

Selective Search



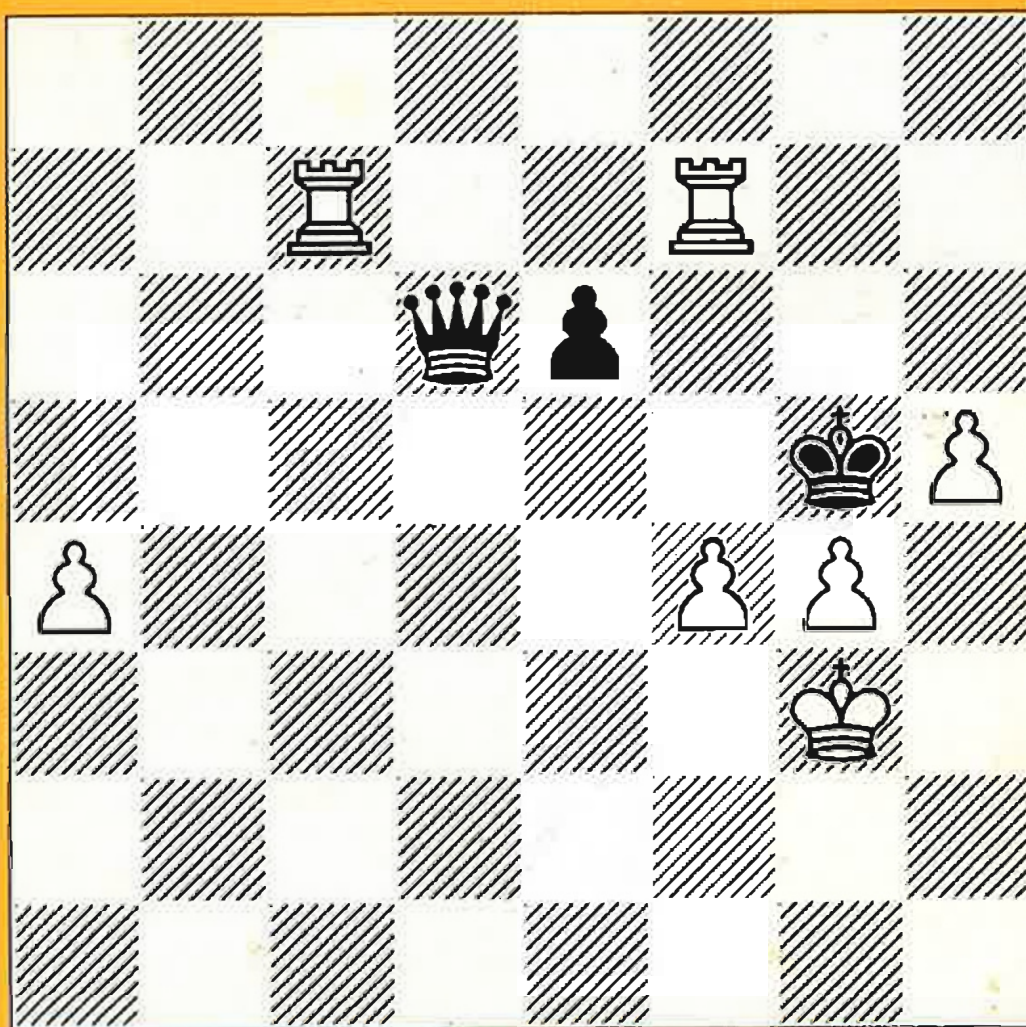
December/January 1994/5

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Final position, final game, from Hiarc's entry
in the Bury Open, where it scored 100%

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Issue 055

Selective Search

is a review of the UK chess computer scene published six times a year by

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As usual, the Christmas period has been pretty quiet so far as new products are concerned, so the articles and correspondence we have received, while always greatly welcome, have been especially appreciated. In the case of the longer articles, from Einar Karlsson and Francis Monkman, we would like to add a further 'thank you' for having supplied them on floppy disk, which greatly facilitates the task of incorporating them into *Selective Search*.

Our sincere thanks also to the several correspondents who were kind enough to send in precisely the information one of our readers was looking for, regarding the Risc 2500 upgrade chip. As this is copyright material we cannot publish it here, but it has certainly solved the problem.

So, if you have been hoarding any games, either CC v CC or CC v Human, don't let them go to waste - we'd like to see them!

SK

HIARCS IN THE REAL WORLD!

Mark Uniacke's new update coasts home with a perfect score at Bury

It is now so commonplace to see the results and game scores of contests between computers and GMs and Super-GMs, that it is quite refreshing to show a few played at a less stratospheric level; certainly the flow of events in the games can be easier to follow for the average player.

Playing in the Open section of the Bury St Edmunds Congress, 26th - 27th November, Hiarcs 3.0 was pitched against five opponents with an average grade of BCF 161. Scan down the listing in your local club, or down the BCF / Cadogan Grading list, and you will see just how tiny a proportion of players are anything like this standard.

