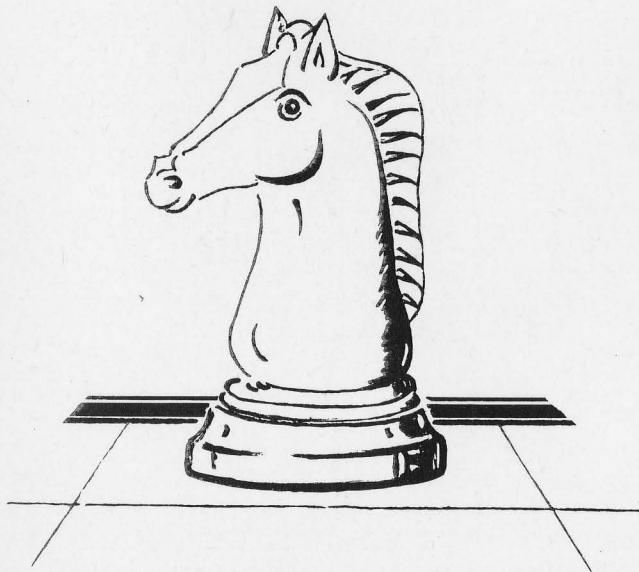


MICROCHESS

A CHESS PLAYING PROGRAM FOR THE 8080 MICROCOMPUTER



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MICRO-WARE LTD.

MICROCHESS

MICROCHESS was originally conceived as a program which would play chess using only a minimum hobbyist microcomputer system. The program which was developed will run on any 8080 based microcomputer configured with at least 4K of contiguous RAM, and an ASCII input/output device.

Although MICROCHESS does not always play chess at the expert level, it will make a reasonable move under most circumstances. In addition to being great fun to play, it can provide a useful and tireless opponent for practising checkmates, learning openings, and sharpening general playing skills.

The MICROCHESS program is supplied on paper tape or on Tarbell(TM) cassette. The documentation provided includes complete player's instructions, a description of the program operation, and an appendix with details for modifying the I/O to suit the individual requirements of each user's personal computer system. If you should have any problems putting MICROCHESS up on your system, please send the details of your system and the exact problem to the address below. We will do our best to assist you in any way possible.

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Player's Manual

NOTATION

MICROCHESS uses a special octal notation to identify the squares of the chess board. Each square is represented by a two digit number. The first digit specifies the rank(0 to 7) from the computer's end of the board. The second digit specifies the file (0 to 7) from the computer's right (your left). A completely numbered board is shown below:

M I C R O C H E S S

00	01	02	03	04	05	06	07
10	11	12	13	14	15	16	17
20	21	22	23	24	25	26	27
30	31	32	33	34	35	36	37
40	41	42	43	44	45	46	47
50	51	52	53	54	55	56	57
60	61	62	63	64	65	66	67
70	71	72	73	74	75	76	77

C H A L L E N G E R

PROGRAM EXECUTION

The MICROCHESS program is executed from address 0000. After printing the initial sign-on message, MICROCHESS will ask: "DO YOU WANT WHITE? (Y,N)". If you wish to play white, respond with 'Y'. If you wish to play black, respond with 'N'. If you wish MICROCHESS to decide which colour to play, respond with any other character. MICROCHESS will then display the board and prompt with a colon, indicating that the program is ready to receive any operating command.

MICROCHESS COMMANDS

MICROCHESS has seven special commands to which it will respond. Commands may be abbreviated to the first letter of the command word. All commands must be terminated with a carriage return. Typing errors may be corrected at any time by typing a control-X. This will clear the input buffer and allow you to retype the entire line.

COMMAND SUMMARY

COMMAND	FUNCTION
<u>D</u> ISPLAY	Display the board at the terminal.
<u>G</u> O	Make a move from the current position.
<u>S</u> PEED	Change the mode of the computer's play.
<u>R</u> ESIGN	End the game.
<u>E</u> XCHANGE	Exchange sides.
<u>A</u> UTO DISPLAY	Display the board after each move.
<u>N</u> O DISPLAY	Do not display the board automatically.

THE DISPLAY COMMAND

The DISPLAY command instructs the computer to display the current position of the internal chess board at the terminal. MICROCHESS is always illustrated at the top of the display, and you are always at the bottom. Each piece is indicated by a two character mnemonic. The first character shows the colour of the piece. The second character shows the type of piece occupying that square. Black squares which are unoccupied are illustrated by :: . The sample display below shows the board set up to begin a game with MICROCHESS playing white.

```

+----- MICROCHESS -----+
! WR WN WB WK WQ WB WN WR !
!
! WP WP WP WP WP WP WP WP !
!
!      ::      ::      ::      :: !
!
!  ::      ::      ::      ::      !
!
!      ::      ::      ::      :: !
!
!  ::      ::      ::      ::      !
!
! BP BP BP BP BP BP BP BP !
!
! BR BN BB BK BQ BB BN BR !
+----- CHALLENGER -----+
```

THE GO COMMAND

The GO command instructs MICROCHESS to examine the current position of the board, choose the best move available, make that move, and then print out the move that it has made. This command may be entered at any time. The computer will not check to see if you have made any moves since the last computer move, or if it is making the first move with the black men. MICROCHESS trusts you. You must referee the game.

THE SPEED COMMAND

MICROCHESS can play chess at three different levels. The best level is called the NORMAL speed, and requires from 60 to 300 seconds per move for analysis. By eliminating some time consuming portions of the strategic analysis, the speed can be increased. BLITZ mode requires only 20 seconds per move on the average, and SUPERBLITZ will make a move in about 10 seconds. In response to the SPEED command, MICROCHESS will ask: "WHICH MODE? (S,B,N)". Type one of the characters S,B, or N to choose the desired speed. This command may be entered at any time during the game.

