Can / Am EMTP News

Voice of the Canadian / American EMTP User Group

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Salford FORTRAN Compilers

"80-bit floating point calculations" is an interesting title of a section of that documentation of Salford FTN95 (see mention in preceding issue). Three choices of precision are listed, beginning with the familiar old single precision (*"approximately 7 decimal digits of precision"*). Double precision is said to offer *"approximately 14 decimal digits of precision."* Nothing radically different thus far. But look at the third alternative : *"KIND = 3, 80-bit numbers which have approximately 19 decimal digits of precision."* Recall Lahey offered quadruple precision (see the July, 2000, issue), but this suffered from a serious loss of speed. Salford's 80-bit alternative has lower precision (80 vs. 128 bits), but it promises more-normal speed : *"All three formats use the coprocessor hardware on x86 chip, and so there is no great speed penalty for operating in high precisions."* Interesting! An extra 5 decimal digits would be very nice, if one did not need to pay an arm and a leg to obtain them. Salford F95 offers this promise, and it looks like an important potential advantage for ATP use. Lahey quadruple precision does involve a *great speed penalty*, so if Salford can avoid this by using hardware instead of software, maybe it has made an ideal and clever compromise that should be of interest to all.

MS Windows ME (Millennium Edition) is used by BPA's Dr. Tsu-huei Liu at home on a relatively-new Pentium III-based PC. January 30th, she reported ATP compatibility --- not only with GNU Mingw32 ATP (this was expected), but also with Salford DBOS, EMTP and TPPLOT, too. Conclusion : ME runs under DOS (see *DR-DOS* or *Caldera* in the October, 1999, issue), and is basically just one more insignificant flavor of Win95.

MS Windows 2000 is incompatible with Salford DBOS (and hence F77 Salford EMTP) just as MS Windows NT is. In E-mail of the EEUG list server dated March 5th, Robert Wheat of LANL in Los Alamos, New Mexico, explained: *"As long as Salford ATP is compiled with the Salford DBOS compiler, the answer is Salford ATP will not run under Windows 2000. The following was snipped from an*

FAQ found on Salford's web site ... Windows 2000 is really just an upgrade to Windows NT 4.0 and is technically Windows NT 5.0" Private clarification one day later included the following insight : Win 2K *"is not a **new** operating system. It is Windows NT 4.0 with some of the bells and whistles from Windows 98 patched in. There have been enough changes made so that some (not all) hardware drivers written for NT 4.0 will not work with NT 5.0. On top of this, many companies (hardware manufactures etc.) are refusing to re-write their hardware drivers in support of NT 5.0. This means that if you want to upgrade your operating system to NT 5.0, you may have to buy some new hardware as well."* Later in the same message, Mr. Wheat made a positive observation about reliability : *"I believe that the 5.0 system is more stable (fewer crashes) than the 4.0 system, and that the 5.0 system makes better use of virtual memory thereby improving it's multitasking abilities."* The improved stability later was confirmed by computer expert David Szymanski, who wrote on March 13th : *"I find it to be more reliable than NT and requires fewer reboots, supports sparse files and lots of memory."* Recall Szymanski recently specialized in MS solutions (see the October, 1996, issue), and seems to have been rewarded in the market place: *"Our business has grown substantially over the last 3 years with 8 Microsoft Certified Professionals and Engineers on staff."*

Fortran 95 from Lahey Computer

Multiprocessor support using Linux dominates *"Lahey's Winter 2001, Fortran Source Newsletter,"* which was received from the factory via E-mail dated February 20th. This is a continuation of the initial mention in the April, 2000, Can/Am newsletter. The advertising continues : *"PRO v6.0 now offers three ways to improve the performance of a Fortran program by building it to run simultaneously on more than one processor: 1) by having the LF95 compiler automatically parallelize your program, 2) by adding OpenMP directives to your code, and 3) by making calls to a publicly available message passing library such as MPICH. The goal of parallel programming is to save elapsed execution time by using two or more CPUs simultaneously. Execution speed improvements in LF95 come from splitting up loops among available processors. ... Among the impediments to increased execution speed are the overhead for initiating and managing threads on more than one processor, a lack of large arrays and loops operating on them, and I / O intensive rather than computationally intensive programs."* Of course, the first alternative is the most appealing since it would seem to require no special programming: *"Use automatic parallelization on your Fortran program if it is to execute on a single computer with more than one processor. This is called shared memory parallelism. The LF95 compiler automatically parallelizes DO loops and array operations without you having to make modifications to your program. ... While certain loops can be analyzed sufficiently to be parallelized by the compiler without input from the programmer, many loops have data dependencies that prevent automatic parallelization because of the potential for incorrect results. For that reason, LF95 PRO also includes optimization control lines (OCLs) with which you provide information necessary for the compiler to parallelize these otherwise unparallelizable loops."* Right, so how amenable to such automatic parallelization is ATP? About Linux, Tom Lahey seems optimistic but a little skeptical. In a separate letter, the company head writes: *"To be frank, there are a number of issues we're concerned about: ... 3) Is Linux the answer to the Fortran community's prayers? Or will fragmentation (the proliferation of not-completely - compatible - with - each -other Linux releases) send Linux to the dust bin? Fragmentation has become a serious problem."*

Use of Lahey's quadruple precision (see the July, 2000, issue) is explained in a separate story.

The difference between dynamic dimensioning of ATP and dynamic memory allocation of compilers was explained by a discussion of the EEUG list server. On March 1st, Robert Wheat of LANL in Los Alamos, New Mexico, wrote about GNU: *"The Fortran compiler (G77) that is part of the Gnu Compiler Collection (GCC) does not include the Fortran extension for dynamic memory allocation."* In response, your Editor agreed as follows (remainder of paragraph): Unfortunately, the term *dynamic* is being used by different persons for different things. What has just been described is the correct terminology for compilers. F77 does not have dynamic memory allocation whereas F95 does. Since G77 is not yet F95-compatible, the statement is true. But ATP involves a different issue. What in 1993 I chose to call *dynamic dimensioning* is not this arbitrary. It is good, and better than the preceding *variable dimensioning*. But it is not this good. Dynamic dimensioning of ATP allows the user to allocate table sizes (see LISTSIZE.DAT), but only within predefined limits (see LISTSIZE.BPA). This technique, independently discovered by Robert Schultz of NYPA and this writer, works for any F77 compiler tested thus far, and this includes G77. Dynamic dimensioning of F95 has been described much of last year using the Lahey compiler. See newsletters. When available to others, it is easy to imagine confusion about terminology. Since the name *dynamic dimensioning* already has been applied to something different, maybe we could call the F95 alternative *true dynamic dimensioning*? This writer is open to suggestions from others.

News from Outside USA and Canada

Iran last was mentioned in the January, 2000, issue. Close to the end of that year, more was learned from Masahiro Kan, the Vice Chairman of JAUG (the Japanese user group). December 12th, BPA received its copy of forwarded E-mail from one G. B. Gharehpetian of Amirkabir University of Technology in Tehran, who

mentioned a commercial alternative: *"As a university professor I cannot solve the political problems and conflicts. So I think for me and other users in Iran who are proficient users of EMTP, the best solution is working with EMTDC. For this option we must pay only $500."* It should be explained that JAUG had advised: *"We are sorry we cannot approve your license application. The reason is that your country has no diplomatic relation with USA, and in the Japanese law, your country is listed in the prohibited area to re-export the technology created in USA. For your reference, I attach the description in the Can/Am EMTP News"* (the paragraph in the January, 2000, issue). Your Editor's question should be obvious: if Canada allows the export of an EMTP-like program to Iran, would it not also allow the export of ATP to Iran? And if Canada allows this, would not other countries? The advice of the January, 2000, issue is reiterated: approach some other supplier. If the USA might have added complications, and if Japan might have export controls, find an agent in a country that has neither. Then nothing more than simple, legal forwarding should be required, and the price should be far less than $500 (even Canadian, which equals about 328 U.S. dollars as computed by Bloomberg early in the morning of February 13th). Remember how a company in Libya was supplied: via ENEL in Italy as documented in the April, 1997, issue. Of course, someone first would need to verify that Libya and Iran are treated comparably by the U.S. government (so that free ATP licensing would not be prohibited). Even if that failed (possibly the restrictions on Iran are tighter), other user groups could be approached. Your Editor is not pleased to learn that various Iranian organizations might pay the EMTDC factory in Canada before exhausting much cheaper alternatives that involve alternate suppliers of ATP. *Only $500* might be the price for a university, but a company would pay much more.

Internet address zjklj@sina.com.cn in China seems unreachable from BPA. This much became clear April 30th when your Editor's message of the previous day was timed out (a familiar 24-hour failure). During February, there were two other time-separated attempts to send E-mail to the same address. Both failed the same way. During February, both your Editor and Dr. Liu attempted to respond to a handwritten (old-style) application for an ATP license. First, we thought that perhaps we were unable to read the handwriting perfectly. But then, April 29th, BPA received its first E-mail from the guy: *"I am an engineer of Zhangjiakou Power Company. I applied for the license of using ATP program in this January. But I got no reply."* This message confirmed the address that had been used. First a "Reply:" was attempted using MS Outlook 98, but this bounced. Your Editor then noticed that MS was not using the ".cn" termination, so he sent a second copy to the address stated in the opening sentence. But both attempts failed. Eventually the 2-page message was printed, and was mailed by conventional Air Mail on May 2nd. What reader has an idea about the trouble? Is it possible that some Internet services in China do not accept messages from outside the country?

More about the Internet and E-mail

Junk E-mail from Nigeria is the latest sign of the Internet revolution. For many years, there have been junk telephone calls from Nigeria to America, trying to locate persons gullible enough to believe that they might share hidden money in exchange for help removing money from the country. But telephone calls are relatively expensive. It should be no surprise that the scam seems to have been switched to practically-free E-mail, which enjoys the added advantage of anonymity (the latest example came from a Hotmail address). Received at BPA on January 31st is a message that claims to be from Mohammed Idris Abacha, *"the son of the late General Sani Abacha, a past Head of state of the Federal Republic of Nigeria."* Pursued by the government, this guy supposedly was able to remove $42 million of the family's much larger fortune *"to a neighboring country ... sealed in trunk boxes."* Now he wants help *"dispensing of these funds in your country. Remuneration is open to negotiation."* As your Editor has written before, *"a fool and his money are soon parted"* (famous adage). Thanks to the Internet, the separation now can be accomplished more economically.

Dynamic currency calculation is performed by Bloomberg --- one of many such free services that are available on the Internet. As discussed with EEUG Chairman Mustafa Kizilcay in E-mail dated January 25th, an important detail is the direction of the conversion. Bloomberg's calculator requires the selection of both a *"from"* and a *"to"* currency, and it also allows the optional specification of an amount (defaulted to unity, of course). About time, Bloomberg warns: *"pricing delayed 15 minutes."* So, the computation is both dynamic and directional; and since Bloomberg is American, prices might correspond to American markets (e.g., Chicago). As your Editor wrote Prof. Kizilcay: *"If just one rate was given, and if one does not know in which direction it applies, there is either a 100% chance that it is wrong (if the average) or a 50% chance (if in one direction, but the direction is unknown)."* One can not make the round trip without paying commissions twice. Readers who are interested in using the service are referred to **www.bloomberg.com** Click on *"currency calculator"* under the *"Markets"* heading at the top of the left margin.

Yahoo is famous for free E-mail (e.g., see the April, 1999, issue), but what about commercial E-mail? As Your Editor first noted at the bottom of a message from Iran dated February 11th, the mandatory Yahoo advertising has changed. It now reads: *"Get personalized email addresses from Yahoo! Mail - only $35 a year! http://personal.mail.yahoo.com/"* The need for profitability of Internet companies (most of which lose money) seems to have increased, and even famous Yahoo has been affected.

