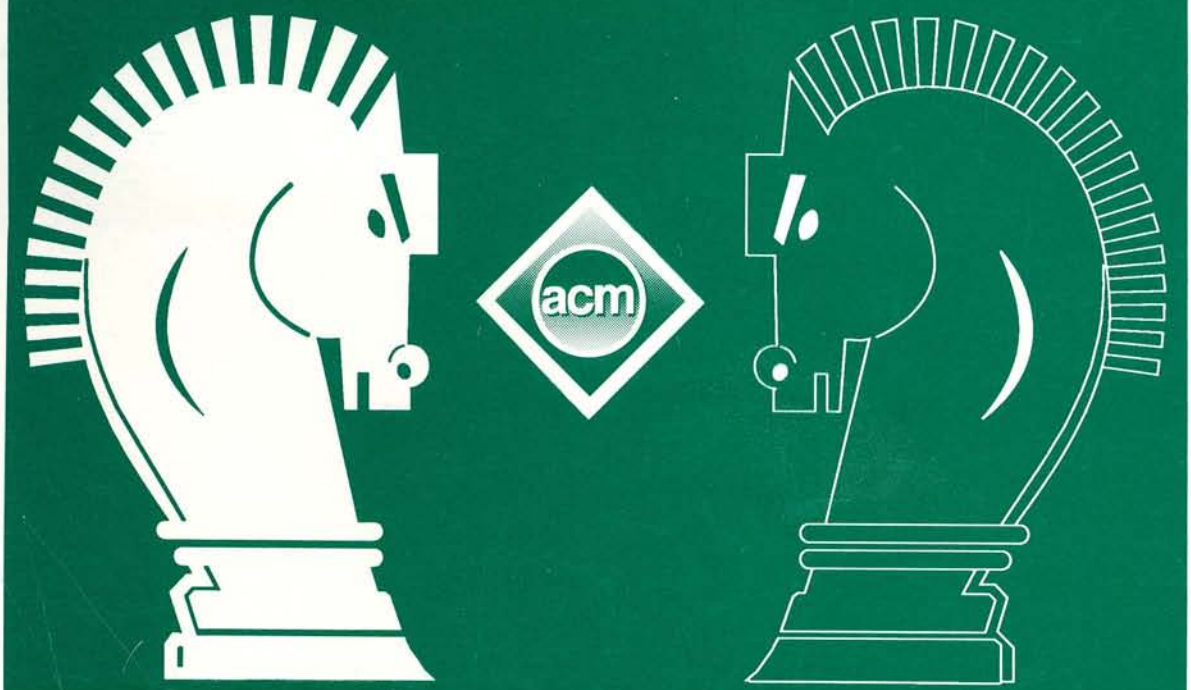
THE 23rd ANNUAL

ACM International Computer Chess Championship

Hyatt Regency Indianapolis
Indianapolis, Indiana
February 14-17
1993



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The Association for Computing Machinery

The 23rd ACM International Computer Chess Championship

Indianapolis, Indiana
February 14-17, 1993
A Special Event at the ACM Computer Science Conference

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1990 New York: MEPHISTO and DEEP THOUGHT (Tied for 1st Place)....1991 Albuquerque: DEEP THOUGHT II

Welcome and Overview

For almost a quarter of a century, the annual ACM computer chess tournaments have established landmarks in the development of chess programs. The tournament, initially called the ACM United States Computer Chess Championship, underwent name changes in 1976 when it became the ACM North American Computer Chess Championship, and in 1991 when it was given its current name — the ACM International Computer Chess Championship. These name changes reflected the widening participation of programs from at first North America and later from around the world.

For the first time this year, this event is hosting a World Champion from outside the United States, even from outside the continent of North America. Ed Schröder's CHESS MACHINE/SCHRÖDER, developed in Holland, won the 1992 World Championship held in Madrid, Spain and has come here for its next major challenge. Most amazing, Schröder's program runs on a microcomputer! Who would have ever imagined when the ACM tournaments began in 1970 that the world's best program would run on a microcomputer in 1993. And perhaps even more amazing, the program is written in assembly language!!! Jan Louwman, who has assisted Schröder over the years, has brought the program here for the second year in a row.

It must be pointed out that the previous World Champion DEEP THOUGHT II passed up the Spain Championship and is passing up this Indy Championship for several reasons: their team is currently working full tilt to get their multiprocessor version together to challenge the human world champion in the near future. Further, at the end of February, DEEP THOUGHT II is scheduled to take on several European Grandmasters including GM Larsen of Denmark to test its current strength.

On Sunday morning, from 9:00 AM until 11:30 AM, some of the top younger talent in the Indianapolis area will challenge some of the computers as part of the "ACM Student Computer Chess Challenge. The best players from the fifth and sixth grades at School 107 and from the seventh and eighth grades at Longfellow Junior High School will test their skill against some of the top programs. Betty Hutt, recently retired from School 107, and Len Wallace of Longfellow are providing the local organization of the event which is under the auspices of the United States Chess Federation.

Throughout the tournament, Robert Levinson, of the University of California at Santa Cruz, will demonstrate a chess program that learns. He demonstrated his program for the first time at the 1991 ACM event in Albuquerque. Since then, he has significantly improved the program's capabilities. His demonstration will be in the tournament hall and run for the length of the championship.

On Tuesday at 3:30 PM, Tony Marsland will serve as the moderator of a panel discussion entitled "Computer Chess: What Remains?" With the defeat of the human world champion just over the horizon, as many think, the interest in activities in this area may change focus. Levinson's learning program reflects one such direction. The construction of large databases for endgames and openings is another. Whether the techniques used by chess programs have wider applicability is still another.

Mike Valvo will serve as Tournament Director. Mike has served in this capacity for a decade.

As one of America's leading players, one of its best blindfold players, and as a consultant in the computer field, Mike combines the two areas needed to take command of this event. Danny Kopec will serve as the assistant TD. Danny also has the necessary background; he is currently a professor in the Department of Computer Science at Carleton University in Ottawa. Both Valvo and Kopec are rated over 2400 by the USCF. As the programs get stronger and stronger every year, the chess expertise of Valvo and Kopec becomes more essential to these events.

We would like to thank the ACM's Computer Science Conference for including us on their program. This is our first year as part of this conference's program and we look forward to a repeat performance next year at CSC '94 in Phoenix, Arizona. Don Nowak and Jim Adams of the ACM deserve a special thanks for their help with the arrangements. Jim, of course, has helped out at all twenty-three tournaments!

We wish all the competitors the best of luck. For the audience, we point out (for the third year running) that those commenting on the games sound more and more like weather forecasters.

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**

Round 1:	1:00 PM	Sunday	February 14
Round 2:	7:30 PM	Sunday	February 14
Round 3:	7:00 PM	Monday	February 15
Round 4:	7:00 PM	Tuesday	February 16
Round 5:	3:00 PM	Wednesday	February 17

Note: All participants must attend a meeting at 12:00 noon on the 14th at which time the rules will be finalized.

2. **ACM Student Computer Chess Challenge:** Sunday February 14, 9:00 AM - 11:30 AM, students from School 107 and Longfellow Junior High School under the direction of Betty Hutt and Len Wallace will take on the computers.

3. **Experiment in Machine Learning:** given by Robert Levinson, beginning Sunday February 14 through Wednesday February 17.

4. **ICCA Meeting:** Monday February 15, 6:00 PM - 7:00 PM.

5. **ACM Computer Chess Committee Meeting:** Tuesday February 16, 12:00 PM - 12:45 PM.

6. **Panel Discussion:** Tuesday, February 16, 3:30 PM - 5:00 PM, "Computer Chess: What Remains?" Chair: Tony Marsland, Room 204, Indiana Convention Center.

7. **Awards Ceremony:** The following awards will be presented at the ACM Awards Banquet at the Indiana Roof Ballroom, 140 West Washington Street, Wednesday evening after the final round (at approximately 9:00 PM):

Awards:	First Place.....	$4000 and Trophy
	Second Place.....	$2000 and Trophy
	Third Place.....	$1000 and Trophy
	Best Small Computing System.....	$1000 and Trophy

Tournament Director: Mike Valvo.

Assistant Tournament Director: Danny Kopec

Tournament Officials: Monty Newborn and Tony Marsland.

Note: All activities will take place in the Mountain Suite at the Hyatt Regency Indianapolis. The Mountian Suite is located on the third floor of the hotel.

Information on Participants

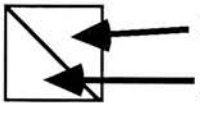
BEBE	Tony Scherzer and Linda Scherzer, SYS-10 Inc., 2117 Stonington Avenue, Hoffman Estates, Illinois 60195.
BP	Robert D. Cullum, PO Box 111, Prospect Heights, Illinois 60070.
B* HITECH	Hans Berliner, Chris McConnell, Carl Ebeling, c/o HB, Dept. of Computer Science, Carnegie-Mellon Univ., Pittsburgh, PA 15213.
CHESS MACHINE/ SCHRÖDER	Ed Schröder, Jan Loumann, c/o JL, Bing Crosby Street #5, 3069 XN, Rotterdam, Netherlands.
CRAY BLITZ	Robert Hyatt, Harry Nelson, Albert Gower, c/o RH, Computer and Information Science Department, Campbell Hall, University of Alabama at Birmingham, Birmingham, Alabama, 35124.
INNOVATION	Jeff Mallett, 1655 20th Avenue Dr NE Apt. 1, Hickory, NC, 28601
KALLISTO	Bart Westrada, Franz van de Eng, c/o BW, P. O. Box 364, 1520 AG, Wormerueer, Netherlands.
M CHESS PROFESSIONAL	Marty Hirsch, PO Box 9388, San Fafael, California, 94912.
NOW	Mark Lefler, ACG Frankfurt ESC, Unit 25401, APO AE 09213.
SOCRATES II	Don Dailey and Larry Kaufman, c/o Julio Kaplan, Heuristic Software, 2550 Nineth Street, #204, Berkeley, CA 94710.
STARTECH	Bradley Kuszmaul, Charles Leiserson, and Ryan Rifkin, c/o BK, MIT Laboratory for Computer Science, 545 Technology Square, Cambridge, MA 02139
ZARKOV	John Stanback, 4237 Cape Cod Circle, Ft. Collins, Colorado 80525.

Computing System Information

Program	Computing system,language, etc. (* indicates computer at site)	Nodes/ sec.	Rating estimate
BEBE	SYS-10 Chess Engine, assmbler, special-purpose chess circuitry, 64Kb, 16 bits,8 mips, 3 Meg hash table.*	40000	2100
BP	486/50 Clone, C & assmebler, 28 Mips, 32 Meg, 32 bits, 165K position hash table.*	2400	2260
B* HITECH	SUN 4 with special chess hardware, microcode + assembler, 1 M hash table, (Carnegie-Mellon University).	100K	2400
CHESS MACHINE/ SCHRÖDER	Laptop with chess machine, Assembler, 24Mips, 512Kb, 434Kb hash table.*	8K	2495
CRAY BLITZ	Cray YMP-8, Fortran+C+assembler 1330 Mips, 64 Mw, 64 bits, 8 processors 60 Megaword hash table, (Cray Research Comp Center, Eagen MN).	200K-500K	2200+
INNOVATION	Macintosh Quadra 700, 68040, 20Meg, 32bit, C, 128K hash table.*	2K	2000
KALLISTO	IBM PC or clone, 80486	NA	NA
M CHESS PROFESSIONAL	IBM PC or clone, 80486, C + Assembler 5 mips, 640Kbytes, 32 bits, 16K position hash table*	5K	2450
NOW	IBM PC or clone, 80486, C.*	8K	2250
SOCRATES II	IBM PC or clone, 486 33 Mhz or 50 Mhz 32K hash table.*	NA	2400
STARTECH	Connection Machine CM-5, 128 processors. (Thinking Machines Corp, Boston)	NA	2100
ZARKOV	HP 9000/735, C 75 mips, 48 Meg, 32 bits, 64K position hash table (HP, Fort Collins, Colorado)	10K	2400

Score Table

Team	Rounds 1	2	3	4	5	Total Points	Final Place
1. BEBE							
2. BP							
3. B* HITECH							
4. CHESS MACHINE/ SCHRÖDER							
5. CRAY BLITZ							
6. INNOVATION							
7. KALLISTO							
8. M CHESS PROFESSIONAL							
9. NOW							
10. SOCRATES II							
11. STARTECH							
12. ZARKOV							



Number of points

Number and color of opponent

23rd ACM International Computer Chess Championship
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 February 14 for the purpose of officially registering for the tournament. Rules will be finalized at that meeting.