SPEED SUMMARY

ENTER	SPEED	TIME PER MOVE
S	SUPERBLITZ	5 TO 10 SECONDS
B	BLITZ	10 TO 30 SECONDS
N	NORMAL	30 TO 300 SECONDS

THE RESIGN COMMAND

The RESIGN command may be entered at any time to end the game. MICROCHESS will display the final position of the board, and then ask if you wish to play again.

THE EXCHANGE COMMAND

The EXCHANGE command enables you to turn the board around at any point during the game. This forces MICROCHESS to play with your pieces in the position that you have left them. You must play with the computer's men. The relative positions of the pieces remain the same, but the numbering of the squares changes because the notation always has its origin at the computer's lower right.

It is possible to have MICROCHESS play a game against itself by entering the EXCHANGE command, then the GO command, then the EXCHANGE command, and so on. Remember that each move printed is being described from opposite ends of the board because of the intervening exchanges. It is best to display the board every two or three moves to be sure that you are following the game correctly.

ENTERING YOUR MOVE

Your move is described to MICROCHESS by specifying the square the piece was moved from, and the square the piece was moved to, using the octal notation described above. For example, with the computer playing white, a KP to KP4 response would be entered at the colon prompt as:

```
:      63-43
```

MICROCHESS will immediately move the appropriate piece internally and begin to consider its response. The GO command is assumed as soon as the move is entered. Note that MICROCHESS carries out no legal validity check on your move. The program will accept a move of any piece on the board to any square on the board. If the square you move the piece to is occupied, the occupying piece will be captured and removed from the board. Therefore, it is very important when entering your move, to take great care not to enter an incorrect square number. As with the commands, typing errors may be corrected by typing a control-x and retyping the entire line.

SPECIAL MOVES

Normally, MICROCHESS begins to consider its response as soon as you have entered your move in the format shown above. If you wish to inhibit this action, in order to make two consecutive moves to set up a test position, or to make an en passant capture as described below, enter an M after the move. For example:

```
:      63-43M  
:
```

MICROCHESS will move the appropriate piece on its internal chess board, and then return to the command mode for further commands or moves. Note once again, that you may move any piece on the board in this manner, This includes the computer's pieces, which you may wish to move in order to set up a special position.

CASTLING

Castling is accomplished by entering 0-0 to castle on the king's side (short), and 0-0-0 to castle on the queen's side (long). The letter O is used, not the numeral Ø.

:0-0

PAWN PROMOTION

If you move a pawn to the eighth rank (rank Ø in the octal notation of MICROCHESS), you may promote it to a piece. This may be done by following the move entry by an equal sign and the mnemonic of the piece you wish the pawn promoted to. For example, if you wish to promote the king pawn to a Queen, the following move would be entered:

: 13-Ø3=Q

Because of the internal board representation of MICROCHESS, only one queen is allowed per side at any given time. If you already have a queen, it will be necessary to choose another piece which has already been lost.

EN PASSANT

En passant pawn capture may be accomplished by making two moves with the capturing pawn. The first move is a lateral move to capture the computer's pawn. The second move is forwards to the final square that you are moving your pawn to. For example, a capture of the computer's queen pawn which has just moved from 14 to 34 with your king pawn, now located at 33, is accomplished by first moving 33 to 34 to capture the pawn (using the M suffix to prevent MICROCHESS from moving), and then moving from 34 to 24 to move your pawn to the appropriate final square.

: 33-34M
: 34-24

THE COMPUTER MOVE

MICROCHESS indicates its move using the same notation that you use to enter your moves. To distinguish your moves from those of the computer when going over an old listing, the computer's moves are preceded by the notation: MC : , as shown in the example game illustrated in appendix F. En passant capture is not a part of the MICROCHESS move generation routines. Consequently, the computer will never capture en passant or recognize the danger of you capturing en passant when it formulates its optimum move.

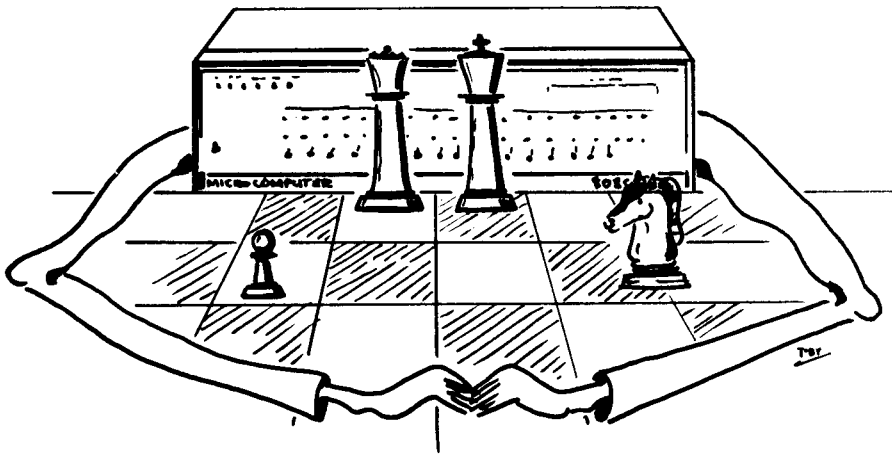
NOTES

Some players may find that their level of play exceeds that of MICROCHESS. In order to make the game more challenging, these players may make the same sacrifice they might make to a weak human player. They can spot the computer a piece by removing it at the beginning of the game, or shortly after the opening play is concluded. This can easily be done by capturing it with one of your own pieces, then returning the piece to its own square. For example:

: 74-73M
: 73-74M

MICROCHESS has been designed for your enjoyment. Have fun! In addition, we are always open to suggestions, ideas, or criticisms. Please let us know if you feel that there is anything we can do to improve our products, or if there are any new products you would like to see us present.

?



APPENDIX A

THE PROGRAM

The program is divided into three functionally distinct sections: the control and input/output routines, the move generation and data collection routines, and the strategic analysis routines.

