Can / Am EMTP News

Voice of the Canadian/American EMTP User Group

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Salford Graphics Should Improve

Although already very good, even greater things are expected from the next major release of the Salford FORTRAN compiler FTN77 / 386. This is based on advance information from David Vallance at the factory in England. FAX dated December 5-th, 1990, begins as follows : "*I thought you would like to be informed of the graphics developments that will be available in Revision 2.5 of FTN77. I quote from Bob Jackman.*" Remaining paragraphs of this story have been quoted verbatim from Mr. Jackman's information. It is understood that LJ2 refers to the widely-used Hewlett-Packard LaserJet series II laser printer upon which many existing users would like to print copies of their screen graphics. This should be possible using resolutions of 75, 100, 150, or 300 pixels/inch.

"More graphics routines have been added to the current release. Of particular interest are the graphics printer specification routines. In the case of the laser printer select routine the paper size and image resolution in DPI may be specified. Provision has been made in the subroutine definition for laser types other than the LJ2 which this routine now provides. We aim to provide an LJ3 driver sometime early next year, probably before the summer. Note that LJ2 output is compatible with the LJ3 but the LJ3 driver will be HP-GL based and provide better graphics.

The dot matrix select routine currently provides an epson/oki compatible interface, now in arbitrary image size. Note that the horizontal and vertical image size is an INPUT argument to SELECT_DOT_ MATRIX@ whilst they are OUTPUT arguments to SELECT_LASER_PRINTER@. The ITYPE argument to SELECT_DOT_MATRIX@ is intended to cater for the 24 or 48 pin graphics modes available on the better quality (particularly ink jet type) printers. We expect this interface to be available at the same time as the LJ3 driver."

CESI Wants ATP Supported Better

CESI is the world-renouned high voltage laboratory and consulting company located in Milan, Italy. It was an historic moment when Dr. Ivano Bonfanti of this organization proposed to the LEC meeting on October 15-th that CESI head a working group that would consider better ways to support ATP development. While no one questioned the desirability of making ATP better, the spirited discussion that followed seemed to reveal a distrust of CESI's motives by some of its competitors. Dr. Bonfanti made repeated efforts to assure the audience that CESI was not trying to control ATP for CESI's own benefit, and that only study was involved initially, in any case. The proposal was for a working group to present its recommendations a year later (to the 1991 LEC meeting) at which time the mandate of the working group would expire. The gathering unanimously endorsed this proposal.

Dr. Bonfanti ended his presentation with a call for participants who were willing to work. He promised that all viewpoints would be heard, and indicated that those unwilling or unable to travel to meetings could submit their views in writing. Finally, CESI and/or LEC will contact directly several important organizations such as BPA that were not represented at the 1990 LEC meeting.

Dr. Meyer did not say a word during the discussion. He carefully noted that no one addressed the economic problem during the discussion: how to obtain greater resources for ATP development without selling ATP. When Dr. Meyer brought ATP to Europe early in November of 1985, he clearly stated that it was to be an alternative to the threatening commercialism of DCG / EPRI. As Dr. Meyer observed to Ir. Bernd Stein of FGH during the following lunch, ATP can not be sold, although related services (e.g., education) might be.

Well, this is just one of the constraints with which the task force will have to grapple. Concerning unsollicited invitations, BPA had received none by the end of the year as this story is being keyed.

EMTP Simulation Including Relays

Relay dynamics should be representable using existing control system modeling (either TACS or MODELS features) of the EMTP. This had been the conventional wisdom for at least a year and a half even though published reports of success were lacking. Jack Hochheimer of Florida Power & Light attended the EMTP short course at Cal Poly during July of 1989 in order to learn about control system modeling from author Laurent Dube (who was not a part of the Florida course 3 months earlier). Until a promotion removed him from the FP&L project, Mr. Hochheimer was the principal contact of ATP developers in Portland on the subject of relay modeling.

Robert E. Wilson, a new doctoral student at the University of Idaho in Moscow, has taken over as the primary relay contact of ATP developers in Portland. Having recently left Western Area Power Admin. in Golden (Denver), Colorado, after several years of work with relays), Mr. Wilson seems to combine industrial experience with a driving academic interest that is expected to endure for several years. ATP developers in Portland hope to be able to assist Mr. Wilson with details of EMTP while he struggles with details of the relays. The Salford EMTP for 80386-based computers was sent to Moscow on December 11, 1990, and it will be updated if and when required by demands of the research.

