricted to VAX/VMS) and the different ways input data cards are stored in the two programs. For background of such recent BPA work with ATP, read Dr. Liu's article in the September, 1991, issue of *EMTP News*.

The input data file name that begins the listing of interpreted data cards was modified on January 6th in order better to serve the needs of LMFS . Whereas previously only the user-keyed string (e.g., "dc35.") was shown to the right of "C data:", now the complete disk file name will be shown. The difference consists not only of the trailing file type ("dat" for most computers), but also a possible preceding path (e.g., "D:\DATA\") that is implied rather than explicitly supplied by the user. This goes back to computer expert David Szymanski's idea of taking advantage of environment variables when using Unix. Well, such capability should be coming before too long for Salford EMTP users, too.

LMFS is not yet universal. It is fundamentally incompatible with any version of the program that has been split into simulation and non-simulation halves (TP1 and TP2, respectively). Fortunately, not many persons still rely on such degenerate ATP versions as the MS-DOS version for PC XT-compatible computers. There probably is mild incompatibility with overlaying (the necessity for minor modifications is expected to be an early discovery of the first person who tests such a version). Uninitialized variables seem to be the final hazard as this paragraph is being keyed at the end of February. Dr. Liu already has correct execution using Sun-3 and VAX/VMS, but there still is trouble using Salford FTN77 (without /ZEROISE , uninitialized variables can not be used, which is a good debugging tool).

Prof. Mohan Teaches Power Quality

"Power Quality and Utility Applications of Power Electronics" is the title of a new course that is to be taught by Prof. Ned Mohan during Winter Quarter at the University of Minnesota in Minneapolis. A preliminary outline that was mailed November 13th indicates there will be 30 lectures (nominally 50 minutes each) covering 15 different topics. Concerning EMTP, your Editor notes the following: *"Computer Simulation: EMTP. No prior knowledge is assumed."*

TACS will be used for the course, it was decided, after a brief consideration of MODELS . Assuming the old control system modeling (TACS) does everything that will be required for the course, why worry about trying to teach the added complexity of the newer, more-powerful MODELS ? This seems to be the consensus that has emerged from a number of recent users. There does not yet seem to be any quick way for the average engineer to learn to write in MODELS language. Maybe there never will be. For a short course such as Prof. Mohan's, there is the obvious danger of possible preoccupation with details of EMTP simulation rather than intended course theory. Yet, Prof. Juan Martinez did offer an interesting qualification: MODELS is easy to *read* (as opposed to being written). If one is just showing existing control system modeling to others, MODELS might even be easier than TACS in some respects. For example, there is no concern about the column alignment of data, and looping is obvious. However, this good news about MODELS concerns the reading of someone else's data rather than composition by the average neophyte.

Progress Using Electronic Mail

Subscribers to Bruce Mork's E-mail service in Fargo has been growing slowly to a total of some 20 on January 21st. Yet, it was natural to wonder why the number of subscribers from Europe was not larger (Mr. Mork's friends

in Trondheim might be the only one). Then, around mid-January, the logical explanation suddenly dawned on your Editor: Apparently, Bruce Mork's 3-page article (see pages 6-8 of the October newsletter) was **not** distributed at the 1991 annual LEC Meeting in Leuven during mid-October. Since then, this has been confirmed by several attendees, and the article was sent by FAX to one of them (Vincent Vanderstockt of Laborelec in Brussels, Belgium) on January 16th. There was no distribution in spite of the fact that your Editor had produced a special, laser-printed copy of the article, and Laurent Dubé had hand-carried it, and given it to LEC staff the day before the meeting. The article was neither distributed at the meeting nor included in the Minutes of the meeting, nor printed in the following (December) issue of *EMTP News* (LEC's journal)! This seems to be just one more indication of the gulf of priorities and philosophy that seems to separate the two user groups.

