Can / Am EMTP News

Voice of the Canadian/American EMTP User Group

Publishers and Mailers:
Kwang-yi and Kwang-chien Ger
3179 Oak Tree Court
West Linn, Oregon 97608
United States of America

Authorized by Co-chairmen
Dr. W. Scott Meyer, Editor
Dr. Tsu - huei Liu

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Salford Rev. 2.50 FORTRAN

The January issue mentioned on page 1 that Salford Rev. 2.50 FORTRAN offered important new extensions, and would be coming soon. Well, it now is available to ATP developers, but has not yet been used to provide any important new features.

Adaptation to Rev. 2.50 was slow because those who did the evaluation were unaware of altered Salford assumptions since Rev. 2.40. Dr. Gary Thomann of PTI in Schenectady was the first to report trouble. After receiving new ATP object files that were created using the Rev. 2.40 compiler, Dr. Thomann linked these (following the use of VARDIM to size tables) using the Rev. 2.50 linker. But the resulting executable EMTP was unreliable. Harold Wehrend of the University of Hannover in Germany experienced similar trouble at about the same time. This was a clearer case because both compilation and linking were done using Rev. 2.50. Mustafa Kizilcay volunteered to look at the trouble during his holidays, and it is he who made the critical observation that all COMMON blocks of EMTP tables no longer were in order.

ATP developers in Portland ordered the Rev. 2.50 compiler from OTG Systems on April 17-th, and received it on April 26-th. The following weekend, the Editor was successful in modifying setup procedures so that COMMON blocks once again all are in order as required. All test cases now solve correctly using both regular and also very large tables (using TP3 and TP20, respectively). Not only is execution correct using Rev. 2.50 of DBOS / 386 , it also is correct using LEC's Rev. 2.42 of DBOS. This is a very important detail for existing users: no update of the DBOS disk will be required --- at least initially.

A second try at Weitek 3167 will be made soon. The associated TP.EXE will be hand-carried back to Pennsylvania by computer expert David Szymanski, who will work at BPA until May 5-th. Recall that AT&T dealer Szymanski is the one who supplied Prof. Tom Leskovich of Penn State with two 20-MHz 386s, with one of these accelerated by Weitek 3167. The first test some months ago failed to demonstrate sustained, correct operation of Salford EMTP using Weitek. Now, with a new compiler, we will try again.

Salford EMTP already has substantially displaced the MS-DOS version of years past, as recent orders should convincingly demonstrate. As this paragraph is being keyed on May 2-rd, only five (5) copies of the MS-DOS version have been shipped since the start of the year. Compare this figure with fifty two (52) mailings of Salford EMTP. The switch is on!

Messrs. Robert Chafer and Tony Webster of the Salford compiler team are scheduled to visit Portland on May 13-th. Any unresolved issues or problems with Salford EMTP certainly will be raised during our talks with these experts. Recall that Mr. Chafer visited us last fall, and made important contributions. ATP developers in Portland are both pleased and honored by a second visit, needless to say. Others in the Portland area who might have interest have been invited to attend a meeting on Monday morning, May 13-th, at 9:00 AM. Room 404 of the BPA building has been reserved for this purpose. The street address is : 905 N.E. 11-th Avenue; Portland, Oregon 97232. This is two blocks south of the famous Lloyd Center.

The /VDISK qualifier of DBOS is not new; any user of DBOS Rev. 2.42 has it. But its use just recently has been found to be very important for some Salford EMTP users, so the use of /VDISK will be summarized here. If DBOS does not automatically avoid RAM between 640K and 1024K (as is the case for IBM PS/2 and AT&T 6386 computers), and if there seems to be a conflict, /VDISK can be used to force DBOS to avoid the 384 Kbytes in question. BPA's Fred Elliott was the

first to point this out. Until he added /VDISK to the DBOS line in his AUTOEXEC.BAT file of his 33-MHz Micro Express 80386-based computer, he could not run Salford EMTP reliably even though CONFIG.SYS and AUTOEXEC were minimal, and shadow RAM had been disabled. The symptoms were reminiscent of the world's worst case of Intel Erratum 21 (that is, execution sometimes would begin, but would not go far before execution seemed to abort). After converting the DBOS command to "DBOS /VDISK", execution was normal. Upon being informed of this, David Vallance of Salford commented as follows in FAX dated April 17-th: "*I think that Fred Elliott, and other new users, should routinely use /VDISK to install DBOS. This would be a useful thing to stress in an upcoming edition of EMTP News*." Well, Can/Am newsletter readers, you have heard it first!

