Can / Am EMTP News

Voice of the Canadian / American EMTP User Group

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Salford FORTRAN Compilers

UP.BAT is the command file to perform a minor update of ATP. Execution using the command UP PUM results in the translation of the family of experimental UTPF segments *.PUM to create FORTRAN MINOR42.FOR which then is compiled to produce MINOR42.OBJ. Finally, this object file is linked along with other ATP object files to produce a modified TPBIG. This procedure has been used without difficulty for a dozen years as the backbone of ATP development. Unfortunately, June 24th, trouble was noted while using UP.BAT with six UTPF segments : CIMAGE, POCKET, MAIN20, ESTIMA, OVER1, and SUBR1. Apparently TPBIG was defective. While simulating DC-7, 16, etc. during subsequent testing, Robert Schultz's TAPOLD failed while working on the very first labeled COMMON block, which is named C0B001. Upon investigation, it was found that the first 2 of the 109 labeled COMMON blocks contained garbage. The debugger showed that most values were either very large or very small (triple-digit exponents), although some cells were reported to be "*unset". Apparently these latter contents were what TAPOLD could not handle. Suspecting trouble with linking, your Editor inspected the map and noted that C0B001 and C0B002 did not immediately precede the remaining 107 C0B blocks as expected (Prof. Mustafa Kizilcay's important Salford innovation during late 1989). Apparently the linker somehow was overpowered by the volume of MINOR42 (13650 lines of non-comment, non-COMMON FORTRAN). This was at home. One day later, the same experiment failed at BPA using newer Salford software (version 3.51 rather than 2.66). In fact, it failed using just 5 files (all but OVER1). But at home later that afternoon of June 25th, there was success using just the 4 segments CIMAGE, MAIN20, ESTIMA, and SUBR1. The difference (POCKET and OVER1) represents a substantial chunk of code (some 4865 non-comment non-COMMON lines), so maybe the trouble is believable. Maybe code expands (in this case, past the start of labeled COMMON at 400000 hexadecimal) due to the

replacement. A final curious detail: at BPA, the map showed all 109 blocks were in proper order following the last of the code, so this was even worse. I.e., the map provided no hint of the trouble that had been proven experimentally! Are there any other good reasons for your Editor not to upgrade from Salford version 2.66 (joke)?

Fortran 95 from Lahey Computer

Those DISLIN graphics (see the April, 2000, issue) were activated February 6th following an inquiry by Dr. Liu. To be sure the procedure of inclusion or omission (for now, graphics are to be left *on*) is not again forgotten (some trial and error by Dr. Tsu-huei Liu and your Editor was required following two years of memory loss), comments are being added to COMPILE*.BAT (the only place where a change is required). Due to modified design using DISLIN.EXT (source code that provides dummy DISLIN externals), no change to translator input is required. Neither is any change to linking involved. Also for easy remembrance, Lahey ATP screen graphics are being configured to agree with Mingw32 ATP screen graphics. Both GRAPHICS and GRAPHICS.AUX are identical --- intentionally. Then only the delay following each CALCOMP PLOT was found to be missing. This was solved by copying the GNU code for DELAYZ, which uses library function SECOND. Curiously, the Lahey linker satisfied this (your Editor had expected an unsatisfied external upon the first linking), and operation seemed normal. I.e., each plot now is held on the screen for a reasonable (believable amount of) time.

The test D9 .LT. 1.0 within FLTOPT was mentioned in the January, 1999, issue. Stu Cook, using the Absoft compiler with his Motorola PowerPC-based Apple Macintosh PC, had trouble with this because DCOS of zero was not exactly equal to unity. Rather, Absoft was returning a value that was one bit less than unity. So, single precision D9SING was introduced. This was defined by D9SING = D9 and the test was converted from use of D9 to use of D9SING. As stated, this was believed to be independent of computer until Dr. Tsu-huei Liu's sharp eyes looked closely at output of the 13th subcase DCNEW-23 produced by F95 Lahey ATP. Compare the following two rows corresponding to step one :

```
            Step    Time    SENDA     RECA    ...
              0     0.0      0.0       0.0    ...
Lahey F95:    1     .1E-3    2.0       1.0    ...
Salford  :    1     .1E-3    2.0  .999999998 ...
```

The F77 Salford answer for RECA is correct whereas the Lahey F95 value is wrong. Curiously, just by turning the debugger on in FLTOPT, the Salford answer was changed to the Lahey F95 answer (unity)! Note that the error is in the 9th decimal digit, which should be beyond the resolution of 32 bits. It seems to your Editor that F95 Lahey was doing its job properly. Should conversion from 64 bits to 32 bits not involve such rounding? Your Editor would be complaining if the 32-bit value were not accurate to all 32 bits. The Lahey answer is not as accurate for engineering use, but it seems to satisfy 32-bit FORTRAN rules. It is

what this programmer would expect. The fact that not all compilers agree is a little disturbing. So, April 18th, after three and a third years of use, single precision is being removed from FLTOPT. It is being replaced by use of existing near-zero tolerance FLZERO as defined by STARTUP. This nominally has value 1.E-12 (for 64-bit computation). This should solve the problem with the 9th decimal digit as well as comparable problems involving the 10th, the 11th, and maybe even the 12th digit, too. Yet, the change is just a patch. The possible very small error in the output of numbers that are slightly less (in absolute value) than unity will remain. The error simply has been reduced in size from about a maximum of 1.E-8 to 1.E-12 --- a value that has no physical significance, clearly. Yet, there are cases where one wants more precision, and any reader who believes this is important is advised to agitate for continuing reform. No question, with more installation-dependence, the final few (roughly 4) decimal digits of precision immediately below unity could be preserved. But in the absence of practical need, your Editor is not inclined to make further change. For the record, Salford standard test cases were unaffected by the modification of FLTOPT to use FLZERO.

News from Outside USA & Canada

Japanese and Korean EMTP user groups exchanged information during a two and a half hour meeting on July 8th. This according to a summary note that was received from Prof. Akihiro Ametani of Doshisha University in Kyoto, Japan. The meeting took place *"in Lotte Hotel, Jeju Island, Korea during the International Conference on Electrical Engineering (ICEE '02) organised annually by Korean IEE, IEE Japan, Chinese Society of Electrical Engineers (CSEE) and Hong Kong Institute of Engineers (HKIE). ... There was the EMTP Session in the ICEE '02 from 2pm to 4pm on 8 July, 2002. The following 6 papers were presented in the session. ... The attendants: 1) Dr. Chul-Hwan KIM, Chairman, Professor of SungKyunkwan University, Korea; 2) Mr. Jae-Won CHANG, Secretary, Korea Electric Power Co. (KEPCO); 3) Mr. Eung-Bo SHIM, Mr. Jung-Wook WOO, KEPCO; 4) Mr. Ki-Mo KIM, Hundai Heavy Industries Co.; 5) Prof. Naoto NAGAOKA, elected as a new chairman of the Japanese EMTP Committee; 6) Dr. Y. Baba and myself, all from Doshisha University, and Dr. T. Funabashi of Meidensha."* Several notes were appended, and two deal with EMTP versions: *"Now most users in Korea are using the ATP-EMTP. The DCG/EPRI EMTP is still used in Korean EPRI. The KEUG deals only with the ATP, but not with the DCG/EPRI EMTP."* About organization within South Korea: *"The Advisory Group of the KEUG is organised by 6 former chairmen of the KEUG. The Steering Committee of the KEUG is organized by 8 members from universities and industries. Every three months, a regular steering committee is held."* Finally, there is a comment about contact with others: *"The KEUG expects to have a co-*

operative relation with ATP user groups in the world, and a close contact with you. They have already had a contact with the JAUG (chairman: Dr. H. Arita, re-elected)."

Bangkok, Thailand was the location of a well-attended ATP short course during April. Although your Editor knows nothing about details, he can report the approval of many ATP license applications afterward. A form letter dated May 19th was sent to each applicant who supplied an E-mail address (there were 26 such notifications): *"Your application was one of many that arrived in a large envelope from Dr. Trin Saengsuwan of Kasetsart University in Bangkok. ... I signed your application earlier today after canceling 'the EEUG Association on behalf of ' from below the signature line. Use of EEUG's form is acceptable to us, although we are not EEUG. We sign on our own behalf, of course. We do not return photocopy to the applicant, however. Should either you or some friend ever need to submit another application for a license to use ATP free of charge, please use the on-line procedure at www.emtp.org ..."* Of course, the importance of this is removal of the necessity for us in Portland to read and key handwritten information including Internet addresses (which sometimes is difficult). Yet, it must be assumed that most notifications reached their intended destinations. Of the 26 messages sent, refusal notices were received for only 3 of them, and Dr. Saengsuwan was provided with details of these later that same day.

TM T&D Corporation is the name of the new company that employs Masahiro Kan, the JAUG Vice Chairman and long-time ATP contributor. His E-mail dated October 15th included an attachment that nicely summarizes the restructuring of parts of two giant Japanese companies: *"Toshiba Corporation and Mitsubishi Electric Corporation have reached an agreement to transfer their power transmission and distribution businesses to the joint venture company TM T&D by applying the provision of the Separation Act, under the commercial laws of Japan. The new company is a fifty-fifty joint venture and starts business on October 1, 2002."* The result is said to be *"the largest company in Japan dedicated to power transmission and distribution."* Global competition is the reason given for the change: *"To survive in this competitive market, the new company ... will centralize, integrate and enhance product development and productivity and reinforce its overseas operations ..."* Employees are said to number 2700.

More about the Internet and E-mail

"The internet domain name (website address) atp.info is for sale. I am the owner, and no longer have the budget to develop a website for it. Needless to say, this particular domain name may be of interest to you." Thus began targeted advertising dated May 24th. As already observed in the October, 2000, issue, ATP is a common acronym having many different meanings, so it is plausible that some other ATP might be interested. But not this user group. As your Editor wrote to owner David Corish the following day: *"Sorry. This ATP user group has no interest in it. I can not imagine why atp.info would be preferable to emtp.org which ATP user groups of the world have been using for the past 2 years or so."* Mr. Corish had explained that *".info was included along side .com, .net, and .org, back in September 2001."* Your Editor responded: *"Right, a longer and more inconvenient domain name. I can not imagine why it would be preferable."* Conclusion: online shopping (see the July, 2000, issue) remains depressed. Two years later, the technology bubble has not re-inflated.

