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Introduction

by Larry Kaufman

For those of you who may be new to CCR, allow me to introduce myself and the magazine. I write all the articles in CCR unless otherwise stated, while the folks at ICD do the proofreading, organizing, and printing.

I am an International Master, USCF rated 2487, FIDE 2430, age 42, and reside in Parkland, Florida (near Ft. Lauderdale). In recent years I have not been an active tournament player but have concentrated on computer chess. I am also the U.S. Champion of Shogi (Japanese chess). My career was in stock option trading, but for the past few years I have worked full time on computer chess. For me this means writing for CCR (and occasionally other publications), doing opening books for Novag computers, operating Mephisto computers in tournaments, testing new machines for ICD and for the manufacturers, and working on the pc program "Rexchess". All this together does not bring in as much money as any decent full-time job, but for me it is fascinating to be a part of the race to build a chess computer that will ultimately surpass every human being alive, even Gary. My involvement with computer chess dates back to 1967, when as a student at M.I.T. I was the chess consultant for "MacHack", the first program to enter rated tournaments (it got a C rating). At the time I doubted whether I would live long enough to see a computer reach even master level, but like David Levy I now feel that nothing can keep them from the summit. When it finally happens (I estimate 1995) perhaps I and other chess programmers will turn their attention to the even more difficult problems of programming shogi and GO.

Going to a quarterly format for CCR has increased my workload, but events are so fast-breaking in computer chess that we felt it was the only way to keep our readers up to date. If I tend to talk too much about ratings and results and too little about features, that partly reflects my personal bias but also reflects the fact that most worthwhile features are now standard on all but the cheapest machines.

Some of the articles in this issue were prompted by letters from readers. If you have any comments or suggestions feel free to write in--we'll need new ideas for future issues.

I would like to make a plea to purchasers of new machines not to draw conclusions from a handful of games. I have even received mail where programs are judged by two games! I know time is limited, but twenty blitz games mean a lot more than two 40/2 games. I enjoy reading reader's results, but only when a decent number of games have been played (at least 10).

Finally, I wish to thank Max Harrell of Mobile, Alabama, Gerald Murphy of England, and the folks at "Ply" magazine in Sweden for their contributions to CCR.

1990 First Quarter Review

There have been a number of changes in the commercial chess computer scene in recent weeks. Since the purchase of Fidelity by Hegener & Glaser, makers of Mephisto models, the two companies have begun acting almost as one, each acting as distributor for the other one, Fidelity for Mephisto in the U.S., Mephisto for Fidelity in Germany. This has resulted in higher prices for Mephisto products in the U.S., since Mephisto no longer wishes to undercut Fidelity here. In another surprising development, Novag agreed to make Fidelity its U.S. distributor, with the goal of getting its low priced models into the department stores. Unfortunately Fidelity has chosen to mark up the upper end Novag models which would compete head on with Fidelity to the point where they are no longer bargains, so Novag is now forfeiting a good share of the U.S. market for its table top tournament level models. With CXG (which makes some nice models at reasonable prices) also distributing through Fidelity, we now have a near monopoly situation in the U.S.. Saitek is now the only manufacturer distributing in the U.S. other than through Fidelity. Perhaps some anti-trust attorney will read about this and institute a class action lawsuit, but absent this we must hope for Saitek to do something to preserve competition in the marketplace.

Fortunately there is hope in this direction. In another surprising development, Saitek has hired the Spracklens

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away from Fidelity for the avowed purpose of having them collaborate with Julio Kaplan on a RISC chess machine, expected by 1991. I don't doubt that this team can produce a Senior Master level model with a top speed RISC processor, but such a machine would cost at least several thousand dollars. Saitek also plans to offer an affordable RISC module in 1991 using a slower RISC chip, which should still offer performance comparable to the current very expensive 68030 models. Mephisto's Ed Schroder, author of Polgar, is also reported to be working on a RISC program, but whether it will become commercial is not known.

As for Lang, Mephisto's 16/32 bit programmer, he is reportedly sticking with the 68000 chip family, since it offers a full range from the inexpensive 68000 chip to the new very expensive but very powerful 68040. Although the Mephisto Portorose 68030 narrowly missed getting a Senior Master rating in a C.R.A. test (see story), there can be no doubt that a 68040 model would achieve the honor, even without the further program improvements Lang has already reportedly made. Unless you're a millionaire though this is only of academic interest. Fidelity plans to enter a multi-processor 68040 in the World Micro this year with the current Elite program. Lang will have to run his program on a 68040 if he hopes to win again. But I wonder how much interest there will be in a match between two (or three with Schroder's RISC program) programmers of one parent company?

In the non-commercial scene, Deep Thought won headlines for its two awful defeats by Kasparov (attributed to bugs), and its narrow defeat by Karpov in exhibition games. Three members of the Deep Thought team have gone to work for IBM to develop a new, even faster and "smarter" chess machine. Apparently the only motivation for IBM is the hope of favorable world wide publicity when and if their creation begins defeating World champions. It is not likely that IBM will make chess computers for sale. As for the other "giants", HiTech shared first place with Deep Thought last fall in the ACM computer tourney, but LaChex, running on a multi-million dollar Cray, earned a 2500 performance rating at the American Open and now has three senior master results to its credit, so it is not clear which is number 2 now. Cray Blitz is probably also of Senior Master strength, but it never competes against humans and so no one really knows.

As for the market for moderately priced chess computers, due to recent price increases this might be a good time to look for sales on discontinued models of the last couple of years. There are still some decent values in new models, but one must be a bit more discriminating than in the past. I hope that CCR can help you get the most for your money should you be in the market for a chess computer.

There have been few new models out since the last quarterly CCR, and most of these are Novag. Novag has been introducing selectivity in more of its low priced models, with modest but definite increase in playing strength. Fidelity models are now the only ones (over 1900 level) that are still primarily full width, and with the Spracklens starting over from scratch at Saitek perhaps all new commercial programs will soon be selective search. It is most curious that the non-commercial giants are still primarily full width despite the overwhelming evidence for the superiority of selective search in the micros. Some of them have introduced selectivity by copying Deep Thought's idea of "Singular Extension", but so far none of the micros have gone this route despite considerable experimentation. Perhaps the idea only works on deep searches, or perhaps it is just not as good as other selective search approaches favored by micros.

Software Toolworks American Open

No less than nine computers played in the '89 American Open, including six Mephisto "clones" playing for a CRA rating. The clones used the "Portorose" program running on a 36 Mhz 68030 processor with 2 Megabytes of RAM, which makes them over 6 times the speed (and price!) of the standard 68000 model and about 3.6 times the speed (and price) of the 68020 version. I was one of the operators, and both Mephisto and I expected a rating in the low 2400s. In fact, the rating came out a rather disappointing 2376 for the 48 games. The good news was that the machine apparently fulfilled all of F.I.D.E.s requirements for the F.I.D.E. Master title, having earned a F.I.D.E. rating just over the required 2300 in its 27 games with F.I.D.E. rated players (25 are required). Since F.I.D.E. ratings run about a hundred points below U.S.C.F., this title is comparable to the U.S. Senior Master title. It is doubtful that F.I.D.E. will actually grant this title to the computer, since in the past computer games were not rated by F.I.D.E., but there is a precedent--"Mephisto, A." from Austria (presumably a Turbo kit version of the Academy) has a published F.I.D.E. rating of 2210 after 9 games. Perhaps F.I.D.E. didn't know this was not a human player, or perhaps they didn't care. Whether or not the title is actually awarded, it was earned fairly and deserves the recognition.

Why did the rating fall about fifty points below forecasts? One reason is that since the abolition of bonus and feedback points a year ago U.S.C.F. ratings have been falling, and so 2376 actually equates to over 2400 on the scale in effect during earlier C.R.A. tests. Another reason is that the opening book for Black has some flaws which gave it two early losses needlessly. In general the machine played around the 2450 level with white but only around 2300 with black, an unusually large difference. This seems to be characteristic of Mephisto. Yet another factor is that players were given far greater incentive money than in the past--$100 per win, $50 per draw. Past tests have shown that computers get inflated ratings when the players' incentives are too small--after all the computer is always fully motivated! Mephisto displayed massive strength at times, beating two of America's top IMs, Jack Peters and Igor Ivanov, and won the bulk of its games against masters and all games against those

below master. Only a poor score against Senior Masters and Grandmasters kept its rating under 2400. The machine missed a draw against GM Dzindzichashvili and fought a very closely contested game with GM Fedorowitz (rated over 2700!), but to no avail. On the other hand there were a few games in which it was outplayed by low rated masters; there are certain types of positions (especially blocked ones) that it just doesn't understand. In my opinion another reason for the mild failure was that the machine generally searched 6 ply full width, but it only seems to benefit greatly from the odd plies. So while it searched nearly a full ply deeper than the commercial 68020 version would have done, it was not usually the crucial odd ply. If a future 50 Mhz 68040 model can regularly do 7 ply searches, it might well be over 2500 strength, I believe. Deep Thought would have a real rival then. Actually the 68030 model (but at about 48 Mhz with 8 Mb RAM) did defeat Deep Thought at the ACM tournament, but clearly the 2550 rated giant from Carnegie Mellon is still the strongest chess computer. Just before the American Open Deep Thought played off its tie with GM Tony Miles from the prior year's event in a 40/2 exhibition game, and D.T. won handily. In this year's event D.T. missed sharing first by a half point, but still performed at its 2550 rating. If the operator hadn't thrown away a half point in the first round by incorrectly setting the time control, perhaps D.T. might have repeated its victory.