Of course, Hiarcs 2.1 is estimated at around 215BCF, and surely no-one who has used 3.0 as well would doubt that it is at least five points stronger still. Therefore a clean sweep was statistically predictable; indeed, it could be said that anything less would have been a poor performance, and this may be so. But - as anyone who has ever played in the hothouse of a weekend congress will tell you - being stronger on paper is one thing, proving it without hiccup is quite another.

The efficiency of the despatches is impressive also; the only game not given here is the one against a 150 BCF player.

Sicilian

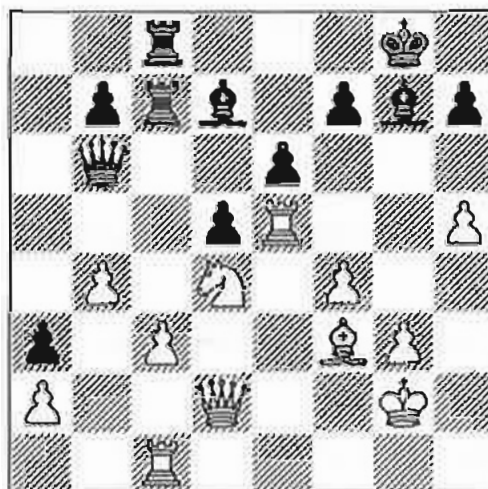
□ A King (BCF 161)

■ Hiarcs 3.0 (486/33)

Round 1, Bury St Edmunds Open 1994

1 e4 c5 2 ♘f3 d6 3 d4 cxd4 4 ♘xd4 ♘f6

5 ♘c3 a6 6 ♙g5 ♘c6 7 f4 ♚b6 8 ♙xf6 gxf6 9 ♘b3 ♙g7 10 ♘d5 ♚d8 11 c3 f5 12 ♙d3 e6 13 ♘e3 fxe4 14 ♙xe4 d5 15 ♙f3 ♚c7 16 g3 0-0 17 ♚d2 a5 18 ♘c2 a4 19 ♘bd4 ♘xd4 20 ♘xd4 a3 21 b3 ♙d7 22 0-0 ♚fc8 23 ♚ac1 ♚a5 24 b4 ♚aa8 25 ♙g2 ♚d6 26 ♚fe1 ♚c7 27 h4 ♚ac8 28 h5 ♚b6 29 ♚e5



A pragmatic if rather desperate attempt to get some counterplay from a rapidly deteriorating position; the pressure on c3 being well-nigh intolerable by now. Hiarcs, however, decides to deprive White of the vistas of ♚g5+, h6 etc., and spurns the offered rook.

29... ♙a4 30 ♚g5 ♙f8 31 ♘e2 ♙b5 32 ♚xg7 ♙xg7 33 f5 ♙xe2 34 ♚g5+ ♙f8 35 ♙xe2 exf5 36 ♚xf5 ♚e3 37 ♚e1 ♚xc3 38 ♚xd5 ♚xg3+ 39 ♙f1 ♚f4+ 0-1.

Sicilian

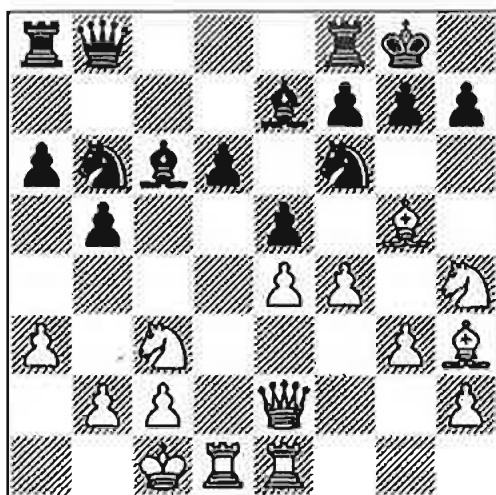
□ Hiarcs 3.0

■ R. Savory (BCF 167)

Round 2, Bury St Edmunds Open 1994

1 e4 c5 2 ♘f3 d6 3 d4 cxd4 4 ♘xd4 ♘f6

5 ♖c3 a6 6 ♙g5 e6 7 f4 ♜bd7 8 ♚e2 ♞c7
9 0-0-0 ♙e7 10 ♜f3 e5 11 ♞c4 ♞b8 12 g3
b5 13 ♚e2 ♙b7 14 ♙h3 ♜b6 15 ♞he1 0-
0 16 a3 ♙c6 17 ♜h4



The stage looks set for an exciting contest, with two flank attacks in the making, but Black's next move allows his kingside to be torn apart.

17... ♞e8

17...g6 may be ugly, but it would at least have prevented the knight from reaching its prime site and causing the ensuing carve-up.

18 ♜f5 a5 19 ♜xe7+ ♞xe7 20 ♙xf6 gxf6
21 ♙f5 b4 22 ♞h5 ♞b7 23 fxe5 dxe5 24
♜d5 ♙xd5 25 exd5 ♜c4 26 ♞h6 ♜d6 27
♞d4! 1-0.