Junk E-mail from Nigeria (and more recently, other West African countries) continues. For background, see the July and October, 2001, issues. Well, recent stories in the news media have confirmed earlier speculation about this spam. *"Nigerian fraudsters -- let the games begin"* is the title of informative writing found at *The Register*. Dated May 27th, this proposes retaliation: *"when you get one ..., simply forward it to the abuse @ address of the ISP involved. The idea here is ... that the Nigerian scammers will eventually get sick of having their accounts closed down and move elsewhere."* Yet, this is the conventional advice. A more entertaining alternative suggested by author Lester Haines is *scambaiting* : baiting the scammers. *"This new sport of Nigerian scambaiting has spawned a series of sites dedicated to the discipline. ... marvel at the perpetrator's dogged pursuit of a lead, no matter how preposterous the correspondence."* A link also was provided to a May 21st "ZDNet (UK)" story --- Ziff-Davis in England, it would seem . This reported progress by police: *"Six arrested over 'Nigerian e-mail' fraud"* is the title of a story that explains: *"Six people were arrested in South Africa over the weekend ... in the infamous 'Nigerian' e-mail and letter fraud. Four of those detained were Nigerian, one was Cameroonian and the sixth was South African. Police in South Africa believe that the six are part of an international fraud and drug-dealing cartel ... Police seized a large amount of drugs, as well as computer equipment and false identification papers. According to published reports from South Africa, officers from the UK's Scotland Yard were also involved ... The arrests could mark an important breakthrough in the battle against the international scam, which is thought to have defrauded hundreds of millions of dollars from victims. The fraud is also known as the 'West African advanced fee fraud' or the '419 fraud' -- 419 being the relevant section of the Nigerian criminal code. ... People who express an interest are then told that they must first hand over an amount of money to cover expenses such as banking fees ..."*

"Europe bans spam" is the encouraging title of a story that was posted at *The Register* on May 30th. There is hope that European law might actually be helpful: *"The European Parliament has voted to ban the sending of unsolicited commercial email."* On the other hand, there is reality: *"sceptics have pointed out that the new legislation will have little impact on the amount of spam people*

receive since much of it originates from outside the EU." Are European lawmakers no smarter than American lawmakers? Perhaps. About location, there is an interesting explanation from Brightmail: *"nine out of ten spam emails are either untraceable or come from operations outside the European Union."* The conclusion is this: *"professional spammers -- whether inside or outside the EU – are unlikely to heed the new legislation."*

"The notorious Providian National" bank or financial service was mentioned in the January, 2000, issue. The average non-American probably has no clue about details. Since Providian's name once again is in the news, this is a good time to clarify. Anitha Reddy is a *Washington Post* staff writer who began a story dated July 13th as follows: *"President Bush's top official on corporate crime and responsibility was a director of a credit card company that paid more than $400 million to settle allegations of consumer and securities fraud. Larry D. Thompson ... was a Providian Financial Corp. board member and chairman of its audit and compliance committee from June 1997 until his unanimous confirmation by the Senate on May 10, 2001."* Remember how the California legislature unanimously approved the recent disastrous energy re-regulation (see the July, 2001, issue)? Once again, if all politicians agree, probably something is seriously wrong! So, what happened to Providian, and how is this tied to that woman's Internet gambling debt? *"Providian began to disclose looming problems with defaults in its credit card portfolio, problems that led to a collapse of its stock price and the layoffs of thousands of employees. Providian was one of the biggest credit card companies in the 'subprime market,' which targets people with low incomes and bad credit histories."* Your Editor probably should feel insulted, since he recalls receiving offers of credit cards in junk snail mail from Providian at about that time. The story continues: *"It ran into financial trouble last year after settling charges that it inflated its financial results by charging excessive fees and engaging in other practices that state and federal regulators said broke consumer-protection rules."* So what is the spin that Thompson puts on his involvement? *"The deputy attorney general is proud of his service on the board of Providian. He only became aware of the [fraud] issues when regulators began to make inquiries."* Following this explanation by a spokesman of Thompson, the author concluded: *"Thompson's service on the Providian board coincided with the time regulators said Providian engaged in fraudulent conduct."* Just an unfortunate coincidence, no doubt. How could a chairman of the company's audit and compliance committee have known? Finally, the guy must be honest since he was confirmed unanimously!

The disappearance of free E-mail was mentioned in the October issue. Yet, this American trend seems not to be universal. Writing from Argentina, Orlando Hevia offered a different perspective in E-mail dated August 18th: *"Free Internet access is growing here. Yes, Internet access is free, and a small part of one's phone bill is paid to the servers by the phone companies. Up to say 20 hours /* *month, this is a cheap alternative unrelated to Yahoo or Hotmail. I have an address heviaop@fullzero.com.ar. It is interesting as an emergency address."*

European EMTP User Group (EEUG)

Deputy EEUG Chairman Laszlo Prikler has been elected by members to fill the post of EEUG Chairman for the next four years. This late-breaking news was received as this issue is being published December 11th. More next issue.

Outgoing EEUG Chairman Mustafa Kizilcay of FH Osnabrueck in Germany has been kept busy by spam. His E-mail dated September 5th, addressed to other list server moderators, explained: *"My motivation ... was an e-mail from the Internet provider of EEUG regarding the CGI script used by the online licensing form at the Web page http://www.emtp.org/atplic.htm The provider warned that the script used is rather old and has security holes that allow spamming. I was informed that we should update it, otherwise they would deactivate it. Upon this, I downloaded the latest copy and adapted the script according ... In addition, I replaced all 'mailto:' strings by HTML coding of letters. There is a small freeware utility "MailTo-Encrypter" which converts plain text email addresses to HTML codes (see ...). This was recommended by a German PC magazine ... It seems that spammers use programs to scan Web pages and copy 'mailto:' fields. Indeed, spamming has increased in recent weeks. I receive through @emtp.org ... several emails per week with suspicious content that I delete immediately. I hope these measures will reduce such messages."* Obviously, Laszlo Prikler approved, but he seemed skeptical of prospects. Later that same day, he wrote: *"Unfortunately our e-mail addresses (xxxx@eeug.de, xxxx@emtp.org) have already been entered in the e-mail databases of spammers. So I think we must be ready for such mail in the future, too. We will see."* Yes, closing a barn door will not recover a horse that already has run away. This is one of the good reasons not to publish a complete list of ATP-licensed users and their addresses. Your Editor recalls that it was foreseen early in year 2000 at the time when the Fargo list server, with its open records (REVIEW) , was debated.

Vienna, Austria, was the site of the guided tour that preceded the annual EEUG meeting, which was held December 9th and 10th. But the meeting itself was held in neighboring Sopron, Hungary. Why the change from what was declared in the October issue? Cost. There seems to be similarity to the problem Prof. Ned Mohan had when he considered offering his successful ATP short course in New York City some years ago (see the October, 1996, issue). According to E-mail from Deputy EEUG Chairman Laszlo Prikler dated September 10th, *"after checking several options, we had to abandon Vienna because of high hotel and conference facility prices. Then I suggested to move the meeting across the border ..."* Fortunately, the border is not that far away, and travel seems easy enough:

"there is a direct train from Vienna Südbanhof to Sopron each hour (journey takes ~65 minutes), and we can offer a shuttle service from the airport to the hotel too (~50 minutes)." About Sopron: *"This 750-year-old city would provide a pleasant environment. The LOC got a very good offer from the Best Western Pannonia Med Hotel (4 stars) in the heart of the city ... 'Med' means full medical services and swimming pool in-house."* With the Euro equal to 0.98 dollar on September 12th, the price seems favorable by Portland standards: *"Room: 55 Euro (single), 70 Euro (double) / night (all taxes, breakfast included in the above price)."* An American should be happy to pay such prices (this looks cheap to your Editor) .

A proposed 1-day short course following the annual EEUG meeting failed to materialize. Organizer Laszlo Prikler made this announcement in members-only E-mail of the EEUG list server dated November 4th: *"The Local Organizing Committee regretfully informs you that the traditional one-day EEUG course ... had to be canceled due to several logistic difficulties and ATP Licensing policy issues."* A workshop replaced the traditional short course as announced to EEUG members 4 days later. For further explanation and discussion, see the following issue.

Watcom ATP for MS Windows

Robert Schultz of the New York City area improved that Watcom ATP error message (see mention of Ricardo Tenorio's use of KFD elsewhere in this issue). First your Editor had made this semi-public observation on November 12th : *"This looks like what Watcom ATP might produce. Not very civilized. Unlike Salford, Watcom provides no information about where the error occurred. But at least the nature of the error seems clear: numbers within ATP have become too large."* Later that same day, Mr. Schultz observed the following in private E-mail: *"I noticed your comment about Watcom and Salford, which I find somewhat misleading. For the record, Watcom produces quite adequate traceback info. if the /TR compile option is used. I felt that including traceback might divulge ATP program secrets (or clues), so I never utilized it in production ATP versions."* Well, VAX/VMS and Salford EMTP have disclosed the calling chain (which subroutine calls which) since day one, and no one seemed concerned. It does seem unfair to deny the Watcom ATP user such information. So, your Editor added /TR to compilation commands of COMP7.BAT on November 17th. The following day, Dr. Tsu-huei Liu demonstrated the improved error termination as follows :

```
*ERR* KO-02 floating-point overflow
 - Executing line 257 in file over16.for
 - Called from line 4508 in file main00.for
 - Called from line 37 in file main00.for
```

In that subroutine names generally are not revealed (main00 is the name of a huge disk file, not a subroutine), it is hard to imagine an objection to the additional output.

News About TACS and MODELS

"SSTACT ignores bad subscript ..." is the way special printout begins as mentioned in the January, 1999, issue. The first person to observe and complain about this was Francisco Javier Peñaloza Sánchez of CFE in Morelia, Michoacan, Mexico. In E-mail dated June 20th, your Editor and Dr. Liu responded: *"Yes, ... this is for the 1st Type-58 or Type-59 S.M. ATP thinks that you have TACS-controlled field voltage. Do you?"* About ways to avoid such bad subscripts, we advised: *"As a user, it is not easy. As programmers, we might be able to understand the cause of trouble, if we had data."* To be continued, we hope.

Some Type-58 TACS devices were incompatible with compiled TACS prior to a correction from Orlando Hevia of UTN in Santa Fe, Argentina. The WRITE using the FORMAT of S.N. 7323 involved 5 variables, whereas only 4 (the first 4) were appropriate. Prior to correction in the UTPF on August 25th, the result was an error in the FORTRAN output: an extraneous, incomplete line that ends with an open parenthesis. It seems strange that this error was not discovered years ago as part of compiled TACS testing. Certainly the 2nd subcase of DC-21 has plenty of illustrations (five), yet there never was any sign of trouble. However, there are different combinations of those control signals on the right, and presumably the flawed code involved one that was not being tested. So, August 26th, Type-58 device S_INTE was appended to the 2nd subcase along with a Type-14 TACS source named SOURCE to drive it. One digit of precision was dropped from the dT-loop output (the maximum of 9 has become 8) in order that a single line continue to suffice for output at each time step in spite of the added burden.

A Type-94 branch without MODELS was not refused prior to the addition of a trap to INNONL on August 28th. Your Editor noted that the Type-94 branch later (in overlay 15, just prior to entry into the dT loop) produced a CALL to MODELS even though MODELS was not being used. Of course, this could not possibly work properly. It led to a extraneous MODELS error stop: *"KILL = 642. The integer stack is overflowing into the integer storage area."* Now (following the reform), the first Type-94 branch will be rejected meaningfully: *"Data error! Halt execution. A Type-94 branch has been encountered in this data that lacks MODELS."*

"78 MODELS test cases of Dube" was the title of a story that began in the October, 2001, issue. This explained that DCNEW-28 is being used to verify Dube's family of test cases. Well, September 2nd, this family was updated, and the change is important. Your Editor had begun his work on the ATP Rule Book with Chapter V, which treats nonlinear elements. Immediately, he recognized a serious omission: the MODELS-defined or controlled Type-94 branch from Laurent Dube. Upon

studying Dube's writing, it was recognized that the Norton alternative involved possible retriangularization of the nodal admittance matrix [Y] at each time step. But where was this illustrated? After your Editor could not find it, BPA's Dr. Tsu-huei Liu downloaded Type-94 MODELS-related materials from the EEUG Web site. Although only two months newer (e.g., 11 February 1996 vs. 11 April 1996 for the Norton family), Dube seems to have been busy during this interim. For one thing, there are more test cases: the 7 Norton illustrations were expanded to 9, etc. (each type has 2 additional names). The old total of 78 has increased to 84. Also, some file names have remained the same while content has changed considerably. This is illustrated by TYP94-N6, which changed from a Norton transmission element (which, by definition, has two ends) to a non-transmission element (just from the left node to ground). Included is the desired retriangularization of [Y] at every time step -- apparently to represent a time-varying (in this case, ramped) inductance.

A multi-phase Type-94 Norton component was extraneously being serviced by SOLVNL prior to an addition to INNONL on September 2nd. This was when your Editor observed that the pseudo-nonlinear element counter NUM99 was correctly being incremented for the first element of each coupled branch group, but not for any 2nd or later element of a group. Of the 9 Norton test cases in Dube's data set, only TYP94-N3 is multiphase, it would seem. Only this one demonstrated the waste (the answer was right, but computer time was being wasted) .

