Can / Am EMTP News

Voice of the Canadian / American EMTP User Group

Publishers and Mailers :
Drs. Kai - Hwa Ger and Tsu - huei Liu
3179 Oak Tree Court
West Linn, Oregon 97068
United States of America

Authorized by Co-chairmen :
Dr. W. Scott Meyer, Editor
Dr. Tsu - huei Liu
E - mail : canam @ emtp . org
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News from Outside USA and Canada

www.jaug.jp is the new simpler and shortened address of a home page for JAUG, the Japanese ATP user group. This was announced by the JAUG Chairman, Hiroshi Arita, in E-mail of the EEUG list server. *"Moved JAUG home page (http://www.jaug.jp/~atp/index-e.htm)"* was the "Subject" of his message dated June 10th. Why the longer address here? Because of Japanese language, it would seem. When your Editor connected to www.jaug.jp he quickly was asked whether he wanted to download Japanese fonts in order to display content properly. After your Editor responded negatively, the page was displayed, but did not look right. Clicking on the English alternative on the left seemed to lead to what Dr. Arita had advertised.

IPST 2001 was held in Rio de Janeiro, Brazil, June 24th through the 28th. The first publishable summary was received from Laszlo Prikler in E-mail dated August 13th. This explained : *"The number of participants has increased. It was 190 this year, including about 90 from Brazil. The number of papers seems to have stabilized at about 100. The conference structure was as before: a plenary session each morning followed by three parallel technical sessions. Participants were very active; it was a challenging task for chairs to moderate discussion within the given time limit. There were two pre-conference tutorials offered (FACTS and insulation coordination). ... The conference provided one more attraction for participants: a post conference technical visit to Iguassu Falls and Itaipu Hydro Power Station. I was not there, but I heard from a creditable source that approximately 30 people made the tour. The conference papers were published in a two-volume book. Authors were requested to submit their papers electronically --- to upload them to the IPST web site www.ipst.org Thus far, more than 80 papers have been submitted, and are available online in PDF format."* A day later, Prof. Prikler clarified attendance at the tutorial courses: *"the pre-conference short courses were successful with approximately 50 attendees ..."*

More about the Internet and E-mail

E-mail swindles involving Nigeria (see the preceding issue) continue. More detail has been provided by that self-described *son of the late General Sani Abacha*. His E-mail dated April 30th explains how easy and profitable it all might be: *"The funds have been in the security company in Spain since July 1998. Because of the restriction placed on my family by the Nigerian Government, I simply cannot travel to secure the funds from the security company in Spain. What I now need from you are as follows: (1) You should travel to Spain to secure the funds in cash on my behalf and deposit it in your bank account in your country. (2) You will be entitled to 15% of the total sum involved for your assistance. (3) As soon as you confirm to me by e-mail your readiness to travel to Holland, I will fax a copy of my Power of Attorney to the security company in Spain authorizing them to release the funds to you. (4) As soon as you have the funds in your custody, I will give you my account details in the Bahamas where you will transfer my funds to on my behalf. Please contact me immediately."* But does Spain qualify as a *neighboring country* (see the preceding issue)? Maybe the guy has different versions of the story, and he sends so many messages he has trouble remembering which was sent to whom. In response, your Editor politely declined: *"Unfortunately, my passport has expired. Perhaps I am not your best candidate. It is impossible for me to travel to Europe quickly."* Thinking about it, maybe your Editor should have provided some names and addresses of California politicians (see preceding issue) as more promising alternatives! Unreal. Even if only one person in a thousand is gullible or mentally ill enough to believe such stories, the scheme probably is profitable thanks to the low cost of Internet advertising.

"Friends don't e-mail friends HTML" is the title of a surprising story by Julia Scheeres dated February 6th. Found at the *Wired News* Web site, this documents a serious potential problem with HTML-format E-mail. It begins: *"Carl Voth describes himself as a regular guy -- a 37-year-old family man who lives in scenic British Columbia with his wife and three young daughters. But he's also the dude who discovered a fatal flaw in Microsoft and Netscape programs that allows forwarded e-mails to be traced and read."* After MS was notified, what was the MS response? According to Voth: *"They got back to me in a couple days, acknowledged the problem was there, but said they weren't going to do anything about it. They said it was a matter of customer convenience."* Upset, Voth published the solution in 1998. Recently, there has been a lot more interest following discovery and support by *"Richard Smith, who was now the chief technology officer of the Privacy Foundation."* The PF *"experimented with Voth's JavaScript for two weeks, and found that Outlook Express and Netscape 6 e-mail readers were vulnerable to attack because both companies had default preferences that enabled JavaScript and HTML formats. The foundation reported its findings Monday morning, and the feeding frenzy began."*

Gambling via the Internet continues to defy local, state, and federal governments of the USA. Recall the subject was introduced in the January, 1998, issue. Now, three and a half years later, federal lawmakers in the nation's capitol seem ready to strike back. *"Lawmakers seek to ban Net gambling"* is the title of Reuters story that was found at the CNN Web site. Posted July 25th, this begins: *"A group of U. S. lawmakers on Tuesday vowed to gear up efforts to ban gambling on the Internet, pushing for legislation that would, among other things, bar the use of credit cards for online wagers."* Note this would extend to the other 49 states the protection that Californians already enjoy in practice if not in theory (see the January, 2000, issue). Included would be *"an outright ban on online gambling, an industry that has grown dramatically over the past several years."* Of course, enforcement would not be easy. But at the very least, an outright ban should effectively prohibit the collection of gambling debt charged to credit cards (the California solution). About size of the problem: *"Internet-based casinos and sports-betting facilities … have proliferated ... from an estimated 25 sites in the mid-1990s to more than 1,200 today ... Revenues … doubled last year to $2.2 billion ... and are expected to grow to $6.4 billion by 2003. Roughly half of that money comes from the U.S."*

News About TACS and MODELS

Interpretation of MODELS data cards was improved as explained in the April issue. Specifically mentioned was WRITE(--- the only output alternative of which your Editor was aware at the time. Since then, he has seen WRITE1(as used by Prof. Juan Martinez, and this second alternative was added to standard test cases on March 4th. But whereas WRITE(had its own special interpretation, WRITE1(did not. So, the following day, the interpretations of WRITE1(and WRITE2(were improved comparably. At the same time, the associated I/O channels were saved if there was no use (changes to TREAD and TACS1A). Why pay for WRITE1(or WRITE2(if not actually used? No longer, beginning March 5th. More than just efficiency is at stake, it should be explained. Apparently MODELS author Dube was unaware of a possible complication: the LUNIT6 SPY window JUNKE overflows onto the same I/O unit number 37 to which he connects disk file MODELS.1 for WRITE1(use!

Type-53 TACS devices no longer are limited in number by fixed, local storage LOCD53(40) of TSTACS. The protection that was mentioned in the April issue did not last long. First, it was expanded from 40 to 150 to accommodate data from Adeoti Adediran of Texas A&M University (see mention in the preceding issue). Then, March 11th, the storage was variably-dimensioned to satisfy the needs of Prof. Juan Martinez. In E-mail dated March 9th, he had written: *"1) We could need about three times the current limit of Type-53 devices, that is more*

than 400." Your Editor decided that the time had come for variable dimensioning of the device, and that this had better be universal so as to include Watcom ATP as used in Barcelona. By definition, Type-53 TACS devices now are stored in a new, 9th TACS table. Although no standard data case actually required change, the new size was added to the 2nd subcase of DC-18 as an illustration and reminder. As a result of the change, many List 19 sizes in case-summary statistics of standard test cases have decreased slightly. E.g., the former 4783 of DC-1 has become 4621. Unfortunately, memory has not actually been saved. In fact, more of List 19 now is being used. But multiplicities have been updated (several vectors had been added during the past 3 or 4 years, but not taken into account), and the new allocation should be more efficient, and closer to theory. Another change to .LIS files is illustrated by the 2nd subcase of DC-37, which involves "3 TACS NL control variables" (data interpretation). The first of the 3 numbers has changed slightly: from 39 to 38.

The first IF(block within TACS begins March 14th as demonstrated by a new 5th subcase to DC-18. This is fundamentally different from previous work and writing about IF (see IF-THEN-ELSE in the October, 1996, issue) because the modern IF block is handled within the pocket calculator rather than as a special TACS device. This implies that TPC is required (do not try to remove this declaration). Initially (until further development and testing might confirm extensions), restrict use to a single supplemental variable and no ELSEIF. Use balanced (although different) halves, as illustrated.

Code to support ELSEIF was added easily enough on March 16th. Then the same 5th subcase of DC-18 was augmented to include a second IF(block --- this one with 3 different formulas. Except that tables eventually would overflow, there is no limit on the number of ELSEIF within an IF block. This is an important step for practical use: removal of the original limit of two formulas.

DGNOST was removed as a UTPF segment on April 26th following the observation that it did nothing. The Salford copy was a dummy module dating to 19 December 1991, so MODELS had no way of knowing whether the routine was used or not. The CALL DGNOST statements that Dube had left in interface modules TACS2 and TACS3 were pure waste, so these, too, were removed. Conclusion: 1 more of Dube's many inefficient subroutines *bites the dust* (cowboy lingo).

Universal lines of TACS1A have been moved out into calling module TACS1 in order to minimize installation-dependence (in this case, file opening for WRITE1 and WRITE2. In the absence of such a principle or goal, there is no reason to have a separate TACS1A since it is called from a single location. The change was made April 16th.

The 2nd subcase of DC-33 was added to demonstrate the use of Laurent Dube's MODELS. The January, 1992, issue explains that Jerry Almos supplied the data, and your Editor probably appended it to the old data without bothering to verify the solution. For nearly a decade, no one noticed that the solution was wrong, it would seem. One need look no farther than step 1 of the nonlinear element current. The 1st subcase of DC-33 documents the beginning as follows :

```
  Step     Time         GEN           GROUND
                                      TERRA
 ***   Phasor I(0) =  3.7700000E-08    ...
    0      0.0           377.       .377E-7
    1    .5E-4   376.9330268  .5235646391
    2    .1E-3   376.7321312   1.04694322
    3   .15E-3   376.3973844  1.023747946
```

whereas the 2nd subcase produced :

```
    0      0.0           377.       .377E-7
    1    .5E-4   376.9330268  -1.42571976
    2    .1E-3   376.7321312  -1.41394374
    3   .15E-3   376.3973844  -1.40217609
```

The addition of a single line to INNONL corrected this obvious discrepancy, as well as it corrected the answer to the new 3rd subcase mentioned elsewhere. In fact, this is how the problem was noticed. For the 3rd subcase, your Editor **did** check the solution following the data addition, and he noticed that it differed from what had been produced using a separate disk file. Lack of initialization for a second or later subset of Type-96 hysteresis was the very old problem.

Dube's own 78 test cases for MODELS were added to standard test cases during early April. See a separate story for details associated with the new DCNEW-28.

Line and Cable Constants

CABLE PARAMETERS can punch branch cards to represent a 1-phase, constant-parameter overhead line , of course. But such output was fundamentally incompatible with ATP prior to a simple modification to NEWCBL by Dr. Tsu-huei Liu on May 29th. Two days earlier, the trouble had been reported by Prof. Mustafa Kizilcay of FH Osnabrueck in Germany. It would appear that he was preparing for the ATP short course in Bristol: *"Example from EEUG course 2000 ... PC1-50-1_5-a.dat ... TPBIG does not accept the 'unity' transformation matrix that follows immediately. ... The card reading error of the simulation case is illustrated using ..."*

DIR DIB* will inventory files that display a cross-section of CABLE CONSTANTS (CC) or CABLE PARAMETERS (CP) data graphically. These files began arriving June 22nd attached to E-mail from Orlando Hevia of Universidad Tecnologica Nacional in Santa Fe, Argentina. The initial message explained : *"I send you a plot of conductors corresponding to data case ... I am working on a program to plot CC / CP data for conductors in a pipe."* Your Editor responded later that same day : *"It is a good*

idea that first was used by LEC during the late '80s, as I recall. They were using AutoCAD. This was before Hoidalen and ATPDraw. Speaking of Hoidalen ... I vaguely remember some name such as LCC --- a separate program, perhaps. Yes, searching newsletters, I found reference in July of 1997. But perhaps this is for data input rather than the display of existing data. There is a difference. ... If Hoidalen will not provide a picture for old data whereas you will, your work could be valuable, in my opinion."