As for the other computers, Lachex, running on a multi-million dollar Cray performed around the 2500 level. In the past it performed only at expert level until its last three events when it suddenly jumped to Senior Master level. This is partly due to program improvement, but also due to the fact that for the first time in this year's American Open Lachex did not have to share its Cray computer with other users. The program is said not to be terribly sophisticated, which makes one wonder what Richard Lang could accomplish with a Cray. The final entrant was an as yet unreleased version of A.I. Chess running on a fast 386 computer, which achieved an estimated performance rating of 2354 thanks to a victory over former U.S. Champion John Grefe (who previously drew with Mephisto).

Another highlight of the event was the blitz tournament. I operated the pieces for the Mephisto Portorose 68030 (for this event the 48 Mhz unit was used). It dispatched its first three opponents (2 experts, 1 class A) each by 2-0, then faced GM Max Dlugy, considered to be among the top 3 blitz players in America. To everyone's surprise, Mephisto won both games quite convincingly! Next, Mephisto faced America's highest rated GM, Boris Gulko, who won both games and went on to win the event with a near-perfect 11.5-0.5 score. In the final round, Mephisto won twice from 2600 rated IM Vince McCambridge, thus sharing third place behind GM D.Gurevich but above three other top GMs. Once again it has been demonstrated that computers perform a class better in blitz than in tournament chess, as long as they are not penalized for operator time. Based on the USCF ratings of Dlugy, Gulko, and McCambridge, Mephisto's 4-2 score against them gives a performance rating of 2778, far above any American since Bobby Fischer, but some other informal blitz games (some losses to Seirawan and Dlugy) suggest that the true blitz rating for the computer is in the neighborhood of USCF 2600. It seems obvious to me that it will not be long before a computer can win a blitz match from any human player, even Kasparov. Tournament chess will take a few years longer--I still say 1995.

Recently many tournaments have barred computers, and it is becoming difficult to find a venue for new C.R.A. tests. Also the cost of these tests has become exhorbitant. In the future we may have to rely more on European rating tests and on computer vs. computer testing. It is likely that many very strong models will have no C.R.A. rating in the years to come, and the lack of such a rating should have no negative connotations to prospective buyers. I urge U.S.C.F. to find a way to make the process easier and more affordable.

Fidelity Review

Due to the takeover by Mephisto owners Hegener and Glaser, Fidelity is becoming more of a wholesaler and focusing less on manufacture. It is importing various models of Mephisto and other companies for sale under its own label. This review will deal only with those products actually manufactured by Fidelity.

The only new model since last review is Elite version 5, the first dual processor commercial chess computer. It did not quite live up to Fidelity's forecast of 80-90% speed up over version 2 (the otherwise similar single processor version): the manual claims 70%, which I confirmed as a fair average in ordinary positions, though it varies from under 40% to over 100% The manual states that the speed-up is less in endings and in tactical problems, and indeed testing on a large number of problems by the Swedish Computer Chess Association shows the average speed-up to be 59%, while in mate solve mode the speed-up is more when there is no mate, near 90%. The speed-up is nearly, but not totally free--so far I have observed only one problem in which the dual takes an extra ply to find the solution. Considering all factors it is probably equivalent to a free speed up of 3-2 from version II, while a further speed up of 3-2 for version 5 would make it about equal to version 6. It is curious that the prices for the various Elites (2,5,6,9) are very nearly proportional to their effective speeds. This seems to be a good general rule for valuing a speed-up. As all the Elites are the same except for speed, the speed and price are really the only factors that need be considered in selecting among them. In strength, the dual should be about midway between versions 2 and 6, about 40 points from each, but in price it is closer to version 2. Version 5 is about as strong as Mephisto Portorose 16 bit, and is somewhat less expensive, so it must be considered good value. Thus, while the Mach III and Version II Elite don't really deserve their 2265 CRA rating (based on subsequent tests in many nations), version 5 probably does deserve its 2265. My unit

occasionally lit up unoccupied squares, which could be corrected by take-back. I don't know if this problem occurs in other units than mine. As for the learning feature common to all the Elites, it works if you replay the same opening repeatedly, but sometimes it takes many games to correct one error. In sum, it's a nice feature, but no panacea. All of the new Elites (and Mach 3 & 4) play a reasonably human-like, aggressive game with a good endgame. The Elites have an enlarged opening book, but occasionally choose a poor opening variation even in tournament book mode. The ability to spot long mates quickly in actual play is unsurpassed. Positional play is not bad but inferior to Mephisto Portorose and Polgar in my opinion. Tactics are excellent, endgame is good by computer standards. The Elites have a slightly upgraded program from the original Mach III, but version 2 seems to run a bit slower than the Designer Mach III.

The various Elites and Machs have played in a number of 40/2 (and 60/2) human tournaments around the world, so here is a brief summary of results, adjusted to USCF levels by the "Ply" table. Version 9 Elite earned 2388 for 7 games in Austria and 2287 for 11 games in France for an average of 2326 for the 18 games. Version 6 and Mach 4 earned 2378 in Sweden from 19 games, 2284 in Holland from 12, 2229 in Germany from 5, and 2172 in France from 9, which averages out to 2295 for the 45 games, which with the 48 CRA games at 2325 gives a total of 2311 for the 93 games. For the Version 2 and Mach III, we have 2268 for 25 games in Sweden, 2200 for 35 in Holland, 2208 for 52 in France, 2124 for 33 games in England, and 2346 for 9 in Germany, which totals 2206 for the 154 games, which together with the 48 CRA games at 2265 gives us 2220 for the 202 games. The 6097 LA version stands at 2151 after 75 games in England, Holland, and Germany, while the Par Excellence (Designer 2100) has a 2029 result from its three major rating tests (U.S., Britain, France). All five of these results are very close to the CCR computer vs. computer estimates, which reaffirms my faith in our methodology.

As for the plastic, pressure sensitive models, while prices of competing models have risen, Fidelity models have trended down in price. With the Designer Mach III (which turned out to be 10% faster than the original) now under $300 and its rivals (Novag Super Forte C and Mephisto Mondial xl) at $400 or more currently it has become the best buy in its range. Its immediate predecessor, the 6097 LA version, although no longer being made has been marked down to below $200, in which bracket it is the outstanding buy, in view of its upper Expert strength, 16 bit processor, hash tables, and lights on every square. It is well worth the extra $50 or so over the Designer 2100 Display with its old program and 8 bit processor. Curiously, the Designer has the 2100 CRA rating but doesn't deserve it, while the 6097 LA version has no CRA rating but deserves over 2100. Still, the Designer 2100 Display has no rival under $150, it being the only (low) Expert level machine in this category. Novag was going to offer a competing Expert level model (SuperNova) but the deal to distribute through Fidelity pushed it out of this price range. The Designer 2000 Display runs at only half the speed of the 2100, and in view of the small price difference it should be avoided by all players above class C. If you are really on a tight budget, you might be able to obtain a discontinued Excellence or even Excel Display for under $100, which will still play a 1900+ game. Unless you are a novice, avoid any cheaper Fidelity made models.

Fidelity plans a talking version of the Designer 2000, to be called "Chesster". It has a much larger and more interesting vocabulary than earlier talking models, but this feature is of no interest to serious chess players. There is no display.

For all you millionaires, if Fidelity fulfills its promise of an Elite Version 10 with 68040 processor, it may well break the 2400 barrier to become a Senior Master, as even at 25 Mhz it will be at least 50% faster than version 9. The discount price should be near eight grand.

With the departure of the Spracklens (Fidelity's programmers for many years) and no replacement in sight, it is likely that future Fidelity machines will simply carry Mephisto programs. If you like the Fidelity style, you should buy now, as there should be no further upgrades of current programs. Machines may still be upgraded in the future, but presumably only to Lang programs.

Fidelity is now offering a GO computer, a dedicated version of the pc program "NEMESIS" by Bruce Wilcox, for around $600 retail. Its playing level is around 15 kyu, good enough to beat novices, and it offers good tutorial features. Despite a prize of more than a million dollars for the first program to defeat a GO master on even terms, no GO program has yet defeated such a player even at enormous handicaps like 16-17 stones!