3. The tournament is a five round Swiss style tournament. The first and second rounds will be played Sunday February 14 at 1:00 PM and 7:30 PM respectively. The third round is scheduled for Monday, February 15 at 7:00 PM, the fourth round for Tuesday February 16 at 7:00 PM, and the final round for Wednesday February 17 at 3:00 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 $4000 will be awarded to the program which finishes the tournament with the most points, $2000 to the second most, and $1000 to the third most. A trophy and $1000 prize 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 it can be established that 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 interupted. 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. Both clocks will be stopped. The game must then be backed up to the point where the error occurred. The TD will back up the clocks to their settings when the error occurred using whatever information is

available. 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 querry 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 INTERNATIONAL COMPUTER CHESS CHAMPIONSHIPS*

Year	City	Winner	Runner-up
1970	New York	CHESS 3.0; Slate, Atkin, Gorlen, CDC 6400	DALY CHESS PROGRAM; Daly,King, Varian 620/i
1971	Chicago	CHESS 3.5; Slate, Atkin, Gorlen,CDC 6400	TECH; Gillogly, PDP 10
1972	Boston	CHESS 3.6; Slate, Atkin, Gorlen, CDC 6400	OSTRICH; Arnold, Newborn, DG Supernova
1973	Atlanta	CHESS 4.0; Slate, Atkin, Gorlen, CDC 6400	TECH II; Baisley, PDP 10
1974	San Diego	RIBBIT; Hansen, Crook, Parry, H'well 6050	CHESS 4.0; Slate, Atkin, CDC 6400
1975	Minneapolis	CHESS 4.4; Slate, Atkin, CDC Cyber 175	TREEFROG; Hansen, Calnek, Crook, Honeywell 6080
1976	Houston	CHESS 4.5; Slate, Atkin, CDC Cyber 176	CHAOS; Swartz, Berman, ALexander Ruben, Toikka, Winograd, Amdahl 470
1977	Seattle	CHESS 4.6; Slate, Atkin, CDC Cyber 176	DUCHESS; Truscott, Wright, Jensen, IBM 370/168
1978	Washington	BELLE; Thompson, Condon, PDP 11/70 w/ chess hardware	CHESS 4.7; Slate, Atkin, CDC Cyber 176
1979	Detroit	CHESS 4.9; Slate, Atkin, CDC Cyber 176	BELLE; Thompson, Condon, PDP 11/70 with chess hardware
1980	Nashville	BELLE; Thompson, Condon, PDP 11/70 w/ chess hardware	CHAOS; Alexander, O'Keefe, Swartz, Berman, Amdahl 470
1981	Los Angeles	BELLE; Thompson, Condon, PDP 11/23 w/ chess hardware	NUCHESS; Blanchard, Slate, CDC Cyber 176
1982	Dallas	BELLE; Thompson, Condon, PDP 11/23 w/ chess hardware	CRAY BLITZ; Hyatt, Gower, Nelson, Cray 1

1983 Not held as the ACM NACCC that year but as the Fourth World Championship. See World Championships.

1984	San Fransisco	CRAY BLITZ; Hyatt, Gower, Nelson, Cray XMP/4	BEBE; Scherzer, Chess Engine, and FIDELITY EXPERIMENTAL; Sparcklen, Spracklen, Fidelity machine
1985	Denver	HITECH; Ebeling, Berliner, Goetsch, Paley Campbell, Slomer, SUN w/ chess hardware	BEBE; Scherzer, Chess engine
1986	Dallas	BELLE; Thompson, Condon, 11/23+c.h.	LACHEX; Wendroff, Cray X-MP
1987	Dallas	CHIPTEST-M; Anantharaman, Hsu Campbell, SUN 3 with VLSI chess hardware	CRAY BLITZ; Hyatt, Nelson, Gower Cray XMP 4/8

*Called the ACM United States Computer Chess Championship from 1970-1974; renamed the ACM North American Computer Chess Championship in 1975; renamed the ACM International Computer Chess Championship in 1991.

1988 Orlando	DEEP THOUGHT 0.02; Hsu Anatharaman, Browne, Campbell, Nowatzyk, SUN 3 w/ VLSI circuitry	CHESS CHALLENGER EXP; Spracklen, Spracklen, Nelson, Fidelity machine with Motorola 68030 microprocessor
1989 Reno	HITECH*; Ebeling, Berliner, Goetsch, Paley, Campbell, Slomer, SUN w/ chess hardware (* denotes 1st-place tie)	DEEP THOUIGHT*; Hsu, Anantharaman, Browne, Campbell, Nowatzyk, 3 SUN 4s w/ VLSI chess hardware
1990 New York	DEEP THOUGHT/88; Hsu, Anantharaman, Jensen, Campbell, Nowatzyk, SUN 4 with two special VLSI chess circuits	MEPHISTO; Lang, 68030 microprocessor MEPHISTO machine
1991 Albuquerque	DEEP THOUGHT II, Hsu, Campbell, RS/6000 550 + 24 chess processors.	M CHESS; Hirsch, IBM PC Clone/486.

WORLD CHAMPIONS

Year	City	Winner	Runner-up
1974	Stockholm	KAISSA; Donskoy, Arlazarov, ICL 4/70	CHESS 4.0; Slate, Atkin, CDC 6600
1977	Toronto	CHESS 4.6; Slate, Atkin, CDC Cyber 176	DUCHESS; Truscott, Wright, Jensen, IBM 370/165
1980	Linz	BELLE; Thompson, Condon, PDP 11/23 with chess circuitry	CHAOS; Alexander, Swartz, Berman O'Keefe, Amdahl 470/V8
1983	New York	CRAY BLITZ; Hyatt, Gower, Nelson, Cray XMP/48	BEBE; Scherzer, Chess engine
1986	Cologne	CRAY BLITZ; Hyatt, Gower, Nelson, Cray XMP	HITECH; Berliner, et al., SUN workstaton with chess circuitry
1989	Edmonton	DEEP THOUGHT; Hsu, Anantharaman Browne, Campbell, Jansen, Nowatzyk, SUN with VLSI chess hardware	BEBE; Scherzer, Scherzer, Chess Engine
1992	Madrid	CHESS MACHINE/SCHRÖDER, Schröder, ARM2	ZUGZWANG; Feldman, Mysliwietz, Parsytec T-800

WORLD MICROCOMPUTER CHAMPIONS

Year	City	Winner	Runner-up
1980	London	CHESS CHALLENGER	BORIS EXPERIMENTAL
1981	Travemunde	FIDELITY X	CHESS CHAMPION MARK V
1983	Budapest	ELITE A/S	MEPHISTO X
1984	Glasgow	Four way tie: ELITE X, MEPHISTO S/X, PRINCHESS, PSION CHESS	
1985	Amsterdam	MEPHISTO AMSTERDAM I	MEPHISTO AMSTERDAM II
1986	Dallas	MEPHISTO DALLAS 3	FIDELITY "2533"
1987	Rome	MEPHISTO	CYRUS 68K
1988	Almeria	MEPHISTO	FIDELITY
1989	Portoroz	MEPHISTO	FIDELITY
1990	Lyons	MEPHISTO	Tie: ECHEC 1.9 & GIDEON
1991	Vancouver	Tie: MEPHISTO & GIDEON	

1992 Not held in 1992. The next championship is scheduled to take place in Germany in the autumn of 1993.

Morph: An Experience-Based Adaptive Chess System

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The best chess computers and the best humans play chess at the master or grandmaster levels but that is where the similarity ends. Chess computers have been built to search millions or even billions of positions per second relying on superficial numerical assessments of each position that when combined properly lead to good moves.

In contrast, psychological evidence indicates that human chess players consider very few positions, and base their positional assessments on a rich set of structural/perceptual patterns that have been learned through experience. Morph is a computer chess program that has been developed to be more consistent the cognitive models.

The current model of computer chess programming was largely developed in the 1960s and has been refined ever since. The main characteristic of the model is the use of brute-force alpha-beta minimax search with selective extensions for special situations such as forcing variations. This has been further enhanced by special purpose hardware (as in Deep Thought) . This model has been so successful that little else has been tried outside this paradigm.

The few alternative approaches from the Artificial Intelligence community have fared poorly due to the expense in applying the "knowledge" that had been supplied to the system. In recent years, the few times chess has been applied as a testbed only a small sub-domain of the game was used in the research thus glossing over the fundamental efficiency issues that AI researchers must ultimately grapple with

.

However, there is a third approach that neither relies mainly on search nor the symbolic computation approach of knowledge-oriented AI: what we shall call the "pattern-oriented approach". In this approach configurations of interaction between squares and pieces are stored along with their significance. A uniform method is used to combine the significances in a given position to reach a final evaluation for that position. That such an approach is possible is evidenced by psychological models of human chess play that have determined that human masters consider only about 10-100 positions in determining where to move and that their evaluations are based on (approximately) 50,000-100,000 patterns culled from experience.

It is not conceivable that the detailed knowledge required to evaluate positions in this way could be supplied directly to a machine, thus learning is required. A learning mechanism has been developed that combines recently developed machine learning methods in weight-updating, genetic, and temporal-difference learning modules to create, delete, generalize and evaluate graph patterns. A sophisticated associative pattern retrieval system for semantic network patterns (graphs) organizes the database for efficient processing. Morph has been developed based on the pattern-oriented approach. Morph differs from most of today's neural networks in that it manipulates structured symbolic data as opposed to numerical or relational. Also, the contents of Morph's learned knowledge is transparent to an observer of its database.

To strengthen the connections with the cognitive model, Morph's knowledge is restricted to come from its own playing experience, no sets of pre-classified examples are given and beyond a graph pattern representation scheme (that shows the interactions between pieces and squares) little chess knowledge such as the fact that having pieces is valuable(leave alone their values) or the rules(!) or the goal has been provided to the system. Morph is told however which moves it can chose from a given position and whether it wins or loses.

Further, the system has been limited to using only 1-ply of search. This year, however, we added a "selective" searching mechanism to Morph that allows it to consider (based on its experience) up to 100 positions from the root position in determining what move to make. This guided search mechanism brings Morph even closer to the cognitive model.

Results with Morph have been encouraging yet challenging! The system has learned the relative values of the pieces and many structural patterns that are recognizable by good chess players. Further, it gives most patterns appropriate values. The system plays reasonable opening moves, developing pieces, castling and attempting to control the center. When Morph has been limited to 1-ply search it is able to draw its archrival and trainer GnuChess (a fairly strong traditional program) once every thousand games, and has two victories in its career of many thousands of games. Most important to us in this stage of the research is that Morph demonstrates a consistently growing learning curve in its ability to win and retain material and to prolong the game. It is hoped that the addition of selective searching as well as more sophisticated pattern addition and retrieval strategies will soon make Morph competitive with its trainer and other tournament players. We feel that each step taken in improving the power of Morph's learning mechanism (which is not really dependent on chess) brings us that much closer to achieving a true computational model of intelligence and its development.

In the demonstration in the tournament hall, Morph will start with an empty database and will be in a "training cycle": it will play a game with GnuChess, learn from the game and repeat. This cycle will continue throughout the duration of the tournament. Each of Morph's games will be displayed as they are being played and spectators will have the opportunity to join the cycle and play Morph themselves. The level of improvement of Morph's, initially random play, to its level after 4 days of training should be significant.