Meanwhile, easier BPA access to e-mail has been worked on (slowly). Use of modems that are attached to BPA's main VAX/VMS computers proved to be unsatisfactory for reasons that were neither understood nor appreciated. Operation was neither reproducible nor reliable (garbage characters would randomly accumulate in the Sun-3 window that was being used), nor observable (we could not see or hear efforts of the hardware). It did not take long to conclude that the correct solution would be to connect our EMTP-dedicated 80486-based computer via a separate modem (Robotics Courier V.32) that already existed. The problem was a missing telephone line. The official word received from local ADP Coordinator Laura Larson on December 17th was that we should not try to use existing BPA telephone lines, which are said to be digital. Instead, an extra, new analog line was ordered, and it appeared on January 2nd or 3rd. With Szymanski scheduled to return to BPA the following week, testing was delayed to take advantage of his expertise. Finally, on January 10th, immediately before heading for the airport (his return to Pennsylvania), Szymanski connected the hardware, installed available communications software (Qmodem SST Version 4.2C by The Forbin Project, Inc.), and demonstrated success connections first to BPA's VAXs and second to the computer in Fargo. Everything worked perfectly.

Procomm Plus by Datastorm Technologies then was recommended by both Bruce Mork and Laurent Dubé, so more recent communication with Fargo has involved this alternative software. Laurent Dubé set up the automatic dialing (entry 7 of the dialing directory now is "Fargo VAX"), so no intelligence is required. Only one problem defied correction for several days, until Mr. Mork suggested the right cure, which consisted of switching to VT100 emulation. Without thinking about it, we had specified VT220 emulation initially, and this was a disaster: after login (no trouble with it), every DCL command except LO was rejected! It seems that the DEC VT220 uses an 8-bit protocol whereas our connection had

been established as 7-bit.

WordPerfect electronic publishing files of EMTP interest first were transmitted by E-mail to Portland on January 22nd. The sender was Dr. Mustafa Kizilcay of Lahmeyer International in Frankfurt, Germany, who was finishing the writing of an important IEEE paper (see mention elsewhere). Rather than send the original disk file directly, two stages of encryption are used: 1) Dr. Kizilcay ZIPped (compressed using PKZIP) his file; 2) he encoded the .ZIP file to convert it from 8-bit to 7-bit storage. The resulting 7-bit file was transmitted to the USA by Internet via the German network EUNET. Next, Laurent Dubé received the encrypted file as electronic mail using Compuserve, he decoded it to convert back to 8-bit storage, and finally, he UNZIPped the intermediate file to restore the original WordPerfect file. Yes, it all worked perfectly as far as anyone in Portland could determine! The **View Document** subcommand (choice number 6) of the **Print** command (Shift-F7) confirms not only good looking text but also the graphical equations. As for the encode/decode programs, the user group thanks Lahmeyer for these utilities, which are understood to be in the public domain. Mr. Dubé received these as short C-language files that then were compiled and linked to produce executable programs UUENCODE.EXE and UUDECODE.EXE (henceforth distributed as disk file EMAIL.ZIP on the GIVE2 disk of Salford EMTP distribution). Mr. Dubé's only warning is that a 286-based (or newer) Intel microcomputer is required. If any reader needs the programs for use on a PC XT-compatible machine, contact the user group for a special compilation.

Encoding and decoding utilities such as those in EMAIL.ZIP have been written and used before by Bruce Mork, your Editor has learned. It should surprise no reader that many different schemes are possible. Is any one significantly preferable to any other for our use? Those in Portland wanted Bruce Mork to pass judgement on this question, and he provided his answer verbally to your Editor on February 28th. This followed Laurent Dubé's earlier supply of the C-language files to Fargo by e-mail. Well, Mr. Mork sees no problems for the small files (e.g., not over 100 Kbytes) we intend to exchange. He likes the compactness: encoding only expands file size about 40%. Some alternatives with which Mr. Mork is familiar will double file size. For small files, the speed of encoding or decoding is not an issue, so there would seem to be no complaint on this score either. To conclude, it looks like Dr. Kizilcay's utilities have become ATP-standard!

FAX now appears to be very weak, inefficient, and expensive compared with E-mail for most English-language communication of EMTP interest. Think about it: If there are no pictures or drawings, it makes no sense at all. Why send bit-mapped approximations to pictures of keyboard characters that are much more compactly represented using 8-bit character codes? The bit maps of

FAX are enormously inefficient, and also are subject to unpredictable, sporadic distortion (familiar to any experienced user). E-mail should be error free, and can be transmitted much faster, so should be substantially cheaper for large volumes and/ or international use. Computer readability gives E-mail an enormous advantage for some uses (e.g., WordPerfect manuscripts or EMTP data files), of course. Finally, one does not need to purchase and maintain a separate machine (a FAX machine) in order to send or receive E-mail. It is amazing how quickly technology ages. Today, Laurent Dubé is less interested in purchasing his own FAX machine than he was last week!