The non-commercial nature of **.org** domain names was mentioned in the April issue. But this was general. The

precise meaning is complicated, and may be changing. Also, theory may differ from practice as explained in a story posted at *The Register* on March 2nd. The title is *"Fury at ICANN / VeriSign over .org domains."* In dispute is the real meaning. Does .org mean non-commercial, or does it instead mean non-profit? One critic observed: *"If you grandfather existing .org domains, I don't have a major problem with this proposal. If, however, ICANN attempts to force existing .org domain holders to comply to USA-specific definitions of non-profit corporations, there will be a serious backlash. ... Org has been recommended by IANA as the namespace for personal domains for some time."* Another critic explained that *"the proposed changes specifically state that .org will become a domain 'for the specific use of non-profit organizations'."* It is hoped that EEUG would satisfy this requirement, so there should be no problem with **emtp.org** --- even if grandfathering (which means that anyone who had a .org name previously would be allowed to keep it) were not included.

"Australia outlaws e-mail forwarding" is the title of a story that was posted at *The Register* on March 5th. The opening sentence reads as follows: *"Outrageously strict Internet copyright laws which have just gone into effect throughout Australia make it illegal to forward an e-mail memo without the author's permission, and could result in fines of $60,000 or five years in the slam, according to a story by the Aussie Sunday Telegraph."* Presumably *slam* is British slang for *prison*. As Register author Thomas Greene concluded, *"this could rank as the world's most copyright-friendly and common-sense-hostile piece of legislation yet devised."* Later that same day, there was a continuation: *"Aussie AG denies e-mail penalty, sort of."* Paragraph two explains: *"Contrary to alarmist media reports, sharing e-mail is not banned by law"* according to a press release by *"Australian Attorney General Daryl Williams."* According to this character, *"a court would need to find that the contents of the E-mail were an 'original literary work' ..."* Well, yes, this **is** the basis of copyright law! It is the foundation for claims that one's writing can not be used by others without permission. Your Editor can only conclude that the original newspaper story was correct, although enforcement seems unlikely. This might be Australia's improvement on America's pioneering legal work involving perjury (recall Bill Clinton's sworn testimony about Monica L). What is happening to law and order? Alternatively, does the problem lie with semi-literate lawmakers? Whichever, the trend is disturbing.

"RUSH 24/7" is the name of Rush Linbaugh's latest commercial product. Recall **www.rushlinbaugh.com** was mentioned in the October, 2000, issue. As copied during mid-March, associated advertising states: *"When you join RUSH 24/7, you get the most Limbaugh allowed by law. You'll be connected directly to the Doctor of Democracy around the clock, 7 days a week!"* Apparently that is the origin of the name: 24 hours a day, 7 days a week. Rush broadcasts 3 hours / day and 5 days / week, so *"if you miss Rush live, you can listen to the entire show later that day or night or any time you choose for two weeks. Every broadcast is available for members in Quicktime, Windows Media Player or Real Audio, and at a level of audio quality 2.5 times that available to non-members."* This seems to be the prime attraction, although there are others such as *"exclusive Rush audio blasts"* and *"the DittoCam: Only 24/7 members will be able to watch Rush broadcast from his studio via the cutting edge RUSH 24/7 DittoCam. Rush will turn on the 'cam' when he wants to show you something or just to give you an inside look at what's going on behind the Golden EIB Microphone."* What else? Special E-mail and a *"private Rush e-mail address: Rush gets tens of thousands of e-mails each day. As a RUSH 24/7 member, you can e-mail Rush at a private address, where your message gets top priority."* A year of this and more for just $39.95 (could this possibly be a money-making operation?).

"Bush sends final E-mail" is the title of a UPI story having date March 10th that was found at **www.newsmax.com** Yes, this Bush is the American President George W, and the title means what it says: he is abandoning E-mail *"after lawyers warned him that any future e-mails could be made public ..."* About the preceding occupant of the White House, who was a lawyer: *"Bill Clinton never sent e-mails during his presidency ... But e-mails from Monica Lewinsky formed part of the evidence gathered by his prosecutor, Kenneth Starr."*

"Court considers digital copyrights" is the title of an important story found at the *ABC News* Web site. Dated March 27th, this account by Geraldine Sealey concluded: *"If the high court sides with the authors, the publishing companies would face massive liability claims."* The opening section begins: *"The president of the National Writer's Union is taking on several powerful publishing companies, accusing them of violating copyrights by republishing freelancers' work electronically without permission or additional compensation. ... Tasini and a host of other freelancers say they are fighting for their rights as the World Wide Web creates new ways of disseminating their work. Today, Tasini's case arrives at the U.S. Supreme Court, seven years after it was first launched. Across the nation, thousands of freelance writers, artists, photographers and illustrators are watching closely how it all unfolds. The case is the court's first real foray into the muddy terrain of who owns what in the online world."* The next section has title: *"Appellate Court Sides With Authors,"* and the opening sentence explains: *"At issue in the case is the 1976 Copyright Act, which has no provisions addressing intellectual property on the Internet."* Big names and a lot of money are involved: *"The publishers --- including The New York Times Co., Newsday Inc., Time Inc., Lexis/Nexis and University Microfilms Inc. --- claim that their right to reprint freelance work also gives them the right to distribute it to electronic publishers unless a contract prohibits it."* Watch this case, readers. It could be as important to the written word as the Napster litigation (see the July, 2000, issue) was to music.

Radio and TV giant NBC has been unsuccessful in its attempt to exploit the Internet. The story is educational. Found at the *Fox News* Web site is an AP story entitled *"NBC to absorb its money-losing Internet subsidiary."* Dated April 9th, this begins: *"NBC is shutting down its loss-ridden Internet subsidiary, acknowledging that any hopes of it becoming profitable had vaporized along with the online advertising market. Many of the 300 jobs there will be eliminated as the unit's assets are integrated into NBC. The announcement ... marks the latest move by a major media company to drastically scale back its Internet ambitions. The Walt Disney Co. and News Corp. have also absorbed their online units, and other media players have pulled plans to sell shares in their online operations to the public."* So how far did value of the stock fall? The collapse was comparable to that of Priceline (see the April issue): *"Shares of NBC Internet had fallen from a high of just above $100 in January 2000 to $1.50 on Friday."* The operating losses were equally spectacular: *"In the three-month period ending in December, it posted a net loss of $245 million on revenues of $31 million."* Incredible, a company that lost 8 times as much money as it took in? *"At its peak, the company was valued by investors at roughly $5.7 billion."* Only in their minds, as tulip bulbs were overvalued in 17th century Holland (see preceding issue).

European EMTP User Group (EEUG)

Proceedings of the year-2000 EEUG meeting in Wroclaw, Poland were received in the mail attached to a cover letter from Dr. Marek Michalik dated April 18th. Slight photo reduction (note that 71% copy would save half the volume) and soft-cover binding were involved, with the blue cover including a picture/etching of some ancient building. Very nice. Dr. Liu was the first to page through the proceedings, and her attention was attracted to the alternative cable modeling of Dr. Lutz Hoffman at the University of Hannover in Germany. "*Cable model with frequency dependent parameters calculated by using subconductors"* is the title of the paper found on pages 29 through 36. Meaningful personal contact began May 7th.

Gabor Furst's color Christmas card was mentioned in the January, 1993, issue. Now, 8 or 9 years later, your Editor notes an important continuation of the idea. E-mail from EEUG Chairman Mustafa Kizilcay summarized his own recent use of a color printer in E-mail dated April 23rd: *"We distributed last week color printed leaflets of the meeting and course to about 500 users in Europe. Instead of offset printing, we preferred digital laser color printing, because it was not complicated and the price was very reasonable compared with offset printing (color: 0.81 DM/A4 page). Only one side of each leaflets is in color, the back side was copied in b&w, which costs 0.07 DM/page. ... The copy shop could print directly from our Word documents. For offset printing text and figures are required separately, I learned."* Prof. Kizilcay's invitation to the fall meeting in Bristol involved cover letter dated April 25th, which was opened at BPA on May 7th. Attached were the two folded sheets of paper --- one advertising the September 3rd and 4th meeting, and the other advertising the FACTS course on September 5th. Yes, only one side involves color, and of this only the 1/3 of the page that becomes the cover after folding. Looking very closely, this side has glossy black printing. The other (offset-printed) side has dull black printing. Also, looking very closely, characters of the laser-printed side seem sharper than the offset-printed side, although the difference is extremely small (not noticeable unless one looks for it). Very nice. The color is attractive.

Watcom ATP for MS Windows

Watcom compiler warnings in *.ERR files proved to be valuable during late February and early March. No two compilers check for exactly the same details, and sometimes Watcom warns of details that the others do not. So, every year or two, all Watcom .ERR files are looked at closely. This time, unused arguments of subroutine calls (e.g., *"... in RMINV, TEMPAA is an unreferenced symbol"*) and unused library functions (e.g., *"... in POCKET, SQRTZ is an unreferenced symbol"*) were corrected thanks to complaints by the Watcom compiler. The latter was the more serious. Whereas the former merely involved waste, the latter revealed a structural weakness: the pocket calculator had been hard wired to use double precision prior to the correction of POCKE4 on March 5th.

An executable GNU program is not guaranteed to halt upon division by zero. This rather startling news was learned from Walter Powell early in the morning of March 15th when he showed your Editor chapter 6, entitled *"Floating-point arithmetic,"* in the Cygnus *"Fortran programmer's guide."* The first paragraph under the section heading *"Trapping a floating-point exception - f77 vs. f90"* reads: *"With f77, the default on SPARC, Intel, and PowerPC systems is not to automatically generate a signal to interrupt the running program for a floating-point exception. The assumptions are that signals could degrade performance and that most exceptions are not significant as long as expected values are returned."* Mr. Powell had demonstrated operation using a small test program on his own PC, and later that same day Dr. Liu produced comparable results using hers, which has the Mingw32 (not Cygnus) compiler. The note she left indicates: *"Mingw32 does not trap this division by zero. But Watcom does."* So, it would seem we have another reason to keep Watcom ATP --- for persons who do not or can not use F77 Salford EMTP. Yes, this, too, does trap division by zero. DBOS opens its familiar blue window that complains of *"Error: Floating point division by zero."* This is without any use of the symbolic debugger (compilation did not involve the **/debug** qualifier).

A global SAVE within POCKET existed prior to removal (without great difficulty) on March 15th. Watcom

(but no other compiler) had produced several warnings about several COMMON blocks. One of these messages follows: *"*WRN* SA-02 in POCKET, COMMON block COMPID must be saved in every subprogram in which it appears."* Not understanding, your Editor concluded that it was time to switch to selective (only those variables that are necessary, it is hoped) SAVE declarations. Continuation 11 days later: Watcom provided no insight beyond that of Salford, which had been used for the initial experimentation. Both executed correctly for the Type-10 sources of DC-22. But not GNU Mingw32 ATP, which was killed by the operating system (a separate window opened, allowing the user to abort the ongoing dump of memory). Debugging Mingw32 ATP execution by means of special diagnostic WRITE and PAUSE statements on March 28th suggested the removal of one variable (KOMAND) and the addition of two more (ITEMP and LOCTIM) to the selective SAVE list.

News About TACS and MODELS

TACS supplemental variables and devices are ordered automatically by code that dates to visiting Chinese scholar Ma Ren-ming in 1984 (see mention in the April, 1996, issue). Previously, such logic was believed always to be an important asset. It was only while considering an enormous data case from Adeoti Taiwo Adediran of Texas A&M University in College Station that potential liability first occurred to your Editor. Another problem was involved, but to learn the real cause of the trouble (unprotected overflow of Type-53 devices as mentioned previously), your Editor simulated using Dr. Liu's 486 DX2-based PC. For a while, prior to discovery of the hidden retardation, your Editor suspected an infinite loop in GUTS2B. Only after the addition of special printout did he realize how slow Mr. Ma's innovation can be for huge data sets. The TAM data involved NSUP = 1861 supplemental variables and devices, and reordering required 10:08 to complete. Left in ATP on January 10th is a message that forewarns the user as the computation begins: *"Ma Ren-ming begins reordering of supplemental ..."* --- a message that will be seen even without diagnostic printout provided NSUP > 500. The second line of this message warns that *"time varies roughly as the square of NSUP. Progress will be monitored automatically for NSUP > 1000."*

Use of both TACS and MODELS in the same data case is illustrated by the 4th subcase of DC-30. What is not illustrated is trouble that might occur if the TACS data is in error. Yes, there is an error stop, but the message might be confusingly inappropriate. This was prior to correction (the addition of one line to OVER2) by your Editor on January 12th. The preceding day, Massimo Ceraolo of the University of Pisa in Italy had sent a data case that produced a complaint about MODELS. Upon investigating this, your Editor was surprised to learn that the ATP error flag KILL had been set within TACS . MODELS should not even have been entered, but it was, and the result was an inappropriate error message.