Danny Kopec
Monty Newborn
Mike Valvo

The 22d Annual ACM International Computer Chess Championship

Albuquerque, New Mexico

DEEP THOUGHT II coasted through five rounds of play at the 22d Annual ACM International Computer Chess Championship, capturing first place with a perfect 5-0 score. The five round Swiss-style tournament was held in Albuquerque, New Mexico at the Doubletree Hotel. Twelve teams participated with all but two teams playing clearly at the level of chess masters. Finishing in second place with a 4-1 score was M CHESS, which received the award for best small computer; while CRAY BLITZ and MEPHISTO tied for third place with 3-2 scores. $8,000 in prizes were distributed with $4,000 going to the winner.

DEEP THOUGHT II ran on an IBM RS/6000 550 processor connected to 24 specially designed VLSI chess processors. The IBM programming team of Feng-hsiung Hsu and Murray Campbell had used only two processors last year when DEEP THOUGHT/88 managed to tie for first place, but this year, with an additional year of software improvements and much improved hardware, their program clearly dominated the competition. It was carrying out brute-force searches on most moves to a depth of ten levels (five moves for each side) and deeper along tactical lines. During endgame play, it searched even deeper. On average, DEEP THOUGHT II examined 5,000,000 chess positions per second. With moves made at an average rate of 180 seconds per move, 900,000,000 chess positions were searched by the program when making a move.

M CHESS, developed for an IBM PC by Marty Hirsch, lost only to DEEP THOUGHT II in the second round. Its most impressive win was over HITECH in the final round when the latter caused most of its own problems by playing too agressively with its queen early in the game.

CRAY BLITZ, running on an 8-processor CRAY YMP, and MEPHISTO, running on a Motorola 68030 microprocessor, each won their final-round game to move ahead of HITECH and CHESS MACHINE/SCHROEDER and finish in a tie for second place. CRAY BLITZ, developed by Robert Hyatt of the Univesity of Alabama at Birmingham and Bert Gower of the University of Southern Mississippi, was world champion from 1983 to 1989. MEPHISTO was developed by Richard Lang of the United Kingdom.

The rules for this championship reverted back to the former ones after a one-year experiment with "finite duration games." At the previous championship, the rules of play were changed: each side was given two hours to play. If one side took more time, it lost the game. This format has been tried in the human chess community with considerable success and might eventually be best for computer play also. Currently, however, a human operator is required to make the moves for each computer, giving rise to problems near the end of the game when the speed of play causes the human operator to panic. Further, last year HITECH unfortunately lost a dead-drawn endgame on time because the rules required all games to be played to completion. Thus, the old rules of 40 moves per side in two hours and 20 moves per side per hour thereafter were used.

Jaap van den Herik, editor the *Journal of the International Computer Chess Association,* attended the championship as an honored guest. As editor of the *Journal,* van den Herik has played a leading role in creating the most important publication in the world of chess.

Also attending the championship were the chess teams from two junior high schools: Adam Clayton Powell, Jr. JHS of New York City (coached by Richard Gudonsky) and Julia R. Masterson JHS of Philadelphia (coached by Steven Shutt). They had finished in a tie for the U.S. Junior High School Championship earlier in the year and they came to Albuquerque to play a friendly match to determine an unofficial champion. The unofficial winner was . . . well, since it was unofficial, maybe it's best not to say!

The event was partially supported by the IBM Corporation and the organizers would like to express their thanks. Also to be thanked are members of the Albuquerque Chess Club for their assistance.

The next ACM International Computer Chess Championship is scheduled for Indianapolis in February 1993 at the ACM Computer Science Conference. More information can be obtained by writing: M. Newborn, School of Computer Science, McGill University, Montreal, Quebec, Canada H3A 2A7.

Round 1

All the ranked computers except MEPHISTO won. MEPHISTO dominated SOCRATES throughout the opening and early middle game, but pressed too hard, got overextended and its position came apart at the seams. It is a game worth playing over as there were many interesting tactics.

DEEP THOUGHT II got an advantage out of the opening and kept squeezing until ZARKOV's position fell apart in a game that showed the power of two bishops.

CRAY BLITZ managed to obtain the advantage of two minor pieces against a rook and pawn in its game with BP. On a purely material basis, this is considered equal, but the activity proved too much for the rook to handle.

BEBE seemed to have caught CHESS MACHINE/SCHROEDER unprepared with its own private book, but it did not appreciate the dark-colored bishop's pressure on the g7 square and never could get the kingside developed.

The LACHEX vs. HITECH game seemed equal for a long time, but HITECH dominated in the endgame. LACHEX played the opening too tenatively and allowed Black to equalize easily and even obtain a slight edge.

DELICATE BRUTE played an interesting pawn sacrifice against M CHESS, but could never convert its temporial advantages into anything concrete. After that, M CHESS was in complete command.

CHESS MACHINE/SCHROEDER vs. BEBE

1.d4 Nf6 2.Nf3 c5 3.dxc5 e6 4.b4 a5 5.c3 b6 6.cxb6 axb4 7.Be3 Nd5 8.Bd4 Nxb6 9.e4 Bb7 10.a3 Bxe4 [10...bxa3 11.Qb3] 11.cxb4 Nc6 12.Bc3 Nd5 13.Bb2 d6 14.Nbd2 Bxf3 [14...Bg6] 15.Nxf3 Qb6 16.Rc1 h5 [16...Nf6] 17.Qc2 Ncxb4 18.axb4 Qxb4+ 19.Kd1 Rd8 20.Rb1 Qc5 21.Qa4+ Ke7 22.Bd4 Qc7 23.Bc4 Rb8 24.Rxb8 Qxb8 25.Bxd5 Rg8 26.Ng5 1-0

CRAY BLITZ vs. BP

1.e4 e5 2.Nf3 Nc6 3.Bb5 a6 4.Ba4 Nf6 5.O-O Be7 6.Bxc6 dxc6 7.d3 Nd7 8.b3 c5 9.Be3 b6 10.Nbd2 Bb7 11.c3 O-O 12.Qc2 Bd6 13.Rad1 Re8 14.d4 exd4 15.cxd4 cxd4 16.Bxd4 c5 17.Bb2 Bf4 18.Nc4 Bc6 19.Nfe5 Qc7 20.Nxd7 Bxd7 21.g3 Bh3 22.gxf4 Qxf4 23.Qc3 Qg4+ 24.Qg3 Qxg3+ 25.hxg3 Bxf1 26.Kxf1 Re6 27.Rd7 Rae8 28.f3 f6 29.Ke2 Kf8 30.Ba3 Kg8 31.Kd2 h5 32.Ke2 g5 33.Ne3 g4

34.Bb2 gxf3+ 35.Kxf3 Rf8 36.Nf5 b5 37.Nh6+ Kh8 38.Kf4 c4 39.Kf5 Ree8 40.Kg6 Rg8+ 41.Kxf6 Rxg3 42.Bd4 Re7 43.Rxe7 1-0

LACHEX vs. HITECH
1.d4 d5 2.c4 dxc4 3.e3 Nf6 4.Bxc4 e6 5.Nf3 c5 6.O-O a6 7.Nc3 b5 8.Be2 [8.Bb3 Bb7 9.Qe2 cxd4 10.Rd1 Be7 11.exd4] 8...Bb7 9.Ne5 Nc6 10.Bf3 Rc8 11.dxc5 Qxd1 12.Rxd1 Bxc5 13.a4 b4 14.Ne4 Nxe4 15.Bxe4 Rc7 16.Bxc6+ Bxc6 17.Bd2 [17.Nxc6 Rxc6 18.b3] 17...Bd5 18.Nd3 a5 19.Nxc5 Rxc5 20.Rdc1 Rxc1+ 21.Rxc1 Kd7 22.f3 Bb3 23.e4 Rc8 24.Rxc8 Kxc8 25.Be3 Kc7 26.Bd4 f6 27.g4 Kc6 28.e5 f5 29.gxf5 exf5 30.Kg2 g6 31.Be3 Bxa4 32.f4 Bb3 33.Bd2 Kc5 34.Be3+ Kd5 35.h4 Ke4 36.Kf2 a4 37.Bd2 a3 38.bxa3 bxa3 39.Kg3 Kd3 40.Bc1 a2 41.Bb2 Kc2 42.Bd4 Kb1 43.h5 gxh5 0-1

DELICATE BRUTE vs. M CHESS
1.e4 c5 2.c3 Nf6 3.e5 Nd5 4.d4 cxd4 5.cxd4 d6 6.Bc4 Nb6 7.Bb5+ Bd7 8.e6 fxe6 [8...Bxb5 9.Qh5] 9.Bd3 g6 10.h4 Ba4 11.Qg4 Qc8 12.Ne2 Nd5 13.O-O Bc6 14.Nbc3 Nf6 15.Qh3 Bg7 16.Nf4 Bd7 17.Bb5 Nc6 18.Bxc6 bxc6 19.Qd3 O-O 20.Re1 Ng4 21.f3 Nh6 22.h5 Nf5 23.hxg6 Bxd4+ 24.Kh1 e5 25.gxh7+ Kxh7 26.g4 Rh8 27.b4 Kg8+ 28.Nh5 Ng3+ 29.Kg2 Nxh5 30.gxh5 Bh3+ 31.Kg3 Bf5 32.Qc4+ d5 33.Qb3 Rxh5 34.Bb2 Kh8 35.Ba3 Qg8+ 0-1

SOCRATES vs. MEPHISTO
1.e4 c5 2.Nf3 d6 3.Bb5+ Bd7 4.Bxd7+ Qxd7 5.c4 Nc6 6.O-O Nf6 7.Nc3 e5 8.d3 Be7 9.Nd5 O-O 10.Nxe7+ Qxe7 11.Bd2 Nd7 12.Re1 f5 13.Qb3 fxe4 14.dxe4 Nb6 15.Ng5

Computing System Information

Program/ Authors	Computing system, language, etc. (* indicates computer at site)	Nodes/ sec.	Rating estimate
BEBE Tony Scherzer Linda Scherzer	SYS-10 Chess Engine, assembler, special-purpose chess circuitry, 64KB, 16 bits, 10 mips, 3 Meg hash table.*	40000	2150
BP Robert Cullum	486/33 clone, C & assembler, 20 Mips, 4 Meg, 32 bits, 1 Meg hash table.* (Highly selective search)	1600	2250
CHESS MACHINE/ SCHROEDER Ed Schroeder, Jan Louwman	ARM-2 Risc Processor (Archimedas) 31 mhertz*	NA	2400
CRAY BLITZ Robert Hyatt Bert Gower	Cray YMP-8, Fortran+C+assembler 1330 Mips, 64 Mw, 64 bits, 8 processors 60 Megaword hash table, (Cray Research Computer Center, Eagen MN).	200K–500K	2200+
DEEP THOUGHT II Feng-hsiung Hsu Murray Campbell (with contributions from Joe Hoane and Jerry Brody)	RS/6000 550 (host) & 24 custom chess processors C+microassembler, 44 mips (host), 192MB (host) 32 bits (host), 2 million entry hash table (IBM T. J. Watson Research Center, Hawthorne, NY).	5M	2550+
DELICATE BRUTE Don Beal	SUN 4	6K	2200
HITECH Carl Ebeling Hans Berliner Chris McConnell	SUN 4 with special chess hardware, microcode + assembler, 1 M hash table, (Carnegie Mellon University).	100K	2400
LACHEX Tony Warnock, Burt Wendroff	CRAY YMPZE, FORTRAN + assembler 4 million position hash table	50K	2328
M CHESS Marty Hirsch	IBM PC or clone, 80486, C + assembler 5 mips, 640KB, 32 bits, 16K position hash table*	5K	2450
MEPHISTO Richard Lang	68030 Mephisto machine, assembler 128K ROM, 32 bits, 45 mh., 1M hash table.*	10K	2350
SOCRATES Don Dailey, Larry Kaufman, Mark Leski	IBM PC or clone, 486 33 Mhz or 50 Mhz*	NA	NA
ZARKOV John Stanback	HP 9000/732, C 67 mips, 32 Meg, 32 bits, 64K position hash table (HP, Fort Collins, Colorado)	10K	2400

h6 16.Nh3 Qe6 17.Rac1 Nd4 18.Qd3 Nf3+ 19.gxf3 Qxh3 20.Re3 Rf4 21.Qf1 Qh5 22.Qd3 Rh4 23.Qxd6 Rxh2 24.Kf1 Qh4 25.Be1 Rd8 26.Qe6+ [26.Qxe5 Rd2] 26...Kh7 27.Ke2 Qg5 28.Bc3 Qg2 29.Rf1 Rd1 30.Qf5+ Kg8 31.Be1 Rd6 32.Rb3 a6 33.Qxe5 Nxc4 34.Qxc5 b5 35.a4 Re6 36.Qc8+ Kf7 37.Qd7+ Re7 38.Qd5+ Re6 39.axb5 axb5 40.Qf5+ Rf6 41.Qxb5 Nd6 42.Qd7+ Kg6 43.e5 Rh5 44.exf6 Re5+ 45.Re3 Rxe3+ 46.Kxe3 Qxf1 47.Qxg7+ Kf5 48.Bc3 Qc1+ 49.Ke2 Qc2+ 50.Kf1 Qc1+ 51.Kg2 Qg5+ 52.Kh3 Qh5+ 53.Kg3 Qg5+ 54.Qxg5+ Kxg5 55.Be5 Nf7 56.f4+ Kf5 57.b4 Kg6 58.b5 Nd8 59.f5+ Kf7 60.b6 Kf8 61.Kh4 1-0

