The Eleventh ACM's North American Computer Chess Championship

Nashville, Tennessee

October 26-28, 1980

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WELCOME AND ACKNOWLEDGEMENTS

The 1980 Annual Conference and Exposition of the ACM marks the eleventh consecutive year that the ACM's North American Computer Chess Championship has been held. Each year, beginning in New York in 1970, and then in Chicago, Boston, Atlanta, San Diego, Minneapolis, Houston, Seattle, Washington, Detroit, and now Nashville, a small highly motivated group of programmers and researchers has met to test their chess programs and exchange ideas. The programs have improved tremendously during this time; the weakest program entered this year probably would have won the first tournament held in 1970. This year's event will provide one more set of important data for those interested in exactly how much progress there has been and what to expect in the future.

In addition to the regular tournament this year, we plan to hold the first major computer speed chess tournament. Robert Hyatt will be in charge. This will take place Sunday and Monday evenings following regular play. These games will be played at fantastic speeds: moves will be made at an average rate of one every five seconds. In another ten years, it may turn out that the speed tournament completely replaces the slower regular tournament. Come and watch and you will find yourself sitting on the edge of your chair!

A panel discussion, moderated by Ben Mittman, will take place in the Cumberland Room at 3 pm on Monday, October 27th. New developments will be discussed by the tournament participants.

This booklet is being prepared just after the Third World Computer Chess Championship held in Linz, Austria on September 25-29, 1980. BELLE was the winner of that event with CHAOS second, DUCHESS third, and CHESS 4.9 fourth. All four will participate here in Nashville!

One of the more interesting features of this year's tournament is the large number of microcomputers participating. Five of the thirteen participants will be microcomputers. For the first time, two commercially available machines will be present, BORIS EXPERIMENTAL and CHESS CHALLENGER.

The tournament Organizing Committee extends its thanks to the many people and organizations that have helped make its event a success. In particular, we would like to thank IBM for their continued support, Teleprinter Services Company for helping with the terminals, and the Tennessee chess organizations, headed by Jim Thatcher, for assisting during the games.

We hope you enjoy the games. David Levy, International Master from London, England, will serve as Tournament Director and Emcee, and he will be happy to answer questions from the audience. You can feel free to cheer or boo during the course of the games if you are so moved.

To the participants, we want to express our thanks for participating, and we wish you three rewarding and exciting and bug-free days!

Monty Newborn
Ben Mittman
ACM Computer Chess Committee
September 20, 1980

IMPORTANT TIMES, PLACES, AND NAMES

Schedule: Round 1: 1:00 PM Sunday, October 26

Round 2: 7:30 PM Sunday, October 26

Round 3: 7:30 PM Monday, October 27

Round 4: 7:30 PM Tuesday, October 28

Location: The tournament will take place in the Cumberland Room at the Opryland Hotel.

Admission: Free to all.

Special Event: First ACM Computer Speed Chess Championship - Sunday and Monday evenings after regular play is complete.

Panel Discussion: Ben Mittman will serve as moderator of a computer chess panel discussion on Monday, October 27th at 3 PM in the Cumberland Room.

Awards Ceremony Luncheon: 12:00 noon Wednesday, October 29, 1980.

Tournament Director: David Levy, International Master, London, England.

Tournament Organizing Committee: Robert Hyatt, University of Southern Mississippi
Ben Mittman, Northwestern University
Monroe Newborn, McGill University
John Thatcher, Vanderbilt University

Selection Committee: Ben Mittman
Monroe Newborn

SCORECARD

Eleventh ACM North American

Computer Chess Championship

Program	Round 1	Round 2	Round 3	Round 4	Total Points	Final* Place
1. AWIT						
2. BEBE						
3. BELLE						
4. BORIS EXPERIMENTAL						
5. CHAOS						
6. CHESS CHALLENGER						
7. CHESS 4.9/5.0						
8. CLASH						
9. CRAY BLITZ						
10. CUBE 2.0						
11. DUCHESS						
12. MYCHESS						
13. OSTRICH 81						

* Ties are broken by adding up the scores obtained by the program's opponents. If a tie remains, the scores of the opponent's opponents are added.

SCORECARD

First ACM North American

Computer Speed Chess Championship

Program	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Total Points	Final* Place
1. AWIT								
2. BEBE								
3. BELLE								
4. BORIS EXPERIMENTAL								
5. CHAOS								
6. CHESS CHALLENGER								
7. CHESS 4.9/5.0								
8. CLASH								
9. CRAY BLITZ								
10. CUBE 2.0								
11. DUCHESS								
12. MYCHESS								
13. OSTRICH 81								

* Ties are broken by adding up the scores obtained by the program's opponents. If a tie remains, the scores of the opponent's opponents are added.