CONTROL AND INPUT/OUTPUT

This section of the program is responsible for all communications between the computer and the human player. The primary functions carried out are the board set up, and data table initialization sections. In addition to this, the various input commands are interpreted and subroutines are called which execute them. The most important subroutine called by the control section is the chess program itself. This is a complex set of routines which examine the current state of the chess board and return a move which has been evaluated as the best available.

MOVE GENERATION

The second major subsection of the program consists of a set of subroutines which generate legal moves from a given position. MICROCHESS, unlike most larger chess playing programs, evaluates its opportunities in a serial manner. That is, it generates an available move, and evaluates it completely before generating the next available move. The evaluation routines calculate a value for each move which is compared with the value of the best move found so far. If it is better, it becomes the best move for comparison with future moves generated. The move with the highest value will be selected by MICROCHESS.

To generate all the moves for a side MICROCHESS works through a table which contains the board position of each piece. This is the table shown in appendix E. First, a king pawn move is generated and evaluated. The evaluation includes the actual moving of the piece, and the generation of potential reply moves by the challenger. The sequence of trial moves of the computer's pieces and the challenger's pieces may extend as far as three moves for each side beyond the current position. At the end of this time, each move made will be taken back, until the board is returned to its original state. Then, the next available move will be made, and the replies tested. This continues until all the moves for each piece have been tested. MICROCHESS is capable of generating and evaluating about 10,000 moves per second. Thus, in a 300 second analysis 3,000,000 moves will be made and taken back in an attempt to evaluate the available moves.

DATA COLLECTION

For each test move available to the computer data are collected which will allow it to evaluate the resulting position. In the normal mode of operation MICROCHESS collects the following information for use by the strategy algorithms.

MOBILITY (μ) This represents the number of legal moves that a side has available to it from a given position.

MAXIMUM CAPTURABLE PIECE (ρ). The value of the most valuable piece presently being attacked by a side.

TOTAL ATTACK (α). The sum of the values of all the pieces under attack by a side.

CAPTURE (ψ). The value of any piece captured by the current move, or the maximum available capture in a future move which can be achieved by a series of captures (an exchange).

The mobility, maximum capturable piece, and the total attack are obtained for the current position, and the position after the test move has been made for both the computer and its opponent. Capture values are calculated to a depth of three moves per side beyond the current position provided the position examined can be achieved by a continuous sequence of piece captures. In addition, the value of the moving piece, and the squares it occupies before and after the move are used in the evaluation.

STRATEGY

After a test move has been generated, and the parameters above have been collected by the data collection routines, the strategic analysis algorithm assigns a value to the move. The basic algorithm is a linear combination of the various parameters. The basic value is then modified by factors such as the availability of a checkmate, or a positional bonus for motion to the center or out of the back rank.

$$\begin{aligned} \text{VALUE} = & 4.00\psi_1 + 1.25\psi_2 + 0.75\rho_1 + 0.75\alpha_1 + 0.25\mu_1 \\ & + 0.25\psi_3 - 3.00\rho'_1 - 2.00\alpha'_1 - 1.25\psi'_1 - 0.25\rho_0 \\ & - 0.25\alpha_0 - 0.25\psi'_2 - 0.25\psi'_3 - 0.25\mu_0 \end{aligned}$$

(') signifies the challenger's value.

(n) subscript signifies the position at time n.
(time 0 is the current board position)

VALUE = VALUE + 02 if a piece is moved from the back rank.

VALUE = VALUE + 02 if a piece is moved to the centre.

VALUE = FF if the challenger is checkmated.

The algorithm used by MICROCHESS is a relatively simple one compared to major chess programs which can compete at an expert level of play. As a result, the computer must make the decision between positional development, or material advantage based upon the few factors outlined above. Good chess is considerably more complex, and requires that the player use algorithms which vary from time to time during the game. MICROCHESS has only a single algorithm which must be used at all stages during the game (except for a few opening moves which can be played from a limited book). This single algorithm is a compromise of the possible opening, middle game, end game, and special situation algorithms. It is because of this compromise that MICROCHESS sometimes makes moves which are not optimal.

INPUT AND OUTPUT SUBROUTINES

MICROCHESS is supplied with input and output subroutines for use with an ASR 33 or equivalent ASCII terminal. These routines are shown below in source format:

```

0DE6          4130 *****
0DE6          4140 * TELETYPE INPUT/OUTPUT ROUTINES SUPPLIED. *
0DE6          4150 *****
0DE6          4160 *                OUTPUT ROUTINE                *
0DE6          4170 *****
0DE6 DB 00    4180 TTYO  IN  0
0DE8 E6 80    4190      ANI  80H
0DEA CA E6 0D 4200      JZ   TTYO
0DED 78      4210      MOV  A,B
0DEE D3 01    4220      OUT  1
0DF0 C9      4230      RET
0DF1          4240 *****
0DF1          4250 *                INPUT ROUTINE                *
0DF1          4260 *****
0DF1 DB 00    4270 TTYI  IN  0
0DF3 E6 40    4280      ANI  40H
0DF5 CA F1 0D 4290      JZ   TTYI
0DF8 DB 01    4300      IN   1
0DFA E6 7F    4310      ANI  7FH
0DFC 47      4320      MOV  B,A
0DFD C9      4330      RET

```

The conventions used by these routines are:

- 1- Status is on channel 0.
- 2- Data is on channel 1.
- 3- Data available is signalled by bit 6 (40H).
- 4- Transmit buffer empty is signalled by bit 7 (80H).

These routines are shown, so that you may modify them if necessary to suit the individual requirements of your system.

If you wish to use your own I/O routines replace the data at address 09DA (C3 F1 0D) with a JMP to your own input routine (C3 XX XX). Then, replace the data at address 09D7 (C3 E6 0D) with a JMP to your own output routine (C3 XX XX).

The data is passed in the B register. The parity bit may be 0 or 1 for an input instruction. Output from MICROCHESS has the parity bit set to 0. There is no requirement for saving any of the registers; however, the stack pointer must be preserved and the routines must end with a return instruction.