FTS is the U.S. government's own telephone network, and it might provide BPA with direct access to E-mail, thereby avoiding reliance upon the hospitality of NDSU in Fargo, ND. Laurent Dubé discovered this exciting possibility Friday night, January 25th, as he was experimenting with Compuserve. As a test of the library service (Computer Database Plus) that provides on-line access to recently published papers, Mr. Dubé requested a search (only of summaries, probably) using the key word **Internet**. Some 100 or so titles were produced, and one with FTS caught Mr. Dubé's eye: "*FTS gets mail links to outside. (Federal Telecommunications System 2000)*" by S. A. Masud on pages 1 and 2 of the June 24, 1991, issue of *Government Computer News* by Ziff-Davis Publishing Co. Knowing BPA would be interested, Mr. Dubé copied the article (the charge will be \$2.50), and then transferred a copy to BPA's VAX. Monday morning, Dr. Liu printed this (just over 2 pages total, including the summary) and passed the paper copy along to Terry Keady of BPA's computer establishment. The summary begins: "*A new gateway will allow ... FTS electronic mail users to exchange e-mail with Internet e-mail users.*" This should have begun in June of 1991.

Transoceanic file transfer without e-mail was first reported by Laurent Dubé on January 29th. Using conventional modems at both ends, and a normal voice telephone line, a 30-Kbyte file was transferred between Portland and a CESI computer in Milan, Italy. The initial connection was made at 1200 baud, which was a conservative (safe) choice. A file of some 30 Kbytes was transferred without need for correction (no packet was retransmitted) at an average speed of 116 bytes/ second. Subsequent transmissions have been made at 2400 baud, sometimes. There never was trouble with the transmission, if the preceding login at 2400 baud succeeded. But sometimes it did not, in which case 1200 baud would be used. When your Editor asked why e-mail was not used for the transfer, he was surprised to learn that it was unavailable (or unknown) to those within CESI who were involved.

Compuserve can be accessed directly by anyone in the USA with a home computer, a telephone, and a modem.

This is **not** what Mr. Dubé does (more about his better idea later), but it is informative. On February 7th, the following information was obtained orally from a Compuserve agent by Mr. Dubé. Compuserve charges an initiation fee of \$39.95 of which \$25 is refunded with use. An extra monthly fee of \$2.00 is independent of usage. New members receive a basic information kit, a user's guide, an identification code, initial password, and navigational software to speed access to the services. Local access numbers exist for many cities around the country, including Portland. Once connected, one pays for the time used: \$ 6.00/hr at 300 baud or \$12.50/hr at 1200 or 2400 baud. The sending or receiving of e-mail is a free service of Compuserve.

Ziffnet is the network of Ziff-Davis, which publishes many magazines including *PC Magazine*. Laurent Dubé uses Ziffnet because it allows cheaper access to Compuserve while still making use of the regular Compuserve telephone numbers. With Ziffnet, there is no initiation fee and no minimum or extra monthly service charge. The use of Compuserve through Ziffnet is monitored and billed by Compuserve at its regular rates. In addition, a Ziffnet user can access all services and forums of Ziffnet. He also can access all services on the Compuserve side, although any such usage in any month will incur the \$2 monthly Compuserve charge. Your Editor thinks of Compuserve as an airline and Ziffnet as a good travel agent (any consumer who purchases tickets directly from an airline is foolish).

Cyrix, Weitek, Intel Microprocessors

Cyrix acceleration of a slower 386-based computer can be reported for the first time. The same Fred Elliott of BPA is involved, only this time his recently-upgraded home computer is involved. After upgrading with a 25-MHz SX motherboard and Cyrix 83S87 coprocessor, the DC-1 time was 395.5 seconds. Recall that the 33-MHz Cyrix time was reported long ago to be 190 seconds. The clock ratio is 33/25 = 1.32

whereas the simulation ratio is 395/190 = 2.08 Note that the ratio of these two numbers is 2.08 / 1.32 = 1.58 which is close to our rule of thumb about 33-MHz machines ("*performance is half again what would be expected based on the clock speed*"). To conclude, the use of Cyrix to not modify the conclusion that 33-MHz machines are in a class by themselves.