DEEP THOUGHT II vs. ZARKOV
1.e4 e5 2.Nf3 Nc6 3.Bb5 a6 4.Ba4 Nf6 5.O-O Be7 6.Re1 b5 7.Bb3 d6 8.c3 O-O 9.h3 Na5 10.Bc2 c5 11.d4 Qc7 12.Nbd2 cxd4 13.cxd4 Bd7 14.Nf1 Rac8 15.Re2 exd4 16.Nxd4 Nc6 17.Be3 h6 18.Ng3 Nxd4 19.Bxd4 Be6 20.Nf5 Bxf5 21.exf5 Rfd8 22.a4 b4 23.Bd3 a5 24.Ba6 Rb8 25.Rc1 Qd7 26.Bb5 Qb7 27.Bc6 Qc7 28.Qe1 Kf8 29.Rec2 Ng8 30.Be4 Qd7 31.Rc7 Qxa4 32.Ba7 [32.f6 gxf6 (32...Bxf6 33.Rxf7+ Kxf7 34.Bd5+) 33.Bh7 Rd7 34.Qe2 Rxc7 35.Rxc7 Bd8] 32...d5 33.Bxd5 Rxd5 34.Bxb8 Qe8 35.Ba7 Rd7 36.Bb6 Rxc7 37.Rxc7 Nf6 38.Qc1 Bd8 39.Rc8 Bxb6 40.Rxe8+ Kxe8 41.Qc6+ Nd7 42.Qa8+ Ke7 43.Kf1 Nf6 44.Qb7+ Nd7 45.Qd5 Ke8 46.Qe4+ Kf8 47.h4 Nf6 48.Qa8+ Ke7 49.Qb7+ Nd7 50.Qe4+ Kf8 51.h5 Nf6 52.Qa8+ Ke7 53.Qb7+ Nd7 54.Qe4+ Kf8 55.Qd5 Ke7 56.Ke2 Ke8 57.Qe4+ 1-0

Round 2

HITECH finished first with a dominating win over CHESS MACHINE/SCHROEDER. The opening was a "quiet" c3 Sicilian that was met by d5. The black king never escaped from the center and a cute piece sacrifice finished him off.

DEEP THOUGHT II had a hard time gaining an advantage against M CHESS and the game seemed quite equal for a long time. Finally, M CHESS missed a necessary endgame nuance and the end became clear.

MEPHISTO must have used one of its nine lives in its game with LACHEX. LACHEX was never programmed for under-promotion and got hit with a knight promotion accompanied by a double check. Bert Wendroff never programmed under-promotion because ". . . it never came up." Last night he left before the game was over and was greeted with a phone call: "It came up."

CRAY BLITZ was winning easily after an opening error by SOCRATES. Matters started going down hill, however, and CRAY BLITZ soon had a difficult double rook ending on its hands. A hash table bug resulted in dropping CRAY BLITZ's most dominant pawn and the game was instantly drawn. BEBE got caught in an opening it did not know and soon lost the exchange against BP. DELICATE BRUTE played beautiful chess against ZARKOV, but eventually fell prey to some tactical nuances. Even then, a draw was possible.

HITECH vs. CHESS MACHINE/SCHROEDER
1.e4 c5 2.c3 d5 3.exd5 Qxd5 4.d4 Nc6 5.Nf3 Bg4 6.Be2 cxd4 7.cxd4 e6 8.O-O Rd8 9.Nc3 Qa5 10.h3 Bxf3 11.Bxf3 Nxd4 12.Bxb7 Ne7 13.Be4 e5 14.Bd2 Qa6 15.Rc1 f5 16.Bc2 Nxc2 17.Qxc2 Rd6 18.Be3 f4 19.Bd2 Rd4 20.Rfe1 Qd3 21.Qb3 a5 22.Qb8+ Rd8 23.Qxe5 Qxd2 24.Nb5 Qd7 25.Rcd1 Qc6 26.Nc7+ 1-0

BEBE vs. BP
1.e4 e5 2.Nf3 Nc6 3.Bb5 a6 4.Ba4 Nf6 5.O-O Be7 6.Re1 b5 7.Bb3 d6 8.c3 O-O 8.h3 Na5 10.Bc2 c5 11.d4 Qc7 12.Nbd2 cxd4 13.cxd4 Bb7 14.Nf1 Rac8 15.Bd3 d5 16.exd5 e4 17.Bxe4 Nxe4 18. Rxe4 Bxd5 19.Bf4 Qd8 20.Re1 Nc6 21.Ne3 Bb4 22.Nxd5 Bxe1 23.Nc3 Bxc3 24.bxc3 Ne7 25.Qd3 Nd5 26.Bd2 Qd6 27.a4 Qg6 28.Qxg6 fxg6 29.axb5 axb5 30.Ra3 Rc7 31.Ng5 Rc4 32.Ne4 b4 33.Ra4 b3 34.Ra1 b2 35.Rb1 Rb8 36.Kh2 Ra4 37.c4 Rxc4 38.Kg3 Rxd4 39.f3 Rc4 40.h4 Rc2 41.Kf2 Nb6 42.Kg3 Nc4 43.Bf4 Rb6 44.Bg5 Na3 45.Rd1 b1Q 0-1

MEPHISTO vs. LACHEX
1.e4 e5 2.Nf3 Nc6 3.Bb5 a6 4.Ba4 Nf6 5.O-O Nxe4 6.d4 b5 7.Bb3 d5 8.dxe5 Be6 9.Nbd2 Nc5 10.c3 d4 11.Bxe6 Nxe6 12.cxd4 Ncxd4 13.Ne4 Be7 14.Be3 Nf5 15.Qc2 O-O 16.Nf6+ Bxf6 17.Qxf5 Be7 18.Rfd1 Qc8 19.Rd2 c5 20.Rad1 Qc6 21.b3 Rad8 22.h3 c4 23.bxc4 bxc4 24.Nd4 Nxd4 25.Rxd4 c3 26.Rc1 Ba3 27.Rc2 Bb2 28.Qe4 Qe6 29.Ra4 Rd1+ 30.Kh2 Rfd8 31.Rc4 Rc8 32.Rxc8+ Qxc8 33.a4 Ra1 34.Bb6 Qe8 35.a5 Ra4 36.Qd5 Rb4 37.Qd6 Rc4 38.Kg1 h6 39.Qd3 Ra4 40.Qd6 Re4 41.Bc7 Re1+ 42.Kh2 Qc8 43.Qb6 Qf5 44.Qb8+ Kh7 45.e6 Qxc2 46.exf7 Ba3 47.Qg8+ [47.Bd6 Rh1+ 48.Kxh1 Qd1+ 49.Kh2 Bxd6+] 47...Kg6 48.Qe8 Qe4 [48...Rxe8 49.fxe8Q+ Kh7] 49.f8N + Kf6 50.Nd7+ Kg5 1-0

SOCRATES vs. CRAY BLITZ
1.e4 e5 2.Nf3 Nc6 3.d4 exd4 4.Nxd4 Nf6 5.Nxc6 bxc6 6.e5 Qe7 7.Qe2 Nd5 8.c4 Ba6 9.b3 Qh4 10.a3 Bc5 11.Qf3 Nb6 12.Bb2 O-O 13.Nd2 Rfe8 14.Ne4 Bf8 15.c5 [15.Bd3] 15...Bxf1 16.Kxf1 Nd5 17.Kg1 Qf4 18.Rd1 Qxf3 19.gxf3 Rab8 20.Rd3 Nf4 21.Re3 Rb5 22.Kf1 a5 23.Rg1 Nd5 24.Rd3 Reb8 25.b4 axb4 26.Nf6+ Nxf6 27.exf6 g6 28.axb4 Rxb4 29.Be5 d6 30.Bg3 d5 31.Bxc7 Rc8 32.Bb6 Rc4 33.Kg2 Bxc5 34.Bxc5 Rxc5 35.Rb1 h6 36.Rb7 Rc4 37.Rd7 h5 38.Re3 Rf4 39.Rc3 Rxf6 40.Rxd5 Rc7 41.Rdc5 Rd6 42.f4 f5 43.Kf3 Kg7 44.h4 Kf6 45.Rc2 Ke6 46.Re5+ Kf7 47.Rec5 Kf6 48.Rc1 Ke7 49.Re5+ Kf7 50.Rec5 Kf8 51.R1c2 Rd3+ 52.Kg2 Rd4 53.Rxc6 Rxc6 54.Rxc6 Kf7 55.Kf3 Rd7 56.Rc3 ½-½

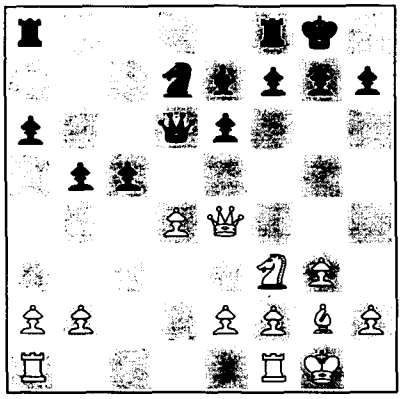
ZARKOV vs. DELICATE BRUTE
1.d4 Nf6 2.c4 e6 3.Nc3 Bb4 4.e3 b6 5.Bd3 Bb7 6.Nf3 Ne4 7.O-O Bxc3 8.bxc3 f5 9.Bxe4 Bxe4 10.Ba3 d6 11.Qe2 O-O 12.Nd2 Bb7 13.Bb2 Qf6 14.Rae1 Nd7 15.f4 Rfe8 16.Nf3 e5 17.fxe5 dxe5 18.Rd1 f4 19.exf4 exf4 20.Qc2 Be4 21.Qd2 Qc6 22.Qxf4 Qxc4 23.Nd2 Qc6 24.Nxe4 Rxe4 25.Qf7+ Kh8 26.Rde1 Rxe1 27.Rxe1 Rf8 28.Re8 Qf6 29.Qfx6 gxf6 30.Re7 Rd8 31.Bc1 c5 32.Bf4 Nf8 33.Bh6 Nd7 34.Kf2 cxd4 35.Bg7+ Kg8 36.cxd4 a5 37.g4 b5 38.Ke2 b4 39.Kd2 a4 40.h3 a3 41.Kc2 Rc8+ 42.Kb1 [42.Kb3 Nb6 43.Bxf6 Rc3+ 44.Kxb4 Nd5+] 42...Rd8 [42...Nb6 43.Bxf6 Nd5 44.Rg7+ Kf8 45.Be5 Nc3+ 46.Ka1 Nd5] 43.h4 h5 44.gxh5 f5 45.h6 f4 46.d5 f3 47.Bd4

Kf8 [47...Nf6 48.Bxf6 f2] 48.d6 Nf6 49.Re3 Nh7 50.Rxf3+ Ke8 51.Re3+ Kf7 52.Re7+ Kg6 53.d7 Nf8 54.h7 Nxh7 55.Bb6 1-0

M CHESS vs. DEEP THOUGHT II
(Annotated by IM Mike Valvo)
Although played in the second round, this game proved to be the deciding game of the championship as both of these competitors defeated every other opponent they faced. The game was even most of the way; DEEP THOUGHT II could only claim a slight pawn structure advantage after M CHESS's 24. f4.

