The Twentieth ACM
North American Computer Chess Championship

Reno, Nevada
November 12-15, 1989
A Special Event at the Supercomputing '89 Conference

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......1973 Atlanta: CHESS 3.5...........1974 San Diego: RIBBIT.........................1975 Minneapolis: CHESS 4.4, 
......1988 Orlando: DEEP THOUGHT
Welcome and Overview

This tournament marks the twentieth consecutive year that the ACM has organized the ACM North American Computer Chess Championship. Beginning in 1970, these tournaments have served as a historical record of progress in this most exciting area of artificial intelligence research. During these twenty years, programs have improved from the level of rank club players to among the best in the world; their USCF-equivalent ratings going from approximately 1600 to 2600! These ACM championships have served as a catalyst for some of this progress.

It was David Slate, Larry Atkin, and Keith Gorlen's program, CHESS 3.0, then 3.2, 3.5, 4.0, 4.5, and finally 4.9 that dominated the ACM tournaments throughout the 70's. RIBBIT, developed at Waterloo University by a team of students — Ron Hanson, Russell Crook, and Jim Parry — surprised everybody when it upset the Northwestern program at ACM '75, but except for that year, versions of the Slate, Atkin, and Gorlen's program won all the ACM tournaments from 1970 through 1977.

Ken Thompson and Joe Condon's BELLE, using special purpose hardware, upset CHESS 4.7 in 1978, but the later came back in 1979 and won its last ACM tournament. 1980-1982 were the years that BELLE dominated. BELLE was awarded the title of US Master in 1983. Just when BELLE seemed unbeatable, Robert Hyatt, Harry Nelson and Bert Gower's CRAY BLITZ upset Thompson and Condon’s protégé in the World Championship (held in New York in place of the usual NACC). CRAY BLITZ repeated at ACM '84. However, HITECH came to ACM '85 in Denver and performed at a new level of strength. Developed at Carnegie-Mellon University by Carl Ebeling, Hans Berliner, Any Goetsch, Andy Gruss, and Murray Campbell, HITECH used special-purpose circuitry designed by Ebeling. Berliner served as head of the team. In 1986, HITECH passed up defending its ACM title, and BELLE came out of retirement to capture first place.

For the last two years, DEEP THOUGHT has dominated the ACM championships, and it is threatening to do so again this year. DEEP THOUGHT was developed at Carnegie-Mellon University by Feng-Hsiung Hsu, Murray Campbell, Thimas Anantharaman, Peter Jansen and Andrew Nowatzky. It searches approximately 2,000,000 chess positions per second, ten times as many as any other program. DEEP THOUGHT seems to be playing chess at the Grandmaster level. It played a two game match against Gary Kasparov in New York just several weeks ago with Kasparov decisively winning both games. The match was held at the New York Academy of Art on October 22, 1989, organized by Shelby Lyman. Kasparov, in an interview just prior to the start of the match, gave DEEP THOUGHT credit for playing at the 2480-2500 FIDE level.

But DEEP THOUGHT will find that its competition is far from giving up the race. HITECH, CRAY BLITZ, and MEPHISTO X are the main challengers, but PHOENIX and BEBE can also be expected to put in strong performances.

This year's tournament offers $5000 in prizes. The prize to the winner is $2500, second place is worth $1500, and the third place finisher will earn $1000. In addition to the cash prizes, trophies will be awarded to the first three finishers. A special trophy will be given to the "Best Small Computing System."
A Technical Session will be held on Tuesday afternoon from 3:30pm-5:30pm chaired by Tony Marsland. The topic of the session will be endgame play by computers. Once upon a time computers played particularly bad endgames, but this is no longer the case. Panelists include Hans Berliner, Robert Hyatt, Feng-hsuing Hsu, David Levy, Monty Newborn, Jonathan Schaeffer, and Tony Scherzer.

David Levy will serve as Tournament Director. David is returning after almost a decade layoff, replacing Mike Valvo. David served as TD for the first time in 1971, continuing into the early 1980s when his programs began to compete. He will be assisted by Tony Marsland and Monty Newborn.

Attending as our Honored Guest is Ben Mittman. Ben was head of Northwestern University's Vogelback Computing Center during the years that Slate, Atkin, and Gorlen dominated the ACM events. From 1971 through 1983, Ben and I organized the tournaments together. From 1977 through 1983, Ben served as the first president of the International Computer Chess Association.

I would like to extend our thanks to the Reno Chess Club, and to its president, Gerry Weikel, for the help they have provided us in running this event.

This is the second year that we have been affiliated with the Supercomputing conference. Last year, Supercomputing '88 hosted us in Orlando, this year it's Reno, and next year we are scheduled to be a part of Supercomputing '90 in New York City. I would like to express our appreciation to Supercomputing '89 for having us as part of their program.

In ending, I want to thank the participants for coming here. I wish them good luck, and I hope the audience enjoys watching one of the greatest shows on earth.

Monty Newborn
Chairman, ACM Computer Chess Committee

Hans Berliner
Tony Marsland
Kathe Spracklen
Ken Thompson
Committee Members
Important Times and Places

1. Schedule of Rounds (All games are played in the Goldwyn Pavilion)
   Round 1:  1:00 PM        Sunday        November 12
   Round 2:  7:30 PM        Sunday        November 12
   Round 3:  7:00 PM        Monday       November 13
   Round 4:  7:00 PM        Tuesday      November 14
   Round 5:  7:00 PM        Wednesday    November 15

2. Technical Session: Endgame Play by Computers, Tuesday, November 14 at 3:30PM. The moderator is Tony Marsland.

3. ICCA Meeting: Tuesday, November 14 at 6:00 PM in the Goldwyn Pavilion.

4. ACM Computer Chess Committee Meeting: Wednesday Luncheon, November 15, 1:00 PM.


6. Awards Presentation: Thursday Luncheon, Nov. 16 at 12:00 PM. (Location to be announced)
   Awards: First Place.......................... $2500 and Trophy
             Second Place.......................... $1500 and Trophy
             Third Place........................... $1000 and Trophy
             Best Small Computing System........ Trophy

   Tournament Director: David Levy (with Tony Marsland & Monty Newborn serving as assistants.)

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The ACM Computer Chess Committee

In 1979, the ACM established the Computer Chess Committee as a standing committee on the Management Board. The committee was given the responsibility of organizing computer chess activities with the ACM. In 1984, the committee was transferred to the Conferences Board where it is today. The main function of the committee is to organize the ACM's Annual North American Computer Chess Championship. The tournament has been held annually since 1970. The current committee members are Monty Newborn, Chairman, Hans Berliner, Tony Marsland, Kathe Spracklen, and Ken Thompson.
Information on Participants

**BEBE**

**BP**
Robert Cullum, P. O. Box 111, Prospect Heights, Illinois, 60070.

**CRAY BLITZ**
Robert Hyatt, Harry Nelson, Alburt Gower, c/o RH, Computer and Information Science Department, Campbell Hall, University of Alabama at Birmingham, Birmingham, ALabama, 35294.

**DEEP THOUGHT**
Thomas Anantharaman, Mike Browne, Murray Campbell, Feng-hsiung Hsu, and Andreas Nowatzyk, c/o FH, IBM T. J. Watson Research Center, P. O. Box 704, Yorktown Heights, New York 10598.

**HITECH**
Carl Ebeling, Hans Berliner, Gordon Goetsch, Murray Campbell, Gruss, and Andy Palay, c/o HB, Department of Computer Science, Carnegie-Mellon University, Pittsburgh, Pennsylvania 15213.

**MEPHISTO X**
Richard Lang, Hegener & Glaser A. G., Arnulf Street #2, 8000 Munich 2, West Germany.

**NIGHTMARE**
Reinhold Gellner, Gaby von Rekowski, Bohnenkampstrasse 12, D-4500 Osnabrueck, West Germany.

**NOVAG X**
David Kittinger, 5965 Arbon Drive, Mobile, Alabama 36608.

**REBEL 89**
Ed Schroeder, c/o Hegener & Glaser A. G., Arnulf Street #2, 8000 Munich 2, West Germany.

**SUN PHOENIX**

**ZARKOV**

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On Standby:

**BELLE**
Ken Thompson and Joe Condon, c/o KT, Room 2C519, Bell Laboratories, Murray Hill, New Jersey 07974.
## Computing System Information

