A History of Chess Computers

by The Players Staff

Since their inception in 1976, commercial chess playing machines have consistently improved in playing strength, reliability, appearance, ease of operation and price.

The main point of discussion in this article will be the price to rating strength ratio of machines on the market.

The latest crop of these machines offers one entering the Expert class, two of solid class "A" strength, with two others bordering on low class "A".

Curiously, the rating of a computer is not as stable as one might expect. It fluctuates more so than the average human due to two factors: 1) whether the opponent is basically a strategic or tactical player (and other more subtle "playing style" considerations), 2) how used the opponent is to

machines would not capture en passant, castle or promote properly. One machine, now classic, had the alphanumeric system backwards, with letters for the ranks and numbers for the files. Nonetheless, these primitive patzer machines, which sold for under $400, were a good beginning for what has become an exciting and challenging application of computer technology to the high logic of chess.

Most of the available machines were manufactured by Fidelity and Applied Concepts. Two companies, Tryom and Compuchess started up solely for the purpose of making chess computers (although Tryom also produced a backgammon model); however, they could not keep pace and quickly dropped out of competition when Fidelity came out with their Chess Challenger 10 which ranked over the 1000 rating.

Gimmicks such as the voice, or machines with little, snide messages running across a screen, were meant to uplift an otherwise unchallenging game. These "innovations" were a questionable use of the added memory space, which could have been devoted to a more challenging level of play or at the very least an improvement on move entry technique. Moves still had to be entered on an external keyboard, leaving much room for error and "illegal" moves. Additionally, it was still possible to enter the moves correctly on the keyboard yet position pieces incorrectly on the playing board.

technology was far superior to the external keyboard method of entering coordinates, eliminating the possibilities of keying errors or move errors discussed above. Additionally, it went a long way toward eliminating "illegalities" in moves.

The price dropped back to the $100 range, while playing strength advanced to slightly over 1200.

The novelty of having a machine that simply "made legal moves" wore off quickly, and designers now began developing strategy on a higher level, incorporating time controls and enhancing combinational considerations by the machines. These "toys" were good gift giving items for beginners.

playing against computers and, more specifically, against the computer at hand. The human who has been playing regularly against different machines can probably count on a new machine playing about 100 points below its "real" rating against him. And after playing a lot of games specifically against the new machine he can possibly subtract 50 points, once he gets to know it. It's no wonder the top computer out now, the Super-Constellation (officially rated 2018), which regularly beats experts, only seems to a computer vet to be in the 1900's. Granted it is a strong expert at speed chess.

In order to understand where chess computers currently stand, however, one must have a sense of the history of the development of chess microcomputers.

The first chess computers appeared in the late 1970s. These included the Chess Challenger 1 and 3, as well as Boris (a small wooden model). The mere fact that these toys could "think" was a novelty which caught on quickly with the general public. However, with ratings of below 1000 these early computers were less than challenging and therefore of little interest to the tournament player. When manufacturers claimed various rating strengths for these machines, i.e. beginner, intermediate and expert levels, they were demonstrating ignorance of the meaning of "expert" rather than any attempt to deceive the chess playing world. In fact, the most primitive of these

1979

In 1979, prices dropped to the $100 range. Machines such as the Chess Challenger 7 and Boris Diplomat were released with no real strength improvement. The next playing strength sophistication came with the Voice Chess Challenger. The rating went up about the same as the price (200 points).
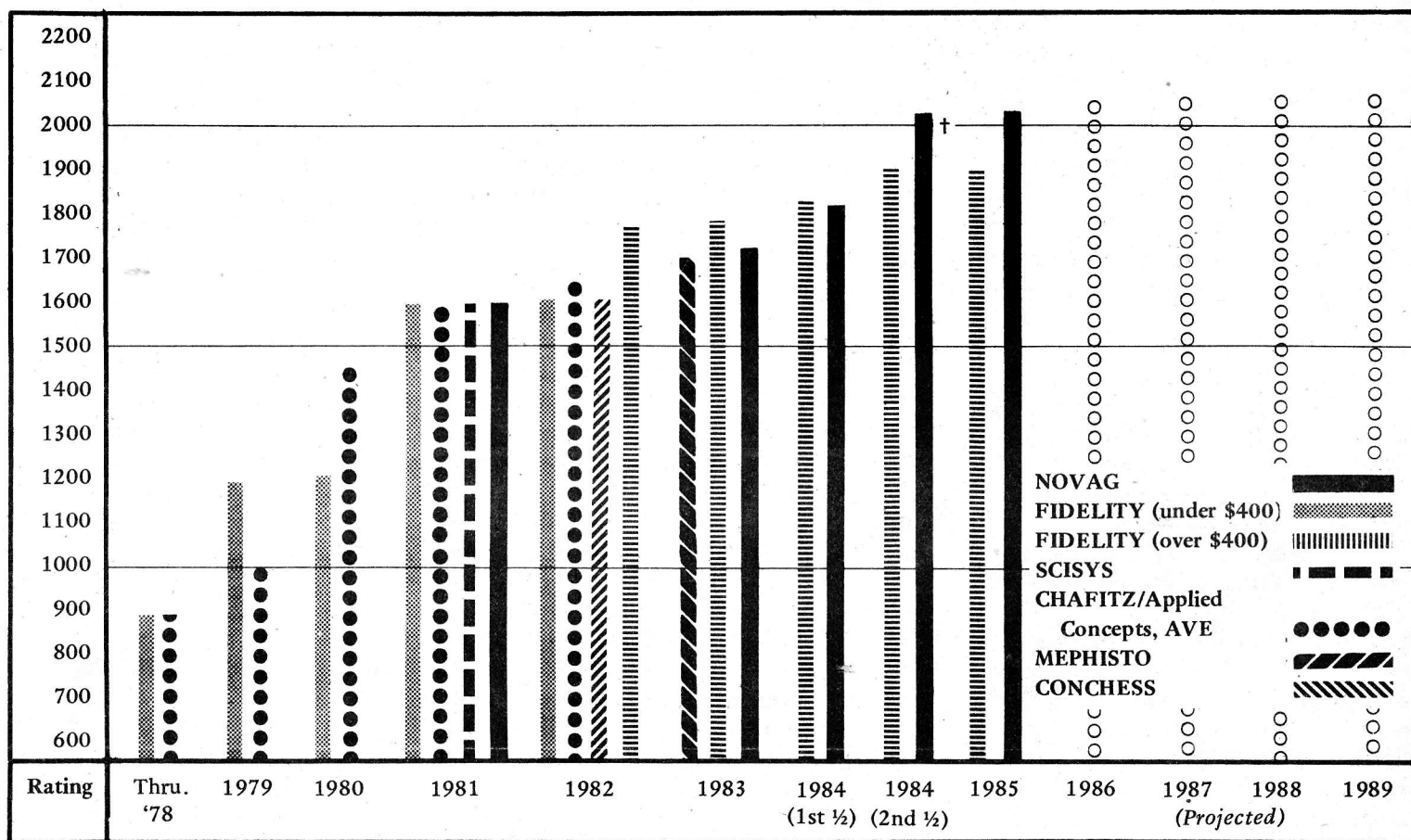
1980