A Weitek 4167-H1B coprocessor is available to speed a 33-MHz, 486-based, NIC computer of the A. B. Chance Company in Centralia, Missouri. This information was written by Robert Hoyt, Manager of Design Analysis, on his ATP AFFIRMATION dated November 14th. Prior to his order of ATP, Mr. Hoyt had expressed a willingness to time his exceptional hardware using EMTP simulation. Unfortunately, the new computer

experienced hardware trouble shortly thereafter, and had to be returned to the factory for service. As a result, consideration of the 4167 has been delayed. This was learned during a telephone call on January 27th.

Intel announced that "*it had set record annual revenues and earnings during the year*" according to a small story on page D16 of the January 17th issue of Portland's dominant daily newspaper, *The Oregonian*. "*The company posted sales of \$4.78 billion, up 22 percent over 1990, and net income of \$819 million, a 26 percent jump above the previous year.*" These figures would seem to move Intel ahead of Motorola as America's largest semiconductor manufacturer, the article states.

To conclude, while others such as Cyrix and Weitek seem to be doing well, Intel would not seem to be suffering. IBM, DEC, and the other conventional computer makers may have fallen on hard times, but not Intel. Think about the significance of this!

Advanced Micro Devices (AMD) is poised to enter the 80486 market according to an article supplied by BPA's Fred Elliott. This is a front-page story of the news magazine *Electronic Engineering TIMES* dated January 13, 1992. Supposedly AMD "... will announce at the end of this month a family of microprocessors that are pin-compatible with the 80486 CPU family but have numerous additional features ..." Apparently AMD's latest initiative was prompted by success of its 386 clone: "... the company disclosed unprecedented gains in selling the 386 ..."). Other manufacturers are not far behind: "... Chips and Technologies Inc. is coming on line with its own 386-class CPUs, and Cyrix Corp. appears to be moving closer to introducing yet another 386-based family."). Meanwhile, Intel fights back in a variety of ways that include doubling of the speed: "*a customer can plug in a new DX or SX CPU that runs its external bus at the old system rate ... But, internally, the CPU will run at twice the clock rate -- up to 66 MHz.*" For CPU-bound EMTP, this sounds good.

DEC VAX / VMS and DECstation

The BOTH command for VAX / VMS EMTP was corrected on January 3rd following unintended usage by Jerry Almos of BPA who was executing ATP on his VAXstation 3100 workstation. The story of this highly-improbable observation is education in its own right, so will be summarized. For months, in response to the opening prompt of ATP, Mr. Almos has keyed data file names without the trailing period (e.g., "DC35.") that is required of most users. Because VAX / VMS uses .DAT as an implied file type for its OPEN statement, there seldom is a problem. But luck ran out when this short cut was applied to a file named B.DAT (never try to send only "B" at the beginning of execution)! Readers should understand that ATP concludes the input is a file name

rather than one of the 8 alternative commands only after first checking to see whether the input string is contained in a list of all possible commands. The FORTRAN 77 INDEX function is used, so column positioning of the beginning of the character string is all that is verified. Mr. Almos' "B" happens to be indistinguishable with "BOTH" in this regard. Similarly, "D" is a short form for "DISK" and "S" is an abbreviation for "STOP". But do not try "K" for "KEY". This will not work because an earlier, extraneous appearances of the letter (within "DISK") will be noted by INDEX !

Royalty-free screen graphics for the VAX / VMS version of TPPLOT could be contributed by Prof. K. S. Rao of North Dakota State University (NDSU) in Fargo.

It seems that he has some public-domain graphics interface that could be used. Your Editor said that he would do the conversion from Salford FORTRAN if the rules for drawing a straight line and outputting a character string could be explained to him.

Of course, many features of Salford TPPLOT most likely would be lost in the conversion: windows, .PCX files, **Page Down** to roll back previous plots, etc.