<table>
<thead>
<tr>
<th>Program</th>
<th>Computing system, language, etc. (* indicates computer at site)</th>
<th>Book size</th>
<th>Nodes/sec.</th>
<th>Rating estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEBE</td>
<td>SYS-10 Chess Engine, assembler 65Kb, 16 bits, 10 mips.*</td>
<td>5K</td>
<td>40K</td>
<td>2150</td>
</tr>
<tr>
<td>BELLE</td>
<td>Special Chess hardware, C (Bell Laboratories, Murray Hill)</td>
<td>200K</td>
<td>140K</td>
<td>2250</td>
</tr>
<tr>
<td>BP</td>
<td>Compaq 386/20, C+assembler 1Mb, 32 bits, 5 mips, 300K hash table*</td>
<td>15K</td>
<td>600</td>
<td>2050</td>
</tr>
<tr>
<td>CRAY BLITZ</td>
<td>Cray XMP 48, Fortran+C+assembler 8 Mw, 64 bits, 105 mips/proc., (Lawrence Livermore National Lab.)</td>
<td>60K</td>
<td>80K</td>
<td>2373</td>
</tr>
<tr>
<td>DEEP THOUGHT</td>
<td>SUN 4 plus 6 special processors, C+microcode, 1 Meg hash table (Carnegie-Mellon Univ)</td>
<td>5K</td>
<td>2000K</td>
<td>2551</td>
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<tr>
<td>HITECH</td>
<td>SUN 4 with special hardware, assembler (Carnegie-Mellon University)</td>
<td>NA</td>
<td>100K</td>
<td>2413</td>
</tr>
<tr>
<td>MEPHISTO X</td>
<td>68030 Mephisto machine, assembler 128k ROM, 32bit, 2meg hash table.*</td>
<td>60K</td>
<td>10K</td>
<td>2350FIDE</td>
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<tr>
<td>NIGHTMARE</td>
<td>IBM PC compatible, C*</td>
<td>15K</td>
<td>2K</td>
<td>NA</td>
</tr>
<tr>
<td>NOVAG X</td>
<td>6502 dedicated hardware, assembler 64K, 8 bits, 4 mips.*</td>
<td>4K</td>
<td>4K</td>
<td>2164</td>
</tr>
<tr>
<td>REBEL 89</td>
<td>6502 bit slice processor, assembler 48K, 8 bits.*</td>
<td>NA</td>
<td>4K</td>
<td>2250</td>
</tr>
<tr>
<td>SUN PHOENIX</td>
<td>5-7 Sun 4s, C (Carnegie-Mellon University)</td>
<td>8K</td>
<td>10K</td>
<td>2150</td>
</tr>
<tr>
<td>ZARKOV</td>
<td>Hewlett-Packard 9000/835, C 48Meg, 32 bit, 10 mips (HP, Fort Collins, Colorado)</td>
<td>5K</td>
<td>3K</td>
<td>2200</td>
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### Score Table

<table>
<thead>
<tr>
<th>Team</th>
<th>Rounds</th>
<th>Total Points</th>
<th>Final Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. BEBE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. BELLE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. BP</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4. CRAY BLITZ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. DEEP THOUGHT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. HITECH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. MEPHISTO X</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>8. NIGHTMARE</td>
<td></td>
<td></td>
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<tr>
<td>9. NOVAG X</td>
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<td></td>
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</tr>
<tr>
<td>10. REBEL89</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. SUN PHOENIX</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. ZARKOV</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Number under the name of each participant is its rating as provided on the entry form. All ratings are USCF unless noted otherwise.

**Code:**
- Square: Number of points
- Number and color of opponent
Tournament Rules

1. Each entry is a computing system and one or more human operators. A listing of all chess-related programs running on the system must be available on demand to the TD. Each entry requires at least one full-time operator (i.e., one operator cannot assist with more than one entry).

2. Participants are required to attend an organizational meeting at 12 noon on November 12 for the purpose of officially registering for the tournament. Rules will be finalized at that meeting. The TD has the right to choose an alternate to replace an entrant who fails to appear.

3. The tournament is a five round Swiss style tournament. The first and second rounds will be played Sunday November 12 at 1:00 PM and 7:30 PM respectively. The third round is scheduled for Monday, November 13 at 7:00 PM, the fourth round for Tuesday November 14 at 7:00 PM, and the final round for Wednesday November 15 at 7:00 PM.

4. Trophies and prizes will be awarded to the first three finishers. The order of finish will be determined by the total number of points earned. If two or more teams have an equal number of points, they will be considered as tied, and the trophies and prizes divided accordingly. A prize of $2500 will be awarded to the program which finishes the tournament with the most points, $1500 to the second most, and $1000 to the third most. A trophy will be awarded to the "Best Small Computing System."

5. Unless otherwise specified, rules of play are identical to those of "human" tournament play. If a point is in question, the TD has the right to make the final decision.

6. Games are played at a speed of 40 moves per player in the first two hours and 20 moves per player per hour thereafter.

7. The TD has the right to adjudicate a game after six hours of total clock time. The adjudication will be made on the premise that perfect chess will be played by both sides from the final position. Every effort will be made by the TD to avoid adjudication. In particular, the second round will not begin until 8:00 p.m. on Sunday, if necessary to avoid adjudicating a first-round game. A game will be adjudicated in the final round after 8 hours of play if the result of the game has no bearing on the order of the top three finishers.

10. An operator may ask that the TD stop the clock at most twice during the course of a game because of technical difficulties. The clock must be restarted each time after at most 15 minutes. If an operator using a remote computer can clearly establish that his problems are not in his own computing system but in the communication network, the TD can permit additional time-outs.

11. If a program experiences technical difficulties, the operator can ask the TD for permission to restart the program. When restarting a program after a failure of any kind, the operator must reset all parameters to their values at the time the game was interrupted. An operator error made when starting a game or in the middle of a game can be corrected only with the approval of the TD.
12. If an operator types in an incorrect move, the TD must be immediately notified. The clock will be stopped. The game must then be backed up to the point where the error occurred. The clock of the side which made the error is left unchanged while the TD will back up the clock of the other side an amount equal to that lost. The TD may back up the clock of the side in error if it would otherwise force that side to lose the game on time, or leave it with less than two minutes per move until the next time control. In this case, the TD will back up the clock of the side in error to give it an average of two minutes per move until the next time control. If no record is available, the TD will assume each move by the side not in error required three minutes. Both sides may adjust program parameters after such an error with the approval of the TD. The TD may not allow certain parameters to be changed, e.g., the contempt factor.

13. Terminals located at the tournament site must communicate directly with remote computers, i.e., there cannot be any human intermediary at the remote location.

14. Each team that uses a terminal must position the terminal on the game table in such a way that the opponent has a good view of it. An operator can only (1) type in moves and (2) respond to request from the computer for clock information. If an operator must type in any other information, it must be approved ahead of time by the TD. (This might happen if there is noise on the communication line and, for example, a CR must be typed to clear the line.) The operator cannot query the system to see if it alive without permission of the TD.

15. A team must receive the approval of the TD to change from one computing system to another.

16. Each game is officially played on a chess board provided by the Tournament Committee. The official clock is also provided by the Tournament Committee.

17. At the end of each game, each team is required to turn in a game listing to the TD.
### History of Major Tournaments

**ACM North American Computer Chess Championships**

<table>
<thead>
<tr>
<th>Year</th>
<th>City</th>
<th>Winner</th>
<th>Runner-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>New York</td>
<td>CHESS 3.0; Slate, Atkin, Gorlen, CDC 6400</td>
<td>DALY CHESS PROGRAM; Daly, King, Varian 620/i</td>
</tr>
<tr>
<td>1971</td>
<td>Chicago</td>
<td>CHESS 3.5; Slate, Atkin, Gorlen, CDC 6400</td>
<td>TECH; Gillogly, PDP 10</td>
</tr>
<tr>
<td>1972</td>
<td>Boston</td>
<td>CHESS 3.6; Slate, Atkin, Gorlen, CDC 6400</td>
<td>OSTRICH; Arnold, Newborn, DG Supernova</td>
</tr>
<tr>
<td>1973</td>
<td>Atlanta</td>
<td>CHESS 4.0; Slate, Atkin, Gorlen, CDC 6400</td>
<td>TECH II; Baisley, PDP 10</td>
</tr>
<tr>
<td>1974</td>
<td>San Diego</td>
<td>RIBBIT; Hansen, Crook, Parry, Honeywell 6050</td>
<td>CHESS 4.0; Slate, Atkin, CDC 6400</td>
</tr>
<tr>
<td>1975</td>
<td>Minneapolis</td>
<td>CHESS 4.4; Slate, Atkin, CDC Cyber 175</td>
<td>TREEFROG; Hansen, Calnek, Crook, Honeywell 6080</td>
</tr>
<tr>
<td>1976</td>
<td>Houston</td>
<td>CHESS 4.5; Slate, Atkin, CDC Cyber 176</td>
<td>CHAOS; Swartz, Berman, ALEXander Ruben, Toikka, Winograd, Amdahl 470</td>
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<tr>
<td>1977</td>
<td>Seattle</td>
<td>CHESS 4.6; Slate, Atkin, CDC Cyber 176</td>
<td>DUCHESS; Truscott, Wright, Jensen, IBM 370/168</td>
</tr>
<tr>
<td>1978</td>
<td>Washington</td>
<td>BELLE; Thompson, Condon, PDP 11/70 with chess hardware</td>
<td>CHESS 4.7; Slate, Atkin, CDC Cyber 176</td>
</tr>
<tr>
<td>1979</td>
<td>Detroit</td>
<td>CHESS 4.9; Slate, Atkin, CDC Cyber 176</td>
<td>BELLE; Thompson, Condon, PDP 11/70 with chess hardware</td>
</tr>
<tr>
<td>1980</td>
<td>Nashville</td>
<td>BELLE; Thompson, Condon, PDP 11/70 with chess hardware</td>
<td>CHAOS; Alexander, O'Keefe, Swartz, Berman, Amdahl 470</td>
</tr>
<tr>
<td>1981</td>
<td>Los Angeles</td>
<td>BELLE; Thompson, Condon, PDP 11/23 with chess hardware</td>
<td>NUCHESS; Blanchard, Slate, CDC Cyber 176</td>
</tr>
<tr>
<td>1982</td>
<td>Dallas</td>
<td>BELLE; Thompson, Condon, PDP 11/23 with chess hardware</td>
<td>CRAY BLITZ; Hyatt, Gower, Nelson, Cray 1</td>
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<tr>
<td>1983</td>
<td></td>
<td>Not held as the ACM's North American Computer Chess Championship that year but as the Fourth World Championship. See information above on this championship.</td>
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<tr>
<td>1984</td>
<td>San Francisco</td>
<td>CRAY BLITZ; Hyatt, Gower, Nelson, Cray XMP/4</td>
<td>BEBE; Scherzer, Chess Engine, and FIDELITY EXPERIMENTAL; Sparcklen, Spracklen, Fidelity machine</td>
</tr>
<tr>
<td>Year</td>
<td>City</td>
<td>Winner</td>
<td>Runner-up</td>
</tr>
<tr>
<td>------</td>
<td>----------</td>
<td>------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1985</td>
<td>Denver</td>
<td>HITECH; Ebeling, Berliner, Goetsch, Paley Campbell, Slomer, SUN w/ chess hardware</td>
<td>BEBE; Scherzer, Chess engine</td>
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<tr>
<td>1986</td>
<td>Dallas</td>
<td>BELLE; Thompson, Condon, PDP 11/23 with chess hardware</td>
<td>LACHEX; Wendroff, Cray X-MP</td>
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<td>1987</td>
<td>Dallas</td>
<td>CHIPTEST-M; Anantharaman, Hsu Campbell, SUN 3 with VLSI chess hardware</td>
<td>CRAZY BLITZ; Hyatt, Nelson, Gower Cray XMP 4/8</td>
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<tr>
<td>1988</td>
<td>Orlando</td>
<td>DEEP THOUGHT 0.02; Hsu Anatharaman, Browne, Campbell, Nowatzyk, SUN 3 w/ VLSI circuitry</td>
<td>CHESS CHALLENGER EXP; Spracklen, Spracklen, Nelson, Fidelity machine with Motorola 68030 microprocessor</td>
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### World Championships

