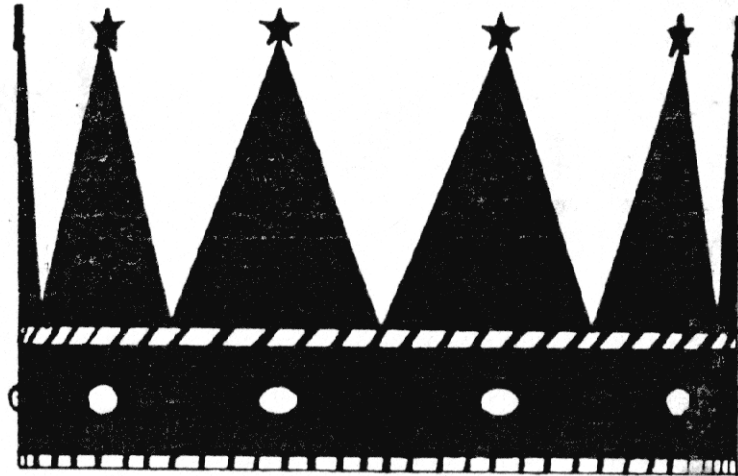


# CHECKERS



color computer



Requires 64K or 32K RAM  
Extended or Color BASIC

Copy. 1986 by Roger S. Young  
Applied Machine Intelligence



#### KEY FUNCTIONS

SHIFT B Return to BASIC  
SHIFT C Make the Computer move.  
E Enter a move.  
SHIFT F Change the clock speed (fast).  
SHIFT G Get the board from RAM.  
SHIFT I Insert the board.  
SHIFT L Change the level of play.  
SHIFT N New game.  
SHIFT P Save (put) board.  
SHIFT Q Turn sound on or off (quiet).  
SHIFT R Rechoose a move.  
SHIFT S Substitute a checker.  
SHIFT T Turn board around.  
SHIFT U Undo the last move.  
SHIFT V Change the randomness (vary).  
SHIFT W Black and white or color T.V.  
SHIFT X Exchange colors.  
SHIFT CLEAR Clear board.  
ENTER Choose the space to move to (after SPACEBAR)  
or change a space (after SHIFT S).  
SPACEBAR Move the cursor.  
RUN "SAVE" Save a game (position) to disk (from BASIC).  
RUN Run the tape version of CHECKERS.  
RUN "D" Runs the disk version of CHECKERS.



# checkers

## KEY FUNCTIONS

SHIFT B Return to BASIC  
SHIFT C Make the Computer move.  
E Enter a move.  
SHIFT F Change the clock speed (fast).  
SHIFT G Get the board from RAM.  
SHIFT I Invert the board.  
SHIFT L Change the level of play.  
SHIFT N New game.  
SHIFT P Save (put) board.  
SHIFT Q Turn sound on or off (quiet).  
SHIFT R Rechoose a move.  
SHIFT S Substitute a checker.  
SHIFT T Turn board around.  
SHIFT U Undo the last move.  
SHIFT V Change the randomness (vary).  
SHIFT W Black and white or color T.V.  
SHIFT X Exchange colors.  
SHIFT CLEAR Clear board.  
ENTER Choose the space to move to (after SPACEBAR)  
or change a space (after SHIFT S).  
SPACEBAR Move the cursor.  
RUN "SAVE" Save a game (position) to disk (from BASIC).  
RUN "C" Run the tape version of CHECKERS.  
RUN "D" Run the disk version of CHECKERS.

TABLE OF CONTENTS.

INTRODUCTION ..... 2  
GETTING STARTED ..... 3  
THE RULES OF CHECKERS . 7  
HINTS ON STRATEGY ..... 9  
ADVANCED OPTIONS ..... 14  
TECHNICAL DATA ..... 16  
MAKING COPIES ..... 17

## INTRODUCTION

Congratulations on your purchase of CHECKERS, a computer version of one of the most popular board games in America. This game is designed to give many hours of entertaining, instructive, and challenging play to players with varied levels of checker skill. Your checkers game is not copy protected for your convenience in making back ups for your own use (see also "Making Copies" in the back of this booklet).