Delay due to MODELS can be minimized by removing everything possible from MODELS --- using TACS as much as possible. This idea suddenly occurred to your Editor while thinking about the hybrid (both TACS and MODELS) use of Massimo Ceraolo (see preceding paragraph), and then remembering Cornel Brozio's use of foreign MODELS (see the July, 1999, issue). Searching for *compiled MODELS* (note two spaces) in newsletter files then revealed earlier supporting thought. Read about Dube's original concept of compiled MODELS in the January, 1992, issue, and the subsequent idea of Prof. Juan Martinez in the April, 1993, issue. The common thread of all of these ideas is this: speed simulation by minimizing the reliance upon existing interpretive (and very slow) MODELS. Dube had proposed to do this by using compiled MODELS, but this never materialized for ATP users. Martinez had proposed the avoidance by USE of previously-compiled standard models for exciters, governors, etc. (easy enough for transient stability) . Unfortunately, Prof. Martinez's idea never could be tested due to the extraordinary interference of higher BPA management (which canceled Dube's contract to work on BPA's Transient Stability Program late in 1994). But note that Brozio demonstrated feasibility six years later! Your Editor now is convinced that the practical way to view combined TACS and MODELS is this: use MODELS only for what can not be modeled in TACS. Speed the simulation by minimizing the MODELS use. Dube may never have presented his hybrid capability this way, but this is the practical way to use it --- provided the delay of MODELS really is roughly proportional to the amount of use. Well, it is easy to demonstrate proportionality for simple arithmetic. Take those six pocket calculator operations of MATHATP.DAT as documented in the April, 1997, issue. Consider four tests, beginning with minimal use (nothing but TEST1 = TIMEX) in F:\DATA\MATHMOD2.DAT The other three consist of one, two, and three copies of the MATHATP data. All involve the single output TEXT1. Subtract the time for the first test from the times of the following three, using the usual average of the best 5 of 6 consecutive trials for each of the 4 tests. Finally, divide by the number of copies of data (1, 2, or 3). Using Salford DBOS under real DOS on your Editor's 133-MHz Pentium-based PC at home, 10K steps demonstrated surprising consistency when timed on January 15th :

```
Number of data copies :    1      2      3
Time in seconds/copy  :  6.154  7.099  6.579
```

Conclusion: you pay for what you use of MODELS, roughly. Use less, and simulate faster. For improved simulation speed, move all possible ATP data from MODELS to TACS.

Normal ATP comment cards can be mixed with MODELS data without difficulty --- in spite of the best effort of MODELS author Dube, who seems not to have

wanted to acknowledge the fact. It was during the morning of January 23rd that your Editor first realized MODELS compatibility with normal ATP comment cards, and then noted that the 8th subcase of DC-68 has illustrated such use since August of 1998 (it is surprising that this detail was never questioned)! About Dube's effort to maintain user ignorance, consider Section 2.1.4 of MDLSRBWP.955 (disk file dated 21 May 1995), which is entitled *"Comments."* Dube wrote: *"Two types of comments can be used."* True, but misleading. The complete answer is this: **three** types can be used, and Dube chose to ignore the simplest and oldest of the three (normal, old-fashioned ATP comment cards). How did your Editor discover the deception? He noted that Dube's TDATA called ATP input routine CIMAGE (which handles comment cards), so in fact comment cards were beyond Dube's control (fortunately) .

A syntax error of MODELS involves a KILL value of 401 or higher and is handled by routine SYNSTP (*syntax stop*). As installed by BPA contractor Dube during October of 1992, associated text sometimes involves either "{B1}" or "{B2}". For example : *"FOREIGN procedure_name {B1} ... {B2}"* Your Editor has no idea what this means, but he easily enough recognized incompatibility with ATP output routine TFLUSH following the improvement to handle KILL = 153 (see mention elsewhere). Recourse had been made to KILL CODES to test all ATP error messages at once, and your Editor observed that execution died on the very first one that involved either {B1} or {B2} (KILL = 404). Why no one complained about this years ago is not understood. Anyway, correction to TFLUSH was made January 29th, and KILL CODES output of all error messages then was demonstrated. Any user interested in repeating the experiment can employ bounding numbers 1 and 999 (in fact, the highest KILL number used is 759) .

A separate story describes use of the pocket calculator for the evaluation of TACS supplemental variables.

"Bug in MODELS DELAY function?" was the "Subject:" of E-mail from Prof. Mustafa Kizilcay of FH Osnabrueck in Germany. Dated January 30th, this mentioned *"trouble, if the ATP simulation starts from steady-state (type-14 source) and the signal passed to MODELS will be delayed inside MODELS."* True, the result was a KILL = 745 error termination, which complained as follows: *"The time value supplied to the function delay ... refers to a past time that lies outside the maximum delay ..."* But is ATP really at fault? Initially, Prof. Kizilcay thought that MODELS storage might be overflowing as it did four years ago (see Dube's famous stack overflow in the July, 1997, issue). Certainly this is consistent with the suggested remedy: *"A likely solution is to increase the number of cells to be allocated to this element in either the definition or the use of this model."* But your Editor did not agree. Instead, his initial reaction was that MODELS merely was reporting indirectly and confusingly that it had not initialized history using the phasor solution of the electric network. Unless and / or until some reader can provide a report to the contrary, this remains the official explanation.

Overlay-2 TACS diagnostic following the "KARG =" line was troubled prior to modification on February 9th. Before the improvement, unexplained blank lines had been seen for many years (probably since the beginning of ATP, if not earlier). Your Editor recalls studying this more than once during the past two decades, and never being able to explain the unexpected output. A high-level WRITE statement was involved, and for a reason that never was understood, it operated incorrectly. Finally (this time), your Editor decided that all the analysis was not worth the effort. The troubled high-level WRITE was replaced by lower-level programming. Indexing was removed from the WRITE statement. Also, a new line now labels the heading, as follows:

```
  Index  Supplemental variable   or   <---  ...
         ----  Supplemental device ---------->
```

This makes clear the fact that rows for supplemental variables use the columns on the left whereas devices use the columns on the right.

"MODELS primer now available in pdf format" was the *"Subject:"* of a semi-public announcement by Prof. Bruce Mork of Michigan Tech in Houghton. Dated February 20th, this began: *"We'd like to thank Laszlo Prikler for converting the existing MODELS primer into pdf format. I've placed in on the secure ftp site at Mich Tech. ... A password is required to access it. If you don't have the password, please check with the ATP users group that you are licensed with ..."* The following morning, Prof. Prikler announced availability of both this and the April newsletter using the EEUG list server. He explained: *"69 pages MODELS Primer (version 1) edited by Mr. Gabor Furst, which has been available as a WordPerfect file for many years, now has a PDF alternative. It is available (together with other MODELS related files) at the EEUG secure FTP site."* For mention of the original publication, see the January, 1995, issue.

Line and Cable Constants

SEMLYEN SETUP (SS) can be used with CABLE PARAMETERS (CP) as well as CABLE CONSTANTS (CC) beginning January 27th. It was while reviewing the ATPDraw story in the April newsletter that the decision to extend SS was made. First, BPA's Dr. Tsu-huei Liu warned about the use of either one for cables, for two reasons: 1) the transformation matrix [T] is assumed to be constant and real (in fact, it is complex and frequency-dependent); and 2) the Semlyen fitter is limited to order two (although the simulation code is not, as demonstrated by Dr. John Hauer's data of DC-41). For more discussion, review that Bonfanti cable of DCNEW-6 (see the April through October, 1994, issues for background). Of course,

Semlyen modeling suffers from the same limitation of constant [T] as does JMARTI modeling. Anyway, January 18th it was agreed that use of CP should be no more objectionable than use of CC, so the connection should be provided (once again, more rope with which each user might hang himself). The following day, your Editor began with mechanical changes: removal of the KILL = 60 error termination, and acceptance of the CP declaration. Left for Dr. Liu was the more complicated communication of frequency-dependent parameters from CP to SS (where execution died due to lack of them), and the suppression of unwanted CP printout. It was noted that standard test cases demonstrated no use at all of SS with cables, so after Dr. Liu completed her extension, the two data cases that she had used for testing were added to DC-60 as new subcases 2 and 3. Except that the first of these involves CC and the second CP, the two data cases are identical. A 3-phase cable without grounding is involved, so 6 coupled phases.

CC *"allows a more flexible grounding scheme than CP"* according to ATPDraw author Hoidalen (see preceding issue). This is true. Visiting Chinese scholar Ma Ren-ming did the work around 1984, and it generally is believed to represent progress. But Dr. Liu reminded your Editor of uncertainty by the CC author, Prof. Akihiro Ametani of Doshisha University in Kyoto, Japan. As best Dr. Liu and your Editor can recall from a decade or more ago, there was concern about the physical and mathematical validity of the elimination of arbitrary conductors. So, a moderate amount of skepticism on the part of any user is advised until this detail might be clarified.

"Warning. TFLUSH line truncation due to 255-byte limit ..." was seen in the diagnostic file when KILL = 153 was encountered. This corresponds to failure of SEMLYEN SETUP to perform the required fitting, and it was seen during late January, during the work to connect CC to Semlyen. For readers not wanting to use real data, a KILL CODES request (see DC-13) can be used to demonstrate the phenomenon. That was prior to January 29th, when TFLUSH was fortified to eliminate the trouble. This is the hope, anyway. Improved logic handled KILL = 153 without difficulty, anyway. If any reader with a newer program ever observes the warning message, he is advised to document details for program developers in Portland. About symptoms, the fatal error message will be distorted. Part of it will be missing, typically. For example, KILL = 153 produced this output: *"As for a remedy, the user might ... or he might attempt to impr quality ..."* Here *impr* was the start of *improve*, which was truncated by the 255-byte limit prior to the improvement of logic.

Temporary storage DUMSEM (20000) burdened ZYMX prior to its removal on January 30th. This completed the project of connecting SS with CP (see a preceding paragraph). The vector name remains, but has been variably-dimensioned using an existing list size. Details need not concern the user since it seems unlikely that overflow ever will occur (how many phases might SS successfully handle, anyway?). Nonetheless, civilized protection in the form of a KILL = 1 error termination has been provided.

Higher - Order Pi Circuits

The letter "K" is used to indicate thousands (kilo) for list sizes 13, 15, or 23 if a blank separator otherwise would be missing on the left as these entries are encoded at the beginning of execution. Thus began a paragraph at the end of the January, 1995, newsletter. Of course, that was before LISTSIZE.FGH (see the October, 1998, issue) , which extended the original problem to lists 3 and 5. Prior to work on March 23rd, the 132-column header line that documents lists 1 through 6 ended as follows :

```
  6002 10000192000   900320000  1200
```

Messy, eh? Well, after the change, this appears as :

```
  6002 10000  192K   900  320K  1200
```

List sizes in the header that begins ATP output were switched from fixed format to optimally-encoded numbers on March 26th. The same kilo scaling is being used, but now it is applied to each of the 30 list sizes when and where appropriate. The 132-column output line for lists 7 onward has been changed from fixed format to variable format, and this has saved enough space to add the two final list sizes 29 and 30 (previously, these were missing). There is an incentive to use multiples of a thousand in LISTSIZE.DAT since two columns are saved for each such use. Even small list sizes show substantial gains. For example, the commonly-used three times default dimensioning involves 3 such improvements, with the first of these being list 13 as shown in the following before-and-after views of the start of the first full line of numbers :

```
  2100   5250  225  480  150  150 15000    60  ..
  2100  5250  225  480  150  150  15K  60  ..
```

At least two blanks now separate each number, and there never should be more than 3 (note both 1 and 4 blanks are used to separate the old output). If space ever might prove to be inadequate, an error message should halt program execution. Any reader who ever encounters this problem is advised to send details to Portland for analysis. Unless and/or until trouble ever is reported, it is assumed not to exist. Advantages of the new logic include unlimited size for each list. Whereas previous encoding involved I5, I6, or I7 format, the new logic should handle all 8 possible digits (the limit of VARDIM input) without complaint, and will replace the final 3 digits with a K for any number of 6 or more digits.