In 1980, Fidelity came out with the first sensory touch board, the Sensory Chess Challenger 8. Now moves could be entered directly on the board by pressing the piece to be moved first on its starting square and then on its destination square. The board, however, required a concentrated, firm pressure on a precise point; nevertheless, this

But even non-tournament players found themselves straining for a good game by giving these computers several hours per move(?!). Most players were still disappointed with the weak responses.

The Spracklens, top programmers of the time, began concentrating on serious program advancement with their Boris/Sargon 2.5 program. Chafitz marketed Sargon as the first serious tournament

ANALYSIS OF STATE - OF - THE - ART PROGRAMS

RATINGS THROUGH THE END OF THE YEAR*

NOVAG
FIDELITY (under $400)
FIDELITY (over $400)
SCISYS
CHAFITZ/Applied Concepts, AVE
MEPHISTO
CONCHESS

Rating	Thru. '78	1979	1980	1981	1982	1983	1984 (1st ½)	1984 (2nd ½)	1985	1986	1987	1988	1989
											(Projected)		

*Estimates based upon tests by the PLAYERS.   †Official USCF rating.

players' computer in the form of the then conventional key-punch system, calling it the Modular Game System. The system could be up-dated with additional insertable modules. Chafitz also marketed a fancier version of its system (a state-of-the-art program in up-datable format) called the Auto-Response Board. This beautiful wooden board, still available, incorporated magnetic reed relay switches below each square. There were magnets in each piece, which responded to the magnets at the squares. Of all the machines of its time, the Auto-Response most simulated play with a human, since all that was required was to move the piece (no pressing squares) and the magnets recorded the moves. At $800, the machine was by far the most costly of its time.

At a 1400-1500 rating, both machines played Class C chess. A less powerful program, the Sargon 2.0 was made available for Apple Computer owners. The 2.0 was a less challenging opponent, both because it was an inherently weaker program and because it was software intended for a general computer rather than a dedicated system.

1981

Fidelity started the year with their Voice Sensory Challenger in an attempt to compete with the top of the line machines. The machine, which integrated voice and sensory technology and included a built-in chess clock, was contained in a plastic casing surrounded by a wooden frame. The price ranged between $300 and $400. However, even

MGS to the Great Game Machine (GGM).

Also in 1981 another pioneer programmer was busy working for Novag. This slick company made its first strong appearance in America in 1981 with David Kittenger's "My Chess" program. Introduced in their Savant machine, a hi-tech, touch-sensitive LCD board with a rating of approximately 1500 and a retail price of $625, the program ranked close to the top but was relatively inaccessible because of price. The same was true of Novag's Robot, which was an elegant machine priced at approximately $1500 (about $1.00 per rating point). Both of these machines were ahead of their time cosmetically, winning the prestigious New Product Award. However, the price/skill ratio was less appealing.

Novag also introduced a weaker, smaller "My Chess" program (only 4K) in a hand-held machine called Micro Chess. Priced at $140 with a rating of approximately 1000, this was the only significant hand-held chess computer of its time. Kittenger had just moved from Alaska to Los Angeles to continue his programming while making use of additional input from strong masters.

The Hong Kong based Scisys also made an appearance in December of 1981 with their Mark V. Programmer David Levy's best effort won the 1981 World Micro Championship, Commercial Section.

To wrap up this significant year — all the companies' top-of-the-line programs were nose to nose at a high Class C, nearly 1600. This included Fidelity's last quarter

Prices dropped to an all-time low as rating strength stabilized. It should be noted here that all rating estimates are based on tournament time controls of 40 moves in 2 hours. This distinction will become more important as we discuss later the newest machines whose "blitz" ratings may exceed their tournament rating by as much as 200 points. Fidelity's 1982 introduction of the Challenger 9 was designed to "blow away the market" at an introductory list price of $165. Later the list increased to $195 as the cost of electronics in all areas increased. Prices have continued to increase with each new generation of strong machines. Even so, the Challenger 9 was a strong and affordable machine, with the same brains as the Champion but at half the price. It was 1982's best buy based on dollar to performance ratio. The "9", however, did not have either a wooden frame or a built-in clock. Fidelity did finally decide to add the modularity (not to be confused with the Modular Game Systems) concept to the "9". The MGS was designed to accept program updates (brains), while Fidelity's could only be defined as modular, accepting raw information (opening cartridges, etc.) but not updatable. This means that to signicantly improve playing strength the whole machine had to be sent to the factory for the guts to be replaced. Now it was possible to purchase a strong program (about 1600) at a low price or pay up to the list price of $600 for the Applied Concepts System, rated at 1600+.