Ultimatum to CESI Task Force

This is a continuation of the story entitled "*CESI wants ATP supported better*" on pages 1 and 2 of the January issue (printed in April). Unfortunately, the initial actions of the CESI task force have satisfied neither BPA nor the Editor, with the latter having issued an important ultimatum as a result.

BPA never did receive any written invitation, although Dr. Bonfanti of CESI did eventually telephone on January 21, 1991. The problem is, this was too late to be taken seriously. The task force already had been formed, and it was obvious that BPA had been ignored --- either by design or accident (it is hard to know which would be better). The closer those in Portland inspected the matter, the worse it looked. For one thing, it would seem that there was no real written record of what had been authorized at the October meeting. The only written account that ever has been seen at BPA is Section 7 (Intermezzo) of the conference proceedings, and this was fatally flawed. The interested reader is encouraged to study closely pages 5 and 6 of the bound "Minutes of the 19th European EMTP User Group Meeting." Not once is the name of any computer program such as EMTP or ATP mentioned, as incredible as this may sound! Also, there is no mention of Laurent Dube's important idea that allowed participation by mail (travel to Europe would have been difficult for BPA). But perhaps the most serious objection had to do with initial operation of the task force. One of the ideas circulated to all task force members prior to the contact with BPA was that LEC might charge an extra initiation fee of perhaps five times the annual membership to encourage continued membership. For an industrial member, this would be 5 times about $3800 (see the next paragraph), or $19000. Well, EMTP commerce by any name is no more acceptable from LEC than it has been from DCG / EPRI since 1984. In the opinion of the Editor, the task force clearly was out of control before its first meeting, and had to be told the time of day in no uncertain terms. This was done in Section IV of a 7-page personal contribution by the Editor that was sent to Milan by Express Mail on February 25, 1991. The remaining text of the story (2 paragraphs) will be quoted verbatim from Section IV of this communication:

LEC's monopoly on ATP within Europe has come under increased scrutiny within recent months. Members should be informed that changes are inevitable, and that these might well affect LEC finances. The author does not challenge LEC's right to distribute ATP free of all charge to its members who are not involved with EMTP commerce. But should LEC be allowed to deny ATP to nonmembers within Europe? Should LEC be allowed to sell memberships outside of Europe? Where did the authority for such creative and lucrative initiatives come from, anyway? The author has received numerous complaints about persons having been asked by LEC to pay several thousand dollars for an unwanted membership in LEC when only EMTP was desired. The contrast between this and the way ATP is distributed in most other parts of the world represents an increasing source of embarrassment for the author. .... So, when a new contact in impoverished Eastern Europe writes to report that he has been asked to pay about $3800, and observes that he has "some doubts about the meaning of *royalty free*," the author can only concur.

The sale of ATP by LEC has become increasingly offensive to the author, who has decided to put a stop to it by the end of the year (December 31, 1991). Either LEC will reform its own policies by that time or the Can/Am EMTP User Group will break with LEC and will itself begin licensing ATP users around the world --- and will encourage the free distribution of ATP among them. BPA would be included in the list of potential additions. If this sounds like an ultimatum to LEC, that's because it is.

All EMTP Outputs Can Parallel Data

Execution of Salford EMTP now can produce a .LIS printer file, a .PL4 plot file, and/or a .PCH punch file parallel to the input data file. The input data file can be remote if the user so chooses, of course. Since most of this capability is new, but part of it is old, the entire topic will be summarized.

If KTRPL4 of STARTUP is negative, the .PL4 file will be named and located parallel to the input data file. This is the old part (operation has been this way for at least a year). With old program versions, the only thing the user had to be careful of was that no such .PL4 file already existed (if it did, the date and the time would be used). But this was confusing, so logic was changed some months ago to lay the new .PL4 file on top of the old --- always. Prior to writing the paragraph on April 12-th, the Editor has verified this using a modified version of

BENCHMARK DC-3 (the $DELETE and $OPEN lines concerning I/O unit 4 were removed). Repeated execution does proceed normally using C-like .PL4 files (see a later story for more about these). Also, the time shown in the output of "DIR DC3.PL4" is correctly updated (unlike some operating systems, DOS is good this way).