APPENDIX C

DISPLAY OPTIONS

Two display option commands are available at the MICROCHESS command prompt. These are AUTO DISPLAY and NO DISPLAY. Entering the AUTO DISPLAY command causes the program to display the board immediately after each move made by either side. Entering the NO DISPLAY command will turn off the automatic display feature. This is demonstrated in the sample game in Appendix F.

The default option in the copy of MICROCHESS you have received is NO DISPLAY. The user may change the default option to allow the program to display the board after each computer move, after each of the challenger's moves, or both. Replacing the three NOP instructions at address 0120 (00 00 00) with a call to the display subroutine (CD 42 02) will cause the board to be automatically displayed after each move made by MICROCHESS. If you wish to have the board displayed automatically after each of your moves as well, replace the three NOP instructions at address 00D4 with the same subroutine call (CD 42 02).

CRT DISPLAY

If you are using a CRT display with only 16 lines on the screen, you may wish to shorten the board display provided by MICROCHESS. This is easily accomplished by entering 3 NOP instructions (00 00 00) at address 0258. This replaces the CD DA 01 which appears in the original code.

CUSTOM BOARD DISPLAY

If you wish to design your own board display for use with a graphic terminal or just to gratify your own artistic ambitions, you may replace the MICROCHESS display routine by replacing the data at address 0242 (CD AC 09) with a JMP to your own display subroutine (C3 XX XX).

The data required to display the board is contained in a table at address 09ED. This table contains the board location of each piece. The address and location of each piece as it would appear at the start of a game with MICROCHESS playing white is shown below.

PIECE ADDRESSES FOR BOARD DISPLAY

PIECE	MICROCHESS	CHALLENGER
King	09ED 03	09FD 73
Queen	09EE 04	09FE 74
King Rook	09EF 00	09FF 70
Queen Rook	09F0 07	0A00 77
King Bishop	09F1 02	0A01 72
Queen Bishop	09F2 05	0A02 75
King Knight	09F3 01	0A03 71
Queen Knight	09F4 06	0A04 76
KR Pawn	09F5 10	0A05 60
QR Pawn	09F6 17	0A06 67
KN Pawn	09F7 11	0A07 61
QN Pawn	09F8 16	0A08 66
KB Pawn	09F9 12	0A09 62
QB Pawn	09FA 15	0A0A 65
Q Pawn	09FB 14	0A0B 64
K Pawn	09FC 13	0A0C 63

APPENDIX D

RETURNING TO YOUR OPERATING SYSTEM

If you wish to return directly to your operating system at the end of a game, this can be accomplished by replacing the HALT instruction at address 01D7 with a JMP xx xx to your operating system entry point. Two NOPs have been included for your convenience in adding this patch.

Please note, that it is impossible to call MICROCHESS as a subroutine because the program manipulates the stack pointer several times during program execution. Thus, the original return address will not be at the top of the stack when the return instruction is executed.