A chess point needs to be made here. Since White moves first, it has a natural advantage in initiative. White's goal in the opening is to preserve that edge and transform it into something more tangible, while Black's is to neutralize it and equalize. This particular game followed opening theory so closely that this issue was a significant factor. White followed that theory for fifteen moves and obtained nothing. The resulting situation, however, was so balanced that it was extremely difficult for either side to press for a win. DEEP THOUGHT II paid more attention to development principles and by the twenty-third move was well positioned to exert great pressure on the White setup. M CHESS responded with a slight pawn structure weakening, but did not follow up its aggressive play. It then became clear that DEEP THOUGHT II had a clear edge, but was it going to be enough? Most likely it would not have been, but M CHESS missed a necessary defensive maneuver (38. g5!) and began to crumble.

1. d4 Nf6 2. c4 e6 3. g3
This treatment is known as the "Catalan Opening." It is an unusual hybrid of a classical setup (white pawns on c4 and d4) and the Reti Opening (Nf3,g3,Bg2). White fights for control of the center from the very first move, and the bishop on g2 hinders Black's queenside development. The so called "Open" variation of the Catalan (which occurs in this game) is typified by the Black capture dxc4 at some point.
3 ... d5 4. Bg2 Be7 5. Nf3 O-O 6. O-O dxc4 7. Qc2 a6 8. Qxc4 b5 9. Qc2 Bb7
A word about strategy in this position (from the point of view of humans!): The whole game revolves around whether or not Black can play its pawn from c7 to c5. If that can be safely managed, the position is considered equal for Black. White's strategy is to do everything to prevent that break and Black's is to do everything to enhance it. An important secondary goal for White is to occupy the c5 square with a knight.
10. Bd2
The idea behind this move is not only to preserve the bishop from exchange, but to go to a5 and hinder c7-c5. White has other possibilities (for example, 10. Bf4 Nd5 11. Nc3 Nxf4 12. gxf4 Qc8 13. Ne4! which led to victory in Ribli-Karpov, Amsterdam, 1980 or 10. Nbd2 Nbd7 11. Nb3 Be4 12. Qc3 Nd5! and White must allow Black's pawn to advance to c5), but 10. Bd2 has always been considered the most dangerous variation for Black.
10 ... Be4 11. Qc1 Bb7 12. Bf4!?
This was considered the most topical line until Black's 14th move put it out of business as a way for White to gain an advantage. White can, of course, "offer" to repeat the position with 12. Qc2. It is not clear what DEEP THOUGHT II would have done than as it must evaluate the position as very slightly better for White. You can bet that DEEP THOUGHT II had been programmed with some kind of "contempt" factor which would cause it to decline a draw even if standing a little worse. In this position, Kasparov's choice against Karpov in the World Championship match in Moscow (1984–85) was 12. Be3. That game continued 12...Nd5 13. Nc3 Nd7 14. Rd1 Rc8 15. Nxd5 Bxd5 16. Ne1 c6 17. Nd3 Qb6 18. Qc3 b4 19. Qd2 at 20. Rdc1 and a draw was agreed at this point.
12 ... Nd5 13. Nc3 Nxf4 14. Qxf4 Qd6!
This 1988 innovation has, since then, caused White to look elsewhere for an advantage. DEEP THOUGHT II can no longer be prevented from advancing its pawn to c5 and thereby equalizing. Previously, Black has played 14...c5 15. dxc5 Bxc5 16. Rfd1 Qb6 17. Ne5 with a slight White edge (Vaganian-Anderson, Leningrad 1987).
15. Qe3!?
This was Khalifman's suggestion at the time without giving any continuations. Numerous other ideas have been tried here (15. Ne5 Khalifman-Karpov, USSR Championship in 1988; 15. Rac1 Kaidanov-Goldune 1988) without yielding White any opening advantage.
15... Nd7 16. Ne4
White must try 16. Rfd1 to try to hold down Black's c5 break with possible continuations of 16...Nf6!? 17. Rac1 or 16...Qb6! intending to recapture on c5 with the bishop.
16...Bxe4 17. Qxe4 c5!=
Black equalizes with this move.


Position after 17...c5

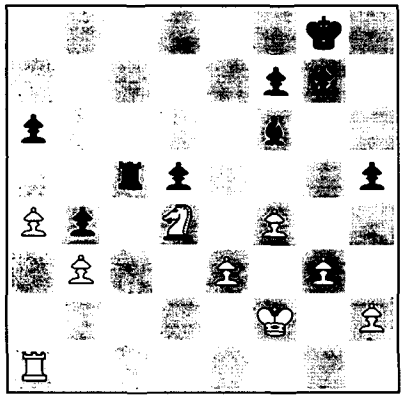
18. Rac1 Rac8 19. dxc5 Rxc5 20. Rcd1
White is in serious trouble if it has to concede the c-line so easily and allow Black to dominate the position. However, after 20. Rfd1, DEEP THOUGHT II has 20...Rfc8! and if 21. Rxd6, than 21. ...Rc1+ 22. Bf1 Bxd6 23. Qd3 Rc6 etc.
20...Qc7 21. Nd4
The threat here is 22. Nxe6!
21 ... Ne5 22. b3 Bf6 23. e3 Rd8 24. f4!?
The alternative was to go completely passive with a move like 24. Kh1. Black has demonstrated that it is slightly better due to control of the c-file and more active placement of its pieces.
24...Ng6 25. Qb7
More consistent is 25. Nc6!? intending Nb4 to harass the only slight Black pawn weakness on the queenside.
25...Qxb7 26. Bxb7 Rb8 27. Be4 Ne7 28. Rc1 Rbc8 29. Rxc5 Rxc5 30. Kf2 Nd5 31. Ra1 h5!

DEEP THOUGHT II has squeezed significant winning changes out of the position.

32. a4

Not a pleasant choice because of the b3 weakness, but DEEP THOUGHT II would eventually play b5-b4 itself and the weakness would then be on a2.

32...b4 33. Bxd5 exd5!?



Position after 33 ...exd5

Things are getting critical for both sides. The DEEP THOUGHT II team was getting concerned, while this game was being played, that they would be unable to generate winning chances out of this position. It may be that 33...exd5 is a slight error that could have cost DEEP THOUGHT II a full point. Correct is the natural 33...Rxd5 34. Rd1 Rc5! to return focus on the b3 weakness. Black's plan would be to first improve its position (kingside: g6, Kg7; queenside: Rc3, a5) and then capture on d4 and b3. White's 35. e4!? does not significantly alter this plan: 35. e4 Rc3 36. e5 Be7 37. Kg2 Bc5. The point is to prevent White from obtaining compensation after capturing the b3 pawn. For example, 35. e4 Bxd4? 36. Rxd4 a5 37. Rd8+ Kh7 38. Ra8=.

34. Rd1 Rc3 35. h3 h4 36. g4 Bxd4 37. Rxd4 Rxb3 38. Rxd5

This is M CHESS's critical juncture: it just could not look deeply enough and see the correct 38. g5! The point is White would have the g4 square available for its king when Black attacks with the rook along the rank. For example, 38...Rb2+ 39. Kf3 Rh2 40. Kg4. Therefore crucial would be 38...Rb1 39. Rxd5 b3 40. Rd8+ Kh7 41. Rb8 and it is not clear how Black will be able to make significant progress. For example, 41. ...Qg6 42. Rb6+ Kf5 43. Kf3! (43. Ra6? b2! 44. Rb6 Rh2 winning). Even 41...b2!? 42. Kg2! Kg6 43. e4 Re1! 44. Rxb2 Rxe4 45. Kf3 Rxa4 46. Kg4 f5+ 47. gxf6 Kxf6 48. Rb6 Kf7 49. kg5 poses no serious problems.

38...Rb2+ 39. Kg1 Ra2 40. Rd8+ Kh7 41. Rb8 a5 42. Kf1 Rxa4

Now it is a matter of endgame technique which DEEP THOUGHT II displays itself capable of.

43. Ke2 Ra2+ 44. Kd3 g6 45. Rb5 Ra3+ 46. Ke4 b3 47. Kd4 a4 48. Rb7 Kg7 49. Kc3 Ra1 50. Rb4 Re1 51. e4 Re3+ 52. Kb2 Rxh3 53. Rxa4 Rg3 54. g5 h3 55. Ra1 h2 56. Rh1 Rh3 57. Kc1 f6 58. Kb2 fxg5 59. fxg5 Kf7 60. Kb1 Ke6 0-1

Round 3

This was a very exciting round. ZARKOV polished off MEPHISTO with a pretty piece sacrifice that forced instant resignation. This has not been a good year for the many-year champion of the micros. MEPHISTO played the little-known Pribyl Variation of the PIRC setup and ZARKOV played simple solid moves. The game transposed into a Philidor Defense which was quite satisfactory for Black. The problems started when MEPHISTO opened up the position and had to pay the price for lagging development. The conclusion, although destined to be heard around the world, was merely the merciful end of a nice game.

DELICATE BRUTE vs. BEBE was a back-and-forth game where DELICATE BRUTE seemingly held the upper hand most of the time. Then, for some strange reason, DELICATE BRUTE refused to play the winning idea of creating a passed queen's rook pawn and actually helped BEBE create counterplay in the form of a BEBE passed king pawn. After that, BEBE was without mercy.

M CHESS and SOCRATES followed recent Kasparov-Karpov play very deeply and SOCRATES obtained an opening edge as Black. However, both sides did not promote their respective play with correct pawn advances in the center (SOCRATES, Black) and kingside (M CHESS, White), although M CHESS did try. M CHESS, though, kept creating dangerous problems and eventually succeeded with an attack against SOCRATES's king. M CHESS had problems reducing the game to a technical exercise and SOCRATES created counterchances of its own, despite being a pawn down. The critical situation came about when both sides thought they were better in the queen and bishop vs. queen and knight ending. SOCRATES spurred a forced draw and lost almost immediately.

BP simply had a better Ruy Lopez book than LACHEX and quickly has a 20 minute time advantage. LACHEX conceded some positional weaknesses which BP patiently exploited.

CRAY BLITZ played a strange line against CHESS MACHINE/SCHROEDER's Open Defense to the Ruy Lopez and seemed to get the worst of the long-term prospects. CHESS MACHINE/SCHROEDER developed technical problems and played weakly in a critical position allowing CRAY BLITZ to obtain a big advantage and snare a pawn (which ironically allowed CHESS MACHINE/SCHROEDER to activate its awkwardly placed pieces). CRAY BLITZ was not able to muster the technique to bring home the full point and eventually the game transposed into a drawn position. At the end, CHESS MACHINE/SCHROEDER even stood a pawn up! We never got to see the torture-ending rook and bishop vs. rook because the game would have been adjudicated after six hours due to CRAY BLITZ's limited time slot availability.

DEEP THOUGHT II played the positional Tarrasch Variant against HITECH's French Defense and had little until HITECH played the dubious 12. d5-d4!? The position instantly became critical as White threatened to create black kingside pawn weaknesses. HITECH was unable to counter White's threats with Qb6 and the game turned into a technical demonstration which DEEP THOUGHT II performed well.