Protection against the overlap of SC cables can be traced to a June 27th message from Orlando Hevia. Having *"Subject: impossible cable,"* this message begins: *"I send you a data case of an impossible cable, as can be seen with the program dibclp ... I think that the distances between external surfaces of cables can be calculated ..."* Indeed they can, as an improved version of dibclp demonstrated later that same day. It should be explained that need for protection was clearly illustrated by Mr. Hevia's data. BPA's Dr. Tsu-huei Liu reported : *"When I ran your impossible cable data case, Salford ATP died in routine CCEIGN, which is used for the eigenvalue calculation. An erroneous eigenvalue required the square root of a negative number. While bad, this was better than Mingw32 ATP, which ran through to completion without protest (GIGO)."* So, Dr. Liu decided to trap such errors within CABLE CONSTANTS and CABLE PARAMETERS (why punch cards if the geometry is bad?). This added protection within SUBR27 and NEWCBL first became available to others on July 6th.

Brain - Damaged MS Windows

"Appeals court overturns Microsoft breakup" is the headline of a UPI story dated June 29th that was found at Newsmax.com This report began: *"A federal appeals court Thursday overturned the breakup of Microsoft Corp. It ruled that the software giant violated antitrust laws but that the trial judge engaged in 'serious judicial misconduct.' In an opinion highly critical of U.S. District Court Judge Thomas Penfield Jackson, the U.S. Circuit Court of Appeals sent the case back down to be reheard by a different judge. At the same time, the appeals court made it tough for any new judge to break up the company. It said the government would have to prove a direct causal relationship between the company's anti-competitive conduct and its dominance of the marketplace --- something the appeals court said the government had so far failed to do."* A *Seattle Times* story by John Hendren was entitled *"Microsoft ducks bullet, again talks about deal."* This emphasized that MS continues to have legal problems: *"A federal appeals court threw out the Microsoft breakup yesterday but affirmed the company's status as an antitrust outlaw ... the appeals judges decisively ruled that the world's largest software maker used illegal tactics to hold on to its monopoly on personal-computer operating systems. ... the ruling left the Redmond-based company with the taint of an antitrust violator and did not decisively rule out a court-ordered breakup in later proceedings. With both sides winning and losing in part, legal analysts called the ruling a recipe for an out-of-court settlement."* About government resolve, *"White House Press Secretary Ari Fleischer ... fueled settlement speculation by saying that President Bush generally opposes using lawsuits to implement regulations."* A *Washington Post* story by Jonathan Krim discussed newer MS Windows: *"The new operating system, called Windows XP, is at the core of Microsoft's aggressive plan to push its dominant operating system from the desktop onto the Internet through an array of new products and services. Scheduled to hit stores on Oct. 25, the new system integrates, or bundles, features such as audio and video playing, instant messaging and Internet telephony in ways similar to how Microsoft bundled its Internet browser software in previous versions of Windows, which sparked the antitrust case in the first place."* New York's Attorney General Elliot Spitzer is quoted as saying: *"What's so deeply troubling about the XP approach is that it looks very much like more of the same."* Finally, a CNN story was entitled *"Appeals court vacates MSFT ruling."* This mentioned that some states are substantially more hostile toward MS than the federal government. One analyst *"pointed out that some of the state attorneys general who joined the Justice Department in its case against Microsoft, have shown an interest in leveling new antitrust charges against the company."*

"Microsoft faces collateral damage" is the title of an interesting background story by Carrie Johnson of the *Washington Post*. Dated July 11th, this begins with a good summary: *"A federal appeals court's recent decision branding Microsoft Corp. a monopolist removes one of the key hurdles facing plaintiffs in more than 100 private lawsuits against the software giant. Those bringing the suits no longer have to prove the Redmond, Wash., firm wields monopoly power. In seeking damages, they now can focus their legal action on how that dominance actually harmed them."* The amount of money involved is huge: *"Plaintiffs who win private antitrust suits can recover as much as triple damages, plus attorneys' fees, under the Clayton Act -- a 1914 law that regulates competition in the marketplace."* But Bill G probably can afford the world's best defense -- even better than recently-weakened Phillip Morris. There also is plenty of ambiguity about amounts: *"questions about how to put a price tag on harm they suffered as a result of Microsoft's tactics."* How are MS customers affected? *"Lawyers representing consumers who bought the Windows operating system and Microsoft programs such as Word and Excel already have filed suit in more than 30 states. A different group of cases has been bundled together for hearing in a Baltimore federal court."* Of course, MS denies all knowledge: *"Microsoft maintained last week that its products benefit consumers and the high-tech industry."* Also, consumers have a problem in that the average user does not purchase directly from MS. There exists *"a 1977 Supreme Court ruling that allows only*

people who directly purchased items from monopolists to recover financial damages. Most people buy computers that already come equipped with Windows, making the computer seller the initial purchaser of the software." Beyond federal law, there remain the anti-trust laws of many states. Even if competitors do not win in court, they might win by negotiation: *"It remains unclear whether some of Microsoft's biggest corporate foes will join the legal fray. AOL Time Warner Inc. and Sun Microsystems Inc., which lobbied behind the scenes on behalf of the government prosecution, could decide to use the ruling to extract their own concessions at the negotiating table."*

"Microsoft appeals case it once said was a victory" was the title of a story by John Hendren that was found at the Website of *The Seattle Times*. Dated August 8th, this summarizes the aggressive decision by MS as follows : *"Microsoft yesterday asked the U.S. Supreme Court to review an appeals-court ruling that the company earlier had portrayed as a victory, arguing that the court should have thrown out nearly the entire case because of judicial bias."* But why now? *"Microsoft's petition comes as the case was set to head back to the lower court and as the company prepares to launch its next core product, Windows XP. Critics have asserted that the company may be stalling progress of the case to allow the operating system's release. ... Whether or not the Supreme Court considers Microsoft's argument, the company may have already won a key advantage: delay. The company is working feverishly to get Windows XP on the market in an Oct. 25 launch, before government attorneys have a chance to block its sale."* Of course, relatively speaking, very few cases are accepted by the high court: *"The Supreme Court accepts only about 1 percent of the cases proposed by private companies, compared with about half of those sought by the federal government."* But *money talks* (the MS case has great economic impact).

MS Windows 2000 arrived on Dr. Liu's Pentium III-based PC the morning of August 15th --- by mistake! The previous night, there was to be some update (*"SMS distribution"*) via BPA's network. But when your Editor arrived at 05:05, he found an error message on the screen: *"OS Loader V4.01 ... Disk I/O error: ... NT could not start because the following file is missing or corrupt: \winnt\ system32\c_1252.nls You can attempt to repair this file ..."* Needless to say, your Editor did not try. Since Timothy Lungren's PC across the hall had the same message on its screen, the problem clearly was not an isolated exception. Eventually, a technician appeared, and tried to reinstall NT from a CD; but that failed for some reason. The guy said it might be easier to switch to W2K, so your Editor reluctantly approved (*"Do whatever it takes to make the PC usable again."*). The biggest disappointment was violence done to the MS-DOS icon. The text used by the symbol has changed to "C:_", the easily-recognizable red and yellow coloring have disappeared, and the old, familiar DOS font, designed for 25 rows and 80 columns, has been lost as well (bad news for Mike Albert's FC). Yet, there is good news about EDIT. Finally (more than a decade late), MS seems to have acknowledged the desirability of a more powerful Editor for its flagship OS. It appears that the multi-file, size-unlimited MS-DOS EDIT program of Win95 has been adopted. A final piece of good news: when FGH-dimensioned Watcom first was linked for EEUG (Prof. Mustafa Kizilcay) on August 16th, there was no need to shut down other processes (few were in use). Perhaps W2K really is managing its memory more efficiently as suggested by experts Wheat and Szymanski in the preceding issue.

New EEUG List Server

Michael Havekost of FH Osnabrueck in Germany has replaced Laszlo Prikler (in Budapest, Hungary), as the person who maintains the EEUG list server. This was announced to the various ATP user groups by EEUG Chairman Mustafa Kizilcay in E-mail dated May 2nd: *"Ing. Michael Havekost ... has been contracted by the EEUG for this task on an annual basis. His tasks are : 1) to add new subsribers to the mailing list as requested by the user groups. ... Please send future subscription orders to his E-mail address mailinglist@emtp.org 2) to delete subscriptions that have invalid Email addresses after sufficiently long observation, and inform user groups about deleted subscribers. 3) to renew subscriptions (mostly in case of Email address change) after checking the licensing situation in consultation with the related user group. Please note that the ATP license is no longer valid if a user moves to another company. 4) to keep administration of subscribers sorted according to user groups in a document or data base. 5) to perform moderation of the mailing list after gaining experience."* Note use of the impersonal alias *mailinglist* in point 1. Once again, your Editor endorses the concept. Fixed Internet addresses simply do not last long enough. About moderation (point 5), it is assumed that this represents an expansion of one person since Prof. Prikler should continue in this role.

A date that depends on the user's operating system is the latest observation by your Editor about E-mail of ATP licensing. This is May 26th, as another batch of license applications is being processed. The first line of information begins with "Date_of_request:" and each of the first three entries is noted to have a different structure: 1) 2001.04.10 2) 2001/05/07 and 3) 20010516 The first comes from the United Arab Emirates, the second from Canada, and the third from RPI in Troy, New York. Why is the third, from the USA, so different? The individual seems to have an Oriental name, and to be using an Oriental operating system (deduced from such characters on the right of the upper margin of each page).

The Fargo list server of Prof. Bruce Mork seems to remain in service, although messages are infrequent. For example, the first news of that MODELS primer by Gabor Furst (see preceding issue) came from Fargo, although this

was not explicitly stated. More recently, the Fargo list server seems to be used for messages that might not comply with rules of the EEUG list server. One such message arrived June 2nd. Although the declared purpose was to announce IPST 2001, the message began with a substantial paragraph that advertised two short courses in Rio de Janeiro immediately prior to the conference. ATP was not mentioned anywhere in the message, and the courses involved several non-ATP users (Dommel, Mader and L. Marti) having DCG / EPRI EMTP pasts and one non-ATP user (Woodford) having an EMTDC past. Three days later, there was a message from Texas A&M University, announcing *"a short course titled 'Protecive relay testing using EMTP and digital simulators'."* Again, no mention of ATP.

GNU ATP Installation Dependence

Changes to GNUMODS.RUM continue. The April issue mentioned: *6) SETCLR, which had to do with warning messages in the window of ATP execution, and 7) D4FACT which controls termination of the screen plot.* May 24th, your Editor finally processed two messages on the subject from Orlando Hevia. The second of the messages dated May 12th suppressed more warnings: *"When the user requires plots to screen ... and NODISL = 1, a lot of warnings to screen are sent by DISLIN. The following change to gnumods2.f avoids the messages."* The one line added to CLOSOP below S.N. 1869 did seem to eliminate most warning messages. Only messages mentioning "rectan" remained (illustrated by DCN21 and DCN26), and Mr. Hevia later eliminated these by a simple change to DRWBAR (his E-mail dated May 26th).