Participants and Standbys in the ACM's Eleventh

North American Computer Chess Championship

1. AWIT, Tony Marsland, Department of Computing Science, University of Alberta, Edmonton, Alberta T6G 2H1

2. BEBE, Tony Scherzer, 2117 Stonington, Hoffman Estates, Illinois 60195.

3. BELLE, Ken Thompson, Joe Condon (c/o K.T., BTL, Room 2C423, Murray Hill, N. J. 07974.)

4. BORIS EXPERIMENTAL, Alan Mead, Applied Concepts, 207 North Kirby, Garland, Texas 75042.

5. CHAOS, Fred G. Swartz, Michael T. Alexander, John J. O'Keefe, Victor Berman (c/o F.G.S., Computing Center, University of Michigan, 1075 Beal Avenue, Ann Arbor, Michigan 48109.)

6. CHESS CHALLENGER, Dan & Kathe Spracklen, Ronald Nelson, Frank Duason (c/o R.N., Fidelity Electronics, 8800 N.W. 36th Street, Miami, Florida 33178.)

7. CLASH, Chris Peters, P. O. Box 10063, Bainbridge Isl., Washington 98110.

8. CRAY BLITZ, Robert Hyatt, Albert Gower, Dave Darling, and Derek Robb, (c/o R.H., Box 8286, Southern Station, University of Southern Mississippi, Hattiesburg, Mississippi 39401.)

9. CUBE 2.0, Lloyd L. Lank and James A. Lank, (c/o L.L., 8500 Eby, Overland Park, Kansas 66212.)

10. CHESS 4.9/5.0, David Slate, Larry Atkin, David Cahlander, William Blanchard, (c/o D.S., Vogelback Computer Center, Northwestern University, Evanston, Illinois 60201.)

11. DUCHESS, Tom Truscott, Bruce Wright, Eric Jensen, (c/o T.T., Computer Science Department, Duke University, Durham, North Carolina 27706.)

12. MYCHESS, David L. Kittinger, 2431 Lyvona Lane, Anchorage, Alaska 99502.

13. OSTRICH 81, Monroe Newborn, School of Computer Science, McGill University, Montreal, Quebec H3A2K6.

On Standby

NUMBER NINE CHESS, Stanley Bialek and Andrew Najda (c/o S.B., 136 Kane Street, West Hartford, Conn. 06119.)

PROGRAM INFORMATION

AWIT

Tony Marsland, University of Alberta, Edmonton, Alberta

Amdahl V/7, University of Alberta
(1 meg; 32 bits; 8,000,000 inst/sec)

AWIT is one of the few programs that carries out extensive foward pruning. During the course of a three minute move, AWIT examines about 200 nodes! This might be contrasted with the 30,000,000 - 40,000,000 nodes examined by BELLE. AWIT is written in ALGOL W. A moderately large book of 10,000 lines is used.

Marsland began his efforts over twelve years ago and his program was one of the six that participated in the first ACM tournament in New York. Tony is a professor in the Department of Computing Science at Alberta, but is spending this year in Montreal at Bell Northern Research.

BEBE

Tony Scherzer, SYS-10, Inc., Hoffman Estates, Illinois

BEBE Chess Machine on site
(32 k bytes; 16 bits; 6,250,000 inst/sec)

A relatively new program and machine, BEBE has recently acquired a provisional USCF rating of 1810 based on play in one tournament. BEBE defeated an Expert in that tournament. Tony Scherzer's brainchild examines 10,000 nodes/sec or about 2,000,000 in a three minute move! The program is small, requiring only 10k 16 bit words. The program has no book. It uses iterative deepening and is written in assembly language.

BELLE

Ken Thompson, Joe Condon, Bell Telephone Laboratories, Murray Hill, New Jersey

PDP 11/70 with special chess hardware, Bell Telephone Laboratories, Murray Hill

Thompson and Condon have spent the last year or so designing special purpose hardware that will process chess positions at the incredible rate of about 200,000 per second, or about 30,000,000 - 40,000,000 per move! This allows the new BELLE to search two plies deeper than the old version which examined a meager 5,000 nodes/sec.

BELLE has a large opening book of 280,000 positions, the biggest of all programs. It uses iterative deepening along with a full width search.

BELLE has just won the 3rd WorldComputer Chess Championship in Linz, Austria and enters this tournament as the favorite. Thompson has been working on BELLE for about ten years; in addition, he has distinguished himself as being one of the creators of the UNIX operating system and is a member of the National Academy of Engineering.

BORIS EXPERIMENTAL

Alan Mead, Applied Concepts, Garland, Texas

On site

The program uses alpha-beta pruning with recently developed and improved search heuristics. The program runs in 8k of program space and has nine levels of play including two tournament levels. The tournament level play is expected to be 100 points stronger than the present BORIS 2.5 program.