The Conchess line of computers made an appearance with

a solid B rating of 1700. A beautiful cabinet for the machine, without additional "brains", sold separately for $550.

Other manufacturers appeared to be doing nothing. It was becoming obvious that updatability did not have much meaning, with regard to the strength of any individual machine. It had more to do with the future of the particular company, their programmers and their updating ambitions than any real potential of the machine.

Suddenly in the Fall of 1983, after a long quiet period, Novag unveiled their new Constellation, and also announced plans for their Super-Constellation, which would make its appearance in 1984. At a list price of $199.95 and solid "B" strength, the Constellation put the "9" and the Mephisto out of contention. Also, Kittenger had spent all his time working on developing program modifications which allow the machine to play an especially strong game on its first level with up to a five second response time. Another especially welcome improvement was Novag's sensor board, which is far more sensitive than the competitors' pressure sensitive boards. Entering moves on the Constellation, thus, falls somewhere in between the hard press of the sensory games and the ease of the Auto-Response. Additionally, by eliminating the response lights on each square which are typical of pressure-sensitive boards and replacing them with prompt-lights on the proper coordinates, Novag succeeded in eliminating one of the more distracting features of its predecessors.

with the additional features, tournament players still preferred the Chafitz's Modular Game System for the playing strength and updatability.

1981 proved to be a year of many changes for computer chess. Chafitz discontinued marketing and distributing their two chess computers. Thus, the two manufacturers, Applied Concepts (Modular Game System) and AVE (Auto-Response Board) started marketing the machines on their own. However, in the confusion of the break-up, the top programmers, the Spracklens, ended up working for the largest manufacturer, Fidelity.

It is important to note that, at least for marketing to tournament players, the programmer is the most important element, even for some multi-million dollar companies. Today's battle is really between which individual programmer will refine and enhance his program to the best possible playing strength and variety.

Fidelity's main sales were of lower-end products until Dan and Kathy Spracklen joined their team. They brought improvements in programming which virtually assured Fidelity's top position.

Applied Concepts was also improving the quality of the product, with the Morphy, which was a few points stronger because of middle-game improvements. Morphy increased the strength of the Sargon 2.5 to an approximate playing level of high 1500. Morphy was available for about $100 as a program up-date, which was a pleasant boost for owners of the Modular Game System. Additionally, they changed the name from

advancement after the addition of the Spracklen team. During those few months, Fidelity added approximately 200 points to its best machine to meet the competition with their "Champion" program. The final 1981 retail price standings, with all machines rating at approximately a high "C" level, were: Fidelity Champion Challenger $375; Applied Concepts Great Game Machine $350 MGS/GGM w Morphy; Scisys Mark V $398; Novag Savant $625.

At this point, all the machines were straining to become solid Class B strength. However, although all manufacturers were now familiar with actual ratings, most of them were claiming "unofficial" ratings of 1700-1799. Things had gotten to the point where if any manufacturer claimed the real strength of their machine, which would have realistically been under 1600, the machine would have appeared to be weaker than any of the competition and therefore unmarketable.

1982

1982 saw Fidelity take the lead in sales of chess microcomputers to tournament players. Novag was busy working on improving their programs, Applied Concepts introduced an opening module (the Gruenfeld, priced at $100) and an endgame module (Capablanca, $160) which only managed to take the strength of the entire system, priced at $600, to a low Class B rating of 1600. Scisys updated the Mark V to their Philidor program, which proved not to be significantly better than their original.

three inexpensive models, all with the same program, rated at approximately 1600. There were three levels of size and craftsmanship, ranging in price from $250 to $400.

Early in 1982, Fidelity also came out with the Elite, a machine for those who wanted the best available program. The machine was basically an advanced version of the Champion program, running at 3.6 megahertz. The stronger Elite program and faster clock speed put the playing strength at high Class B (almost 200 points stronger than the "9"). The limited edition of 500 pieces has long since sold out at a list price of $1000.

Later in 1982 Fidelty produced the Prestige, the same basic program but in a much nicer housing (similar to the Auto Response Board previously discussed), with an internal chess clock and a price tag of $1295.

So, 1982 offered the tournament chess player three good choices: Challenger "9", a low priced machine with decent strength; Conchess, with a nice casing and decent strength; and Prestige, a top-of-the-line, machine combining beauty and brains.

1983

In early 1983, the main choices remained Challenger 9 and Prestige. But for spice, the German firm Mephisto came on the American scene, offering a machine which fell somewhere between the "9" and Prestige in both price and strength. The Mephisto II, a hand-held model, list for $350 and had

Concurrently, in late 1983, Fidelity brought the cost of the larger wooden sets down with the Elite A/S (Elite Auto-Sensory); similar to the Prestige in operation and playing strength at one-third the price — $450. This was the lowest price ever on full size sets.

So, at the end of 1983 the two top programs offered at good prices were: in the inexpensive version, the Constellation, rated around 1700 and listed for $200, and in the expensive range, the Elite A/S, approaching 1800 and priced at $450.

1984

Early in 1984, Fidelity discontinued the 1983 Elite A/S model and put their Budapest program into the Elite A/S casing, calling it the Elite A/S World Champion. This was a well-deserved title, since Fidelity had just won the 2nd World Micro-Computer Chess Championship in Budapest, Hungary a few months earlier (late '83). The Budapest program brought the machine solidly over 1800. Customers with older Prestige machines or the Elite A/S could send the machines to the factory for a $150 up-date, and first time buyers paid $600 list.