The .LIS file will parallel the .DAT file automatically if just **<CR>** is sent in response to the prompt for a disk file name. Should such a file already exist, the program will issue its familiar warning and reprompt. If the user wants to trash the existing file, "-R" (either upper or lower case) will do the job. If "-R" is sent the first time, the user will be spared the warning and reprompt. It is acceptable to send "-R" whether or not the .LIS file already exists.

The .PCH file will parallel the .DAT file automatically if KTRPL4 is negative and if the user does not follow his $PUNCH request by a file name. But if KTRPL4 is positive, the former logic will be used. I.e., an unused disk file name of the form PUNCHXX.PCH (where "XX" indicates two decimal digits of serialization) will be used, and the file will be located in the local working directory. Of course, if the user does key a file name after $PUNCH, his request will continue to be honored.

Utility BATCH.EXE Builds .TEX Files

The GIVE2 disk of Salford EMTP distribution now contains a small, new file BATCH.ZIP that will assist the user in construction of .BAT and .TEX files for the batch-mode execution of Salford EMTP.

Gerald Lee of BPA deserves the credit for inspiring the Editor to code program BATCH the weekend of March 16-th and 17-th. Mr. Lee had been running batch simulations at home on his own 33-MHz 80386, and (apparently) cursing the need to create an associated .TEX file for each of his several data cases. The Editor sympathized with his plight (aggravated by 2-finger keying), and agreed that relief could and should be provided.

It is easy enough to summarize the operation of BATCH. Although users can specify individual data file names using the FILE command, more useful is the DIR command which will result in a display of available data files. The procedure was modeled after the PL4 command of Salford TPPLOT. After seeing the choices, the user can select entries by number --- either individually, or using ranges (for example, "6-14" would select entries numbered 6 through 14 and "ALL" would select all entries). The SHOW command will display a current list of selected files, and KILL allows the removal of one or more of these, should the user change his mind after having made a bad selection. There is a HELP command --- also modeled after that of TPPLOT. Finally, the MAKE command will halt execution after first creating the .TEX files of interest (one for each selected file), and the single batch file RUN.BAT to run Salford EMTP using the selected files as data. Print or edit BATCH.HLP (the disk file of HELP text) for more detailed instructions.

1991 Florida EMTP Short Course

Prof. Dennis Carroll gave another (his third) successful EMTP short course at his University of Florida in Gainesville March 11-th through the 15-th. As expected, there were fewer surprises and problems than the year before. Yet, a few details probably are worthy of note.

The new monochrome VGA projector was a big improvement when it was properly adjusted using the several color knobs. This was driven off of Prof. Carroll's home computer (a DataWorld 20-MHz portable) along with a VGA color monitor that the instructor could see. With overhead lighting turned off, the projected display appeared to be both bright and crisp.

Intel Erratum 21 trouble was experienced for some data cases (e.g., BENCHMARK DCNEW-3, which involves JMARTI SETUP use) for some computers (the 10 older machines that had amber Hercules monitors). There never was any trouble with the other half (newer computers with VGA color monitors). Prof. Carroll and the Editor asked each other: How could such trouble have gone unnoticed the year before? The most plausible explanation is that it did not, that a year ago there was no such trouble. Unless one believes that the hardware somehow has degenerated in the interim, we seem to have evidence that Salford EMTP compiled using Rev. 2.40 is less immune to Erratum 21 than Salford EMTP used a year earlier (which was compiled and linked using Rev. 1.67.

Dr. Kurt Fehrle lectured for a whole day about power electronics and its supporting aspect of control system modeling (mostly TACS, but some MODELS, too). In the Editor's opinion, this was a resounding success that should be repeated in future years. The only problem is that Dr. Fehrle could not disclose all data to students. Critical parts of the real industrial simulations were trade secrets of CGEE Alsthom (formerly G.E. Philadelphia), for whom Dr. Fehrle has worked as a consultant in recent years. This is just an early example of what is expected to be an increasing problem as time passes: more proprietary EMTP data for relays, load modeling, etc.