Line and Cable Constants

TWOBYT is a new module that enabled completion of the expansion beyond 99 coupled phases. That first try (see preceding paragraph) erroneously involved just the type code in columns 1-2. This was the easy part because ATP data input had been modified years ago to allow any number of phases (see HOPC beginning in the April, 1998, issue). But node names were more difficult. Your editor can imagine no easy way to use just 2 decimal digits for these, for the general case of more than 99 conductors. Once again it was Ashok Parsotam who first recognized the error of your Editor's initial, oversimplified attempt at expansion. Responding on August 10th, your Editor wrote: *"We need to think more about an alternative to the present logic, which uses 2 decimal digits. For example, we could use hexadecimal, which would extend to 255 using just 2 digits."* This is what TWOBYT does. Worrying that 255 someday might be exceeded, 4 more letters (G, H, I, and J) were added to extend the limit to $20**2 - 1 = 399$. For 99 or fewer conductors, nothing will change (decimal encoding will continue to be used). But between 100 and 255, base-16 (hexadecimal) encoding will be used. Finally, for 256 or larger, base-20 encoding will be used. This is beginning August 11th.

Serialization using 3 decimal digits is possible, and will be used, if and only if no cross-bonding is specified. In fact, the only output that Ashok Parsotam wanted seemed to be a single Pi-circuit. He was willing and able to do his own transposition, it would seem. For this simpler case, there is more room for serialization, so why not use a 3rd digit for the serialization of phases beyond 99? This is what Mr. Parsotam proposed in E-mail dated August 11th, and this is what is being provided for any number of coupled phases beginning August 14th. The multiphase branch connects IN with OUT (root names). So, the branch connecting IN 99 (note the blank 3rd of 5 bytes) with OUT99 will be followed by the branch connecting IN100 with OU100, etc. for later phases up to a maximum of 999. Your Editor agrees with Mr. Parsotam that this *"naming change is logical and users should not have too much difficulty understanding it without explicit instructions."* Anyway, why expect ATP to do the naming? Mr. Parsotam concluded: *"From time to time users would like to use their own names rather than automatic naming."*

The overflow error stop of CC was improved following a report of trouble by BPA's Dr. Tsu-huei Liu. Mingw32 ATP had terminated confusingly after List 31 had not been appropriately increased to handle the high-order data of Ashok Parsotam. Instead, all data was loaded, and execution ended with an extraneous complaint about overlapping SC cables. Rather than overlapping geometry, it was overlapping data that was the problem prior to a change to SUBR27 on August 13th. Overflow error termination KILL = 225 did exist, but the checking of geometry precedes this. Hence the check for overflow was moved so as to be performed earlier. Otherwise, logic is unchanged: data continues to be loaded whether or not there is adequate room to store it. Along with the earlier error message, documentation was improved, and minor improvements were made to data card interpretation. For example, the 2nd subcase of DC-28 had displayed 3 numbers as part of *"Y,X locations"* interpretation even though only 2 had meaning (because only one SC cable is involved). Also, the 3rd subcase had 3 SC cables, so 3 numbers were appropriate. But the 3rd was wrong (it has been corrected to show Y of the last SC cable). Finally, for 5 or more SC cables, a second data card would be required, and this was not being shown for a reason that long ago has been forgotten, or maybe never was understood. Beginning August 13th, any 2nd or later location card should be seen.

The JMARTI SETUP fitting of single-phase cable data from CABLE CONSTANTS (CC) was not possible prior to Dr. Tsu-huei Liu's correction of CCEIGN on August 15th. As source of the data, CC is the 3rd of 3 possibilities, and it was not being handled properly as first reported by Jules Esztergalyos. That unity transformation matrix [T] was not being provided as required by JMARTI SETUP. The other 2 possibilities were not a problem. The 3rd subcase of DCNEW-5 illustrates 1-phase LC, and the data from Mr. Esztergalyos was handled normally after CC was changed

to CP (Dr. Liu's recommendation for avoidance using an old program).

The real matrix inversion of RMINV was improved September 20th following a note from Dr. Tsu-huei Liu the preceding day. This reminded your Editor of the necessity to remove temporary local storage. She had encountered an error message: *"Replacement RMINV that uses DGELG needs more space. Limit = 40."* But how and why is DGELG involved with cables? The Type-50 S.M. code, contributed to EMTP around 1975 by Mike Hall and John Alms of Southern California Edison (SCE), is believed to have used DGELG first. Although the original S.M. code itself did not survive beyond the early '80s (when it was removed by Dr. Vladimir Brandwajn of Ontario Hydro), the matrix inversion with complete pivoting did. For years, it has been used to support various other models including distributed transmission lines (for the transformation matrix), the solution of compensation-based elements, and the alternative USE AR equations. So, after CP author Akihiro Ametani questioned the validity of matrix inversion within his own RMINV during March of 2000, your Editor decided to remove uncertainty by a switch to the complete pivoting of DGELG. This has been traced back to a UTPF segment dated 11 May 2000. In fact, this probably was an unimportant change (Ametani's original RMINV seemed to perform satisfactorily), but your Editor had left use of DGELG in the code. Then came the need to expand from 40 to 151 conductors (see recent issues). Your Editor was not tolerant of such huge fixed, local storage, so unused space of List 3 replaced the local storage. However, rather than unused space in the sense of LISTSIZE.DAT or NEW LIST SIZES (NLS), this is unused space in the sense of limiting dimensions (the limit of dynamic dimensioning, as specified at linking time). Protection against overflow was provided, and double subscripting was removed to improve the efficiency as work was completed on September 24th.

Variable JSIMUL distinguishes between simulation and supporting program use. The effect is seen at the end of printed output of each subcase. For simulation, the data burden on Lists 1 through 30 is documented whereas for a supporting program it is not; and times consist of either just the total time (if a supporting program) or 5 component times plus the total time (if simulation). The concept remains unaffected, although a detail was changed on September 24th. Prior to this date, a subcase was not considered to involve simulation unless and/or until it passed into source input of overlay 5. But because of a need within CABLE PARAMETERS routine RMINV, the threshold for simulation was moved from overlay 5 to overlay 1 --- from module SUBR5 to SUBR1. As a result, a few test cases (DC-50 twice, 64, DCNEW-10, 19, and 25) have a little more output. Although the change is obvious, it is only cosmetic. No computed value should be affected. Today, if ATP begins to read data for either TACS or MODELS or electric network branches, it is considered to involve simulation.

NPP for CABLE PARAMETERS was not always being handled properly prior to an addition of 2 lines near the top of CYMTRX on September 25th (date of delayed addition to UTPF). The change makes a difference only if there is no pipe. BPA's Dr. Tsu-huei Liu documented her change in E-mail to Ashok Parsotam in New Zealand on September 11th: *"After checking into your data, I found the source of your problem. On the first miscellaneous data card, NPP (which ends in column 40) is unused for CC if a class A cable system (your data involves a class A, SC cable without any pipe). However, NPP is used for CP if a class A cable system as a request for snaking (value -99). You have '1' for NPP, and CC apparently ignored it, but CP did not ignore it. After removing NPP =1 from your data (leave NPP blank), ATP ran to completion and answers agree with those obtained using CC, as they should. I will try to find time to improve the use for CP --- i.e., ignore NPP if not equal to -99 to indicate a Class A cable system."* Dr. Liu emphasizes: the Rule Book states that NPP will be ignored if the value is not -99. However, this was not always the case prior to the change. The Rule Book remains unchanged. The program is being made compliant with the Rule Book.

EIGEN CONTROLS is a new optional request card for CABLE PARAMETERS (CP) that allows the user some control over the iterative eigenvalue computation within Prof. Akihiro Ametani's EIGEN. Controlled by this new data is semi-diagnostic printout that allows the user to monitor the iterative and sequential (one eigenvalue at a time) extraction. This feature, which first became available September 28th, is illustrated by the 8th subcase of DC-27 -- deliberately picked because it involves higher-order data (10) than other subcases. Consider a part of the new output, chopped on the right :

```
Prof. Akihiro Ametani begins his eigenvalue ...
vary as the cube of N.  Progress will be mon ...
Eigenvalue N3 = 1 found after IQ = 3 iterations.
Eigenvalue N3 = 2 found after IQ = 4 iterations.
   Etc. (1 line per eigenvalue as each is found)
Eigenvalue N3 = 9 found after IQ = 1 iterations.
```

Perhaps this resembles the intermediate printout during Ma Ren-ming's reordering of TACS supplemental variables and devices (see the July, 2001, issue), which served as the inspiration and starting model.

DEC ATP for VAX / Open VMS

An extraneous SAVE line within POCKET was removed as a result of Randy Suhrbier's compilation using Alpha. Typically, Mr. Suhrbier notices nothing unusual. But this time was different, as he reported in E-mail dated May 7th. The compiler produced 4 messages such as: *"%FORT-W-EQVSAVCOM, EQUIVALENCE may not be used to put a SAVE variable into COMMON at line number 2608 in file ..."* The observation is accurate. When your Editor EQUIVALENCE-d the 4 vectors to COMMON for communication with TACSUP as required

by TACS POCKET CALCULATOR (TPC), he forgot to remove the previously-required (but no-longer-needed) SAVE declarations. Later that same day, Mr. Suhrbier documented the compilers being used: *"Remember way back when you had a problem with the 6.1-ish VMS compiler and I set you up with a way to use the older 5.9 version? Well, we are currently using 7.1 of the F77 compiler (and 7.3 of the F95 compiler) ..."*

USE GIFU SWITCH is a declaration that is required in the 8th subcase of DCNEW-17 because the first GIFU switch is not followed by either a diode or a second GIFU switch. See discussion of this situation in the April issue. Well, Dr. Liu observed that VAX ATP switching at step 400 differed from that of all Intel-based PC versions. VAX ATP closing was delayed one time step, so it occurred on step 401. Depending upon perspective, all were right or all were wrong. The good news is this: supposedly universal code, not any compiler, was at fault. Following study, a change involving NOGIFU was made to OVER16 on May 28th in order that all solutions be the same. Which .LIS file was right? Those of Intel-based PC versions. But they were right for the wrong reason. Neither a SAVE statement nor a DATA statement had involved NOGIFU, and this was an oversight. Yet, the VAX compiler seemed to preserve the local variable (i.e., there seemed to be an automatic, implicit SAVE), and it correctly produced the wrong answer. The PC versions did not, and this explained the different switching. The PC versions had obtained the right answer, but for the wrong reason. At issue is the way local vector MDIODE is zeroed prior to a following subcase that involved a GIFU switch. Previously, this burden was in LOAD22 whereas now it has been moved to OVER16. In theory, operation now is not quite as efficient, but it is simpler; and answers should be universally correct. On step 400, a diode closes on the same time step that the GIFU switch opens. This is the *dynamic current redirection*.

The GNUPLOT switch NOGNU is not empowered for VAX ATP, it should be noted. This was Dr. Liu's observation: there is no .GNU output, ever. But .PS and HP-GL are correct. Unless and/or until some VAX ATP user can think of a compelling reason to implement GNUPLOT output, this will remain unfinished business.

Universal C-like files without use of real C? This seemed to be the possibility suggested by Orlando Hevia of UTN in Santa Fe, Argentina. His E-mail dated August 18th stated: *"DISLIN has all the subroutines to write/read C-like files."* This was in response to the lack of C-like support for VAX as mentioned in the October issue. Two days later, your Editor responded: *"DISLIN allows writing and reading of C-like files? I am not sure that we knew this. If true, how do you suppose speed would compare with Masahiro Kan's coding"* using real C?

Another VAX/VMS translation was produced late in September following interest from user Dan Goldsworthy.

Dr. Liu left a handwritten note dated September 27th. No changes to code were required, and data was updated appropriately. Most interesting of the new output is the new 5th subcase of DC-19, which illustrates Orlando Hevia's new CIGRE source. Recall the January issue showed how Salford, Lahey /Mingw32, and Watcom ATP versions produced 3 different results for variable CIGRE1 on Step 40. October 1st, the corresponding value for VAX was obtained, and it provides a 4th distinct value:

```
Step   VAX      Salford  Lahey    Mingw32  Watcom
40    .961567  .661331  .997342  .997770  .552993
```

This is further evidence of sensitivity to roundoff. Since its inception in the late '70s, DEC VAX / VMS has been known to use a different 64-bit word structure, so lack of agreement comes as no surprise.

