Cyrus IS Chess drew with Colossus and defeated Grand Master on the easy level, and drew with Sargon III on the competition level.

Colossus drew with Cyrus IS Chess on the easy level, defeated Grand Master on the competition level, and drew with Sargon III on the competition level.

Sargon III lost to Grand Master on the easy level and drew with Cyrus and Colossus on the competition level.

Grand Master defeated Sargon III and lost to Cyrus IS Chess on the easy level, and lost to Colossus on the competition level.

| Feature | Grand Master 64 | Colossus | Cyrus IS | Sargon III |
|---|---|---|---|---|
| Invisible play | NO | YES | NO | NO |
| List possible moves | NO | YES | NO | NO |
| Play 'next best' | NO | NO | YES | NO |
| Replay a game | NO | YES | YES | YES |
| Show listing | NO | YES | NO | YES |
| Printout listing | NO | NO | YES | YES |
| Take back moves | YES | YES | YES | YES |
| Tutorial | YES | NO | NO | YES |
| Promote to non-Queen | NO | YES | YES | YES |
| Human play | NO | YES | YES | YES |
| Change sides | YES | YES | YES | YES |
| Analyse problems | NO | YES | YES | YES |
| Show search | SINGLE PLY | YES | NO | YES |
| Invert board | YES | YES | YES | YES |
| Offered draw | NO | NO | NO | YES |
| Print board | NO | NO | YES | YES |
| Save game | NO | YES | YES | YES |
| Disable library | NO | NO | NO | YES |
| Auto play | NO | YES | YES | YES |
| Real-time clock | YES | YES | NO | YES |

## Features

All competent chess programs will include the ability to castle, promote a pawn to a Queen, and capture en passant, and will understand draw and stalemate situations. Some of these programs have very interesting additional features. Sargon III is the program with most extras, and includes a second disk that contains 107 classic chess matches and 45 chess problems. The documentation is superb, with 75 pages in a loose-leaf notebook. Of course, Sargon III was running on an Apple IIe, and was three times as expensive as the other programs. For the money, Cyrus IS Chess and Colossus also offer some very nice features, as you can see from the table.

## Conclusion

In terms of playability, Cyrus IS Chess and Colossus are easiest to use because moves are entered by using the cursor, while Sargon III and Grand Master require you to enter the moves in algebraic notation, such as E2-E4 for pawn to King 4. Colossus and Sargon have the best screen displays. Grand Master offers excellent chess for a very low price.

program because of the human's ability to see and create new openings and positions. Computers play superb tactical chess, but, even among human chess masters, a good positional player should beat a good tactical player. Computer chess programmers have focused on tactics because, for a computer, tactical play involves simple number-crunching. If a human opponent makes an unconventional move, the computer will often miss the best response. For this reason, many chess programs have difficulty in dealing with 'quiet' positions, where none of the available moves offer a particular tactical advantage. In these situations, which often occur during the endgame, the program will often simply shuffle pieces around instead of taking the opportunity to plan ahead.

A recently developed style of programming involves 'selective search'. Using this technique, the computer mimics a human player by looking in greater depth at a smaller number of possible moves. Hegener and Glaser, in Germany, have utilised the selective search technique in their Mephisto III program, which looks at every possible move for the first two ply (a 'ply' is one move by one player), then narrows the search and examines a smaller range of moves in depth. Mephisto III also makes an attempt to distinguish between quiet and tactical positions. Techniques of this type should eventually result in computers becoming a real challenge to human players.

## The Heart Vs The Head

The ability to examine every position up to nine moves ahead almost guarantees chess programs a tactical supremacy over humans. The human chess master's special skill is in selecting a few crucial moves on which to concentrate enormous analytical skill up to 30 moves ahead.

Here, Moritz (black) plays Emmerich (white) in 1922; the position is featured in the film 'Night Moves'. Black can mate by sacrificing his Queen, and then making three very elegant knight moves: most human chess players would unhesitatingly prefer this sequence over all others. Moritz himself missed it and bitterly regretted his oversight. All our packages found mate, but none of them suggested the Knight moves ploy, although some of them must have considered it. The computer's inability to perceive that ending as the 'best' seems to offer humans their only possible defence against the chess of the machine

This is the knight moves sequence

| 1 | | H5—H2 ch |
|---|---|---|
| 2 | G1—H2 | E5—G4 ch |
| 3 | H2—G1 | F4—H3 ch |
| 4 | G1—F1 | G4—H2 mate |

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