New EEUG List Server

"Subscription probe for ATP-EMTP-L - please ignore" was the *"Subject:"* of E-mail from the EEUG list server on January 14th. Presumably every subscriber should have received such a copy, and not responded to it: *"You do not need to take any action to remain subscribed to the list, and*

in particular you should not reply to this message." Although not fully understood, the rationale behind this exceptional mail is interesting. A probe *"is ... tagged with a special signature to uniquely identify this particular subscriber (you can probably not see the signature because it is in the mail headers). If the subscriber's e-mail address is no longer valid, the message will be returned to LISTSERV and the faulty address will be removed from the list. If the subscriber's address is still valid, the message will not bounce and the user will not be deleted. The main advantage of this technique is that it can be fully automated; the list owner does not need to read a single delivery error. ... Another advantage is that the special, unique signatures make it possible to accurately process delivery errors that are otherwise unintelligible, even to an experienced technical person."* This all sounds good, but there seem to be limitations: *"a common problem with automatic probes is mail gateways that return a delivery error, but do deliver the message anyway. LISTSERV has no way to know that the message was in fact delivered, and in most cases the subscriber is not aware of the existence of these 'false' error reports."*

NOMAIL is a useful Listserv switch that suspends service of the EEUG list server for a given address. As confirmed by E-mail from Deputy EEUG Chairman Laszlo Prikler on February 28th, the NOMAIL switch **does** work the same way for the EEUG list server as it did for the preceding Fargo list server (see Prof. Bruce Mork's explanation in the October, 1991, issue). But NOMAIL is much more important for the EEUG list server because subscription is more difficult, and slower, for many. EEUG does not allow an interested user to re-subscribe himself on a moment's notice. Instead, the licensing user group must make the request; and over here in North America, this typically requires the delivery of two sheets of paper (printed from Prof. Kizilcay's Web form) by snail mail. So as not to bother Prof. Prikler too frequently, this typically is not done more than once a week. The effect is this: many subscribers are unable to change addresses quickly. So, if a different E-mail address might prove useful sometime in the future, think ahead. License an alternative address ahead of time even though it might not normally be used (the NOMAIL switch). At the instant a change is desired, apply the MAIL and / or NOMAIL switches to the two subscriptions. About the utility of NOMAIL, your Editor was responding to Dr. Li-Ming Zhou at the University of Connecticut, who had made this request: *"I will be away from my office for several months. I will not able to check my email ... But I can check email at ... Could you please add this email in the ATP email list ..."* The answer was no, unfortunately. About use of the switch, Prof. Prikler wrote: *"If one sends the command SET ATP-EMTP-L NOMAIL to the address LISTSERV@LISTSERV.GMD.DE , it will disable mail delivery. Each individual subscriber can set it by himself."*

SIGNOFF is another useful Listserv switch, and subscribers should be aware that EEUG has empowered its use. This is contrary to the situation during initial operation (see the October issue). E-mail from Laszlo Prikler advised as follows on February 26th. One can desubscribe or unsubscribe (term used by the Fargo list server) *"by sending a message to LISTSERV@LISTSERV.GMD.DE with a SIGNOFF ATP-EMTP-L command in the mail body."*

Missing E-mail from the EEUG Web form was a problem that first was noted February 2nd. More precisely, this seems to be the date of a failure of the system --- a problem that was realized on February 13th. The following day, your Editor explained to Prof. Laszlo Prikler: *"The latest complication of the on-line Web form was discovered yesterday. We had two pieces of paper (signed licensing forms) for which there was no corresponding E-mail. Both involve date February 2, and I believe this is too much of a coincidence to be random. My guess is that BPA's post office might have been off line that day. But Friday? During normal working hours, this would have been unthinkable. But after the close of business? Maybe. If you can think of a better explanation for the missing E-mail, let me know."* Later, a third missing message was identified, and this had date February 3rd. Prof. Prikler responded February 14th: *"The corresponding e-mail messages are sent by the CGI script to your canam@emtp.org address immediately when applicant clicks on the 'Send'. ... I do not know exactly what happens if the e-mail sent by the script bounces. As I remember, the header of this e-mail is complete. It contains 'From:', 'To:', 'Subj:', and 'Date:' fields. So if it is undeliverable, the mailer deamon will send it back to the sender's address specified in the 'From:' field. That is the theory."* But what about the canam@ address? Does this involve a third computer? If so, maybe we have the first sign of a double outage of significant duration (e.g., 24 hours). This always had been the one worry about mail forwarding: dependence on an extra computer. Unfortunately, no licensee was able to supply a copy of the missing E-mail. At first this seemed strange, but Prof. Prikler explained this lack in E-mail dated March 1st: *"As I expected, you are the only one who receives e-mail from the script. I filled the Can/Am form, clicked the 'Submit' and got back the HTML page including what I entered. At the same time the script sent an e-mail to you, but no copy to me."*

Yet another cause of missing E-mail from the Web form has been discovered: printing, and subsequently signing and mailing, but not clicking on the *"Send data"* button! The first such example of this problem had date 2001.02.27 and it came from a school in Connecticut. The paper copy includes all necessary information for licensing, although it looks completely different. It looks like the Web browser window prior to clicking on the *"Send data"* button! So, your Editor is preparing to key another missing disk file.

Legal disclaimers, automatically appended by an increasing number of company E-mail services, are prohibited by EEUG list server rules as first explained in the

October, 2000, issue. Recall E-mail from the former Commonwealth Edison in Chicago was used as an illustration, with the text referring to *"the Unicom family of Companies."* Well, shortly after that paragraph was written, it had been superseded, apparently. March 2nd, Jamal Khudai sent E-mail from Chicago, and your Editor noted a change in the disclaimer : *"Exelon? I do not remember this name. ... Have you guys been sold again (amazing)?!"* Five days later, confirmation was received: *"You asked about Exelon (EXC). Here is the company profile from Yahoo : Exelon Corporation is the holding company for ComEd, PECO Energy Company, Genco and other subsidiaries. ... In October 2000, PECO Energy Company and Unicom Corporation merged in a merger of equals ..."* As far as your Editor knows, PECO includes what once was Philadelphia Electric --- another huge company, and one that was well known to system planners of decades past thanks to free PE load flow and transient stability programs for IBM System 360 and 370 mainframe computers. Conclusion: for better or for worse (your Editor suspects the latter, sometimes), conglomeration of the industry continues unabated.

Superposition of Phasor Solutions

Use of $ERASE among source cards was found to be incompatible with phasor superposition (see newsletters beginning with January of 1999) prior to correction of OVER4 on March 11th. This was data case RAUL.DAT from Orlando Hevia of Universidad Tecnologica Nacional in Santa Fe, Argentina. The previous day, he had explained that *"the DBM file.dat data case that generated the user file.pch has a $ERASE ... This $ERASE sentence is transmitted to file.pch. ... The simulation aborted because the $ERASE was in the sources section of data case."* Yes, for a case involving superposition of phasor solutions. Except for this particular location within data of this particular type, there would not have been a problem.

Automatic addition of sources to represent all preceding harmonics (for the final excitation set) is possible as mentioned in the April, 1999, issue. However, prior to correction on March 13th, this worked only for voltage sources. Current sources had not been properly accounted for, and they produced catastrophic oscillation beginning on the first time step, as first observed by Orlando Hevia. This was March 13th, when OVER4 was corrected and a new 19th subcase was added to DCNEW-26 to illustrate correct operation for a current source.

ATP Licensing Problems

E-mail from EDF in suburban Paris, France, was summarized in the preceding issue. This is a conclusion to the story. which was interrupted following Robert Jeanjean's two questions: *"Can you explain me the meaning of the message?????? Is it related to my question?????"* Your Editor responded as follows on October 9th: *"In the response I sent an hour or two ago, I quoted from your writing. I responded line by line . Which sentences of my writing do you not understand? What is unclear to you? What part of my response do you believe to be unrelated to your question? Finally, which of your questions? About your 'my question,' I would remind you that I did not see your initial inquiry to EEUG . All I have seen is what Prof. Kizilcay attached to his message to us. This mentioned nothing about consulting outside of work. But the EDF E-mail address is clear at the bottom, as is the famous EDF postal address in Clamart . As part of Prof. Kizilcay's attachment, I see your question: 'Can you send me that software, or can you give me the right way to obtain that software.' How have I failed to respond to this question (stated without the usual question mark, but a question nonetheless)? Your second message had another implied question: 'I asked you if it would be possible to have, as private person, the last version of ATP.' Here you use the past tense ("asked"), which would seem to be a reference to your first message. If so, I again point out that I read nothing about a 'private person' in that part of your first message that I am able to read. Perhaps you were not referring to that first message. Let's assume that you more properly meant something such as 'I now ask you if ...' So, an EDF employee now asks whether he could be licensed to use ATP at home? I can assure you, this would be an extraordinary request. I can think of no precedent for such ATP licensing other than the IREQ example (which you seem not to find relevant). Oh well, I tried. Maybe Prof. Kizilcay can think of something to add. I am out of ideas, as far as your inquiry is concerned."* Later that same day, M. Jeanjean had the final word : *"thank you for your answer and forget my request. it is simply too complicated."*

Demands of ATP security favor the use of a few large, existing storage sites on the Internet. This point was made well by Tom Field of Southern Company Services in Birmingham, Alabama. Discussion began with an inquiry by Russell Patterson of TVA in Chattanooga, Tennessee. In semi-public E-mail of the EEUG list server dated February 18th, he asked : *"If I wanted to put up a personal website with some example ATP or ATPDRAW files ... would it be permissible? Would it need to be password secured?"* Mr. Field explained as follows two days later: *"I had a website for a little while ... (I still do, but I need a new place for it). Anyway, the way I handled all the commotion that it first caused was to require proof of an ATP license before giving out the passwords to the site. Not only is a password required to enter the site, but the individual files are also password encrypted as a second level of protection for the ATP secrets contained in the information. While ATP may seem like a nice free program, it is licensed and the license agreement must be adhered to. The use of the Internet for dissemination of files related to ATP is*

convenient, but it also increases the possibility of violating the license agreement. You take a lot of personal risk with this method since it can result in a violation of your ATP license agreement. Another method which several people have used is to place their files on one of the existing secure FTP ATP sites. I raised a question about a Japanese website that was being set up to give out an ATP tutorial to the general public. The author of the material decided not to take the risk and placed his files on a secure FTP ATP website in Japan. I would suggest placing your files on one of the secure ATP FTP sites since it relieves you of the burden of requiring proof of ATP licensing. I still require proof of ATP licensing, which at times can take a while."

Comings and Goings

Dr. Hans Hoidalen is the author of ATP data assembly program ATPDraw, which is funded by BPA. During recent years, the work was performed at SINTEF Energy Research in Trondheim, Norway. But as first pointed out to your Editor by Laszlo Prikler, Dr. Hoidalen now has another job. Asked whether the organizational name should be changed, Associate Professor Hoidalen answered as follows in E-mail dated January 26th: *"I am now working at the Norwegian University of Science and Technology. My institute (Electrical Power Engineering) is closely related with SINTEF. In fact I have an agreement with them for project work . The ATPDraw project is still organized by SINTEF."* So, the SINTEF name was retained for ATPDraw purposes.