Immediately after the Elite World Champion came out at Class A strength in mid-1984, Novag stepped up their Constellation program to run twice as fast (from 2.0 to 3.6 mhtz), bringing its strength up to Class A also. For an additional $50.00, everyone opted for the Connie 3.6 ($250) and the slower version

is now discontinued. Programmer Kittenger's emphasis has always been on speed, and now not only were the heuristics designed to play exceptionally well at fast speeds (see Dave Welsh's explanation in *Chess Life* reprint) but the chip speed was running faster. The speed chess level was almost 2000 strength (based on the human opponent spending as much time, moving as quickly as the machine), while the tournament level strength was low Class A (1800+).

All these statistics were taken at the time the machines appeared and continued to hold up in tournament competition throughout the world, against humans and against other chess micros. Of course the manufacturers still get a little excited about their own products. For instance, both the 3.6 and Elite A/S (Budapest) claim to be rated over 2000 by their manufacturers. Well, perhaps the 3.6 is close at speed chess, but at 40/2 both had just entered class A. Even so it seems now that rating claims are overstated much less so than years before.

Mid - 1984

At the end of the first half of '84 the 3.6 was heralded as being the best priced machine for the playing strenght, and probably still is — just as the Challenger '9' was in '82. The Elite A/S (Budapest) was the other tournament player's choice for those opting for a more beautiful casing. It was becoming clear that Novag and Fidelity were the two to watch.

Fidelity produced two attempts to compete with Novag. 1)the Challenger "12", an Elite downgraded both in strength (close to 1800)

levels so one can win on occasion), while only 8 for the 3.6 (and no training levels). Tournament players like this feature since they can teach their wife or kids to play the game and, after not too long, the kids will start winning and be encouraged to move up the ladder. The constellation 3.6 for instance would start off on its lowest, in instant response level by beating even intermediate players a hundred games in a row. After such a string of losses, the average person becomes disenchanted and feels like he'll never be able to play the game competently. We suggest that if you get such a machine, plan on losing against it every time, use it as a tutor. Then trounce your human opponents. The advantage of the Super of course is that you can start monitoring your progress by seeing a ratio of wins as you go up the "easy" levels. Also if you set a goal of, say reaching expert strength you can progress in smaller increments and have the machine still keep you interested even when you reach your goal. And you'll always have the lower levels to beat up on if you ever find yourself disenchanted with progress. For anyone rated below 1600 the choice between the 3.6 (the best priced machine for the playing strength) and the Super (the best machine. Period.) would be easier if the Super were presently priced at $600.00. However, with the current cost being so close the two main factors appear to be a) can one handle losing every time against the 3.6 with no out, until improvement finally shows through and b) is your goal to have a good, strong partner (if you don't mind losing) or a tutor that can help you

1984 TOURNEY RESULTS

Chess Tournament Ingolstadt, West Germany, January 1984

6 teams fought for the title in Ingolstadt, 5 teams of human players and one computer team. The Novag Constellation 3.75 (megahertz) had the best individual performance of the computer team, winning 4½ out of a total of 5 points.

NOVAG Constel. 3.75	4½
MEPHISTO Excalibur	4
FIDELITY Prestige	4
FIDELITY Elite	3½

11th Porz Open Chess Tournament, West Germany, Jaunary 1984

Results of the chess computers in this 9-round tournament:

NOVAG Super Constel. Y	4½
MEPHISTO Excalibur (experim.)	4½
FIDELITY Prestige	4
FIDELITY Elite S	4
NOVAG Constellation	3

2nd Commonwealth Chess Championship, Hong Kong, March 1984

31 players from 16 Commonwealth countries participated, among them 3 Grandmasters, 8 International Masters, 2 FIDE Masters, and the Super Constellation. At the end of the 11-round tournament, the Super Constellation had gained 4 points (3 wins, 2 draws).

In a side show a blitz tournament was held with 29 players. The Super Constellation always played black and won 19 points out of 29 games. 5 points were won against International Masters with an "ELO rating" of 2355 to 2474. In comments on the event the local press dubbed the machine the "blitz monster."

National Open, Las Vegas, Nevada, March 1984.

The Super Constellation was the only participating chess computer. The extraordinary result of the 6-round tournament for the machine was 3½ points (3 wins, one draw.)

Hong Kong National Chess Championship 1984.

The Super Constellation qualified for the finals of this event, the first instance ever of a computer qualifying for a national chess championship.

USA, informal match.

In a friendly match the Super Constellation won against 6-time US Women's champion, Diane Savereide.

Dutch Chess Federation Tournament, August 1984.

The participating computers among the human players in this 7 round event finished as follows:

NOVAG Super Constellation	4½
MEPHISTO Exclusive S	3
FIDELITY Elite A/S	2
MEPHISTO Excalibur	1½

British Open, Brighton, England, August 1984.

In addition to 103 club players, 4 chess computers including 2 standard Super Constellations participated in this 11-round Swiss tournament. The 2 Novag machines garnered a total of 9½ points between them, compared with the other two machines' total of 4½.

French Championship, France, August 1984.

An 11-round event. The participating computers finished as follows:

NOVAG Super Constellation	7
FIDELITY Elite A/S	6

Computer Topples G.M. (In Simul.)

British Grandmaster Jon Speelman and 6-time American Women's Champion Diane Savereide were both recently beaten by Constellation computers. Their games are particularly interesting—

Qe7 7 0-0 e4 8 b3 Nb4 (Black plays for control of the center prematurely, but what else can a computer do against passive play?) 9 Nf4 d6 10 a3 Bg4 11 f3 exf3 12 Bxf3 Bxf3 13 Qxf3 Nc6 14 d4 Bb6 15 Ncd5 Nxd5 16 Nxd5 Qd7 17 Bb2

and cosmetic appeal (half size with imitation metallic look and wooden border rather than full wood surface). The price was brought down to the 3.6's $250. However, the 3.6 still remained king in that price range. 2) The Elegance, also in the 12's size, but much more handsome, retaining the Elite's full-wood look, was quite an improvement both in appearance and play. The pieces, however, lacked a touch of class. It's program was an elite update, running at the same speed (3.6 mhtz) but with better programming. The Elegance program just tied for first in the Fourth Micro Chess Championships in Glasgoe, Scotland, August '84 and appears to be close to 1900 strength.