The new BOTH option of EMTP (to send LUNIT6 program output to both the screen and also a disk file) was agreed upon during discussion with Prof. Kurt Fehrle. A good instructor who wanted his students to follow closely

could not practically use the DISK option, since it would result in nothing being projected as EMTP executed. So, output typically was run to the screen. But then the LUNIT6 record of the simulation would be lost when execution ended. "*What you really should do is add a DISK2 option*," Prof. Fehrle had suggested. The Editor did, only using a different name that simplified the programming.

The PL4 command of TPPLOT was noticed to display one blank entry at the start of the numbered list of available files. This has since been corrected. The trouble was traced to instability of the position of file names within output of the MS-DOS DIR command. Perhaps because MS-DOS had changed (version 4.0 was being used in Gainesville), or because the working directory did not immediately follow the disk drive (as in D:\ATP), the file names did not begin on line number 5 as expected. Well, shortly thereafter, Bruce Mork, still in Norway, reported a much bigger problem with the PL4 command. It seems that the European MS-DOS has a substantially different display for DIR, which explained why execution would die on the PL4 command. The Editor could easily see that use of the MS-DOS DIR command was too unstable to be relied upon, so he quickly switched back to the use of Salford utility FILES@ which returns comparable information. To incorporate Mr. Mork's NEW command, however, it was necessary to understand MS-DOS compressed format for the date and time --- information that was provided by Laurent Dube. The result is a faster PL4 command, and one that should be universal for any country and any version of MS-DOS.

The computers in Gainesville were networked, but this important capability was not used for the course because of potential conflicts with DBOS in the use of extended memory. Might the newly-discovered DBOS qualifier /VDISK solve this problem? This has not yet been tried, but Prof. Carroll is aware of it.

The class was full, although there was serious concern several weeks prior to its start. Whereas one year ago the course had filled 5 or 6 weeks ahead of time, this year the limit of 20 was not reached until the final weekend. With one person not appearing as anticipated, the official, paying registration was 19. But with one visiting professor (Dr. Shawki El-Batal of the University of Damascus in Syria), the laboratory manager (Mario Parades), an occasional university student, and faculty, the facility was well filled.

More About Slow EPRI OS / 2 EMTP

"*Quarter-speed DCG / EPRI EMTP Using OS / 2*" is the title of a 3-page story by the Editor in the March, 1991, issue of *EMTP News* (see pages 89-91). Whereas most details of EPRI's bungled attempt to move EMTP to personal computers were summarized in the preceding (January) issue, no specific reference to *EMTP News* could be provided at that time.

But is OS / 2 really responsible for the 76% loss of simulation speed? More than one reader of the March story has echoed the Editor's suspicion that DCG and EPRI just might possibly be having EMTP problems that transcend Intel microcomputers. Only careful observation can answer the question, so the call for comparisons using other computers to simulate DC-1 continues. No such DCG / EPRI EMTP simulation has yet been received, however.

Chet Davis of Electrical Systems Analysis (ESA) added a different perspective in a call of April 19-th. It seems that the use of FORTRAN with OS / 2 is not recommended by Microsoft experts, who seem to advance "C" as the language of preference. So, we have another possible explanation for the extreme inefficiency of EPRI's EMTP under OS / 2 : Is it possible that somehow Microsoft provides inferior service for Fortran? Your Editor has never heard of such a thing, but who is to say?

The fate of *EMTP Review* is not known. Has any reader seen a copy printed this year? The Editor raises this question now only because he had challenged this "voice of EMTP commercialism" to publish the embarrassing truth about OS / 2 EMTP simulation speed. Quoting from the final paragraph on page 90 of the March issue of *EMTP News*: "*Now the question is: Will EMTP Review inform its readers how slow EPRI's OS/2 version of the DCG / EPRI EMTP really is? A copy of the present article has been mailed to Madison, Wisconsin, attached to a cover letter dated March 3, 1991*." Well, the response from Madison was surprising. In a memorandum dated March 11-th, Prof. Long stated the following: "*As I am no longer associated with the EMTP Review, your letter and attached EMTP News article have been forwarded to the new editor, Tom Grebe of Electrotek, with copies to H. W. Dommel, D. J. Mader, and R. Adapa*." Does this mean that readers have seen the last of the slick paper and green ink that characterized publication in Madison? What does the replacement look like? As of April 20-th, EMTP users at BPA have seen nothing.