CONCATENATE INCLUDE FILES is illustrated by DCNEW-28, which was expanded by one line on October 3rd. This one line illustrates rejection of a nonexistent data file. Previously, ATP would terminate execution in this case. But why? Just as ATP will recover from an error in one subcase to begin the following subcase, so ATP should be able to skip any missing disk file as part of the CONCATENATE operation. For the record, this progress required modification and study of OVER1 following trouble using VAX ATP. We had forgotten to augment Dube's family of test cases by the six newest Type-94 illustrations (see mention elsewhere in this issue --- the story of how the original 78 subcases of DCNEW-28 expanded to 84). Execution simply died. There was a VAX ATP error due to failure to upgrade STOPTP a year or 2 ago. But having corrected this, your Editor thought about allowing execution to continue. This would be for any translation. As an illustration, DCNEW-28 was augmented by the name NONEXIST. This is rejected with a single-line message: *"Warning. ATP could not connect ... Ignore this 1 file."*

Brain - Damaged MS Windows

"MS Outlook digital sigs easily forged" is the title of a story that was posted at *The Register* on September 3rd. It begins: *"Digital signatures can easily be forged and therefore can't be trusted in Outlook because of the same certificate chaining issue plaguing Internet Explorer, researcher Mike Benham says."* It seems this is the guy *"responsible for discovering and publicizing the IE debacle ... Now after a bit of further tinkering it appears that the same design flaw can be used against Outlook users."* According to this expert, *"Unless carefully inspected, signed email in Outlook is essentially meaningless. This also applies to any signed email received over the past 5+ years."*

"No Microsoft breakup: judge upholds most of pact" is the headline of a NewsMax.com story dated November 2nd. This began by summarizing the latest milestone of the long journey: *"The federal judge overseeing the Microsoft*

antitrust case Friday approved most of the year-old settlement between the software giant and the Justice Department. However, U.S. District Judge Colleen Kollar-Kotelly made one major exception: She retained for herself or some other federal judge the authority to determine whether the agreement was being carried out properly. The settlement between the Justice Department and Microsoft invested most of that jurisdiction in a three-member independent monitoring board." The *New York Times*, too, generally saw this as a win for Bill G. A story entitled *"Microsoft's new set of hurdles,"* dated November 4th, began as follows: *"The ruling on Friday by a federal judge, rejecting strong sanctions against Microsoft, means it will not have to change its ways much despite its antitrust violations."* But author Steve Lohr argued that MS must continue to dodge bullets beginning with those from Linux: *"Today's embodiment of the Internet threat to Microsoft is Linux ... The business problem of competing against Linux is far trickier for Microsoft than was thwarting the early Internet challenge from browsing software ... The competitive weapons in the Microsoft arsenal will be fewer because a federal appeals court has ruled that the bullying of industry partners and rivals to protect its monopoly was illegal. And Linux ... is a more elusive target. ... The Linux strategy is to undercut Microsoft ... in pricing its personal computer operating systems for high-volume sales."* An analyst at Gartner is credited with this quotable observation: *"In market after market, Microsoft has come in from the bottom and said we're cheaper. It can't do that with Linux. How can you get cheaper than free?"* Yeah. Finally, remember that MS legal problems are not limited to U.S. law. *"Microsoft's U.S. settlement won't clear path in Europe"* is the title of another *New York Times* story filed the same day. But this one came from Brussels, not Washington: *"The settlement in the United States ... will not easily serve as a template for resolving the case in Europe, officials here said today."* Of course, Brussels, Belgium, is headquarters of the European Union (EU, formerly Common Market). According to a spokeswoman, *"Our case is quite different from a factual point of view ... We also have our own rules to uphold."*

New EEUG List Server

Out-of-office auto-replies have been a problem of list servers for years; and as time passes, the problem probably grows with volume. The first formal objection that your Editor can recall came from Prof. Bruce Mork of Michigan Tech in Houghton, who had proposed a prohibition some 2 or 3 years ago. This was during the discussion that led to the switch from the Fargo list server to the EEUG list server. Prof. Mork clearly was right: automatic replies by subscribers are a pain. From experience over the past 20 months or so, though, only the author of a message received these, however. How many? Today, typically 2 or 3 per contribution. Auto-replies were not a problem for other subscribers, however, since others were unaware of them.

That was prior to July 8th when new potential danger of auto-replies suddenly became obvious. Moderators of the EEUG list server then received such a message as a proposed contribution to the forum! This was *"submitted by phil.newhouse@sce.com ..."* and it stated: *"I will be out of the office ... and will not return until ... I will respond to your message when I return."* As observed in the October issue, *"need for moderation continues to be demonstrated on a daily basis."* Appendage on September 20th: The problem is not going away. Another out-of-office reply was received (and ignored) by moderators. This one, from jose.elguezabal@tde.alstom.com had the distinction of being trilingual: English and Spanish in addition to the dominant and initial German. Etc. (more have followed).

Legal disclaimers first were mentioned in the October, 2000, issue. Surprisingly, not every subscriber seems to understand the problem. As an active moderator, Deputy EEUG Chairman Laszlo Prikler probably has removed more than his share of prohibited appendages. When he does, typically he mentions something about company lawyers. July 16th, a contributor responded: *"Will you be so kind to explain me why you say 'lawyers' ...?"* Later that same day, Prof. Prikler answered the question as follows: *"Hmm ... Maybe you do not know, but your outgoing messages are completed by a* **Confidentiality Notice** *... It is generally attached by the mail system, and users can do little to eliminate it. Such an appendage is not allowed ... I used the word 'lawyers' because normally company lawyers ... stick such a notice at the end of employee's email. If you send a message to the ATP mailing list with this notice included, the message will be put on hold until a moderator's time allows to remove it and re-send your message to the list. This procedure has some drawbacks: 1) the message appears on the list slower; 2) your name is not included in the Sender (From:) field; and 3) it needs a moderator's intervention, instead of a simple OK."*

An appropriate *"Subject:"* was a requirement proposed by your Editor for all list server submissions. Of course, the average subscriber **does** provide such information, but one in Nancy, France, did not on August 26th. So, your Editor recommended resubmission for this as well as other reasons. Fellow moderator Laszlo Prikler agreed with your Editor the following day: *"We should. If others also agree, I will complete the listserver rules with that new requirement."*

Many requests for help are not seen by subscribers. Instead, they are answered privately by moderators who refuse to approve messages for publication. The ultimate illustration occurred on August 30th when the following was submitted from a university in England: *"I want to be an ATP user. Can you help me in getting the software?"* This was a proposed *"Reply"* to a meaningful request for help from BHEL in Bhopal, India. List server moderator Laszlo Prikler probably was more sympathetic than your Editor would have been. He rejected publication as follows: *"Hmm ... Having been registered on the ATP-EMTP-L list on 14 February 2001 (otherwise we could not see this*

request), and having an ATP license (a pre-requisite for the list) granted on 26 January 2001, Mr. XXXX still does not know how to obtain the (ATP) software? Quite interesting. Initially, I feared that we had a security backdoor somewhere in the system. But the case is simpler. This person has a license to use ATP ... and he has all that he needs to become an ATP user --- except the software to make him a practicing 'user'." Prof. Prikler went on to outline four ways to acquire ATP: *"There are several options to obtain 'the software': *) Order it from EEUG; *) Order it from Can/Am authorized distributor Dr. Kai-Hwa Ger; *) Download it from secure Web sites operated by EEUG; or *) Download it from secure Web sites operated by JAUG. Concerning documentation, the available options are just 2 (and a half): *) Order it from EEUG; *) Order it from the Can/Am authorized distributor Dr. Kai-Hwa-Ger; or *) ATPDraw documentation is downloadable from secure EEUG site. A Username / Password can be obtained from the regional user group that provided the ATP license for you. In your case, it is EEUG, and the corresponding secure account at http://www.eeug.org ... was created for you a long time ago. If you lost or forgot it, please contact me using private e-mail."*

The NOMAIL command was recommended by list server manager Michael Havekost of FH Osnabruck. This same command first was explained by Prof. Bruce Mork of Michigan Tech in his pioneer exposition over a decade ago (see the October, 1991, issue). Whereas SIGNOFF is permanent, NOMAIL is temporary, and it subsequently can be retracted by the user. Mr. Havekost explained to subscribers on September 14th: *"If for any reason (e.g. vacation, longer trips) you cannot receive messages ... please use the listserv command NOMAIL. It temporarily disables mail delivery and protects you from a full mailbox. Full mailboxes usually bounce all incoming e-mail and that can lead to an automatic unsubscription from ATP-EMTP-Mailinglist. ... The usage of the NOMAIL command is easy:*

```
To: LISTSERV@LISTSERV.DFN.DE
Subj: irrelevant
Mail body: NOMAIL ATP-EMTP-L"
```

Of course, cancellation is identical except that MAIL replaces NOMAIL. If there are questions, Mr. Havekost can be reached at **mailinglist@emtp.org**

More than 700 subscribers were mentioned by Laszlo Prikler in his message to an author and other moderators of the EEUG list server. Dated September 24th, this note rejected a submission having *"Subject: just test."* Prof. Prikler explained: *"Just to confirm, the service is in operation. But the mailing list is moderated to protect our 700+ subsribers from such 'hello' messages. Please send your ATP-EMTP related message to the same address ... and moderators will be happy to approve it."* Your Editor notes that more than 700 subscribers is an historically-significant level. It comes less than 22 months after security was imposed on 30 November 2000. Recall that the

October, 2000, issue mentioned 607 addresses that were extracted from a then-recent REVIEW of Prof. Bruce Mork's Fargo list server. Presumably Prof. Mork's uncontrolled subscription peaked somewhere slightly above the 600 level. This then was nearly cut in half when security was tightened (the April, 2001, issue explained that *"46% of present subscribers must re-subscribe!"*). From this low, subscription has increased methodically, week after week, until today a new record is noted.

Monte Carlo (STATISTICS)

The FIND command within data of statistical tabulation was summarized in the October, 1992, issue. Nearly a decade later, another PTI (Power Technologies, Inc., located in Schenectady, New York) employee has inspired generalization. This time, change was made in response to E-mail from Dan Durbak dated September 20th. About possible further study of the worst energization of some STATISTICS study, Mr. Durbak wrote: *"My idea of how to make the process more efficient and less error prone is as follows. Near the end of the file, after the FIND command is executed, enter the new request word RESIMULATE. ATP then would re-simulate the case found, and create a .PL4 file that could be plotted using PlotXY or other. Thus, the .PL4 file would contain just one simulation."* That final comment about a single .PL4 file seemed to be a reaction to your Editor's mention of the *"concatenation of all .PL4 signals of a Monte Carlo simulation"* (see the October, 2000, issue) . So, Mr. Durbak's suggestion inspired the extension. In response, your Editor proposed the DATA subcommand rather than RESIMULATE, however: *"I was thinking of creating data cards for a deterministic data case. You instead would simply produce the deterministic simulation. But how, without the associated data cards? ... Punching of a data case would seem to have the advantage of clarity and flexibility (data then could be modified based on human intelligence). The card creation would be done in one place ... Otherwise, the program would be unchanged. On the other hand, internal and automatic re-simulation probably would require changes in several places,"* increasing the complexity of program logic. So, this is what was begun September 23rd: modification of DICTAB to honor a new subcommand DISK within the old FIND command. The result will be a disk file SHOT*.DAT where the associated energization number will provide 4 digits of decimal serialization (bytes 5-8 of the disk file name). To be continued.

SLASH is the variable used to store the symbol that is used to separate a directory name from a file name. For Unix, this is a forward slash ("/") whereas for MS-DOS or MS Windows, it is a backslash ("\"). October 4th, SLASH was put in COMMON in order that it not separately require definition in routines FNDFIL and DICTAB (the later for the new DISK subcommand of the FIND command

of statistical tabulation). This is in addition to DIMENS for which the definition is being retained. BLKCOM provides the communication. The same symbol is used to define ATPDIR near the start of MAIN00, but this code deliberately is being left unchanged in order to avoid further complication. The ATPDIR service is isolated, and it occurs before STARTUP is read, so can not easily use the same code as the other locations. Logic of MAIN00 is not being changed.