Mephisto review

No new machines have come out since our last review, but we now have much more data on the strength of the new models. The increase in strength for the Portorose (16 and 32 bit models) over the corresponding Almeria models was estimated last time to be 64 points (based on "Ply" ratings), but with more results the gap has dropped to 35 (or 26 with my 25% correction), which agrees closely with my own results. The 32 bit Portorose has done very well in human 40/2 tournaments in Europe: 2401 in France (44 games), 2242 in Austria (16 games), 2473 in Sweden (4 games), and an obscenely high 2643 (6 games) in Ireland, where it won a major tourney and defeated the last two Irish champions. All of these ratings are adjusted to USCF levels based on a study by "Ply" magazine on rating levels in various nations. They average out to 2390 for 70 games. Since the 3.6 times faster 68030 model only got 2376 in its 48 game C.R.A. test, and only 2286 (USCF equivalent) in a 9 game German tournament, something is strange here. The playing conditions in the French test were said to be poor, and the inflation of USCF ratings versus European ones is probably less at these high levels than at the levels of the "Ply" study. Also recently USCF ratings have been deflating. Most likely the true strength of the 68020 model is in the low 2300s USCF. In Action chess (game/30') it has done much better, winning a major Austrian event outright (defeating GM-elect Oll) and earning a 2413 British rating (2497 USCF) in a six game event in England. As for the 16 bit model, it has a 2312 rating based on USCF rated play in Alabama, but this includes many Action games. Most likely the 16 bit belongs in the mid 2200s at 40/2 on the new stricter scale. Note that the spread between the two models (which differ only by a 1.8 - 1 mean speed ratio) is much less at intermediate time limits like game/30 or 60/1, due to the relative unimportance of even plies to the Lang program, so even the 16 bit should play at least USCF 2400 at action chess, as did its predecessor Almeria in Alabama tournaments. Despite higher prices for the 32 bit model recently, it remains a better buy than the top end Fidelity Elites, since it outrates the more expensive Elite Version 9 (68030) on both the "Ply" list (by just 4 points) and on the basis of French rating tests (by over 100). As for the Portorose 68030, it is easily the best chess computer one can buy, but the five figure price tag is clearly unwarranted and should be reduced. All the Portorose models play more actively than their predecessors on the default "active" style, which is widely acknowledged as the strongest of the three modes. For quality, features, and ease of use its hard to beat the Portorose.

The Mephisto Polgar, the new 8 bit module for the various boards, has now proven to be around the strength implied by my testing for the last quarterly--a bit below the Fidelity Mach III or Elite version 2. The early incredible results from various sources, including "Ply", have not held up after much additional testing by both "Ply" and myself (although one U.S. purchaser reports a 17 1/2 - 1 1/2 score against the Mondial xl at 40/2-- inexplicable). Still, the Polgar is the top 8 bit program in the world now (at equal Mhz), at least at 40/2, although both its predecessor "Academy" and the Novag Super C appear to be a bit stronger at faster levels. It is probably close to 2200 level since its predecessor Academy performed at 2177 USCF equivalent in 63 European tournament games vs. humans. But with the price in the wood "Exclusive" board now above the Fidelity Elite version 2, it won't appeal to many.

Fortunately, Mephisto promises to bring out a 10 Mhz Polgar in the "Modular" board in May, which although not modular will be priced close to the 5 Mhz version now on sale. Since the Polgar seems to benefit from extra speed more than any other model around, this doubling should add more than the usual 75 points and should put it around the same strength as the Portorose 16 bit and the Fidelity version 5, both of which cost much more. Consequently, it should stand out as the best value in terms of strength versus price among the autosensory units. The Polgar plays a very nice, human like game with remarkably few weaknesses. It lacks some of the specific endgame knowledge found in the 16 bit models, but most of the time its opening, middle game, and endgame are all of a high standard. Since the standard model seems to be optimized for 40/2, it follows that the 10 Mhz version will achieve this optimal power at the much more practical speed of 40/1. At these levels the selective search program can nearly always complete at least 3 plies of full width, which seems to be the minimum to avoid occasional tactical errors seen at faster levels. I have not yet received a test unit, but there can be little doubt that at 10 Mhz it will easily outperform all other models now selling for under $1000, and only by spending twice the money can one purchase a slightly stronger model (Elite version 6). An 18 Mhz Polgar (using a bit-slice Turbo kit) is also available by special order from Germany for around the same price as the Portorose 32 bit. I would expect the two to be about equal at 40/2, with the Polgar 18 somewhat stronger at intermediate levels. However, in view of warranty questions for the Turbo-kit and the extra features of the Portorose, I would prefer the latter.

If you wonder how an 8 bit 10 Mhz model with no hash tables can be as strong as a 16 bit 12 Mhz model with huge hash tables by the same company, bear in mind that the 10 Mhz "6502" processor is about as fast as a 16 Mhz "68000" processor because the latter takes more cycles per instruction. The hash tables in the 16 bit model probably raise the effective speed to around the equivalent of 20 Mhz or so, so in effect the Portorose has only a mild speed advantage. Since they both have first rate programs they should be very close in strength. Many people feel that the 8 bit Schroeder programs are really the best in the world if we allow for the hardware in this way. The secret is a fine evaluation function plus a selective search algorithm that quintuples the effective speed while only rarely throwing out a good move. One weakness of this type of program is that it can sometimes be blind to a sacrificial mating attack, but the improved play in nearly all other types of positions easily justify this type of selective search. The same type of pruning is also used in Novag and CXG programs, and in "RexChess".

Mephisto has a number of other less expensive plastic models with upper Expert level programs--the Mondial 68000 xl, the Mega IV, and the "College" a.k.a. Supermondial II, but as the prices of these models are now above the stronger Fidelity Designer Mach III in the U.S. these fine machines cannot be recommended to Americans. Now that Mephisto owns Fidelity, it has no incentive to offer prices that might detract from Fidelity sales.

Because the 8 bit 6502 does not handle large enough memory to make hash tables worthwhile, Mephisto's 8 bit programmer Ed Schroeder has recently translated his Polgar program to the Acorn RISC processor and added hash tables. Whether this will eventually be offered for sale to the public is not yet clear, nor is it clear whether the price and strength will be more attractive than the Lang 68020 model. The Acorn is rather slow and inexpensive compared to most RISC chips, but quite speedy and costly compared to the 6502 and the 68000.

In the hand-held category, the Roma II is now available in the Mobil housing and plays high expert level, far above other hand-held units, but the price is clearly excessive. Although the Roma II is portable, it can not run on bat-

teries. The Marco Polo plays amazingly well (nearly 1900) for a unit with little memory (1/4k of RAM!), and is the strongest hand held model on the market for under $100. In fact, except for discontinued models on sale, it is probably the only class A model of any type, table top or hand held, that sells for under $100. The Novag Super VIP plays slightly better due to more memory and higher Mhz, but costs more and uses keypad entry.

Novag review

The most significant news here is the Novag Super Expert (and Super Forte) C, which is not merely a touched up B but a new program. In the past I have done the opening books used in several Novag models, but this time my involvement was much greater. Until now, Novag relied rather heavily on ply 1 bonuses, which tends to make the program play good looking moves. This is fine for speed chess or for slow processors, but with faster hardware and long time limits it seems better to emphasize the final placement of the pieces rather than the immediate effect of the move under consideration. This is done in many programs by "Piece value tables", and Novag decided to try this approach. In the pc program "RexChess", by Don Dailey and myself, Don had invented a user programmable rulebase to fill these tables, which I had programmed with my chess knowledge. Novag purchased this rulebase, added some additional chess knowledge already in the "B", and improved the selective search further to create the "C". Naturally the style of play will be similar to RexChess, but with some of the Novag speculative style added. Results against humans in Alabama tournaments (with a 9 Mhz unit) have been dramatically better for the C than for the B, near the 2400 mark after nearly 20 games at various time limits from Action to normal tournament levels. Moreover, this same 9 Mhz unit has been scoring over 60% at the 60/1 level in independent testing vs. the Mephisto Portorose 16 bit. My own testing (on an 8 Mhz unit at 30" reversal) has also shown a plus result against the Portorose, but oddly just even results against the Mach III and Polgar (combined). My own tests do not show the improvement over the B, but that's probably because my B results were abnormally high. It's too soon to be very accurate, but I expect the gain will end up around 30 points.

Because of the deal to distribute through Fidelity, pricing is very uncertain right now. The Super Expert C has already risen to nearly $600, at which level it is no longer a bargain like the B was but still a good buy considering the price increases in competing Mephisto models. But if the price goes any higher the Elite version 2 would be the better buy, with its hash tables and learning feature. The two are very close in strength. The Super Forte C is not so interesting at a hundred dollars over the Designer Mach III. So far Novag has not announced any plans to produce commercial units at speeds above the current 6 Mhz, although various test units have run reliably at 8 and 9 Mhz.

In the under $200 category Novag has some new machines of interest. By running the "single chip" 6301 processor at 16 Mhz, they are able to produce machines with the approximate speed of a 3.6 Mhz 6502 for somewhat less money. The same type of selectivity now used in the "C" is also being used in these new models, the "SuperNova" with a 32k program and the "Beluga" with a 16k. They should probably be competitive in strength with the Fidelity Designer 2100 and Designer 2000 respectively. Unfortunately the Fidelity deal has pushed the prices of these units above the comparable Fidelity models and hence ruined Novag's chances of selling these models in quantity to tournament players. But if the price increases are ultimately repealed, these models may become best buys.

As for the hand held models, the increase in strength of the Super VIP over the original VIP now looks like 75 points, and is the strongest hand held on the market except for the very expensive Mephisto Roma II. As for the cheaper Amigo, it shares the same program with the table top Mentor 16; both should fall somewhere in class B.

Novag has still not made any decision to switch to a more powerful processor than the 6502. Since Novag has shown no interest in the $1000+ market, I expect the change will occur only when a much more powerful processor becomes available for under $20. Novag apparently concluded that the superiority of the 68000 was not sufficient to justify the cost of writing a brand new program. Perhaps a cheap RISC chip might tempt Novag in a year or so. I hope so.