## GETTING STARTED

LOADING THE PROGRAM If your program is on tape, see "Loading from Tape" below. If your program is on disk, see "Loading From Disk" below. There is a manual on disk. Type RUN "MANUAL" for the menu.

LOADING FROM TAPE Use this method to load the program if your program is on tape. Use the correct side for your computer.

1. Rewind the tape to the beginning of side 1.
2. Press "PLAY" on the recorder.
3. Type CLOAD "C" (including the quotation marks.)
4. Press the ENTER key.  
(If it does not load, adjust the volume and try again.)
5. Type RUN. Keep the play key on the recorder down.
6. Type RUN again. Keep the play key on the recorder down.
7. You will see a title display and, in about two and a half minutes, a checker board with the checkers already set up as in figure 1.

LOADING FROM THE DISK Use this method to load the program if your program is on a disk.

1. Make a backup copy of the disk. Then use the backup copy.  
( You cannot save games to the original unless you remove the write protect tab.)
2. Insert the disk into the disk drive.
3. Type RUN "D" (including the quotation marks.)
4. Press the ENTER key.
5. You will soon see a checker board with the checkers already set up as in figure 1.

4

BLACK AND WHITE T.V.'S If you are using a black and white television, press the "W" key while holding down the "SHIFT" key. The checkers should now be easy to see. If the checkers are still difficult to see, adjust the brightness and contrast on your television.

MAKING MOVES:

1. Press the SPACEBAR. A checker (that can be moved) should change color.
2. Continue pressing the SPACEBAR until the checker that you would like to move changes color.
3. Press ENTER. A space that you can move the checker to should change color.
4. Continue pressing ENTER until the space that you would like to move to changes color.
5. Press "E" to make (enter) the move.

If, at any time while making a move (but before entering it with "E") you wish to restart making your move (or change another option before you move) press "R" while holding down the shift key.

After you press "E" the checker will move. Any jumped checker will be removed from the board. The computer will then think about and then make its counter move. Sometimes, before the computer moves, it will make a comment. If so, press any key to continue the game. The computer will then move. It will then be your turn.

You can take back (undo) your last move (and the computer's last move) by pressing SHIFT "U". (Press "U" key while holding down the SHIFT key.) You can only undo a move after the computer has made its counter move.



5

UNDERSTANDING THE DISPLAY There are a number of indicators on the screen. They are in the red area on the left side of the checker board.

Description of the three most important indicators - LEVEL, TIME and RANDOMNESS - will now be described:

LEVEL The most important indicator is labeled "LEVEL" in figure 1. The higher the column is, the better the computer will play. Each pair of bars (yellow and green (or white and grey)) indicates an additional level of play. Level 1 is the default and is displayed when the program starts. Level 4 is indicated in figure 1. To change the level, press shift "L" repeatedly until the desired level is reached.

Ratings (unofficial) for the playing levels are

- 0 - BEGINNER
- 1 - APPRENTICE
- 2 - EXPERIENCED
- 3 - EXPERT
- 4 - MASTER

Levels above 4 are mainly for problems.

TIME The column labeled "TIME" in figure 1 indicates, roughly, the time remaining for the computer to think before it moves. When the column falls to zero, the computer will move.

CONFIDENCE This indicator is labeled "CONFIDENCE" in figure 1. It indicates how confident (or worried) the computer is about winning. If it is yellow (white) then the computer thinks that you have the advantage. If it is green (grey) then the computer feels that it has the advantage. The more yellow, the more worried the computer is; the more green, the more confident the computer is.

BASIC OPTIONS Options may be changed any number of times before any move.

LEVEL To change the level of play, press SHIFT "L" repeatedly until the desired level is displayed (see "Understanding the Display").