Copies of two interesting IEEE papers about relay modeling, both presented at the 1990 PES Summer Meeting in Minneapolis, already have been provided to ATP developers in Portland by Mr. Wilson. A third but older paper was supplied as well. For those interested in relaying, these are:

1) Alexander Domijan and Michael Emami, "State space relay modeling and simulation using the Electro-magnetic Transients Program and its Transient Analysis of Control Systems capability," 90 SM 469-7 EC.

2) James N. Peterson, Richard Wall, "Interactive relay controlled power system modeling," 90 SM 270-9. 3) K. S. Prakash, O. P. Malik, and G. S. Hope, "High speed digital directional comparison relaying," Electric Machines and Power Systems, Volume 15, pages 353-369, 1988.

To conclude, no longer is the important subject of relay modeling without its associated literature. Although nothing on the subject has yet appeared in EMTP News, at least the just-listed references provide a starting point for interested readers. The modeling of relays is expected to be an important use of EMTP in the years ahead --- provided data can be obtained.

Mustafa Kizilcay Writes His Thesis

Mustafa Kizilcay is best known to ATP users as the author of the popular plotting program PCPLOT for MS-DOS computers. But this is just his most visible contribution to ATP usage. There have been several other important contributions, including arc modeling (a time-dependent resistor controlled by TACS) and proof that the Salford FORTRAN compiler would support EMTP reliably. However, it is possible that Mr. Kizilcay's greatest contribution of all has yet to be delivered. Since leaving the University of Hannover during September, Mr. Kizilcay first worked for AEG in Frankfurt, but then switched to a consulting company (Lahmeyer) in the same city. In FAX dated December 20-th, Mr. Kizilcay indicated that his doctoral dissertation already has been written, and was undergoing "minor modifications, which concern the layout, pictures and structure. I hope, I will finish them during the Christmas holiday. Thereafter the thesis will be handed in to the faculty of (the) university officially." As explained to the 1990 LEC meeting in Leuven on October 15th or 16th, this should be important to ATP because of successful research involving a frequency-dependent network equivalent. Dr. Meyer promised to implement in ATP any such new modeling as soon a Mr. Kizilcay releases it following the acceptance of his thesis.

A new version 6.10 of PCPLOT was received in Portland on February 13th, it should be mentioned. A copy was sent to Prof. Carroll in Gainesville for use at the EMTP short course March 11-15, 1991.

EPRI EMTP Using OS / 2 is Slow

The first speed comparison between Salford ATP and the OS / 2 version of the DCG / EPRI EMTP finally is available. It would seem to confirm the worst suspicions of ATP developers (that OS / 2 is an inferior operating system for the support of a big program such as EMTP) . Recall that this newsletter has called for comparative timings of enormous EMTP BENCHMARK DC-1. Well, one cooperating reader who prefers to remain anonymous found that the DCG / EPRI OS / 2 version of EMTP simulates at less than one quarter the speed of Salford EMTP for the data of DC-1. The times spent in the time-step loop were 1021 sec for DCG / EPRI EMTP and 246 sec for ATP --- both using the same 33-MHz 80386 with 8 Mbytes of RAM and a 16-msec SCSI disk.

Assuming that the timings (which came from an experienced EMTP user) are correct, what plausable

explanation is there for the poor showing of the DCG / EPRI EMTP using OS / 2 ? With 8 Mbytes of RAM, it is hard to believe that memory could be inadequate (resulting in paging within the time-step loop). One can look at this another way: If 8 Mbytes of RAM really might be inadequate, OS / 2 would have more fundamental problems than even the most cynical critic might earlier have suggested! Remember, the Salford EMTP runs DC-1 at full speed using just 896 Kbytes (DBOS run on a 1-Mbyte COMPAQ shows 256 Kbytes being used above 640K). Of course, some speed would be lost because OS / 2 is 16-bit software written for the 80286 rather than the 80386. But could this explanation account for more than a factor of two (remember, there is only about a factor of two separating Salford EMTP simulation speed from MS-DOS [Lahey F77L] speed)? Is it possible that the DCG / EPRI EMTP might be slower than ATP using any computer and any operating system? Interested readers are encouraged to repeat the experiment using DC-1 and report their findings to ATP developers in Portland.