Saitek review

Saitek, although reportedly the largest seller of chess computers (unless we consider Mephisto and Fidelity as one now), has in recent years come to be regarded as a second rate company in terms of playing strength, having been clearly surpassed by Mephisto, Fidelity, and Novag. Apparently this has had enough effect that Saitek has decided to go all out to regain top spot by hiring the Spracklens away from Fidelity to work on a "RISC" chess machine, reportedly based on the "SPARC" chip, in conjunction with IM Julio Kaplan, their current programmer. It is expected that one or more RISC modules will be offered for the Galileo and Renaissance boards sometime in 1991. I don't doubt that these modules will be very strong, as RISC offers more speed for a given price than standard processors. I have heard that a $100 17 Mip Sparc chip is expected this year, which suggests that a 2400 level modul might sell for perhaps $1000 or so sometime in 1991. Whether the new team can offset Mephisto's huge lead in current program strength remains to be seen. It looks likely that the battle of Lang (and Schroeder) vs. Spracklens will continue on into the 90s, but with Fidelity now on the other side! Since the flaw in Kaplan's programs has always been speed, the Spracklens' strongpoint, I expect good things from this collaboration.

As for this year, Saitek plans to come out with a medium priced ($200??) model based on a new single chip processor, reportedly the Hitachi h-8. It is a fast chip, but because it comes with limited memory it is not expected to equal the strength of the current 6502 Saitek models. With added memory this chip could support hash tables, so it is possible that a master level module for the Galileo may be made with the h-8, but don't count on it. At present, the best module is the 10 Mhz Maestro D, which although quite strong is not the equal of the competitive Elite or Polgar models. Saitek may offer modules by other programmers in the future.

Saitek does have two models out now of interest--the Corona and the Simultano. They share the same program (along with the Maestro C module), and both run at 5 Mhz. The features are also similar, except that the Simultano can play simultaneous games, and more importantly has an LCD display of the position. The main difference is the board--the Corona is a larger, more attractive autosensory unit, the Simultano a typical pressure sensory plastic model. In fact the Simultano is very similar to the Radio Shack Chess Champion 2150 model, but since it runs at 5 Mhz vs. the Champion's 3 it should rate about 55 points higher. The Simultano is not competitively priced at present but would deserve consideration if the price drops below $200. The Corona, though, is the most economical Expert level autosensory model on the market at under $400. The board is a pleasure to play on. As always, Saitek models are relatively weak at blitz, but rather good at intermediate levels, say 60/1.

Most of the cheaper Saitek models are not of competitive strength due to the single chip processor used, but in the hand held category the Cavalier is an exception, offering class B strength for a very modest price. The Mephisto Marco Polo is stronger but more expensive.

CXG and others - Review

CXG is primarily known for selling very cheap (and weak) models. However, they now have some decent mid range models, which although not presently sold in the U.S. may be imported at any time through Fidelity. The Sphinx Dominator is perhaps the most interesting; if it should go on sale for under $200 (which is a likely price) it would be the strongest unit in that range once the discontinued Fidelity 6097 LA version is sold out. The programmer is Franz Morsch, formerly Mephisto's third man and author of the Mephisto Europa/Marco Polo program, which is amazingly strong for the hardware it uses. The Dominator is a 4 Mhz 6502 model, like the Mephisto College, and the programs are also very similar, since Morsch uses the same type and depth of selectivity (3 plies) as does Schroder--they once collaborated. The Dominator seems to be a bit better tactically but a bit weaker positionally than the College. I tested an old version which had some serious bugs, which have reportedly been mostly fixed in the current version. Despite the bugs, my unit performed around the 2075 level, and the Swedish ratings put the current version 45 points (adjusted) above the Designer 2100 and just about 25 below the more expensive Novag Super Forte B and Mephisto Mega IV. If a fast (8-10 Mhz) version should come out for less than the Mach III it might be an excellent value. In a recent 9 round computer tournament in Europe an 8 Mhz Dominator finished sixth out of 24, behind only 32 bit models and a 10 Mhz MM4, but ahead of many very strong machines, including even an Almeria 32 bit and a 20 Mhz Mach III. There is also an autosensory version, the Commander (also currently only at 4 Mhz). Morsch has recently written a new program on the 80386 processor used in high-end personal computers, but to what purpose is unknown. CXG also plans soon to offer a new model based on the fast single chip Hitachi h-8. It should be faster than the present 6502, and although it has limited RAM Morsch has already proven that he is superb at living with that handicap in the Europa. This machine may well make CXG the leader in the modest price category, but Saitek has similar plans so we'll have to wait and see who wins. Since CXG sells only through Fidelity in the U.S., it is not clear whether Fidelity will allow the new model to be sold at a price that would compete with the Designer 2100, assuming the CXG model to be clearly stronger, as I expect.

Another company not previously reviewed is Yeno, a French company. Like Conchess, it uses the programs of Ulf Rathsman, who also did MM2 for Mephisto. His programs are extremely fast and tactically strong, but rather weak in positional play. The Yeno 532 xl uses a 5 Mhz 6502 and appears to be the best value on the market in France, but it is not sold in U.S. yet and would have to be below $200 to be of any interest here. I think it would be suitable primarily for problemists. As for Conchess, no new models have come out recently to my knowledge.

Best Buys

The problem with giving a "best buy" list is that prices are always changing, so today's bargain may be tomorrow's lemon. All my selections are based on current discount prices. Also, my selections weight strength heavily, since most players I talk to put strength and price above all else.

In the unlimited (up to $2500) class, the Mephisto Portorose 32 bit Exclusive is currently king, considering strength, features, board, and quality of construction. The Fidelity Elite Version 6 is somewhat stronger than the 16 bit Portorose and the best buy in the mid $1000s. Elite Version 5 is the best buy for around $1000, and the Polgar 10 will be the best buy when and if it goes on sale here for around $700-$800. In fact, the Polgar 10 should be considered the absolute best buy in the autosensory category, with the strength of the Portorose 16 bit for a lot less money, but it is not wood. If you require wood and master strength for a reasonable price, the Novag Super C would be my choice if the price remains below

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Mephisto Porto Rose 32-bit..... under $2000
If you already own an Almeria 32-bit..... under $500

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Modern design for the novice.....under $80

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Pressure sensitive board with coaching capability..... under $80

Fidelity Genesis
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Fidelity Chess Coach 1500
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Fidelity Designer 2000
Excellence program in the sleek "Designer" housing....under $110

Novag Quattro
Most Powerful under $120 .....under $120

Novag Primo
LCD Display, multi-featured ..... under $120

Fidelity Designer 2000 Display
Same as above with LCD information display..... under $130

Saitek Team-Mate
Three-colored information LEDs, coaching features....under $130

Novag Supremo
Large LCD display, printer optional..... under $140

Fidelity Designer 2100
Improved Par Excellence program with new housing... under $140

Fidelity Designer 2100 Display
Same as above with LCD display and more openings....under$150

Saitek Astral
A wonderful gift - fine wood pieces on a pressure sensitive board with a genuine wood border.....under $150

Saitek Conquistador
A Team-Mate program with dual time clocks.....under $150

Novag Super Nova
Novag's most powerful entry in this price class ..... under $200

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Least expensive 16-bit, most powerful in its class..... under $200

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(All units are pressure sensitive except where noted)

Saitek Simultano
LCD board display, plays games simultaneously...under $300

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Mach III program, Designer housing, display.... under $300

Mephisto Mondial 68000 xl
Dallas program, affordable housing, info LCD....under $400

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$600; if not get the Elite Version 2. If low expert strength is sufficient the Saitek Corona is the bargain of the autosensory units.

In the pressure sensitive category, Fidelity has a monopoly on the best buy list, with the Designer Mach III at $300, the 6097 LA version at $200, and the Designer 2100 Display under $150 all rating best buy labels. Competing Novag and Saitek models are simply not in the same strength class for a given price. But in the hand held category, the Novag Super VIP, the Mephisto Marco Polo and the Saitek Cavalier are each best buys in their price class.

Finally, if you are looking for a table top model that plays decent (class A) chess for under $100, your best bet is a discontinued model--Novag Quattro or Primo (Quattro is slightly stronger, Primo has a display and more features), or Fidelity Excellence or Excel Display. So far as I know, all new models selling for under $100 play class B or worse, while the really cheap ones (around $50) are suitable only for novices. A good rule to remember is that if a computer cannot take back at least 8 plies, it probably has too little memory to play decent chess.

Rating Commercial Chess Computers

As each quarter passes, we learn more and more about how to rate chess computers. With C.R.A. tests becoming more expensive and infrequent, we must rely more and more on computer vs. computer testing. New results are confirming the theory that I have espoused for several years, namely that comp vs. comp is basically valid provided we contract differences by around 25%. To demonstrate this, let's consider the weakest and strongest models for which we have ample evidence against both computers and humans. The Fidelity Champion Sensory Challenger, dating from 1981, was the first commercial machine strong enough to have a meaningful rating. Based on its relative strength vs. other models with USCF ratings over the next couple of years, the 1984 Computer Chess Reports put it at 1674. Due to the increased familiarity of players with computers now, it is reasonable to suppose that its rating today would be lower, but rating inflation may offset this. This puts it about 700 points below the Mephisto Portorose 68030 with its 2376 C.R.A. rating. However, the Swedish ratings (extrapolating back to resurrect the no longer rated Champion) show a spread of about 910 points between these two models, based solely on computer vs. computer testing at 40/2. This ratio of 700 to 910 agrees well with my 25% proposed contraction. In other words, if we reduce the estimated comp vs. comp rating spread of 910 by 25%, we get nearly the correct 700 point spread in USCF ratings. Whether this reduction is a phenomenon of USCF ratings only or is applicable to foreign Elo ratings as well is still not yet clear.