6

COLORS The indicators marked "COLOR" in figure 1 indicate which side has the light checkers. A green (grey) square in the upper left hand corner ("COLOR") indicates that the top player controls the light checkers. A green (grey) square in the lower left hand corner indicates that the bottom player controls the light checkers.

To exchange color with your opponent, press SHIFT "X". To change the colors of both players' checkers (especially, if you have a black and white T.V.), press SHIFT "W".

NEW GAME Press SHIFT "N" for a new game.

BASIC Press SHIFT "E" to return to BASIC.

MAKING THE COMPUTER MOVE: Press SHIFT "C" to make the computer move instead of you.

TURNING THE BOARD AROUND Press SHIFT "T" to turn the board around. When you begin a game, the darker checkers (which move first according to American Checker Federation Rules) are toward you (at the bottom of the screen). If you prefer to let the computer move first, turn the board around (SHIFT "T", SHIFT "C").

## THE RULES OF CHECKERS

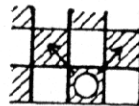
INTRODUCTION The rules given here will be concise. For a more complete description of the rules of checkers, get a book on checkers at your library.

Rules vary from country to country, but the rules given here and used by the computer are those followed in the United States (cheer!) and United Kingdom and promoted by the American Checker Federation.

One of the best ways to learn checkers is to play. The computer will make only legal moves and will allow you to make (and indicate) only legal moves - so jump right in! The rules that are most often forgotten are underlined in the following.

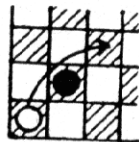
OBJECT Checkers is a game of strategy between two players. It's played with 24 markers, (called checkers) on the dark squares of a checker board with 64 spaces. The board is oriented so that a dark square is at the left of the row nearest each player. Each player begins with 12 checkers on the three rows of squares nearest him as in figure 1. The object of the game is to capture (jump) or block (prevent from moving) all of the opponent's checkers. The last player to move wins.

MOVING Players take turns moving one of their own checkers. A checker may be moved one space diagonally toward the opponent onto the unoccupied space.



MOVE

JUMPING A player may "jump" one of his opponent's checkers (or kings) if the opponent occupies a space that is one space diagonally forward of one of his own checkers and there is an unoccupied space directly beyond the opponent's checker. The jump is made by moving a player's checker to the unoccupied square and removing the opponent's checker from play. If a jump can be made, it must be made. If more than one jump can be made, one of them must be made.



JUMP

8

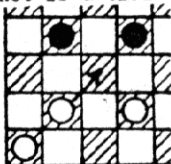
MULTIPLE JUMPS Multiple jumps are made if, after a jump is made, another jump with the same checkers is possible. The jump must be continued until the jumping checkers cannot jump any more checkers.

KINGS If a checker reaches the row (king row) of squares nearest to the opponent, it becomes a king. A king moves like a checker except that it may move forward or backward. If a player's checker jumps into the king row, the player's move is immediately over. (The new king cannot continue the jump back out of the king row.) A king is usually indicated by stacking two checkers but the computer draws a crown on the checker.

or Mastering Checkers in Ten Easy Lessons  
(and one Hard One).

These are the strategies to keep in mind (most important first). Remember to also try to prevent your opponent from doing these things and that the computer knows to do these things. If you follow these strategies and move slowly and carefully, you will be able to play a strong game of checkers and find victory against the vast majority of checkers players. Practice these strategies and watch how your computer opponent applies them.

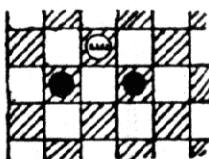
1. JUMP Jump your opponent's checkers! Also try to trade your checkers for your opponent's kings. The simple two-for-one shot is one of the most common ways to gain a checker in the early and middle parts of the game. (A shot is a trade that gives, or loses, at least one checker or king.)



TWO FOR ONE

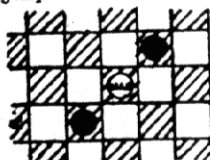
2. KINGS Obtain kings. Then try to use them to sneak up on your opponent's uncrowned checkers. Then use the straddle or breeches. Usually, it's better to get a king that you already have into the action early than to try to king many checkers before attacking.