Just as the Elegance was coming out, Novag released their long-awaited Super Constellation. The list price was expected to be $600.00, but Novag surprised us with an introductory price of $399.95 ($600.00 with printer and clock). The other surprise which Novag had kept well secret was the fact that the machine is now user programmable. The biggest surprise, however, came late November when the USCF officially acclaimed the Super to be expert strength. After 40 games of humans (average rating 1982) playing against 10 production off-the-shelf models, the computer garnished 22 points. This 55% score under tournament conditions netted an official rating of 2018.

SUPER vs. 3.6

Some of the main differences between Novag's Constellation 3.6 and Super Constellation are:
1) 16 levels for the Super (7 lower

set your goal at expert/master class rather than class "A"?
2) The Super is compatible with the Novag printer, while the 3.6 is not. If you find that you have played a particularly brilliant or instructive game, you may print out the game in crisp figurine notation with diagrams at instructive points. The printer may also be used to verify positions in the computer's brain or keep track of which opening variations one has programmed in.
3) The Super accepts a clock for a more even match. Masters may spot time odds of five minutes to three for an even struggle (the machine has been nick-named "blitz monster" after winning games against IMs in blitz matches). Weaker players may give themselves the time advantage. The clock may also be used for tournament chess, or to play speed chess with friends.
4) The rating difference between the two machines is close to 200 points. Opening play is much more varied with over 21,000 moves versus 3000. This should result in a better middlegame starting point. The program has been written in a 56K format as opposed to 16K. This allowed the programmer much room for advanced strategic heuristics. Now its positional insight is more equal to its proverbial tactics. It will even sacrifice on positional grounds. The endgame play is also much more enhanced. It will force a mate with bishop and knight versus king, a feat no other computer can perform and many experts find difficult!
5) The internal clock speed is only 0.4 megahertz faster (3.6 mhtz versus 4.0 mhtz). This is much less significant than the drastic program

Savereide—Super Constellation
Sicilian / Sozin-Najdorf

1 e4 c5 2 Nf3 d6 3 d4 cxd4 4 Nxd4 Nf6 5 Nc3 a6 6 Bc4 e6 7 Bb3 b5 8 0-0 Be7 9 f4 Bb7 10 e5 dxe5 11 fxe5 Bc5! 12 Be3 Nfd7 13 Qh5 0-0 14 Rf4 Nc6! 15 Rh4 h6 16 Kh1 Bxd4 (White's attack appears very strong but Constel. exposes the weak link by accurate defense.) 17 Bxd4 Qg5 18 Qxg5 hxg5 19 Rg4 Nxd4 20 Rxd4 Nxe5 21 Re1 Ng6 22 Rg4 Rad8 (Black obtains the control of the open d-file and uses it to good effect.) 23 Rxg5 Nf4 24 Rf1 Nxg2! (An excellent combination that forces the win as White's pieces are passively placed.) 25 Rxg2 Rd2 26 Rfg1 Rfd8 27 Bd5 R8xd5 (A neat combination to finish off a beautiful game by the Super Constellation. The endgame after 28 Nxd5 Bxd5 is hopeless.) 28 Rxg7+ Kf8 29 Rg8 Ke7 30 R1g3 Re5+.   0—1

Speelman — Constellation 3.6
Irregular opening

1 g3 (Getting 'out of the book.') e5 2 Bg2 Nf6 3 c4 Bc5 4 Nc3 0-0 5 e3 Nc6 6 Nge2

f5! (A good move which keeps the 3-pawn backward and vulnerable to attack.) 18 Rae1 Rae8 19 Kg2 Rf7 20 b4 g6? (A rare tactical miscalculation, and it's back to the drawing board.) 21 c5 dxc5 22 dxc5 Ne5 23 Bxe5 Rxe5 24 Rd1 Qa4 25 cxb6 axb6 26 Rd2 Qxa3 27 Qf4 (A superficial move which returns the favor, with interest. Computers see such simple combinations in a matter of seconds.) 27. . . Rxd5! 28 Rc2 Rdd7 29 Rff2 Rde7 30 Rfe2 Re4 31 Qh6 Qxb4 32 Ra2 Qf8 33 Qh3 Qe8 34 Qh6 Ra4 35 Rad2 Ra1 36 Rd4 c5 37 Rf4 Rd1 38 e4 Re7 39 h4 Rxe4 40 Rfxe4 fxe4 41 h5 Qf7 (Good counter-attack.) 42 Rf2 Qg7 43 Qf4 Qe7 44 h6 b5 45 Re2 Rd4 46 Qb8+? (The final mistake which allows the forced exchange of queens.) Qf8 47 Qxf8+ Kxf8 48 Ra2 b4 49 Ra8+ Kxf8 48 Ra2 b4 49 Ra8+ Ke7 50 Rh8 b5 51 Rxh7+ Ke6 52 Rb7 Rd2+ 53 Kh3 Rd1 54 Kg2 Rd2+ 55 Kh3 Rd1 56 Kg2 (A Vain attempt to repeat positions.) b3! 57 h7 Rd2+ 58 Kh3 Rd1 59 Rxb5 Rh1+ 60 Kg4 Rxh7 . . . .   0—1

NOVAG and the '4th Micro'

As a matter of policy, no Novag chess computers are ever entered in any tournaments in which only chess computers play, and this even included the 4th World Microcomputer Chess Championship. Novag machines are entered in as many major tournaments against human players as is possible and practical, however.