"Halt in C-like RUNOUT. Overflow JARRAY(200) at KRAS = xxx." was mentioned in the April, 1999, issue. It should be explained that this limit is peculiar to GNU because separate C-language vector utilities from Masahiro Kan were being used in place of high-level FORTRAN WRITE statements. The limit of 200 did not last long. Since Orlando Hevia had data that needed more during September of 1999, 300 had been the limit. JARRAY stores the limits of Robert Schultz's data and zero runs (two integers for each run). Well, suddenly 600 was found to be needed (more precisely, 500 cells were inadequate) for data that was supplied by Takeshi Yamada of Tokyo Electric Power Company (TEPCO) in Japan. Yes, this is the same person who visited BPA during 1994 (see the April issue of that year). Why suddenly was there a much greater need for JARRAY storage? Quoting from your Editor's E-mail dated August 2nd, the difference was *"many conductors of JMARTI modeling in data that involves a base case. The burden is about 4 or 5 times the number of F-dependent phases."* It turns out the unusual burden was traced to vector SCONST, which contributed 108 alternate data and zero runs. The base case is required because existence of the holes is contingent upon location in ATP. Overlay 12 is involved if there is a base case, and this precedes the initialization of SCONST in overlay 13. In OVER12, SCONST seems to involve a substantial (in the sense of Schultz's compression) zero run for each frequency-dependent JMarti mode. A factor of 4 can be explained by the need to store 2 integers for each zero run and another 2 for the following data run (they alternate). So, temporarily the GNU limit of JARRAY(300) has been increased to JARRAY(600). But, your Editor wrote, *"long-term ... we can solve the problem of overflow of JARRAY by use of PARTIAL TABLE DUMPING. I should begin working on this again, before I forget about it."*

The single-precision constant 0.5 was replaced by variable ONEHAF in several subroutines on April 27th. This seems to be an improvement, at least for some compilers including GNU g77. Whereas all standard test cases were unchanged for F77 Salford and Watcom ATP, the Mingw32 ATP solution to DCNEW-20 showed plenty of differences of roundoff-like size. No other explanation for the differences can be imagined. For later consultation by any interested researcher, the old solution is being retained at BPA as DCN20.OLD within C:\GNUNT. For decades the value 1/2 has been defined using double precision in SUBR1, and carried in variable ONEHAF in order to be sure that precision would not be lost. By chance, your Editor happened to notice one use of the constant, and he then searched for all such uses. Modules modified were ZEGEN for cables and OVER8, MAIN9, and FXSOUR for those TEPCO improvements to the S.M. models two years ago (see story in the April, 1999, issue).

Computer Viruses and E-mail

This is a continuation of the stories about Internet vandalism that started in the July and October, 2000, issues.

The SirCam virus was received by many E-mail users during mid-summer. A personal warning about it first was received from Mustafa Kizilcay of FH Osnabrueck in Germany. His E-mail to list server moderators on July 30th had *"Subject: Attention! Dangerous virus."* It explained: *"Our computer center warned all members of the university about a new dangerous virus called 'W32/Sircam-Worm' that infects all MS Office documents located in the directory and sends them to others. Laszlo informed us indirectly through his reply to Marjan Popov. Today I received a message addressed to ask@eeug.de from Dr. Ahmad Jammal (e-mail: ajammal@dm.net.lb from Libia?) that has an attachment named english.doc.pif Thanks to the warning of the computer center and Laszlo, I did not open it. Instead, I first saved the file on disk and then started Norton Antivirus ... Yes, the file was infected by W32 / Sircam-Worm !!! Norton Antivirus isolated the file and then deleted it successfully."* In his "Reply all" later that same day, your Editor reported: *"We received the same message. But BPA's protective incoming-mail filter*

removed the file as 'dangerous.' ... I should mention that a comparable message was received the preceding day. ... This message was trickier because it came from a non-locatable source (I see ....@tavanir.org). ... I have to believe that this message was mischievous at best and hostile at worst. Clearly, we must be careful of mail."

"SirCam worm still spreading documents" is the title of an August 3rd *CNET News* story that was found at the *New York Times* Web site. Author Ian Fried began: *"Like a summer cold that just won't go away, the SirCam e-mail worm lingers on, sending out the contents of infected hard drives for all the world to see. Even as most companies have prevented their networks from spreading the bug, individual computer users continue to send out infected files day after day, with the worm piggybacking on documents ranging from confidential to comical: recipes, shopping lists and lots and lots of resumes. The result is that SirCam is still spreading two weeks after it first cropped up."* The mechanism of contagion is summarized as follows: *"The SirCam worm spreads by e-mailing copies of itself to everyone in the infected computer's Windows address book. It also sends itself to any e-mail addresses contained in the Web browser's cache files, which store recently viewed pages. An added twist with SirCam is that it sends a randomly chosen file from the infected computer's hard drive, potentially sending confidential business data or embarrassing personal information along with itself. The e-mail subject line matches the name of the file being sent."* The story does not name Microsoft directly, although the previous quote mentions *"Windows"* as in Bill G. Once again, the cost of doing business with that convicted monopolist continues to rise. About who the victims are, consider this: *"SirCam doesn't appear to be doing much damage to large companies, which are getting tens of thousands of copies of the worm but have been largely successful in preventing infection. ... Another problem is that infected e-mails often are coming from people unknown to the recipient. As a result, the sender isn't told he is sending out the bug, and the infections continue. Plus, many of those being hit are people on home PCs who don't have updated antivirus software to cure their infection. Even those who have antivirus software often disable it ..."*

A CNN story by Richard Stenger, dated August 3rd, mentioned troubles of anti-virus software: *"Computer users with infected machines have complained that the bug had eluded updates from Symantec and Norton Anti-virus. Symantec, which released a second Sircam patch on July 24 ..."* This story, too, failed to mention MS explicitly (a curious coincidence, eh?). Although past viruses have used English, Sircam seems to be breaking new ground: *"A Spanish language version of Sircam is also making the Internet rounds."* Another difference is this: *"In contrast to conventional viruses, Sircam can also travel on its own like a worm, using an internal mail program to spread via shared network drives. Besides embarrassment, more permanent harm can result. The bug includes a time bomb, set to go off on October 16, which, in rare instances, could destroy many or all computer files."* About that 2nd suspicious message that was mentioned to Prof. Kizilcay, it carried no sign of BPA intervention. But this was not a problem because some other message handler seemed to have provided protection previously. There were two attachments, with one empty. The other, with garbage characters for a name, contained the following: *"FILE QUARANTINED ... Antigen for Exchange IMC removed ÓáÇã ÏÑ ÚÒíÒã.doc.lnk since it was found to be infected with W32/Sircam@mm.Worm (Norman, CA (InoculateIT), Sophos) virus."*

ATP Licensing Problems

Zenji Research and Development Corp., Ltd. in Yokohama, Japan, seems to be another company that has lost its free ATP license due to involvement in EMTP commerce. Details are contained in a long E-mail message from Masahiro Kan, the JAUG Vice Chairman. Dated February 10th, this documents in English the Japanese-language communication between the JAUG Chairman, Dr. Hiroshi Arita, and Yoshiharu Sakai of Zenji: *"I translated the important part of the contents of their home page and correspondence."* The story is long, but can be summarized easily enough by quoting from Mr. Kan's translation: *"Transient analysis program described on your company's home page ... ZR&D three phase unbalanced power system analysis program (MPSAP: Multiphase Power Sytem Analyser Program). You write on the home page that you are selling this program. Begin quote from your home page: This program (MPSAP) analyses the power flow in a steady state and fault transient voltage and current in a three phase unbalanced power system. It can analyse a wide range of time ranges from [micro-second] (surge) to [sec] (transient stability). ... The contract form is a monthly lease. The amount of monthly rental fee depends on the contract terms ... MPSAP is developed to be used for actual business work, so it is not cheap. For student or personal users who have time and interest in analysis, but don't have much money, we recommend the use of EMTP-ATP. It is not so user-friendly but the rental fee is only 1000 Jyen/month. End quotation. The above description of ATP-EMTP is wrong because ATP-EMTP is royalty-free software for anybody who has the royalty-free ATP license. To get the royalty-free license, no fee is required, but only signature and approval by the user group is needed. In addition, JEC (Japanese EMTP Committee) is a different organization from JAUG, and has no rights to authorize an ATP license application."* Mention of JEC and the 1K yen/month is curious, and could be the result of honest misunderstanding. ATP licensing of Zenji dates to 1995 --- before JAUG. At the time, JEC Secretary Naoto Nagaoka would collect Can/Am license applications from JEC members, and mail them to Portland in a big envelope for your Editor's signature. The 1K yen is close to the annual JEC

membership fee of 15K yen. Beyond the EMTP commerce, JAUG had concern about unauthorized disclosure of ATP materials. Zenji mentions *"SMPL308J One-line fault of an unbalanced transmission line EMTP-ATP example DC25 ..."* In their reply to JAUG on February 16th, the Can/Am co-Chairmen wrote: *"Agreed, if the file comes from ATP materials, this is a problem. On the other hand, the basic data of DC-25 can be found as part of BPA's EMTP distribution. It predates the creation of ATP beginning early in 1984. There is nothing to prevent these people or others from using the public-domain materials from BPA. ... Remember Prof. Ned Mohan's 'Exercises ...' If data for ATP also is compatible with BPA's public-domain EMTP, it is not secret. Recall this is the way Mohan avoided the need to license his customers: make the data universal. But note, too, that much ATP data is* ***not*** *compatible with BPA's EMTP. For example, ... is present in most data cases, but would be rejected by BPA's EMTP. Specifically note that ATP disk file DC25.DAT has this declaration, so is not in the public domain."* A draft of the preceding was shown to JAUG officers shortly after it was written. In a reply dated February 24th, Masahiro Kan provided both approval and closure: *"I have no objection to your writing. As for JEC, Dr. Arita wrote to the JEC secretaries that Zenji has lost the ATP license, and asked them not to share the ATP information ... As for the wrong writing about ATP, and use of the ATP benchmark data on Zenji's home page, it already was withdrawn."*

Erich Gunther of Electrotek Concepts has been mentioned before (see the July, 1993 and 1995 issues). Of course, Electrotek, located in Knoxville, Tennessee, is famous for its former collaboration with EPRI in EMTP commerce (see summary in the October, 1996, issue). Well, June 4th, Electrotek's Vice President of Technology sent the following 4-paragraphs as E-mail to both the Can/Am and EEUG mailboxes of **emtp.org** :

"I just saw a copy of the January 2001 issue of EMTP News where TOP 2000 is mentioned and would like to comment generally.

TOP 2000 is a free program - no fee and we don't care what commerce people engage in - it is still free. It is quite popular and a lot of ATP users use it. TOP 2000 and earlier versions ATP file support was enabled from reverse engineering the file format from files posted on the Internet by ATP users.

It is unfortunate that the Canadian / American EMTP Users Group policy on "EMTP commerce" is so broad and restrictive to prevent it's membership from getting additional support in TOP 2000 by making the file specifications available to us. The only people hurt by this policy are ATP users. We do the best we can when ATP users who wish to use TOP have a problem and luckily we have been able to resolve the issues as they come up.

The vindictive attitude of the Canadian / American EMTP Users Group toward our past business dealings with certain clients of ours (e.g. EPRI, ABB, DCG) is beyond our comprehension. We are simply a small consulting firm trying to make a living, keeping our families fed and have a good time doing it."

End of complete body of message from Mr. Gunther. Look for a response from your Editor in the following issue. Several important aspects will be discussed.

Comings and Goings

Atsushi Kurita of the Power System Technology Group at the Power Engineering Research Center of TEPCO (Tokyo Electric Power Company) in Japan, has replaced Dr. Hiroshi Okamoto as principal contact for TEPCO-supported contributions to ATP. This news arrived in E-mail dated June 6th. Recall that the creative work of Xiang-lin Cao of Toden Software, Inc. (TSI, a subsidiary of TEPCO) includes the Type-58 S.M. (see the April, 1997, issue) and CAO LOAD FLOW (see the April and July, 1999, issues). The reader will note that Mr. Kurita's name appears in the last-mentioned issue, so he seems well qualified for his new role.

BPA's move to Vancouver Mall is approaching as this paragraph is frozen for publication on September 4th. Recall the July issue warned about the change to snail mail address (bad news). This issue warns about telephone numbers. These, too, will change. *"Yes, they will all be new"* was the information received from the head of Network Planning in E-mail dated June 14th.