STRADDLE Sneak your kings up behind your opponent's checkers and threaten two at once. When your opponent moves one, capture the other.



STRADDLE

BREECHES In the later stages of the game, try to place your king between your opponent's checkers and/or kings so that when your opponent moves one, you can jump the other.



BREECHES

10

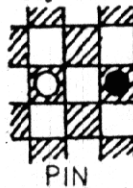
3. BRIDGE Maintain your two bridge checkers in their original positions. These checkers, on their starting spaces, make it very difficult for your opponent to obtain a king. (Early in the game, it is also a good idea to keep the checker that is between your bridge checkers where it is at to prevent your opponent from getting a king early.)



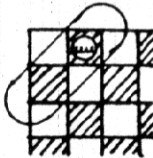
4. CENTER Move your checkers (and kings) to the center of the board.

5. TRADE Trade checkers when you are at least one checker ahead, so that your opponent eventually runs out of checkers.

6. PINNING When you are winning late in the game, try to pin your opponent's checkers against the side of the board so that when your opponent eventually has to move one, you can jump it.



7. DOUBLE CORNER If you are losing late in the game, move a king into a double corner and don't let your opponent in. A king that reaches the diagonals between the double corners can usually reach a double corner, eventually; especially if both players have the same number of checkers and kings put together. The double corner diagonals are illustrated in figure 2.



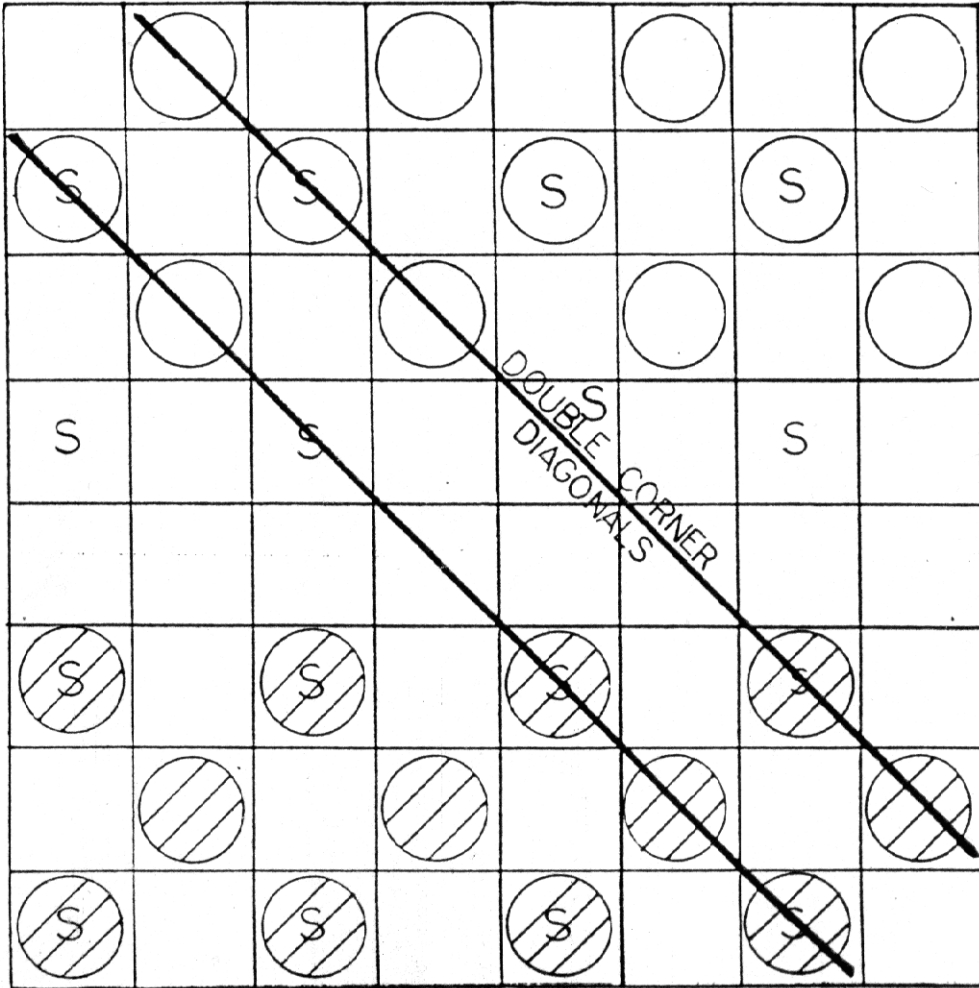
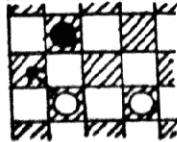
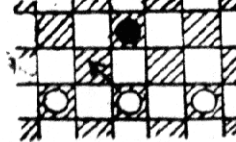