EPRI and its agent in the matter (Electrotek Concepts, Inc. of Knoxville, Tennessee) were notified of the preceding results by letter dated February 5th. The associated project manager at EPRI is Dr. Rambabu Adapa, who responded by telephone on February 12th. Dr. Adapa indicated a willingness to run the time trial himself, so a copy of BPA's VAX-stored DC1.DAT disk file was mailed to Palo Alto that afternoon by First Class. Since then, two more letters have been written, with copies going to both Palo Alto and also Knoxville. The most recent of these, dated February 15th, stated: "*I would be happy to publish whatever timings EPRI or DCG or its agents might produce along with those I already have --- provided I receive them in time. Changes to my writing for the March issue of EMTP News almost certainly could be made through the end of this month (February).*" No timings ever were received on paper, however, although Electrotek certainly did receive the letters from the Editor, and did consider the matter. For more details, the reader is referred to the March issue of *EMTP News*.

Tsu-huei Liu Lost to Management

It is with a heavy heart that the Editor must announce to readers that Dr. Tsu-huei Liu, Co-Chairman of the user group, has been lost to EMTP development by promotion within BPA. After 15 years as an EMTP developer, she was promoted during January to head those who program the system planning applications named load flow, transient stability, short circuit, etc. This is the job that was occupied by Jim Harries for the last 2 or 3 years, John Walker before him (most of the last decade), and William F. Tinney before that. It is a responsible position that will require a significant fraction of her time. On the other hand, Dr. Liu is not expected to work on any of the new computer programs for which she now has responsibility, and about which she knew next to nothing at the time she took charge. Dr. Liu has stated that she would like to continue with EMTP development in her free time (when not managing) --- provided working conditions (DCG / EPRI and LEC EMTP politics) could be improved sufficiently. The author sees this possibility as being very important to EMTP development, and has told Dr. Liu that she could *write her own ticket* for this. I.e., she could set her own rules. In fact, since November, the author has urged Dr. Liu to take control of all political decisions regarding EMTP that affect the two of us working at BPA.

The delays in publishing this newsletter, as well as the secondary printing and distribution of *EMTP News*, can be attributed to the change within BPA. It was Dr. Liu and her children who previously had handled publication, printing, and mailing for the user group.

C-like .PL4 Files for Salford EMTP

With the addition of C-like ".PL4" files, Salford EMTP now supports all 3 possible file types. Also, the user can plot all three using TPPLOT. C-like files really are superior. They can be created much faster than UNFORMATTED .PL4 files if plot points are held in RAM until the final time step. Recall that this is accomplished by a negative LUNIT4 in STARTUP , and then no DISK PLOT DATA card as part of the data case. Any reader who is interested in switching to C-like .PL4 files is advised to consult READ_ME.DOC (see ALLSEE.DAT) for details.

IBM RS / 6000 Work in Leuven

Guido Empereur of LEC has taken over the testing and development of ATP for IBM's RISC workstation RS / 6000. Of course, the batch-mode EMTP runs fine (we knew that before). The real challenge will be to provide both good and free windowing and graphics, and also SPY.

Sun SPARC ATP by Swiss ABB

Ferdinand Platter is the ABB (formerly Brown Boveri) employee in Zurich, Switzerland, who has taken over the support of ATP for Sun SPARC.

Sun's Sparcstation 2 workstation has arrived, it is worth noting. This story dominates the front page of the December, 1990, issue of *The Sun Observer*, a computer news magazine that is "*not sponsored nor endorsed by Sun Microsystems, Inc.*" The subtitle of the story is: "*Going head to head with IBM's RS / 6000*" (see preceding story). From column 4 of the story: "*The CPU is Cypress's 40 MHz 32-bit Sparc microprocessor (the*