"Online grocer Webvan to file for bankruptcy" is the title of a Reuters story dated July 9th. Recall Webvan was mentioned in the January and April, 2000, issues. Also, ridicule of the concept of on-line grocery shopping can be found in the April, 2001, issue. Well, the news of Webvan's funeral first was noted at the *New York Times* Web site. The story explains that Webvan *"is closing down after a long struggle to stay in business. ... About 2,000 workers will be laid off as a result."* In the end, the business model was defective: *"The company has spent most of the past year scaling back its ambitious plans to become a nationwide service. Recently it has exited several key markets and even appealed to its customers to place larger orders."* It seems that management failed to foresee operating costs as well as competition from conventional stores: *"Webvan also encountered tough competition from some local grocers that set up their own home delivery services, and it found that its operating costs were much higher than it had planned."* A lot of money was lost by owners: *"Although Webvan would be just one of hundreds of dot-com companies to go out of business, its story is somewhat unique. Webvan was one*

of the most well funded of all the dot-com companies, having raised, and burned through, around $1 billion in financing." A story found at *The Register* the following day added complementary details: the operation covered *"7 US cities including Chicago, Los Angeles, San Diego ... Webvan had around 750,000 customers."*

Power Company Politics and Religion

BPA has an *acting* (i.e., temporary) Administrator rather than a permanent Administrator, it should be mentioned. Without comment, the term *acting* was used in the July issue. So what happened to Judi Johansen (see paragraph in the July, 1998, issue)? Nothing nearly as interesting as the story about her family-devoted predecessor, Randy Hardy (see the January, 1998, issue). Whereas Randy suddenly and heartbreakingly found himself separated by 180 miles from his family in Seattle (surprise!), perhaps Judi merely realized that she could escape BPA problems, uncertainty, and stupidity, while earning much more money, by moving across the river to Pacific Power (PacifiCorp) in downtown Portland. A story found at Lars Larson's Web site states that she was scheduled to leave BPA 17 November 2000.

The idea of a crippled version of ATP is heard from time to time. In years past, the user group has dismissed the thought as inapplicable. So-called demo (demonstration) or student versions of commercial software typically exist for purposes of advertising. In the hopes of later selling a real version, a crippled version is provided either free of charge or at a much lower price. Since ATP is non-commercial, your Editor never saw the practicality. But what about DCG / EPRI? In E-mail dated March 29th, Wenjie Zhang of Manitoba Hydro (MH) in Winnipeg, Canada, explained: *"I contacted DCG / EPRI, but they don't have a demo version as yet. That's why I gave ATP a try."* The interest was for education at home. Unfortunately, the user group was forced to question the relationship of MH to EMTDC. Upon learning that *"the HVDC Research Center is now a wholly owned subsidiary of Manitoba Hydro,"* your Editor responded as follows April 1st: *"The issue is: does MH acquire EMTDC on the same terms as everyone else? Here we adopt the same posture as taxing authorities around the world. It is not what something calls itself, but rather how it behaves, that determines how it will be treated. One hears the expression 'an arms-length transaction' as opposed to 'a sweetheart deal' (the latter typically is among relatives or friends, and may involve privileged, artificial fees or rates) ."*

Stu Cook Uses Apple Macintosh

*BPA is **not** friendly to Apple Macintosh PCs* as was documented in the preceding issue. Upon reading this, Stu Cook was not convinced by the BPA logic. Neither was your Editor, it should be made clear. The part about security (protection against viruses and hackers) is particularly laughable after BPA's own recent disability due to reliance upon MS Windows (see ILOVEYOU in the July, 2000, issue). Mr. Cook had written that *"for years, when the US Army home page was being run on various versions of the Windows OS, it was being hacked regularly. About a year or so ago they got fed up with this situation and switched to Mac servers and haven't had a problem since."* Your Editor does not doubt it. About how misinformation comes from government committees, your Editor offered this opinion on January 21st: *"It happens more than chance would explain ... My own belief is that this probably is not accidental ignorance. More likely, it is intentional ignorance to serve a pre-conceived need for a Wintel conclusion."*

Apple Macintosh has conspicuously embraced Unix about a year after IBM's prominent support for Linux (see a summary in the July, 2000, issue). *"Apple hopes to 'tame Unix' with OS X"* is the title of a story by Josh Fruhlinger of itworld.com that is dated March 26th. Mentioned in copyright notices of the story are idg.net of International Data Group and Computerworld, Inc. The opening paragraph explains: *"Declaring that Apple Computer Inc. has built a product that will set the stage for the next 15 years of computing, Apple CEO Steve Jobs last week unveiled the final release of OS X, the company's new operating system. When the long-awaited OS X finally became available to the public on Saturday, it marked the end of a seven-year process to create a new operating system for the company's flagship Macintosh computers."* About Unix compatibility, Jobs is quoted as follows: *"By the end of the year, Apple will be the biggest distributor of Unix."* Of course, the IEEE-standard Unix is Posix (see the July, 1995, issue), and Apple is understood to be compliant. About history: *"Apple committed to revamping its venerable operating system in 1994, a decision spurred in part by a similar project at Microsoft Corp. But while Redmond's efforts bore fruit only a year later with Windows 95, Apple's project meandered on for better than half a decade. A major change in direction occurred in December 1996, when Apple bought Next Computer Inc. and company founder Steve Jobs reassumed control; much of the intellectual property Jobs brought over from Next found its way into OS X."* About finances: *"Jobs asserted that Apple was healthy; he pointed to the fact that the company was essentially debt-free and had $4 billion in cash on hand."* But what about the recent financial downturn of Motorola, which might affect Apple's ability to obtain a supply of PowerPC microprocessors that are competitive with Intel and AMD products? A reporter asked about possible concern by Apple, and Jobs denied the problem. He is quoted as responding: *"You're wrong. You don't know what you're talking about."* Time will tell. Recall that long ago Robert Schultz of NYPA had bet on Intel (see the April, 1996, issue), and today Motorola is substantially behind Intel and AMD in clock speed (see the January, 2001, issue). Schultz has been proven right.

Pocket Calculator Used by PCVP

$POCKET is a new $-card similar to $PARAMETER in that the pocket calculator is entered to evaluate variables (the left hand sides of simple FORTRAN assignments). Unlike $PARAMETER, the resulting symbol values of a $POCKET block are not used to modify data cards, however. Instead, variables might control execution due to their presence in COMMON (SPY variables); or special program output (see a later paragraph on this subject) might be generated. Whereas $PARAMETER normally will appear early in a data case (so as to affect all following data cards), $POCKET commonly will appear toward the end --- such as among node-voltage output requests of a frequency scan, or among batch-mode plot cards of a loop over time simulations. For data involving a loop, these locations allows $POCKET operations to be performed **after** each phasor solution or time simulation is complete. Data must be modified **before** it is read, but results can not be processed until **after** a solution has been computed. For an illustration of use, see the 4th subcase of DCNEW-26, which was added December 27th.

Output became an option of the pocket calculator on December 27th. Laurent Dube's MODELS has a WRITE statement (e.g., see the 4th subcase of DC-68), and this provided the inspiration. Operation is comparable, as illustrated by additions to the 4th subcase of DCNEW-26. Together with accompanying comments, this illustration should be self-explanatory. The new WRITE(statement allows an arbitrary mixture of text and variable values much like the free-format WRITE statement for FORTRAN.

HFS would seem to be an ideal application for MODELS, and correct operation of the two (see story about MODELS) has provided ample incentive for your Editor to discontinue his work on $POCKET.

An unused $PARAMETER block caused trouble as first reported by Prof. Juan Martinez in E-mail dated January 2nd. He wrote: *"This time the problem is related to parameter numbering. ... if we reduce the number of total parameters (many of them are just dummy parameters without any further application)."* The following day, your Editor responded: *"This was the second detail that I had not planned on : unused parameters. It turns out the 2nd pass had parameters numbered differently than the first because your first parameter ... was not actually used. … I decided that we needed consistency, and I chose to number all parameters whether they are used or not. Each $PARAMETER block is assigned at least one triplet of pointers, even though it might not be required. My code assumed that each $PARAMETER block did something, and if this was not the case, there was trouble on the second pass."*

Expanded limits of 200 parameters and 3000 bytes total length were another result of the preceding reform on January 2nd. As your Editor explained to Prof. Martinez on January 3rd, there was an overflow error stop: *"This was my fault. I had expanded the number of separate $PARAMETER blocks to 91 while leaving the number of variables at 20. This makes no sense at all. Yes, I found the same overflow message you did, so the first thing I did was expand the 20 to 200. But that did not solve the problem. Execution then died on the following pass number 2."* Trouble was traced to an unused block (see preceding paragraph) . About the 3-Kbyte limit, this corresponds to an average symbol length of 15 bytes, which is reasonable.

Use of character strings along with mathematics first was suggested for IF blocks by Prof. Martinez. Attached to E-mail dated January 5th, data TESTB1.DAT clearly demonstrated both the practicality and the impossibility using existing code, which rejected text by means of the message *"=== Halt. No equal sign found on last-read card ..."* But later that same day, your Editor worked to allow such an extension. Acceptance by MATDAT (avoidance of the preceding error message) was simple enough, but more involved was tolerance of the pocket calculator itself. Yes, POCKET required structural change because IF blocks are handled within it. If text is to be part of an IF block, the pocket calculator must handle text as well as numbers. About IF blocks in general, Prof. Martinez approved: *"The capability IF-THEN-ELSE-ENDIF inside a $PARAMETER block is obviously a very powerful one."* Yes, and the inclusion of character strings within such blocks became possible January 7th as illustrated by a new 10th subcase of DCNEW-25.

Memory location function LOCINT was relied upon by the pocket calculator to access current simulation time T in BLKCOM prior to the provision of an alternative on January 8th. Although not necessarily limited to such use, simulation time was a common independent variable of Type-10 analytically-defined sources (e.g., see use of TIMEX in DCNEW-19); and this was the use that prompted the first report of trouble, which was received the previous day from Orlando Hevia. *"Mingw32 ATP runs correctly but djgpp ATP stops with Non-0 remainder on TIMEX. N15, N16, N17, N18 = 11144109 ... Is djgpp for masochists?"* The good news is that your Editor had considered the possibility of failure, and had provided this civilized error stop in case the logic ever proved to be inadequate. But how, and why now rather than years ago? Your Editor can not explain the timing (why it took years for the trouble to appear). But he can explain the trouble. The separation between vector VOLTI and BLKCOM is not an integer multiple of 8 bytes as required for VOLTI to access T. Of course, memory addresses of COMMON blocks come from the linker, and none of us knows much about details. Today, absolute locations are not being used for any compiler and

linker. The last person to have controlled addresses absolutely is believed to have been computer expert David Szymanski, using standard Unix in a very non-standard way (see mention of System V, Release 3 and dynamic dimensioning in the October, 1989, issue). Since then, the most anyone does is specify relative order. For Salford DBOS, this was the important discovery of then doctoral student Mustafa Kizilcay in Hannover, Germany (see mention in the April, 1991, issue). For no flavor of GNU is any such ordering used, however, and for some unknown reason, the relative location of the two COMMON blocks shifted for djgpp ATP so as no longer to be divisible by 8 with non-zero remainder. There can be no doubt about this detail since Mr. Hevia was able to produce correct operation by adding a 4-byte integer IJK immediately before T within BLKCOM. But why trouble using djgpp and Linux but not Mingw32? And why now but not a year ago, and perhaps not a year from now? In order to guarantee the right result for all GNU flavors at all times, your Editor decided that it was time to remove the reliance upon LOCINT by the treatment of TIMEX as if it were a constant. New variable LOCTIM is associated with this. If this new logic is used, there will be a new output line mentioning "mis-aligned COMMON" in the .DBG file. Finally, there is Mr. Hevia's question. Yes, at this late date, djgpp ATP commonly might be used mostly by masochists. Time has passed it by. But, because djgpp behaves so differently, it remains a valuable tool of creative program developers such as Mr. Hevia. His continued use is encouraged by less courageous developers in Portland.