Comment cards are worthy of some thought when the DISK subcommand of the FIND command is used. If comment cards are destroyed using NOCOMM = 1 (traditional practice for standard test case verification using Salford ATP in Portland), then comment cards will be missing in the SHOT*.DAT output file. ATP can not copy what it already has discarded. So, if the user wants an easy comparison between input and output data using Mike Albert's great freeware program FC, he should preserve comment cards. Yet, this assumes no $INCLUDE or data sorting by class ("/" cards). Recall the latter two features generally will drastically change data. The output of DISK will be after any inclusions and sorting, so will not compare easily with the input data. But recall that NORUN = 1 can be used to create an intermediate data file at the end of $INCLUDE and /-card sorting. If NOCOMM = 1 during this operation, comments will be missing. In this way, comment cards cease to be a problem of FC use as long as the NOCOMM switch is used consistently. It does not matter whether it is on or off since both the intermediate file and the output file created by the DISK subcommand will be consistent.

How reliable is the DISK output? It is too early to know. This is why user intelligence is important for those data cards that have changed. This also is why use of FC is strongly recommended. Until a user gains familiarity and confidence, he is advised to understand every changed line; and the only easy way to locate the changes is using FC. The DISK output should be viewed as a starting point that might be improved by manual modification. Of course, any error that might be discovered should be reported promptly to program developers in Portland.

A /LIST qualification of the DISK subcommand will result in a $PUNCH-like display, in the .LIS file, of the output card images. Provided data is not too voluminous, /LIST is highly recommended as a way of documenting the conversion. Use is demonstrated by DC-24 and DC-48.

RESIMULATE is allowed immediately after the final DISK subcommand of a data case. Well, there actually is nothing to prevent a later DISK command, but all later data cards of any type will be ignored, so they make no sense. Response to RESIMULATE is the abandonment of the original data, which is replaced by the data created by the DISK subcommand. Simulation of this SHOT*.DAT data will follow automatically as illustrated by the new 5th subcase of DC-48. Rather than the re-simulation of an

EXCLUDE-d shot (a common use), this subcase also illustrates re-simulation of an arbitrarily-numbered shot.

Next issue: ABB's Ricardo Tenorio discovers that table dumping for KIZILCAY F-DEPENDENT requires work.

GNU ATP Installation Dependence

Either DISK or BOTH was required for STOPTP to halt execution of GNU ATP prior to an update of GNU installation-dependent code on August 8th. Credit for recognition and reporting of the deficiency goes to that high-order pioneer in New Zealand, Ashok Parsotam of Vector Ltd. in Auckland. This was in E-mail the preceding day, which had *"Subject: TPBIG.151 -- some feedback."* Of course, because Bill G's DOS window is troubled by amnesia, nearly everyone who sends a copy of output to the screen will use BOTH, so the troubled mode of use is quite uncommon. About age, the weakness seems to have entered GNU ATP during February of 2000. This is when code at S.N. 4278 of the Salford module WINDOW was modified. Unfortunately, the GNU module was not updated comparably at the same time.

Your Editor was surprised by that huge file size (2.6 Mbytes as reported in the October issue) of Orlando Hevia's text. After all, the FORTRAN is just 972 Kbytes. Well, the difference was explained in E-mail dated August 20th: *"It is because of different character assignment in the replacement of the FORTRAN DATA statements. I must assign character by character to preserve all the special characters such as quote, double quote, apostrophes, etc. I found that the only procedure that allows all characters to be in data uses numeric representation (e.g., the ASCII number 65 is equivalent to the letter A)."* In any case, the end user of the program is not affected. The resulting object and executable files involve no waste.

Numbers for Y-axis tic marks sometimes were too generously applied within AXISXX prior to a correction on September 9th. A comparable change (introduction and use of variable D7) also was made to the corresponding PostScript module PSAXIS. No such reform was needed for HP-GL, however, because slightly different logic avoided the defect. The extraneous output was seen when Y-max, the number at the top of the Y-axis, was negative. There was no problem with the axis itself, or the associated tic marks. But the accompanying numbers did not end at negative Y-max as they should; instead, the loop continued until the absolute value of this (a positive value) was reached. Credit for discovery of this problem goes to Orlando Hevia of UTN in Santa Fe, Argentina. His E-mail dated September 8th explained his own patch to AXISXX, which involved the removal of one call to the absolute value function. *"Without the change, the Y axis for underground cables is drawn from say -1.6 to 0.6 whereas the correct range is -1.6 to -0.6 ... DISLIN sent a lot of warnings and*

the figure on the screen was correct, but the Y axis continues in a vacuum." Actually, the axis does not continue, but associated numbers do. This is why nobody noticed, all of these years (the error has nothing to do with more recent cross-sections of cables or lines). If the axis had been too long, one would have noticed it run off the top of the screen. But this was not the case. Nothing visible was being clipped. But, in fact, entire numbers were missing. Although not visible on the screen, such output was easily noted in the .PS file. It also was easily confirmed in diagnostic output. But how did Mr. Hevia notice? Certainly those DISLIN warnings were a readily visible clue that deliberately was ignored at BPA. Also, Mr. Hevia had a way of looking beyond the Mingw32 window (all that was used at BPA). He mailed a .PDF copy of a much taller screen, and this clearly showed numbers extending well above the top of the Y-axis. This was proof positive that inspired study at BPA. The error is serious because AXISXX is installation-dependent. Only Watcom, which lacks CALCOMP PLOT graphics, escapes the need for modification.

ATP Licensing Problems

IREQ headquarters, located in suburban Montreal, Quebec, Canada, once again has demonstrated interest in ATP. Recall that a South American branch, *Hydro Québec International Sucursal del Perú*, was mentioned in the October issue. During March of 2002, Ricardo Quijada had registered via the Can/Am Web form, although no signed paper copy ever was received subsequently by snail mail. Your Editor wrote: *"Perhaps the applicant later realized the potential conflict with free ATP licensing."* Well, not so for one Pierre Denommée, who registered from IREQ headquarters (High power laboratory; 1806 boul. Lionel-Boulet in Varennes) one month later. *"Rejection of ATP license application"* was the *"Subject:"* of your Editor's E-mail to denommee. pierre@ireq.ca Dated May 25th, this explained : *"This is a slow response to your signed application for an ATP license"* dated April 5th. *"If you want to discuss any detail of what I am about to write, be advised that French is read easily enough at this address. ... On to ATP licensing. Most likely you did not pay close attention to the form letter that precedes the ATP licensing form. IREQ/Hydro-Quebec is a DCG member --- or it was, the last time we checked. DCG members are actively and voluntarily involved in EMTP commerce, so are ineligible for free ATP use. ... About licensing, one story in the July, 1995, issue mentioned your company specifically. For your information, I append this writing ..."*

EPRI PEAC Corporation is yet another EPRI company that has applied to use ATP free of charge. Recall the July, 2002, issue mentioned interest by EPRIsolutions. Well, on October 24th, a license application was received from epri-peac.com in the name of Arindam Maitra, who claims to be located in Knoxville, Tennessee. Connecting to www.epri-peac.com your Editor reached a home page that lists *"EPRI Family of Companies"* in the upper right hand corner. Clicking on this leads to a list of family members. The third entry states : *"EPRI PEAC is a taxable, wholly owned subsidiary of EPRIsolutions."* Yet, as explained in the July, 2002, issue, EPRIsolutions has the same street address in Palo Alto as EPRI itself! These people honestly believe they are not involved in EMTP commerce? Perhaps they honestly know nothing about EMTP simulation (your Editor would not be surprised) .

MODELS author Laurent Dube failed to sign an ATP licensing agreement when asked to do so around the end of October. Users are advised that Dube, once a BPA contractor and cooperating program developer, must be considered **not** to be licensed to receive and use ATP information. Details next time. The story is long.

Comings and Goings

Prof. Xusheng Chen of Seattle University was last mentioned in the January, 2001, issue. E-mail from him dated June 24th requested assistance with the installation of ATP on 2 different computers: *"My summer vacation starts today. ... I plan to go to Vancouver to ... get the ATP source code installed on my computer-A which is run on MS Window 98, so that I can ... improve my three-phase transformer model; (3) Get the new ATP program installed on my computer-B which is run on MS Window 2000 ..."* Your Editor responded as follows 3 days later: *"There is the potential problem of access. We are in a new building, and BPA's offices are locked (even during working hours). Unless your visit is approved, you are not supposed to be able to enter."* Your Editor's final word on June 29th: *"We await your decision. Look for our confirmation after we receive a specific day and time from you."* Five months later, the wait continues.

Dr. Tsuyoshi Funaki now is an Associate Professor at Kyoto University in Japan. This was the information found at the bottom of his E-mail dated October 31st. Before summarizing a GIFU switch problem, his message began: *"I just moved to Kyoto Univ. from Osaka Univ."* Four days later, Prof. Funaki explained that he has two jobs for a few more months: *"My move was in the middle of the Japanese school year, which begins in April. Therefore, until the end of next March, I must work concurrently at Kyoto Univ. and Osaka Univ. Now, I'm working on a new ATP server here at Kyoto Univ."*

Power Company Politics and Religion

Northern States Power Company (NSP) in Minneapolis, Minnesota, seems to be yet another old name (see previous newsletters) that has disappeared as part of ongoing

restructuring of the American electric power industry. Remember how Commonwealth Edison (ComEd) in Chicago first became Unicom, and then Exelon (see the July, 2001, issue)? Well, a similar story about NSP was summarized in E-mail from Randy Oye on August 1st: *"We became Xcel almost two years ago. We merged with New Century Energy out of Colorado - which was a merger of Public Service of Colorado, a New Mexico utility, and a Texas Utility. We're still in the same building -- you might even recognize some of the carpet and decorations!"* Funny guy! Why the explanation? Your Editor had recognized the street address (414 Nicollet Mall) at the bottom of a previous message, and had inquired: *"Restructured NSP? Amazing. ... I have walked up to the 8th floor many times, more than 30 years ago. That was System Planning, where I had access to an IBM System/370 mainframe computer."* About ATP, Mr. Oye had asked: *"Is the ATP program compatible with the Common Information Model developed by EPRI ..."* Your Editor denied all knowledge: *"Data for what? ATP does not use load flow or transient stability data (we do understand there are standards for such data). ... EMTP data is quite different."* In his 2nd message, Mr. Oye explained: *"CIM ... is basically a standardized way to represent data. We are building a database of the majority of our transmission system data that we want to work with as many applications as possible. The CIM defines the format on how it is represented in the database. What we would like to do is exchange data from one database into applications like ATP without having to create separate databases for each application."* Your Editor remains skeptical. Any reader who disagrees is encouraged to argue the case for CIM using the EEUG list server. The audience now exceeds 700.

The cost of fish is summarized at the top of BPA's *Hot Issues* dated August 30th. The story, entitled *"GAO misses mark on BPA fish costs,"* emphasizes the difference between visible spending and waste. According to BPA, a GAO (the General Accounting Office of Congress) report states that *"BPA has spent only $378 million on fish and wildlife since 1997."* The difference between this and BPA's claim (*"well over $3 billion"*) is due to the cost of spilled water, etc. (i.e., hidden costs). If there is a surplus of water (the good old days), water is not worth much. But if water is in short supply, and if BPA must purchase replacement power during times of shortage, the cost can be staggering. Note the political secret: cost of environmental policy is hidden in the price of electricity where the average consumer and voter will not appreciate its size. There is similarity to income taxes on corporations rather lower-income wage earners. For readers who do not follow such details, nearly half of American workers pay no federal income tax at all, and the bottom 50% pay less than 4% of the total. Of course, in effect, taxes on businesses are hidden sales taxes, and are paid by rich and poor alike at the same fixed rate. But how many voters understand this? Probably not many. That is a serious problem of American politics : apathy. Only about half of persons eligible to vote bother to vote regularly.