K.U. Leuven in Belgium, once the home of LEC (see the July and October, 1993, issues about closure that year) might have need of ATP thanks to the support of transformer manufacturer Pauwels Trafo, an EEUG member. This news was spread February 15th in E-mail of the EEUG list server from Deputy Chairman Laszlo Prikler. The announcement itself was entitled: *"Research assistant ... to simulate fast transient overvoltages in distribution transformers."* About this, Mr. Prikler noted: *"the host university of this vacancy position (Katholieke Universiteit Leuven) is not licensed to use ATP at present. So if ATP-EMTP software is going to be used in this project, an authorized representative of K.U.L. ESAT-ELEN should apply for the license."* The announcement ended as follows: *"This project runs in cooperation with Pauwels Transformers Belgium, and offers opportunities both for industrial experience as for a challenging Ph.D.-study. Experiences in electromagnetic transient simulation is an advantage. The ideal candidate must be willing to learn and use the ATP-EMTP program for this project."* For the record, the Can/Am user group has no obvious objection. In private E-mail dated February 14th, your Editor wrote to all moderators: *"I reviewed this with Tsu-huei. Yes, our user group had complaints about LEC, and one of these was about prices (remember the $3800/year for Poland). But this was not the fundamental objection. Our primary complaint was about LEC's dishonesty --- most importantly, the vanishing money, and LEC's failure to honor membership agreements. But none of these problems would prevent either EEUG or the Can/Am user group from licensing K.U. Leuven today, from what I can see."* About needing modern ATP, your Editor wrote the following on February 7th: *"Higher-order (e.g., 400) Pi-circuits have been developed since 1993, and should be of interest to any transformer manufacturer, of course, so there should be interest in newer ATP."* I.e., the use of 1993 or earlier materials, which might escape modern ATP licensing, should be inadequate for modern transformer simulation.

March, 2001, has arrived as your Editor keys this mention. The average reader has no idea about the ATP significance of this date, so a few words seem appropriate for the historical record. March of 2001 was the nominal retirement date (believed to correspond to 30 years of service) for your Editor. Had he not voluntarily accepted early retirement during September of 1994, your Editor might have been forced to work this long for BPA in order not to lose a fair proportion of his retirement benefits. However, 1994 was not the earliest consideration of this date. While in Europe, working with LEC in Leuven, Belgium, the issue was raised. Probably it was discussed publicly at the 1990 LEC Meeting, although your Editor has not bothered to search for a printed reference. The point was this : LEC Chairman Van Dommelen had expressed concern about what would happen to ATP work after your Editor retired from BPA. This might have been part of his hope to expand the power and influence of LEC (see mention of a task force on this subject, headed by Ivano Bonfanti of CESI, in the January, 1991, issue). Your Editor recalls dismissing the concern with a statement such as : *"Nominal retirement will not be possible prior to March of 2001, and that is a long time from now. Furthermore, other circumstances might change in the interim."* And they did! First, LEC disappeared (at the end of 1993). Then, suddenly, BPA wanted to shrink, and it began to allow (even encourage financially) early retirement. The standard offer was accepted, although retirement was delayed six months (until March of 1995) by mutual agreement. Now, six years later, the original nominal date finally has arrived. In retrospect, your Editor's work on ATP has been positively (rather than negatively) affected by retirement. All persons who had expressed concern about reliability of your Editor's future work on ATP have themselves disappeared from EMTP development! This includes all prominent DCG/EPRI politicians from 1984 as well as the few individuals at BPA who tried to cooperate with them for commercial purposes. It is noteworthy how little endurance the critics and enemies of ATP have been able to demonstrate. It was to the first LEC meeting, early in November of 1985, that your Editor explained the state of "EMTP war" that then existed. Neither affluence nor size (alleged advantages of EPRI and DCG) has proven to be decisive in this 17-year-old conflict.

BPA Planning expects to relocate once again. This bad news became public via E-mail from *"Maher, Mark W - T-DITT2"* to all BPA employees on April 24th. The attached *"TBL Newsbreak"* disk file explained that management *"decided today to begin negotiations on lease space near the Vancouver Mall for 330 Portland employees and 170 Vancouver employees. If we secure a lease within 30 days, we anticipate moving design, planning, and construction employees, and support staff ... late fall."* The bumbling stupidity continues. Skyport (see the April, 1997, issue) was not an isolated exception. Rather, in retrospect, Skyport is viewed as a prologue to the future. The worst part about the impending move is this: once again, the location is expected to be temporary only, with duration unknown. So, before sending snail mail to Dittmer near or after October, first make sure that ATP developers have not yet moved. Fortunately, E-mail is expected to be unaffected, and it has largely replaced snail mail. Once again, the Internet is our salvation.

Power Company Politics and Religion

A plea for forgiveness is the latest tactic of BPA management in dealing with the resentment of workers who remain. Consider the 2-page newsletter *The Ombuds News* dated January 2001, which is entitled *"The power of forgiveness."* Section headings that precede a sermon by Dr. Everett Worthington, a Virginia psychologist, are: 1) *"What is forgiveness?"* 2) *"Organizational forgiveness;"* and 3) *"How to forgive."* That middle section is particularly interesting: *"As employees, we've all struggled with substantial organizational change over the past several years. Throughout this time of change, decisions were made and events occurred which impacted or continue to impact each of us in some way. Some of those impacts may have created feelings of anger and resentment. ... Forgiveness can help us all move through the journey of organizational change. After all, making a journey is more difficult if you're carrying heavy baggage."* Etc. Your Editor can only conclude that management has abandoned hope of convincing workers that it knows what it is doing! Having failed with its *contorted logic* (see the January, 1998, issue), it has switched to psychology and/or religion. Of course, the latest suggestion is offered in the best interests of each employee (ha, ha): *"Want to be released from this burden of hatred, resentment, anger and/or pain? Forgiveness may be the answer."* Notice the attempt to shift guilt to employees. Amazing.

"Lights that burn 24 hours a day without reason" was the *"Subject:"* of your Editor's complaint to BPA's Acting Administrator in E-mail dated January 19th. For weeks, BPA had been urging others to save electricity -- originally to help mentally-impaired California utility regulators, but more recently because the Pacific Northwest also became worried on its own behalf because of below-average snow in the mountains. Following reception of an open appeal by E-mail to all BPA Transmission employees, your Editor decided that the time was right to document waste closer to home: *"Specifically, since June of 1998, I have worked on the 2nd floor of Dittmer at all hours of the day and night, plus weekends . Not once during this time have the overhead fluorescent lights around Post 2E3 been 'off'. Quite a large bank of lights burns continuously --- 24 hours a day, 365 days a year."* To its credit, management responded faster than your Editor had expected. Perhaps the warning about danger of a public exposé in news media was not wasted! Whatever the reason, E-mail *"From: Nelson, Marg - T/Ditt2"* dated January 23rd confirms the problem: *"This area does not have a light switch. We are looking into why this is not available and how it can be remedied."* Saturday, January 27th, your Editor was at work in the building when lights finally were extinguished. He reported to Ms. Nelson: *"Lights went out about 30 minutes ago, after what looked like a contractor warned me of work on the circuit . Looks good, Marg ! ... A couple of mornings ago when no one else was around, I counted a few more than 80 fixtures in the block that was illuminated, so allowing for the 5 that remain, that is close to 80 that have been saved. Each has 4 fluorescent tubes of 40 watts each, so close to 80 x 40 x 4 = 12.8K watts has been saved."* Finally, after 30 or 35 years, …

Wind generation is fashionable at BPA once again after more than a decade of neglect. The February 23rd issue of BPA's *Hot Issues* includes prominent mention as follows: *"BPA is looking for perhaps 1,000 megawatts of new renewable wind power, fast. On Feb. 22, BPA sent out a request for proposals for new large-scale wind power projects. ... The request set a minimum of 15 average megawatts (about 40 to 60 megawatts of capacity) for a project. ... Proposals are due by April 6."* For readers who were not paying attention at the time, Prof. Hian Lauw of Oregon State University in Corvallis developed his Universal Machine (U.M.) model of EMTP for precisely such use. As historical explanation, your Editor found a short but relevant mention in a Volume XI *EMTP Memoranda* dated 5 August 1981. Section I-F begins as follows on page MSPR-4: *"BPA has already made good use of Hian's U.M. modeling of the EMTP --- for the study of induction wind generation. Hian's 2nd contract with BPA ... was concluded with a 74-page report which quite nicely summarizes his numerous EMTP studies of induction and synchronous wind generator transients for MOD2-size systems."* Of course, MOD2 was Boeing's supposed answer to the demand for more: the world's largest wind generator driven by the mother of all 2-bladed propellers. Who would have expected less from the maker of the 747 (which forced the redesign of airports)? But history proved Boeing engineers wrong this time, as your Editor recalls. Gravity was the problem. Each time a blade of the propeller passed the supporting tower (required to counteract gravity), turbulence created excessive mechanical stress. More modern installations involve larger numbers of smaller generators, and propellers have 3 blades, from what your Editor casually has observed. Biggest seems not to be best

when it comes to wind generation. That would seem to be one important lesson learned from Boeing's MOD2 experimentation during the '80s.

"Northeast Utilities sues ConEd for pulling out of merger" is the title of an AP story dated March 13th that was found at the *Fox News* Web site. It illustrates that not all acquisitions proceed as planned by either party. In this case, a lot of money is involved (*"more than $1 billion"*), and the latest legal action was not the first: *"Northeast's action comes roughly a week after ConEd sued Northeast for allegedly failing to satisfy conditions of the deal . ConEd is seeking to absolve itself of any obligations it had to Northeast under the 1999 merger agreement."* Of course, ConEd is Consolidated Edison, the giant utility that supplies New York City. What were some of the problems? *"Regulators imposed conditions, including rate cuts, profit sharing and a write-off of $60 million in debts. Northeast said these requirements did not change the finances of the deal, but ConEd said the conditions were significant. ... The merger, which hasn't been approved by the Securities and Exchange Commission, would have created the country's largest electricity and gas utility, with more than 6.5 million customers in the Northeast."*

Relay communication that is carried by power lines is not new. This is the so-called *power-line carrier application* (see Chapter 12 of the big 1950 Westinghouse T&D Reference Book). But what about normal voice telephone and the Internet --- all the way into the homes of individual customers? This is the exciting prospect from Hannover, Germany, which hosts *"CeBIT, the world's largest computer and technology fair, with a Florida firm saying the technology will be in U. S. stores by June. Known as powerline, the system transmits telephone call data over regular electric wiring. It is catching on in Europe and Asia and could turn local power companies into competition for global telecom companies."* This is the beginning of an AP story by by Hans Greimel that was found at the *Tampa Bay Online Network* during late March. European experimentation is interesting. An Israeli company, Main.net Communication, *"is testing the system in six European countries, with its biggest project in Mannheim, Germany, where 200 families get their telephone and high-speed Internet service through local power company MVV. The country's biggest electricity provider, RWE, is also on board with plans to hook up 20,000 people with Internet connections by the end of the year, and another 130,000 with Internet and phone connections in 2002."* Except for time-sharing with other users, speed is an attraction: *"under ideal conditions, it can achieve speeds of 2 megabits per second, more than 30 times faster than an ISDN line."* But legal obstacles exist in some countries *"including Japan and Israel, where the power industry is strictly separated from the telecommunications industry."* Why is this a new story rather than an old one? The problem posed by surges and noise finally has been overcome by *"new microchips used in the powerline adaptors ... The fast chip is capable of ... instantaneously calculating how the data transmission needs to be adjusted so that the signal is not as easily lost."* Interested readers are referred to www.intellon.com (that Florida-based company).

Pocket Calculator Used by PCVP

Mention of IF-THEN-ELSE-ENDIF can be found in the preceding issue. December 2nd, substantial change was made to MATDAT in order to allow such structured execution within $PARAMETER of PCVP use. This is an intermediate step prior to activation. Previously, the pocket calculator was called once for each variable -- to evaluate the expression of the right hand side. While this structure might have been retained, it would be illogical and inefficient for an IF block, which more consistently and easily is processed in its entirety. The first step was to send the entire IF-block into the pocket calculator, and that now has been accomplished. All standard test cases continue to be handled properly, with only interpretation of the BLANK card ending $PARAMETER changing. Previously, interpretation mentioned lack of an equal sign: `Lack of "=" terminates $PARAMETER definitions.` Obviously, this no longer is true for two or more lines of any IF block, so it was necessary to change both the interpretation and the supporting code accordingly. Several different interpretations now are being used, for the several different types of lines making up an IF block.