English

□ M Ross (BCF 164)

■ Hiarc 3.0 (486/33)

Round 3, Bury St Edmunds Open 1994

1 c4 e5 2 b3 ♜c6 3 ♙b2 ♜f6 4 d3 d5 5 e3
dxc4 6 bxc4 ♙f5 7 ♜f3 ♙b4+ 8 ♜c3 0-0
9 ♙e2 e4 10 dxe4 ♜xe4 11 ♞xd8 ♞axd8
12 ♞c1 ♜c5 13 0-0 ♜d3 14 ♙xd3 ♙xd3
15 ♜d5 ♙xf1 16 ♞xf1 ♞d7 17 ♜g5 ♞e8
18 f3 f5 19 e4 ♙d2 20 h4 ♙xc1 21 ♙xc1
h6 0-1.

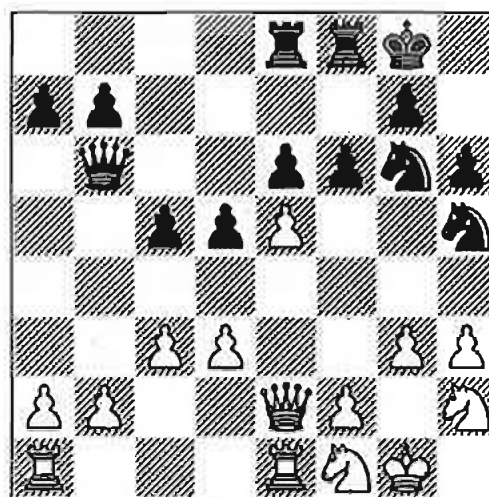
Sicilian

□ A Williams (BCF 161)

■ Hiarc 3.0

Round 4, Bury St Edmunds Open 1994

1 e4 c5 2 ♜f3 d6 3 ♙b5+ ♙d7 4 ♙xd7+
♞xd7 5 0-0 ♜c6 6 c3 ♜f6 7 ♞e1 e6 8 d3
♙e7 9 ♙g5 0-0 10 ♜bd2 h6 11 ♙h4
♞ae8 12 h3 d5 13 e5 ♜h5 14 ♙xe7 ♜xe7
15 g3 ♞b5 16 ♞c2 ♜g6 17 ♜f1 ♞b6 18
♞e2 f6 19 ♜3h2



19... ♜xe5

White, who has played well up to this point, and continues to give Hiarc its stiffest test of the congress, has trapped the offside knight at h5, but Hiarc sells it dearly...

20 ♞xh5 ♞xb2 21 ♞e2 ♞xc3 22 ♞ed1
♜c6 23 ♞d2

It seems dubious to swap queens here, since White is ahead in pieces but down in pawns. Watch how fluently Hiarc conducts the ending - for all the world as if playing to a plan...

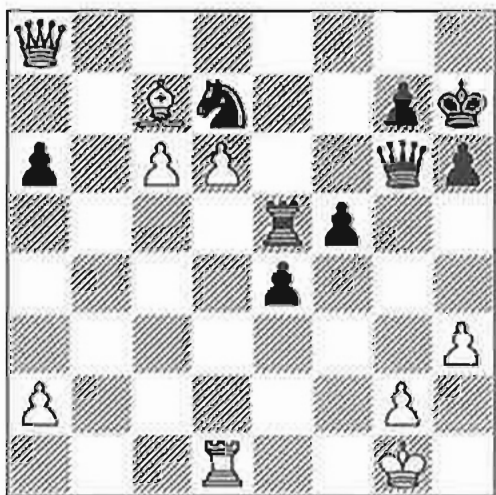
♞xd2 24 ♞xd2 f5 25 ♞c1 b6 26 f4 e5 27
fxe5 f4 28 g4 ♞xe5 29 ♜f3 ♞e7 30 ♞f2
♞fe8 31 ♞e1 ♞xe1 32 ♜xe1 ♞f7 33 ♜c2
g5 34 ♜h2 h5 35 ♜f3 hxg4 36 hxg4 ♞f6
37 ♞d1 ♞h8 38 ♞g2 b5 39 ♞h1 ♞xh1 40
♞xh1 ♜e5 41 ♜xe5 ♞xe5 42 d4+ cxd4
43 ♜e1 ♞e4 44 ♞g2 d3 45 ♜f3 ♞e3 0-1.

The Crack in the Rock

Musician and PC buff Francis Monkman responds to Thorsten Czub's article in S/S 054, and looks more deeply at that Hiarc3 v R30 game along the way...

It was kind of the editor to award my Pentium 90Mhz an exclamation mark in the last issue. I, too, agree that it was, and remains, a very good move! (And move it does!)