Locks on the PPOC-2 building suddenly became a problem on October 4th. The first meaningful SHOT*.DAT output of the DISK subcommand of the FIND command (see mention elsewhere in this issue) was produced at home late on Saturday, October 5th. Normally your Editor would have traveled to work within PPOC-2, but this desire was thwarted by delayed access the previous day. Your Editor had arrived a few minutes after 04:00 AM to discover that he was denied access by a faulty electronic lock.   The geniuses who conceived this system failed to provide either reliable equipment or backup in the form of an independent card reader on a second door. Not a good testimonial for Network Planning (formerly System Planning) which is located therein. Planning failed to consider reliability and / or redundancy of access? Your Editor filed an early report of trouble by telephone (another story). Finally, E-mail at 9:02 that morning warned other occupants of the building. Unfortunately, this message *"From: Burnett, Janet L - CGF-PWP-1"* did not promise prompt repair. Neither did it indicate that anyone actually was working on the problem: *"The card reader company has been called and we will notify you as soon as we have any information about the repair."* Not only are the electronics unreliable and without backup, they are someone else's electronics (not good) ! Curiously, the problem seems more general and serious than the one lock that was reported by your Editor. E-mail dated October 8th mentioned *"malfunctioning card readers"* (note the plural). This states : *"Since that time we have had numerous other malfunctions in the system in other buildings ..."* Later, your Editor learned that there were a few old mechanical keys that should have been usable on other entrances, but it seems that those keys did not fit the locks! Your Editor was told that the building owner had changed the locks since keys had been issued (probably around the end of November, 2001, when BPA moved in). So there was a backup of sorts, but it was provided to persons who had no need, and therefore never bothered to verify operation. E-mail dated October 9th documents the need for new mechanical keys: *"OK, I think we have it straightened out. We will have keys made for XXX and YYY and will get them to you as soon as I can."* But the message ends on an ominous note: *"keep in mind that if the card key system goes down a building key will not open the door into the office suites."* Do you suppose Alcatel (see the October issue) supplied the networking (joke)? Once again, BPA seems to have selected technology beyond its understanding and its ability to maintain. Only in the government, where there is neither competition nor a bottom line.

Pocket Calculator Used by PCVP

"A $PARAMETER variable that begins with the letter C ..." was the beginning of a paragraph in the October issue. Yes, that problem was solved. But another much simpler problem thereby was created: the modified logic failed to handle (ignore) some normal comment cards!

This report, too, came from Orlando Hevia of UTN in Santa Fe, Argentina. His E-mail dated September 23rd correctly observed the grossly-improper handling of a comment line such as

```
 C  Rating = 18000.0  V-mult = 1.00000E+00  ...
```

(punched by ARRDAT as part of ZNO FITTER service). Your Editor investigated September 30th, and decided to treat such "C " lines as an exception within OVER1 service of $INCLUDE. The blank after the "C" may not be necessary for a comment, but it certainly is sufficient, so the addition should always be right. Why your Editor did not see this improvement 2 or 3 months earlier is odd.

Vector Plots of JMARTI Fitting

Those plots of JMARTI fitting were not correctly coming out of Mingw32 ATP in HP-GL form. This first was reported by Orlando Hevia of UTN in Santa Fe, Argentina. In E-mail dated November 6th, Mr. Hevia reported lack of separation as follows: *"all the figures are on the same page ... The output lacks a PG at the end of each figure, to start a new page in the same HP-GL file."* The single page is true, although there is another interpretation. Upon investigation at BPA, Dr. Tsu-huei Liu and your Editor observed this difference: Salford EMTP avoids the problem because each plot is separated in a different disk file ATPHPGL.001, .002, etc. This agrees with conventional batch-mode plotting, so might reasonably be taken as the intended form of output. Thus the GNU HP-GL problem might be solved by separating the output so that each disk file contains only one plot. However, it was during investigation of November 12th that Dr. Liu and your Editor decided not to touch the delicate balance of DISLIN graphics. Your Editor feared unintended consequences. Instead, immediately prior to an end of ATP execution in STOPTP, postprocessing would provide a way to separate plots easily. This should be safe, and could be used with Watcom ATP, too (which was noted to have the same problem, just as Lahey ATP should have) .

Considering segmentation of HP-GL output, where should the single disk file ATPHPGL.001 be split? Mr. Hevia's proposed PG seemed to be a convenient marker for a postprocessor. So, the extra PG was produced by universal HPPLOT beginning November 12th. But why split the file? After adding PG, why not leave the single-file output intact for non-Salford versions? Because the response to PG seems not to be universal, unfortunately. For example, WP 9 does not seem to honor it, as far as your Editor and Dr. Liu could see. With or without PG, the result was the same: a single plot that involved the superposition of 2 or more (it is impossible to see how many because distinction between colors is poor) plots.

MS Word acceptance of HP-GL was the big surprise of that work on plots of JMARTI fitting. Orlando Hevia reported this casually in E-mail dated November 10th: *"Word 2000 plots all the figures in the same plot. PG is useless with Word."* Dr. Liu and your Editor were surprised by the first sentence, so they tried Word at BPA once again. Still no success at BPA. Upon learning this, Mr. Hevia advised as follows two days later: *"Maybe you do not have the HP-GL filter. It is not installed if you do not force it at the time of Word installation. It can be installed at any later time, however."* So, Dr. Liu inquired of BPA's computer established, and the response was surprisingly quick. E-mail delivered an attachment (*"Here is the filter"*), and Dr. Liu's response dated November 13th documents success of the addition: *"Thanks. It works!! ... HP-GL graphics file now can be displayed correctly by MS word on my PC."*

Hoidalen Improves ATPDRAW

Stale news is a problem of this newsletter as noted by ATPDraw author Hans Hoidalen during his pre-publication review of the October issue. On August 19th, Prof. Hoidalen wrote: *"The paragraph in the October newsletter that deals with ATPDraw is a bit outdated. Since the launch of version 3.3 several new versions are released. Besides several bug fixes the most important point is that BCTRAN is supported. A version 3.6 recompiled in Borland Delphi 6.0 is also released. This version runs better under windows XP. A 247 pages Users' Manual that covers all the features of ATPDraw (with several practical examples) is completed and will be made available at the secure ftp-server in PDF format any time ..."* About age of news, your Editor offered no apologies. The shoe fits. The following day, he responded: *"Plenty of other news is old, too. Some dates to late last year, I noted. So ATPDraw is not being treated any worse than ATP. ... Years from now, no one will care about the delay. If one wants new news, clearly, one should be reading mail of the list server!"*

A new *"User's Manual for ATPDraw version 3.5"* was announced by Deputy EEUG Chairman Laszlo Prikler on August 21st. His E-mail of the EEUG list server explained: *"This 246-page Users' Manual includes more than 200 colour screen captures and documents all new program features: grouping, $Parameter, line/cable and transformer modeling. The Application Manual has been extended with several new examples. A detailed Index, internal hyper-links between Table of Contents, section headers and figures support the easy reading and searching. ... The first two chapters (Introduction, Installation) were particularly dedicated for beginners"* to *"give a general overview about the ATP-EMTP simulation environment :*
1. Introduction
1.1 What is ATPDraw?
1.2 What is ATP?
1.3 Operating principles and capabilities of ATP
1.3.1 Integrated simulation modules in ATP ..."
Although Prof. Prikler remains at the university in Budapest, he now seems to be using his own company for ATP-related activities, and this should be stated for the

record. It is Systran Engineering Services Ltd. in Pomaz, Hungary. Of course, ATPDraw author Hans Hoidalen remains an Associate Professor at the Norwegian University of Science and Technology in Trondheim, Norway.

Creative ATP Modeling

Numerical overflow of Kizilcay frequency dependence (KFD) was encountered by Ricardo Tenorio of ABB Utilities, Power Systems - FACTS in Vasteras, Sweden. In E-mail of the EEUG list server dated November 6th, he reported: *"I decided to represent a network, which I only knew through a frequency scanning plot. However, the network is an existing one! ... The network was modelled by KFD (22nd order, Laplace representation in s) and put in series with a saturable transformer component ... I always got the following message: '*ERR* KO-02 floating-point overflow' The simulation used a deltaT = 10 micro-seconds (us). DeltaT was increased progressively from 10 to 100 us. With deltaT = 90 us, EMTP-ATP indicated a solution that appears to be correct ... The same is valid for 100 us."* This beginning led to several observations and modifications as should be summarized in future issues if not elsewhere in this issue.

Symmetrical Component Z0Z1Z2

Frequency scans involve data that might change as a function of frequency (the previous writing was about conventional time simulation). So, the user should worry about possible associated complications. In that the conventional FREQUENCY SCAN (FS) loop does not include data input, your Editor can imagine that there would be no special problem. But what about Gabor Furst's HARMONIC FREQUENCY SCAN (FS) ? Fortunately, Orlando Hevia reassures users in E-mail dated April 13th : *"I did the test with a HFS data case, with X-seq and XOPT a function of frequency. It works."* In reply, your Editor observed: *"What you write is believable. Note that it contains an important qualification, however. The user who forgets to modify the associated frequency will be in trouble, from what I can imagine. Also, there will be no warning message in such a case, so use could be more dangerous. This is a tricky business, with ample room for GIGO"* (Garbage In, Garbage Out, of course, as last defined in the January, 1997, issue) .

Is the Z0Z1Z2 model practical for the modeling of anything other than generators? This was your Editor's question. *Yes* seems to be the answer from Orlando Hevia of UTN in Santa Fe, Argentina. In E-mail dated May 30th, he summarized a practical regional application: *"A power company has a bank of three single-phase transformers (500/132/13.2 kV) that requires greater capacity. But the replacement can not be made all at once. This Sunday, phase A will be replaced. Next Sunday, it will be phase B.*

Two weeks will pass before the device once again is balanced, and during this time, different power ratings of the phases implies different impedances. These, in turn, cause negative sequence currents and voltages in the generators. This is a nice use for model Z0Z1Z2 with Z1 not equal to Z2. ... The study is limited to the steady state ... a small negative-sequence voltage produces big negative-sequence currents in generators."

USRFUN and CIGRE Sources

A new 5th subcase has been added to DC-19 in order to document new source types mentioned in this story (see preceding issue). Variable names and request words should be self-explanatory. The user should find two CIGRE source signals plus one USRFUN source signal.

About possible in-line USRFUN (see mention in the preceding issue), Mr. Hevia wrote as follows on August 18th : *"I think USRFUN cannot be inserted in line by the compiler because it must be linked with a previously compiled library."* Two days later, your Editor recognized the problem : *"Interesting point. Yes, to insert a function in-line, one must have the code that calls the function. You are right. If this is to be done using GNU ATP, developers would need to distribute the source code of another subroutine (SUBTS3)."*

FUNCTION CIGRES is very short and simple, yet it caused trouble for F95 Lahey ATP. In fact, CIGRES was too simple. Lack of some (any) card between the function declaration and the definition of a library function caused IMPLICIT to be delayed illegally. Yes, the translator F95ET could have been modified, but your Editor was lazy. Also, he reasoned that it was highly unlikely for the problem to recur. So, instead of added complication to the F95 translator, a separating comment card was added to CIGRES on August 26th. If and when Orlando Hevia ever might document his code, real comment cards could replace this artificial comment card that serves F95.

Sensitivity to precision of the computation is a concern about the CIGRE source. This began with the observation that Salford, Lahey, and Mingw32 ATP versions produced significantly different results for variable CIGRE1 in the new 5th subcase of DC-19. This was after most of author Hevia's code involving non-ATP-standard functions (e.g., DSIGN, DFLOAT, and MAX) had been converted to ATP-standard functions and/or code. Consider an illustration. During the initial rise toward a peak of 1.000 (all 3 versions agree), the 3 standard test case solutions show variable CIGRE1 having values :

```
 Step  Time    Salford  Lahey   Mingw32  Watcom
  40   .2E-5   .661331  .997342 .997770  .552993
```

So, your Editor decided to study differences in detail. In the process, he noted the need for more conversion to ATP-standard code (previous work was incomplete). What he learned using just the Salford compiler (no need for the

others) was a little frightening. With code fully converted, there was the question of whether or not the symbolic debugger had been turned on during compilation of the CIGRE fitter (used during source input of overlay 5). For that same Step 40, the CIGRE1 value rises to .668485 just by turning the debugger on. The difference is more than 1 % --- just due to the selective replacement of some 64-bit results by 80-bit results (see the explanation of Robert Schultz's INT_CONVERT in the January, 1994, issue)? If 64-bit round off error really can have this big an effect, the differences among the compilers has been explained. Unless some other discrepancy such as hidden single precision might somewhere and somehow later be discovered, the CIGRE source formulation in ATP seems to be precariously posed. CIGRE source results seems unreasonably dependent on precision of the mathematics of the CIGRE fitter. This is the conclusion as your Editor terminates his investigation on August 21st.