IFHFS.DAT is the name of the disk file that first was shown to others as an illustration of an IF block within a $PARAMETER declaration. A practical application is for HARMONIC FREQUENCY SCAN (HFS), so the simple 3rd subcase of DCNEW-26 was modified slightly as explained on comment cards. Rather than a single analytic formula for inductance INDUCT, there now are two different formulas: one for low frequencies, and one for high. After sending an archive of the various IFHFS.* files to Gabor Furst on December 3rd, data was appended to DCNEW-26 as a new 17th subcase.

ELSEIF has not been mentioned previously, but it represents a very important detail of IF blocks. Yes, it is honored, and ELSEIF extends from two to an arbitrary number, the alternatives of a formula within an IF block. Also, it should be mentioned that there is no obvious limit on the number of variables. While IFHFS illustrates just a single variable MHENRY, two or more are possible. A new 18th subcase of DCNEW-26 was added on December 6th to illustrate this use. It is worth mentioning that data card interpretation no longer includes the value of a variable on the first pass of the loop. This is because compilation must precede execution, and compilation can not occur before the entire block has been read. Prior to the availability of IF blocks, each variable was compiled separately, and it was easy to delay the interpretation until the variable value was known (from execution following compilation). That was for a scalar. For an IF block, the

number of variables is indeterminate, and no attempt is being made to delay all such interpretation. Instead, initial variable values will be found on extra output lines that follow the ENDIF interpretation --- one for each variable defined within the IF block. Careful column alignment makes for easy reading, it will be noted.

Type-10 sources were the next model to be extended to include possible block-IF logic. Work began December 8th when SUBR5 was modified for this reason. Three days later, changes of this module as well as POCKET and SUBTS3 were moved to the UTPF. New variable SIN3 was added to DCNEW-19 to illustrate the new capability, and the old COS signal was scaled in order that the following vector plot more clearly display the various signals. Comment cards and in-line comments make various observations about usage. Of course, Type-10 sources are functions of time, so time naturally is the controlling variable --- just as frequency was for frequency scans of any type. Time is not necessarily the only variable involved, and is not necessarily involved at all; but most commonly it will be the dominant variable.

Mathematics within $INCLUDE files are the purpose of DEP (indicating dependent) variables as explained on comment cards at the start of the 3rd subcase of DC-36. This refers to Jeff Peggs of Virginia Power in Richmond as mentioned in the April and July, 1997, newsletters. The procedure has not yet changed, although illustration was improved substantially on December 16th. The formula for variable CAP_44 involved only constants, not the important practical case of one or more variables. So, a new 5th subcase was added to illustrate dependent variables that do two things: 1) convert from RMS, line-to-line voltage (e.g., 500 kV) to peak, line-to-neutral voltage for use on Type-14 source cards; and 2) compute balanced angles for phases b and c from the user-supplied angle of phase a. Three dependent variables are involved, and full precision (10 columns) is used, note. Finally, the output disk file DC36E.PCH is referenced by a new 2nd subcase of DC-64. Output of the first looks different only because $STOP required replacement by $ABORT in order that program execution no longer terminate. Even though comment cards are being killed (NOCOMM = 1), the three dependent formulas and values will be seen as part of the interpretation of such lines immediately following the $INCLUDE card. Ending question: what reader has a practical application requiring generalization of such dependent variables to allow surrounding IF blocks? Your Editor believes such an extension should be straight forward, although he has not yet envisioned realistic use, and does not want to proceed without it.

Multiple $PARAMETER blocks first were reported to be lacking by Prof. Martinez in E-mail dated December 18th. It is true that the original design did not guarantee the correct operation of two or more per data subcase, even though the 1st subcase of DCNEW-19 seemed to demonstrate such operation. But two or more became an advertised feature the following day when a new 8th subcase of DCNEW-25 was added to accommodate Prof. Martinez's data. This followed changes to SUBR1 and MATDAT. Modularized data seems to provide the practical need, since Prof. Martinez observed: *"There are many examples for which we really need the two loops, for instance if the loops are embedded in different data modules produced by DATA BASE MODULE."* As for numbers, unless and/or until some respected user justifies the need for more, the limit on separate $PARAMETER blocks will be 7. Any attempt to use more will result in an error message (*"=== Halt in MATDAT. Overflow local MIN3(8) ..."*).

$ENDPARAMETER was mishandled prior to the addition of protection on December 19th. An alert reader already should be asking himself: what is this declaration? Eventually that is what your Editor concluded. Of course, Dube used MODEL and ENDMODEL to define the limits of a model in MODELS, so a reasonable guess might be that $PARAMETER would be ended as stated. But since the introduction of IF blocks, this no longer is tolerated. As your Editor reported to Prof. Martinez the preceding day, then-current ATP responded badly to such data. Prof. Martinez had two data cases, and your Editor observed: *"I just attempted solution using current Salford EMTP. Both ended with an indexing error ('page memory exhausted'). So, I switched to corresponding Watcom ATP. Both times, execution was interrupted with a 'program terminated abnormally' message."* Following improvement, such data should be rejected in the following civilized fashion: *" === Halt. No equal sign found on last-read card which is non-blank, non-comment and not ..."*

Scalar variables recognized by SPY can be redefined using the pocket calculator beginning December 23rd. Previously, all user-defined variables were local, and values were lost when the pocket calculator was exited. Now, if the user chooses a symbol that is recognized by SPY (885 are, at last count), the value in COMMON will be overwritten upon exit from the pocket calculator. In effect, this is like an implied, automatic $DEPOSIT operation on each such variable as the pocket calculator is exited. Of course, $DEPOSIT for data involves only constants. Definition of a SPY scalar from within the pocket calculator is much more powerful because the pocket calculator allows dependence on variables, functions, and conditions (equalities or inequalities). The user is warned of potential danger, however. If what he thought was local is in fact global, that global variable will be overwritten. So, be careful (e.g., avoid use of time-step size DELTAT, etc.)

Gabor Furst in suburban Vancouver, B.C., Canada, inspired the extension of the preceding paragraph. His initial reaction to an illustration of IF blocks was contained in E-mail dated December 5th: *"An excellent addition. It could have been used in BACKFL.DAT but*

we did not have these things then." Of course, BACKFL is Mr. Furst's famous illustration that simulates random lightning backflash, and data involved Dube's MODELS (see the April, 1996, and January, 1997, issues for background). Innovator Furst continued: *"As for BACKFL.DAT ... Isn't this interesting. Now we have $PARAMETER with IF-THEN. Of course, the MODELS' ATP function could do a little more as it preserves values through KNT sequences. You may recall, Scott, that we talked about a special array which could be used for manipulating variables and saving them through the KNT sequences. For some reason, I forget now why, this was not done, so I used an EMTP variable."* Well, it is this preservation of values from one KNT loop to the next that the preceding paragraph addresses. It brings such capability to the pocket calculator.

Names HOLDxx for arbitrary xx (any two bytes beyond the first four) took on special meaning the following day as your Editor decided to eliminate the problem of finding an unused SPY symbol. While your Editor has little trouble identifying such variables, the average user probably has no way to know where or how to begin. By definition, any variable beginning with HOLD (bytes 1-4) will be non-volatile, and will start with value zero. Rather than be global, all such HOLDxx variables are local to the pocket calculator. But like SPY symbols, they retain their contents between uses of the pocket calculator. To illustrate this new capability, HOLD01 was added to the 8th subcase of DCNEW-25.

The SAVE declaration allows a user to declare any pocket calculator variable as local and non-volatile. Meaning is consistent with standard FORTRAN 77, note. Even variables that are SPY symbols can be made local by means of such a definition, although this is not standard FORTRAN. That is, SAVE takes precedence. All SAVE declarations are checked first, and SPY will not be checked if SAVE is found for a variable. As a result, a famous variable such as the current simulation time T can be made local for purposes of the pocket calculator. But if a user did not declare T using SAVE, the SPY-recognized content of COMMON would be changed (beware!). Final point: SAVE ALL can be used instead of declarations for individual variables, if all pocket calculator variables are to be treated as non-volatile. Note that your Editor writes all pocket calculator variables, not all variables of some particular block. I.e., no matter when it is read, SAVE will apply to all variables of a data case. But it has no effect at all until it is read. $PARAMETER blocks are processed one at a time, after all. For consistency between the first pass of a loop and the second or later pass, SAVE ALL should be placed within the first $PARAMETER block. About date, programming was done December 25th although use was not illustrated until the 4th subcase of DCNEW-26 was augmented two days later.

High - Order JMarti Branch Cards

High-order, 3-phase JMarti branch cards produced slightly different simulation using GNU Mingw32 ATP than other program versions. Concern can be traced to E-mail of the EEUG list server dated February 16th. The person who deserves credit for the important observation is Marta Val Escudero of ESB International in Dublin, Ireland. Shown at the bottom of her message were ATP extrema, of which minima readily demonstrate unacceptable differences in the 2nd or 3rd decimal digit:

```
 Watcom minima  :  -509350.  -766501.  -589366.
 Mingw32 minima :  -493801.  -746960.  -587499.
```

About high order, a limit of 50 had been specified, and this was approached. The high 40s were typical.

Your Editor was the first to respond after seeing data : *"I noted that resistivity of 1000 ohms might be unusual without ground wires. This might distort functions."* But Ms. Val Escudero rejected this idea on February 23rd: *"That is the average soil resistivity that we have in Ireland (it's a very rocky country). Anyway, I have tried with 500 and 100 ohms.m and I did not notice any significant difference."* Your Editor also had included advice from a note that had been left by BPA's Dr. Tsu-huei Liu: *"1) beginning looping frequency at 1.E-6 Hz (.01 or .001 Hz is generally recommended. 2) -9 punched in col. 71-72 for ITRNSF means that the full, complex matrix calculated by LINE CONSTANTS is used. In the Rule Book, a note recommends that this be left blank. Much lower order resulted from changing the beginning frequency to .01 Hz and leaving ITRNSF blank."*

Your Editor's conclusion was this: *"maybe it is time to add some warning messages about unusual requests, or even make some changes more difficult (e.g., by requiring an English-language request word for them)."* As this subject was discussed with Dr. Liu on March 6th prior to writing this story, she stated that use of "-9" seemed to be the primary problem. Her E-mail dated February 23rd mentioned *"two references to trouble caused by using the full transformation matrix (ITRANSF = -9) ... in the ATP Rule Book (Page 21 - 10) . These findings led to the recommendation of leaving ITRNSF blank for JMARTI SETUP use."* As for the low frequency, it might be responsible for the fortuitous roundoff error (see two paragraphs below) .

The DEFAULT fitting option of JMARTI SETUP does not use the value of shunt conductance G that is stated in the Rule Book. A different polynomial order had been observed in Dublin, and Dr. Liu explained this as follows in E-mail dated February 27th: *"The differences are due to a change in the default value for GMODE. The current default value is 2.E-9 mhos / km or 3.2E-9 mhos / mile. The values in the ATP Rule Book need to be changed or updated. Thanks for discovering this need. We knew about the change, but failed to mark the Rule Book accordingly."*

About floating-point accuracy, GNU Mingw32 ATP is superior to the three alternatives used on Intel PCs at BPA. This is the amazing discovery. F77 Salford, Watcom, and F95 Lahey ATP versions all produced similar results whereas Mingw32 ATP was different. But Mingw32 ATP was right and all the others were wrong! This was proved by temporary conversion of F95 Lahey ATP to quadruple precision. The 64-bit Mingw32 ATP simulation agreed with this 128-bit simulation! How could this be? Your Editor noted the differences, but could not see precisely where and how in overlays 12 or 13 differences began. But Dr. Liu found a place (next paragraph).