APPENDIX E

```

0000 31 82 0D CD AC 09 21 6D 0B CD DA 01 21 93 0B CD
0010 DA 01 21 B9 0B CD DA 01 CD AC 09 CD AF 05 21 95
0020 0A 22 7D 0A 21 CB 0A 22 7F 0A 21 01 0B 22 79 0A
0030 21 37 0B 22 7B 0A AF 32 74 0A 32 78 0A 32 82 0A
0040 32 81 0A 32 75 0A 32 76 0A 3E 10 32 77 0A 3E EE
0050 32 4D 0A 32 4E 0A 21 F5 0B CD 5C 01 CD C9 09 CD
0060 BF 09 78 0F D2 6F 00 3E 01 32 82 0A CD C3 05 CD
0070 42 02 CD AC 09 31 82 0D 21 E6 0D 22 59 0A 21 20
0080 20 22 20 0C 21 10 0C CD 5C 01 CD 20 03 CD AC 09
0090 21 0A 0D 7E FE 47 CA D7 00 FE 44 CA 42 03 FE 45
00A0 CA 2C 02 FE 53 CA E1 01 FE 4F CA D1 03 FE 52 CA
00B0 20 02 FE 41 CA F1 02 FE 4E CA 05 03 CD 68 01 3A
00C0 0F 0D FE 4D CA 26 01 FE 3D CA 48 03 FE 0D C2 2C
00D0 01 CD 6D 08 00 00 00 CD 7D 04 3A 78 0A B7 CA F4
00E0 00 21 4F 20 22 1E 0C 21 20 4F 22 1B 0C AF 32 78
00F0 0A C3 02 01 CD AD 01 CD 97 03 3A 4F 0A FE FF CA
0100 38 01 21 16 0C CD 5C 01 3A 81 0A FE FF CA 17 03
0110 3A 74 0A B7 CA 1D 01 21 AE 0C CD 5C 01 CD AC 09
0120 00 00 00 C3 75 00 CD 6D 08 C3 75 00 21 23 0C CD
0130 5C 01 CD AC 09 C3 75 00 21 30 0C CD DA 01 CD 42
0140 02 CD AC 09 21 47 0C CD 5C 01 CD C9 09 CD BF 09
0150 78 FE 59 C2 C8 01 CD AC 09 C3 18 00 7E FE 0D C8
0160 47 CD BF 09 23 C3 5C 01 2A 0A 0D CD 99 01 32 50
0170 0A 2A 0D 0D CD 99 01 32 51 0A 32 4E 0A 3A 50 0A
0180 21 0C 0A 0E 1F BE CA 91 01 2B 0D F2 85 01 C3 2C
0190 01 79 32 4D 0A 32 4F 0A C9 7D E6 0F 17 17 17 17
01A0 47 7C E6 0F B0 47 E6 88 C2 2C 01 78 C9 3A 50 0A
01B0 47 CD 8F 09 2A DD 09 22 1B 0C 3A 51 0A 47 CD 8F
01C0 09 2A DD 09 22 1E 0C C9 CD AC 09 CD AC 09 21 5B
01D0 0C CD 5C 01 CD AC 09 76 00 00 CD 5C 01 CD AC 09
01E0 C9 CD AC 09 21 DF 0B CD 5C 01 CD C9 09 CD BF 09
01F0 78 FE 53 CA 03 02 FE 42 CA 0A 02 FE 4E CA 11 02
0200 C3 2C 01 06 00 0E FF C3 15 02 06 00 0E FB C3 15
0210 02 06 08 0E FB 78 32 1E 07 79 32 61 08 C3 72 00
0220 CD AC 09 21 7E 0C CD 5C 01 C3 3E 01 CD C3 05 3A
0230 82 0A B7 CA 3A 02 AF C3 3C 02 3E 01 32 82 0A C3
0240 75 00 CD AC 09 CD AC 09 16 00 21 B6 0C CD DA 01
0250 7A B7 CA 5B 02 21 D2 0C CD DA 01 06 21 CD BF 09
0260 06 20 CD BF 09 21 0C 0A 0E 1F 7E BA CA B8 02 2B
0270 0D F2 6A 02 7A E6 0F 5F 7A E6 F0 0F 4F 4F C3
0280 1F DA 89 02 06 20 C3 8B 02 06 3A CD BF 09 CD BF
0290 09 06 20 CD BF 09 14 7A E6 0F FE 08 C2 65 02 06
02A0 21 CD BF 09 CD AC 09 7A C6 08 57 F2 50 02 21 EE
02B0 0C CD DA 01 CD AC 09 C9 79 FE 10 D2 D3 02 3A 82
02C0 0A B7 C2 CC 02 3A 83 0A 47 C3 DD 02 3A 84 0A 47
02D0 C3 DD 02 3A 82 0A B7 C2 C5 02 C3 CC 02 CD BF 09
02E0 79 E6 0F 4F 06 00 21 85 0A 09 46 CD BF 09 C3 91
02F0 02 3E CD 32 D4 00 32 20 01 21 42 02 22 D5 00 22
0300 21 01 C3 72 00 21 00 00 22 L4 00 22 D5 00 22 20
0310 01 22 21 01 C3 72 00 21 96 0C CD 5C 01 C3 3E 01
0320 21 0A 0D 0E 00 CD C9 09 73 77 FE 0D CA 3C 03 FE
0330 18 CA 72 00 CD BF 09 23 0C C3 25 03 AF B9 CA 25
0340 03 C9 CD 42 02 C3 75 00 CD 68 01 21 0C 0A 0E 0F
0350 3A 50 0A BE CA 5C 03 2B 0D F2 53 03 36 CC 21 85
0360 0A 0E 07 3A 10 0D BE CA 72 03 2B 0D F2 5 03 C3
0370 2C 01 21 FD 09 06 00 09 3E CC BE CA 83 0C 2B BE
0380 C2 2C 01 3A 51 0A 77 3A 11 0D FE 4D CA 72 00 FE
0390 0D CA D7 00 C3 2C 01 3A 51 0A E6 F0 FE 70 C0 3A
03A0 4F 0A 4F E6 08 C8 21 ED 09 06 00 09 3E CC 77 21
03B0 EE 09 1E 00 BE CA BD 03 23 1C C3 B4 03 3A 51 0A
03C0 77 3E 3D 32 20 0C 21 85 0A 16 00 19 7E 32 21 0C
03D0 C9 3A 0C 0D FE 4F C2 2C 01 3A 0E 0D FE 4F C2 2F
03E0 04 3A 82 0A B7 CA 05 04 3A FD 09 FE 74 C2 2C 01
03F0 3E 72 32 FD 09 3E 73 32 00 0A 32 4E 0A 3E 13 32