CHAOS

Fred Swartz, Mike Alexander, Jack O'Keefe, Victor Berman, Computing Center, University of Michigan, Ann Arbor, Michigan

Amdahl V/8, Amdahl Corporation, Sunnyvale, California (8 million bytes, 8 bits per word, 10,000,000 inst/sec)

CHAOS has been one of the leading programs since it first appeared at the 1973 ACM tournament in Atlanta. It has participated in eight ACM tournaments and three world championships, and it has never lost more than one game in any tournament. The program was started at SPERRY-UNIVAC in Blue Bell, New Jersey, where several of the authors were employed; recently the program has been affiliated with the Computing Center of the University of Michigan where its programmers are staff members.

CHAOS, written in FORTRAN, requires in excess of 3,000,000 words of memory to execute, using most of it for storing the tree. It only examines about 50 nodes/sec or about 10,000 per move. The program carries out a selective search with iterative widening, a bit different than the others. Its book contains about 10,000 lines.

CHESS CHALLENGER

Ronald C. Nelson, Fidelity Electronics Ltd., Miami, Florida

On site

This marks the first appearance in an ACM tournament for this popular machine. CHESS CHALLENGER is written in assembly language for a 6502 microprocessor. It has 20k bytes of memory and executes about 1,000,000 inst/sec. A book of about 1,000 moves is used. The program uses the alpha-beta algorithm with iterative deepening.

CHESS 4.9/5.0

David Slate, Larry Atkin, David Cahlander, and William Blanchard, Northwestern University and CDC.

CDC Cyber 176, CDC Arden Hills, Minnesota (262k CM and 512k ECS; 60 bits per word; 36,000,000 inst/sec)

Earlier versions of this entry have won eight of the ten ACM tournaments.

CHESS 4.9 was world champion from 1977 to 1980. The program was started in 1968 by Slate, Atkin, and Keith Gorlen. Gorlen left the group in 1974 and Cahlander joined in 1975 when the CDC CYBER series was introduced. Blanchard and Slate have been working together to develop a FORTRAN program which is effectively a clear and easily modifiable version of CHESS 4.9. That program, NUCHESS, participated in Linz and finished with two points.

CLASH

Chris Peters, University of Washington, Seattle, Washington

Texas Instruments TX990 on site
(28k, 16 bits; 200,000 inst/sec)

CLASH is entering its first ACM tournament. The program is written in FORTRAN IV by Chris Peters, a student at the University of Washington. It requires 10k for instructions and an additional 4k for the tree search. The program searches a highly selective tree and examines about 1,000 - 2,000 positions per move. It uses the alpha-beta algorithm and the killer heuristic but does not employ iterative deepening.

CRAY BLITZ

Robert Hyatt, Albert Gower, Dave Darling, Derek Robb

CRAY-1, CRAY Research, Mendota Heights, Minnesota
(1 meg; 64 bits; 80,000,000 inst/sec)

Formerly called BLITZ 6.9, this new version of Hyatt's and Gower's work, with help from Darling and Robb, will be running on a CRAY-1 for the first time and it is likely to be playing expert level chess. The program is written in FORTRAN IV, requires 24k for the instructions and 256k for the tree search. CRAY BLITZ uses an iterative deepening search to examine 500,000 to 1,000,000 nodes per move, and performs exhaustive searches of 6 to 7 plies in the middlegame. A book of 3,000 moves is used in the opening. In recent years this program has been a serious contender in the ACM tournaments running on much slower machines. CRAY BLITZ's performance should be carefully followed by those wondering about the importance of machine speed to a chess program.

CUBE 2.0

Lloyd L. Lank, James A. Lank, United Computing, Kansas City, Missouri

CRAY-1, United Computing, Kansas City
(512k;64 bits; 80,000,000 inst/sec)

CUBE 2.0 is an updated version of CUBE 1.1. It executes on either the CRAY-1 or on a Honeywell 60/80 provided by Honeywell in Minneapolis. The program is written in FORTRAN, uses the alpha-beta algorithm and iterative deepening. On the CRAY-1, the Lanks say the program examines 4,000 nodes per second. This is its first ACM tournament.

DUCHESS

Tom Truscott, Bruce Wright, and Eric Jensen, Duke University, Durham, North Carolina

IBM 370/165, Research Triangle, North Carolina
(8 m byte; 32 bits; 3,000,000 inst/sec)

DUCHESS is the product of a team effort headed by Tom Truscott, a graduate student at Duke University. It first participated in the 1974 ACM tournament and has done well in every subsequent one. Its best result was a 3 1/2/4 points finish in the 1978 ACM tournament in Seattle. This equaled CHESS 4.6's score, although DUCHESS lost the title on tie-breaking points. It finished third in the 1977 world championship.

Truscott, Wright, and Jenson have also developed strong checker and Othello programs using techniques in their chess program. Truscott expects to complete his doctoral program shortly.

DUCHESS has a USCF rating around 1850. It is written in assembly language, uses iterative deepening, and searches about 200,000 nodes per three minute move. A book of 3,000 positions helps with the openings.