Character string replacement within an IF block was incorrect if it immediately followed a control statement (i.e., appeared as the initial executable statement). This was the analysis of trouble submitted by Prof. Martinez in E-mail dated January 22nd. The illustrative 10th subcase of DCNEW-25 was handled properly only because numeric substitution preceded the character substitution, it was noted. Internally, a S.N. must be applied, and this was not being properly applied to a line involving character replacement prior to correction on January 25th. The following day, the order of the two variables within the IF block of the 10th subcase was reversed to demonstrate that the resulting solution now is unaffected. To be continued (many changes remain to be summarized) .

Creative ATP Modeling

6-phase machine modeling was of interest to Dr. Michael Steurer (see paragraph in the preceding issue). Privately, the discussion continued at some length, with your Editor having a fourth idea on May 1st: *"Alternatively, do you have any computer code? If you had code, an alternative thought comes to mind : user-supplied compensation modeling. ... There is a story in the January, 2000, issue of the newsletter. You could proceed the same general way, I would think. There is nothing fixed about the phases. The interface will work for a variable number of phases."* About theory, Dr. Steurer explained: *"The two identical machines were modeled in 1998 by E. J. Lecurt, Jr., presented in 'Using simulation to determine the maneuvering performance of the WAGB-20,' Naval Engineers Journal, January, 1998, pp.171-188. The dq-Model is given there. The machine is simple in the sense that it has no damper windings. We also have the mechanical dynamics of the shaft and propeller system."* Although Web-based details require a password (*"Healy Project. Consortium for electric-ship research and development. (password required)"*), *"there is a short section to give general info on the project and on the icebreaker that is open to the public. ... see www.caps.fsu.edu/Healy/Healypub/index.html"*

A reference to publication of Dr. Kosterev's work using MODELS was provided by Laszlo Prikler in a reply dated May 15th. A relevant paper is said to be: J. Esztergalyos, D. Kosterev, and L. Dube, "The application of user defined induction machine models in EMTP," Proc. of the 3rd Int. Conf. on Power Systems Transients (IPST'99), Budapest, June 20-24, 1999, pp. 247-251. Of course, Prof. Prikler himself is in Budapest, and he explained how others could obtain copies, if interested: *"Order form for the complete copy of the proceedings is available at the IPST Web site: www.ipst.org. I still have 5 author's submitted originals of the above paper, that could be sent by snail mail if one is interested and if he gets authors' permission (authors retain copyright of their IPST papers)."*

"But then MATLAB, too, might be slow. Who knows?" This semi-rhetorical question was asked in the July issue. Since then, your Editor also expressed general doubt about the effect of a delay of one time step if compensation might not be used for the interface between MATLAB modeling and the electric network of ATP. Harald Wehrend of SEG in Kempen, Germany, seems to confirm the concern about MATLAB speed in E-mail dated June 11th: *"I had a short talk with my colleague who, too, uses these foreign models. Some months ago he used Simulink to build a controller for controlling a power electronics converter. He confirmed that it is no problem for him to have the small time delay because the time constants of the regulator are much longer than a single time step of simulation. Another important remark of this colleague (Stephan Müller, who also studied in Hannover), is this : for routine use, the inclusion of Simulink / Matlab models is too slow. They came back to directly include C-code rather than use Simulink models directly."* Conclusion : MODELS from Laurent Dube is not the only higher-level simulation tool to offer generalization at the expense of performance.

Compensation of the U.M. should not conflict with compensation of a single-phase nonlinear or time-varying element provided each is isolated in a separate subnetwork. Yet, no standard test case illustrated such use prior to the addition of a new 10th subcase to DCNEW-16. Comment cards explain that the addition was inspired by testing of Dr.

Michael Steurer of CAPS at Florida State University in Tallahassee as described in E-mail dated May 17th. Prior to a correction to SOLVUM on May 20th, the compensation logic was troubled. Note the 6th subcase involved the same mixture of element types, but data was illegal because of lack of separation. The output of this remains wrong, unfortunately (still no adequate error termination). But at least the solution to the 10th subcase now seems right.

DEC ATP for VAX / Open VMS

FORMATTED .PL4 files prompted the non-standard treatment of LUNIT4 as mentioned in the preceding issue. This was for cases of TO SUPPORTING PROGRAM use. Later, this difference should provide incentive to switch to the more-efficient UNFORMATTED alternative, if there is time. At this late date (years later), it is difficult to remember why FORMATTED files were used. Of course, debugging is easier using a FORMATTED disk file. It may be that this was the only reason for the choice.

A simple improvement that was made to the VAX translator this time was the destruction of comments within INCLUDE files (the *.INS output) . The Salford translator has removed comments for years, so uniformity was improved by this change.

Column 1 of the output that precedes the start of each new pass of a PCVP loop was missing prior to a universal correction to MAIN00 and MAIN20 on April 4th. Of concern are lines that begin with *"Begin next shot KNT of PCVP parameter variation."* For execution involving DISK, this line was being sent to the screen by WRITE (* --- practice that resulted in the loss of byte 1. Correction involved replacement by the universal procedure that had been perfected early in ATP history (the '80s) for the MAIN23 loop over modes of JMARTI SETUP fitting. The same installation-dependent treatment simply was extended to PCVP (no problem) .

Column 1 of the *"2nd coil."* interpretation of a Type-52 branch (e.g., see DC-53) was discovered to be missing due to a different problem: procrastination associated with the movement of text from code (temporary storage) to data (storage in the external file of program text). Modification to installation-dependent OUTSIX solved not only this present problem, but also all such possible future problems. Beginning April 5th, VAX OUTSIX includes recognition of a JCOLU1 value equal to unity.

The DECterm window is increasingly unsatisfactory as the years pass. It is worth documenting the reasons. The window can be scrolled up and down for a reasonable distance (some sizable, fixed history is provided), but not sideways as needed to reveal 132-column output to the right of column 80. The same limitation applies to EDIT and data to the right of column 80. Also serious is lack of current information. The window has no knowledge of files that were created by another process since opening of the window (e.g., by use of a second such window). It would seem that some information is gathered when the window is opened rather than when it is demanded. Finally, time-sharing is horrible. It really brings back memories (the reason workstations and PCs prospered at the expense of remote time-shared minicomputers or mainframes) .

$OS (e.g., see the 9th subcase of DCNEW-25) is not being supported. For VAX, such use was commented out. Is this necessary? Can anyone supply FORTRAN for the VAX equivalent of CALL SYSTEM of Unix (to execute an arbitrary operating system command) ? If such generalized power does not exist (this seems possible), could any VMS expert supply specialized code to handle those particular functions that are used in DCNEW-25? Note that Prof. Juan Martinez's new use of $PARAMETER provides the incentive.

That Type-68 TACS device from Robert Meredith (see the April, 1998 issue) is illustrated by the huge first subcase of DCNEW-25. But this was mishandled by VAX ATP prior to a correction to universal GUTS2A on April 6th. The VAX solution was wrong at the time of the preceding translation (July of 1999), but no one previously noticed, it would seem. Most variables were close in an engineering sense. But this time, Dr. Liu's sharp eyes questioned the comparison between VAX and Salford solutions, so your Editor investigated. He found that the 4E16.0 decoding of S.N. 3729 did not correspond to data being right-adjusted. Other versions were not bothered, but VAX ATP was, as explained previously (see BN in the July, 1998, issue). The FORMAT used by Meredith's device presumably was added after the BN work, and need had not then been remembered (a weakness of the procedure). Alternatively, the data was not properly right-adjusted. As documented on comment cards, this change now is being made to Salford DCNEW-25.

Work ended Friday, April 6th, a full 7 days after your Editor and Dr. Liu resolved to begin the work. What a struggle. Yet, the project was educational.

78 MODELS Test Cases of Dube

Laurent Dube's own 78 test cases for MODELS were rediscovered by accident on April 6th, and have been added to the set of standard test cases so that they will not again be lost. Weeks earlier, your Editor and Dr. Liu had agreed that such augmentation of testing was desirable, but Dube's data then could not be located on either PC at BPA. Neither could your Editor find it at home prior to accidental discovery while working on data from Jules Esztergalyos. Yes, like Walter Powell, Jules has retired, and he continues to do work for BPA as a contractor. The disk file was named JULES.DAT, and LIST JULES.* was used to display the several associated files. But in addition to new files there was an old JULES.BAT that had 17 lines to

verify Type-94 branch modeling. The first of these was :

```
CALL RUNTP disk \ld\testmodl\typ94-T1. * -r
```

Once within f:\ld at home, the rest was obvious. Since then, corresponding storage has been copied onto Dr. Liu's DX2 486-based PC at BPA. Dube's data files date either to 1995 or 1996, and verification last had been performed on 26 March 1996 (date of the *.LIS in f:\ld\testref) .

No one else has been using ATP to methodically verify Dube's 78 MODELS test cases during recent years, it would seem. That much now seems clear. More precisely, if anyone else has been doing the work, he has failed to note and complain about those cases that produced different solutions. This much now is known. Many test cases involved cosmetic changes, and not all of these were desirable. More seriously, several test cases ended with unexpected error terminations, so were clearly being mishandled. Careful comparison of new .LIS files with old ones has resulted in several corrections to either ATP or the data cases themselves, as the following report will summarize.

CONCATENATE INCLUDE FILES is a request word that extended $INCLUDE capability to the concatination (unification) of otherwise separate data cases on April 7th. Operation is illustrated by new DCNEW-28 (the unused old contents were renamed DCNEW-31) for the 78 test cases of MODELS author Dube. Inclusion as part of standard test cases, executed by RUN.BAT, began April 10th, when 73 seconds were required for completion at home using Salford EMTP on your Editor's 133-MHz Pentium-based PC. But the disk light flickered weakly and continuously, indicating borderline paging. Not so for Dr. Liu's 550-MHz Pentium III at work, which has no shortage of resources. Watcom ATP running under WinNT on this PC completes the job in 8.8 seconds. This is as timed by DOS (using TIME), taking the average of the best 5 of the final 6 of 7 consecutive executions. Conclusion: the added delay is not a serious problem. It is a reasonable added burden to bear in exchange for knowledge that all features of MODELS are being tested.

Installation-dependent SYSDEP will modify .PL4 file names a maximum of 99 times in case of conflict, it should be explained. Two serialization digits have been used for all compilers and computers since around 1985 (ATP year 2), as best your Editor can remember. Of course, the need for modification occurs if time has been frozen by KOMPAR > 1 in order to ease mechanical comparisons. Whether one adds seconds (the original design for Apollo and other workstations) or minutes (MS-DOS) depends on the maximum length of file names. But this is an unimportant difference. The problem is this: a maximum of 99 increments can be handled, and prior to an addition on April 9th, there was no error message to explain overflow. So, the following message was added: *"More than 99 perturbed file names for .PL4 have failed. Erase 8B11*.PL4 (WW I name if KOMPAR > 1)."* An alternative would have been the addition of a 3rd digit, to expand the limit to 999. But such operation is enormously wasteful. Any user who might experience the trouble typically will be unaware of the accumulation. Proper file management seems to be a preferable alternative to such increased accumulation. Understand what has happened when execution is terminated this way. For the single data case that fails to simulate, 100 different file names already have been attempted without success. The previous one failed 99 times, the one before that 98, etc. Like symmetric, full-matrix manipulation, this requires an order of N**2 / 2 interrogation of the disk. It is contrary to public policy to allow N to be unrealistically large.

PTLSTE is Dube's test to verify point list operation, and it involved $INCLUDE on a .LST disk file. But for easy collection of all test case files, standard ATP practice always has been for all input data to involve .DAT file type. So, on April 10th, PTLSTEIN.DAT was created. Corresponding modification was made to PEAKTEST to remove reliance upon an exceptional .M file. Now, use of *.DAT within the appropriate directory should span a complete set of Dube's data files.