```

0400 4D 0A C3 1F 04 3A FD 09 FE 73 C2 2C 01 3E 75 32
0410 FD 09 3E 74 32 00 0A 32 4E 0A 3E 13 32 4D 0A 3A
0420 0F 0D FE 4D CA 72 00 FE 0D CA D7 00 C3 2C 01 3A
0430 82 0A B7 CA 53 04 3A FD 09 FE 74 C2 2C 01 3E 76
0440 32 FL 09 3E 75 32 FF 09 32 4E 0A 3E 12 32 4D 0A
0450 C3 6D 04 3A FD 09 FE 73 C2 2C 01 3E 71 32 FD 09
0460 3E 72 32 FF 09 32 4E 0A 3E 12 32 4D 0A 3A 0D 0D
0470 FE 4D CA 72 00 FE 0D CA D7 00 C3 2C 01 2A 75 0A
0480 7D FE 36 D2 6B 05 CD CF 04 F5 2A 75 0A 23 22 75
0490 0A F1 D2 6B 05 CD 4F 05 CD B7 04 CD 6D 08 3A 4D
04A0 0A FE 00 C0 3E 02 32 4D 0A 3A 4E 0A EE 03 32 4E
04B0 0A 32 78 0A C3 98 04 21 ED 09 3A 4D 0A 32 4F 0A
04C0 4F 06 00 09 7E 32 50 0A 3A 4E 0A 32 51 0A C9 CD
04D0 04 05 CA EB 04 CD 1C 05 21 77 0A 35 F2 E7 04 AF
04E0 26 00 2E F0 22 75 0A DA CF 04 C9 CD 29 05 2A 75
04F0 0A EB 2A 79 0A 19 7E 32 4D 0A 2A 7B 0A 19 7E 32
0500 4E 0A 37 C9 2A 75 0A EB 2A 7D 0A 19 3A 4D 0A BE
0510 C2 1B 05 2A 7F 0A 19 3A 4E 0A BE C9 2A 75 0A 7D
0520 C6 09 6F 22 75 0A FE 36 C9 2A 75 0A E5 3A 77 0A
0530 4F 3E FF 32 77 0A CD 1C 05 21 77 0A 34 D2 4A 05
0540 0D FA 4A 05 CD 04 05 CA 36 05 E1 22 75 0A C9 3A
0550 1E 07 3C 57 06 05 0E FF 3E FF 3D C2 5A 05 0D C2
0560 58 05 05 C2 56 05 15 C2 54 05 C9 3E 0C 32 54 0A
0570 32 50 0A 0E 14 CD DF 05 3E 04 32 54 0A CD DD 05
0580 3A 50 0A FE 0F DA A3 05 21 ED 09 06 00 3A 4F 0A
0590 32 4D 0A 4F 09 7E 32 50 0A 3A 51 0A 32 4E 0A CD
05A0 6D 08 C9 3E FF 32 4F 0A 32 50 0A 32 51 0A C9 21
05B0 0D 0A 11 ED 09 0E 20 7E 12 23 13 0D C2 B7 05 C9
05C0 CD AF 05 21 ED 09 11 FD 09 0E 10 3E 77 96 47 EB
05D0 3E 77 96 70 EB 77 23 13 0D C2 CB 05 C9 0E 10 21
05E0 5D 0A AF 77 23 0D F2 E3 05 3E 10 32 4D 0A 21 4D
05F0 0A 35 F8 CD 58 07 3E 08 32 55 0A 3A 4D 0A FE 08
0600 F2 56 06 FE 06 F2 43 06 FE 04 F2 35 06 FE 01 CA
0610 1E 06 F2 27 06 CD 98 06 C2 15 06 C3 EE 05 CD A9
0620 06 C2 1E 06 C3 EE 05 3E 04 32 55 0A CD A9 06 C2
0630 2C 0E C3 EE 05 CD A9 06 3A 55 0A FE 04 C2 35 06
0640 C3 EE 05 3E 10 32 55 0A CD 98 06 3A 55 0A FE 08
0650 C2 48 06 C3 EE 05 3E 06 32 55 0A CD DA 06 FA 6B
0660 06 3A 52 0A B7 CA 6B 06 CD 93 07 CD 58 07 21 55
0670 0A 35 7E FE 05 CA 5B 06 CD DA 06 DA 8B 06 FA EE
0680 05 3A 52 0A B7 C2 EE 05 CD 93 07 3A 4E 0A E6 F0
0690 FE 20 CA 78 06 C3 EE 05 CD DA 06 FA A1 06 CD 93
06A0 07 CD 58 07 21 55 0A 35 C9 CD DA 06 D2 C0 06 F5
06B0 E1 22 72 0A 3A 52 0A B7 CA A9 06 2A 72 0A E5 F1
06C0 FA D2 06 3A 52 0A F5 CD 93 07 F1 32 52 0A B7 CA
06D0 A9 06 CD 58 07 21 55 0A 35 C9 3A 55 0A 06 00 21
06E0 2C 0A 4F 09 3A 4E 0A 86 32 4E 0A E6 88 C2 51 07
06F0 3A 4E 0A 0E 1F 21 0C 0A BE CA 04 07 2B 0D F2 F8
0700 06 C3 12 07 79 FE 10 DA 51 07 3E 01 32 52 0A C3
0710 16 07 AF 32 52 0A 3A 54 0A B7 FA 4F 07 FE 00 F2
0720 4F 07 F5 3A 52 0A F5 3E F9 32 54 0A 32 53 0A CD
0730 6D 08 CD C3 05 CD E9 05 CD 70 07 F1 32 52 0A F1
0740 32 54 0A 3A 53 0A B7 FA 4F 07 3E 80 B7 37 C9 AF
0750 C9 AF 32 52 0A 2F B7 C9 21 ED 09 06 00 3A 4D 0A
0760 4F 09 7E 32 4E 0A C9 CD 6D 08 CD C3 05 CD E9 05
0770 CD C3 05 21 00 00 39 22 57 0A 2A 59 0A F9 D1 21
0780 55 0A 72 21 4D 0A 73 C1 E1 71 E1 70 78 32 4E 0A
0790 C3 A0 08 3A 54 0A B7 16 00 5F FA 20 08 3A 4D 0A
07A0 B7 CA B2 07 47 3E 08 BB C2 B2 07 3A 65 0A B8 CA
07B0 FB 07 21 62 0A 19 34 3E 01 B8 C2 BE 07 34 3A 52
07C0 0A B7 CA F2 07 0E 0F 21 0C 0A 3A 4E 0A BE CA D7
07D0 07 2B 0D F2 CD 07 76 21 3D 0A 06 00 09 7E 21 63
07E0 0A 19 BE DA EC 07 77 21 65 0A 19 71 21 64 0A 19
07F0 86 77 7B FE 04 CA FC 07 FA 34 08 C9 3A 67 0A 32