MYCHESS

David Kittinger, Anchorage, Alaska

Cromemco Z80 on site
(64k; 8 bits; 500,000 inst/sec)

A relatively new program, developed for the Cromemco microcomputer which uses a Z-80 microprocessor, MYCHESS has had a fairly successful first year. It finished sixth at the 1979 ACM tournament, third at the London microcomputer tournament, and first at the West Soast Computer Fair microcomputer tournament. Kittinger indicates that it has a 1530 USCF rating.

The program is written in Z-80 assembly language and requires 30k bytes to execute. It uses iterative deepening and examines about 100 nodes per second or about 20,000 per three minute move. A small book of about 1,000 moves help with the opening.

NUMBER NINE CHESS (stand-by)

Steve Bialek, Andrew Najda, West Hartford, Connecticut

KIM 1 System with 6502 microprocessor, at tournament site.

A brand new program, the authors hope it is ready to give a few of the other programs a battle if it gets the chance to participate.

OSTRICH 81

Monroe Newborn, McGill University, Montreal, Quebec

Data General Nova 3, McGill University
(32k, 16 bits; 600,000 inst/sec)

OSTRICH 81, originally developed by George Arnold and Monroe Newborn at Columbia University in 1971, has participated in seven ACM tournaments and two world championships. Its best result was a second place finish in the 1972 ACM tournament. OSTRICH 81 won 3 out of 4 points in qualifying play for this tournament among the three Canadian programs this August.

OSTRICH 81 is written in assembly language and requires 32k words of memory to execute. A book of about 1,000 lines helps with the first few moves; when the program leaves the book, various strategies guide its play for the next dozen moves or so. The program carries out an iteratively deepening and variable depth search examining about 20,000 nodes per three minute move. During the last few years, two of Montreal's better chess players, Ilan Vardi and Frank Wang, have helped with the openings.

HISTORY OF THE ACM TOURNAMENTS

Year	City	Winning Program	Runner-up
1970	New York	CHESS 3.0; Slate, Atkin Gorlen, CDC 6400	The Daly Chess Program; Daly, King
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, D.G. Supernova
1973	Atlanta	CHESS 4.0; Slate, Atkin. Gorlen CDC 6400	TECH II; Baisley, PDP 10
1974	San Diego	RIBBIT; Hansen, Crook Parry, Honeywell 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, Ruben, Winograd, Berman, Toikka, Alexander, Amdahl 470
1977	Seattle*	CHESS 4.6; Slate, Atkin CDC CYBER 176	DUCHESS; Truscott, Wright, Jensen, IBM 370/168
1978	Washington	BELLE; Thompson, PDP 11/70 with special purpose hardware	CHESS 4.7; Slate, Atkin, CDC CYBER 176
1979	Detroit	CHESS 4.9; Slate, Atkin Cahlander, CDC CYBER 176	BELLE; Thompson, PDP 11/70 with special purpose hardware.

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* Both teams finished with 3½/4 points. The winning trophy was awarded to CHESS 4.6 based on tie-breaking points.

Computer Chess at ACM 79:
The Tournament and the Man vs. Man and Machine Match

Ben Mittman, Northwestern University
Monroe Newborn, McGill University

ACM 79 in Detroit marked the tenth consecutive year that the ACM has hosted the North American Computer Chess Championship. This year, the tournament saw continued improvement in the level of play by all participants and a return to the top of the pack by the current world champion program, CHESS 4.9. CHESS 4.9, the work of David Slate and Larry Atkin of Northwestern University and David Cahlander of Control Data Corporation, has now won eight of the ten ACM tournaments. Upset last year by Ken Thompson's BELLE, CHESS 4.9 went into the tournament a slight underdog but won its first three games and then drew with BELLE in the final round to finish with 3½ points. The latter was forced to a draw by CHAOS, the bridesmaid of many past tournaments, and finished second with 3 points. Tom Truscott's DUCHESS also finished with 3 points but lost second place to BELLE on tie breaking points. (Table I on the next page lists the history of the ten ACM tournaments.)

In attendance at the tournament as guests of ACM were Professor John McCarthy of Stanford University, George Koltanowski, former president of the United States Chess Federation and the world's most famous blindfold chess player, and Dr. Max Euwe of Holland, former president of FIDE (the world's chess governing organization) and former World Champion from 1935-1937. David Levy, International Master from London, served as Tournament Director. Dr. McCarthy awarded the trophies at a conference luncheon on Wednesday, October 31, and called for placing greater stress on the experimental aspects of the tournament. He encouraged the tournament organizers to require programs to print out more of the important information leading up to their choice of moves. This would permit a clearer understanding of why the computers play as they do. Koltanowski and Euwe mixed with the participants and from time to time came to the stage to assist David Levy. They commented on the games and dipped into their large reservoir of chess-related stories and jokes. The tournament was organized by Ira Purchis of the Burroughs Corporation, Ben Mittman, and Monroe Newborn. IBM, Burroughs, Anderson Jacobson, GM (General Motors), and Ford provided partial support of the tournament.