A word of caution though: the vagaries of current programs being as they are, there is no guarantee that any will play a better move at, say, two minutes than it would at ten seconds. A good, if extreme, example: the position reached in the (extraordinary) analysis produced by the 14th match game in last year's PCA championship, after White's (putative) 34 c5!, when the line continued 34...♖e5 35 ♗a8+ ♔h7 36 c6, resulting in the following position:



At first, 36...♖c5 followed by 37...♖c2 seemed Black's correct continuation, but then, after overnight analysis, Kasparov came up with 36...♖b5!, which frees c2 for Black's queen. (If now 37 cxd7, Black wins; 37 ♗xa6 and 'peace is established'.) Obviously 36...♖b5 is not an easy move to find; Genius3 and CM4000 (not Hiarc3) find it in about twenty minutes.

But - CM4000 plays it (on 'first impression', as it were) for the first ten seconds or so of its search. So, playing this particular position, you would get a 'better reply' at 5 secs. response time than at 15 mins! Fritz3 also 'gets it right' for two minutes, then that's it. (Fair to point out that humans are not immune to this one, eg. Capablanca-Janowski, San Sebastian, 1911, or, indeed, the above).

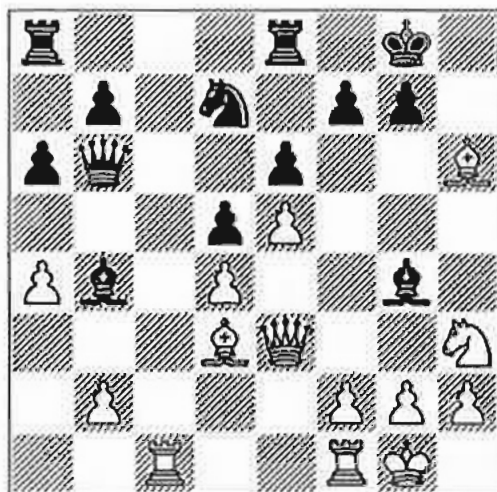
Despite this unpleasant tendency to find the best move and then leave it far behind, I've 'upped' the response time on my stuff (except for special analysis) to two minutes a move, though when playing prog-prog, it should be understood as half that time, since no 'background thinking' occurs. I only use multi-tasking for lengthy analysis on several games/progs.

Two necessary words of apology; firstly to CM4000. Stupidly, I hadn't realized the extent to which Windows (3.1 fwg) labours in 8 Mb of RAM, though the other applications I was running seemed happy enough with this amount. Since I put in another 8 Mb, CM's operation can be described, more or less, as 'snappy'. (One still has to endure the glowering 'Mr. CM', now transformed by a Windows 'colour weirdo' into startling metallic red-and-yellow: quite 'Bergmanesque'.)

Still, as one who fondly remembers Sargon II running in a luxurious 16k, I have long looked askance at such perverted concepts as 'memory-hungry' and 'C'. CM4000 uses 10Mb of installed hard-disk space, which is a lot more than any other current chess engine.

Next, to the editor, for causing him the embarrassment of spelling my name wrongly. I had named White as 'FM - etc' in last issue's game, in order to draw a distinction between the biped 'Francis Monkman' (who, after all, gave up playing chess years ago) and the hybrid intelligence 'FM' (not so much 'electrode implant', as 'synthesis of understanding') who prefers not to spoil the occasional good idea with the inevitable blunder. (His 'machine friends' concur on this one.)

Now, it is not so much Thorsten Czub's ideas (given in the last issue) - about which the best we can say is, 'that they are not so new that we have not heard them before' - to which we object (nor to his program, which we have not seen, but are told by Oxford Softworks is due for release at the end of January - and of course we should be delighted to see something that plays better chess'), but rather his 'looking-glass' manner of presenting them as, somehow, a 'new paradigm'. Before jumping off the deep end though the following chess offering contains some exceptional examples of 'AS'. (The apt term 'Artificial Stupidity' was, of course, inaugurated by Bill Hartston in a paper of that title (with some delightful examples), which can be found in *Advances in Computer Chess 4* (Pergamon, 1986).



All but our newest readers will recall this 'resonant' position from last issue's cover - no time for eulogy on the Slav Dutch, but both Grigoric-Smyslov 1956 and last year's 13th PCA World Championship game spring to mind (actually, 12 e5 ♖d5 seems to be flavour of the day).

I was keying the game into ChessBase (seven lines of analysis, I have running; which unique facility, rather than its 'mixed strengths and weaknesses', make it an excellent workmate) when, at this point, I noticed that, rather than Tasc's 19 ...gxf6, CB's top line had 19 ...♗xh3. Now, I make no claims for this move (nor to have the last word on what, after all, must be said to be a sharp position) but I can at least report with certainty that Black could have held Hiarcs3 to a draw from this position.

I decided that Genius 3, having also chosen 19...♗xh3, should aid me in this 'task'. CM and Fritz3 agreed with Tasc's move, both as 'last minute' preferences; perhaps a 'realization' that there was insufficient information about the alternative? I would welcome other views, but it seems to me that Black is, essentially, lost after 19 ...gxf6. After...