FIGURE 2

8. SQUEEZE The squeeze play involves threatening to jump an opponent's checker that is away from the edges of the board but that cannot move without being jumped and that cannot be "backed up" with another of the opponent's checkers or kings.



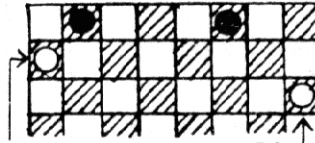
SQUEEZE



SQUEEZE

9. DIAGONAL DEVELOPMENT Early in the game, it is usually best to advance your checkers along the development diagonals of figure 3. This leaves the six checkers that form the triangle in figure 3 as a solid formation with few holes for you opponent to jump into.

10. DOGHOLE Do not get your checkers stuck on the two doghole squares.



WHITE IN DOGHOLE

The hard lesson:

11. THE MOVE Try to get and keep the move when both players have the same number of checkers and kings and there are no more than about eight checkers and/or kings on the board. You have the move if after your turn there are an even number of checkers on the squares marked "S" in figure 2. Finally, if two opposing checkers are in the same double corner, then the opposite player has the move.

For more information on checker strategy, consult books on checkers at your local library.

For instance:

Wiswel, Thomas, The Wonderful World of Checkers and Draughts. San Diego, Calif. Pub. A.S. Barnes, 1980.

Grover K.M. Let's play Checkers. New York, N.Y. Pub. David McKay, C. 1940.