David Slate and Larry Atkin (foreground) working together with the CDC CYBER 176 with opponent being out of sight.

In addition to the chess tournament, ACM 79 was the scene of a most unusual event on October 27, 1979. An exhibition chess game was held between David Levy and a unique team consisting of CHESS 4.9 and David Slate. Before we go on with our coverage, we wish to assure you that man won!

The Tournament

Twelve teams participated in the four-round Swiss style tournament held October 28-30. Eight programs were from the United States, three from Canada, and one from The Netherlands. Three microcomputers were in attendance: SARGON 2.5 on a 6502-based SARGON Chess machine, MYCHESS on a Cromenco Z-2D, and RUFUS on an Apple II microcomputer. Three participants brought electronic chessboards: CHESS 4.9, BLITZ 6.9, and SARGON 2.5 (SARGON 2.5 has both board and computer in one package). BELLE's electronic chessboard was left at home in Murray Hill because Ken Thompson was concerned about how one would handle the situation when two electronic boards faced one another. A small time advantage (of several seconds) would be had by the side using the board on which the game officially took place. The rules of the tournament were modified before the tournament began to take this into account.

Table I. History of the ACM Tournaments.

Year	City	Winning Program	Runner-up
1970	New York	CHESS 3.0; Slate, Atkin, Gorlen, CDC 6400	The Daly Chess Program; Daly, King
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, D.G. Supernova
1973	Atlanta	CHESS 4.0; Slate, Atkin, Gorlen, CDC 6400	TECH II; Baisley, PDP 10
1974	San Diego	RIBBIT; Hansen, Crook, Parry, Honeywell 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, Ruben, Winograd, Berman, Toikka, Alexander, Amdahl 470
1977	Seattle*	CHESS 4.6; Slate, Atkin, CDC CYBER 176	DUCHESS; Truscott, Wright, Jensen, IBM 370/168
1978	Washington	BELLE; Thompson, PDP 11/70 with special purpose hardware	CHESS 4.7; Slate, Atkin, CDC CYBER 176
1979	Detroit	CHESS 4.9; Slate, Atkin, Cahlander, CDC CYBER 176	BELLE; Thompson, Condon, PDP 11/70 with special purpose hardware

* Both teams finished with 3½/4 points. The winning trophy was awarded to CHESS 4.6 based on tie-breaking points.

Table II. Final Standings of ACM's Tenth North American Computer Chess Championship.

Program, computer, authors	Initial seeding	Round 1	Round 2	Round 3	Round 4	Total points	Tie breaking* points	Final place
1. CHESS 4.9, CDC CYBER 176, David Slate, Larry Atkin, David Cahlander	2	1_9	1_8	1_3	$1/2_2$	3½	—	1
2. BELLE, PDP 11/70, special hardware, Ken Thompson, Joe Condon	1	1_5	$1/2_4$	1_7	$1/2_1$	3	10	2
3. DUCHESS, IBM 370/168, Tom Truscott, Bruce Wright, Eric Jensen	3	1_{10}	1_7	0_1	1_4	3	9	3
4. CHAOS, Amdahl V/6, Mike Alexander, Fred Swartz, John O'Keefe, Victor Berman	4	1_{12}	$1/2_2$	1_8	0_3	2½	7½	4
5. L'EXCENTRIQUE, Amdahl V/7, Claude Jarry	7	0_2	1_{12}	1_9	$1/2_6$	2½	7	5
6. MYCHESS, Cromenco Z-2D, David Kittinger	12	0_7	1_{10}	1_{11}	$1/2_5$	2½	5½	6
7. SARGON, SARGON Chessboard (6502-based), Dan and Kathy Spracklen	6	1_6	0_3	0_2	$1/2_8$	1½	10	7
8. BLITZ 6.9, UNIVAC 1100/80, Robert Hyatt, Albert Gower	5	1_{11}	0_1	0_4	$1/2_7$	1½	8½	8
9. OSTRICH 80, Nova 3, Monroe Newborn	8	0_1	1_{11}	0_5	$1/2_{10}$	1½	8½	9
10. AWIT, Amdahl V/7, Tony Marsland	9	0_3	0_6	1_{12}	$1/2_9$	1½	7	10
11. BS '66, '76, IBM 370/168, Barend Swets	11	0_8	0_9	0_6	1_{12}	1	—	11
12. RUFUS, Apple II, Charles Sullivan	10	0_4	0_5	0_{10}	0_{11}	0	—	12

* Sum of opponents' points.

Initial seedings of the teams are shown in Table II. The only significant upset of the tournament was CHAOS's draw with BELLE in round 2. This was a surprise to all except maybe the authors of CHAOS who had made improvements in their program and anticipated improved play. Claude Jarry's L'EXCENTRIQUE, using an Amdahl V/7 for the first time, played strong chess throughout the tournament and was given the unofficial award of the most improved program. MYCHESS, David Kittinger's program, also did better than expected.