The line of OVER12 that has UTPF ident M31.2729 was used by Dr. Liu to illustrate differences of floating-point accuracy between Mingw32 ATP and the other 3 alternatives. The mathematics are simple enough:

```
HI = ( UNITY - SCONST(N5) ) / FAC1
```

Both F77 Salford and Mingw32 had the same variable values for the right-hand side. Of course, UNITY has value one, and the error occurs because SCONST(N5) was very close to this for N5 = 120: .999999999890634 Note the nine leading nines. So, for REAL*8 with 15 or 16 significant digits, 9 are lost in the numerator --- for F77 Salford, although apparently not for Mingw32. Your Editor can only conclude the Mingw32 compiler already, and automatically, uses the 80-bit precision about which Salford advertises for F95 (see the opening paragraph of this newsletter issue). About the resulting HI, Dr. Liu found value 1.00000000065813 for Salford EMTP and value .9999999996667737 for Mingw32 ATP. Amazing. As your Editor wrote to Masahiro Kan on February 24th, *"not only is Mingw32 ATP fastest, it is more accurate, too."*

Free-format diagnostic WRITE statements made the comparison of preceding paragraphs difficult. Different compilers assume different formats, and FC shows differences where in fact none exist. For OVER12 of immediate interest (see preceding paragraph), free-format output was converted to fixed on January 22nd. Other subroutines require comparable attention, but are not yet being done. The improvement is just beginning (one small step at a time).

Publishing Programs and Viewers

Laszlo Prikler was quoted about new WordPerfect in the October, 2000, issue. At the end of an unrelated message dated April 25th, he provided the following optimistic continuation of the story: *"I recently upgraded my Win95 to Win98 Second Edition, then reinstalled WP Office 2000. The trouble (GPF in module WSTR9.DLL) reported earlier disappeared. Now I can use WP9 longer than 10 minutes without pushing the reset button (joke!). WP9 is stable even on my relatively old hardware at school (Pentium 200, 64 MB) and at home with PIII-500, 128 MB, as well."*

Hoidalen Improves ATPDRAW

The Hoidalen Revolution was the "Subject:" of private E-mail from your Editor to Deputy EEUG Chairman Laszlo Prikler on March 1st. Earlier that morning, Prof. Prikler had responded to a submission that had been made to the EEUG list server. A newly-licensed user in California had complained: *"I am a new user of ATPDraw and had downloaded and installed ATPDraw version 2.4 on my machine ... I am having a little problem trying to run ATP from ATPDraw. Each time I run a file, I receive an error message – 'Bad Command or File name.' I'm not sure if I have configured my machine properly to run ATP. Please help."* In reply, Prof. Prikler had explained: *"It is a wrong impression. ... Then you need the ATP program itself. ATPDraw is only a preprocessor. ..."* Finally, your Editor provided this private summary: *"I have written before that ATPDraw confuses many users about details of ATP. This most recent inquiry provides the perfect illustration of the ultimate confusion: persons who think that ATPDraw* ***includes*** *ATP ! My concern about ATPDraw continues to grow. Hoidalen seems to be creating a generation of ATP-illiterate users. Amazing."*

Creative ATP Modeling

A 6-phase rotating electric machine was requested by Dr. Michael Steurer in E-mail of the EEUG list server dated April 24th. This is the same person who for years has been with ETH in Zuerich, Switzerland. But this time he writes from the Center of Advanced Power Systems (CAPS) at Florida State University in Tallahassee (*"I recently moved here after finishing my PhD in Switzerland"*). About those 6 phases: *"I mean a real 6 phase machine, not a dual fed machine as described in the rule book. Has this ever been done in ATP and are there models available?"* The most interesting response came from Allen Windhorn of Kato Engineering in North Mankato, Minnesota, USA. Three days later, he explained: *"I have a book, 'Dynamic Simulation of Electric Machinery,' by Dr. Chee-Mun Ong at Purdue, in which there is a chapter on simulation of six-phase machines using Matlab. I also have a couple of papers and a Master's Thesis ..."* on the subject. Three thoughts occur to your Editor. First, remember that MATLAB can participate in an ATP simulation (see the explanation by Harald Wehrend of SEG in the July, 2000, issue). Second, Dr. Dmitry Kosterev of BPA has simulated 3-phase machinery using MODELS (e.g., see the July, 1996, issue), and presumably this same general technique could be extended to any number of phases. But would the solution inefficiency of Dube's MODELS be a problem? No question, the 3-phase simulation was slow by U.M. standards. But then MATLAB, too, might be slow. Who knows? Third, it should be mentioned that interest in 6-phase U.M. use was expressed years ago. Your Editor's

recollection is that the inquiry came from the University of Florida in Gainesville --- most probably from Dr. Yin Yuexin, then a graduate student of Prof. Dennis Carroll. Your Editor recalls inspecting Prof. Hian Lauw's source code, and finding the 3 phases hardwired in place (e.g., arrays dimensioned 3 x 3). Most probably this was before October of 1993, when Agora first was used. No trace was found in Agora E-mail archives, and earlier CompuServe messages no longer can be easily searched. If either Dr. Yin or Prof. Carroll could add details, their continuation of the story would be welcomed.

Frequency Scans and Harmonics

Random numbers within a $PARAMETER block were mentioned in the April issue. In E-mail dated January 23rd, Gabor Furst observed: *"I can't think at the moment of any HFS application, but one never knows when a problem of this nature would arise. Particularly, as HFS is strictly speaking a statistical problem, but we have treated it so far deterministically, at least from the point of view of a computer model."* Needless to say, your Editor knew nothing about the real statistical problem, so the following day, Mr. Furst added: *"I saw this message on Power Globe. It will be interesting to see the papers if any."* The attached announcement stated that *"the next meeting of the Probabilistic Aspect of Harmonics Task Force will be held at the PES Winter Meeting, Columbus, January 30 …"*

MODELS use with HFS was mentioned in the April issue. In E-mail dated January 23rd, Gabor Furst recalled how consideration of MODELS preceded what today is HFS. *"It is interesting to note that this was my very first idea ... and I did some experimentation before we embarked on HFS. My conclusion was that it was rather cumbersome ... Of course in those days we did not have $PARAMETER so this changes the picture a bit."* Later that same day, your Editor responded: *"Right. With or without MODELS, the special structure that we programmed is the secret to easy use. ... The pocket calculator itself is just a tool used by it. Recently, I had thought that I could support $POCKET using MODELS instead of the pocket calculator, but I do not yet see a good reason to change."*

Spanish seems to be the best language for reading about Prof. Juan Martinez's creative work using PCVP. In semi-public E-mail of the EEUG list server dated January 23rd, Prof. Martinez explained: *"For those of you who can read Spanish I would advise to download papers on the application of PCVP and $PARAMETER from the following page ... More than one year ago we started to publish several works showing how these capabilities could be used for expanding DATA BASE MODULE or using ATP (only ATP!) for sensitivity analysis (this will be shown again at the next IEEE PES Winter Meeting). However, I recognize that no data files are included in all papers. ... During the last two years, I have been telling some people that ATP is no longer a tool for transient (add also frequency) analysis. With the recent capabilities, this tool can be* ***theoretically*** *used for performing statistical analysis (every type of statistical analysis) or sensitivity analysis, for building very flexible custom-made models (i.e. a capacitor bank either in D or Y, with or without neutral connection, can be inserted using a single data module, in which we specify voltage and reactive power), selecting components (for instance the surge arrester which is needed for achieving a given protective margin), and of course for creating open systems (e.g. , on-line connection to MATLAB) . "*

"Parameter 99" was followed by *"Parameter100"* as first seen in the interpretation of Prof. Martinez's data on March 8th. Modification to MATDAT then provided the missing blank to accommodate $PARAMETER variables through 999.

DEC ATP for VAX / Open VMS

Yes, Digital Equipment Corporation (DEC) is long gone, having been purchased by Intel (Alpha hardware) and Compaq (DEC VMS software). But DEC VAX hardware continues to exist, and VAX / VMS and Open VMS software continue to be supported by the new owners. It is convenient to continue writing about VAX ATP or VMS ATP to distinguish this ATP version from those for Intel-based PCs.

A VAX translation was performed on April 2nd for the first time since July of 1999. This was in response to a request from BPA's Dan Goldsworthy, who is the only remaining survivor of a group that once did little else. A time-shared VAX, (BPA8 or BPA9) continues to exist at BPA despite the 1999 warnings (see the October, 1999, issue), and this is what was used, from a window of Dr. Liu's Pentium III-based PC just as it was two years earlier. There were two separate aspects of the connection: 1) the DECterm icon for a DEC terminal emulator; and 2) file transfer between the PC and VAX using Exceed brand software from Hummingbird Communications.

Several features of standard Salford test cases remain unused during the initial testing. Notes about required changes to data show: 1) No support for [] of DC-8, etc.; 2) No support for Pisa-format .PL4 files as verified by DCNEW-21 and 22; 3) occasional added $CLOSE and $OPEN of LUNIT4 (DC-41 and DCNEW-25) ; and 4) continued use of FMTPL4 = 8E10.0 FORMATTED .PL4 files. To be continued in the next issue.

California Electric Power Crisis

California's inability to regulate electric power was summarized in the preceding issue. Three or four months

later, the situation has not improved greatly. Previously, your Editor always referred to *deregulation* in California. This is what the politicians named it, but in fact the term is a misnomer. California approached the brink of disaster precisely because it did **not** deregulate the retail price of electricity, and because the supply was inadequate due to uncertainty of the rules. What California did was change its rules in a way that bankrupted major utilities PG&E and SCE. The wholesale price of electricity rose, but the retail price was held fixed. The utilities were forced to sell power for less than the cost of acquisition. But even this was not real disaster. Real disaster became imminent when utilities ran out of money. Then suppliers no longer were anxious to sell, fearing that bills might not be paid. Of course, this further restricted supply, and further raised the price. A very bad situation was made even worse.

Politicians in Washington --- first the waning Clinton Administration (Democrat party), and more recently (since January 20th) the Republican George W. Bush Administration --- looked closely at the problem, of course. Both seemed to decide that troubles were too big (total peak load is nearly 50K MW), and risks were too great, for them to want any part of the problem. The prevailing opinion outside the state seemed to be this : California's politicians were the ones who created the problem, so they should bear the burden of solving it.

California's politicians **did** rapidly solve the immediate problem posed by credit unworthiness of the utilities. That much did happen quickly, although at great cost to state tax payers. The February 23rd issue of BPA's newsletter entitled *Hot Issues* states : *"the California Dept. of Water Resources is spending $45 million to $66 million a day to keep the state's lights on."*). Yet, the state is prosperous, so neighbors were not inclined to show great sympathy. California voters and rate payers are being taught an expensive lesson: beware of politicians who promise a free lunch (remember Governor Gray Davis's 3-part mantra in the preceding issue). Politicians more often are wrong than right, so the unanimous agreement in the state legislature for the associated 1996 law should have been a sign of future trouble. Yes, unanimous! Every single legislator (mostly Democrats) and the Republican Governor (then Pete Wilson) wanted to share the credit for seemingly guaranteed success. In retrospect, this should have been the best single predictor of the present failure. This was a case of the blind leading the blind, with greed the motivation. People want to believe, and as a result, often are not skeptical enough of bad ideas during good economic times.

"California regulators OK huge rate increases" is the title of a March 28th story by Patrice Hill of the conservative *Washington Times* at **www.washtimes.com** This looks like capitulation by the governor and his friends, all right. The story begins: *"California regulators, in a complete reversal, yesterday tossed aside Gov. Gray Davis' pledge not to raise consumer electricity rates and approved record rate increases of up to 46 percent for 25 million power customers."* These are Democrats, of course, but they were unable to deny reality any longer : *"The commission's refusal to act on the request earlier this year led to a series of quickly deteriorating events that included three episodes of rolling blackouts and the threat of cascading bankruptcies from the state's largest utilities to its smallest power generators. The state in two short months spent more than half its $8.5 billion budget surplus purchasing power on behalf of its failing energy companies and this week was preparing to issue a record $16 billion of debt to finance more power purchases. It had little hope of recouping its rapidly escalating costs without the rate increases, which average 3 cents per kilowatt hour."* Suddenly, real-world economics returned to California with a vengeance.