Single precision constants might be part of the problem. This was author Hevia's reaction to the preceding writing. So, August 22nd, your Editor inspected every decimal point. Two instances of 0.9 with no following exponent were found. Replacement by PCT90 = 0.9D0 did make the answer using the Salford debugger closer: .6605693 This is a lot closer to .661331 than .668 was, but it remains far different from Lahey and Mingw32.

August 24th, quadruple precision Lahey was used without much satisfaction. Quoting from a report to Mr. Hevia that day : *"The result is not as close to Mingw32 as it was. Now, the value at step 40 is .957 ... Yes, Lahey remains a lot closer to Mingw32 than to the other 2, but this is hardly cause for rejoicing. I interpret this result to mean that 64 bits are inadequate. This is not good news. It is all quite discouraging, I find."* Yet, author Hevia is not convinced that there is an engineering problem. I.e., even though the rises occur at slightly different times, any of the surges might be equally good. More next time.

$PARAMETER and PCVP Loop

A PCVP loop can be used in place of STATISTICS as illustrated by Orlando Hevia of UTN in Santa Fe, Argentina. His submission to the EEUG list server on September 20th was a response to your Editor's general assertion of capability: *"this is another possibility, although it might be too complicated for casual use. Use of PCVP does have the advantage of creating a separate .PL4 file for each energization, as you note. Of course, the limit is 999 (eventually, there will be complaints about this, no doubt)."* Mr. Hevia's response included an illustration: *"Yes, it is more complicated, but it is not impossible."* Following ATP data cards provided support for 3 switches. There were 29 intermediate (local) variables within Mr. Hevia's $PARAMETER block, and these use function RAN to produce the random variation. Recall this would be an

alternative to *"concatenation of all .PL4 signals of a Monte Carlo simulation"* as summarized in the October, 2000, issue. Then, your Editor had asked a question: *"would a special marker line that includes the energization number be appreciated?"* Now, Mr. Hevia supported this idea (*"a special marker may be convenient for post-processing"*), so code of OVER12 was modified on September 24th to produce a special marker line. For example, using the first subcase of DC-24, the following new line will be seen immediately before signals for the second shot:

```
++++  ++++  ++++  Begin next shot  KNT =    2
```

This provides the desired absolute positioning provided two conditions are satisfied: 1) plot points are not being cached in RAM (i.e., provided LUNIT4 > 0); and 2) the .PL4 file is FORMATTED. Finally, there never will be such a marker before the first shot (it is only for the 2nd or later shot), and signals may not begin at time zero because the simulation may not (recall each energization typically begins 4 standard deviations before the mean of the first switching time) .

Cross - Sections of Cables and Lines

CROSSEC.BAT is the command file that will verify, using KROSEC = 2, each standard test case DC*.DAT that involves CC, CP, or LC. There are 14 such files. As first used August 5th for Salford EMTP execution, BOTH serves to send plots to the screen. Output .LIS files are not being saved as for normal testing. Instead, the PostScript files .PS have been saved as .PSC files, and each of these is compared using MS-DOS FC. Your Editor prefers Mike Albert's older freeware version of FC, but it was found that files were too large (*"more than 16300 lines in this file"*) for 3 of the files (27, 28, and N29). These range in size from 1447 to 1805 Kbytes. Why so big? Because there are many plots, and each coaxial structure is shaded by the drawing of concentric circles; and each of these is approximated by many connected straight lines.
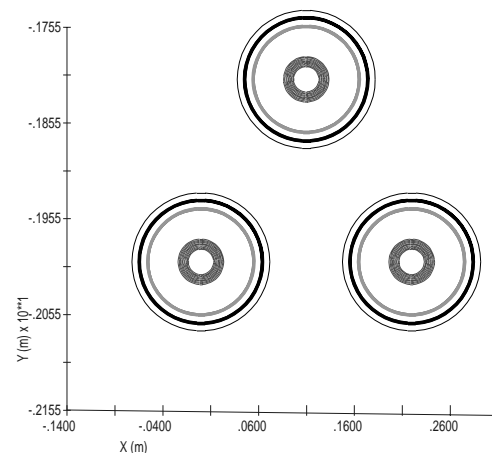
When KROSEC = 2, just 3 lines will be seen in the .LIS file for each subcase that does not involve either CC, CP, or LC. DC-9 provides a good illustration. Of the 27 subcases, only a single one --- the 7th --- produces more than the minimum 3 lines of output. Of the first 3 of these, only the 3rd is unfamiliar. The first two are the same as the first two lines of the header that always begins program output. The 3rd then notes the special use: *"Since STARTUP had KROSEC = 2, Orlando Hevia next plots line/cable cross-sections ..."* But without any CC, CP, or LC data, only a blank subcase-separating line will follow.

Use of KM as a local scalar in KRSUBR was found to conflict with the F95 Lahey compiler. A statement such as `IF ( KM .EQ. 0 ) ...` was objected to as follows: *"Expression must be a scalar logical expression."* Yet, a search of both the subroutine and its 3 INCLUDE files revealed no vector use. Eventually it was realized that DECK10 involves USE KOMGNDD and this, in turn, declares KM as a vector. This was not true for F77, but it is the case for F95. This is probably the trickiest aspect of F95 observed thus far. Your Editor no longer remembers the nuances of how the F95 translation differs from the F77 translations (which are used on a daily basis). Particularly confusing was lack of objection to a line of simple scalar initialization : KM = 0 If KM were a vector, why no complaint about a missing subscript? Is it possible that F95 responds to this statement by initialization of the entire vector? Anyway, correction was made August 22nd by avoidance: scalar KM was changed to KMM .

SUP.PCH that contains only $STOP is the way execution using DCNEW-25 is terminated following one picture of a cable when KROSEC = 2. Of all disk files, DCNEW-25 was the most challenging. Without this change to the operating environment, somehow execution ended normally at home. But at BPA, using the newer Salford compiler version 3.51, execution died while attempting to READ ANSI26 as I26 information using S.N. 1429. The content was non-numeric $ENABL, right-adjusted. Using the special .PCH file, execution is stopped earlier, so the problem is avoided. For a reader who might believe that the remedy is more extreme than necessary, note that following data cards represent simulation (not supporting program) data. Reading and discarding it would require new logic that your Editor did not want to write.

Estimate Actual Table Sizes

DC-68 produced the most confusing change --- during simulation of that final (9th of 9) subcase that involves MODELS as originally used by Rod Price. Although output signals (printout of the dT loop) are identical, the use of EATS resulted in 3 additional warning messages that have not been seen since associated writing for the January, 2001, newsletter. The first of these 3 messages

follows: *"October 2000 correction to compensation has modified the solution. In OVER16, BUSJ, N2, N10, T = CR20A 1 2 2.0000000E-02"* Recall code was changed to correct the handling of data from Steve Nurse of Reyrolle in England. Your Editor has no idea how or why EATS suddenly has made this difference. But unless and/or until some signal of consequence is affected, the 3 extra output lines are being ignored. Some days later, the first testing of DCNEW-16 revealed two more copies of this same warning. Once again, no output signal was affected, so it is not obvious that a practical problem exists.

Testing of RUNEATS.BAT ended at home on June 26th when the last of standard test cases was reconciled. At that point, there really was no need for a separate command file. The original big old RUNEATS was replaced by a new one containing just 4 lines :
```
CALL EATSON.BAT
CALL RUN.BAT
CALL EATSOFF.BAT
CALL FCEATS
```
The final line is the same as FCSALFOR except that .SAL generally (for comparison of .LIS files) has been replaced by .EAT Resulting DIFF.LIS has size 27821 exactly as it did for RUN.BAT

Error termination within EATS has been eliminated wherever the associated erroneous data is not essential to the counting. This is the theory, anyway. To illustrate, consider two examples. First, an error termination that has **not** been eliminated is KILL = 78 near S.N. 1633. This traps non-positive line length of a constant-parameter, distributed line. Without a valid (positive) length, it is impossible to determine the amount of past history (the burden on List 8). So, this error termination must remain. Contrast this with KILL = 224 near S.N. 8212, which is used if the two terminal nodes of a switch are the same. While such a degenerate connection would serve no useful engineering purpose, neither would it interfere with counting, so the associated halt within EATS has been eliminated. Of course, any error termination that might be missing in EATS should be triggered during the subsequent data input following the re-sizing of tables. Thus no error termination has been overlooked. Rather, some merely have been delayed. Where not necessary, redundancy has been removed to minimize code and speed execution (for the more common case of data without errors).

Branch Data Input Restructured

One line of INNONL was removed July 29th to handle a small data case named DS004.DAT from Orlando Hevia of UTN in Santa Fe, Argentina. Circumstances are documented on 3 comment cards that mention this disk file. About data, a Type-98 element with no phasor solution was involved. Although not excited, a voltage across this branch appeared on the first time step. Mr. Hevia wrote as follows on July 25th: *"I send you a case with strange*

results. The case was sent by a user from Colombia. It has a single phase STC, with capacitances between buses and from buses to ground. The model is bad for lightning studies, but the results are amazing ..." It might be mentioned that your editor attempted without success to add a disconnected Type-98 element to an existing test case in order to demonstrate correction of the problem. The following subcases involve no phasor solution, yet failed to produce the hoped for nonzero voltage prior to the change: DC-3a, 37c, 38a, 55a, and 55b. So, it is not clear what was necessary for the error to appear. Data **was** extremely simple (just two nodes, plus ground). Another detail should be understood: it never was proved that the error was caused by input data restructuring. This is just a reasonable assumption (hence the story title) in spite of the age of the code line, which carried an "M28." UTPF ident dating to the early '80s. A second occurrence of this same error subsequently was located by Mr. Hevia within SUBR3. His E-mail dated August 1st reported that this second omission corrected comparable trouble involving a saturable TRANSFORMER (which includes a Type-98 element as a sub-component, of course).

Interactive Plotting Programs

GTPPLOT is the interactive plotting program from Orlando Hevia of UTN in Santa Fe, Argentina. Progress that was begun in the preceding issue continues. Tenth, from a summary dated 15 April 2001: 16) The Pisa format of ATP was improved (see the July, 2001, issue), and GTPPLOT was modified accordingly. 17) The scale for Fourier of HFS cases was enhanced; and 18) The zero frequency component was added to the PQF table. Eleventh, from a summary dated May 1st: 19) The keys "$" and "/" were added as synonyms for "#". These are easier using Spanish keyboards; 20) The key "?" was added as a synonym of HELP; and 21) X- and Y-axis scaling was improved. Twelfth, from a summary dated June 12th: 22) Newer DISLIN version 7.5 is being used; and 23) Small improvements were made to axis labeling. Thirteenth, from a summary dated August 28th: 24) Text output of the DICE command was enhanced. Fourteenth, from a summary dated September 6th: 25) The DICE command allows an optional, trailing file name for output; 26) Statistical values were added to cumulative statistical plots; and 27) A statistical plot will be drawn only with symbols if NOSYMBOL = 0. Fifteenth, from a summary dated September 30th: 28) The command PARAM was added to plot the results of parameters as a function of frequency. Input is read from ATP output of supporting programs CABLE CONSTANTS, CABLE PARAMETERS, LINE CONSTANTS, JMARTI SETUP or SEMLYEN SETUP. The appropriate file name for input data can be specified as part of the PARAM command, or it can be selected from a list of alternatives. Sixteenth, from a summary dated October 10th: 29) The command DIBCLP was added. It allows drawings of cross-sections of the raw data of CABLE CONSTANTS, CABLE PARAMETERS and LINE CONSTANTS. The file name is specified as for PARAM. Seventeenth, from a summary dated December 2nd: 30) Spanish accented and diaeresis vowels and n with a tilde above it are allowed in titles. This feature requires the CMPLX font. Special German characters are allowed, too, using any font; 31) For statistical graphics, an analytical curve having Gaussian distribution can be drawn using the user-specified mean and standard deviation. Eighteenth, from a summary dated 15 December 2001: 32) Both BARCHART and FOURIER plots can deal with subharmonics and interharmonics; 33) PPM (Portable PixMap) format was added as an optional output that is controlled by variable NOPPM in gtpplot.ini; 34) PDF (Portable Description File) format was added as an optional output that is controlled by variable NOPDF. Either landscape or portrait orientations are allowed, and the same choice was added to PostScript output; 35) The PQI calculation and the format of output to the .log file were improved. Nineteenth, from a summary dated 20 January 2002: 36) The command PHASOR was added to plot steady state solutions as phasors. The following sub-commands are allowed ... plots will be in phasornn.ext disk files. Twentieth, from a summary dated February 10th: 37) Newer DISLIN version 7.6 now is being used, and it corrects PostScript output of the Linux alternative; 38) BMP (Windows Bit Map) format was added, as controlled by NOBMP. Twenty first, from a summary dated March 10th: 39) New variable NOTIT of gtpplot.ini either enables (value 0) or disables (value 1) the three title lines of ASCII widenn output of the RELAY command; 40) The new variable KPHASOR of gtpplot enables (1) or disables (0) the division by sqrt(2) of phasor quantities prior to PHASOR plots. Twenty second, from a summary dated April 8th: 41) COMTRADE configuration files use floating point format not exponential / scientific format. (see paragraph involving Multi-amp in the October, 1995, issue). Twenty third, from a summary dated April 20th: 42) The PSS command was added. All the variables are sent to a PSSPLT-compatible ASCII file where PSSPLT is the plotting program of PSS/E 26 by Power Technologies Inc. (PTI); 43) The PSS ASCII format was added to input formats. ... the file file.pss will be converted to file.pl4, PISA-formatted.