0800 5C 0A AF 32 54 0A CD 6D 08 CD C3 05 CD DD 05 CD
0810 C3 05 3E 08 32 54 0A CD E9 05 CD 73 07 C3 AC 08
0820 16 FF FE F9 C2 34 08 3A FD 09 21 4E 0A BE C0 AF
0830 32 53 0A C9 3A 52 0A B7 C8 3A 4E 0A 0E 07 21 04
0840 0A BE CA 4B 08 2B 0D C2 41 08 C9 21 3D 0A 06 00
0850 09 7E 21 61 0A 19 BE DA 5B 08 77 1B 7B 32 54 0A
0860 FE FF CA 68 08 CD 67 07 21 54 0A 34 C9 21 00 00
0870 39 22 57 0A 2A 59 0A F9 3A 4E 0A 47 0E 1F 21 0C
0880 0A BE CA 8A 08 2B 0D F2 81 08 36 CC E5 21 ED 09
0890 16 00 3A 4D 0A 5F 19 E5 4E 70 C5 21 55 0A 56 D5
08A0 21 00 00 39 22 59 0A 2A 57 0A F9 C9 97 3E 80 21
08B0 6A 0A 86 23 86 23 86 21 60 0A 86 21 5E 0A 86 21
08C0 6F 0A 96 23 96 21 61 0A 96 21 5F 0A 96 21 5D 0A
08D0 96 21 6E 0A 96 21 62 0A 96 D2 DD 08 97 1F C6 40
08E0 21 6B 0A 86 23 86 21 63 0A 96 1F C6 90 21 5C 0A
08F0 86 86 86 86 21 60 0A 86 21 63 0A 96 96 23 96 96
0900 21 5F 0A 96 F5 3A 4E 0A FE 33 CA 30 09 FE 34 CA
0910 30 09 FE 22 CA 30 09 FE 25 CA 30 09 3A 4D 0A B7
0920 CA 34 09 21 ED 09 06 00 4F 09 7E FE 10 F2 34 09
0930 F1 C6 02 F5 3A 63 0A 21 3D 0A BE C2 43 09 F1 97
0940 C3 5B 09 3A 62 0A B7 C2 5A 09 3A 6D 0A B7 C2 5A
0950 09 F1 3E FF 32 81 0A C3 5B 09 F1 0E 04 21 54 0A
0960 71 21 50 0A 32 5B 0A BE DA 8E 09 CA 8E 09 32 50
0970 0A 3A 4D 0A 32 4F 0A 3A 4E 0A 32 51 0A AF 32 74
0980 0A 3A 6B 0A 21 3D 0A BE C2 8E 09 32 74 0A C9 21
0990 DD 09 47 1F 1F 1F 1F CD A2 09 77 23 78 CD A2 09
09A0 77 C9 E6 0F C6 30 FE 3A D8 C6 07 C9 06 0D CD BF
09B0 09 06 0A CD BF 09 06 7F CD BF 09 CD BF 09 C9 E5
09C0 C5 D5 CD D7 09 D1 C1 E1 C9 E5 D5 C5 CD DA 09 78
09D0 C1 D1 E1 E6 7F 47 C9 C3 E6 0D C3 F1 0D 00 00 00
09E0 00 00 00 00 00 00 00 00 00 00 00 00 03 04 00
09F0 07 02 05 01 06 10 17 11 16 12 15 14 13 73 74 70
0A00 77 72 75 71 76 60 67 61 66 62 65 64 63 03 04 00
0A10 07 02 05 01 06 10 17 11 16 12 15 14 13 73 74 70
0A20 77 72 75 71 76 60 67 61 66 62 65 64 63 F0 FF 01
0A30 10 11 0F EF F1 DF E1 EE F2 12 0E 1F 21 0B 0A 06
0A40 06 04 04 04 04 02 02 02 02 02 02 02 02 EE EE 00
0A50 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0A60 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0A70 00 00 00 00 00 00 00 10 00 01 0B 37 0B 95 0A CB
0A80 0A 00 00 57 42 4B 51 52 52 42 42 4E 4E 50 50 50
0A90 50 50 50 50 50 EE 1F 17 16 16 14 16 1B 16 EE 1F
0AA0 1E 16 14 16 11 10 1D 1E 1D 16 1A 14 12 17 11 11
0AB0 1F 16 17 14 12 1E 15 1B 12 1F 16 14 12 1E 11 14
0AC0 1E 17 1F 16 14 1D 1E 1D 17 12 1B EE 43 55 52 33
0AD0 63 54 55 66 EE 53 44 52 63 64 63 72 45 43 42 55
0AE0 56 66 75 52 62 52 44 55 52 31 75 53 36 52 74 44
0AF0 55 31 75 43 64 22 34 52 44 55 42 52 43 43 52 75
0B00 52 0F 06 04 00 0E 01 04 0E 07 0F 0E 07 05 0F 05
0B10 01 0C 06 06 0F 0B 05 04 00 06 06 0C 0F 07 06 04
0B20 00 0E 04 01 07 0F 07 06 06 04 06 0B 06 00 0F 07
0B30 04 06 0F 04 06 06 04 33 22 46 01 34 13 55 43 25
0B40 33 34 25 41 43 63 14 32 22 25 24 21 11 14 06 44
0B50 52 35 34 22 25 41 06 23 52 14 03 34 22 25 44 14
0B60 23 22 11 06 34 22 32 25 43 41 44 52 52 1D 49 43
0B70 52 4F 43 48 45 53 53 20 20 20 20 20 20 20 20
0B80 20 20 20 20 20 20 20 20 28 43 29 20 31 39 37
0B90 37 2E 0D 57 52 49 54 54 45 4E 20 42 59 3A 20 50
0BA0 2E 20 4A 45 4E 4E 49 4E 47 53 20 26 20 54 2E 20
0BB0 4F 27 42 52 49 45 4E 2E 0D 2D 2D 2D 2D 2D 2D
0BC0 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D
0BD0 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 57
0BE0 48 49 43 48 20 4D 4F 44 45 20 3F 20 28 53 2C 42
0BF0 2C 4E 29 20 0D 44 4F 20 59 4F 55 20 57 41 4E 54

TYPICAL OUTPUT FROM MICROCHESS

MICROCHESS (C) 1977.
WRITTEN BY: P. JENNINGS & T. O'BRIEN.

DO YOU WANT WHITE ? (Y,N) N

THE USER DECIDES TO PLAY BLACK.

```

+----- MICROCHESS -----+
| WR VN WB WK WQ WB WN WR |
| | | | | | | | |
| WP WP WP WP WP WP WP WP |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| BP BP BP BP BP BP BP BP |
| | | | | | | | |
| BR BN BB BK BQ BB BN BR |
+----- CHALLENGER -----+

```

THE BOARD IS AUTOMATICALLY DISPLAYED AT THE BEGINNING OF THE GAME.

: SPEED

THE USER WISHES TO SELECT THE SPEED OF PLAY.

WHICH MODE ? (S,B,N) S

```

: GO
MC : 13-33
: 63-43
MC : 01-22
: 76-55
MC : 02-46
: 71-52
MC : 0-0
: AUTO
: 52-33

```

HE SELECTS THE SUPERBLITZ MODE.

