Software Strategies

In an effort to evaluate some of the most popular chess programs for home micros, THE HOME COMPUTER ADVANCED COURSE conducted a mini-tournament for these products: Sargon III, running on an Apple IIe (£41.95 disk – Hayden Software, programming by Dan and Kathe Spracklen); Cyrus IS Chess on a 48K Spectrum (£9.95 cassette – Sinclair Software, programming by Intelligent Software); Colossus 2.0 on a Commodore 64 (£12.95 disk – CDS MicroSystems, programming by Martin Bryant); and Grand Master 64, also for the Commodore 64 (£5.95 cassette – Audiogenic, programming by Kingsoft).

Although these programs have played against one another in international microcomputer chess tournaments, we wanted an informal evaluation based on features, playability and competence. The mini-tournament consisted of a minimum of two games for each program, one on the simplest level of play and the second on a higher, competition level. There was no attempt to determine an overall winner.

One of the problems that arises in playing one chess computer against another is that it is often difficult to identify the level of play that gives the two programs a fair and equal footing. Levels are usually defined by the length of time the computer allows itself to search for the best move, but there may not be a direct correlation between a 10-second time limit in one program and the same time limit in another. For instance, Sargon III 'steals' time from its opponent and keeps its move generator operating while its opponent is moving. All the other programs turn off their move generators at this point. Nevertheless, every effort was made to be fair, if not absolutely precise, in pairing the programs.

Quality Of Play

In general, all the programs played sound, if uninspired, chess on the lowest level (taking approximately 10 seconds per move). And all of them made some very strange, apparently useless, moves toward the latter stages of the middle game. This was probably a result of a 'quiet' position, in which the computers simply bided their time until something interesting happened. On the higher, competition level (approximately 10 minutes per move), all four programs showed clever and sometimes brilliant tactical play. The results of the tournament are shown in the chart opposite.

and the relatively low speed of processing, but advances in technology over the last few years have meant that the quality of such programs is now dependent on the software.

As computers are essentially high-speed calculators, computer chess is designed around numerical calculations, which are used to evaluate the two essential elements of the game: the material and mobility. The 'material' of a game refers to the number and strength of the pieces on the board. The chess program allocates each piece a numerical value. The King may be given either an infinite value or an arbitrarily high one, such as 10,000 (this is done because the loss of the King ends the game); the Queen is assigned a value of nine; the rook is worth five; bishops and knights three; and pawns one. When considering whether it is worth sacrificing a piece in order to capture one of the opponent's pieces, the program will compare their values. Most computer chess programs place great importance on relative values, and will rarely swap pieces if this results in a material disadvantage, unless there is a marked gain in positional strength.

'Mobility' is of great importance in chess as any piece is of little value if its movement is restricted. Conversely, its value is enhanced if it can be positioned in such a way that it asserts influence on several locations at the same time. The chess program therefore needs to evaluate mobility as well as the material considerations. In addition, the program must be able to plan ahead, determining the best sequence of moves from any given position. It is here that chess programs can excel, using the speed of the computer to examine a large number of possible moves in a very short time.

Most chess programs use a 'brute force' technique, searching through as many moves as possible in the time allowed. The time allotted for each move is determined by selecting a 'level' of play at the beginning of each game, with each level giving a different time span during which the computer must make a move. These periods vary from a few seconds to several hours, and the longer a computer is allowed to search, the more likely it is to find the best line of attack for the current position.

At each move, the computer determines whether or not the King is in check, and then considers whether pieces are likely to be gained or lost, whether key squares can be occupied, and many other similar questions. The more criteria the program examines, the better the result will be. The final question is to discover if the opponent's King may be forced into a checkmate position.

In games between computers and humans, computers have a distinct advantage in speed and range of search — yet an excellent human player should always defeat an excellent computer chess