The reasons for Novag's non-participation in computers-only tourneys are as follows:

— Results of computer-vs.-computer events are highly academic and say little about actual playing performance. It is next to impossible to verify to what degree such results are achieved with enhanced or modified "killer" programs, which were specially designed to exploit weaknesses in opponents' units.

— No satisfactory Tournament Rules have been established to distinguish between "commercially available" and "experimental" chess computers. It is almost impossible to produce experimental computers commercially, since their hardware

and/or software renders them far too expensive. Thus their winning against commercial machines is meaningless as far as consumers are concerned.

— No independent committee has been set up to check the specifications of the participating commercial computers. This is crucial, as there have been documented cases of manufacturers running their machines at a faster speed, or stuffing them with a greatly enlarged "opening book" than is available in their machines for sale.

— Advantageous results in World Microcomputer Chess Championships have been widely used in commercial advertising, regardless of whether they were obtained with commercially available or experimental computers.

— This year's tournament has been sponsored and organized by companies which are developing and distributing commercial chess computers themselves — hardly a sign of objectivity.

advancements as it very rarely allows it to see even an extra play (½ move) further. The fact that the machine plays a strong expert, close to master speed-chess game has more to do with the programming.

6) The Super can be unplugged and the game still continued three months later, due to its long-term CMOS memory. Thus, if you wind up in a losing position and "accidentally" knock all the pieces over or trip over the cord...well, the machine is still ready and willing to continue.

7) If asked, the Super will display its depth of search at that moment. It also automatically announces up to mate-in-four. If you are playing along when unexpectedly on comes the mate-in-four signal, you know already that it is time to hit the "take-back" key (followed, perhaps, by the "hint" key).

8) Both solve mates and problems with amazing swiftness. Often, the Super will solve the problem in seconds, faster than some Grandmasters!

9) With the Super, one can in effect aid the programmer by adding opening lines that you, specifically, have a more difficult time against and need practice playing, either as White or Black. You can also program in how often you would like to see each line appear. Now if you find that you need to get a few fast wins in against the computer, just put in a couple. You could have it open 1 g4 every time and after your 1...e5, have it play 2 f3 50% of the time and 2 f4 the rest of the time. After mating it a number of times on h4 and proving it is not invinceable, you can erase those moves from

players who are objective enough to recognize their own weaknesses. Weaker players who purchase the Super and hope to get to master strength can utilize this feature more fully as they go up the ladder.

ELITE A/S DILEMMA

Now the more costly Elite A/S (Budapest) only had beauty to show for itself as it was ranked third behind the Super and the Elegance. It was more closely grouped with the Constellation 3.6 and the Challenger 12 in playing strength.

A good number of people found that they never expected to beat the Super or the Elegance, nor had any realistic aspirations of doing so. They did not like the flimsy pieces on the Elegance, the plastic of the Super and liked the size of neither. For them the Elite A/S Budapest was fine.

The only real advantage to getting the strongest program for someone at that level is that although he or she never plans on getting to the point of beating the machine regularly on its higher levels, at least the machine will be providing a better game on fast response levels. In addition to receiving a more challenging game without having to wait, also the stronger the machine, the less likely the chance of outgrowing it.

The machines are so strong now, however that most people can start to make compromises between top strength and top looks. Still some players wanted the beauty and a program ranking closer with the top models.

Shortly after Novag released their Super Constellation, Fidelity

more specialized ones. Also offered is the 5-volume ECO (Encyclopedia of Chess Openings) set (each volume, $120 list) or the even more specialized Queen's Gambit Tarrasch module ($120 list).

4) Unlike the Elegance, the Elite 4.0 has a built-in displayed chess clock. Besides the obvious telling of time, one can see a number of insights the machine is trying to relay. For instance, it will display its assessment of the position in + or − fractions of points (+ 0.5 means it feels it is up the equivalent of half a pawn as a positional/material equation. It does, occasionally, display minus scores —this is to make the human opponent feel better). The clock will also display which ECO opening module should be popped in next, in the event that a line should cross over to a different ECO volume (a rare occasion, and only useful if one owns the ECO cartridge set, $600 list).

5) The Elite 4.0 has a long-term memory (as the Super), whereas the Elegance is only short term.

6) The one advantage of the Elegance is that it has no voice. But rest assured, the voice on the Elite A/S can be turned off. Actually, the voice may have a positive influence in stimulating the interest of a youngster to tackle the game.

THE MATTER OF RATINGS

It should be noted that Novag is the only company to have their computer officially rated by the USCF computer rating agency. Most companies won't risk permitting their products to be officially rated because of the possible bad press if theirs does poorly. The Chess Fe-

OPENING ENHANCEMENT

All rating estimates given so far have been based on the machines' performance without utilizing any opening enhancements. The following comparison of these enhancements is primarily between Fidelity's complete set of ECO cartridges and Novag's programmable opening book and how they relate to the two primary aims of the opening "book" of a chess computer: 1) to play these automatic moves quicker and 2) to create more difficult middlegame opposition.

We at Players feel that, in general, the opening is the least important phase of the game. One of the primary reasons for increasing one's depth of rote knowledge of an opening repertoire is that it simply allows one to budget extra time to more signifiant middlegame and endgame considerations. The set of ECO cartridges for the Fidelity machine override the much smaller, built-in lines and increase the average depth of many lines to over 10 moves, setting the machine in motion for a decent middlegame. The set is especially good for beginners as they can see if the moves they are making are respectable enough to be considered a main line (the cartridges contain only the main ECO lines). However, the entire set probably increases the overal strength of the machine by only 25 points.

Additionally, while ECO may assess a line as being slightly better for White, equal, etc. these assessments do not have the same meaning for every player. "Good" and "Bad" positions are relative terms.

memory and do some serious programming. The moves do not just stay in memory for a limited time. Rather, they become an integral part of the machine's permanent opening memory repertoire (although of course you can erase and reprogram this repertoire).