19...♗xh3

...White has several options, two of which capture the bishop. My feeling is that the crucial continuation is 20 gxf3, which not only maintains White's protection of his d4 pawn, but opens the g-file in a particularly threatening manner. CM was alone in choosing this, after some time spent considering its other, quite laudable, originality 20 a5!?, the not inconsiderable ramifications of which I leave to the reader, except to say that I think Black has drawing chances after 20...♙xa5 [not 20 ...♗xa5? 21 ♖g3 g6 22 ♗xg6 1-0] or perhaps ...♙a7 21 ♖g3 ♗f8 22 ♖c7 ♙xd4 23 ♖xd7 ♗f5.

After...

20 gxf3

...White's 'mini-strategy' (worthy of the name if only because of some programs' reluctance to find it) is to follow this up with 21 ♖h1 and 22 ♜g1, the only workable defence to which must be 21 ...♗f8.

All programs continued 20 ...♞ac8, except Hiarc3, whose 20 ...♙e7 is even worse: 21 ♖h1 g6 22 ♜g1 ♞xb2 23 ♙xg6 fxf6 24 ♞d3! and, seeing mate in 6 after 24 ...♗f8, Hiarc3 chose a swifter death with 24...♗h8? 25 ♞xg6 ♗b8?? 26 ♞g7#, 'over-enthusing' to the tune of Elo 3258! (so precise, this Hiarc3 rating function...).

Really, I consider it rather bad form that a program should credit the results of its own blunder to the intelligence of its opponent! It explains, however, H3's rejection of 20 gxf3. I might also add, that the program took some forty minutes to play the above half-dozen moves, despite its 2 min/move allotment, and only five of these were spent on the first, fatal, mistake. 20 ..♞ac8 would work if White played ball, ie. 21 ♞xc8 ♞xc8 (and after 22 ♖h1 Black must play ...♗f8 if he wishes to continue), but of course White plays 21 ♖h1 ♞xc1 22 ♞xc1 ♗f8 23 ♞f4+-, so it cannot be said that any program has a 'grasp of the situation'.

So, back to Hiarc3 v myself (the reluctant apologist), with H3 playing White from the diagram, after 19...♙xh3. H3 (seconded by G3) decided on...

20 ♞xh3

Its minute-long consideration of 20 gxf3, though founded on the 'misconception' revealed above, does mean that on the editor's 486/33 White might in fact have played this, without necessarily being able to take advantage of the possibilities offered. After 20 ♞xh3 the 'obviously dynamic' reply is...

20...♞xd4

Genius saw it immediately - then changed its mind and fell for the kind of 'imaginary draw' trap that I'm sure some readers will be familiar with, ie. 20 ...gxf6? 21 ♞xh6 ♗f8 22 ♞g5+ ♖h8 with the fond idea of playing 23 ♞h6+? I'm somewhat appalled that a program like G3 can make a mistake like this on ply 6, though it is not alone. I have, at some moments, seen all these programs similarly disadvantaged. Instead 23 ♖b1! (making room for the rook) 23...♞d8 24 ♞h6+ ♗g8 25 ♞cd1 threatening 26 ♞d3 and White is winning.

So, with 'a little help' as above, things continued with...

21 ♙h7+ ♗f8 22 ♞c7 ♗xe5 23 ♙c2 ♙e7
24 ♙e3 ♞h4 25 ♞xe7 ♗f3+ 26 ♞xf3
♞xe7 27 ♞h5 f5 28 a5 ♞b4 29 ♙b6
♞ac8 30 ♙xf5 exf5 31 ♞xf5+ ♗g8 32
♞xd5+ ♖h8 33 ♞d7 [33 ♞xb7 ♞c1 34
g3 ♞ee1 35 ♞b8+ ♖h7 36 ♞xe1 ♞xe1+
37 ♗g2 ♞f1+ 38 ♗f3 ♞d1+ 39 ♗g2=] 33
...♞e7 34 ♞h3+ ♗g8 35 f4 ♞e4 36 f5
♞f8 37 ♞e3 ♞xe3+ 38 ♙xe3

...and we have reached an endgame with, it must be admitted, some measure of equality.

38 ...♞c2

Here Genius 3 made a 'final-ply' choice of 38 ...♗f7, at which point H3 became terribly optimistic about its chances. G3 almost nonchalantly refused to get excited, and despite one passably tense moment where H3's wild predictions began to look almost credible, the game from this line was eventually drawn on move 82.

39 b4

On 39 ♙d4 ♞e8 40 f6 gxf6 41 ♞xf6 ♞e1+ 42 ♞f1 ♞ee2 with equality. Or 39 f6? ♞xf6 40 ♞xf6 gxf6 41 ♙d4 ♗f7.

39 ...♞e8 40 ♞f2

Hiarc3 narrowly opted for this over

♙f3

40 ...♙xf2 41 ♖xf2 ♜e4 42 ♖f3 ♙xb4 43 g4 ♖f7 44 h4

...at which point Hiarcs was ready to accept a draw. Having played, it said, at '(H)elo' 2644, 'we got the same...'