<table>
<thead>
<tr>
<th>Year</th>
<th>City</th>
<th>Winner</th>
<th>Runner-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974</td>
<td>Stockholm</td>
<td>KAISSA; Donskoy, Arlazarov, ICL 4/70</td>
<td>CHESS 4.0; Slate, Atkin, CDC 6600</td>
</tr>
<tr>
<td>1977</td>
<td>Toronto</td>
<td>CHESS 4.6; Slate, Atkin, CDC Cyber 176</td>
<td>DUCHESS; Truscott, Wright, Jensen, IBM 370/165</td>
</tr>
<tr>
<td>1980</td>
<td>Linz</td>
<td>BELLE; Thompson, Condon, PDP 11/23 with chess circuitry</td>
<td>CHAOS; Alexander, Swartz, Berman O'Keefe, Amdahl 470/V8</td>
</tr>
<tr>
<td>1983</td>
<td>New York</td>
<td>CRAZY BLITZ; Hyatt, Gower, Nelson, Cray XMP 48</td>
<td>BEBE; Scherzer, Chess engine</td>
</tr>
<tr>
<td>1986</td>
<td>Cologne</td>
<td>CRAZY BLITZ; Hyatt, Gower, Nelson, Cray XMP</td>
<td>HITECH; Berliner, et al., SUN workstation with chess circuitry</td>
</tr>
<tr>
<td>1989</td>
<td>Edmonton</td>
<td>DEEP THOUGHT; Hsu, Anantharaman Browne, Campbell, Jansen, Nowatzyk, SUN 3 w/ VLSI circuitry</td>
<td>BEBE; Scherzer, Scherzer, Chess Engine</td>
</tr>
</tbody>
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### World Microcomputer Championships

<table>
<thead>
<tr>
<th>Year</th>
<th>City</th>
<th>Winner</th>
<th>Runner-up</th>
</tr>
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<tbody>
<tr>
<td>1980</td>
<td>London</td>
<td>CHESS CHALLENGER</td>
<td>BORIS EXPERIMENTAL</td>
</tr>
<tr>
<td>1981</td>
<td>Travemunde</td>
<td>FIDELITY X</td>
<td>CHESS CHAMPION MARK V</td>
</tr>
<tr>
<td>1983</td>
<td>Budapest</td>
<td>ELITE A/S</td>
<td>MEPHISTO X</td>
</tr>
<tr>
<td>1984</td>
<td>Glasgow</td>
<td>Four way tie: ELITE X, MEPHISTO S/X, PRINCHESS, PSION CHESS</td>
<td>MEPHISTO AMSTERDAM I</td>
</tr>
<tr>
<td>1985</td>
<td>Amsterdam</td>
<td>MEPHISTO AMSTERDAM I</td>
<td>MEPHISTO AMSTERDAM II</td>
</tr>
<tr>
<td>1986</td>
<td>Dallas</td>
<td>MEPHISTO DALLAS 3</td>
<td>FIDELITY &quot;2533&quot;</td>
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<tr>
<td>1987</td>
<td>Rome</td>
<td>MEPHISTO</td>
<td>CYRUS 68K</td>
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<tr>
<td>1988</td>
<td>Almeria</td>
<td>MEPHISTO</td>
<td>FIDELITY</td>
</tr>
</tbody>
</table>
Results of The Nineteenth ACM North American Computer Chess Championship

Monty Newborn and Danny Kopec

In 1987, it was called CHIPTEST-M. In 1988, with tongue in cheek and after a major overhaul, it was renamed DEEP THOUGHT 0.02. Whatever it is called, it plays tough chess! DEEP THOUGHT 0.02 won three and drew one of its four games and captured first place at The 19th ACM North American Computer Chess Championship held November 13-15, 1988 at ACM SIGARCH/IEEE Computer Society's Supercomputing '88 in Orlando, Florida. Also finishing with three-and-a-half points was CHESS CHALLENGER X. DEEP THOUGHT 0.02 was awarded first place based on a tie-breaking scheme that considers how well each program's opponents performed. The two programs divided the $2000 first-place prize.

DEEP THOUGHT 0.02 was developed at Carnegie Mellon University by a group of graduate students headed by Feng-hsiung Hsu which included Thomas Anantharaman, Mike Browne, and Murray Campbell. It uses special-purpose VLSI chess circuitry developed by Hsu, and it searches approximately 720,000 chess positions each second. In 1987, its predecessor, CHIPTEST-M won all four of its games in winning the championship. This year, the competition was stronger yet, and while DEEP THOUGHT 0.02 finished first, the road to the title was strewn with obstacles. In Round 1, it had to be happy to finish with a draw with CHESS CHALLENGER X. It had a rather easy victory against SUN PHOENIX in Round 2, and played a brilliant game against HITECH in Round 3. In Round 4, it looked as though it would be upset by MEPHISTO X in an exciting, grinding game, but the great power of DEEP THOUGHT 0.02's search finally overcame the excellent positional play of MEPHISTO X.

To put the strength of the programs into perspective, it is important to note that in the week following its success in Orlando, DEEP THOUGHT 0.02 finished in a first-place tie with Grandmaster Anthony Miles in the $130,000 Software Toolworks Chess Championship in Long Beach, California. In doing so, it defeated Grandmaster Bent Larsen who holds a World Chess Federation (FIDE) rating of 2580. It finished ahead of five other Grandmasters, including former World Champion Mikhail Tal, Sammy Reshevsky, and Walter Browne. (A comprehensive report on this tournament appears in the March 1989 issue of Chess Life.)

It was expected that DEEP THOUGHT 0.02 would receive its stiffest competition from HITECH, also developed at Carnegie Mellon under the leadership of former World Correspondence Chess Champion Hans Berliner, and the team of Carl Ebeling, Gordon Goetsch, Murray Campbell, Andy Gruss, and Andy Palay. HITECH uses special-purpose circuitry connected to a SUN 4. It searches approximately 150,000 chess positions per second. HITECH had finished first in the Pennsylvania State Championship both in 1987 and 1988, and its rating appeared to be over the 2400 United States Chess Federation (USCF) level. Anticipating a showdown between his program and DEEP THOUGHT 0.02, Berliner prepared a special opening for their encounter. It involved an old variation where White (DEEP THOUGHT 0.02) was given the opportunity to make a pawn sacrifice in return for sustained attacking chances. The opening proceeded as Berliner expected, but DEEP THOUGHT 0.02 took advantage of several passive moves made by HITECH just after leaving its book and defeated the latter in elegant style.

DEEP THOUGHT 0.02's strongest test came, in fact, in its Round 1 battle with CHESS CHALLENGER X. DEEP THOUGHT 0.02 was at a disadvantage throughout much of the game but hung on for a draw. CHESS CHALLENGER X, written by Dan and Kath Spracklen and Ron Nelson, is an experimental version of Fidelity International Inc.'s CHESS CHALLENGER series of products. It defeated CRAY BLITZ, the current World Champion, in the third round and HITECH in the final round showing that its success in the first round was far from an accident.