Entering the moves into the computer's brain is easy. It does not involve laborious keying-in. Just play the game naturally and each move you play is automatically ingrained into its brain, as long as you are in programming mode. You can create your own monster — the variations you dread playing will keep coming back in future games to haunt you.

You may find after drilling yourself through many games that certain variations you used to have a difficult time playing against you now find easy to play. At that time you may steer the machine much deeper down the line to a fork where you feel that the branch the machine usually opts for poses fewer problems than one it plays less frequently (or perhaps the friend you're trying to beat plays the less frequent line). At that fork you can change the ratio of response — have it play the move it usually opts for only 1 in 10 times, and the other move, 9 out of 10 times. If you ever find that you master the line altogether then you may delete that line, leaving space for others. The deletion flexibility is especially important if you are close to the capacity of programmable moves, which is 2400 half moves.

This programmable feature is only of optimum use to stronger

released a third version of the Elite A/S. The program is exactly that of the Elegance's. However it runs 0.4 megahertz faster (3.6 versus 4.0 mhtz), resulting in only perhaps a 10 rating-point gain. This program at 4.0 mhtz. is 50 to 100 points stronger than the older Elite A/S program (Budapest), putting it close to 1900.

So the dilemma was solved with the EliteA/S 4.0 ranking solidly in the top two. The cost went up only $50 ($650 list), a healthy price/strength raise.

With a list price close to the Super's, the comparison is easy — expensive, handsome cosmetics (beauty) versus costly electronics/programming (skill).

ELEGANCE vs. ELITE A/S 4.0
With a difference of $250 in price, the Elite/Elegance comparison is a little muddled.

1) Playing strength is approximately equal, both at solid class "A".

2) Playing surface of Elite 4.0 is almost tournament size, with beautiful wooden pieces, making for much more comfortable, natural playing.

3) Both machines have a modest number of built-in opening moves (several thousand) intended to be supplemented with any of Fidelity's opening cartridges, such as the CB9 ($78 list) with 8,160 moves or the CB16 ($120 list), with 16,100 moves. (The Chess Challenger "9", incidentally, will only accept these two). The newer Fidelity models such as the older Prestige, all three Elite A/S's, the Sensory "12" and Elegance) will all accept these two general opening cartridges and the

deration allows any production or experimental models to play in regular rated human tournaments (e.g. U. S. Opens). However, since they cannot monitor the legitimacy of "on-market" models, all computer entrants are considered experimental. Therefore many are supped - up to their max. One supped - up program (faring very well as such) has been made to run very powerfully in tournaments it has competed in, the Sargon III. Commercial models are much less impressive.

SOFTWARE vs.
DEDICATED MACHINES

Substantially stronger than the Sargon II, the III is the best software (diskette) program out. However, since the program was designed for the casual player already owning a home computer, the manufacturer cannot economically staff a team of programmers to approach the strength of state-of-the-art dedicated models. The weaker programming in conjunction with the limitations of home computers (previously discussed) in for instance a standard Apple computer (running at 1.2 mhtz.) will play a slower, weaker game. Still, one can achieve a 1600 level game. The diskette is a good buy, but there is still some charm lost from having to key in moves, watch the board on a screen and then move the pieces on a real board. Playing against a dedicated machine that actually "thinks" is quite different. Many people owning a home computer will ask for a chess diskette simply because they already own a computer. What they mean to ask is — What will give me a good game of chess?

More important than speeding up the opening with a vast collection of opening moves to reach relatively even positions is to have the moves continue into the middlegame with significant effect. Thus, the ECO set for Fidelity is less effective than Novag's programmable opening (more appropriately titled programmable middlegame) feature, since the Novag approach may be used to specifically affect only the middlegames in which the user needs practice. This approach has great significance for the serious student.

Imagine that every game played resulted in a middlegame where you found yourself having to struggle, not just any randomly selected middlegame, but specifically the ones that occur in your opening repertoire. Every player finds that there are lines within his or her repertoire that cause more difficulty than others. One lesson to be learned with a programmable middlegame is how to steer the opponent away from these more difficult lines when they are encountered in tournament play. If this is not possible, using the computer the player is able to learn how to counter and/ or handle these difficult middlegame positions through regular practice. Let us continue this example in greater detail.

Imagine, if you will, the average master playing against an expert. If the expert is playing an opening where the middlegame plays itself (e.g. a thematic kingside attack) and the master has been steered into his least favorite line, suddenly the expert is playing at least

100-200 points stronger than his usual play. Similarly, if a 2200 rated player was playing the 2000 rated Super and programmed it to enter only middlegames he despised playing, then the strength of the computer goes up in like manner. Of course, the next player with his own repertoire who sits down to play the machine will find its strength back to the original, because the machine is only stronger specifically against the person who programmed it.

With the Super this is achieved by first changing the ratio of response of the 21,000 moves it comes with. Undoubtedly some of the machine's lines will provide you with difficult middlegames to play against with either color. After you select the cream of the crop, the most difficult lines the machine has against you, specifically (probably a total of several hundred or more, depending on how varied your opening repertoire is), then you add other lines of your choice which are designed to pose you with difficulties. This process of aiding the enemy works like an inoculation.

Thus, curiously enough, the 2400 programmable half moves of the Super are more significant than the tens of thousands of ECO moves contained in the Fidelity cartridges on both of the opening qualities discussed earlier: 1) the game generally goes deeper into the middlegame, gaining time for later analysis and 2) the middlegame opposition is tougher.

To conclude: The Fidelity ECO system is good for the intermediate player to help widen his or her opening repertoire. For the

strength to be slightly under 2000, high 1900's (without utilizing the programmable opening book). These pros usually underate chess computers by far more than 25 to 50 rating points. Maybe they need more time to attempt uncorking any quirks they may discover. These hard cores know exactly how to play against computers.