GO: CAUSES MICROCHESS TO MAKE A MOVE.

- 1 P-K4 P-K4
- 2 N-KB3 N-QB3
- 3 B-B4 N-B3
- 4 O-O

THE USER TURNS ON THE AUTOMATIC DISPLAY FEATURE.

```

+----- MICROCHESS -----+
| WK WR : WQ WB WN WR |
| | | | | | | | |
| WP WP WP WP WP WP WP WP |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| BP BP BP : BP BP BP BP |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| BP BP BP : BP BP BP BP |
| | | | | | | | |
| BR BB BK BQ BB : BR |
+----- CHALLENGER -----+

```

N X P

...

THE BOARD IS NOW DISPLAYED AFTER EVERY MOVE.

MC : 14-34

5 P-Q4

```

+----- MICROCHESS -----+
|   WK WR :: WQ WB WN WR |
|   |
|   WP WP WP   :: WP WP WP |
|   |
|   :: WN ::   ::   :: |
|   |
|   ::   :: BN WP   ::   |
|   |
|   ::   BP   :: WB :: |
|   |
|   ::   ::   :: BN :: |
|   |
|   BP BP BP :: BP BP BP BP |
|   |
|   BR   BB BK BQ BB :: BR |
+----- CHALLENGER -----+

```

: NO DISPLAY

: 72-63

MC : 04-13

: 33-54

MC : 46-55

: DISPLAY

THE USER TURNS OFF THE AUTOMATIC DISPLAY.

... B-K2
6 Q-K2 N-Q3
7 B X N

THE USER REQUESTS A BOARD DISPLAY.

```

+----- MICROCHESS -----+
|   WK WR ::   WB WN WR |
|   |
|   WP WP WP WQ :: WP WP WP |
|   |
|   :: WN ::   ::   :: |
|   |
|   ::   ::   WP   ::   |
|   |
|   ::   BP   ::   :: |
|   |
|   ::   ::   BN WB :: |
|   |
|   BP BP BP BB BP BP BP BP |
|   |
|   BR   :: BK BQ BB :: BR |
+----- CHALLENGER -----+

```

: EXCHANGE

THE USER EXCHANGES MEN WITH MICROCHESS.

: DISPLAY

```

+----- MICROCHESS -----+
| BR :: BB BQ BK :: BR |
| | | | | | | | | |
| BP BP BP BP BB BP BP BP |
| | | | | | | | | |
| :: WB BN :: :: |
| | | | | BP | | | |
| | | | | WP | | | |
| :: :: :: WN :: |
| WP WP WP :: WQ WP WP WP |
| | | | | | | | | |
| WR WN WB :: WR WK |
+----- CHALLENGER -----+

```

```

: EXCHANGE
: AUTO
: 66-55

```

```

+----- MICROCHESS -----+
| WK WR :: WB WN WR |
| | | | | | | | | |
| WP WP WP WQ :: WP WP WP |
| | | | | | | | | |
| :: WN :: :: :: |
| | | | | WP | | | |
| | | | | BP | | | |
| :: :: BN BP :: |
| BP BP BP BB BP BP BP |
| | | | | | | | | |
| BR :: BK BQ BB :: BR |
+----- CHALLENGER -----+

```

THE BOARD IS DISPLAYED WITH THE MEN EXCHANGED. MICROCHESS IS NOW BLACK, AND THE CHALLENGER IS WHITE.

EXCHANGE BACK TO THE ORIGINAL POSITION.

TURN ON THE AUTO DISPLAY.

... P X B

MC : 34-43

8 P X P

```

+----- MICROCHESS -----+
|   WK WR ::   WB WN WR |
|   |
| WP WP WP WQ :: WP WP WP |
|   |
|   :: WN ::   ::   :: |
|   |
|   ::   ::   ::   :: |
|   |
|   ::   WP   ::   :: |
|   |
|   ::   ::   BN BP :: |
|   |
| BP BP BP BB BP BP   BP |
|   |
| BR   :: BK BQ BB :: BR |
+----- CHALLENGER -----+

```

: 54-66

...

N-N2

```

+----- MICROCHESS -----+
|   WK WR ::   WB WN WR |
|   |
| WP WP WP WQ :: WP WP WP |
|   |
|   :: WN ::   ::   :: |
|   |
|   ::   ::   ::   :: |
|   |
|   ::   WP   ::   :: |
|   |
|   ::   ::   :: BP :: |
|   |
| BP BP BP BB BP BP BN BP |
|   |
| BR   :: BK BQ BB :: BR |
+----- CHALLENGER -----+

```

MC : 06-25

9 N-QB3

```

+----- MICROCHESS -----+
|   WK WR ::   WB   WR |
|   |
| WP WP WP WQ :: WP WP WP |
|   |
|   :: WN ::   WN   :: |
|   |
| ::   ::   ::   ::   |
|   |
|   ::   WP   ::   :: |
|   |
| ::   ::   :: BP :: |
|   |
| BP BP BP BB BP BP BN BP |
|   |
| BR   :: BK BQ BB :: BR |
+----- CHALLENGER -----+

```

: RESIGN

... RESIGNS

YOU RESIGNED - I WIN!!!

```

+----- MICROCHESS -----+
|   WK WR ::   WB   WR |
|   |
| WP WP WP WQ :: WP WP WP |
|   |
|   :: WN ::   WN   :: |
|   |
| ::   ::   ::   ::   |
|   |
|   ::   WP   ::   :: |
|   |
| ::   ::   :: BP :: |
|   |
| BP BP BP BB BP BP BN BP |
|   |
| BR   :: BK BQ BB :: BR |
+----- CHALLENGER -----+

```

THE GAME IS OVER.

PLAY AGAIN ? (Y,N) N

THANKS FOR THE GAME... MICROCHESS.

**Micro-Ware Limited
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