In the final round, DEEP THOUGHT 0.02 was paired with MEPHISTO X, programmed by Richard Lang. The program is an experimental version of the commer-
cially available series of programs developed by West Germany's Hegener and Glaser A.G., which use the name MEPHISTO. Hegener and Glaser's best commercial version of MEPHISTO is currently the World Microcomputer Champion. For most of the game, MEPHISTO X had a positional advantage, gradually constraining DEEP THOUGHT 0.02's pieces into a smaller and smaller space. However, DEEP THOUGHT 0.02 fought tenaciously and slowly turned the tables, emerging as victor on move 73. If there is one weakness which could be observed in MEPHISTO X's play, it was the inability to convert an opening or middlegame advantage into a decisive attack by opening up the position in the correct way.

As mentioned earlier, the current World Champion, CRAY BLITZ, lost to CHESS CHALLENGER X but it also could do no better than to draw with MEPHISTO X in Round 2. It had to settle for a fourth-place finish, much to the disappointment of its programmers Robert Hyatt, Bert Gower, and Harry Nelson.

A field of twelve programs participated. Even the weakest, WAYCOOL, which managed only to pick up a half-point, played strong chess—apparently at the Expert level (2000 USCF). WAYCOOL used 256 processors of a 512-processor N-Cube, one of three multiprocessing systems to participate. SUN PHOENIX used a network of 28 SUN 3s, and CRAY BLITZ used a 4-processor Cray XMP.

Mike Valvo served as Tournament Director. It is interesting to note that following the tournament, Valvo and DEEP THOUGHT 0.02 entered into a two-game postal match via electronic mail. The games began in December and Valvo won both of them. Valvo has a USCF rating of 2481 and is also perhaps the best blindfold player in the United States. His two victories may mean: (1) computers intimidate Valvo less than others less familiar with their play; (2) play by computers, in contrast with that of man, is relatively weaker as time limits are increased—the combinatorial aspects of the game become less acute for humans; (3) Valvo had observed DEEP THOUGHT 0.02 play a number of games and had some feeling for its weaknesses, while DEEP

### Score Table and Computing System Information

<table>
<thead>
<tr>
<th>Number, program, computing system and language, (programmers), book size, nodes/sec, (*) indicates computer at site</th>
<th>Cumulative Points of Rounds</th>
<th>Place/Tie Break</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 DEEP THOUGHT 0.02, SUN 4 plus 2 special processors, C+microcode, at CMU, (Thomas Anantharaman, Mike Browne, Murray Campbell, Feng-hsiung Hsu, Andreas Nowatzky), 5K, 720K.</td>
<td>0.5 (W2)</td>
<td>1/10</td>
</tr>
<tr>
<td>2 CHESS CHALLENGER X, 68030-based micro, assemb., (Dan Spracklen, Kathy Spracklen, Ron Nelson), NA, NA.*</td>
<td>0.5 (B1)</td>
<td>2/8.5</td>
</tr>
<tr>
<td>3 MEPHISTO X, 68020 Mephisto machine, assemb., 128K ROM, 2meg RAM, (Richard Lang), 60K, 3–5K.*</td>
<td>1.0 (B11)</td>
<td>3/9.35</td>
</tr>
<tr>
<td>4 CRAY BLITZ, Cray XMP, 4 proc's, Fort + C + assemb., 32Mw, 64 bits, 105 mips, at Cray Research, Mendota Heights, Minn. (Robert Hyatt, Bert Gower, Harry Nelson), 50K, 80K.</td>
<td>1.0 (W6)</td>
<td>4/9.32</td>
</tr>
<tr>
<td>5 HITECH, SUN 4 with hardware for search and pattern recog., (Carl Ebeling, Hans Berliner, Gordon Goetsch, Murray Campbell, Andy Gruss, and Andy Palay), NA, 110K.</td>
<td>1.0 (B12)</td>
<td>5/9.5</td>
</tr>
<tr>
<td>6 SUN PHOENIX, 28 SUN 3s, C, at SUN Microsystems, Mountain View, Cal. (Jonathan Schaeffer, Marius Olaffson), 8K, 20K.</td>
<td>1.0 (B10)</td>
<td>6/9</td>
</tr>
<tr>
<td>7 BEBE, SYS-10 Chess Engine, assemb., 16Kb, 16 bits, 10 mips, (Tony Scherzer, Larry Scherzer), 4K, 40K.*</td>
<td>1.0 (W9)</td>
<td>7/5.5</td>
</tr>
<tr>
<td>8 NOVAG X, Novag-dedicated Super Expert, 6502 bit-sliced micro, 6502 assemb., 16Kb for program, 35K for search, 6 mips, (David Kittinger), 3.2K, 3K.*</td>
<td>0.0 (B4)</td>
<td>8/7.5</td>
</tr>
<tr>
<td>9 BF, Compaq 386/20, C + assemb., 1Mb, 5 mips, 70Kb for program, 300 Kb for search, (Robert Culum), 15K, 6K.*</td>
<td>0.0 (B7)</td>
<td>9/7</td>
</tr>
<tr>
<td>10 CYRUS 68K, IBM PC with 88020 card, assemb., 256K RAM, (Mark Taylor, David Levy), 25K, 1K.*</td>
<td>0.0 (W6)</td>
<td>10/5</td>
</tr>
<tr>
<td>11 A.J. CHESSI X, IBM compatible 80286 AT or 80386-based, assemb., 3–4 mips, (Martin Hirsch), 5K, 2K.*</td>
<td>0.0 (W3)</td>
<td>11/7</td>
</tr>
<tr>
<td>12 WAYCOOL, 512 processor NCUBE/10, 1/2 Mb RAM, 1 proc., 1mips/sec, C, at Cal Tech. (Ed Felten, Steve Otto, Rod Morison, Rob Fatland), NA, NA.</td>
<td>0.0 (W5)</td>
<td>12/9</td>
</tr>
</tbody>
</table>

The notation (W2) indicates the program played against #2 with the White colors.
THOUGHT 0.02 had no similar opportunity. This might have been particularly important in the openings and long-term strategically or structurally based positions. The table lists the participants, information on their computing systems, their authors, and basic information about the programs. It is interesting to note that all programs were written in either C or assembler, something that no one would have imagined in 1970 when the first ACM Championship was held.

The 20th ACM North American Computer Chess Championship is scheduled to take place at Supercomputing '89 in Reno, Nevada on November 12–15, 1989. Prizes for the first three finishers for this special 20th year edition of the championship will total $5000. For information, write to Professor Monty Newborn, School of Computer Science, McGill University, 3480 University St., Room 318, Montreal, Quebec, Canada, H3A 2A7.

THE GAMES
Five outstanding games are presented. Overview comments are made about three games, while the Round 3 showdown between DEEP THOUGHT 0.02 and HITECH and the critical Round 4 game between CHESS CHALLENGER X and HITECH are annotated in detail.

Round 1
Form held in the Round 1 with the exception of an outstanding performance by CHESS CHALLENGER X in drawing with favorite DEEP THOUGHT 0.02 although in the end the Fidelity program missed at least one clear chance to win. The opening was placid with a number of exchanges, but the isolated Black Q-pawn still offered White a long-term weakness to attack. DEEP THOUGHT 0.02 mishandled the position, however, looking for a tactical solution (16...c4) to exploit the weakness, only to emerge with a slightly disadvantageous ending of R+N against R+B. The resulting B vs N ending with pawns on both sides of the board and White’s weakened, split Q-side pawns, clearly favored Black. A definite improvement was 34...Kf3 when the BK could have become dominant. Instead, as more pawns were exchanged, Black’s winning chances were eroded.

DEEP THOUGHT 0.02 (White) vs. CHESS CHALLENGER X (Black)
Sielle Defense,
c3 Variation
1. e4 c5 2. e3 e6 3. d4 d5
4. exd5 cxd5 5. Nf3 Nc6
6. Be3 cxd4 7. Bxd4 Nxd4
8. Qxd4 Nf6 9. Bb5+ Bd7
10. Bxd7+ Qxd7 11. O-O Be7
12. Nbd2 O-O 13. Ne5 Qf5
14. Ndf3 B6 15. Ra1 Re8
16. c4 Ne4 17. Qxd5 Bxe5
18. Kh1 Rad8 19. Qxe4 Qxe4
22. Rd1 Ba3 23. Rd7 Re2
24. h4 h5 25. Rd8+ Kh7
26. Rd2 Rxh2 27. Nxd2 Kg6
28. g3 Kf5 29. Nbd4 Bb4 30. f3 f6
31. Kg2 g5 32. Nc1 Bd6
33. Kh3 Ke5 34. Ne2 Bc5
35. f4+ Kf5 36. fxg5 fxg5
37. hxg5 Kxg5 38. Ne3 Bb4
39. Nd5 Bb6 40. Kg2 Be5
41. Kf3 b6 42. a4 Bd6
43. Nc3 Be7 44. c5 bxc5
45. Ne4+ Kg6 46. Nxc5 Kf5
47. Nd3 Kg5 48. Nb4 a5
49. Nd5 Be5 50. Ne3 Bf6 (Drawn by agreement) (½–½)

Round 3
When Round 3 began, HITECH was the only program with a perfect score. DEEP THOUGHT 0.02, CHESS CHALLENGER X, MEPHISTO X, and CRAY BLITZ followed with 1.5 points.