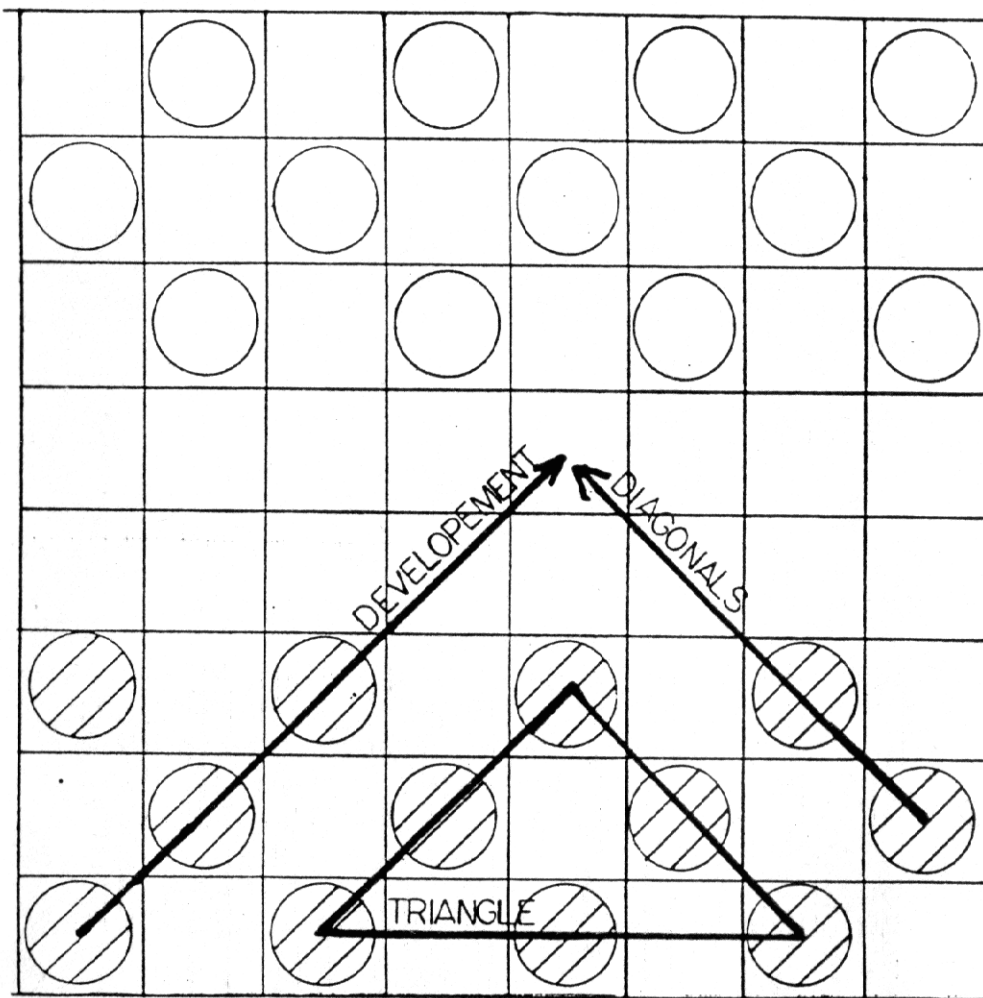


FIGURE 3

The most important thing to remember is to move slowly. Carefully consider everything that your opponent might do. You will improve most rapidly if you challenge opponents (like your computer) that play as well as you do (or even better). Also, watch how the computer applies the strategies given above.

#### ADVANCED OPTIONS

INTRODUCTION The following options are provided: Clearing the board, changing the contents of squares, inverting the board, adjusting the randomness of the computer's play, changing the clock speed, and saving positions and games.

CLEAR To clear the board, hold the shift key down and press the clear key.

SUBSTITUTE To change (substitute) the contents of any square, press SHIFT "S". The first space should blink. If you want to change the contents of this square, press "ENTER" until the desired contents appear. Then press the spacebar to proceed to the next space. When you get to the last square, press the spacebar to stop substituting.

TURNING THE SOUND ON AND OFF Press SHIFT "Q" to turn the sound on or off. The sound indicator is labeled "SOUND" at the left hand edge of figure 1. The sound indicator is green (grey) when the sound is on and blue (black) when the sound is off.

INVERTING THE BOARD To invert the board so that the computer plays from the bottom of the screen and you play the top, press SHIFT "I". This is useful for computer vs. computer games.

RANDOMNESS To make the computer play more randomly, press SHIFT "V" (vary). The amount of randomness is indicated on the left hand side

of the screen and varies from 0 to 8. The indicator marked "RANDOMNESS" is in figure 1. The computer plays its best on a given level when the randomness is low. The default is 0 but the computer plays somewhat randomly even then, especially in the opening. Entire games should be played on levels 0 through 4.

CHANGING THE CLOCK SPEED When this option is set the computer takes only half as long to decide on its move but the screen is blank while the computer is deciding on its move. To change this option (which may not work with all computers) press SHIFT "F" (fast). The associated indicator is at the left hand side of the screen. It is marked "FAST" in figure 1 and is yellow (white) for regular speed and blue (black) for doubled speed. This option is useful when playing at the higher skill levels.

SAVING A BOARD POSITION To save (put) a board position in the computer's memory (RAM), press SHIFT "P".

RECALLING A BOARD POSITION To recall (get) the saved board position from the computer's memory (RAM), press SHIFT "G".