Time-step loop output no longer exists for data cases that involve no output variables. This was a significant difference that was noted when new solutions were compared with old ones from 1996. Many of Dube's data cases involve no output variables, with GLOCST ("global constants") providing a simple illustration. A single time step is taken, and Dube's 1996 .LIS file includes the following two lines (although separated by other MODELS output) :

```
0     0.0
1     1.0
```

The first of these was not preceded by the usual column headings for dT loop output, although there was a single line that stated: *"Column headings for the 0 EMTP output variables follow. ..."* Removal of output that was not requested by the user is part of enforced uniformity. After all, ATP will not produce output of the dT loop without a request for one or more output variables, so why should MODELS be given such power? About ATP, recall *"KILL = 44. The user apparently forgot to request one or more output variables ..."* But this reflects the difference between the total and a part. MODELS data might be just a small part of the data being considered. MODELS, like TACS, can be used effectively with no outputs because observation by the user can be confined to the electrical side of a hybrid problem.

Data case PEAKTEST ("voltage measurement") was handled wrongly due to a conflict with Gabor Furst's alternative, high-precision specification of dT and T-max (see the October, 1998, issue). Use of steps per cycle is illustrated by the 4th subcase of DC-22, and Dube's data required modification to avoid this alternative. Then answers compared favorably (no other trouble was noted). To be continued (the story has just begun).

California Electric Power Crisis

California's inability to regulate electric power was summarized in the preceding issue. The amazing story about that expensive free lunch continues.

That 50K MWatt figure for peak California load (see preceding issue) was obtained from the state's energy-related Web page, which is **www.energy.ca.gov** This is run by the California Energy Commission (CEC) , and hundreds of official reports are available there, online, in PDF format (click on *"publications"*). It should be explained that discussion of the great California energy shortage is complicated by the fact that not all of the state is involved in the disastrous regulation. The 1996 law (Assembly Bill 1890) provided an exemption for publicly-owned power companies, and the City of Los Angeles took advantage of this. The LA Department of Water and Power (DWP) had the foresight not to participate, so this large city and some smaller ones have avoided the power shortages that have plagued most of the state beginning last year. *California ISO* (where ISO is an acronym for Independent System Operator) is the name of the regulated part, and estimates for it can be found in a CEC document that is numbered P300-00-006. This CEC Staff Report is entitled *"Summer of 2001 forcasted electricity demand and supplies."* Immediately following the cover pages is a table for the *California ISO Control Area*. Of course, air conditioning is the biggest variable, so temperature is the critical statistic. One finds columns for 1 in 2, 5, and 10, with the 1 in 10 figure being 50,068 MW. This table of estimated peak load is followed by a table entitled *"2001 Peak Resources."* Included is a row for *"Excess capacity from LADWP control area."* For the 3 temperature conditions, estimates are 1222, 898, and 832 MW, respectively. I.e., the City of LA is expected to continue to export power during the hottest temperature conditions considered! Except that city residents now also must pay inflated state income taxes to cover the state's debacle, the city itself has avoided negative consequences. Remember why it all began. California electric rates were higher than in some other parts of the country, and state politicians were sure they could provide greater choice and lower prices (see *"retail wheeling"* in the January, 1995, issue). That was the free lunch, which the City of LA and a few others (Glendale, etc.) had the common sense to refuse.

Fish-first environmentalists (recall that unofficial BPA logo in the January, 1995, issue) are angry at BPA, which has agreed to supply surplus power to California in an emergency. *"BPA strikes deal with California"* is the title of a story found at the Lars Larson (AM 750 KHz KXL radio in Portland) Web site June 17th. *"Officials said the deal means California would return power to Oregon in the winter, when this state's power demands increase."* BPA agreed to *"send the federal agency's excess power to its southern neighbor, but only in the event of an emergency."* The story concludes: *"Fish advocates criticized the plan, fearing that water needed to aid protected salmon might go to California instead."* But why the need for a written agreement? If California is facing rolling *grayouts* (the new name for blackouts, in honor of Governor Gray Davis), why would BPA not automatically send its excess power? Your Editor suspects that we have here yet another sign of how BPA management has been intimidated by Oregon's fish-obsessed environmentalists. By signing the deal, California will shoulder responsibility for the decision to import BPA power. At this late date, and considering the seriousness of their problem, California politicians will not hesitate to tell Oregon environmentalists that people come before fish.

The *blame game* was mentioned in the July issue. This became both national and high-profile during June when the recently-empowered Senate Democrats provided a sympathetic platform in the nation's capitol. *"Davis continues blaming energy providers"* was the title of an AP story found at the *Fox News* Web site. Dated June 20th, this explains: *"California Gov. Gray Davis told Fox News today he will sue the power companies if they do not cough up the $9 billion in rebates he believes are due ... According to Davis, the state will pay nearly $50 billion in energy costs this year. ... He told senators that new power plants will provide 20,000 additional megawatts of electricity by 2003, including 4,000 megawatts by the end of the summer."* The same day, the *ABC News* Web site entitled its story: *"Davis demands nearly $9 billion for electricity overcharges."* Included was this added summary of escalating prices : *"The state spent $7 billion for electricity in 1999 and $27 billion in 2000 and is projected to pay nearly $50 billion this year, said Davis."* A CNN story the same day mentioned regional antagonisms: *"Davis has accused out-of-state suppliers -- particular those based in Texas -- of gouging California consumers."* Of course, Republican President Bush is from Texas. About state politics : *"Davis is under increasing political pressure at home and faces re-election next year."*

Juan Martinez Stresses PCVP loop

The pocket calculator loop over simulation is illustrated by the 5th subcase of DCNEW-25. But this use is small in scale. Very large-scale use has been proposed by Prof. Juan Martinez of the Polytechnic University of Catalunya in Barcelona, Spain. Attached to E-mail dated July 23rd were troubled data cases CASE01, CASE02, and CASE03 which prompted the following improvements.

$PARAMETER variable values are documented by lines that begin with the fixed text *"New values:"* Such output was mishandled prior to correction on July 24th. No test case was affected since none illustrates more than 9 variables. But disk file CASE01 from Prof. Juan Martinez certainly had plenty (158 variables), and it revealed the trouble on the very first row of output. This was seen beginning with variable number 10 because only a single digit was supported by the code. Since CASE01 involved narrow variables of just 6 columns each, even

the right side of the first row was wrong. Ignoring the first 7, consider numbers 8 onward, which appeared as :

```
8)   1.0  9)   1.0  0)   1.0  1)   1.0  1)   1.0
```

What should be 10, 11, and 12 have been erroneously labeled as 0, 1, and 1, respectively. But this is better than subsequent rows, each of which consisted of a single entry. For example, the second row consisted of just :

```
  New values:  -)   1.0
```

Following correction, all rows appeared as they should. For example, the second row now begins as follows :

```
  New values:  12)   1.0  13)   1.0  14)  ...
```

IOPCVP was explained in the October, 1998, issue, and this binary control (value 0 or 1) served well until Prof. Martinez's huge data cases. During the final week of July, two new alternative values were added for more control. Value 2 will preserve the extrema but suppress the output of parameter values (the line beginning with the fixed text *"New values:"*) . Value 3 will suppress extrema, too, leaving just the single line that indicates both the pass number KNT and its limit MAXKNT (*"Begin next shot ..."*). The alert reader might be asking himself : but if there is no output, what purpose is served by program execution? The suppression is inside the PCVP loop only. It does not affect subsequent *"extrema of the extrema"* output, plotting, or statistical tabulation after the loop is exited. Neither does it affect MODELS output to a separate disk file using either WRITE1(or WRITE2((output to MODELS.1 or MODELS.2 is fundamentally different in that it escapes both output buffering and possible suppression by ATP). Of course, such output of MODELS can be made conditional, so is under the control of the user. For example, he may produce none until some criterion is met. Dice might be rolled to change some parameter randomly at the start of each pass. Like Glenn Wrate (see the July, 1996, issue), a user might be simulating forever while waiting for an interesting response from ATP. To be continued.

Details of $INCLUDE Files

$INCLUDE files that are located along with the main data file became an option March 30th following changes to OVER1 and FNDFIL (the latter of these is installation-dependent in theory, but universal in practice, thus far). This represents more progress in the quest for universal data. Whereas $PREFIX always could be used to locate the $INCLUDE files, the need would vary from user to user or version to version. Several data cases involve a $PREFIX declaration on a comment card for precisely this reason: no one choice of directory will satisfy everyone. But this problem has been solved with the new symbolic directory [] that can be found in DC-8, 17, 58, 64, and DCNEW-21.

"NONDUM =" is the form of a possible new declaration line at the end of the header of a $INCLUDE file that involves arguments. Changes to SATURA and OVER1 were made July 9th following a report of overflow by Dr. Michael Steurer of CAPS at Florida State University in Tallahassee. A minus sign is used to distinguish each reference to a dummy variable as defined by a DUM declaration. Since all numbers were stored as I3 information, this limited the number of dummy variables to 99. But Dr. Steurer's use (apparently to model that 6-phase S.M. that was mentioned in the preceding issue) exceeded this, so a patch was devised to remove the limit of 99. The new "NONDUM =" line should be seen if and only if it is needed (i.e., only if more than 99 dummy variables exist). Old data continues to remain compatible (no change is required). Extended Watcom TPBIG was supplied the following day, and after the correction of a stupid programming error by your Editor, Dr. Steurer confirmed correct operation.

Use of NOSORT (see the illustrations in DC-36) prevented use of $INCLUDE prior to correction on July 17th. Once again, the first report of trouble came from Prof. Mustafa Kizilcay of FH Osnabrueck in Germany. Following the introduction of new variable NOSORT to OVER1, correct operation is demonstrated by a new 6th subcase of DC-36, which is Prof. Kizilcay's example. Of course, the NOSORT request is being used because of the "/" card within the data. Prior to correction, the response to NOSORT was a bypass not only of the data sorting by class, but also the code to replace $INCLUDE lines by the contents of the associated disk files.

CONCATENATE INCLUDE FILES is a request word that extended $INCLUDE capability significantly. But it is complicated enough to warrant its own separate story.

Pocket Calc. Does TACS Supplemental

TACS ASSEMBLY LANGUAGE (TAL) ceased to have meaning when TPC was introduced on January 12th. Although the TAL request word was used prior to that for some 8 days, the original TAL code had been removed from TACSUP -- replaced by a CALL to the pocket calculator. Later, execution should be transferred to TACSUP in order to increase speed. This is a key point: we do not yet want to measure execution speed since each supplemental variable now requires the execution of POCKET once for each time step. While not at all comparable to Dube's *"extremely poor programming technique"* (see the January, 1997, issue) of MODELS, even a single subroutine CALL is more than your frugal Editor is willing to pay for the evaluation of each supplemental variable. Later, the CALL POCKET statement within TACSUP should be removed, and comparative timing should be performed.

Supplemental devices of TACS are unaffected by the latest development, and this should not be forgotten when speed later is measured. Remember, the pocket calculator handles low-level FORTRAN, and this corresponds to supplemental **variables** of TACS. The pocket calculator

can do nothing for **devices**. Compiled TACS can speed the execution of supplemental devices some (see the January, 1997, issue), but the pocket calculator unfortunately can not. Added thought about devices: Although only of historical significance, it might be mentioned that the former TAL logic did not account for any TACS device. This was one of your Editor's recent discoveries: devices were being ignored during early (prior to correction on February 7th) use of POCKET. An extra IF statement was required inside the loop over supplemental variables and devices.

The conversion of TACS integer constants to floating-point constants is a tricky detail of which the user should be aware. Recall Dube recognizes no integer data. All TACS data storage is floating point, and this includes logical variables for which special values 0.0 and 1.0 represent false and true states, respectively. Of course, FORTRAN never was like this. But Dube decided that such personalized logic made sense for EMTP. More than two decades later (Dube's free-format supplemental variables date to 1980), it is too late to change the rules. Your Editor believes that changing rules now would be an invitation to never-ending confusion. So, although not happy about the situation, your Editor accepts the fact that he must treat all constants of TACS supplemental variables as floating point. Unfortunately, this detail was not considered as the pocket calculator evolved, so it was necessary to design a patch. Your Editor began with one scheme, which involved the appendage of A4 text "tacs" to program-generated integers in order that they later could be distinguished from integers of the user's data. While this began easily enough, later testing revealed more such need, and the concept became too complicated to be practical. So, February 11th, the first try was removed in favor of a second: new logic inside the DO 3176 loop. Diagnostic output should document each modification of an integer constant using the following pair of lines:

```
Add period to TACS assembler line J =  ...
                Modified line = ...
```

If trouble with the conversion from integer constants to floating-point constants ever is suspected, this is the place to begin an investigation. Look for such output in the .DBG file after turning on diagnostic printout for overlay 2.