Salford EMTP Under DESQview

Salford EMTP running within a window of Quarterdeck's DESQview is described by Harold Wehrend of the University of Hannover on pages 39-45 of the March, 1991, issue of *EMTP News*. This complements the first report of such use which was published 9 months earlier by Stuart M^{c}Kay (see pages 24-27 of *EMTP News* dated June, 1990). Important additional information is

now available.

Mr. Wehrend summarizes experience using DESQview with four different 80386-based computers in Hannover, Germany:

1) a 16-MHz 386-SX with 2 Mbytes of RAM running MS-DOS version 3.3 ;
2) a 16-MHz 80386 with 4 Mbytes of RAM running DR-DOS version 5.0 ;
3) a 25-MHz 80386 with 4 Mbytes of RAM running DR-DOS version 5.0; and finally,
4) a 33-MHz 80386 with 4 Mbytes of RAM running MS-DOS version 3.3 .

Not only does this collection vary from the slowest to the fastest 80386, it also includes variation of the operating system. Whereas MS-DOS comes from Microsoft, DR-DOS is a similar, mostly-compatible product from Digital Research. Not only have those in Hannover confirmed that Salford EMTP is compatible with DR-DOS, they also confirm that its use within DESQview is. This is an important finding.

The most serious problem reported in using Salford EMTP with DESQview was possible incompatibility with some hardware: "... *there might be older hard disk controllers that cannot manage the timing for that heavy disk action, or there might be graphic cards that cannot be detected by QEMM. Only (then) .... you will have to ... use one of the starting parameters of DESQview*." Computer number 2, believed to be Mr. Kizilcay's home computer, "*failed when two programs tried to use the hard disk*" because of "*an old and slow MFM-type hard disk controller. ... The installation of a faster controller solved that problem*."

The overhead of DESQview for running BENCHMARK DC-1 and DC-3 is clear from Mr. Wehrend's Table 1. Without DESQview, it is said that case summary statistics show times of 285 and 18 seconds, respectively, for the 33-MHz 386. Running within a DESQview window, these times lengthen to 298 and 20 seconds, respectively. This should reassure those who worry about slowing simulation by the use of DESQview. The loss of speed would be easily tolerated by a user who wanted to use his computer for other tasks while Salford EMTP was running.

"*The amount of memory should be 4 MB or more*." This is the important summary conclusion of the paper, which is explained as follows: "*Working with 2 MB or less means that DESQview will swap Salford EMTP to disk when starting another extensive program like Microsoft Word 5.0. This makes no sense for the user because EMTP simulation is stopped and reactivated when leaving the other program. If you have less than 2 MB extended memory, the only use could be to run little programs without waiting for the end of EMTP simulation. After finishing that little task, EMTP goes on running.*"

1000-MVA Transformer Inrush Current

"*Inrush currents of a 1000 MVA transformer bank; comparison with EMTP results*" is the title of another important contribution from the University of Hannover in the March issue of *EMTP News*. The author of this paper that occupies pages 46 through 60 is Peter Riedel, who was coauthor with Mustafa Kizilcay of the famous first report of success using Salford EMTP (December, 1989, issue of *EMTP News*). The remainder of this story is quoted from Mr. Riedel's paper. First the Abstract (one paragraph), followed by the 3-paragraph Conclusion:

"*The measured curves of the inrush currents of a transformer bank are compared with the results of EMTP. The transformer bank consists of three single-phase autotransformers with tap-changing transformers. An approximation of the transformer saturation curves leads to reasonable amplitudes of the inrush currents.*

The approximation of the nonlinear transformer magnetizing curves was the most difficult part of the determination of the model parameters. A correct modeling of the saturated region of the magnetizing curve is of considerable importance. Otherwise the amplitudes of the calculated inrush currents are not correct. It has been shown, how the last segment of the approximation curve can be determined, supposed the magnetic flux density for the saturation of the iron core is known.

Although hysteresis and remanence (sic.) have not been considered in the model, and each magnetizing reactance was represented by only two linear segments, the measured and calculated inrush current curves showed a good agreement."

Tsu-huei Liu and Kids Publish News

Dr. Tsu-huei Liu's contribution of printing and mailing the January issue of this newsletter, and also accounting associated with *EMTP News*, are gratefully acknowledged. In fact, it was she and her children, Kwang-yi and Kwang-chien Ger, who published and mailed the January issue. The front page did not give this credit only because of a shortage of time to make the correction at the last minute (during April!).