DECstation 5000 now **might** support ATP properly at BPA . Troubles compiling and linking ATP using DEC software on this Unix workstation first were published on page 109 of the March, 1991, issue of *EMTP News*. Well, the patch offered last summer by the factory in Atlanta did solve the immediate complaint that execution was not properly returning from the dummy ENTRY PLTEND following a normal exit from the time-step loop. It took those at BPA a long time to realize this, but that's another story entirely. Before too long, it is hoped that the solution of all BENCHMARK DC-XX test cases can be verified.

Use of a version number (e.g., ";37") as part of the input data file name might result in a perturbed plot file name if this was automatically placed in parallel with the input data file as requested by STARTUP choice KTRPL4 = -1. There never was any trouble for single-digit version numbers. But for 2 or more digits, the version number was not fully erased when the 6-byte character string PL4TYP that is read from STARTUP was laid on top of the input name. For example, ".DAT;54" would leave a trailing "4" which VAX / VMS would change to ".PL44" because the two imbedded blanks would be ignored. The error was corrected on February 26th. Now, the version number (if any) is erased before 6-byte PL4TYP is superimposed.

Miscellaneous Small Items

Cray YMP2 support of ATP should be provided by Prof. G. A. Capolino of the Mediterranean Institute of Technology in Marseille, France. Three sheets of FAX

dated November 15th first suggested the possibility while mentioning one obvious attraction of the new Cray supercomputer: "*we are encouraged in using it extensively for free.*" Well, this may be what is required to make Cray supercomputers look favorable economically for EMTP simulation: *socialized computing (joke)!* Having not heard from any Cray EMTP users at the University of Illinois (see page 8, column 3 of the January, 1989, issue) in many moons, ATP developers in Portland have decided that it makes sense to encourage a second source for such work while remaining as skeptical as ever of the practicality of super computers for typical EMTP simulation. The contact in France has the advantage of continuing interest in EMTP. Prof. Capolino and his associates at Technopole de Chateau-Gombert are proven performers, having already applied EMTP to power electronics in creative ways. Recall that Prof. Ned Mohan saw the operation first hand as reported at the bottom of column 1 on page 6 of April, 1991.

/INITIAL did not work correctly until November 22nd when the feature was fixed in response to yet another report of trouble by Prof. Juan Martinez in Barcelona. DC-33 has been expanded to illustrate such now-correct usage. In addition to two groups of initial condition cards (both types 2 and 3, not necessarily in order), there also is a /LOAD FLOW entry to demonstrate that this usage, too, works.

Electrical Business magazine published its story about ATP on pages 15 and 16 of the October, 1991, issue. The final article had not yet been seen as the October newsletter went to press. During November, Stuart M^cKay of Toronto sent photocopy of the printed article to Portland. Unlike so many other stories about EMTP (e.g., see the middle of column one on page 8 of the July, 1991, issue), this one would seem to involve no mistakes as far as those in Portland can see. Thanks again for the careful editing, Stu!

Laser printer prices continue to drop, with the HP LaserJet series II-compatible product from Okidata, Oki Laser 400, being sold in Portland by Office Club (which also photocopies this publication) for \$629 at the end of last year. A half-page advertisement on page C8 of the local daily newspaper, *The Oregonian*, describes the offering this way: "*4 pages per minute, 512K RAM (expandable to 2.5MB), HP Laserjet Series II emulation, 300 dpi, 200 sheet paper capacity.*" Dr. Liu purchased the Panasonic equivalent from the same store about half a year ago, and her kids have been very pleased with it (school reports by the Publishers and Mailers never looked better)!

Time-varying capacitance or inductance can be modeled using ATP without unusual error or added numerical burden. This is the surprising conclusion to a request from Bruce Mork of NDSU in Fargo on or about

December 4th, 1991. The representation of a capacitor or inductor in TACS or MODELS is nothing new. What is new is the realization that error associated with the usual delay of one time step need not occur. Laurent Dubé discovered this, and quickly sent an illustrative data case to Mr. Mork. This showed how to use MODELS for the task. Since then, Mr. Mork has applied the idea to his ongoing research (a whole other story that will have to be told by Mr. Mork in some other publication). For details of the mathematics and ATP implementation, see the 5-page paper by Messrs. Dubé and Mork in either BPA's *EMTP Memorandum* dated 11 February 1992 or the March, 1992, issue of *EMTP News*.