DEEP THOUGHT 0.02 (White) vs. HITECH (Black)
Alekhine’s Defense
(ECO B, Section 04, Row 3)
Hans Berliner, the head of the programming team that developed HITECH, prepared a risky line in the Alekhine’s Defense which involved an effort by Black to ensconce a pawn, but the program had to pay the price in terms of pawn structure, development, and king safety. This play backfired due to DEEP THOUGHT 0.02’s ingenious tactical skills. Although the game was protracted, it was virtually decided by the twentieth move.

DEEP THOUGHT 0.02 was searching between eight and ten plies on most moves. Hsu provided us with a printout of the log of the game created by DEEP THOUGHT 0.02, and the following analysis of the game uses data from the log. On each non-book move, DEEP THOUGHT 0.02 prints out the first eight moves of the principal continuation and the score of that continuation.

1. e4 Nf6 2. e5 Nd5 3. d4 d6
4. Nf3 Nc6

Black can avoid the ensuing gambit with 4...Bb4 which is the move usually seen at the Master level in this position.

5. c4 Nb6 6. e6 fxe6

Berliner had anticipated the game would follow this path, and he assumed his program was capable of gaining a positional advantage after accepting the pawn sacrifice. DEEP THOUGHT 0.02 responds strongly, however, and according to Robert Byrne of the New York Times, the game followed “known analysis” until Black’s questionable tenth move.

7. Ng5

This is the sharpest move, threatening simply Bd3, but more preparation with 7. Nc3 is also possible, although theory then gives 7...e5 8. d5 Nxd4 9. Nxd4 exd4 10. Qxd4 e5 with equality. Another principal alternative is 7. h4 when White keeps an edge (as with the text move) after: 7...e5 8. d5 Nxd4 9. Nxd4 exd4 10. Qxd4 e5 11. Qd1 according to Boleslavsky in the Encyclopedia of Chess Openings, Vol. B, Section B04, pp. 32–34.

7...g6

8.  Bd3
DEEP THOUGHT 0.02 predicts

8.  ... Nxd4 9.  Nxc7 Nf5
10.  Nxf8 Kxf8
This seems to have been an error by HITECH. It may have been better to have captured with the rook. In any case, for the extra pawn Black pays the price of a shattered pawn structure around the king and weakened dark squares in the absence of his KB.

11.  O-O e5
This seems overly ambitious. Black might better have played either Nd7 or e5 here, gaining some control of important center squares and giving his pieces a bit more freedom. Understandably, however, on 11.  ... e5 12.  f4 may have been feared.

12.  b3
An enterprising move when after Bb2 White's bishop will be impressive on the open long diagonal.

Although the deployment Bb2 has been discouraged, the weakness of Black's e-pawn is a permanent target which White can focus on.

15.  Re1 d4 16.  Ne5??
A brilliant move from many perspectives except for one: see note to Black's 17th move. DEEP THOUGHT 0.02, of course, realizes that this is not a real sacrifice. If 16.  ... Nxe5, then White plays 17.  Bf4 pinning the Black knight to its queen. White also threatens 17.  Nxc6. Thus Black is forced to continue:

16.  ... Nxe5 17.  Bf4 Rh7
HITECH misses the opportunity to effect some exchanges and release some pressure with the queen sacrifice 17.  ... Nxc3 18.  Bxd6 Nxd1 etc. with good compensation for the queen.

18.  Rxe5
DEEP THOUGHT 0.02's scoring function goes positive for the first time, expecting the game to continue as follows: 18.  ... Qb6
19.  g4 Nh4 20.  Bg3 Bd7
21.  Rh5 Rxh5.

18.  ... Qb6 19.  g4 Nh4 20.  Bg3
White has a won position highlighted by the blockading and splitting effect of the R/e5 on the Black position. DEEP THOUGHT 0.02's analysis gives 20.  ... Kg8

20.  ... Bd7
(See figure.)

21.  Rh5
An elegant move that caught Tournament Director Valvo and the audience by surprise. DEEP THOUGHT 0.02's scoring function now believes White is ahead by approximately one pawn. However White could also win more routinely with 21.  Bxh4 Rxh4
22.  Qf3+ etc.

21.  gxh5 Bxh7
DEEP THOUGHT 0.02 sees:
22.  ... Kg7 23.  Qd3 e5
24.  Bxh4 Rhb 25.  Bf5 e6, and assigns the continuation a score of +2.69 pawns.

22.  ... e5
A good move giving Black's queen some room to maneuver.

23.  Bxh4
This time, DEEP THOUGHT sees:
23.  ... hxg4 24.  Bg3 Qf6 25.  Qd3 b6
26.  Re1 Kf7, leading to a score of +2.79 pawns.

23.  ... Bxg4 24.  Qd3 Re8
25.  Re1 Qe6 26.  f3 Bh3 27.  Qg6
HITECH finds a way to ruffle DEEP THOUGHT 0.02.

27.  ... Qxg6 28.  Bxg6 Re6
29.  Bxh5 Re6 30.  Bg3 Ra6
HITECH has nothing better to do. Black's only chance now is somehow to trade off all material, winning the lone White pawn in the process. That would leave White with a single bishop, insufficient to mate Black. White, however, is a bit too strong to be led into this scenario. It has too many ways to win and knows that a lone bishop is a drawn game.
35. Be3 Rxb3 36. Bxc5 d2
37. Bxe7+ Kg7 38. Rd1 Re3
39. Bh4 Ra3 40. Be8 Rx3
41. Bg5 Rf4 42. Bh5 Kg6
43. Be3 Rf3 44. Bxd2 Rd3
45. c5 Rd5 46. c6 bxc6
47. Bxc6 Rd6 48. Bf3 Rd4
49. Bxa5 Rx4a 50. Rd6+ Kf5
51. Bc3 Ra2 52. Rh6 Bg4
53. Bd5 Rc2 54. Rc6 Re2
55. h4 Kf4 56. Rc4+ Kg3
57. Ba5 and Black resigns.

DEEP THOUGHT 0.02 sees the game going as follows: 57... Re7
58. Bc7+ Rx7 (not 58... Kxh4
because of 59. Bd8 pinning the rook) 59. Rxc7 Kxh4 60. Rg7.

CRAY BLITZ (White) vs.
CHESS CHALLENGER X (Black)

Sicilian Defense,
Accelerated Dragon Variation
In the Accelerated Dragon Variation of the Sicilian Defense essayed by
CHESS CHALLENGER X against CRAY BLITZ, Black appeared to be
in some trouble in the middlegame.
11. Qf3 was a short-sighted move,
but so was Black’s reply 11... Ne5.
White should have capitalized with
13. f4, while 13... b5 was a viable
alternative. Black’s position after
13... Qa6? allowed isolated dou-
bled pawns, however, but this was
not as bad as the pawn structure
might suggest. It should have fol-
lowed with 19. Nd5 with unclear
play. Instead CRAY BLITZ gravely
misjudged the resulting bishops of
opposite color ending by permitting
Black’s passed pawns to become
decisively advanced while White’s
were blocked.

1. e4 c5 2. Nf3 Nc6 3. d4 cxd4
4. Nxd4 g6 5. Be3 Nf6 6. Nc3 Bg7
10. h3 Bd7 11. Qf3 Ne5
12. Qe2 Rac8 13. Rad1 Qa6
14. Qxa6 bxa6 15. f4 Ne4
16. Bxc4 Rxc4 17. e5 dxe5
18. fxe5 Nhx5 19. Nf3 Bc6
22. e6 Bxd4 23. Bxd4 fxe6
24. Rxf8+ Kxf8 25. Ne2 g5
26. c3 Kf7 27. Kf2 Kg6
28. Bxa7 Nfx4 29. Nxf4+ gxf4
30. Bd4 Kf5 31. Bc5 Kf6
32. c4 e5 33. b4 Bc6 34. Bb6 e4
35. Bd4+ e5 36. Bb2 e3+
37. Kg1 Kf5 38. c5 e4 39. Bc1 Bb5
40. Kh1 Ke6 41. Kg1 Kd5
42. a4 Bxa4 43. g3 e2 44. Kf2 f3
45. Bd2 Kd4 46. g4 Be6
47. Bf4 Kd3 48. b5 axb5
49. Bh6 b4 and White
Resigns (0-1)

Round 4
Going into Round 4, three programs were tied for first place with 2.5
points: DEEP THOUGHT 0.02,
CHESS CHALLENGER X, and
MEPHISTO X. HITECH was
fourth with 2.0 points. CHESS
CHALLENGER X upset HITECH
in a relatively fast game lasting
54 moves. The DEEP THOUGHT
0.02/MEPHISTO X game lasted
much longer with MEPHISTO X in
the lead for most of the game. For a
long time it looked like the two mi-
crocomputers would finish 1-2; as it
turned out they finished a most im-
pressive 2-3.