The MS-DOS version of EMTP continues to be supplied by Dr. Liu from the home computer in her basement. Yet, orders are decreasing rapidly.

Prof. Mohan Spreads ATP Message

Prof. Ned Mohan of the University of Minnesota continues to show others how ATP solves problems of power electronics.

"*A novel approach to integrate computer exercises into teaching of utility-related applications of power electronics*" is the title of Prof. Mohan's paper that has been scheduled for presentation at the 1991 IEEE Summer Meeting in San Diego. Point number 3 of the SUMMARY AND CONCLUSIONS section concludes that "*... at present, the royalty-free SPICE and EMTP are the best suited for this application.*"

San Diego is to be the site of Prof. Mohan's first portable EMTP short course. This will be Thursday afternoon and Friday, immediately following the 1991 IEEE PES Summer Meeting. Then the course will be repeated twice in Dallas (first September 24-25 and then again September 26-27). This course is different in that no ATP licensing is required, and students will not be using EMTP on their own computers (although instructors will be projecting such execution on a big screen for all to see).

Marseille, France, is to be the site of a week-long EMTP short course about rotating machinery and power electronics at the end of May. Organized by Prof. G. A. Capolino of Institut Mediterraneen de Technologie, this is sponsored by the Common Market's Erasmus Project. The advance schedule that was received from Marseille by FAX dated April 8-th shows only Prof. Mohan's name beside the final 2 days. Day 1 has the name Prof. Van Dommelen (of Leuven, Belgium), day 2 the name Prof. Capolino, and day 3 the name Prof. Martinez (of Barcelona, Spain).

The European Power Electronics Conference (EPE) is to be held September 3-6, 1991, in Florence, Italy. The abstract already has been accepted for a paper entitled "*Computer-aided education of power electronics.*" Involving ATP, this paper now is being written by the same three authors of the popular John Wiley textbook on power electronics: Professors Mohan, Undeland, and Robbins.

Sun SPARC ATP at Taiwan Power

Taiwan Power Company (Taipower) had sent a 60-Mbyte Sun cartridge tape to Portland many weeks ago. This tape finally was loaded with Sun EMTP FORTRAN files and returned by Air Mail on April 9th. The idea is to complement the work of ABB in Zurich, Switzerland by providing a second, independent source for Sun SPARC versions of EMTP. Unlike Mr. Platter's testing in Zurich, Mr. Chiang's testing in Taipei is not expected to involve GKS.

John Swartzenberg of Drexel University in Philadelphia should be another source of SPARC EMTP versions in the near future. Once Mr. Chiang in Taipei confirms that no files are missing on his tape (this was a problem for Mr. Platter in Zurich!), a tape will be copied and mailed to Philadelphia.

C-like .PL4 Files for Salford EMTP

C-like .PL4 files are recommended for serious users of Salford EMTP on 80386- or 80486-based Intel microcomputers. The present story is a continuation of the brief mention in the preceding issue (see page 3, column 2).

Some time in the near future, it is expected that C-like .PL4 files will become the default choice of Salford EMTP files that are distributed to others by the user group. That is, the STARTUP files and BENCHMARK DC-XX data cases will be converted from the present FORMATTED choice to the faster and more compact C-like choice. One computer that is used by ATP developers already has been converted this way, and others should follow soon.

For START AGAIN use, C-like .PL4 files are particularly useful. More than just a question of efficiency, the issue is flexibility. Having made the C-like choice, the old .PL4 file is connected at the start of the continued simulation using $OPEN with one of the following two choices for STATUS : 1) Use OVERLAY if new points are to be laid on top of old points (thereby destroying them in the process); or 2) use APPEND if new points are to be added at the end of old ones, resulting in a continued or concatenated .PL4 file. BENCHMARK DC-49 within ALLSEE.ZIP illustrates the latter of these two alternatives.

Salford EMTP Runs Fast on 80486 !

"*Intel 80486s run Salford EMTP for 80386 at very high speeds*" is the title of a 2-page article that will be found on pages 87 and 88 of the March, 1991, issue of *EMTP News*. Authored by Prof. Dennis Carroll of the University of Florida, Dr. Laurie Snider of Consultek Services, and the Editor, this paper shows that the 80486 represents an important leap forward for those who have a practical use for increased simulation speed. This conclusion is based on independent tests of two different 25-MHz 80486-based computers in Florida and British Columbia during the latter half of February, 1991.