WordPerfect for Microsoft Windows 3.0 has been recommended by Prof. Dennis Carroll of the University of Florida in Gainesville. "*It is more WYSIWYG,*" the Co-Chairmen were told during a phone conversation on December 16th. For a review of this and competing publishing packages, see the February 25, 1992, issue of PC Magazine. WordPerfect covers pages 167 through 176. "*If you now use WordPerfect for DOS and want to supplement or replace it with a Windows program, you won't go wrong with WordPerfect for Windows,*" the magazine concludes. EMTP developers at BPA have not yet begun to struggle with MicroSoft Windows, however.

TACS dimensioning, which is List Size 19, was quadrupled for TP20.EXE on January 4th following a request for more space by Prof. Dennis Carroll of the University of Florida. The former 30K words of List 19 have increased to 120K in order better to satisfy the needs (for history) of those demanding RMS meters, it would seem. This is understood to be simulation that is funded by General Dynamics. To put the new TACS dimensioning into perspective, it can be compared with MODELS dimensioning as described in the preceding issue (top of column 2 on page 5). TACS data now is limited in TP20 to 960K bytes whereas MODELS data is limited to 526K bytes.

Microsoft MS-DOS version 5.0 seems to have been adopted by BPA as the standard operating system for all Intel-based microcomputers. Without any request by any end user, the 10-MHz, 286-based AST of the Editor's office was updated on January 4. One has to wonder whether such mindless conformity is a prudent policy. Prof. Corwin Alexander of Oregon State University reported on January 8th that such updating of Department computers in Corvallis had been delayed because of compatibility problems (some old programs did not run properly using the new operating system). Yet, no such complaints have been received about Salford EMTP performance under MS-DOS 5.

H-P DeskJet 500C is the color printer recently purchased by Gabor Furst from a computer shop in the

Vancouver area of British Columbia, Canada, for \$985 Canadian (about \$800 American). In a verbal report by telephone on January 7th, Mr. Furst explained that MS Windows 3.0 has drivers for this printer, and a .PCX file produced by Salford TPPLOT could, indeed, be printed as a color bitmap using PBRUSH as an intermediary. We do see this as the next quantum leap forward for PC users: color hard copy. It no longer is that expensive, and software such as WordPerfect (presently only monochrome in output) is bound to adapt.

FC.EXE and FC.DOC are Mike Albert's powerful and flexible shareware programs that compare files. They can be used with MS-DOS version 5.0, although care is required. This is because MS-DOS has its own utility of the same name, and most users will put \DOS into their PATH declaration ahead of the directory that contains Mike Albert's utility. It was Co-Chairman Liu who provided this explanation to your confused Editor who did not understand why FC behaved differently after the upgrade to DOS 5. An easy way to avoid any such possible confusion is to rename Mike Albert's two files from FC to FLC as was done for the 286-based AST that was acquired for EMTP documentation.

DCN3.DAT of the Salford EMTP distribution was not updated before January 9th to activate the newer subcases (numbers 2, 3, and 4) that had been appended to the end of the original, single data set some time last summer or fall. This was nothing more than an oversight. In fact, Salford EMTP has executed correctly for all 4 subcases since September. For those wanting to use old data, remove the extra blank card that terminates execution after the first subcase. Also, verify that each subcase has the necessary JMARTI SETUP, 1.0, declarations (2 were missing, as best your Editor can recollect).

Dr. Mustafa Kizilcay of Lahmeyer International in Frankfurt, Germany, submitted to IEEE a paper about frequency-dependent network equivalents. If accepted, this will be presented at the 1992 IEEE PES Summer Meeting in Seattle. Entitled "*Low-order power network equivalents for Electromagnetic Transients Studies*," this paper is the long-awaited English-language summary of research that is derived in detail in Dr. Kizilcay's German-language doctoral thesis. If the paper is accepted by IEEE, Dr. Kizilcay himself plans to present the paper in Seattle. Those who read German and are seriously interested in such work are advised that a printed copy of Dr. Kizilcay's thesis was received in Portland around the end of February. The plan is for Dr. Liu to carry this copy with her to Gainesville on March 8th in order that Dr. Fehrle can see it at the Florida short course.