From the opening, which appears
to be DEEP THOUGHT 0.02’s weak-
est phase of play, Black is worse.
The game, which followed through
White’s 6th move SUN PHOENIX-
DEEP THOUGHT 0.02 from
Round 2, transposes into an Indian
structure whereby White’s spatial
advantage and superior pieces (es-
specially Q and B) reign superior for
many moves. White tries to organize
a breakthrough, but DEEP
THOUGHT 0.02 defends well. MEP-
HISTO X’s apparent weakness,
which was alluded to earlier,
namely the inability to find advant-
tageous time (or way) to open up an advan-
tageous position, proves costly.
Around move 38 White should have
tried to improve the position of its N
by Ne2 and Nd4, heading for e6 or
c5 with a decisive infiltration for
which Black had no answer to while
the BQ was tied to the defense of the
bishop on b7.

Nonetheless, White maintains the
same kinds of advantages for many
moves as the position gradually
transforms. 44. a4? was an error in
ceding Black an outside passed
pawn for no apparent reason. Much
stronger would have been the se-
quence 44. Qh8+ Kg6 45. Qg8+ Ng7
(not Kh5 46. Bxg5) 46. Bd4 as given
by Grand Master Raymond Keene
(ICC Journal, Vol. 11, No. 4, p. 191),
when Black is tied up in knots.
Still MEPHISTO X had a trap: if
45... Nxe4 46. Qd1+ Kg6
(Kh6 47. Qe2) 47. Qe2 and wins. But
DEEP THOUGHT 0.02 continued
to regroup, as on 48. e5+ Bf5
49. exf6? Qe1+ wins for Black and
soon there was no win in the offing
for White. MEPHISTO X’s final error
was 60. Nbs5? (instead of Nxe4) after
which DEEP THOUGHT 0.02 was
able to gradually take over the cen-
ter and K-side for an overwhelming
onslaught.

MEPHISTO X (White) vs.
DEEP THOUGHT 0.20 (Black)
1. c4 e5 2. Nc3 Bb4 3. Nf3 Nb5
4. b4 c6 5. bxa5 cxd5 6. cxd5 Qxa5
7. e4 d6 8. Bb2 Nf6 9. Bc3 Qd8
10. Bb5+ Nbd7 11. d3 a6
12. Bxd7+ Bxd7 13. Ne2 Rc8
16. Ba5 Qe7 17. f3 Nh5 18. Rac1 f5
19. Rxc8 Rxc8 20. Rc1 Nf6
23. Ba5 Qe7 24. Qc1 Bb7 25. Ng3 g6
26. Bb6 Kf7 27. Ne2 Kg7 28. Ba5 h5
29. Kh1 Kf7 30. h3 Kg7
31. Qe3 Kh7 32. Qb6 Ne8
33. Nc3 Qd7 34. Kg1 Kg7 35. d4 exd4
36. Qxd4+ Kf7 37. Qb6 fxe4
38. fxe4 Qe7 39. Bb4 Kf6
40. Ba3 h4 41. Bc3 Kg5
42. Be3+ Kh5 43. Qd4 g5
44. a4 bxa4 45. Qxa4 Nf6
46. Bd4 Kg6 47. Qc2 Bc8
48. Qd3 Kf7 49. Qf1 Bd7
50. Qf3 a5 51. Qe3 Kg6
52. Qd3 Kf7 53. Qf3 a4
54. Qe3 Kg6 55. Qd3 Kh6
56. Qb1 a3 57. Kh2 a2
58. Qxa2 Nxe4 59. Qe2 Bf5
60. Nh5 Qf7 61. Qc4 Bd7
62. Kg1 Qf4 63. Na3 Nd2
64. Qd3 Bf5 65. Qe3 Bxh3
66. Bh7+ Kh6 67. Qd3 Bxg2
68. Kxg2 Qg4+ 69. Kh1 Ne4
70. Qc2 Qh3+ 71. Kg1 Qe3+
72. Kh1 Qe1+ 73. Kg2 and White
resigns (see mate in seven against
itself) (0-1)
CHESS CHALLENGER X (White)  
vs. HITECH (Black)  

Vienna Opening  
1. e4 e5 2. Nc3 Nf6 3. f4 d5  
4. fxe5 Nxe4 5. Nf3 Be7  
6. d4 Nxc3 7. bxc3 O-O  
8. Be2 c5 9. O-O Nc6  
10. Be3 Qa5 11. Qd3  

After an opening where White has no great prospects, this awkward move does not inspire confidence that White knows what is going on. However, the move does guard the c-pawn and prevents Bf5. Perhaps Black should play 11... g6! when Bf5 can indeed follow.  

11. Bg4 12. Kh1 Bh5  
13. Rb1 Rab8 14. dxc5  

Now White's pawn structure becomes rather ugly, although the tripled c-pawns do maintain a vice-like grip on the Q-side.  

14. Bxf3 15. gxf3 Nxe5  
16. Qxd5 Nc6 17. Bd4 Qd8!  

Necessary and good. Not 17... Rfd8 18. Qe4 Bxc5  
19. Rb5 winning. The resulting ending is rather equal.  

18. Bc4 Qxd5 19. Bxd5 Bg5  
20. Rg1 Bh6 21. Rab1 Rfd8  
22. Bxc6 bxc6 23. Bxf5!  

A stronger way for White to try to make headway might be 23. Rb3 when White may gain control of the b-file or straighten out its pawn structure to mobilize the Q-side.  

23. Rxb1 24. Rxb1 Re8  
25. f4 a5 26. c4 f6 27. Rb8 Rxb8  
28. Bxb8 a4 29. Kg2 g6  
32. Ke4Bg7 33. Kd4 f5+  
34. Kd3 Bf6 35. Ke3 Bg7  

Clearly if Black wants to win, a passed pawn should be created with 35... g5 or by trading bishops with 35... Be7 when Black cannot be worse in the king and pawn ending with a potential passed pawn on the K-side. Unfortunately, HITECH shows no inclination to create a passed pawn until it is too late.  

36. Kd2 Bf6 37. Kd3 h5  
38. Ke2 h4?  

Not a particularly significant move in the ensuing play, but the pawn does become a fixed target on the color of White's bishop.  

39. h3 Bh2 40. Bc7 Kd7  
41. Ba5 Bd4 42. Bb4 Ke6  
43. Be1 Bf6 44. Bd2 Be7  
45. Be3 Bd8 46. Kc3 Kf7  
47. Kc3  

Black has been drifting and now suddenly its a-pawn is in serious danger.  

47... Be7 48. Kb4 g5  
49. fxg5 Kxg6 50. Kxa4 Bh2  
51. Ka5 f4 52. Bxf4 Bxf4  
53. Kb6 Kf7 54. Kxc6 and Black resigns (1-0)
ICCA Journal
December 1988

ACM's Nineteenth North American Computer Chess Championship

RESULTS AND GAMES (Ken Thompson)

Orlando, Florida
November 13-15, 1988

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Round 1
Deep Thought 0.02 — Chess Challenger X

1 e4 c5 2 c3 e6 3 d4 d5 4 exd5 exd5 5 Qf3
d6 6 Qc3 cxd4 7 Qxd4 Qxd4 8 Qxd4 Qf6
9 Qb5+ Qd7 10 Qxd7+ Qxd7 11 O-O Qe7
12 Qb2 O-O-O 13 Qe5 Qf5 14 Qd3 Qd6 15
Qae1 Qxe8 16 c4 Qe4 17 Qxd5 Qxe5 18
Qh1 Qad8 19 Qxe4 Qxe4 20 Qxe4 Qxb2 21
Qxe8+ Qxe8 22 Qd1 Qa3 23 Qd7 Qe2 24 h4
h5 25 Qd2 Qh7 26 Qxe2 Qxe2 27 Qxe2
Qg6 28 Qg3 Qf5 29 Qb3 Qb4 30 f3 Qf6 31
g2 g5 32 Qc1 Qd6 33 Qh3 Qe5 34 Qe2
c5 35 Qf4 Qf5 36 hxg5 fxg5 37 hgx5 Qg5
38 Qc3 Qb4 39 Qd5 Qd6 40 Qg2 Qe5 41
Qf3 b6 42 a4 Qd6 43 Qc3 Qc7 44 b5 cxb5
45 Qe4+ Qg6 46 Qc5 Qf5 47 Qd3 Qg5 48
Qb4 a5 49 Qd5 Qe5 50 Qe3 Qf6 1/2

Waycool — Hitech

1 e4 e5 2 c3 Qh3 3 Qc6 3 d4 c5 4 Qa4 f6 5 Qb5
Qge7 6 exd5 Qxd5 7 d4 e4 8 c4 Qf7 9
Qg1 Qxd4 10 Qc3 Qd7 11 h3 i5 12 Qf3
d8 13 Qd1 Qd7 14 c5 a6 15 Qe2 Qe5 16
Qb3 Qc8 17 Qd5 Qg6 18 h4 Qc6 19 h5
Qe7 20 Qh4 h6 21 Qd4 Qd3 22 Qd3 exd3
23 Qxb3 Qe4 24 Qg3 Qd7 25 Qg7 O-O-O
26 Qxe6 Qxg7 27 Qxg7 Qxe6 28 Qd6 Qxe8
29 Qxe2 Qxd5 30 Qxd4 Qh8 31 Qxg8 Qxg8
32 Qd4 Qe2 33 Qxg2 Qxg2 34 Qxh4 Qh1
35 Qd2 Qd7 36 Qh3 Qf1 37 Qf3 Qh1 38
Qd5 Qxf5 39 Qxf5 Qe6 40 Qf4 Qd5 41
Qb4 Qxc5 42 fxb7 Qxb7 43 Qb3 Qf4 44 Qa3
a5 45 Qd3 c6 46 Qc3 h5 47 Qd3 h4 48 Qd2