CY7C601). .... This Cypress chip set gives the new Sparcstation 2 more than double the performance of the Sparcstation 1: 21 SPECmarks (compared with 10.0 for the Sparcstation 1); 28.5 MIPS (compared to 12.5); and 4.2 MFLOPS (compared to 1.7 for the Sparcstation 1)." But the new performance is not cheap, since Sparcstation 2 begins with a minimum of 16 Mbytes of RAM and 207 Mbytes of hard disk. "*Priced at $14,995, the next-generation Sparcstation 2 offers a 20 percent price/ performance boost over the first-generation Sparcstation 1 (priced at $8,995 for one-half the memory and disk storage).*"

Breaking Intel's Monopoly on 80386

The success of Intel's 80386 microprocessor, and the current challenge to it by Advanced Micro Devices, Inc. (ADM), is summarized by Brian Rooney of United Press International in a half-page story that appeared on page 3 of the December 24th, 1990, issue of the *Daily Journal of Commerce* ("*the official newspaper of the City of Portland*"). Those who still question the dominance of Intel microprocessors are advised to think hard about the significance of the numbers for competing architectures.

Today, the 80386 clearly is Intel's dominant microprocessor. Estimated sales of 80386s for 1990 are 8.7 million, with some 55% of these being the slower and narrower (but fully functional!) 386-SX "*which sells for about $60" (the attraction remains low price). Whereas other chip manufacturers have been struggling, Intel "is expected to report record earnings through December ...*" Naturally enough, Intel wanted to monopolize this success by refusing to allow others to manufacture the 80386. But there have been legal challenges. "*AMD said it would produce a version of the 386, code-named the Longhorn, with or without Intel's permission. ... A federal judge refused to grant an injunction against AMD pending trial, which is expected to begin in January. ... Asian clone manufacturers which make inexpensive IBM-compatible machines, are the most likely candidates to buy the AMD chips, analysts said.*"

John C. Dvorak provides his typically-colorful summary of this news on page 83 of the January 15, 1991, issue: "*The ruling (by Judge Barton Phelps in favor of AMD over Intel) paves the way for Intel to fork over the 80386 license. ... (This comes) not a moment too soon as the Taiwanese have geared up their factories to produce cheap laptops utilizing the 386SX. Recent publications from Asia indicate that perhaps 500 different laptop models are about to hit the market.*"

An optimistic conclusion is contained in the final paragraph of Brian Rooney's story: "*Mel Phelps, an analyst with Hambrecht & Quist in San Francisco, said he expects Intel to respond to the AMD challenge by introducing less expensive versions of its 80486 microprocessor. ... That would attract more customers to the next generation of microprocessors and leave AMD with a clone of yesterday's part, he said.*" It is difficult to see how EMTP consumers could lose from this. If the price of a 33-MHz (or faster) clone of the 80386 did not exceed 386-SX levels, the SX could well be doomed the same way IBM's PC Jr was five years ago. The only question would seem to be about the math coprocessor, which the news media seems to ignore. For full benefit to EMTP users, compatible clones of the 80387 coprocessors will be required as well. A 33-MHz Cyrex clone is being used by BPA.

MicroWay Supports Intel RISC i860

"*Is there an attempt to suppress the facts about the performance potential of the Intel i860 RISC chip? That seems to be a theme I keep hearing. It's easy to see why when you put a MicroWay i860 card into a 386 machine and discover that you're running at over 40 mips!!*" This is the way John C. Dvorak beings his *Inside Track* column on page 83 of the December 25th issue of PC Magazine.

"*Dubbed the Number Smasher 860 Coprocessor card, the board comes with 8 megabytes of RAM and is available at 33 or 40 MHz. While not cheap ... you do get one of the MicroWay NDP compilers for free. MicroWay offers Fortran, PASCAL, and a new C++ compiler tailored for the 860 card. The 860 becomes the primary processor, and its number-crunching capabilities are incredible. The 386 controls the hard disk and acts as an ancillary processor in this scheme.*"

ATP developers in Portland would like to know of any reader who already has the MicroWay card, the FORTRAN compiler, and an interest in evaluating the combination using ATP. Priced at $7000 for the 33-MHz model, or $9200 for the 40-MHz model, this is not an experiment that the user group itself would be quick to fund. But it would be pleased to cooperate with someone who already has access to the required MicroWay materials.