Should ATP developers meet in Seattle during the IEEE PES Summer Meeting for discussions? Laurent Dubé was the first to verbalize the possibility, and your Editor likes the idea. He already has told others that such

a meeting is likely, with both Drs. Meyer and Liu in attendance (Seattle is close, and Mr. Dubé might drive). As a first step in the planning, any qualified person who might be interested in such a meeting is invited to make his presence known to any program developer in Portland.

DR-DOS, the imitation MS-DOS from Digital Research, now is being used by computer expert David Szymanski on his 80386-based AT&T Safari notebook computer. It was the University of Hannover in Germany that first advanced the use of DR-DOS within the EMTP community, recall. Yes, the desirability of dynamic file compression has been confirmed: after disk caching (another feature of DR-DOS) was added, access to disk files seems to be no slower than before, Szymanski reports. But this is old news. All new and more interesting was Szymanski's astute observation that DR-DOS does not seem to allocate storage for parts of random-access files that have not been written using C language. We had known for years that MS-DOS was not this sophisticated when using Lahey's F77L FORTRAN compiler (recall the growth of text file BLOCKD51.BIN to which about 80 * LIMCRD bytes were added regardless of the number of data cards actually handled). The day after Szymanski's arrival in Portland on January 27th, work began on the exploitation of his idea in EMTP. Yet, by week's end, DR-DOS already had been forgotten because an even better alternative had been discovered: virtual scratch files. In retrospect, this should have been worked on long ago. The idea is simple enough: any disk and its supporting software are orders of magnitude slower than memory (RAM). RAM is cheap enough now that we should consider using it for storage that in the past was placed on disk. With virtual memory, the beauty is that any shortage of RAM will be paged to disk, anyway. The logic to accomplish the change was developed and tested, with significant gains of speed at the start of execution. Unfortunately, the new code will not be activated for use by the general public until Salford's utility USE_VIRTUAL_SCRATCH_FILES@ is perfect (see separate mention of this problem).

COMTRADE is the new IEEE standard that could and should be applied to .PL4 files. The first mention of this will be found in the July, 1991, issue (page 5, column 2). The reader should understand that more than just format changes for the same old data will be required, however. This important point was learned from Mark Adamak of G.E. in Philadelphia following an inquiry into the current status by your Editor and Gene Davis of BPA on February 6th. Mr. Adamak's preoccupation seems to be with relays, for which switching instants are critical information. Yet, closing and opening times of switches are nowhere to be found in existing .PL4 files! They are in the LUNIT6 output file, but not in the .PL4 file. The same is true of extrema of variables. Your Editor renewed his offer to implement quickly in EMTP (more precisely, ATP) whatever COMTRADE-compatible structure for

.PL4 files Mr. Adamiak might desire, and document on paper.

The telephone conversation could be important for a reason that was not even suspected 24 hours earlier: it encouraged the connection of two different IEEE working groups that share a common interest. Mr. Davis had just returned from New York where he attended the IEEE working group that is concerned with EMTP (see story on page 102 of the March, 1991, issue of *EMTP News*). Yet, Mr. Davis could recall no consideration of COMTRADE at the meeting. Later, this recollection was confirmed by Dr. Kurt Fehrle, another attendee. In casual discussion earlier in the day at BPA, it suddenly was realized that this was a major oversight. This point was made to Mr. Adamiak, who said that he knew Dr. Keri of AEP, so could speak with him on the subject. Shortly thereafter, BPA's Robert Hasibar reported to your Editor that he, himself, had telephoned Dr. Keri and made precisely this point. Mr. Hasibar reported that Dr. Keri was receptive to the suggestion. COMTRADE may have been ignored in New York, but it certainly should not be during the upcoming Summer Meeting in Seattle.

[T_i] of CABLE CONSTANTS is supposed to end the branch cards that are punched to provide constant-parameter, distributed representation of the geometry of interest. An interested reader is referred to the bottom of page 4D-2 of the *ATP Rule Book*. Well, Dr. Gary Thomann of Power Technologies in Schenectady, New York, would seem to be the first to complain that the transpose of [T_i] was what actually was being punched. Any translation newer than March 2nd should have this error corrected, however.