Clay Blitz — Novag X

1 e4 e5 2 Qf3 Qf6 3 Qb5 a6 4 a4 Qd6 5
d3 b6 6 Qb3 Qd7 7 O-O d5 8 exd5 Qxd5 9
Qe1 Qd6 10 a4 Qb8 11 Qxb5 a5 12 Qe2
Qg4 13 h3 Qxh3 14 Qxh3 Qf6 15 Qc3 O-O
16 Qf5 b4 17 Qe4 Qxe4 18 Qxe4 Qh8 19
Qa6 Qb6 20 Qxb6 Qxb6 21 Qa4 Qh4 22 Qf5
Qa8 23 Qxe6 Qc6 24 h3 Qf6 25 Qf4
Qxc2 26 Qxb4 Qxd3 27 Qxb6 Qd5 28 Qe3
Qg8 29 Qc1 Qe5 30 b4 Qd8 31 Qa6 h6 32
Qa2 Qd6 33 Qb6 Qa8 34 Qd1 Qc6 35 Qa5
Qb8 36 Qd2 Qe5 37 Qd3 Qa4 38 Qc1 Qe8
39 Qc4 Qb2 40 b1 Qf6 41 b6 Qe6 42
Qec6 43 Qf1 Qec2 44 b5 Qd4 45 Qxd4
Qxd4 46 Qe1 Qh2 47 Qxb2 Qxb2 48 Qe8
Qh7 49 g3 Qb1 50 Qg2 Qb4 51 Qc6
Qa4 52 h4 g6 53 Qd5 Qa7 54 Qb3 Qb7 55
Qf3 Qxb5 56 Qd7 Qh8 57 Qxg6
Qd5 58 f3 h5 59 Qh6 Qg8 60 Qg5
Qxg5 61 hgx5 Qg7 62 Qh3 1-0

Cryus 68K — Sun Phoenix

1 e4 c6 2 d4 d5 3 Qc3 Qc6 4 Qa3 Qg7 5 h3
dxe4 6 Qxe4 Qd7 7 Qc4 Qg6 8 Qe6
Qf6 9 Qe5 Qd5 10 O-O O-O-O 11 Qe1 Qc7
12 Qb3 Qf5 13 c4 Qf6 14 c5 Qd5 15 Qd2
Qd8 16 Qc1 Qab8 17 Qf3 Qf6 18 Qf4 Qf4
19 Qxf4 e6 20 Qc3 h6 21 Qg3 Qxd4 22 Qg4
Qxg3 23 Qxh6 Qg7 24 Qd3 Qf6 25 Qf3
Qd7 26 Qg4 Qd3 27 Qd1 Qab8 28 Qe3 Qb5
29 Qxd4 Qxd4 30 Qc3 Qd2 31 Qe2 e5 32
Qg2 Qe2 33 Qg3 Qf1 34 a3 Qf8 35 b3 Qe7
Bebe — BP

1 e4 e5 2 d4 f5 3 d3 fxe4 4 dxe3 d5 5 cxd5 exd5 6 c6 d6 7 e4 c3 8 f4 d6 9 h5 g5 10 gxe5 dxe5 11 b3 a6 12 b2 c6 13 bxc5 c5 14 f4 e1 d4 f5 e7 f5 e6 d4 c3 15 bxc6 bxc6 16 cxd5 exd5 17 cxe4 e5 18 e5 g3 e4 19 c4 d4 20 c6 d2 21 c5 e5 22 c4 b3 23 b1 c5 24 c5 c7 25 c4 b6 26 c1 27 c2 b2 28 c1 c5 29 b4 c6 30 c4 c4 31 d6 c6 32 cxe6 cxe6 33 c5 c3 34 c6 c5 35 c7 c7 36 c3 c3 37 c1 c1 38 c2 c2 42 c1 43 c1 c1 44 h3 c1 45 h2 c1 46 c1 47 c1 48 c1 49 c1 50 c1 51 c1 52 c1 53 c1 54 c1 55 c1 56 c1 57 c1 58 c1 59 c1 60 c1 61 c1 62 c1 63 c1 64 c1 65 c1 66 c1 1-0

Mephisto X — Cray Blitz

1 d4 d5 2 d4 f5 3 c4 e4 4 d3 fxe4 5 b3 b6 6 c3 dxe5 7 e4 c5 8 e5 a6 9 d4 b5 10 cxb5 cxb5 11 d5 d6 12 b4 g6 13 b5 b5 14 d5 e7 15 c4 dxe5 16 dxe5 f7 17 c4 e4 f6 18 d5 c6 19 f4 d4 20 c1 c1 21 c1 c1 22 c1 c1 23 c1 c1 24 c1 c1 25 c1 c1 26 c1 c1 27 c1 c1 28 c1 c1 29 c1 c1 30 c1 c1 31 c1 c1 32 c1 c1 33 c1 c1 34 c1 c1 35 c1 c1 36 c1 c1 37 c1 c1 38 c1 c1 39 c1 c1 40 c1 c1 41 c1 c1 42 c1 c1 43 c1 c1 44 c1 c1 45 c1 c1 46 c1 c1 47 c1 c1 48 c1 c1 49 c1 c1 50 c1 c1 51 c1 c1 52 c1 c1 53 c1 c1 54 c1 c1 55 c1 c1 56 c1 c1 57 c1 c1 58 c1 c1 59 c1 c1 60 c1 c1 61 c1 c1 62 c1 c1 63 c1 c1 64 c1 c1 65 c1 c1 66 c1 c1 1-0

A. I. Chess — Mephisto X

1 c4 c6 2 d4 d5 3 e3 d6 4 f3 f5 5 c3 c6 6 b3 c3 7 d5 e6 8 d2 c6 9 e4 e4 10 b4 f6 11 c1 c1 e5 12 c2 c2 d6 13 c1 c1 e5 14 c1 c1 d6 15 c5 c5 16 b5 c5 17 b3 c3 18 d6 c6 19 c4 c4 20 c5 c5 21 c6 c6 22 c7 c7 23 c8 c8 24 c9 c9 25 c10 c10 26 c11 c11 27 c12 c12 28 c13 c13 29 c14 c14 30 c15 c15 31 c16 c16 32 c17 c17 33 c18 c18 34 c19 c19 35 c20 c20 36 c21 c21 37 c22 c22 38 c23 c23 39 c24 c24 0-1

Round 2

Hitech — Bebe

1 e4 c5 2 c3 d5 3 e5 dxe5 4 e5 c6 5 d4 c6 6 c4 c4 7 d5 d5 8 c4 c4 9 d5 e6 10 c6 d6 11 a6 e6 12 a7 d6 13 b3 c6 14 b4 a6 15 c2 a5 16 d3 c5 17 d4 c4 18 d5 c5 19 e4 c6 20 d5 c5 21 c6 c6 22 c7 c7 23 c8 c8 24 c9 c9 25 c10 c10 26 c11 c11 27 c12 c12 28 c13 c13 29 c14 c14 30 c15 c15 31 c16 c16 32 c17 c17 33 c18 c18 34 c19 c19 35 c20 c20 36 c21 c21 37 c22 c22 38 c23 c23 39 c24 c24 0-1

Sun Phoenix — Deep Thought 0.02

1 e4 e5 2 d4 f5 3 c4 c4 4 a4 a6 5 b4 c6 6 c3 b5 7 d5 cxd5 8 c5 x6 c5 9 b3 d6 10 b4 f6 11 b5 e6 12 b6 c4 13 c2 e4 14 d3 c3 15 e2 d4 16 d3 d4 17 e3 c2 18 d2 b5 19 c5 a6 20 d4 c6 21 e5 c5 22 f3 c4 23 d2 b3 24 e5 c5 25 c5 b6 26 c5 a6 27 c5 b5 28 c5 c5 29 c5 d6 30 c5 c5 31 c5 b6 32 c5 c5 33 c5 a5 34 c5 b4 35 c5 c4 36 c5 a4 37 c5 b3 38 c5 c3 39 c5 d3 40 c5 e4 41 c5 c4 42 c5 d5 43 c5 e6 44 c5 f7 0-1

Chess Challenger X — Waycool

1 e4 c5 2 f3 c6 3 b5 a6 4 a4 c5 5 d5 c6 6 c3 b5 7 b4 a4 8 b4 a4 9 b5 a5 10 b2 a2 11 b3 a3 12 b4 c3 13 a5 d5 14 c4 d4 15 b5 c5 16 c6 a6 17 d5 e6 18 a5 e5 19 c4 b5 20 c5 b5 21 b5 a5 22 b5 b4 23 b5 c4 24 b5 d5 0-1