The Swedish "Ply" comp vs. comp rating list has gained widespread acceptance as the most accurate 40/2 rating list (most other lists include faster time limits or are too incomplete or base ratings on small samples). Their reputation for integrity and objectivity is good. The current list agrees rather well with my own ratings and most objective estimates. The spread between the three Portorose models is rather large, but is probably due to the large odd/even effect of the Lang program, since it is usually the crucial odd (5th) ply that separates the two fast models from the 16 bit at 40/2.

In the last quarterly I wrote about the mystery of the incredibly high Swedish rating for the Mephisto Polgar. While the mystery is still unsolved, the rating has dropped over 100 points to about the level I expected originally. The mystery is that it performed some 200 points better in its first 100 games than in its second, with the third batch (187) falling right in the middle. These differences are too large to be attributed to sampling error, but so far there is no evidence that test conditions varied in any way, and no reason to suspect fraud. I am pleased to see my estimates confirmed, but I hope some rational explanation of the huge swings is forthcoming.

Eric Hallsworth's latest rating list from England generally correlates well with the Swedish "Ply" list with 130 points added to the Ply ratings, but there are some interesting anomalies. He shows much smaller differences between the three Mephisto Portorose models (his ratings are 2375, 2289, and 2233), about in line with expectations. This is probably due to his inclusion of human games and of 1 & 2 min/move level games. He recommends adding 120 points for USCF equivalence, but a study by "Ply" gave a figure of 84 between England and U.S. I use 100. Eric's top ratings are all unrealistically high, again showing the need for 25% scaling. Unlike Ply, he rates the Polgar above the Mach III, reporting a 26-10 win for the Polgar over the Mach III, while Ply reports a 27-18 win for the Mach III over the Polgar! Such swings are too great to be attributed to chance. So it seems that either someone has a defective or accelerated model, or test conditions (i.e. tournament book use or time limit) vary, or someone is not being honest. My own results at 1,2,&3 min levels were an even 7 to 7, so I don't know what to think; at 30" the Mach III wins handily.

As for my own testing for CCR, I have resurrected my "reversal" testing (at 60/30 level) in which both sides have a chance to play white once in each of eight standard openings. I feel that this minimizes the problem of computers being "booked" to beat one another, and also simply reduces the element of chance. This way, if a certain opening is easier to play as white or as black (for a computer), at least both computers get the "easy" side once. Of course, if a computer is programmed only to know how to handle certain types of openings, it will be at a disadvantage, but I feel the purchaser has a right to expect his computer to play all normal openings reasonably well. The ratings I get from this method are more internally consistent than with free style testing, where I sometimes see a weaker machine outrate a stronger one. With my reversal testing, this has only happened once-the Almeria 16 bit outrates the Almeria 32 bit slightly, presumably due to sampling error and to the fact that at 30" the faster unit generally benefits only by sometimes doing the relatively unimportant even (4th) ply. In my opinion, the choice of time limit plays a greater role in the ratings than the choice of openings. Ideally, I should do reversal tests at several time limits and average the ratings, but it would take too much time to be practical.

In the following list, all rating differences for both CCR and Ply ratings have been contracted by 25% (towards the C.R.A. mean rating for CCR and towards 2000 for PLY), with 220 points added to the adjusted Ply ratings to bring them to U.S. levels. Matches played for Ply after their last list have been included in the Ply ratings to make the list as current as possible. The main CCR list is free style with a minimum time limit of 60 moves or game in one hour and a maximum of 40/2, with a good mixture of 1,2,and 3 minute level games. The reversal list is 60 in 30', the Ply list is strictly 40/2. The overall level of the lists is set by reference to C.R.A. rating tests since 1986, but only comp. vs comp. results count in the individual ratings. Parenthetical ratings are adjusted for speed differences. I then average the three lists to obtain a mean rating that reflects the strength of the machines over a range of time limits. Readers may note that the ratings are somewhat lower than before, especially at the top, reflecting the recent deflation in USCF ratings and the application of the 25% contraction factor to the "Ply" list.

Rating List

Computer	Mhz	CCR free	CCR 30" reversal	"Ply" Adj.	Mean Rating	PRICE
Meph Portorose 68030	36	(2420)	(2411)	2418	2416	10,000
Fid Elite 9 68030	32	(2346)	(2397)	2310	2351	
Meph Portorose 68020	12	2309	2300	2309	2306	3,000
Fid Elite 6/Mach 4	20	(2284)	(2335)	2270	2296	1,700
Meph Almeria 68020	12	2274	2296	2272	2281	
Meph Portorose 16bit	12	2288	2285	2229	2267	1,650
Meph Almeria 16 bit	12	2258	2313	2216	2262	
Meph Polgar 10	10	(2250)	(2228)	(2255)	(2244)	950
Meph Roma 32 bit	14	2245	2245	2222	2237	
Fid Elite 5 (2x68000)	16	(2240)	2261	2215	2239	1,000
Meph Dallas 32 bit	14	2216	2258	2216	2227	
Fid Elite 2/Mach 3	16	2196	2247	2206	2216	750
Novag Super Ex/ForteC	6		(2209)	****	(2209)	600
Meph Academy	5	2257	2205	2153	2205	
Meph Roma 16 bit	12	2223	2147	2180	2183	
Meph Mondial 68000xl	12	2177	2170	(2195)	2181	400
Novag Super Ex/ForteB	6	2174	(2231)	2126	2177	
Meph Polgar	5	2175	2153	2180	2169	
Meph Amsterdam	12	2165	2160	2144	2156	
Meph Mega IV	5	(2148)	(2155)	2139	2147	
Fid 6097 LA (Mach II LA)	12	2131	2111	2144	2129	200
Meph MM4	5	2109	2147	2128	2128	400
Meph College (S.M.2)	4	2126	2133	(2117)	2125	450
Sait Gal. Maestro D	10	2096	****	2140	2118	550
CXG Sphinx Gal/Domin	4	****	****	2111	2111	
Novag Super Ex/Forte	6	2158	2081	(2089)	2109	
Fid Excel 68000 B	12	2091	2070	2090	2084	
Fid Des. Display 2100	6	(2076)	2088	****	2082	150
Novag Forte B	5	2038	2066	2059	2054	
Fid Des. 2100/Par Ex	5	2056	2026	2066	2049	
Saitek Stratos	5.6	2036	****	2052	2044	
Novag Forte A	5	2042	2037	2053	2044	
Sait Simultano/Corona	5	2005	2013	2036	2018	300
Fid Des. Display 2000	3	(2001)	(2013)	****	(2007)	130
Fid Des. 2000	3	(2001)	(1971)	(2011)	(1994)	
Novag Super VIP(6301)	10	1951	1972	1995	1973	125
Saitek Turbo King	5	1968	1900	(2038)	1969	
Radio Shack 2150	3	(1950)	1876	(1981)	1936	
Fid Excel Display	3	1932	1930	****	1931	
Novag Quattro	4	1917	1894	1940	1917	
Meph Marco Polo(6301)	8	1873	****	1955	1914	100
Novag Primo/VIP(6301)	8	1856	1886	1916	1886	
CXG Adv.Star (6301)	8	****	****	1855	1855	
Saitek Turbo S 24k/ Galileo(no Mod)(6301)	8	****	****	1795	1795	

Finally, for those who don't trust computer vs. computer testing, here is a list of all computer results for the past three or four years in major tournaments and formal rating tests in the seven nations included in the "Ply" international rating levels study, with all ratings adjusted to USCF level per "Ply". Only games at a minimum of 2 minutes per move are included, and I list only those models with at least 48 games. Meph Portorose 68020 = 2366, Meph Portorose 68030 = 2362, Fid Elite 6 and Mach 4 = 2311, Meph Almeria 68020 = 2270, Mega IV Turbo (18Mhz) = 2226, Fid Mach 3 = 2220, Meph Academy Turbo (18Mhz) = 2197, Meph Academy (5Mhz) = 2177, Mondial 68000xl = 2170, Meph Dallas 68020 = 2164, Mega IV = 2162, Fid 6097 LA version = 2151, Novag Super Expert (A,6 Mhz) = 2119, Novag Forte B (5 Mhz, not the Super) = 2110, Saitek Maestro B / Stratos = 2097, CXG Dominator (4 Mhz) = 2055, Par Excel / Designer "2100" = 2029, Novag Forte (original) = 2012. I think you will agree that the correlation with the above mean comp-comp ratings is quite good, partly due to the 25% adjustment I use. You may also note that in two cases the same program performed slightly better at a lower speed than at a much higher one, which is quite rare in comp-comp testing (with enough games). There are just too many variables in human tests for me to fully trust them. Still, they provide necessary confirmation for the validity of our comp-comp testing methods.