Salford TPPLOT Scrolls Window

The interactive plotting program TPPLOT has undergone enormous changes in order for it to support a scrollable window for dialogue. The original plan was to describe this in detail in the December issue of *EMTP News*. But LEC staff refused to hold printing beyond early December for reasons that were not appreciated in Portland. The remainder of this story passes along a substantial portion of the important information that was intended for the December issue, but which now should appear as a 9-page article in the March issue of *EMTP*

News).

The interactive plotting program TPPLOT offers many advantages to users of the Salford DOS extender (DBOS / 386) on an Intel 80386-based microcomputer. Some of these were explained in the September issue of *EMTP News* (see pages 42-50). Since then, a user-scrollable dialogue window, use of the graphic cursor (a mouse with Micrsoft drivers), and more have been added.

The new scrollable window for TPPLOT dialogue is mandatory. It will be opened automatically at the beginning of program execution whether the user wants it or not. The maximum number of lines of window storage in RAM is fixed at compilation time, with 500 currently being used. This is the middle of 3 numbers shown on the right side of the window title at the top. To the left of this is the line number at the bottom of the window (always 22 or larger) and on the extreme right is the number of lines that have been written to disk file JUNKTPP (more about this later).

The dialogue window of TPPLOT superficially looks like the Salford EMTP window for SPY dialogue (requested by the first function key **F1**). There is a title line at the top and a horizontal separator at the bottom immediately above the program prompt for input. But the TPPLOT dialogue window is wider : 132 columns. Yet, most TPPLOT dialogue requires 80 or fewer columns, so the user seldom will have occasion to use the right arrow ---> to scroll to the right of column 80. Unlike the LUNIT6 window of Salford EMTP, the dialogue window of TPPLOT moves in smaller steps of just 10 columns each. Vertical positioning operates in intuitive fashion using the up-arrow, down-arrow, **Page Up**, **Page Down**, **Home**, and **End** keys. This is the same as for the Salford EMTP windows.

The special windows that were described in the September issue continue to be used, and thus far, their operation is largely unchanged. For example, the program's response to the TYPE command continues to be the opening of a special, scrollable window to display the disk file of interest. After the user has seen enough, he exits this display by touching **Esc**, at which point no trace of the file will remain. Since the new dialogue window was not involved in the operation, the contents will not be seen in it. While it might be useful to allow the dumping of a disk file into the dialogue window, such capability has not yet been provided.

The OS command, which allows the user to issue operating system commands while within TPPLOT, required substantial modification in order to work properly with the new dialogue window. Previously, user-keyed MS-DOS commands were executed without modification by TPPLOT. Any associated output from MS-DOS would go to the screen, and would continue to be seen until eventually (25 lines later) it would be lost off the top of the screen. Unfortunately, this satisfactory behavior was lost with the introduction of a scrollable window. Output to the screen would just be seen for an instant, it was discovered. As soon as execution of the MS-DOS command ended, any output that had been sent to the screen would be covered by the dialogue window as the window was redisplayed in order to issue a new prompt for more input at the bottom. This was for an individual MS-DOS command such as the common DIR *.PL4 (to see dates and sizes of .PL4 files --- output that is missing from the compacted display of the PL4 command). For the MS-DOS shell (the response to OS followed by **<CR>**), there was less of a problem since erasure would be delayed until the user sent EXIT to leave MS-DOS and resume TPPLOT dialogue. So, nothing was done to modify behavior of the MS-DOS shell. But for the single MS-DOS command, logic was altered so that MS-DOS output automatically would be sent to a disk file rather than to the screen. Then, upon completion of the MS-DOS command, the disk file would be connected, and its contents would be transferred to the dialogue window. This results in both scrollability and preservation of the MS-DOS output, which is good. To conclude, the dialogue window has complicated the OS command a little. There have been both gains and losses.

The STOP command is required for a clean exit from TPPLOT if the user wants his dialogue window flushed to disk file JUNKTPP at the end of execution. This assumes variable KJUNKE of TPPLOT.INI is set to zero, which means that earlier flushing will occur only to prevent loss due to overwriting (after RAM storage has filled).