CHESS 4.9's game with BELLE is shown without comments. The game was an exciting battle that ended in a draw by agreement. Each side had a Rook, Pawn, and King (Black had a second Pawn but that was destined to fall on the next move).

Man vs. Man and Computer

This event resulted from an idea suggested by ACM President Dan McCracken. Dan has spoken and written a great deal recently about the exciting possibilities opened up

	WHITE : BELLE			BLACK : CHESS 4.9			
1	P-Q4	N-KB3	22	B-K1	N-B5	43	N-B4	R-B7
2	P-QB4	P-B4	23	K-R1	P-R3	44	P-K5	BxP
3	P-Q5	P-K3	24	B-KN3	P-N4	45	NxB	PxN
4	N-QB3	PxP	25	PxP	PxP	46	QxP	R-K7
5	PxP	P-Q3	26	RxR	RxR	47	K-B1	P-B5
6	P-K4	P-KN3	27	B-B1	P-QN5	48	Q-N7	R-R7
7	N-B3	B-N2	28	N-K2	P-N6	49	B-N6	P-R6
8	B-K2	0-0	29	Q-N1	N-R4	50	QxN	Q-B3
9	0-0	R-K1	30	B-B2	N-B5	51	Q-Q8+	QxQ
10	N-Q2	N-R3	31	N-B4	NxN	52	BxQ	RxP
11	P-B3	N-B2	32	BxN	B-N4	53	R-K1	P-B6
12	P-QR4	P-N3	33	B-N3	R-R5	54	RxP	P-B7
13	N-B4	B-QR3	34	Q-B1	B-B1	55	R-K8+	K-N2
14	B-N5	P-R3	35	R-Q2	Q-Q1	56	BxP	RxB
15	B-R4	P-KN4	36	Q-KB1	P-R4	57	R-QB8	R-N7
16	B-B2	N-R4	37	K-N1	P-R5	58	P-Q6	RxP
17	N-K3	B-QB1	38	B-B2	B-N2	59	P-Q7	R-Q7
18	Q-B2	N-B5	39	N-K3	BxB	60	K-N1	RxP
19	B-B4	B-Q2	40	QxB	R-R8+	61	RxP	R-Q6
20	R/B1-Q1	Q-B3	41	R-Q1	R-R7	62	R-KB2	K-B3
21	B-KN3	N-R4	42	Q-Q3	RxP	63	K-R2	Drawn by agreement

by man/computer interaction in complex problem solving situations (see [1]). He urged the organizers of the ACM tournament to try and set up an experiment to see what gain in playing strength there may be when man and machine cooperated in the area of computer chess.

The difficulties were considerable. David Levy agreed to cooperate, although he pointed out the inconclusiveness of a single game as an indicator of validity in such an experiment. The man/computer half of the competition was even more difficult to arrange. For this part we needed a program of sufficient playing strength to make the contest interesting. We also needed a player of strength equivalent to the program who could interact and cooperate with it in trying to choose the best moves against their opponent. CHESS 4.9 and David Slate met these qualifications. Slate was as skeptical as Levy of basing any conclusion upon the outcome of a single game. Nevertheless, he agreed to play, mostly for the curiosity and fun of it. Both Levy and Slate felt that they knew the inevitable outcome, but one never knows for sure.

CHESS 4.9, running on a Control Data Cyber 176, has a U.S. Chess Federation rating of within 50 points of 2000. Slate's USCF rating is about the same. Levy's USCF rating would be about 2350. Given such a spread in rating points, your second author has conjectured that statistically, in a 20-game match, Slate playing alone would win no more than two games and, perhaps, draw another five.

The problem which was to face Slate was how to work with his program as a team to improve their chances of winning against Levy. He would need to modify CHESS 4.9 so that certain information such as principal variations and estimated valuations could be printed out at a terminal on request and he would need to be able to interrupt the program's computations at any time to input a "trial balloon" move and request the program's "opinion." And all of this had to be done within the time constraints of an average of three minutes per move. Slate called upon the co-author of CHESS 4.9, Larry Atkin, and their long-time collaborator, Dr. David Cahlander of Control Data Corporation, to make the necessary program changes.

Another problem to overcome was the logistics of the match itself. It was clear that Levy and Slate must be physically separated so that the unavoidable hubbub of Slate's interaction with the computer would not disturb Levy's play. Slate decided that he needed an operator to handle terminal interaction so that he could concentrate on his play. Atkin volunteered to serve that role. Moves made by each side were transmitted from one location to the other over a computer terminal link, with Cahlander making Slate's moves on Levy's board.

Then there was the audience to consider. They would be in a third location with a display chessboard, closed-circut TV monitors to view the two (three?) contestants, a terminal to pick up the moves made, and expert commentary to make the match enjoyable. Euwe and Koltanowski agreed to do this and they were outstanding.