Games Section

Los Angeles, Nov. 1989

Time Limit 40/2 hours
White: Grandmaster Tony Miles
Black: Deep Thought

1 d4 d5 2 c4 dxc4 3 e4 Nf6 4 Nc3 e5 5 Nf3 exd4 6 Qxd4 Bd6 7 Bxc4 o-o 8 Bg5 Nc6 9 Qd2 h6 10 Bh4 Bg4 11 o-o-o? Bxf3 12 gxf3 Nxe4! 13 Bxd8 Nxd2 14 Bxc7 Bxh2! 15 Bxh2 Nxc4 16 Rd7 b6 17 f4 Rad8 18 Rhd1 Rfe8 19 b3 Rxd7 20 Rxd7 Re1 21 Nd1 N4a5 22 Kd2 Rh1 23 Bg3 h5 24 f5 h4 25 Bf4 Nb4 26 a3 Nbc6 27 Rd3 Nd4! 28 b4 Nac6 29 f6 gxf6 30 Nc3 Ne6 31 Nd5 Kg7 32 Bd6 Ng5 33 Ke2 h3 34 Rd1 Rxd1 35 Kxd1 Ne5 36 Ne3 h2 37 Nf5 Kg6 38 Ng3 Ne4! and White resigned.

Time limit one hour
White: Grandmaster John van der Wiel
Black: Fidelity Elite Version 9 (68030)

1 e4 e5 2 Nf3 Nc6 3 Bb5 a6 4 Ba4 Nf6 5 o-o b5 6 Bb3 Bb7 (the Archangel variation of the Ruy Lopez) 7 d4 Nxd4 8 Bxf7 Kxf7 9 Nxe5 Ke6? (a book error. The correct Kg8 should have been in the Elite's book and gives a roughly even game.) 10 Qd4 c5 11 Qc3 Nxe4 12 Qe1 Kxe5 13 f3 c4 (Now it is clear why the Elite exposed its king. It would have required a 9 ply search on move 9 to see that white regains his piece now, too deep for any full width micro.) 14 Nc3 Qb6 15 Kh1 Ke6 16 Nxe4 Kf7 17 Be3 Qc6 18 Rd1 d5 19 Ng5 Kg8 20 Bd4 Re8 21 Qg3 h6 22 Nh3 Rh7 23 Rde1 Be7 24 Qe5 g6 25 Nf4 Rf8 26 Ne6 Bd6 27 Qe2 Re8 28 f4 Ree7 29 Qg4 Qe8 30 f5 Bc8 31 Qxg6 Qxg6 32 fxg6 Bxe6 33 gxh7 Kxh7 34 Rf6 Bg8 35 Rxe7 Bxe7 36 Rxa6 Bg5 37 Ra7 Kg6 38 Rg7 and Black resigned. I felt that the Elite did well to resist as long as it did after its awful start. Van der Wiel expressed the opinion that there is not one chance in a hundred that a computer will be the world champion by the year 2000. I think he is in for a surprise.

Time Limit: 60 moves in 30 minutes
White: Rexchess 2.00 on a 486/25 Mhz computer
Black: Mephisto Portorose 32 bit

1 d4 d5 2 Nf3 c6 3 c4 Nf6 4 Nc3 e6 5 Bg5 h6 6 Bxf6 Qxf6 7 e3 Bd6 8 Be2 o-o 9 o-o b6 10 cxd5 exd5 11 e4 Qg6? (a dubious gambit, but it illustrates that the Portorose has a much more adventurous style than its predecessors) 12 exd5 Bh3 13 Ne1 Bf5 14 Bh5 Qg5 15 Bf3 Rc8 16 Nd3 Bg6 17 Re1 b5 18 a3 a6 19 Ne5 c5 20 Nxg6 Qxg6 21 Ne4 Rd8 22 dxc5 Be5 23 d6 Ra7 24 Qe2 Re8 25 a4 b4 26 Qc4 a5 27 c6 Rc8 28 d7 Rd8 29 Ng3 Qd6 30 Bd5 Qf6 31 Nh5 Qf5 32 g4 Qg5 33 h4 Qe7 34 c7 Nxd7 35 Bxf7 Kh8 36 c8 = Q Rxc8 37 Qxc8 Qf8 38 Rac1 Kh7 39 Be6 Qxc8 40 Rxc8 g6 41 Bxd7 Rxd7 42 Rxe5 gxh5 43 Rxh5 Kg7 44 Rxa5 Kh7 45 Rb5 and White won.

Computer tournament, Austria

(score from "Modul")
40/2 hours
White: CXG Dominator 8 Mhz
Black: Mephisto Portorose 68030

1 d4 d5 2 c4 dxc4 3 Nf3 c6 4 e3 Bg4 5 Bxc4 e6 6 Qb3 (book is 6 h3) b6 7 Ne5 Bf5 8 Nd2 Nf6 9 Ndf3 Nfd7? (the Portorose 68020 chooses the better 9...Bd6 at 40/2) 10 Nxf7! Kxf7 11 e4 Bg4 12 Ng5 Ke8 13 Bxe6 (only now does Portorose see that it must return the piece with a lost game) Ne5 14 Bf7 Kd7 15 dxe5 Kc8 16 f3 h6 17 fxg4 hxg5 18 Be3 Kb7 19 Be6 Na6 20 o-o Nc5 21 Rf7 Kb8 22 Qc4 Qe8 23 Bf5 Qxe5 24 h3 Bd6 25 Rd1 g6 26 Bxg6 Qh2 27 Kf1 Qh1 28 Bg1 Bh2 29 Qd4 Qxg1 30 Qxg1 Bxg1 31 Kxg1 a5 32 Rd6 and white won the ending in 69 moves. The Portorose 68030 usually annihilates affordable chess computers by huge margins ("Ply" reports its score against top 8 and 16 bit models as 90.5 to 6.5), so this was a big upset and a credit to the Dominator. The Elite Version 9 won this event despite losing to the Portorose 68030 due partly to this game. Now another game from this event:

White: CXG Dominator 4 Mhz
Black: Mephisto Polgar 5 Mhz (set on 5 selective!)

1 c4 c6 2 Nf3 d5 3 d4 Nf6 4 Nc3 dxc4 5 a4 Bf5 6 Ne5 e6 7 f3 Bb4 8 e4 Bxe4 9 fxe4 Nxe4 10 Bd2 Qxd4 11 Nxe4 Qxe4 12 Qe2 Bxd2 13 Kxd2 Qd5 14 Kc2 Na6 15 Nxc4 (Up to here both computers were playing from book) o-o 16 Rd1 Qf5 17 Kb3 b5 18 Nd6 bxa4 19 Kxa4 Qc5 20 Qe4 Nc7 21 Bd3 Rfb8 22 Qxh7 Kf8 23 Qh8 Ke7 24 Qh4 Kxd6 25 b4 Qb6 26 Kb3 Nd5 27 b5 cxb5 28 Qg3 Ke7 29 Qxg7 Rg8 30 Qb2 Rac8 31 g3 Rg4 32 Qa3 Rb4 33 Qxb4 Nxb4 34 Kxb4 and Polgar announced mate in 5 by 34...Qd4.

Vienna Open, 1989,

Time Limit 40/2 (?)
(score from "Modul")
White: Mephisto Portorose 68020
Black: FIDE Master Perovic (FIDE rating 2345)

1 e4 e5 2 Bc4 Nf6 3 Nc3 (transposing, appropriately for the occasion, to the Vienna Opening--does Portorose have a sense of humor?) Nc6 4 d3 Bb4 5 Bg5 h6 6 Bh4 (Port. is now out of its book; theory recommends 6 BxN) g5 7 Bg3 Bxc3 8 bxc3 d6 9 Nf3 Rg8 10 o-o (very risky; most computers have no fear of castling into an attack) Bg4 11 h3 Bh5 12 Rb1 Na5 13 Bb5 c6 14 Ba4 Nd7 15 Re1 Qf6 16 Re3 Nc5 17 Bb3 Naxb3 18 axb3 o- o-o 19 Ra1 a6 20 d4 Ne6 21 d5 cxd5 22 Qxd5 Nf4 23 Qc4 Kb8 24 Ne1 Rc8 25 Qb4 Tc6 26 f3 Qe6 27 Rd1 f6 28 c4 Be8 29 Qa5 Bd7 30 Nd3 Nxd3 31 cxd3?! (31 Rexd3 is even better; Portorose apparently overestimates the importance of undoubling) h5 32 d4 Qe7 33 Red3 Bc8 34 c5! dxc5 35 dxe5 fxe5 36 Qc3 g4 37 Be5 Ka7 38 hxg4 hxg4 39 f4 Qh4 40 g3 Qh3 41 Rd6 Rxd6 42 Rxd6 b6 43 b4 Bb7 44 Qb3! c4 45 Qe3 Ka8 46 b5! c3 47 Bxc3 Re8 48 Rxb6 Rxe4 49 Rxa6! Kb8 50 Qa7 Kc8 51 Qc5 Kd7 52 Qd6 and White announced Mate in 7 beginning 52...Ke8 53 Qb8. An impressive win by Portorose from a strong player.