The human player has a distinct advantage -- he learns how to play against the machine, even subconsciously picking up on its weaknesses. Two human opponents playing regularly against each other will attempt different late-opening/ middle game lines and after the other sees that he is losing, he adjusts and unleashes a different middlegame strategy.

So, the ultimate goal is to produce a machine varied enough, good enough that you never catch on to its tricks; you can never learn to beat it automatically. Lacking that, a machine that learns to play against you.

Well the Super has achieved the goal on both counts to some compromising degree. Opponents will find that they are actually improving, not just uncovering weaknesses in the machine. With the earlier, weaker models, once you discovered certain failings (entire books elaborate on these deficiencies), you could beat it at will. Players would go through all kinds of contortions trying to make the machine's game better, such as opening up files one usually wouldn't, playing unsound sacrifices, or just playing an inferior game. With the Super's advanced middle game and endgame positional understanding, its weaknesses

Regarding playing strength advancements in the next few years, we don't expect anything real significant for two reasons:
1) Chess computers appear to have come to a sticking point. This slowing down of advancement started in early '82. You'll notice from the chart on the front page of this article the company at the top of the pack, Fidelity has gained only 100 points in the last three years. Other companies, such as Mephisto have experimented with the newest, most costly chips to no avail. Perhaps it's the same phenomenon that occurs with human players causing many not to cross the 2000 rating barrier, no matter how much they play. Maybe it's the Grandmaster's intuition that can't be programmed in, that sixth sense.
2) For economic considerations. The top computers will now beat 99% of all players. For instance, the super Constellation recently scored 1 - 3 against 2347 rated U.S. Women's Chess Champ Diane Savereide (one of her few losses of the year). The point is that, even in the games it lost, the computer gave her enough of a sting to keep her interest. So now that even masters

are challenged, why should the manufacturers continue to pour vast sums of money into programming and costly electronics: -- just to sell a few more units to select IM's and GM's?! Rather, it appears that improvements will come out at a much slower, gradual pace.

The market has stabilized -- the manufacturers will always be selling tournament machines to those first-time buyers and old-timers who have outdated or worn-out machines. However, the bulk of the market will continue to be the low-end gift givers, where prices are also now very competitive. Already manufacturers are specifically offering lower levels (as with the Super) to gain a larger marketshare.

Players Chess News has finally become seriously involved in chess computers now that the top models are strong enough to be of interest to most of our readership. The next big breakthrough seems too far off in the future, getting the machine to learn from its mistakes.

Certain details are omitted from this article which will be supplemented by David Welsh's review (reprinted here by permission from *Chess Life*).

1985 UPDATE

The latest development in chess computers for 1985 is Fidelity's Chess Challenger 12 running at 5 megahertz. The older CC12 ran at 3.25mh, but both machines use the same program, the Budapest. The increased speed of the Chess Challenger 12 does not make it stronger than the Elite 4.0 which has the Glasgoe program, a one year further advanced program. In other words, the increased program

from a list of $250 to the current list of $350. The rating strength increased approximately 50 points.

Another new computer has arrived on the market, the Turbo Star from Scisys. Our computer experts are now testing this machine to evaluate its overall strength.

The first quarter of 1985 saw no changes in existing computers except the Chess Challenger 12, a5 5 megahertz and the Scisys machine.

beginner or intermediate player who purchases the Super, the assumption is that the student will learn from the built-in book lines and from a library of actual books. The student has probably set his sights on reaching expert or master rating and will find the machine with its own book challenging to that point. When he reaches his goal (or perhaps even at Class A) the owner can then take the time to boost the machine's strength with the programmable option (also by that time there will probably be a slight up-date on the overall strength of the machine).

FAMILIARITY BREEDS CONTEMPT

Some computer owners have sent their machines in for an update (eg. up-grade to a Budapest program) and were disappointed to find that the improvement was very slight, so slight for some that the machine actually seemed weaker. This may have been due to the human having improved against the first edition and improving in the couple months it takes to get it back. However, chances are that the player was comparing his cumulative win/loss ratio on the older version (where he may have had many more initial losses) to his current record against the update. Incidentally, the Glasgoe program is a more significant upgrade. Although the top program out, the Super, boasts an official rating of expert, a number of the stronger, seasoned chess computer vets on gut feeling estimate after a solid month with the machine, even its

are much more subtle (a master's are even more subtle) and hardly as predictable.

To most people the machine is unbeatable (excluding training levels, of course). But for the expert or master, as they try different lines and find ways of outwitting it, i.e. learn the machine, it won't quite learn back. However, with the owner's assistance the computer can, in a sense, learn how to improve on its play and "learn" to beat its master.

No longer does familiarity with a computer necessarily breed comtempt. The computers now are so good that even after becoming intimately familiar with their style, their playing strength remains about the same.

THE FUTURE

We have seen the prices on tournament strength plastic models drop to rock bottom in '82 with the Chess Challenger "9." Since then prices have been going up along with strength -- in '83, Constellation ($200 list); in '84. the 3.6 ($250 list); and, most recently, the super-Constellation ($600 list, or $400 as long as the introductory price holds). In large, aesthetic versions, the price came down from the Prestige to the original Elite A/S (list $450) in '83 and has since climbed to the Budapest version (list $600) and the Glasgoe (list $650). Prices peaked in '81-82 in both categories and the best price/ performance ratio has been offered ever since. It appears that prices will continue to inch up with the cost of faster electronics and inflation.

strength of the Elite 4.0 outweighs the greater clock speed of the Challenger 12. The new CC12 increased $100 in price over its predecessor,

We do not expect any significant changes in chess computers during 1985, mostly because of the reasons listed earlier in this article.