A 25-MHz Hewlett-Packard Vectra was the 80486-based computer tested in Florida. For enormous BENCHMARK DC-1 , time spent within the time-step loop was a mediocre 262 seconds using DBOS/386, but

a spectacular 95 seconds using DBOS/486. This is just one of many comparisons that were presented in the March article. The conclusion is simple: one can run the 386 Salford EMTP plenty fast on a 486, but one needs the 486 Salford DOS extender to do it. Unfortunately, the right to distribute DBOS/486 free of charge to end users has not yet been negotiated.

Lahey programs for the 386 do not seem to need a separate DOS extender for the 486 according to Marc Coursol of Cyme International in Montreal. Mr. Coursol was surprised to learn of the Florida results. He explained that Cyme transient stability simulation will run about 4 times as fast on a 486 as on a 386 --- without changing any software at all. So why the Salford distinction? Switching to 486 Salford products should solve the problem since these should perform at maximum efficiency for both the 386 and 486. May 1st, Prof. Carroll reported that for a 386, DBOS / 486 seems to support Salford EMTP as well as DBOS/386. So, it seems likely that LEC will switch from /386 to /486 products (compiler, linker, DOS extender) soon.

No 80486-based computer yet is available for EMTP use within BPA, although one is expected soon. The Editor hopes to have his own (including Unix and Szymanski's extensions) for purposes of EMTP development, and Salford EMTP user Gerald Lee hopes to upgrade his present 33-MHz 386 soon.

Prof. Dennis Carroll has the distinction of being the first serious production user of Salford EMTP on an 80486. For work with a defense contractor, Prof. Carroll purchased a 33-MHz clone (Touche 5550T by Touche Micro Technologies) at the price advertised in PC Magazine during March. This was $5499 for the complete tower configuration including 8 Mbytes of RAM, a 338 Mbyte hard disk, a 768 by 1024 Sony color monitor, and 2 floppy disk drives.

Breaking Intel's Monopoly on 80386/7

Imitation 80386s are not far off, if one can believe the April 30-th issue of *PC Magazine*. John Dvorak's "*Inside Track*" column appears on page 83, from which the following is quoted: "*With AMD coming on-line with its 386 clone and Nextgen about to announce a 386 clone with RISC aspects, all hell is going to break loose. Word has it that Chips and Technologies will release a 386 clone too. The company to watch, though, may be performance-minded Weitek, makers of coprocessors. Here's a company with some hotshots itching to do a processor chip, I'm told.*"

The Cyrix coprocessor was first benchmarked by Fred Elliott of BPA --- by accident! Mr. Elliott recently was given a 33-MHz 80386-based computer some time during March, and he naturally installed Salford EMTP quickly. Using BENCHMARK DC-1 for experimentation, Mr. Elliott and the Editor were shocked to find that time spent in the time-step loop was between 190 and 200 seconds. As now well known, something closer to 246 seconds (or 1021 seconds if running EPRI's OS / 2 EMTP!) was expected. Well, Mr. Elliott used SPEEDLM to reveal that "Cyrix 83D87" was being used.

Laurent Dube purchased a 25-MHz Cyrix 83D87 math coprocessor for his own home computer shortly thereafter (April 5-th). Mail order prices on that date, from Call Dram Company of San Francisco, were as follows: $355 for 25-MHz Cyrix and $48/Mbyte for 80 nsec RAM.

"*Intel revs up 25-MHz 486 to 50-MHz internal rate*" is the headline of an exciting front-page story in the April 15-th issue of Infoworld computer news magazine. This, too, was pointed out to the Editor by Laurent Dube. It would seem to be very important --- if EMTP is still CPU-bound on a 25-MHz computer. The idea is simple enough: the computer stays cheap because the same old, slow, 25-MHz motherboard could continue to be used. But numeric processing would occur at 50 MHz. This latest introduction is seen as another bold move by Intel to fight off AMD and other 386 clone makers. "*...growing sentiment within Intel is for the company to introduce as many variations on the 486 product line on April 22 as possible in an attempt to 'blow away' AMD's recently introduced 386 close.*" The cost is expected to be around $1200, and the competition from Advanced Micro Devices (AMD) is described as a "*40-MHz Am386 clone.*"

All of this competition in the Intel microprocessor marketplace certainly does look good for the consuming public! Henceforth, it is difficult to imagine many potential EMTP users who should consider using anything other than an Intel microcomputer. RISC workstations no longer hold the attraction that they did a year ago. For 99% of EMTP users, an Intel microcomputer will provide all the simulation speed that is needed at a much lower price.