Matesolving Speed Index

In the 1987-88 CCR I introduced the concept of judging the speed of chess computers by the time it takes them to prove that no mate in x (usually 4) moves is possible in some ordinary position. The point is that since so many chess computers use selective search now, there is no way to compare their speed in normal play mode. The selective programs always look very fast based on main line depth, but very slow based on full width depth. However, in mate solve mode all computers are forced to revert to full width mode, at least on the final iteration, since that is the only way to prove that mate is not possible in x moves. If mate is possible, solution time depends on the order in which moves are looked at, but if not this should be alesser factor. In the 87-88 article I used total times to disprove mate, but I now know that this was unfair. It is best to time only the final iteration, since some machines start right out on the indicated iteration (i.e. 7 ply for 4 moves) while others iterate hoping to find a mate earlier via extensions or perhaps a shorter mate. On such machines, the clock should be started only when the display shows that the final iteration has begun.

To calculate a speed index, I compute the geometric mean from 20 "no mate" times, take the reciprocal, divide by the comparable number on the Par Excellence/Designer 2100, and multiply by five. This tells us what Mhz a Par or Designer 2100would have to run to give the same index. Consequently, a Designer 2000, which runs at 3 Mhz, would have an index of 3; an index of 15 means a machine is three times as fast as a Par Ex. I chose to take the 20 positions from a Harrwitz-Morphy at 5 ply intervals beginning after 5 moves. I chose this game because it was fairly routine, with a reasonable length opening, middle game and endgame; in other words, like a typical computer game.

Some points need to be stressed. Some programs are simply better written for mate solving than others, especially some of Mephisto's. More importantly, this index tells us nothing about the effect of selective search in ordinary play--we are simply comparing the full width modes of the computers. So this method should underrate the selective programs, but curiously these very programs seem to be the best at no-mate, even though forced to go full width. I believe the reason is that the Lang programs, and perhaps other selective ones, generate all the moves at once rather than one at a time as Fidelity and Novag do. The all at once method works best when you are searching for a non-existent mate, as every computer move must be tried to disprove mate. Finally, the quality of evaluation and chess knowledge play no role in this test; but at least the programs with good evaluation are not penalized for it since such evaluation is turned off by using mate solve mode. The test is most useful for comparing similar programs on different hardware, but it gives a good idea of the relative power of your chess computer, especially the hardware. With a few exceptions, speed index seems to correlate quite well with playing strength.

In the following list, I have had to omit the Mephisto Portorose and Almeria programs, because of a strange quirk I found. In most positions they were extremely fast, typically around 2/3 the time (on the 16 bit models) of the already super fast Mondial 68000 xl. But for some unknown reason, in about a quarter of the positions tested the times exploded to 10-50 times the Mondial, making them much slower than many cheap machines. I believe there must be some bug present in the mate mode to account for this, as I am sure the problem is not relevant to practical play. Any number I might calculate would be misleading under the circumstances.

Model	
Mega IV Turbo,	
Polgar Turbo 18 Mhz (same mate mode)	50.9
Fidelity Elite Version 9 (68030)	est. 48
Mephisto Dallas	est. 48
Roma 32 bit(similar mate mode)	est. 48

Mephisto Polgar 10 Mhz	27.8
Fidelity Elite Version 6, Mach IV	est. 26
Mephisto Mondial 68000 xl	24.7
Fidelity Elite Version 5 (dual processor)	21.7
Mephisto Dallas	est. 20.6
Roma 16 bit(similar mate mode)	est. 20.6
Mephisto Polgar	13.9
Academy, Mega IV (5 Mhz)	13.9
Fidelity Elite Version 2	est. 12
Mephisto College/Supermondial II (4 Mhz)	est. 11.3
Novag Super Expert C (6 Mhz)	9.6
Fidelity Mach III (original)	8.5
Fidelity 6097 LA	8.4
Fidelity Designer 2100 Display (6 Mhz)	6
CXG Dominator (version 1) (4 Mhz)	5.7
Fidelity Designer 2100	5
Par Excellence (5 Mhz)	5
Saitek Corona, Simultano (5 Mhz)	4.6
Fidelity Designer 2000	3
2000 Display (3 Mhz)	3
Novag Super VIP (9.8 Mhz 6301)	est. 3
Radio Shack Chess Champ. 2150 (3 Mhz)	est. 2.7
Mephisto Europa	est. 2.5
Monte Carlo (8Mhz 6301)	est. 2.5

Some points of interest on this list: The scores of all the Lang pre-hash table models (Mondial, Dallas, Roma) are way above the playing strength of these models. This is probably due to his all-at-once generator, which is a mixed blessing in actual play. The huge superiority of his mate mode over Fidelity's comparable 68000 models, despite the handicap of hash tables in the latter, is also due to his having written the program for the 68000 originally, while the Spracklens merely translated their 6502 program and added hash tables, etc. So the 68000 may indeed be a fine processor for chess if properly utilized. The poor showing of the Mach III (original) above is perhaps due to the mate mode not being worked on until after its release, since the Elite Version 2, with nearly the same program in normal mode is considerably faster in mate mode. The fine showing of all the Schroeder programs suggests that his programs are strong partly to a very efficient search, as is confirmed by the fact that the Full width mode of Mega IV is rated well above all other full width machines on comparable hardware (though still 67 points below the selective mode of Mega IV). The rather poor showing of Saitek confirms that it is only speed that has kept Saitek out of top contention so far. As for the missing Portorose models, if the above mentioned blow-ups can be corrected I would anticipate scores of around 40 for the 16 bit, 70 for the 32 bit and 250 (!) for the 68030 model, which would make it about 100 times as fast as some 1900+ rated models on the no-mate test.

For readers who are especially interested in the performance of chess computers on various problem sets, I can recommend "Modul" magazine from Austria. It's in German but the problems and results of various computers require little if any knowledge of German to follow. Write to Thomas Mally, c/o Wiener Schachverlag, Postfach 57, A-1082 Wien, Austria. "Modul" also has results of many computer events in Europe, and publishes the Swedish rating list as well.

Chess Mips

There are three basic elements contributing to the strength of a chess machine: the quality of the program, the speed of the processor, and the RAM (memory available for data) size. With so many first rate programs these days, more emphasis is being placed on processor speed, this being generally more important than RAM size. Speed is usually quoted in Mhz, the internal "clock" rate in millions of cycles per second. This is fine when comparing computers using the same processor type, but is of no value otherwise. The problem is that different processors take widely varying numbers of cycles to complete one instruction, and also widely varying numbers from one instruction type to another.

To get around this problem one often hears speed quoted in "MIPS", or million instructions per second. However, since this depends on the choice of instruction, it is a poorly defined quantity. Hence it is standard to use a particular test program ("Dhrystone") and compare the speed with a certain standard computer ("Vax 780") which is defined as 1 MIP. So if some computer does the test five times faster than the Vax 780, it is said to do 5 Vax Mips. One problem is that since the test program is written in a particular high level language ("C"), the results depend on the compiler as well as the processor itself.

Since we are interested in chess, it makes sense for us to use a chess program in place of the Dhrystone test, and to replace the Vax 780 with a machine more likely to be used for chess, the original IBM 8 Mhz AT. Since this machine generally rates around 1 MIP on standard tests, we will define it as doing 1 "Chess Mip". The choice of chess program is the problem: if we use a "C" program ("Gnu" being perhaps the strongest readily available one at the moment), it can run on any processor, but we are back to rating the compiler along with the processor. We can also look at assembly language programs that have been translated from one processor to another, but no one program has been translated to more than a small number of processors, and we are then rating the skill of the translator in place of the compiler. I have considered evidence from several chess programs, both in assembly and in C, to arrive at "Chess Mips" for the various processors currently used widely for chess. While this is necessarily somewhat subjective, I think that others who attempt to do such tests will confirm my numbers within a reasonable margin of error, say 10-20%. In the future perhaps we can improve on this margin of error with new data.

For IBM compatible computers, the "Chess Mips" ("CM") numbers are rather precise, since they seem to vary only slightly from one program to another. A standard IBM pc or xt (4.77 Mhz, 8088 processor) rates about 0.25 CM, an xt Turbo (9.54 Mhz) about 0.5. For IBM AT compatibles (80286 processor), divide the Mhz by 8 if it is a "1 wait-state" machine or by 6 if a "0 wait-state" machine. So a 12 Mhz 0 wait state 286 machine would have a CM of 2. For a 386 machine without "Cache

memory" divide the Mhz by 6, and for a 386 with Cache divide by 4.7, so the fastest 386 machines, 33 Mhz with Cache, have a CM of 7. Finally, for a 486 machine divide the Mhz by 2.3, so the 25 Mhz models now out have a CM of nearly 11. These numbers may vary by a few percent from model to model. The divisors quoted give you a rough idea of how many cycles each processor requires for a typical chess instruction. Note the enormous range: from 19 to 2.3!

Now let's look at the 68000 family, used by Mephisto and Fidelity in their chess computers and by MacIntosh and some other personal computers. The 68000 appears to be slower than the 80286 for chess programs written in "C", but at least equal for assembly language programs such as the Mephisto/Fidelity models. Since the latter is of more interest to the chess public, I suggest a divisor of 6 for the 68000, 3.75 for the 68020, 3.25 for the 68030, and 1.3 for the 68040 (based on preliminary reports). So the Mondial xl and 6097 LA would be 2 CM, the Mach III 2.7 CM, the Portorose 68020 3.2, the Elite Version 6 5.3 CM, the Elite Version 9 nearly 10, the Portorose 68030 11, and a future Elite or Mephisto 68040 19.2 CM.