As Mr. Czub rightly points out, "they don't know that they don't know" - but to suggest that by means of a simple 'mental switch' some 'intelligent' high-level module can be said to 'assume the identity of knowledge' is, I think, to adopt a naive attitude towards what should be a serious attempt at understanding the difference between human and artificial intelligence.

If I say that "I know that I know that I know", (and this abstraction can of course be continued ad infinitum) even those who would maintain that this faculty is merely a function of memory, ie. 'I remember that I remember that I knew' (which does not, meanwhile, explain the 'persistence of 'knowing' during the exercise) would have to admit that this is memory of a very different kind from the RAM and ROM that the computer contains.

In fact, the very fact of execution of each instruction would have to be recorded, together with all kinds of information about the circumstances surrounding that execution - I need hardly go on, except to point out that this kind of exponentially increasing storage requirement would soon outrun the 'smartest zip compression'. Those who would go further, and assert that the persistence of the human consciousness across time is a powerful argument for its existence outside of time would be called artists, and it has long been considered a primary function of art to draw attention to this seeming paradox; but remember - chess is an art-form, too! We use names like 'Evergreen' and 'Immortal' precisely to refer to this 'timeless' quality. The reader may already

have an 'encapsulation' in his (or her) mind: multi-faceted, kaleidoscopic, with perhaps '♙d6' (without, I hope, a query) somewhere at the heart of it. So it is with a Bach fugue, or a great painting; they can be appreciated in time, as well as out of it.

To improve the 'connection across time' on any computer powerfully reinforces the impression of intelligence, as any adherent of macro recorders, or even batch file control, will know, even if not amounting to self-knowledge.

Before suggesting that the search process itself might generate much information which, were it stored, could prove 'intelligence-conferring', a brief but necessary 'historical overview' is needed.

Some readers may own a copy of David Levy's excellent *Computer Chess Compendium*, and so already know that Shannon's original paper of 1950 posited 'another type of strategy' (although it is arguable that his use of the term, while referring to a 'more strategically-aware' type of program based on chess heuristics, actually means 'the strategy of writing a chess program', a potential confusion) further to his 'type-B' specification, which corresponds more or less with the title of this publication (Mr. Czub has here unfortunately confused 'A' and 'B' (ie. full-width and selective) with 'a' and 'b', which are used to denote a pruning algorithm (as applied to alternate plies), which, although not easy either to understand or to explain, must be first 'allowed to exist'); since then, Botvinnik and others have constructed 'strategy first' algorithms, with varying degrees of success, but not to the point where they could be shown to be even as effective as 'dumb' search-based solutions. (even if a 'static strategy' were to be 'evolved' by the program, I surmise that to be 'convinced of its reliability' must, for a computer, involve a

complete search. The program *Schach*, I believe, uses NO look-ahead; one is reminded of Capablanca's "I see only one move ahead, Madam, the right one!"

But men (and women) are not machines, and Schach was not so successful with the 'right' part of Capablanca's declaration. Botvinnik's *Pioneer* is known to have solved at least one specific problem, (although, possibly not the successful maintenance of Russia's nuclear installations) and the *Paradise* module of Wilkins did well, in 1980, to solve Berliner's 19-ply mate in twenty minutes, and a mere 109 nodes! (CM4000 solves this in five seconds of normal play, though not, curiously, as a 'mate in 10'. Why?).

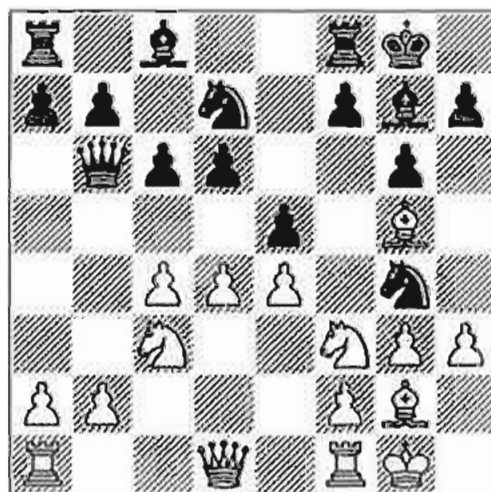
However, it will be noticed that these, and chess programs generally, are 'proved' by their ability to solve problems of the 'good move exists - find it' variety. Simple logic dictates, that if a good move is already known to exist, a good search will find it, and in truth this proves to be the case. As we all know, even a mediocre program can play like a grandmaster when it sees a clear course of action.