ZARKOV vs. MEPHISTO

1.e4 d6 2.d4 Nf6 3.Nc3 c6 4.Be2 Nbd7 5.Nf3 e5 6.O-O Be7 7.a3 O-O 8.h3 d5 9.exd5 e4 10.Ne5 cxd5 11.Bf4 Re8 12.Re1 a6 13.Bh5 Nxe5

14.dxe5 Nxh5 15.Qxh5 Bc5 16.Rad1 Qb6 17.Qe2 Qxb2 18.Nxd5 Ra7 19.Be3 b6 20.Bxc5 bxc5 21.Qxe4 Qxa3 22.Nf6+ gxf6 23.exf6 [23.exf6 Be6 (23...Rf8 24.Qh4) 24.Qg4+] 1-0

DELICATE BRUTE vs. BEBE

1.e4 c5 2.c3 d6 3.d4 Nf6 4.f3 cxd4 5.cxd4 e5 6.Nc3 Be7 7.dxe5 dxe5 8.Qxd8+ Bxd8 9.Be3 Be6 10.O-O-O Bb6 11.Bxb6 axb6 12.Bb5+ Nc6 13.Bxc6+ bxc6 14.Rd6 Ra6 15.Nge2 Ke7 16.Rhd1 Rc8 17.Kb1 Nd5 18.Rxe6+ fxe6 19.exd5 exd5 20.b3 Rd8 21.h4 b5 22.Kb2 d4 23.Ne4 Ra7 24.Nc1 Kf8 25Nd3 Rda8 26.Ra1 Rd8 27.Rc1 Rda8 28.Nb4 Rc7 29.Rxc6 Rxc6 30.Nxc6 Re8 31.Na7 Rb8 32.Nc6 Re8 33.Nc5 [33.a4] 33...Kf7 34.Nd7 e4 35.Nxd4 e3 36.Nc2 e2 37.Ne1 Rc8 38.Ne5+ Kf6 39.f4 Kf5 40.N1d3 Ke4 41.g3 Ke3 42.Ne1 Kf2 43.N5f3 b4 44.g4 Rc3 45.Nd4 Kxe1 46.a3 Rd3 47.Nxe2 bxa3+ 48.Kxa3 Kxe2 49.f5 Rd5 50.b4 Kf3 51.g5 Rxf5 52.Kb3 Kg4 0-1

DEEP THOUGHT II vs. HITECH

(Annotated by IM Danny Kopec)

The third round showdown between DEEP THOUGHT II and HITECH was anticlimactic. At last year's ACM Championship HITECH finally scored in tournament play against DEEP THOUGHT II after three critical tournament losses. In that game (November, 1990) in New York City, HITECH scored an outstanding victory. So this year the spectators and tournament situation was suggestive of a big struggle. Instead, an opening book error quickly led HITECH to a lifeless game. One should not be led astray by the number of moves played in this game. Black's ultimate debacle was easy to foreshadow from move 12!

1. e4 e6 2. d4 d5 3. Nd2!

Probably White's best answer to the French Defense because it stays clear of future pawn structural defects.

3. ...c5

Another way for Black to proceed is 3. ...Ngf6 4.e5 Nfd7 5.Bd3 c5 6.c3 Nc6 7.Ne2 Qb6 etc. leading to the usual French Defense problems of a backward king pawn and bad bishop.

4. exd5 exd5

In recent years Black has often played 4. ...Qxd5 5.Ngf3 cxd4 6.Bc4 Qd6 etc. leading to more open central positions where he often castles queenside with varied success.

5. Ngf3 Nf6

More mainstream here is 5. ...Nc6. The advantage of the move is in avoiding the exchange of light-squared bishops, based on the general view that the more pieces on the board, the better for Black in view of his ability to cope with the isolated queenpawn.

6. Bb5+ Bd7

Here 6. ...Nc6? is known to give White an advantage via 7.O-O Be7 8.dxc5 O-O (if Bxc5 9.Re1 Be2 10.Qe2 with a clear plus for White) 9.Nb3 Ne2 10.Be3 Bg4 11.Bxc6 bxc6 12.c3 Re8 12.Qd4 since the game Pachman-Opocensky, Brno, 1944.

7. Bxd7+ Nbxd7 8.O-O Be7 9.dxc5

Now White establishes the pawn structure which remains for the rest of the game. Black is saddled with an isolated queen pawn which is the focal point of White's play—to methodically blockade, attack and destroy it. Black's compensation, in theory, lies in active piece play via the e4 and c4 squares which the d-pawn controls and on his half-open c-file.

Most strong players would prefer White's chances, because White has a defined weakness to attack, but a few, including World Champion Gary Kasparov and many-time Candidate Victor Korchnoi have demonstrated Black's resources in such positions.

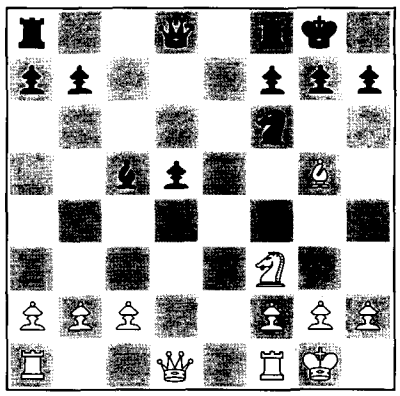
9. ...Nxc5 10. Nb3 O-O

10. ...Nfe4 11.Be3 O-O 12.Nxc5 Bxc5 13.Bxc5 Nxc5 14.c3 Qd6 15.Qd2 gave White a small, but not insignificant advantage in Zagorovskij-Barczay, USSR 1964. Certainly, once the blockading process on the d-pawn begins with moves like c3 and Qd2, White's game is easier to play. On 10. ...Nce4 White has 11.Nfd4 with Nf5 or f3 soon to follow.

11. Nxc5 Bxc5 12. Bg5

12. ...d4?

This bad move was probably due to an outright human input error in creating the Opening book. In the Encyclopedia of Chess Openings, Volume C, (Section C08/note 68) there is the reference: 12. ...d4?! 13.Qd3 h6 14.Bh4 Rc8 15.Rfe1 Qb6 16.Qf5 Matulovic-Puc, Yugoslavia, 1970 giving White a clear advantage.



Position after 12. Bg5

Our game follows this sequence until DEEP THOUGHT II varies on move 15. The problem with 12. ...d4 is that it restricts the black bishop's mobility while creating a target on its color. These detriments outweigh the space gained by the pawn and the creation of a slightly backward white c-pawn

13. Qd3

A queen is not usually considered the best blockader of weak pawns. However here she plans to move again to f5 or b5 and readies to meet Qb6 with Qb3. Nonetheless this move was probably still part of DEEP THOUGHT II's book. On the alternative 13.Re1 Qb6 would be a little troublesome.

13. ...h6 14. Bh4 Rc8 15. Rfd1 Re8 16. Qf5 Qb6

If 16. ...Re6 17.c3 would win the isolani.

17. Bxf6 Qxf6 18. Qxf6 gxf6.

In a nutshell, Black's doubled and isolated pawns must ultimately spell defeat. The activity he enjoys on the c and e-files will be gradually neutralized and only weaknesses will remain.

19. Kf1 f5

HITECH chooses among evils. Without this move the f5 square will likely become blockaded by the white knight via h4. The text clears a patch for the black king.

20. Rac1!

An excellent defensive move, which now threatens the Black d-pawn.

20. ...Rcd8 21. Rd3 Rd6 22. a3 a5

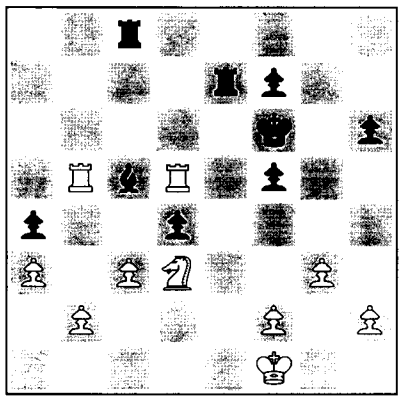
Although this is not an easy pawn to attack, Black exacerbates his vertical and horizontal pawn weaknesses.

23. Rb3 b6 24. Ne1!

An excellent move which is part of plan to start attacking Black's weak pawns. The next phase of play is highlighted by White's manoeuvres with his rooks and knight to start attacking the weak black pawns.

24. ...Rc6 25. Rb5 Kg7 26. Nf3 Rd8 27. Ne5 Rc7 28. Nd3 a4 29. Re1 Bf8 30. Re2 Bc5 31. g3 Rdc8 32. Re5 Kf6 33. Rd5 Re7 34. c3!!

A move which is at first hard to fathom. Why should White trade off its c-pawn for Black's weak d-pawn and weaken its other queenside pawns? The crux of the move is the variation: 34. ...dxc3 35.Nxc5 c2 36.Nd3 c1=Q+ 37.Nxc1 Rxc1+ 38.Kg2 and White wins; amazing, weird and wonderful; or on 36. ...Rxc5 37.Rdxc5 bxc5 38.bxc3 and White's more active rook will soon pick off Black's more exposed pawns. On 36. ...bxc5 37.bxc3 and White will win a pawn or two. Finally on 35. ...cxb2 36.Rxb6+ followed by 37.Rxb2 wins.



Position after 33. c3

34. ...Re4 35. cxd4 Rxd4 36. Rxd4 Bxd4 37. Rb4 Rd8 38. Rxa4

The first fruits of DEEP THOUGHT II's labor.

38. ...Ke6 39. Rb4 Kd5 40. a4 Ra8 41. b3 Ra5

Not a natural move, but on 41. ...Rc8 42.Nf4+ Ke5 43.Rb5+ Ke6 44.Rd5 and White has a winning advantage.

42. Ke2 b5

Desperation in a hopeless position

43. Rxb5+ Rxb5 44. axb5 Bb6

The rest is a fairly easy win for White.

45. h4 Bc7 46. h5 Ba5 47. f4 f6 48. Nb2 Bb4 49. Nc4 Bc5 50. Kf3 Bf8 51. Ne3+ Kc5 52. Nxf5 Kxb5 53. Ke4 Kc5 54. Ne3 Kb4 55. Kf5 1-0

BP vs. LACHEX

1.e4 e5 2.Nf3 Nc6 3.Bb5 a6 4.Ba4 Nf6 5.O-O Nxe4 6.d4 b5 7.Bb3 d5 8.dxe5 Be6 9.c3 Nc5 10.Bc2 Bg4 11.Re1 Be7 12.Nbd2 O-O 13.Nb3 Ne4 14.Bf4 f6 15.exf6 Nxf6 16.Qd3 Qd7 17.Ne5 Nxe5 18.Bxe5 g6 19.Qd4 c6 20.Bf4 Bd6 21.h3 Bf5 22.Bxf5 gxf5 23.Qe3 Ne4 24.f3 Ng3 25.Nc5 Bxc5 26.Qxc5 Nh5 27.Re7 Qc8 28.Rc7 Qe8 29.Bd6 Rf7 30.Rxc6 Nf6 31.Kf1 Nd7 32.Qxd5 Nf6 33.Qc5 Nd7 34.Qa3 Nf8 35.Rxa6 b4 36.Qa5 Rxa6 37.Qxa6 bxc3 38.bxc3 Ng6 39.Qc4 Qd7 40.Rd1 Ne7 41.Rd2 Qd8 42.Bf4 Qe8 43.Bg5 Nc6 44.Rd6 Na5 45.Qd5 Nb7 46.Ra6 Qb8 47.Rf6 Nd8 48.Rd6 Nc6 49.Rxc6 Qb1+ 50.Kf2 Qb2+ 51.Kg3 Qb8+ 52.Rd6 h6 53.Bf4 Qf8 54.Rd8 Kh7 55.Rxf8 Rxf8 56.Kh4 Rf6 57.Be5 h5 58.Qd8 1-0