The most common processor for chess computers in the $100- $500 range is still the old 8 bit 6502, also used in Apple computers. Mephisto, Fidelity, Novag, Saitek, Cxg, and Conchess all use this chip in various models. Although it suffers from memory limitations that make hash tables impractical, it is quite a fast chip, and I propose a divisor of 3.6. So the Novag Supers and the Fid. Designer Display 2100, both 6 Mhz, would be 1.67 CM, the Designer 2000 and Radio Shack "Champion 2150" 0.83 CM, and the 18 Mhz Turbo kit versions of various models would be 5 CM.

Another processor in widespread use in models selling for around $100 is the 6301. It seems to be somewhat over 4 times slower than the 6502 at equal Mhz, so I will use a divisor of 16. This puts the Novag Primo and Mephisto Marco Polo at 0.5 CM, the Novag Super VIP at 0.6, and the new 16 Mhz Novag Beluga and SuperNova at 1 CM.

Finally we come to the RISC processors. RISC stands for "Reduced Instruction Set Computing". The idea of RISC is that by limiting the instructions to the ones most frequently used, most of them can be executed in a single cycle, so the divisor should be near 1. We have no chess data yet, but published results of various tests point to a divisor of around 1.2 for the leading RISC chips, or around 2 for cheaper ones like the "Acorn". Since RISC processors generally run at speeds of from 8 to 40 Mhz, we can expect CM values in the 6 to 17 range for future commercial RISC machines and up to 33 for very expensive machines. We are even starting to see RISC machines planned that do more than one instruction at the same time to bring the divisor below 1; for example the forthcoming "IBM RISC System 6000" claims over 27 Mips at 20 Mhz. Such technology might well be used to win tournaments, but it will be years before it becomes cheap enough for use in commercial chess computers.

Assuming one knows the rating of a particular program on a certain hardware, it is possible to estimate a rating for the same program on different hardware by using the CM values and referring to the below table. Simply subtract the values below the two CM numbers and you have the rating adjustment. If RAM size also differs add another 8 points for each doubling.

The below table is based on a formula proposed by Alex and Barbara Szabo in the ICCA journal. It takes into account the diminishing value of each successive doubling of speed.

CM:	.25	.5	1	1.5	2	3	4	6	8	12	16	24	32	48	64
adj:	-180	-87	0	47	80	124	154	195	223	261	287	323	347	379	402

Thus we can estimate that a pc program running on a 25 Mhz 486 machine (CM=11) will play over 430 points stronger than the same program on an ordinary pc (cm=.25). For another example, the Mephisto Portorose 68030 (cm=11) should rate about 173 points above the 68000 version (cm=2) based on speed alone (est. 253 for 11 minus 80 for 2) + another 16 for two doublings of RAM size for a total of 189 points. By the turn of the century, micros are apt to reach 1000 CM, for which the table value is 583. With ratings over 2200 USCF for CM=2 models now, the table implies that home computers should reach 2700 USCF(2600 FIDE)by then! Program upgrades and huge RAM may add another 100+ points.

Chess Playing Software For The PC

Since our last quarterly, the only new programs to come out in the U.S. are Rexchess 2.00 (by Don Dailey and myself) and a new version of Zarkov. A.I. Chess remains the strongest, but as no new versions have come out for some time now the gap is narrowing. My tests put it at over 2300 on a 20 Mhz 386, which suggests a 2400 rating might be achieved on a $5000 486 computer. On a standard AT (8 MHz) it should be a strong expert, and on a standard pc it should rate somewhere around 2000. The graphics are still awful and the price still excessive. Zarkov has gotten stronger and has nice graphics, but the price has doubled. Having just received the new Zarkov, it's too soon for me to say how much it has improved, but it is probably the strongest program written in a high level language ("C")--A.I. and Rex are primarily written in assembly language, which runs faster but takes much more time to program. ChessMaster 2100 remains king of the mass market programs, but is nowhere near the level of the above three programs. Sargon IV is reportedly quite strong on the Macintosh version, since it is basically the same program as the 6097 LA version. The pc version was originally a translation of this program, but somehow it got ruined and is very weak. It is already being discounted severely, for good reason. As for other programs, some recent tests on EGA Chess show it to be pathetically weak.

As for Rex, the first version was released in January. It estimates a rating for itself based on the speed of the

computer it is run on, and in the case of my computer (25 Mhz 286, about like 20 Mhz 386) it estimated 2171. When I actually ran 48 games with it (30" level) against dedicated computers after its release, it came out 2177, a surprisingly close agreement to the original estimate, which was based on very little data. Due to some bugs in certain features and compatibility problems with MCGA systems, production was halted after the first hundred and a new version, 2.00, is now out. This version is much stronger than the first, due primarily to adding hash tables and improved code efficiency, but also to added pawn structure knowledge, less selectivity on short searches, a safer set of selectivity rules, and various speed-ups. I recently purchased a 25 Mhz 486 based computer, and on this machine Rexchess 2.00 leads the Mephisto Portorose 68020 by 12 1/2 - 11 1/2 at levels ranging from game in 5' to game in one hour. Of course this does not mean that Rex is as good a program as the Portorose, since it enjoyed a substantial hardware advantage (about 3-1 in my opinion). In independent testing by Max Harrell the pre-hash table version of Rex running on a 25 Mhz 386 leads a 9 Mhz Novag Super Expert C by 5 1/2-2 1/2 in Action chess. We have raised our estimated rating for Version 2.00 by 50 points over version 1.10, but based on these results that is probably conservative. Please bear in mind that the actual strength of Rexchess (or any pc chess program) is highly dependent on the hardware it runs on. Estimated ratings for Rexchess appear on the screen and are based on actual timings of your computer, and a table of such estimated ratings is given in the documentation. The difference between a standard 4.77 Mhz pc/xt and a 33 Mhz 486 (not yet available) is about a factor of 60 in speed and some 450 rating points. I highly recommend running any chess program on the fastest hardware you can afford, at least a 286 in any case. My timings showed that Rexchess and Chessmaster 2100 accelerate more on a 486 than other programs-- over 10 times as fast as on a standard 8 Mhz AT (286), while for A.I.Chess and Psion the ratio is around 8 to 1. We don't know the reason for this difference.

If you are thinking of purchasing a new computer primarily for chess, there are several decisions to make. It is probably best to stick to IBM pc compatible, because you can get a more powerful machine for the same money than with most other types, and because more recent software, both chess and other, is written for IBM compatibles. The major decisions to make include the processor (type and speed), hard disk (size and speed), video (type and color vs. monochrome), and memory size. If you are cost conscious, keep memory down to a minimal 640k since many programs use this much, but few make any use of additional memory. A hard disk is a great time-saver and convenience and speeds access to the opening book for some chess programs, but will have no effect on a chess program after the opening since the entire program is usually loaded into RAM. Unless you plan to store many hundreds of games, even the minimal size hard disks sold (20-30k) are adequate, and disk access time is not so important for chess, so you can cut corners here. As for video, since chess is normally played with black and white pieces I see no great merit in color, but you may want it for other software. The board will look a little nicer with the more expensive video options (VGA,EGA), but it should be adequate on even the least expensive monitors.

The one place where you should not skimp is the processor. If you want good chess you should get at least an 80286, which is far superior to the old 8088. The higher the Mhz the better a chess program will play, with a doubling in Mhz worth about 75 points, but note that a "0 wait state" machine at 12 Mhz is about equal to a "1 wait state" machine at 16 Mhz; a wait state seems to slow the processor down by about 25%. It is now possible to get a 20 Mhz 0 wait state 286 computer with a small hard disk, cheap video, and 640K RAM for $1200 or less if you shop around, and you will have a very powerful computer. For about the same price you could substitute a 16 Mhz 0 wait state 386 sx processor for the 20 Mhz 286. Surprisingly the 386 (regular or sx) seems to offer no speed advantage over a 0 wait state 286 at the same Mhz for most current programs, so you would be sacrificing about 20% in speed in return for the hope of future software made specifically for the 386. Since such software would probably not be more than 20% faster anyway, the fast 286 is the best buy for chess, though you may want a 386 for other software. A 386 with Cache will run about 25% faster than without, so a 25 Mhz Cache 386 is nearly twice the speed of a 16 Mhz sx, but the cost difference is around $1000. Finally, the very expensive 486 chip seems to run most chess programs about twice as fast as a Cache 386 system at the same Mhz.

There are several popular speed indicators by which systems are compared. Of these the "MIPS Power Meter" test seems to correlate best with chess, the "Landmark" is second best, while the "Norton SI" and several others are unsuitable for chess. You should get over 2.5 on the MIPS and over 20 on the Landmark on an sx or 16 Mhz 0 wait-state 286, sufficient for low master chess.

The Pawn Shop

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Final Notes

If you have any ideas for future issues, have written an article or have any comments, mail them to: CCD Bits&Pieces, co/ICD 21 Walt Whitman Rd., Huntington Sta. NY, 11746. Contact ICD for rates for The Pawn Shop.

The editors wish to thank all of you who sent in comments - keep them coming! We would also like to thank everyone who sent in donations to help our publication.

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We'll see you again in the summer.