So, the stage was set. The CDC Cyber 176 was in Arden Hills, Minnesota, and the contestants, guests, and audience were in Detroit. The match began at 2:30 P.M. What follows is the game score with comments made by Dr. Euwe during the game, and Levy and Slate after the game.

White: Slate/CHESS 4.9 Black: Levy

Bird's Opening

1. P-KB4 ...

Levy has seen this before in Minneapolis in 1975 and at that time he won very quickly after making a sacrifice.

1.	...	P-Q4
2.	N-KB3	N-KB3
3.	P-K3	B-N5

White's idea in Bird's opening is to take control of the square K5 and maybe to occupy this square with his Knight. Black's strategy in this game is to exchange off the Knight so that

it will be Black who controls this vital square.

4.	P-QN3	QN-Q2
5.	B-N2	P-B3
6.	B-K2	BxN
7.	BxB	Q-B2
8.	N-B3	P-K4

Having prepared the move carefully, Black stakes a first claim in the center of the board.

9.	PxP	NxP
10.	Q-K2	. . .

Slate picked this move, overriding the computer's decision to castle Kingside, because he anticipated Levy would continued B-Q3 followed by P-KR4 and N/K4-N5 with a very strong attack.

10.	. . .	B-Q3
11.	P-N3	Q-K2

A waiting move. Black did not wish to castle until he had seen where White was going to put his own King. Black wanted to castle on opposite sides and then launch an attack against the White King.

12.	0-0-0	. . .

Better was B-N2 leaving Black with the question once again.

12.	. . .	0-0
13.	B-N2	B-R6
14.	K-N1	BxB
15.	KxB	P-QN4
16.	R/Q1-KB1	N/B3-Q2!

This move does two things. It prevents a possible exchange sacrifice by White on KB6 and it prepares to bring the King's Knight into the attack on the Queenside.

17.	P-Q4 ? ?	. . .

After this move White is always in very serious trouble, probably even lost. Perhaps White might consider R-B4 followed by KR-KB1 though Black still has the better attacking chances.

17.	. . .	N-B5+!
18.	PxN	. . .

If 18. K-R1, then the simplest way to win is 18. . . . QxP.

18.	. . .	Q-N5+
19.	K-B1	QxN
20.	PxNP	PxP
21.	BxP	N-N3
22.	B-N3	. . .

If 22. BxR N-B5! and White must give up his Queen in order to prevent mate.

22.	. . .	N-B5
23.	BxN	PxB

This was the position Levy had in mind when playing 17. . . . N-B5+. Black is a Pawn down but can pick up the QRP at will. The decisive factor is the exposed position of White's King which must eventually prove fatal.

24.	Q-K1	Q-R6+
25.	K-Q2	QR-N1
26.	K-K2	R-N7
27.	Q-Q2	RxRP
28.	R-QN1	Q-K2!

Black maintains pressure on the Queen's side where he has a passed Rook Pawn and simultaneously prepares to open up a second front on the King's side where White's King is trying to find a haven.

29.	R-R1	Q-K5
30.	KR-QB1	. . .

If 30. RxR, then Q-N7+ 31. K-Q1 QxR+ 32. Q-K1 Q-N2, with a similar position to that arrived at in a few moves.

30.	. . .	RxR
31.	RxR	Q-N7+
32.	K-Q1	Q-R8+
33.	Q-K1	Q-N2
34.	K-K2	R-N1
35.	R-R4	. . .

Euwe observed that K-B2 offered more resistance though after 35. . . . P-KR4! Black must still maintain excellent winning chances.

35.	. . .	R-QB1
36.	R-R5	Q-K5
37.	RxP	QxBP+

Levy discussing his game with the audience following its completion.

The beginning of the end. Black now has a strong passed Pawn in addition to his attack on the White King.

38.	Q-K2	Q-K5
39.	Q-K1	. . .

Passive but if 39. R-R3 P-R4! and Black will still have a good attack on the King's side.

39.	. . .	P-B6
40.	K-B2	P-R4

Eliminating the possibility of a black rank mate and launching the final attack on the Black King.

41.	R-R5	P-R5
42.	R-R1	P-R6
43.	Q-R1	Q-B7+
44.	K-B3	R-B3

The CDC/Cyber 176 became unavailable to Slate and he chose to continue on his own.

45.	Q-QN1	R-B3+
46.	K-N4	Q-K7+
47.	K-R4	R-R3+
48.	K-N5	Q-R4+
49.	K-B4	R-KB3+
50.	Resigns	

Slate observed after the game was over that he did not want to get into the kind of game that was played. He had hoped to steer the game along more active lines. He also observed in restrospect that he had put too much faith in the moves recommended by his computer and that if he had to do it again, he would have overridden the computer's suggestions more often. Slate said he felt comfortable following the advice of his companion when it showed that he was in no tactical danger.