SAVING A GAME TO DISK To save a game to disk, save the board position in the computer's memory with SHIFT "P" and immediately after returning to BASIC (and before pressing SHIFT "P" again), type RUN "SAVE" and press ENTER to transfer the position to disk.

RECALLING A GAME FROM DISK To recall a game press SHIFT "G" (get) (before pressing SHIFT "P").

INTRODUCTION This checker program is written in assembly language. It is conventional in that it uses a minimax search with  $\alpha$ - $\beta$  pruning to search a game tree to determine its moves and uses memorized openings for the first few moves of the game.

The static (or board) evaluation function considers, roughly, the ideas in the "Hints on Strategy" section of this manual.

SEARCH The search is depth first and is continued to a depth determined by the level of play. Level 1 considers the result of each of the computer's possible moves. Level 2 also considers each of your possible counter moves, etc. Search is usually continued if pending jumps remain until all pending jumps are resolved. Not all jumps contribute to the calculation of search depth. The even numbered levels (2,4,6, and 8) give the best play for the time expended. Level 0 chooses moves randomly and is intended for children. The computer moves fast during memorized openings, because it need not calculate moves; slowly during the early middle game because of the many moving and jumping possibilities; and faster late in the game.

LIMITATIONS These limitations should not effect normal play but should be considered when setting up (strange) problems. Hextuple (6) and higher, jumps are not allowed (only 5 will be jumped). At most twenty possible moves are considered.

RANDOMNESS Opening moves are chosen randomly from lists of opening moves until you vary from the lines of play in the lists or the end of the lists is reached. Further randomness is provided throughout the rest of the game because the computer chooses randomly between the two best moves unless the best move is too much better than the second best move. The maximum difference doubles each time the randomness is increased with SHIFT "V". When the randomness is at level 8 the maximum difference is about two thirds of the value of a checker. With randomness at 0 (the default) the maximum difference is zero.

THE TIME INDICATOR The height of the time indicator is proportional to the number of moves to be considered.

THE CONFIDENCE INDICATOR The confidence indicator is turned on after the memorized openings are finished. It is scaled like the randomness indicator except that it shows both positive and negative values. It shows the backed up value from the game tree search.

#### MAKING COPIES

You may make up to 10 copies of this program and manual for your friends for \$1 per program by following these steps:

1. Copy the disk or tape and the manuals.
2. Copy the serial number onto the label of the new disk, appending your friend's initials to the serial number.
3. Fill out and sign the "copy form" in the back of this manual and send the form plus \$1 (cash O.K.) to:  
Applied Machine Intelligence  
P.O. Box 358  
Salida, CO  
81201

Of course, you may make backup copies for personal use. You may not accept reimbursement for more than 3.95.

To copy checkers from disk to tape, copy "C/BAS", "CHECKERC/BAS", and "CHECKERU/BIN" to tape, in that order. (See below for how to copy "CHECKERU/BIN".) (If copying to a color (non-extended) basic system, copy "CU/BAS" instead of "C/BAS" and "CHECKERU/BAS" instead of "CHECKERC/BAS" (renaming "CU/BAS" to "C/BAS" and "CHECKERU/BAS" to "CHECKERC/BAS".

#### Tape:

Note: To copy the tape machine code routine "CHECKERM/BIN";

1. Type PCLEAR 1 (enter).
2. Type CLEAR 100,7167 (enter).
3. Position the original tape just after CHECKERS (use SKIPF).
4. Press "play" on the tape recorder.
5. Type CLOADM "CHECKERM" (enter).
6. Position the new tape to just after CHECKERC.
7. Press "record" and "play" on the tape recorder.
8. Type CSAVEM "CHECKERM", 7168,32767,22272 (enter).



Name of original purchaser  
Serial number of original tape or disk  
Address of original purchaser

Serial number of copy

I hereby affirm that I have not accepted and will not accept reimbursement for more than \$ 3.95 from my friend for the consideration of a copy of this program.

Further \$ 1.00 is enclosed in return for the right to make a copy of this program for my friend.

Original Purchaser's signature      Date

CUT HERE