Conservation was the emphasis of the larger and more liberal *Washington Post* at **www.washingtonpost.com** The Post told the story this way: *"The rate increases, approved unanimously by the California Public Utilities Commission, take effect immediately and are structured to hit the hardest those consumers who do not take significant steps to reduce their energy consumption. ... The decision may help reduce the threat of rolling blackouts across California during the summer and could save the state from spending billions of dollars more to bail out its bankrupt utility companies and purchase emergency power supplies. But the new rate increases also bring enormous political risks."* Indeed they do, for state Democrats who had promised a free lunch to California voters! It is stated that *"Gov. Gray Davis ... and other state leaders have feared that any additional substantial increases in monthly utility bills would ignite a ratepayer's revolt. California had already imposed an emergency 9 percent utility rate increase earlier this year."* Translation: the politicians responsible feared being voted out of office by angry consumers, at the next election !

Yes, conservation finally should be rewarded in California. Maybe state regulators finally have awakened from their dream, and are beginning to think clearly for a change. A story found at the CNN Web site emphasized benefit to those who reduce their electric consumption: *"households that conserve energy might not experience an increase. ... a so-called 'normal' power user would see little or no new increase ... Households using less than 130 percent of their so-called baseline wattage would see no increase in rates. ... A user's baseline rate is figured at roughly 60 percent to 70 percent of the average normal usage, but is adjusted up or down depending on local climate."* But wattage? Why not watt hours? Is the rate aimed just at the peak? Maybe. Hmmm .

Radical consumer advocates were featured in a Reuters story that was found at the *ABC News* Web site. California Democrats now are faced with this problem : *"The regulators' meeting, which attracted a standing-room only audience, was marked by an unusual demonstration by consumer advocates fighting any rate increase. Four*

demonstrators attempted to shout down the commissioners as they prepared to vote and were ejected by CPUC security guards." Amid this tumult, where was the most famous consumer advocate of them all? Your Editor here is making reference to recent presidential candidate Ralph (*"Unsafe at any speed"*) Nader, whose name has been largely out of the news since the November elections.

Ralph Nader and his supporters were squarely blamed by Mary Mostert in a March 28th story entitled *"Ralph Nader's California legacy -- either higher rates or no electricity."* Any reader interested in this perspective is referred to **www.bannerofliberty.com** ("The *Banner of Liberty*"). Mostert charges that the problem deliberately was ignored last year because of the November election : *"Today's Sacramento Bee reports the capitulation, finally after their election year refusal to approve rate hikes, lest they cause Al Gore to lose California to George Bush. ... Before the meeting, four women ... stood in the PUC chambers with yellow signs saying 'We Won't Pay.' Maybe they can all send their electric bills to millionaire Ralph Nader who is the one responsible for their plight. It was Green Party founder Ralph Nader who managed to block the building of power plants, especially nuclear power plants with such diatribes as ..."* Not surprisingly, most Californians suddenly seem much more approving of nuclear power. What a difference a year makes. But this is another story for another time, if there is space.

PG&E, the largest California electric utility, filed for protection from creditors on April 6th. *"Bankruptcy filing. Chapter 11 for California utility giant"* is the title of an AP story found at the *ABC News* Web site the following day. The summary paragraph provides context for the move. PG&E filed for protection *"despite months of efforts by state officials to bail out the cash-starved company."* Unfortunately, the company was not convinced that the Governor was either serious or honest enough. It chose the protection of a U.S. court as a more attractive alternative: *"PG&E Corp. said its subsidiary was forced into bankruptcy because of 'unreimbursed energy costs, which are now increasing by more than $300 million per month,' state regulatory decisions that are hurting the company and 'the now unmistakable fact that negotiations with Gov. Gray Davis and his representatives are going nowhere."* About the effect of the filing : *"The utility's 13 million customers probably will be among the least affected, since bankruptcy proceedings allow companies to continue operating while trying to dig out of their financial hole. But lenders, bondholders and power generators may have to write off billions advanced to the utility as losses. And the company's financial reputation could be damaged for years, making it more difficult to raise money to upgrade transmission lines and plants."*

SCE (Southern California Edison) is California's second largest utility. Having failed with PG&E (Pacific Gas and Electric), Gov. Davis rapidly adopted a more reasonable position in dealing with SCE, it would seem. *"California reaches deal to buy Edison's power lines"* is the title of an AP story by Leslie Gornstein dated April 9th. Found at the *Fox News* Web site, this begins : *"Gov. Gray Davis announced a deal on Monday for the state to buy power lines from Southern California Edison for $2.76 billion. ... It would give Edison money to reorganize its debts and pay power generators, many of which have not been paid for power since last November. ... The deal requires Edison to provide low-cost power to the state for 10 years and to dismiss a lawsuit seeking hikes in consumer rates, Davis said. ... Consumer advocate Harvey Rosenfield said the PG&E filing put immense pressure on Davis to cut a deal with Edison ..."* Right, the PG&E bankruptcy effectively had removed the state's largest utility from state control: *"Also Monday, PG&E asked U.S. Bankruptcy Judge Dennis Montali to issue a temporary restraining order to stop the California Public Utilities Commission from trying to collect $8 billion the state says it is owed for buying power on behalf of the utility. PG&E said the PUC has incorrectly calculated the amount it owes."* About the size of the continuing subsidy: *"The state has been spending $45 million to $50 million a day since January to buy power for customers of PG&E and SoCal Edison. Wholesale power suppliers have refused to sell electricity to the utilities because their credit is nearly worthless."* A *Washington Post* story the following day includes this important caveat : *"As part of the pact, which must be approved by California lawmakers ..."* How likely is this? Your Editor observes ongoing attempts by politicians to blame others for the trouble rather than accept responsibility themselves. The blame game is underway. About size of SCE's problem, debt is *"more than $5 billion."* No matter what politicians do, it appears that a long and difficult summer is approaching. *"Energy officials are predicting as many as 34 more days of rolling blackouts this summer ..."*

Pocket Calc. Does TACS Supplemental

Supplemental variables of TACS can be evaluated using the pocket calculator beginning January 12th. This plateau of initial usability followed nearly nine days of strenuous work to replace the largely-unused TACS ASSEMBLY LANGUAGE (see the January, 1998, issue) code within TACSUP. Following the creation of code to support TAL, your Editor had written: *"later, TACS assembly language might be generated automatically by ATP."* It took some three and a half years, but this is what has happened, in effect. Of course, with the passage of time, the assembly language has become considerably more sophisticated. Your Editor noted just 41 commands in the old code that was removed (compare with 97 that are used by the pocket calculator today) .

TACS POCKET CALCULATOR (TPC) is the new request word to replace Dube's old logic by your Editor's pocket calculator. This is for free-format supplemental variables --- the TACS data lines with an equal sign in column 11. In the absence of such a request, Dube's

inefficient logic (see *MATHPLOT* in the April, 1997, issue for documentation) will continue to be employed. But with a TPC request, Dube's logic is used outside the dT loop only. Within the dT loop, the assembly language generated by the pocket calculator will be used in place of Dube's logic in order to speed simulation. To be continued in the next issue.

Interactive Plotting Programs

Pisa-format .PL4 files were expanded to include an indication of the use of Gabor Furst's HARMONIC FREQUENCY SCAN (HFS) . This was in response to E-mail from Massimo Ceraolo at the University of Pisa in Italy. Dated March 16th, the suggestion began with mention of communication with La Plata, Argentina: *"I've had a small discussion with Raul Bianchi Lastra about the graphical visualization of outputs of FS and HFS."* It is true that ATP batch-mode plotting automatically (without special user intervention) will produce a bar chart for HFS data rather than a continuous curve as for ordinary FREQUENCY SCAN (FS) data. For example, compare vector plots of the 3rd subcase of DCNEW-21 (an illustration of HFS) with the 1st subcase of DC-52 (an illustration of FS). But, this distinction requires that the plot immediately follow the simulation, as part of the same data subcase. If REPLOT were used to delay the plot, the bar chart of the HFS data would be lost. Separate interactive plotting programs such as Mr. Ceraolo's PlotXY had the same problem: no knowledge of HFS use. So, the idea of adding more intelligence to Pisa-format .PL4 files seemed good, and the change was made the following day for Salford EMTP (modules HEADPI and BEGPLT). Unfortunately, C-like .PL4 files are installation-dependent, so every other compiler will require its own corresponding special attention, if Pisa-format .PL4 files are to be supported.

Pisa-format .PL4 files that were compatible with HFS has been a goal of Massimo Ceraolo for many months. Finally, on March 18th, your Editor took the time to investigate known trouble. Corrections were made to HEADPI and BEGPLT, and a new 15th subcase of DCNEW-21 was added to demonstrate correct operation. The screen plot is identical to that produced by the 3rd subcase. Included will be found an extraordinary definition of NEWPL4 = 2 in order that STARTUP not require change. This should work as long as STARTUP requests a normal C-like .PL4 file (standard practice in Portland). Prior to its addition to a standard test case, the data was tested as a separate disk file named HFS. The .DAT, .LIS, and .PL4 files were sent to Mr. Ceraolo the following day for verification.

The following day, the 4th subcase of DCNEW-22 (Masahiro Kan's operational amplifier, or *op amp*) was modified to demonstrate use of the Pisa-format .PL4 file for simulation. There never was a known problem, but correct operation had never been documented in standard test cases prior to the change. At the same time, diagnostic output of HEADPI was improved, and is included (note the exceptional request for selective diagnostic output).

Miscellaneous Small Items

$INCLUDE will tolerate an exclamation point to hold lower case beginning January 28th. Several other data cards use this technique to avoid conversion of text to upper case (assuming KINSEN = 1), so for reasons of consistency, the new feature is being added. However, in fact, nothing is done with an exclamation point, which is extraneous for $INCLUDE use. If found, and if both preceded and followed by a blank, the exclamation point simply is erased above S.N. 1205 of OVER1 .

Comment cards at the end of a subcase that involves simulation --- after the blank card ending batch-mode plot cards --- represent a tricky detail if such cards have not previously been destroyed as part of data input. This would be for NOCOMM equal to zero, of course. At BPA, trouble first was noticed on February 12th when new translations for both Watcom and Mingw32 were verified using DC-30. The .LIS file ended with the following familiar 2-line warning:

```
Input data exhausted!  CIMAGE will pass back innocuous blank card.
Input card pointer NUMDCD = 2.  Exit "CIMAGE" with blank …
```

Why these extra two lines were not seen a month ago is a mystery. They seem to have reappeared (they were a common sight during years past) for no apparent reason. In any case, after the phenomenon was duplicated using Salford EMTP, OVER1 was modified the following day to suppress such output. The logic should be universal, so all program versions should be improved by the change. Final discovery on February 14th: Two test cases for Salford EMTP changed even though NOCOMM has value unity. The improvement is more general than originally realized (nice). Although no one ever previously complained, the warning about exhausted data was seen immediately following the 1st subcase of DC-5 and also DC-67. Rather than being due to comment cards, it was the $WIDTH and $PUNCH requests that caused these extraneous warnings. Following the modification to OVER1, the warnings of DC-5 and 67 disappeared.

"Insulation Coordination for Power Systems" is the title of a 1999 book from publisher Marcell Dekker. It is mentioned only because the author, Andrew R. ("Bob") Hileman is an ATP user. In a snail-mail note that accompanied his list server subscription dated April 11th, author Hileman mentioned ATP: *"I have used it both to solve customer problems and for my book ... BPA purchased several copies (see Gerald Lee)."* So what does Barnes and Noble show? Of the 14 responses to a search for *Hileman*, this book was number one (*"sorted in bestselling order"*). The work seems to be both expensive and big: hard cover, 784 pages, $195.