Location of the compilation of TACS supplemental variables is a strength of the final design. Initially, compilation was performed within ENTRY MATH15 of overlay 15, which was used immediately prior to entry into the time-step loop. But this was a holdover from the original TAL implementation. This had two disadvantages: 1) compilation was delayed unnecessarily (if there might be an error, the user should prefer to learn of it as quickly as possible); and 2) the storage for TACS data conflicted with the storage for IDEAL TRANSFORMER components. After some thought, compilation was advanced from overlay 15 to the end of TACS data input. Immediately before the first branch data card is read, one invocation of POCKET will compile all TACS supplemental variable lines. This avoids the need to store supplemental variable lines at the same time as IDEAL TRANSFORMER lines --- both saving storage and simplifying the coding in SUBR5 (for which no changes then were required). Not trivial, the modification failed to work properly on the first attempt. Later, a second independent attempt succeeded on February 7th.

The pocket calculator was modified on February 10th to accept only standard FORTRAN input. While logical enough, this is not the way the code began. Rather, Dube's free-format supplemental variables, with an equal sign in column 11, initially were assumed. Then normal, indented FORTRAN followed as an exception, and such data was being converted to Dube's supplemental variable format for internal use. Finally, this distortion has been eliminated. Code for TACS data input now converts to standard FORTRAN prior to CALL POCKET.

For TACS use, TACS variable names take precedence. This is another important detail that every user should understand. Discovery of the need for care can be traced to variable X1 of the 2nd subcase of DC-18. It turns out X1 is both a TACS variable name and a SPY name, and the latter was being used unintentionally. As code was left February 11th, the user is being allowed SPY names within TACS data, but only for names that are not also used as TACS variables. Note that this result **is** more powerful than ordinary TACS because use of the pocket calculator eliminates the need for a Type-25 TACS source if the user wants to access a SPY variable.

Branch Data Input Restructured

$PI is a new declaration to redefine the scaling factor for parameters R, L, and C of Pi-circuits. The idea was learned from Prof. Mustafa Kizilcay of FH Osnabrueck in Germany. Quoting from E-mail dated July 11th: *"Last Friday I visited in Berlin Dr. Sven Demmig at Bewag (power utility of the city of Berlin). He uses ATP intensively. He has two suggestions to improve data input of ATP: 1) He would like to scale Pi-circuits (type 1,2,3,..) by length, which is acceptable for short line lengths, and use this feature combined with DATA BASE MODULE, i.e. to pass only the length as variable. He would enter per length values of R, L and C for type 1,2,3,.. element and ATP multiplies them by the length."* Illustration is provided by a new 2nd subcase of DC-3, which was added July 14th. There are 4 disconnected subnetworks involving different combinations of scaling for the 2 cascaded sections of 3-phase line that constitute each one. As explained on the extensive comment cards, all 4 subnetworks produce exactly the same solution.

Dr. Demmig explained his motivation in E-mail dated July 17th: *"The idea occurred to me when modeling a cable connection. The cable screens are cross-bonded, so the cable connection is subdivided into a number of major*

cross-bonding sections. Each major cross-bonding section consists of three minor sections. The lengths of the cable sections vary significantly. The cable formation (horizontal and vertical location of the SC cables) does not change, however. (Actually, it does change, but I neglected these differences in my study.) I modeled the cable as Pi-circuits using CABLE PARAMETERS and DATA BASE MODULE. Because of the different lengths of the cable sections I had to deal with a number of similar CP and DBM data cases with only one different parameter: the lengths of the cable sections."

$LINE could be defined for constant - parameter , distributed lines by analogy to $PI (see preceding paragraph). Once one sees $PI, the extension to distributed lines should be obvious. Unfortunately, frequency dependence would be excluded (branch cards punched by JMARTI SETUP are a very complicated function of circuit length). Also, saving would be minimal since line length is declared only once per phase at the maximum. Finally, a single argument of $INCLUDE always has provided an easy solution for constant-parameter distributed lines (it did not, for Pi-circuits). Unless and/or until some reader can demonstrate practicality, $LINE will remain nothing more than an unrealized idea.

Partial Table Dumping (PTD)

Partial table dumping is a story that began in the January and April, 1999, issues. Now, nearly 3 years later, the suspended work is being resumed because it offers hope of the elimination of a limit of GNU ATP (see mention of TEPCO overflow of JARRAY elsewhere in this issue).

The size of ATP table storage on disk is not much affected by use of PTD logic, it has been noted. Yet, there are differences. Mostly gains, but some losses, are associated with PTD use. Saved is much of the small overhead of Schultz's compression, if and when that logic is not being used. In some cases, the saving is complete (e.g., for TACS storage if data does not involve TACS). In others, it is only partial (e.g., a run of zeros at the end of the average vector). Wasted might be some of Schultz's interior zero runs, where your Editor either failed to recognize the likelihood or refused to believe that it was worth exploiting. On average, the gains seem approximately to cancel the losses, resulting in a small net change. For example, consider the two standard test cases that permanently save tables on disk. Sizes of the .BIN files are :

```
   Standard test case name   :   DC-24    DC-32
  .BIN file bytes  using PTD :  37,528   41,672
  .BIN file bytes without PTD:  37,454   42,170
```

Yet, these are very small data cases that are simple structurally. Consider two more meaningful and varied cases, to which table dumping was added :

```
                                  DC-1     DC-47
  .BIN file bytes  using PTD : 151,518   234,434
  .BIN file bytes without PTD: 154,358   239,404
```

To conclude, of these first 4 standard test cases that were studied, three showed small gains while one showed a small loss. It would appear that size of .BIN files should not be much of an issue. Virtual memory, and possibly a lot of speed (if tables exceed available RAM), should be gained without significant payment in terms of storage space.

Pentium III hardware and the GNU compiler seem particularly well suited to Robert Schultz's turbo table dumping, which dates to the fall of 1993. As background, read the paragraph about LU2RED and LU2WRT in the January, 1994, issue. August 10th, speed was measured by an insertion at the start of Mingw32 ATP execution using Dr. Liu's 550-MHz P3-based PC. One important difference since 1993 must be recalled, however: Masahiro Kan's C is used in place of Schultz's FORTRAN for the actual I/O (see mention of CLIKE.C the April, 1999, issue). For the time trial, a DO loop read the same vector from disk 8000 times, and this operation was timed using the critical core of TIME_IN and TIME_OUT (another ATP feature from the New York Bobs). An INTEGER*4 vector was used, and length began at 2 words. Each successive pass of another (an outer) loop, the vector length was doubled until 4096 words finally had been timed. Schultz's modularized READ-ing was compared with the single in-line statement READ (LUNIT2) (KM(J), J=1, LENGTH) Elapsed times in seconds were observed to be :

```
 LENGTH :   2    8   32  128   512 1024 2048 4096
 LU2RED : .14  .14  .14  .18   .23  .27  .43  .67
 In-line: .14  .15  .23  .56  1.86 3.60 7.08 14.0
```

To conclude, Robert Schultz has been vindicated using newer hardware (Pentium III) and the currently-preferred Mingw32 compiler. Although there is little or no difference for short vectors (the left side), a huge advantage is seen for longer vectors (the right side). As data cases continue to grow (along with PCs) without any obvious bound, this is where program developers want to concentrate: on large tables. Eight years later, Schultz's decision to modularize seems very important.

Look for a continuation in the next issue. There is bad news as well as the preceding good news.

Interactive Plotting Programs

Ten different alternatives for plotting ATP .PL4 files are nicely summarized in an MS Word table that was attached to E-mail from Laszlo Prikler dated May 21st. The editor of *EEUG News* explained: *"I would like to publish a quick comparison of capabilities of different plotting programs. The report is going to be 3 pages, beginning with a short description of each program (operating system supported, main characteristic, developer, licensing conditions etc.), and completed with a table."* The attached disk file plt_comp2.doc begins with a heading line that names the 10 different programs : 1) TPplot; 2) GTPplot; 3) PCplot; 4) PCplot for Windows; 5) PlotXY; 6) DisplayNT; 7) HFSplot; 8) DspATP32; 9) PL42MAT; and 10) PL42MCAD. Of course, the final two themselves are not

plotting programs. Rather, they convert .PL4 files for use with commercially-available plotting programs MATLAB and Mathcad.

Recall HFSPLOT is the plotting program from Gabor Furst of suburban Vancouver, B. C., Canada. It was described in the April, 2000, issue. Well, E-mail from author Furst on August 1st indicates that this tool for HFS users is being ported to MS Windows: *"I attach the Windows version of HFSPLOT, Whfsplot. The conversion of the original QBASIC program to Visual C++ was done by a programmer friend. It has to have some improvements, such as a cache option, but I would like to show it first to get some comments from ... and show it at the Bristol EEUG meeting. The ZIP file also has some HFS data files to make the review easier."* The .EXE file has size 340 Kbytes, and your Editor keeps it at home under Win 95 in the \TPPLOT directory. Clicking on the "Help" button at the top shows Whfsplot Version 1.0.0 dated July 28th. The name Gregory Madsen appears after Gabor Furst in the copyright notice. About availability: *"This program is free for licensed ATP program users only."*

Miscellaneous Intel PC Information

Trade name Clipper of Intergraph workstations suddenly is in the news once again. For the first mention of this name, see the October, 1989, issue. For years, Intergraph has pursued Intel legally, alleging that Intel was not authorized to copy Clipper's pioneering RISC technology. Finally, at a high judicial level, Intergraph has been rewarded. *"Intergraph wins appeal in Intel case"* is the title of an AP story dated March 2nd that was found at the Yahoo Web site. This mentioned *"a federal appeals court that allowed Intergraph to seek royalties on Intel's multibillion-dollar Pentium chip. The U.S. Court of Appeals for the Federal Circuit in Washington, D.C., reversed a ruling by U.S. District Judge Edwin Nelson of Birmingham, saying Intel is not licensed to use Intergraph's technology. The decision Thursday allows Intergraph to return to court to pursue royalties on Intel's profitable Pentium line, which Intergraph says incorporates technology it owns. ... Intel ... had $29 billion in sales in 1999. Intergraph, which has spent as much as $1 million a month battling Intel in court since 1997, hasn't made money since 1992."* So what was the point of legal contention? *"Intel says it had rights to the chip technology under a 1976 agreement with National Semiconductor Corp., but Intergraph attorneys claim Intergraph bought the rights from what is now a National subsidiary in 1987. The court said a parent company can't license the patents of a subsidiary without that subsidiary's approval."* Intel had argued that it was authorized by a cross-licensing agreement, but the court disagreed. About the judicial level, only the U.S. Supreme Court remains above the U.S. Court of Appeals, according to your Editor understanding, and the Supreme Court does not accept routine cases. Why bother with this one, even if Intel might decide to appeal? Shareholders finally should be rewarded after a long wait. A Yahoo graph shows that stock has been trending downward since a peak of around $30/share during 1991. During the past year, price never reached $10, and usually traded in the $5 to $10 range. Royalties from Intel (and maybe AMD, too?) might arrive just in time.

"Intel takes Alpha from Compaq's hands" was the title of a story posted at *The Register* on June 25th. This is how your Editor first learned of what appears to be the final chapter in the DEC Alpha story. Recall Intel had been fabricating Alpha for DEC as part of the legal settlement of DEC's suit (see the April, 2000, issue). But Intel did not own Alpha. Apparently now it does, or it soon will : *"Compaq today confirmed that it will transfer its Alpha microprocessor division to Intel and consolidate its entire 64-bit server family on Intel's IA-64 architecture by 2004." About software, "Compaq will immediately begin to port Tru64 UNIX, OpenVMS and NonStop Kernel operating systems and development tools to the Itanium processor family."* No mention of price. How much value did Alpha have? Probably more dead than alive. Intel is the undertaker, although funeral services for Alpha have been delayed for several years. The story first was broken by *The Inquirer* (copyright Breakthrough Publishing Ltd) in a story by Mike Magee. Dated June 22nd, this predicted a smooth transition: *"If there are job losses, they will be very very few. ... A substantial number of erstwhile Alpha developers already work for Intel."* Sale of Alpha is described as a win-win situation. Expectations for Alpha never were that great, and *"Compaq would be able to wave goodbye to several hundred high-priced employees, not to mention a hefty ongoing Alpha research and development budget. Given Compaq's cost-cutting jihad, the exodus would delight the Houston bean counters and perhaps the Wall Street crowd as well."* Of course, Intel now has one fewer competitor, and presumably was willing to pay something for this gain.