M CHESS vs. SOCRATES

1.e4 e5 2.Nf3 Nc6 3.Bb5 a6 4.Ba4 Nf6 5.O-O Be7 6.Re1 b5 7.Bb3 d6 8.c3 O-O 9.h3 Bb7 10.d4 Re8 11.Nbd2 Bf8 12.a4 h6 13.Bc2 exd4 14.cxd4 Nb4 15.Bb1 c5 16.d5 Nd7 17.Ra3 f5 18.exf5 Nf6 19.Ne4 Bxd5 20.Rae3 Bf7 21.Bd2 Nxe4 22.Rxe4 Rxe4 23.Rxe4 d5 24.Re1 Nc6 25.axb5 axb5 26.Qe2 Rb8 27.Qd3 Bd6 28.g4 Qf6 29.g5 hxg5 30.Nxg5 Ne5 31.Qg3 Bh5 32.Bf4 Re8 33.Bc2 Nc4 34.Rxe8+ Bxe8 35.Bxd6 Nxd6 36.Ne6 Nb7 37.Qb8 Qe7 38.Qa8 g6 39.Kf1 gxf5 40.Nc7 Qxc7 41.Qxe8+ Kg7 42.Bxf5 Nd8 43.Qxb5 Kf6 44.Bg4 Qd6 45.Qd3 Nf7 46.Qf5+ Ke7 47.f4 d4 48.h4 d3 49.Ke1 Qd4 50.Bh5 Nd6 51.Qg5+ Kd7 52.Bg4+ Kc6 53.Bf3+ Kb5 54.Qd5 Qe3+ [54...Qg1+ 55.Kd2 Nc4+] 55.Kf1 Qc1+ 56.Kg2 Qxb2+ 57.Kh3 Qd4 58.Qxd4 cxd4 49.h5 Nf7 60.Kg4 d2 61.Kf5 Kc4 62.Kg6 Nh8+ 63.Kg7 Kd3 64.Kxh8 Ke3 65.Bd1 1-0

CRAY BLITZ vs. CHESS MACHINE/SCHROEDER

1.e4 e5 2.Nf3 Nc6 3.Bb5 a6 4.Ba4 Nf6 5.O-O Nxe4 6.d4 b5 7.d5 Ne7 8.Re1 Nd6 9.Bb3 f6 10.Nc3 Bb7 11.Qd3 g6 12.a4 Bg7 13.axb5 axb5 14.Be3 Rxa1 15.Rxa1 b4 16.Nb5 Nec8 17.Nxd6+ Nxd6 18.Qd2 O-O 19.Qxb4 Qb8 20.Ba7 Qc8 21.Bc5 Qb8 22.c3 f5 23.Ra5 e4 24.Nd2 Ba8 25.Nc4 Qxb4 26.Bxb4 Nb7 27.Ra1 d6 28.Na3 Kf7 29.Nb5 Rc8 20.g3 Ke7 31.Nxc7 Rxc7 32.Rxa8 Nc5 33.Bc4 Rb7 34.b3 Nd3 35.Ba6 Rb6 36.Ra7+ Kf8 37.Bxd3 exd3 38.Ra2 Bh6 39.f4 g5 40.Rd2 gxf4 41.Rxd3 fxg3 42.hxg3 Kf7 43.Kg2 Kf6 44.Rd1 Ke5 45.Re1+ Kxd5 46.Re7 Bg5 47.Rxh7 Ke4 48.Ra7 d5 49.Ra4 Kd3 50.Ra5 Ke4 51.Ra8 Kd3 52.Rf8 Bf6 53.Ba5 Ra6 54.Bc7 Bxc3 55.Rb8 d4 56.b4 Kc4 57.Rd8 d3 58.Bf4 Bxb4 59.Kf3 Bc3 60.g4 fxg4+ 61.Kxg4 Ra1 62.Kf3 Rf1+ 63.Ke4 Re1+ 64.Kf3 Bd4 65.Rc8+ Bc5½-½

Round 4

CRAY BLITZ vs. DEEP THOUGHT II seemed to be an even struggle in most of the early going, but one had to prefer the black pawn structure. DEEP THOUGHT II was able to eventually win a pawn on the queenside and soon thereafter made a sham sacrifice of the exchange to gain another pawn. DEEP THOUGHT II concluded brilliantly with an endgame piece sacrifice that quickly forced resignation.

HITECH sprang an opening innovation on ZARKOV that seemed to backfire. ZARKOV did not play the direct road to equality and weaknesses in the White position increasingly pointed to a Black advantage. ZARKOV won a pawn and then started to go downhill. HITECH made the most of its queenside opportunities despite the fact its king was in the area. Everyone anticipated a potential rook and bishop verses rook endgame and queries buzzed about whether the 50 or 75 move rule would apply (75 would). Alas, HITECH was unwilling to part with a pawn that was necessary to set up the envisioned endgame and the machines were content to move back and forth for a draw.

MEPHISTO smashed BEBE quite easily in less than 20 moves. BEBE had its book turned off in an attempt to thwart the well-known MEPHISTO opening preparations, but that backfired as the game followed lines well-known to MEPHISTO.

CHESS MACHINE/SCHROEDER played a Spassky specialty to quickly gain an advantage against SOCRATES. CHESS MACHINE/SCHROEDER's play was brutal once

it smelled blood.

LACHEX vs. DELICATE BRUTE was interesting in that White had nearly all its pawns advanced and all its pieces on the first rank at one point. DELICATE BRUTE was unable to cope with all these goings on and was mated in less than 30 moves.

M CHESS defended a Petroff Defense against BP and quickly obtained an attack against the white king. Around move 35, this attack netted a piece and the game was effectively over.

MEPHISTO vs. BEBE

1.d4 d5 2.c4 dxc4 3.Nf3 e6 4.e4 b5 5.Nc3 b4 6.Ne2 Nf6 7.Ng3 Be7 8.Bxc4 Nbd7 9.Bb5 O-O 10.Bc6 Rb8 11.Bf4 Ba6 12.Rc1 Nb6 13.b3 Bd6 14.e5 Nfd5 15.Bxd5 Nxd5 16.exd6 cxd6 [16...Nxf4 17.dxc7 Nxg2+ 18.Kd2] 17.Qd2 Nxf4 18.Qxf4 Qc7 19.Rxc7 1-0

CHESS MACHINE/SCHROEDER vs. SOCRATES

1.d4 d5 2.c4 c6 3.Nf3 Nf6 4.Nc3 dxc4 5.e4 b5 6.Qc2 Bg4 7.a4 Bxf3 8.gxf3 Qb6 9.Rg1 e6 10.Bd2 Nbd7 11.axb5 cxb5 12.Rg5 Rc8 13.Rxb5 Qxd4 14.Qa4 a6 15.Ra5 Bc5 16.Be3 Qe5 17.f4 Qh5 18.Rd1 Ke7 19.e5 Nxe5 20.fxe5 Qxe5 21.Bg2 Rhd8 22.Rxd8 Kxd8 23.Bc6 Qxh2 24.Rxc5 Rb8 25.Qd1+ Ke7 26.Rg5 1-0

BP vs. M CHESS

1.e4 e5 2.Nf3 Nf6 3.d4 Nxe4 4.Bd3 d5 5.Nxe5 Nd7 6.Qe2 Nxe5 7.Bxe4 dxe4 8.Qxe4 Be6 9.Qxe5 Qd7 10.Be3 Bb4+ 11.c3 Bd6 12.Qa5 Qc6 13.f3 Bd5 14.Nd2 O-O 15.O-O Rfe8 16.Rfe1 b6 17.Qa6 Bxh2+ 18.Kxh2 Rxe3 19.Rxe3 Qh6+ 20.Kg3 Qxe3 21.Nb3 f6 22.Rh1 Re8 23.Qxa7 Qg5+ 24.Kf2 Re2+ 25.Kxe2 Qxg2+ 26.Ke1 Qxh1+ 27.Kd2 Qg2+ 28.Kc1 Qg1+ 29.Kc2 Bxf3 30.Qb8+ Kf7 31.Qxc7+ Kg6 32.Nd2 Qd1+ 33.Kd3 Qe2+ 34.Kc2 Be4+ 35.Kb3 Qxd2 36.Qxb6 Qe2 37.Ka3 Qc4 38.Qb4 Qxb4+ 39.cxb4 h5 40.d5 h4 0-1

LACHEX vs. DELICATE BRUTE

1.d4 Nf6 2.c4 e6 3.Nc3 Bb4 4.a3 Bxc3+ 5.bxc3 c5 6.f3 cxd4 7.cxd4 O-O 8.g4 d5 9.e4 dxe4 10.g5 Nfd7 11.fxe4 f5 12.exf5 exf5 13.Nf3 f4 14.Bd3 Re8+ 15.Kf2 Qc7 16.Qd2 Rf8 17.Qc2 g6 18.c5 Kh8 19.Bb2 Kg7 20.Rae1 Qa5 21.Re7+ Rf7 22.Re8 Rf8 23.Qe2 Rxe8 24.Qxe8 Nc6 25.Bc4 Qd8 26.Qf7+ Kh8 27.d5+ Nce5 28.Nxe5 Nf6 29.Nd7 h5 30.Nf8 Qxf8 31.Bxf6+ 1-0

CRAY BLITZ vs. DEEP THOUGHT II

1.e4 c5 2. Nf3 d6 3.d4 cxd4 4.Nxd4 Nf6 5.Nc3 Nc6 6.f4 e5 7.Nxc6 bxc6 8.fxe5 Ng4 9.Be2 Nxe5 10.Be3 Be7 11.O-O Be6 12.Qd4 O-O 13.Rad1 f6 14.b3 Qe8 15.Na4 Qg6 16.Bf4 Rf7 17.Qe3 Raf8 18.Qxa7 Qxe4 19.Bd3 Qb4 20.Qe3 Ra8 21.c3 Qb7 22.Rf2 Qa7 23.Qxa7 Rxa7 24.Be3 Ra5 25.Bb6 Ra8 26.Bc2 Bf8 27.Re1 c5 28.Be4 Ra6 29.Rb1 f5 30.Bc2 Rb7 31.Bd8 g6 32.Re1 c4 33.Rb1 Bd7 34.Nb2 Ra8 35.Bg5 Rxa2 36.b4 Bb5 37.Re2 Bg7 38.Nd1 Ra6 39.Bd2 Nd3 40.Ne3 Ra2 41.Bxd3 cxd3 42.Rf2 Rxd2 43.Rxd2 Bxc3 44.Nf1 Bxd2 45.Nxd2 Re7 46.Nf3 h6 47.Rb2 Re4 48.Kf2 g5 49.g3 f4 50.gxf4 Rxf4 51.Kg3 h5 52.Nd2 h4+ 53.Kg2 Bc6+ 54.Kg1 Rg4+ 55.Kf2 Rg2+ 56.Ke3 Bb5 57.Ra2 Rxh2 58.Ra5 Re2+ 59.Kd4 h3 60.Rxb5 Rg2 61.Rb8+ Kg7 62.Rb7+ Kg6 0-1

HITECH vs. ZARKOV

1.e4 e5 2.Nf3 Nc6 3.d4 exd4 4.Nxd4 Bc5 5.Be3 Qf6 6.c3 Nge7 7.Qd2 a6 8.Nxc6 Qxc6 9.Bxc5 Qxc5 10.Na3 d6 11.O-O-O O-O 12.Kb1 Nc6 13.Nc4 Be6 14.Ne3 Rae8 15.f3 Ne5 16.f4 Ng4 17.Nxg4 Bxg4 18.Re1 f5 19.b4 Qc6 20.e5 dxe5 21.h3 Bh5 22.fxe5 Bf7 23.Bd3 Qd5 24.Rhf1 Rd8 25.Rf3 b5 26.Qf2 g6 27.Bf1 Qc6 28.Kb2 Bd5 29.Rd3 Rde8 30.Rd4 Be4 31.Qg3 Re7 32.c4 Rfe8 33.cxb5 axb5 34.Rc1 Qb6 35.Rc5 Rxe5 36.Qc3 Rxc5 37.bxc5 Qe6 38.a4 c6 39.axb5 cxb5 40.Rd6 Qe5 41.Bxb5 Qxc3+ 42.Kxc3 Rc8 43.c6 Bxg2 44.h4 f4 45.Kd4 Kf8 46.Ke5 Kg7 47.Kxf4 Kh6 48.Kg3 Bh1 49.Ba4 Be4 50.Kf4 Bg2 51.Bb5 Bh1 52.Kg3 Be4 53.Rf6 Bd5 54.Rd6 Be4 55.Rf6 Bd5 56.Ba4 Bh1 57.Rd6 Be4 58.Kf4 Bg2 ½-½

Round 5

DELICATE BRUTE was doing well as Black in a Petroff Defense against SOCRATES until 12...g5. Don Beal, the programmer, explained that the machine has no king safety criteria and such moves are the result. SOCRATES soon thereafter put several pieces en prise enroute to a mating attack.