Both Slate and Levy were very excited about repeating the experiment. Slate said that there was considerable room for improving the interactive features in CHESS 4.9, that he often wanted "partial results" and they were not available.

Dan McCracken awarded the winning trophy to Levy and then announced that he was the first to take a $1,000 slice of Levy's new wager. Levy has bet that no unaided computer program will beat him in a multigame match any time before January 1, 1984. We wish both of them good luck!

Reference

1. McCracken, Daniel J. Man + computer: A new symbiosis. *Comm. ACM 22*, 11 (November 1979), 587-588.

1980 TOURNAMENT RULES

1. The tournament is a four round Swiss style tournament with trophies to be awarded to the winner and runner-up.

2. The first and second rounds will be played Sunday, October 26th, at 1pm and 7:30pm. The third round is scheduled for Monday, October 27th, at 7:30pm, and the fourth round on Tuesday, October 28th, at 7:30pm.

3. Unless otherwise specified, rules of play are identical to those of regular "human" tournament play. If a point is in question, the tournament director has the authority to make the final decision.

4. Games are played at a speed of 40 moves per player in the first two hours and then 10 moves every 30 minutes thereafter.

5. The tournament director has the right to adjudicate a game after four and one half hours of total elapsed time.

6. The order of finish of the participants will be determined by the total number of points earned. If two teams have an equal number of points, the sum of opponents' points will be used as a second factor. If a tie still remains, the opponents' opponents' points will be used as a third factor.

7. If a team encounters technical difficulties (machine failure, communications failure or error, or program failure) during the course of a game, the tournament director may allow them to stop their clock as long as necessary, but not to exceed 20 minutes, in order to restore their system. At the end of at most 20 minutes their clock will be started again. The tournament director may grant a team permission to stop their clock at most two times during the course of a game. These two time outs can be taken consecutively. In addition a 20 minute delay at the beginning of each round may be allowed.

8. There is no manual adjustment of program parameters during the course of a game. In the case of failures, the program parameters must be reset to their original settings if it is at all possible. Information regarding castling status, en passent status, etc., may be typed in after a failure. If at any time during the course of a game the computer asks for the time remaining on ither his or his opponent's clock, this information may be provided. However, the computer must initiate the request for information.

9. At the end of each game, each team is required to turn in a game listing to the tournament director.

10. Participants are required to attend a meeting at 12 noon on Sunday, October 26th, for the purpose of making any last minute rule changes that may be necessary.

11. The programs that participate must be the work of the individual submitting the entry. No individual can submit two programs.

12. Each entry is a program. A listing of the program should be available on demand to the tournament director. The program can be run on any computing system.

13. Each game is officially played on a chess board provided by the Tournament Organizing Committee. A electronic chess board used by one side can be substituted if the other side is agreeable. The official clock is provided by the TOC. If both sides are agreeable, another clock can be used.

COMPUTER CHESS LITERATURE

Books:

Bell, A. (1978) The Machine Plays Chess?, Pergamon Press, Oxford.

Botvinnik, M.M. (1970) Computers, Chess, and Long Range Planning, Springer Verlag, New York.

Frey, P. (ed.) (1977) Chess Skill in Man and Machine, Springer Verlag, New York.

Hayes, J. and Levy, D. (1976) The World Computer Chess Championship, U. of Edinburgh Press.

Levy, D. (1976) 1975 U.S. Computer Chess Championship, Computer Science Press, Potomac, Maryland.

Levy, D. (1976) Chess and Computers, Computer Science Press, Potomac, Maryland.

Levy, D. (1976) 1976 Computer Chess Championship, Computer Science Press, Potomac, Maryland.

Levy, D. and Newborn, M. (1980) More Chess and Computers, Computer Science Press, Potomac, Maryland.

Newborn, M. (1975) Computer Chess, Academic Press, New York.

Newborn, M. (1979) "Recent Progress in Computer Chess", Advances in Computers, Vol. 19, Academic Press, New York, pp. 58-119.

Magazines:

In the last few years, articles on computer chess have appeared in Sports Illustrated, Scientific American, Science Magazine, Nature, and many others. Personal Computing has taken the lead and publishes about 10 pages monthly in its magazine. The bimonthly, SIGART Newsletter of the ACM also publishes several pages on computer chess.

The ICCA:

Established at the Second World Computer Chess Championship in Toronto in 1977, the International Computer Chess Association currently has over 300 members. Ben Mittman has been recently elected its President and is in charge of publishing the ICCA Newsletter three or four times a year. Monroe Newborn and Ken Thompson were elected Vice President and Secretary/Treasurer, respectively. Dues are $10.00 (U.S.) for a one year membership. Interested individuals should write to Ken Thompson, Bell Telephone Laboratories, Room 2C, 423 Murray Hill, New Jersey 07974.

A review of the ICCA Triennial Meeting that took place in Linz, Austria at the recent world championship will be presented by ICCA officials at 6:00-6:30, Cumberland Room on Tuesday, October 28, 1980.