The problem, for man and machine alike, is to create the positions from which there are good moves to be found. (I have suggested this to GMs, and have found it 'not a matter for unconcern'). And this, precisely, defines the problem. What, in essence, is strategy? If Mr. Czub's generalissimo says, 'Order the men behind that hill to attack, over the top, at dawn', we may say that he is carrying out an 'applied' strategy, located in time and space (and subject to specific 'refutations', eg. a total eclipse, the forewarning of the enemy etc.). On the other hand, we may also say that his plan embodies a 'theoretical' strategy concerning the wisdom of attacking with the light behind one, the element of surprise, etc. So it can be seen, that the

term 'strategy' is already used in two quite different ways. Applied to chess, one can equate these to 'the pursuit of a specific' (which one might call the kind of 'static strategy' constructed by the Pioneer type) and to 'the pursuit of principle(s)', in the form of 'embedded chess heuristics'.

But there is also a third, more recent definition of strategy as a 'dynamic process' (courtesy of M. Suba's excellent book *Dynamic Chess Strategy*, Cadogan Books), and of course this appeals to anyone who senses that the 'dynamic' ideal represents the 'true advancement of chess in the 20th century'.

We are not helped here by Mr. Czub's static (not to say entrenched) interpretation of the 'obviously relevant' axiom that 'chess is war' - a comparison with Eastern martial arts might be better: the Taoist might say, 'if there is a hole in the rock, the water will rush in to fill it - this is harmony'. So in chess; if there is a potential weakness in a position, the most 'harmonic' move is the most devastating exploitation of that weakness, whether obviously so or not. Grandmaster Smyslov, himself an opera-singer, is constantly speaking of 'harmony in chess', as I understand. Dispel any notion of 'acquired aesthetics' in this term - it should be understood scientifically, as a fact of nature.



Here is an excellent example of a 'strategic-harmonic-dynamic' move made by Smyslov against Botvinnik in 1954 (14th match game), which also serves as an excellent test for computer programs. After White's last move 11 h3 Black played **11...exd4!**

"The most vigorous continuation". Of all my programs, only CM4000 and CBA-analysis have this, briefly, at the top of their list - perhaps CM is unbeatable at ten seconds' response time! - before settling for the 'popular' 11...♘gf6, after which "White is well placed". [Stop press: Fritz3, alone among 'his friends', plays ...exd4! after overnight analysis: a genuinely 'good shot'!]

Of course, the move 11...exd4 'rests on' the previous 10 ...♚b6 (and the 'crack in the rock' provided by White's dubious ninth move), so cannot by itself be said to 'win the game', but it creates the kind of dynamic where good moves are to be found.

It also, I hope, dispels any notion that 'harmonious' chess is also necessarily quiet, insipid, 'music to milk cows by'! We suspect that search-based algorithms are already 'poised for a breakthrough'.

With the introduction of 'selectively extended' searching, already a new level of 'intelligence' has been reached (as after all, a successful decision to 'search further' must be regarded as evidence of intelligence).

Now, for my assertion that much wasted information already exists as a by-product of the search process, let me give a specific example: at the end of an n-ply search, two moves have the relative values (derived from material and positional evaluation) of, say, 0.68 and 0.38. But it may be that the first 'leaf node' evaluation

may have had, two ply earlier, the value 0.96; and the other, lower-rated line, - 0.12. Now it will be immediately clear that the lower-rated line is, in fact, improving at a rate that 'suggests' a higher evaluation. We could call this rate a 'delta' value, to denote 'change mapped against time' and although in this case, time = ply depth, there could be a good case for a 'real-time search monitor' to detect the rate at which moves were, for example, 'changing their expectation value'.

Another example: if a move which 'seems to lose' (ie. a sacrifice), nevertheless turns out to have a much better value 'than it should' (and of course, may be improving), it should be studied.

It can be a simple step to intuiting the extraction of the value for a 'dynamic heuristic' from such information - eg. sudden, 'unexpected' change, or a greatly increased (or reduced, ie. quiescent) range of values across the tree (this one courtesy of watching seven simultaneous analysis lines on the ChessBase analysis module - definitely 'unused information' there) - and, for that matter, the kind of awareness of 'cruciality' that, as we saw, was so much needed earlier.

I'm sure readers would agree, that were a chess program to display some sense of the 'importance of a critical moment' we should all feel relieved. Designers of fly-by-wire aircraft are, of course, faced with this problem in a more concrete form, and I understand they employ a number of programs from different software houses, with, I would imagine, something not so different from the 'real-time monitor' outlined above, to 'adjudicate' the resultant output. Perhaps too utopian for chess-programmers, as a present-day strategy, though!

How Good is Your Chess Computer?

This issue's *How Good...?* is from the Cadogan book *Rate Your Endgame* by GM Edmar Mednis and IM Colin Crouch, which, at £10.99 for 239 pages is good value in quantity, while the quality of the work is outstanding, based as it is on Mednis' best-selling tutorial *Practical Endgame Lessons*.