HITECH got blown away in the opening against M CHESS. An early queen sortie seemed to be the source of the problem and cost HITECH a full piece.

CHESS MACHINE/SCHROEDER got the better of the opening against DEEP THOUGHT II, but rashly attacked on the kingside giv-

Final Standings:

No.	Computer	1	2	3	4	5	Total	Place
1	DEEP THOUGHT II	+7	+2	+5	+3	+6	5	1
2	M CHESS	+12	−1	+8	+9	+5	4	2
3	CRAY BLITZ	+9	=8	=6	−1	+7	3	3
4	MEPHISTO	−8	+10	−7	+11	+9	3	3
5	HITECH	+10	+6	−1	=7	−2	2.5	5
6	CHESS MACHINE/ SCHROEDER	+11	−5	=3	+8	−1	2.5	5
7	ZARKOV	−1	+12	+4	=5	−3	2.5	5
8	SOCRATES	+4	=3	−2	−6	+12	2.5	5
9	BP	−3	+11	+10	−2	−4	2	9
10	LACHEX	−5	−4	−9	+12	+11	2	9
11	BEBE	−6	−9	+12	−4	−10	1	11
12	DELICATE BRUTE	−2	−7	−11	−10	−8	0	12

ing away its edge plus a pawn. DEEP THOUGHT II eventually won another pawn. DEEP THOUGHT II had difficulty in making progress in the rook and pawn endgame, but eventually the program figured it out and went on to win the game and the championship.

BEBE did well in the opening, but got into trouble in the early middle game and had to give up the exchange. LACHEX simply pushed the h-pawn down to make a new queen and the game was over.

MEPHISTO played well to defeat BP out of an unclear Queen's Gambit Accepted. Its 41.Ra5! was especially pretty.

CRAY BLITZ defended ZARKOV's Ruy Lopez with a risky line, but survived the opening. CRAY BLITZ gained a small advantage but was unable to do anything with it. Finally, ZARKOV went wrong in a difficult endgame and collapsed.

SOCRATES vs. DELICATE BRUTE
1.e4 e5 2.Nf3 Nf6 3.Nxe5 d6 4.Nf3 Nxe4 5.d4 d5 6.Bd3 Nc6 7.O-O Bg4 8.Re1 f5 9.c3 Be7 10.h3 Bh5 11.Bf4 O-O 12.Qc2 g5 13.Bh2 Qc8 14.Nbd2 Bxf3 15.Nxf3 Rd8 16.Rad1 a5 17.Ne5 Nxe5 18.Bxe5 Bd6 19.Bxd6 Rxd6 20.f3 Ng3 21.Kh2 f4 22.Re7 h5 23.Bg6 b6 24.Bf7+ Kf8 25.Bxh5 Nxh5 26.Qh7 1-0

BEBE vs. LACHEX
1.e4 e5 2.Nf3 Nc6 3.Bb5 a6 4.Ba4 Nf6 5.O-O Nxe4 6.d4 b5 7.Bb3 d5 8.dxe5 Be6 9.c3 Nc5 10.Bc2 Bg4 11.Re1 Be7 12.Nbd2 O-O 13.Nb3 Ne4 14.a4 bxa4 15.Rxa4 f6 16.exf6 Rxf6 17.Bxe4 dxe4 18.Qxd8+ Rxd8 19.Nfd4 Nxd4 20.Nxd4 Re8 21.Rxe4 Bd7 22.Ra5 c5 23.Nb3 Rd6 24.f3 Rd1+ 25.Kf2 Bf5 26.Rxe7 Rxe7 27.Rxc5 Rf7 28.Ke2 Bc2 29.Rc8+ Rf8 30.Rxf8+ Kxf8 31.Nd4 Rxc1 32.Kd2 Rg1 33.Kxc2 Rxg2+ 34.Kb3 Rxh2 35.c4 Ke7 36.Kc3 h5 37.b3 h4 38.Nf5+ Kd7 39.Kd4 h3 40.Ng3 Rg2 41.Nf1 Rf2 42.Ng3 Rxf3 43.Nh1 Rxb3 0-1

M CHESS vs. HITECH
1.e4 e5 2.Nf3 Nf6 3.d4 Nxe4 4.Bd3 d5 5.Nxe5 Nd7 6.Nxd7 Bxd7 7.O-O Qh4 8.c4 Bc6 9.g3 Qf6 10.cxd5 Bxd5 11.Bxe4 Bxe4 12.Re1 Qg6 13.Nc3 f5 14.f3 O-O-O 15.fxe4 a6 16.Bf4 fxe4 17.Nxe4 Bb4 18.Rc1 c6 19.Re3 Rd5 20.Qa4 Bf8 21.Rec3 Kd8 22.Qb3 Rb5 23.Qc2 Bb4 24.Rb3 Re8 25.Be5 Qh6 26.a4 Rb6 27.Rf1 Qg6 28.Rbf3 a5 29.Rf5 Qh6 30.Rf7 Be7 31.Rxg7 Qe3+ 32.Kg2 1-0

DEEP THOUGHT II vs. CHESS MACHINE/SCHROEDER
1.e4 e5 2.Nf3 Nc6 3.Bb5 a6 4.Ba4 Nf6 5.O-O Nxe4 6.d4 b5 7.Bb3 d5 8.dxe5 Be6 9.c3 Be7 10.Bc2 O-O 11.Nbd2 f5 12.Nb3 Qd7 13.Nbd4 Na5 14.Nxe6 Qxe6 15.Bf4 c5 16.Qc1 h6 17.h3 g5 18.Bh2 g4 19.hxg4 fxg4 20.Bxe4 dxe4 21.Nd2 Bg5 22.Qe1 Bxd2 23.Qxd2 Nc4 24.Qe2 Rad8 25.b3 Nxe5 26.Qxe4 Rf5 27.Rae1 Re8 28.Re3 Qf6 29.Bxe5 Rfxe5 30.Qxg4+ Kh8 31.Rxe5 Qxe5 32.c4 Rd8 33.Qh3 Qg5 34.Qe6 bxc4 35.Qxc4 Rg8 36.g3 Rg6 37.Re1 Qf5 38.Re7 Qb1+ 39.Kg2 Qf5 40.Qc3+ Qf6 41.Qxc5 Qc6+ 42.Qxc6 Rxc6 43.Re5 Kg7 44.Ra5 Kf6 45.f4 Ke7 46.g4 Kf6 47.Kf3 Re6 48.Rc5 Rb6 49.Rc7 Rd6 50.Ra7 Rc6 51.Ke4 Rb6 52.Ra8 Rb4+ 53.Kf3 Rb6 54.Rh8 Kg7 55.Rd8 Kf6 56.Rd7 Ke6 57.Ra7 Kf6 58.Kg3 Rc6 59.Kh4 Ke6 60.Kh5 Kd5 61.f5 Ke5 62.Re7+ Kf4 63.Re6 Rc3 64.f6 1-0

MEPHISTO vs. BP
1.d4 d5 2.c4 dxc4 3.Nf3 Nf6 4.e3 e6 5.Bxc4 c5 6.O-O a6 7.Qe2 b5 8.Bd3 cxd4 9.exd4 Nc6 10.a4 bxa4 11.Rxa4 Nb4 12.Bb5+ Bd7 13.Bxd7+ Qxd7 14.Nc3 Be7 15.Bg5 Qb7 16.Bxf6 Bxf6 17.Ne4 Be7 18.Nc5 Bxc5 19.dxc5 O-O 20.Qc4 Rab8 21.Rc1 Rfd8 22.Nd4 a5 23.c6 Qc7 24.g3 Rd5 25.Qc3 Rb6 26.f4 Rb8 27.Qe3 Rbd8 28.Rc4 R8d6 29.Kf1 Kh8 30.Qc3 f6 31.Rxa5 Rxa5 32.Qxb4 Kg8 33.Nb5 Rxb5 34.Qxb5 Rd5 35.Qb4 Rd1+ 36.Kg2 Rd6 37.Qc3 Kf7 38.b4 Rd8 39.b5 Qb6 40.Rc5 Qc7 41.Qb4 Rb8 42.Rc2 h6 43.Qc4 Rd8 44.f5 Ke7 45.Qc5+ Kf7 46.fxe6+ Kg6 47.b6 Qc8 48.c7 Rd1 49.Qc6 Qa6 50.Rf2 Re1 51.c8Q Qxc8 52.Qxc8 Re4 53.b7 1-0

ZARKOV vs. CRAY BLITZ
1.e4 e5 2.Nf3 Nc6 3.Bb5 a6 4.Ba4 b5 5.Bb3 Na5 6.O-O d6 7.d4 exd4 8.Nxd4 Bb7 9.Bd2 c5 10.Qe1 Nxb3 11.Nxb3 Be7 12.Na5 Bc8 13.Bc3 Nf6 14.Nc6 Qd7 15.Nxe7 Qxe7 16.Qc1 b4 17.Bxf6 Qxf6 18.a3 O-O 19.axb4 cxb4 20.Nd2 Be6 21.Re1 Rfc8 22.Re3 d5 23.Rd3 dxe4 24.Nxd4 Qe5 25.Re3 Rc6 26.c3 Rd8 27.Qc2 Qd5 28.Qe2 a5 29.Qe1 Rb6 30.Re2 bxc3 31.Nxc3 Qa8 32.Rd1 Rdb8 33.Rdd2 Rb4 34.f3 Qa7+ 35.Kh1 h6 36.Qg3 Qa6 37.h3 Bc4 38.Re1 Rxb2 39.Rd6 Qa7 40.Rxh6 Qf2 41.Qxf2 Rxf2 42.Rc6 Bb3 43.Ra6 Rc2 44.Ne4 a4 45.Nd6 g6 46.Ne4 Rbc8 47.Kh2 Rb2 48.Nf6+ Kg7 49.Ne8+ Kf8 50.Nf6 Rcc2 51.Rg1 Kg7 52.Ne8+ Kh6 53.Nf6 Rc3 54.Kg3 Kg7 55.Ne8+ Kf8 56.Nf6 Re2 57.Ra8+ Kg7 58.Ne8+ Kh6 59.Nf6 Rc6 60.Ng4+ Kg7 61.Nf2 Bc2 62.Ng4 f5 63.Ra7+ Kf8 64.Ra8+ Ke7 65. Ra7+ Ke6 66.Nh6 Rc4 67.Ra6+ Kd7 68.Ng8 Kc7 69.Rc1 Bd3 70.Rg1 Kb7 71.Rd6 f4+ 72.Kh2 Bf5 73.Nh6 Bc2 74.Rc1 Rb4 75.Ra1 Kc7 76.Nf7 Bb1 77.Rd1 Bf5 78.Rac1+ Rc2 79.Rxc2+ Bxc2 80.Rc1 Rb2 81.Ne5 Kb7 82.h4 Ka6 83.Nc6 Bd3 84.Ne5 Bf5 85.Rc4 Kb5 86.Rc7 a3 87.Ra7 a2 88.Ra8 Re2 89.Nf7 Be6 90.Nh8 g5 91.hxg5 Bd5 92.Rxa2 Rxa2 0-1

The first and third authors of this article served as assistant tournament director and tournament director, respectively. The second author served as organizer and also serves as the chairman of the ACM Computer Chess Committee.

Eckert-Mauchly Award Nominations

Nominations are being solicited for the ACM/IEEE Eckert-Mauchly Award which is presented annually to an outstanding computer architect for significant contributions to the field of computer architecture.

Nominations for the award, to be presented at the annual International Symposium on Computer Architecture next May, should be submitted by November 24 to: Yale Patt, Chair, Eckert-Mauchly Award Committee, EECS Department, University of Michigan, Ann Arbor, MI 48109-2122.

Questions regarding the award or the nomination process can be directed to the same address, or preferably via e-mail to patt@eecs.umich.edu.