Miscellaneous Intel PC Information

Slow copying of files from that old, Szymanski-supplied AT&T 486 (see the October issue) surprised Laszlo Prikler in Budapest. His E-mail dated August 22nd summarized a much better solution: *"If it were my problem, I would have tried a parallel or series cable and Laplink software (only DOS is needed). You need only a cable connected to the printer port or RS232 port of both PCs and you can make file transfer between them easy and quite fast --- much faster than using floppy disks and manpower ... It is even possible to install the software remotely via the cable (if*

you have no working floppy on that old machine). I routinely used this procedure for transferring large amounts of data to an old notebook having neither CD nor netcard installed."

DVD is a new storage technology that is worthy of summary explanation if only because eventually DVD might threaten CD use in PCs. This seems to be a case where the motion picture industry might drive the computer industry just as the audio recording industry did a decade ago with the CD. DVD indicates *Digital Video Disc*, which is rapidly replacing the video cassette (tape) for movies. *"Revolt in the den ..."* is the title of a *New York Times* story by Rick Lyman dated August 26th, and this contains some impressive statistics about DVD growth: *"Some recent hit films ... have earned more money from their DVD releases than from their first-run theater engagements. And for the first time, DVD sales have surpassed those of videocassettes, even though DVD players are in only about a third of American households, compared with a saturation of more than 90 percent for videocassette players. In the face of this, American retailers have shown the first major signs of making a permanent shift to DVD's from videocassettes, much as they did to CD's from vinyl albums a decade ago."* Quality seems to be the driving motivation: *"DVD's, which are a vast improvement in quality over cassettes and have many more features --- director commentary, for instance, or alternating endings --- are also changing the way that millions of Americans actually watch movies at home. The enhanced video and audio qualities are nudging more people toward elaborate home-theater systems. The digital nature of DVD allows viewers to pop in a disc and watch only one or two favorite moments instead of a whole film ... changing movie watching from a linear experience to a more interactive one."* As always, declining price provides added incentive: *"Few predicted how quickly the price of DVD players would drop. They typically cost between $600 and $700 in 1997 and now go for $150 to $160, with some retailers last Christmas offering players for as low as $79."* This unusually fast decline of price is explained by *"entry of Chinese manufacturers into the DVD player market in the last two years. That forced the Japanese to slash their prices. ..."* To conclude, DVD drives are appearing in PCs. For now, this seems to be almost exclusively read-only. But if CD history is a guide, can writing be far behind?

"PC makers hit speed bumps; being faster may not matter" is the title of a *New York Times* story dated September 30th. Your Editor is not alone in asking questions (see the October, 1991, issue) such as: Why upgrade? Why more power? For decades, the story in *The Times* explains, PC makers *"relied on the certainty that customers have an unquenchable desire for speedier new machines. But computers have reached a point where for the most common home purposes --- Web surfing, e-mail and word processing --- they are already more than fast enough to suit a typical home user's needs."* What

made more sense to one user? *"more memory, a new digital camera and a CD-ROM burner."* The industry is worried. Sales of PCs are more depressed than the general economy: *"More than any other time in its 27-year history, the personal computer industry has found itself in a quandary, having to concoct new reasons to persuade the world's 500 million PC owners to replace their existing machines."* A poll by Odyssey Ventures indicates that *"among households with PC's, the intention to buy a new computer in the next six months has fallen to just 11 percent from 21 percent in early 2000 and the lowest level in five years. And half of PC owners now have home computers that are at least two years old --- more than at any time since 1994, when Odyssey began keeping track."* Yes, well, your Editor's 133-MHz Pentium from Szymanski is half way through year 7, and it continues to work just fine for ATP. Of course, the industry hopes for some revolutionary new software that will make new PCs more important. It has worked before, but might this time be different? *"So far, innovative new software to spur big new sales has not materialized. ... Gartner estimates that the industry's sales shrank last year by almost 5 percent after growing by 10 percent to 27 percent annually since 1990. This year promises to be just as bleak."*

Miscellaneous Small Items

VERIFY U.M. COMPENSATION (VUMC) was mentioned in the January, 2002, issue along with STEP ZERO COUPLE (SZC), and these two requests are discussed in the 6th subcase of DCNEW-16. Beginning August 27th, these two optional requests are mentioned in a new error termination of OVER16 that provides additional protection against faulty compensation. The problem is potentially more serious and confusing than originally thought at the time of VUMC introduction. The first hint of trouble came in E-mail of the EEUG list server dated August 22nd. In this, Alejandro Montenegro at the University of Florida asked a general question that ended: *"The problem appears when I combine TACS-controlled Type 13 switches, Type 94 components and UM type 3."* Orlando Hevia studied the problem first, and privately reported two days later: *"I send you a case from a user (Alejandro Montenegro ...). The case aborts using Salford, Watcom and GNU ATP."* Yes, your Editor found that execution of any version would die on step 35K of TSUM simulation because of switching that led to erroneous compensation. Whereas DCNEW-16f merely produced wrong answers, TSUM produced a tight loop with ever-increasing index of Z-thev. Eventually, the OS interrupted execution. MS Windows is bad because it provides no hint as to the cause. At least Salford DBOS suggested trouble indexing: after a pause of several seconds, DBOS reported *"page memory exhausted."* The new error stop traps any such bad subscript : *"... Compensation is in error. ... If U.M. is involved, try adding VERIFY U.M. COMPENSATION or STEP ZERO*

COUPLE ..." A new 11th data subcase was added to DCNEW-16 to illustrate such use. Data is as simple as your Editor could make it: no time steps, no distributed line, no saturable TRANSFORMER, no switch, no TACS, and no MODELS. The Type-94 branches were converted to Type-93 nonlinear inductors, and the original motor was replaced by Bonfanti's as used in the 3rd subcase. The same excessive subscript of Z-thev was trapped.

Real-time simulation was discussed again using the EEUG list server. This began August 21st when Zainul Arif Bin Mohamed at Universiti Teknologi Malaysia asked: *"I'm trying to use the ATP software in Linux machine in cluster configuration (a number of computers connected together with high speed switching). The problem is that F77 doesn't support multi-processor and distributed computing."* Your Editor responded the following day: *"What realistic simulation would require speed in excess of what is readily available in a single, conventional PC? Certainly real-time simulation comes to mind, and this has been mentioned in several issues of the newsletter (most recently, the April issue). ... Until now, no one has expressed interest. Even if the university in Malaysia might already have the hardware, the need for an appropriate compiler might remain. ... Orlando Hevia of UTN in Santa Fe, Argentina, wrote some thoughts about the compiler earlier this morning: ..."* Next to respond was Stu Cook of JUST Services, who privately provided an update on his own use of Apple Macintosh. The plan is to try *"new Mac OSX which is based on Unix -- generally the FreeBSD flavour. As at present, I expect to be using the AbSoft compiler. ... At some point in the future ... I will be getting a new PowerMac and it will have dual processors."* To other moderators, Laszlo Prikler offered the most interesting information about compilers. Orlando Hevia had suggested that *"Intel compiler price is 600 $USA."* But Prof. Prikler *"found a more economical one :>) : 0 US$ and no time limit: Under page http://www.intel.com ... I read this: 'This page provides a download copy of the Intel® Fortran Compiler 6.0 for Linux* for non-commercial purposes, and has no timeout on the license. The non-commercial license allows you to register for Intel Premier Support, but does not guarantee the timely support and product updates that we provide for commercial customers' ..."*

GIFU switch logic of OVER16 has been changed once again --- most recently on November 3rd to correct the treatment of data from Prof. Tsuyoshi Funaki of Kyoto University in Japan. A new 9th subcase of DCNEW-17 was added to document the improvement. What Prof. Funaki had observed was this problem: a Type-13 TACS-controlled switch was being treated differently when the two terminal node names were interchanged. Yet, there is no directionality to the Type-13 switch, so there should be no difference in the solution other than a change of sign for the branch voltage and current in question. The trouble was traced to this fact: the Type-13 switch was a

GIFU switch, and its status was being changed as part of the GIFU experimental step. This should never occur. GIFU logic should have no power over a Type-13 switch, which is controlled only by TACS. So, that was the correction : exempt any Type-13 switch from possible change during the GIFU experimental step. Why was this trouble not noted previously? The polarity of the current was being checked, and only half the time would this be in the wrong direction. Of course, polarity is critical for a diode or thyristor.

A series R-L-C branch that is short-circuited should have been prohibited. This would be if the 2A6 terminal node names BUS1 and BUS2 are the same; it is not a prohibition on the shorting of any branch through one or more closed switches. A KILL = 239 error message should warn the user that such use *"makes no physical or engineering sense ..."* Yet, such protection was not present for the first branch of a network as first reported by Orlando Hevia of UTN in Santa Fe, Argentina. After some study, your Editor reported as follows on November 5th to Messrs. Hevia, Prikler, and Hoidalen (the troubled data seems to have been created using ATPDraw): *"being the first branch is not necessary. But it was sufficient (what you guys were observing). ... To demonstrate the problem as a 2nd or later branch, simply use a name that has not yet been defined."* The previous day, an addition was made to GETBUS. But November 6th, another addition was made to suspend the protection during CASCADE LINE data input. This was found to be necessary to avoid modification of the DC-9 solution.

HEIDLER SURGE FUNCTION was not illustrated in standard test cases prior to November 16th when Orlando Hevia's HEIDLER.DAT was appended to DC-13 as a new 11th subcase. This is the Heidler equivalent of STANDLER SURGE FUNCTION as explained in the January, 2001, newsletter. The end of this old story mentioned that Heidler probably would follow, and it did. Yet, no mention could be found in newsletters, and no standard test case illustrated use. Your Editor's work on the *Rule Book* revealed this shortcoming. At the same time, the 3rd subcase of DC-19 was modified to include integer N for in-line Heidler use. This is for node HEID2. Mr. Hevia had written: *"GNU version will allow N ... I don't know if this enhancement is in the universal code."* So, in addition to the original 4 floating-point parameters, there now is integer N, which has value 5. The resulting simulation is unchanged (is this right?) .

TWO EXP SURGE FUNCTION was not illustrated in standard test cases prior to November 16th when Orlando Hevia's TWOEXP.DAT was appended to DC-13 as a new 12th subcase. This is one of the simpler extensions as mentioned at the end of the Standler story in the January, 2001, newsletter. The capability was provided rapidly enough, although no standard test case illustrated usage. Your Editor's work on the *Rule Book* revealed this shortcoming.