18
Novag X — A. I. Chess

1 d4 d5 2 c4 e6 3 Qf3 Qf6 4 Qc3 Qe4 5 Qd2 Qxd2 6 Qxd2 b4 7 a3 Qxc3 8 bxc3 dxc4 9 bxc4 Qxd7 10 e4 Qc6 11 Qc1 c6 12 Qe3 e5 13 O-O Qf6 14 Qc3 Qe8 15 dxe5 Qc4 f6 16 Qe6 17 Qd7 Qg8 18 Qg4 Qe1 Qh6 20 Qd3 Qf4 21 Qj3 Qf8 22 Qe4 Qc6 23 Qd4 Qc5 24 g3 Qg4 25 Qd6 b6 26 Qe3 Qh5 27 Qd3 Qe6 28 Qf1 Qe8 29 Qd8 Qg6 30 Qb5 Qd8 31 Qxd8 Qf7 32 Qe8 Qd7 33 Qc7 34 Qe2 Qc7 35 Qd7 Qxd7 36 Qc8 Qd4 37 Qc7 Qc6 38 Qd2 Qe5 39 Qf3 a6 40 Qd4 Qd4 41 Qf4 Qc5 42 Qb7 Qc5 43 e5 c5 44 bxc3 Qxe5 45 fxe5 Qe5 46 Qd2 Qc5 Qe8 48 Qc8 Qd6 49 Qc6 50 Qc4 Qf6 51 h4 Qe6 52 Qd4 Qg5 53 Qh5 Qg5 54 Qf4 Qe6 55 Qxe6 Qxe6 56 Qd5 Qd6 57 Qe6 Qe6 58 Qd4 Qg4 59 Qd4 Qc6 60 Qd3 Qd7 61 Qe4 Qc6 62 Qd4 Qd6 63 Qd3 Qc7 64 Qd4 Qd6 65 Qd3 Qd7 66

Cray Blitz — Chess Challenger X

1 e4 c5 2 Qf3 Qc6 3 d4 Qxd4 4 Qxd4 Qd6 5 Qe3 Qf6 6 Qc3 Qg7 7 Qc4 Qa5 8 O-O Qe3 9 Qb3 d6 10 h3 Qd7 11 Qf3 Qe5 12 Qe2 Qac8 13 Qad1 Qa6 14 Qxa6 Qxa6 15 Qf4 Qc4 16 Qxc4 Qxc4 17 e5 dxe5 18 fxe5 Qh5 19 Qf3 Qc6 20 Qad4 Qxd4 21 Qxd4 Qb7 22 e6 Qd4 23 Qd4 Qxe6 24 Qxe8 Qx8 25 Qe2 Qg5 26 c3 Qf7 27 Qd2 Qg6 28 Qa7 Qf4 29 Qxf4 Qxf4 30 Qd4 Qf5 31 Qc5 Qf6 32 Qe5 Qd3 33 Qb4 Qc6 34 Qd6 35 Qd4 Qe5 36 Qd2 Qf3 37 Qg1 Qh5 38 Qc5 39 Qc1 Qb5 40 Qh1 Qe6 41 Qg1 Qd5 42 a4 Qa4 43 g3 e2 44 Qf2 f3 45 Qd2 Qd4 46 Qc4 47 Qf4 Qd3 48 b5 a5 49 Qh6 b4 0-1

Sun Phoenix — Mephisto X

1 c4 c6 2 Qc3 d5 3 Qxd5 cxd5 4 d4 Qf6 5 Qf3 Qc6 6 Qf4 Qf6 7 e3 e6 8 Qh5 Qc7 9 Qd4 Qf6 10 Qe8 Qh6 17 Qb8 Qb7 18 Qg3 Qd4 19 O-O Qxc3 20 bxc3 Qc8 21 Qc1 c5 22 Qf1 Qe8 23 Qd4 Qh5 24 h3 Qd3 25 Qg1 Qc6 26 Qh2 Qa3 27 Qg4 Qh4 28 Qf4 Qg5 29 Qb8 Qe7 30 Qg2 Qe8 31 Qh2 Qc8 32 Qg1 Qc4 33 Qc7 Qd4 34 Qg1 Qa6 35 Qd3 36 Qg2 Qd7 37 Qh2 Qe4 38 Qa8 39 Qg1 Qc8 40 Qf1 Qe7 41 Qg1 Qc4 42 Qb8 Qd3 43 Qg2 Qa8 44 Qh2 Qc8 45 Qg1 b4 46 f3 Qg6 47 Qf2 bxc3 48 a4 Qb4 49 Qe1 Qb2 50 Qg1 Qd3 51 Qd2 Qc8 52 Qd1 c2 53 Qd1 Qb1 0-1

Round 3

Deep Thought 0.02 — Hitech

1 e4 Qf6 2 e5 Qd5 3 d4 d6 4 Qf3 Qc6 5 c4 Qc6 6 e6 Qxe6 7 Qg5 Qe6 8 Qd3 Qd4 9 Qxh7 Qxf5 10 Qd8 Qxh8 11 O-O c5 12 b3 d5 13 Qd2 Qd6 14 Qf3 Qd7 15 Qe1 d4 16 Qe5 Qxe5 17 Qf4 Qf7 18 Qe5 Qd4 19 g4 Qh4 20 Qg3 Qd7 21 Qd5 g4 22 Qxh7 e5 23 Qxh4 Qxh4 24 Qd3 Qc8 25 Qe1 Qe6 26 Qh3 27 Qg6 Qxg6 28 Qf5 Qc6 29 Qxh5 Qe6 30 Qg3 Qa6 31 a4 d3 32 Qxe5

Bebe — Novag X

1 e4 e5 2 Qf3 Qc6 3 Qd5 a6 4 Qa4 Qf6 5 O-O Qxe4 6 Qe1 Qc5 7 Qxe5 Qe7 8 Qxc6 dxc6 9 d4 Qxe6 10 Qd3 O-O 11 Qd3 Qd8 12 Qh5 Qg6 13 Qd1 Qf8 14 Qd3 Qg7 15 Qf3 b6 16 Qe4 Qd7 17 Qg5 Qxg5 18 Qxg5 Qd5 19 Qc4 Qa5 20 Qd3 Qxc3 21 bxc3 c5 22 Qd1 h6 23 Qxe8 Qxe8 24 Qh3 Qxd4 25 Qd4 c5 26 Qb3 Qxc3 27 f3 Qe1+ 28 Qxe1
Novag X — Sun Phoenix

1 e4 e6 2 d4 d5 3 Qc3 Qb4 4 Qge2 Qe7 5 a3 Qa5 6 b4 Qb6 7 a4 a5 8 b5 c5 9 bx6 Qbxc6 10 Qxb2 O-O 11 Qb1 Ae8 12 exd5 exd5 13 Qb5 A5 14 g3 Qg2 Qg4 16 f3 Qf5 17 Qf2 Qe3 18 Qd2 Qa5 19 Qa3 Qb4 20 Qb1 Qc8 21 Qg1 Qa2 22 Qe1 Qxc2 23 Qbd1 Qxe1 24 Qxe1 Qe7 25 Qf2 Qb4 26 Qf4 Qxe1+ 27 Qxe1 Qxe1 28 Qe1 g5 29 Qxd5 Qxd5 30 Qd2 Qd8 31 Qxe4 Qc7 32 Qc3 Qxc3 33 Qxc3 Qd7 34 Qe3 Qa4 35 d5 b5 36 Qh1 Qf8 37 Qd3 Qb3 38 Qe4 a4 39 Qd3 a3 40 d6 0-1

Waycool — Bebe

1 e4 c5 2 Qf3 Qc6 3 Qb5 g6 4 O-O Qg7 5 Qe1 e5 6 Qxc6 Qxc6 7 c3 Qe7 8 d4 exd4 9 Qxd4 e4 10 Qxd4 Qb8 11 Qf3 Qxb2 12 Qxb2 Qxb2 13 Qd1 Qa1 14 Qa1 O-O 15 Qf6 d6 16 Qc1 Qd7 17 Qc4 d5 18 exd5 Qxd5 19 Qf2 Qe7 20 Qa3 Qc7 21 Qd6 Qd8 22 Qxc8 Qxc8 23 h5 c5 24 Qc5 Qb6 25 Qf6 c4 26 Qc3 Qf4 27 Qe1 f6 28 Qa3 Qa8 29 Qc5 h6 30 Qc6 Qb6 31 Qe6+ Qh8 32 Qf7 c3 33 Qe7 Qd1+ 1-0

The International Computer Chess Association

Established at the Second World Computer Chess Championship in Toronto in 1977, this international association has about seven hundred members from all over the world. The ICCA Journal is the leading publication on the subject of computer chess, and one day may be the world's leading chess publication. It is published four times a year. Current officers are David Levy, President, Tony Marsland, Vice President, and Jonathan Schaeffer, Secretary/Treasurer. If you are interested in becoming a member, please write to Professor Jonathan Schaeffer, Department of Computing Science, University of Alberta, Edmonton, Alberta, Canada T6G 2H1. The annual dues is $25.00 (US).
Kings and Pawns Endgame Test

The set of Kings and pawns positions shown below serves as a good endgame test. HITECH and CRAY BLITZ took this test recently and solved them all in a minute or so. HITECH took no more than 40 seconds to solve any one. Try them yourself. The answers are at the bottom of this page. In each position it is White to move and win.