CHESS ON CHIPS

Chessboard Champ
David Levy is an International Chess Master who resigned from competition against humans in 1978. In 1968 he wagered a large sum on his prowess, betting that no computer chess program would be able to beat him within the next 10 years. Since then, the period covered by the bet has been extended, but he remains undefeated. A leading authority on computer chess, Levy heads Intelligent Software, a company that provides the dedicated programming skills behind many chess computers and microcomputer chess packages. Levy believes that micros are now beginning to approach mainframe performance in chess playing, and estimates that within five to eight years a microcomputer will be able to defeat Belle (a dedicated chess machine) and the mainframe Cray Blitz (which won the 1983 World Computer Chess Championship) — possibly by using parallel microprocessors to speed search functions

One of the most popular applications of home computers has been games playing, and it is not surprising that the game to have received the most attention is one of the oldest and most highly respected of strategic board games — chess. We look at some of the ideas and thinking behind the development of chess programs on computers.

Few games have ever captured the imagination as much as chess: it has been played by millions of people around the world for thousands of years, and it is played today with rules almost unchanged since the 17th century. There are those who devote their lives to the study and mastery of this game of strategy, finding satisfaction in its need for intellectual rigour and agility. The game has spawned a range of variations that attempt to introduce greater levels of complexity: for example, three-dimensional chess involves several boards suspended in space and demands a lot more concentration. Another variant is three-person chess, which is played on a board in the shape of a Y. On the diagonals where the three 'wings' intersect, special rules apply to the movement of the pieces. The theory behind this version is that two of the players will unite against the third and then battle each other for victory. But none of these variations has managed to displace the essential two-person confrontation played out on the 64-square board.

One reason for this is the almost infinite number of variations within the game itself. In 1949, the mathematician Claude Shannon wrote a paper called 'Programming a Computer for Playing Chess', in which he calculated that there are 10^{120} possible games of 40 moves. This means that a person playing chess 24 hours a day, seven days a week, and taking an hour for each game (which isn't long for 40 moves) would take slightly more than 10^{17} years to play all the possible games! Of course, chess has now been so thoroughly analysed that this vast range of possibilities is in practice decreased by a factor that is dependent on the player's experience.

Given this complexity, it is hardly surprising that programming computers to play chess has consumed much time and effort. Chess programs have been run on large mainframe computers for many years, and there are now numerous versions for home microcomputers. The development of high-quality microcomputer chess programs is linked to hardware innovations; problem areas have always been the lack of sufficient memory