TPPLOT.INI is a new disk file that supplies TPPLOT with initial parameters much as STARTUP does for the EMTP. Included are 8 Salford colors --- variables that begin with the four letters KOLR. The new window for TPPLOT dialogue uses 2 colors (variables KOLRE and KOLRF), the separate HELP window, also providing service for TYPE and SET DATA; LIST, uses another 2 colors (variables KOLRH and KOLRS), the temporary, small status window that monitors the preparation for plotting uses 3 colors (variables KOLRX, KOLRY, and KOLRZ), and finally, satisfaction of the F9 search command uses the remaining color (variable KOLROV) for overprinting of the requested string. If the user does not like the colors that he see, he is free to experiment with the just-mentioned 8 variables. Numbers 1 through 15 provide regular colors for either EGA or VGA color monitors, it has been found. Another parameter is KJUNKE, which controls the preservation of program dialogue in disk file JUNKTPP. Finally, IPRSRT initializes the control of diagnostic printout that can be modified at any time by the DEBUG command.

DEBUG.LIS is the disk file of diagnostic printout. Whereas previously diagnostic was divided between the screen and this disk file, now it goes exclusively to the

disk file. Addition of the dialogue window necessitated this consistency because output to the screen conflicts with the new window. At the same time diagnostic printout was redirected, it also was made conditional on variable IPRSRT in nearly every case for screen plotting.

The .PCX files produced by Salford TPPLOT can be displayed and modified using PC Paintbrush. This was proven by Stuart McKay of Toronto, Ontario (Canada) during September. A detailed report should appear in the June, 1991, issue, of *EMTP News*.

The TIMESPAN command no longer is required prior to the use of ALL TIME to plot curves over the entire time span. Program logic has been modified to issue the TIMESPAN command internally if the user does not himself issue the command. There will be a single-line indication of such action ("--- Ok, but first TIMESPAN will be executed ...") followed by the usual output of the TIMESPAN command.

The HPGL command provides HP-GL output (a disk file) that now begins with as many as 8 lines of user-supplied initialization. This modification was inspired by an observation of a BPA engineer, Fred Elliot, who had trouble sending an HP-GL file of TPPLOT into MicroSoft Word as a picture. Mr. Elliott traced the trouble to the very first line, which represented initialization that was required for use with BPA DEC VAX / VMS computers. WordPerfect did not object to this line, but MicroSoft Word did. To solve the problem, such initialization has been placed under user control by movement from code (FORTRAN) to data. Any non-blank and non-comment (in the sense of EMTP data) lines numbered 3 onward within disk file TPPLOT.INI are assumed by TPPLOT to be such HP-GL initialization. This continues until either a hard (real) end-of-file or a soft end-of-file ("EOF " in columns 1-4) .

The FORM command no longer is mandatory for .PL4 file types other than the default type. As pioneered by Mustafa Kizilcay's PCPLOT many moons ago, TPPLOT now automatically recognizes the .PL4 file type. This is the default choice.

The **Esc** key has been provided as a way of aborting lengthy, repetitive loops. Although other locations could be added later, six exist following the introduction of the feature. These are for the following loops: 1) TIMESPAN; 2) Reading from disk of curves to be plotted; 3) Extrema determination of these; 4) Point discarding of these; 5) Character plot; 6) Modification of file type after error reading .PL4 header. Should the program abort such a loop, there will be one line of text documenting the action.

The MS-DOS PRINT command was defective for Epson-compatible plot files that can be produced by either the PEN command of TPPLOT or the PEN PLOT command of the Salford EMTP itself. Recall that using PRINT was the inspiration of computer expert David Szymanski of Wattsburg, Pennsylvania, and it almost worked (see pages 47 and 48 of the September, 1990, issue of *EMTP News*). Szymanski himself provided a believable explanation of the trouble, if not a solution to it, during a telephone conversation of November 26th. According to Szymanski, the trouble is caused by a CTRL-Z character combination in the file, which MS-DOS interprets as an end-of-file. He explains that COPY and PRINT are treated differently in this respect, which the author has confirmed by studying a copy of "AST Premium/286; Microsoft Disk Operating System (MS-DOS); User's Manual" dated May, 1987. The COPY command "copies one or more files ...." whereas the PRINT command "prints text files ..." As Szymanski observed, his past usage of PRINT had been confined to text files, so he never noticed this restriction to text. Since the attempted use for .EPS files clearly involved graphics and not text, no one should be surprised that the operation failed.