Salford TPPLOT Uses Mouse, Too

Pages 5 and 6 of the previous (January, 1991) issue of this newsletter described the enhanced Salford TPPLOT, but only mentioned use of the graphic cursor and mouse in passing. This was the final enhancement, and there just was not room or time for it. But now there is (this is a continuation).

The graphic cursor, a cross, will appear at the center of the screen when the **F7** key is pressed. This assumes that the user has a mouse, and that it has been connected using Microsoft-compatible drivers. It also assumes that the screen is in graphic mode (note that the cursor is not yet being used in character mode). Actually,

the **F7** key is a binary toggle: when the user is done with the graphic cursor and mouse, he need only press **F7** again to remove the graphic cursor.

The graphic cursor can be positioned on the screen in several ways. Most obviously, as the mouse is moved, the cursor will move. Alternatively, the horizontal and vertical arrow keys can be used. Finally, TPPLOT itself may position the cursor to show the location of plot points (more about this usage of **F1** through **F6** later).

Button 1 (the left button of a 2-button Microsoft mouse) is used to mark the screen with a cross and return the associated coordinates in a small rectangular window (hereafter referred to as the digital readout box) in the upper left of the plot. Button 2 is used to draw a straight line between the present location and the preceding marked point, and display the slope of this line in the digital readout box. If **F8** is pressed, coordinates of the last-marked point will be updated when button 2 is pressed. Then a piecewise-linear curve results as button 2 is pressed repetitively during mouse movement. Finally, **F9** requests a continuous readout of (X, Y).

Function keys **F1** through **F6** are used to request a readout of plot points for curves numbered 1 (marked as "a") through 6 (marked as "f"). Once one of these function keys has been pressed, the cursor will be transferred to the extreme right of the associated curve, and the associated coordinates will be displayed in the digital readout box. Next, the horizontal arrow keys <--- and ---> are used to move the cursor along the curve by the variation of time. Of course, the digital readout will be modified in lock step. The mouse should not be moved during such use because it will pull the cursor off the curve where it belongs. To end such operation, press the **Esc** key. Further details are provided by the HELP command under the BITMAP entry.

Erasure of all mouse markings and the digital readout window is trivial. The user need only hit **<CR>** to return to character mode followed by **F1** to restore the current bit map. If the cursor is wanted, **F7** must be pressed once again (the cursor was removed automatically during the shift to character mode).

Miscellaneous Concluding Thoughts

Wendell Neugebauer and Stuart M^{c}Kay both deserve a public apology from the Editor, who was unable to submit their contributions in time for publication in the March issue of *EMTP News*. Well, readers now are advised to look in the June issue for articles that detail the theory behind EMTP modeling of mass drivers (Mr. Neugebauer) and the use of PC PaintBrush on .PCX files (Mr. M^{c}Kay).

Khin Swe of Ebasco Services in New York City has been an ATP user for a long time. In fact, she holds the record for Salford EMTP dimensioning (her request exceeded 8 Mbytes total). Well, some of the Ebasco ATP usage has been described in a 2-part IEEE paper about superconducting energy storage that Khin Swe mailed to ATP developers in Portland on April 1st. "*400 MW SMES power conditioning system*" is the title and I. D. Hassan, R. M. Bucci, and K. T. Swe (all from Ebasco) are the authors. Presentation will be at the IEEE Power Electronics Specialist Conference that is to be held in Boston during June, 1991.

"*Guidelines for representation of network elements when calculating transients*" was seen on a list of CIGRE publications within the February, 1991, issue of Electra. Other cryptic information associated with this offering is: "CE/SC 33 GT/WG 02 (30 pp) 1990." The price for members is 130 FF, which contributor Bob Wilson of the University of Idaho in Moscow has converted to about 26 U.S. dollars.