PC sales have declined for the first time in 15 years. A CNN story dated July 20th is entitled *"PC sales drop in 2Q"* (i.e., the 2nd quarter of the year). The summary statement begins : *"Surveys show global deliveries off 2% ..."* Dataquest and International Data Corp. are the sources, and *"Analysts from both firms pointed to worsening economies, cutbacks in corporate spending and the lack of a compelling reason for users to upgrade existing systems as the primary factors driving the trend."* Your Editor must agree with the lack of necessity. Who needs newer or faster? Certainly your Editor plans to continue using his 1996 PC with Win 95 until it breaks. As Clark Howard is fond of recommending, *drive your car until the wheels fall off* (his advice about saving money on automobiles).

"IBM PC turns 20" was the ending half of the title of a CNN story dated August 11th. This began: *"The IBM PC was introduced to the world 20 years ago at a press conference in New York on August 12, 1981. ... The IBM PC originated not at Big Blue's Armonk, New York,*

headquarters but at its small Entry Systems Division in Boca Raton, Florida ..." The PC was radical for IBM because it relied on outside suppliers, *"bucking IBM's long-standing practice of using its own hardware and software. A one-year deadline was established that would have been impossible to meet operating under IBM's traditionally proprietary ways. ... IBM's decision to buy instead of build was driven by economics. ... the proposal to sell the PC through retail channels led to the decision to go with an open architecture. ... This paved the way for open hardware standards ... IBM selected Intel's 8088 processor for the system chiefly because it was the only 16-bit processor available that had an 8-bit bus."* I.e., IBM deliberately crippled its PC to reduce the price (until 1984, when 80286-based PC AT corrected the weakness). There remained IBM's need for an operating system, and this decision made Bill G the world's richest man: *"In the early 1980s the most common OS in non-Apple PCs was CP/M, developed by Digital Research in Pacific Grove, California. ... Microsoft, then a small software company in Bellevue, Washington, seized on this opportunity. Co-founders Bill Gates and Paul Allen assured IBM that in addition to developing the Basic programming language for the IBM PC, Microsoft could provide an operating system. But Microsoft did not have an OS of its own. Racing against IBM's tight deadline, Allen got in touch with a local hardware vendor that did have an OS, Seattle Computer Products."*

Miscellaneous Small Items

$DEBUG with blank columns 7 and beyond was mishandled prior to correction on February 20th. Although the error is universal, symptoms of the mishandling were highly dependent on program version, with old Salford DBOS version 2.66 differing from newer version 3.51 (anonymous DBOS). Recall $DEBUG provides a way to modify diagnostic printout, although use is not illustrated in standard test cases because diagnostic printout itself is seldom illustrated there. But one can find a trace of former usage on a comment card of DC-36. $DEBUG is useful for debugging, but was found to be dangerous if not followed by a comma. BPA's Dr. Tsu-huei Liu first showed such data to your Editor on February 20th, and correction to FREFLD was made later that same day. Using Salford EMTP and newer DBOS on the 486 DX2-based PC at BPA, execution would hang. Killing this with **Ctrl-Break** indicated that control was in FLAGER (which reads keyboard input). At home, using older DBOS version 2.66, execution died quickly by itself, with the DBOS error window complaining about *"Floating-point number too big for integer conversion"* in CIMAGE. Of course, either response was unintended. Another confusing detail was this: on the screen was extraneous output complaining about *"Matrix inversion within SUBROUTINE CCMINV ..."* Actually, nothing of the sort was happening. Following correction, the offending $-card should be seen, and it should be followed by an error message that explains: *"... Bad free-format number. Did the user perhaps forget his separating comma on a $-card?"*

The Type-18 ungrounded voltage source and ideal transformer has been corrected once again for a special configuration (see the July, 1997, issue for the last such mention). This time, the need was for one or more of the Type-18 nodes to be excited by a conventional Type-14 voltage source. Following modification of SUBR5 on February 25th, correct operation was demonstrated by a new 5th subcase of DC-55, which involves a single IDEAL TRANSFORMER connecting nodes GENA and GENB (the primary). The IDEAL TRANSFORMER, readers may remember, was inspired by modeling of Prof. Bruce Mork, as explained in the April, 1994, issue. But it is a figment of the user's imagination. Internally, a Type-18 source is used for the representation. About the new data, the secondary has one terminal grounded (this was never a problem), and the other terminal is open-circuited. With a turns ratio of unity, the voltage at LOAD should equal the difference between the two source values, and step 1 should have a value very close to the step-zero value of 10 + 5 = 15 because of the abnormally low frequency. It did not previously, but it does now. Recognition of the former trouble followed semi-public discussion of the EEUG list server. Attached to E-mail dated February 20th, Orlando Hevia sent *"two cases, ... the first produces bad secondary voltages. The second produces correct values. I think that a closed loop of sources (the sources associated to ideal transformers) may be the cause of the problem."* Three delta-connected windings formed the closed loop, but this seems to have been a coincidence rather than a cause of the trouble, from what your Editor could see. The phasor solution (and hence step 0) seemed to be correct, but step 1 onward involved gross error (maybe 50%) in two or more variables. There was a discontinuity between step 0 and step 1, but no longer. As the single step of the 5th subcase of DC-55 demonstrates, the transition now is very smooth.

$OS is a new $-card that was added March 3rd. Since year one of ATP (1984), SPY has had an OS command, and this was being used imaginatively by Prof. Juan Martinez Velasco of the Polytechnic University of Catalunya in Barcelona, Spain. But why force the use of SPY if all one needs is the execution of a simple operating system (OS) command? Just as DEPOSIT began in SPY but was followed by $DEPOSIT, so now the concept is being extended to OS. Yet, time of execution might be critical, and $-cards are more limited than SPY in this sense. To satisfy Prof. Martinez's need, it was decided that one new data card will be read at the end of each PCVP pass except the final one. This improvement to PCVP data structure was proposed by your Editor to Prof. Martinez in E-mail earlier that same day. Code was changed at the same time $OS was added. Old data should be unaffected, so no user should be forced to change anything. It should not matter if the program reads one more data card (e.g., the first plot card) prior to rewinding the input file for the next

pass. But for Prof. Martinez, this new input provides an opportunity to use $-cards in an important way. A problem he had with MODELS thereby has been solved. Follow his writing to learn the practical engineering consequence. For an impractical and artificial illustration, see the 9th subcase of DCNEW-25.

Series R-L-C branches are created internally as part of each Type-18 source, and one or more of the 8 (two for each of the 4 possible terminal nodes) will be unnecessary if one or more of the 4 terminal nodes is grounded. This discovery --- that such branches connect ground with ground, and hence have no effect --- was made February 25th while studying Type-18 code. Why add a do-nothing branch (it is surprising that no user complained years ago)? Following the addition of one line to SUBR5, output of the 2nd and 3rd subcases of DC-55 has changed substantially in a superficial sense. First, there is the connectivity output. Gone are the "TERRA |TERRA *TERRA * ..." entries. Second, the "Size 1-10:" line of case-summary statistics (if KOMPAR = 1) will have the second number reduced (e.g., 30 became 24 for the 2nd subcase). Finally, if phasor branch flows are printed, no longer should the user see zero flows from TERRA to TERRA (see the 3rd subcase).

$DUMMY node serialization was found to be in error after number 999 for some data cases. This was March 9th, and once again data from Prof. Juan Martinez was involved. The October, 1998, issue explained the theory of 4-digit serialization, but practice was found to be imperfect, sometimes. Did sorting by class make the difference (what is in order after $INCLUDE becomes out of order after sorting)? That was the only cause your Editor could imagine. The counter itself certainly was monotone increasing, but use was found to decrease sometimes. After reaching 4-digit value 1000, it dropped back to 3 digits, and this was when the trouble occurred. The leading digit 1 of previous use was not replaced by 0 as it should have been. Of course, the trouble was removed by methodical use of all 4 digits always (change to OVER1) .

Incompatibility between a Type-96 hysteretic inductor and a Type-13 TACS-controlled switch was the principal subject of Prof. Kizilcay's E-mail dated March 20th. The following day, a modification was made to OVER12 to correct the misbehavior. There was nothing subtle about the symptoms: a switch did not close when it was ordered to do so by TACS. The trouble was traced to MAIN9 additions to the branch table for the phasor solution. In fact, any of the other true or pseudo-nonlinear inductors could have caused the trouble, it would appear. Each defines a phasor branch that was not being appropriately erased once the phasor solution was complete.

COUNTDC.FTN is a new utility to count standard test cases. Once upon a time (in the beginning), a typical disk file might have involved 2 or 3 subcases at the most. But during recent years, subcases have been added wherever useful, and the total has increased greatly. Thanks to the explosion of processor power and available disk space, there no longer is any practical limit to the number of small cases that conveniently can be verified. So what did COUNTDC find when executed at BPA on March 17th? Each meaningful subcase (ignoring the empty one at the end of nearly every disk file) produces one line of output, and the final of these is:

```
   97.  KNT = 434  Begin subcase of DCN29.SAL
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The first figure gives the number of separate disk files (97) whereas the second gives the total number of subcases (435) minus one. Missing is NODA SETUP of DCNEW-13.

The Type-96 hysteretic inductor no longer requires that flux of the phasor solution (if any) be identically zero in order to apply the user-supplied residual flux RESID. When the device was installed by Jim Frame about two decades ago, it was assumed that lack of excitation corresponded to flux that was exactly zero. But apparently this is not always the case, as explained by Prof. Mustafa Kizilcay of FH Osnabrueck in Germany. His E-mail dated March 20th also involved Dr. Michael Igel of Alstom: *"I was yesterday in Heiligenhaus. Michael and I discussed this subject briefly. The condition that RESID will be effective is that the type-96 element must have zero initial conditions (zero voltage and current). There are cases where the initial conditions are physically zero (no-load operation for example), but numerically the voltage or current is not exactly zero. In such cases type-96 element ignores RESID ..."* In a later message, Prof. Kizilcay explained what Alstom has been forced to do, to avoid the problem: *"we used a switch that was closed during the steady-state to short-circuit the type-96 element. Of course, we opened at the first time step, using a large I-margin. But, this method produces in some cases numerical oscillations, Dr. Igel observed."* Clearly, such avoidance should not be necessary. March 21st, tolerance of small but non-zero flux was introduced as documented on comments of a new 3rd subcase of DC-33.

$OPEN and $CLOSE statements for I/O units have been mentioned many times in previous issues, but such use always was for constant I/O unit numbers. However, FORTRAN allows variable I/O unit numbers, so why should ATP not be equally accommodating? This thought occurred to your Editor March 28th as he showed Dr. Liu how some Watcom data cases differed from Salford data cases. For example, in DC-49, those program tables of DC-32 are connected to unit 22 by Salford ATP but to unit 2 by Watcom ATP because of differences in STARTUP (which, in turn, are due to differences of the compilers). Following the generalization, Watcom will accept the same data as Salford for 5 more standard test cases (numbers 24, 40, 48, 49, and 54). Both accept I/O unit LUNIT2 (a variable that replaces the preceding constant 2 or 22) . Only DC-24 and 40 remain installation-dependent for GNU Mingw32 ATP because of different treatment of LUNIT2 (C-like as opposed to UNFORMATTED --- perhaps due to problems of the djgpp version that continues to be maintained by Orlando Hevia) .