Although everybody interested in chess computers knows that the ending is the weakest part of their game, a lot of people express surprise that this should be so; after all, they reason, with fewer pieces around, and with cold calculation being the dominant factor, computers should actually excel at this phase of the game more than any other. Part of the reason for this apparent anomaly is that master players are guided by a target position they want to reach, which may involve giving up pawns or even pieces in order to achieve a situation on the board which, as they already know from theory, will subsequently lead to a win, a draw etc. To some extent therefore, each individual move is just a brick in an overall design to which they already have the blueprint. Computers, on the other hand, although programmed with a greater or lesser degree of theory, have to rely mainly on calculating one move at a time. Even in an endgame, the number of possibilities can soon mount up to push the 'proof' of any target or goal way past their horizon.

All that said, Mike Healey of Countrywide (who did most of these tests) probably has a point when he remarked that, in 'real life', and despite the non or low-scoring moves below, these computers might well have come through in a game against opposition of less than Master

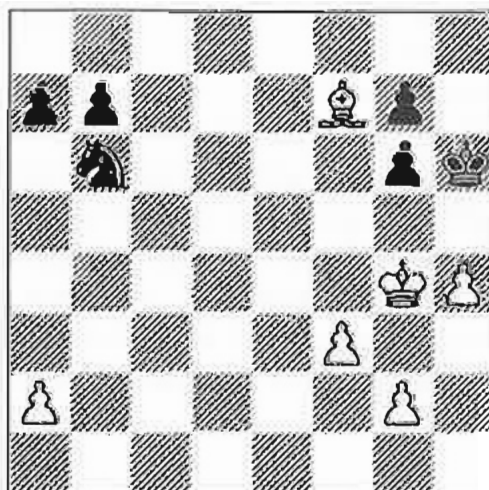
strength. As has been mentioned before in these pages, the strength of the top modern-day programs is such that conducting *How Good...* tests on them is becoming increasingly problematical, since the authors look for alternatives that humans might choose, and completely overlook the 'unthematic' but sometimes highly effective choices of a CC; perhaps the next generation of such books will be written with a computer by the writer's side...

Still, it is probably fair to say that computers usually play the endgame to a standard perhaps 40/50 BCF points below their middlegame performance. As always, we strongly recommend you try these two exercises yourself before introducing them to your own computer, although to gain real benefit you will need the notes from the book itself.

On test were the Mephisto Vancouver 16, Mephisto Genius 68030, Mephisto Risc V2 (the Risc 1Mb update), the Tasc R30, and Hiarc3 3.0 on a 486/33 PC. All on 3 minutes average response level.

The first test is from the section Bishop versus Knight, with Black to play from the following position:

38 ...♘a4



Z-Kunststoff

5

1

2

0

2

2

0

6

2

0

1

00000055

MONTECARLO

5 pts - for all bar H3 with 2 for its ...a5.

39 ♖f4 5

39... ♗h5

3 points. Only Hiarc had this. ...b5 scores 1 (v2), as does ...♗c3 (all the rest).

40 g3

2 40...♗c3 2

2 points, picked up by G68030, R30, and v2. Van. 16 had ♗h6 for zero, while Hiarc also scored 2 for ...b5. ...a5 would pick up 1 point.

41 ♗e3

2 41...b5 0

2 points. Hiarc and R30 had the wimpy ...b6 (0), G68030 wanted ...a6 (0), while the others scored.

42 ♗d3

42...b4 0

2 points. All scored.

43 ♗c2

2 43...♗h6 2

6 points, but all CCs had ...♗e2, (2 pts.) the ramifications of which lead to a whole test of its own in the book. 6 points also for ...a5.

44 ♗b3

44...a5 0

1 point. "The only sensible move" yet all the CCs were united in choosing 44...♗e2 again.

45 f4!

45... ♗h5! 1

6 points. Again, the computers were unanimous in choosing ...♗e2, which this time scores 1.

46 f5

46...a4+!! 0

6 points. 2 for ...♗g4, which all chose.

47 ♗xb4

47...♗xa2+!! 0

3 points. Hiarc and R30 alone had this, the rest going for ...♗e4 (0).

48 ♗xa2

48...gxf5 1

1 point apiece.

49 ♗e6

49...♗g4 1

1 point only, as per v2, H3, and R30. ...g5 (V16 and G68030) is for 2, and ...f4 is worth 3.

50 h5

50...♗xg3 1

2 points - for H3 and R30. The rest had ...♗g5 for 1.

51 ♗xf5

51...♗f4 0

1 point, which only G68030 missed out on with ...♗f3 (0). ...♗h4 is also worth 1.

52 ♗g6

52...♗e5 0

1 point. As played by H3. 1 also for ...♗g5 (R30). Van. 16 had ...♗g4 (0), and the other two had ...a3, also for nil.

53 ♗xa4

53...♗f6 0

1 point, as per H3, R30, and v2. The other two had ...♗f4 for nil. ...♗d6 is also worth 1 point.

54 ♗b4

54...♗e7 0

1 point, which only Hiarc got, the others wanting ...♗e5 (0).

55 ♗c5

55...♗f8 0

1 point for the R30 and v2. The others had ...♗e6 (0).

56 ♗h7

1 0

1 0

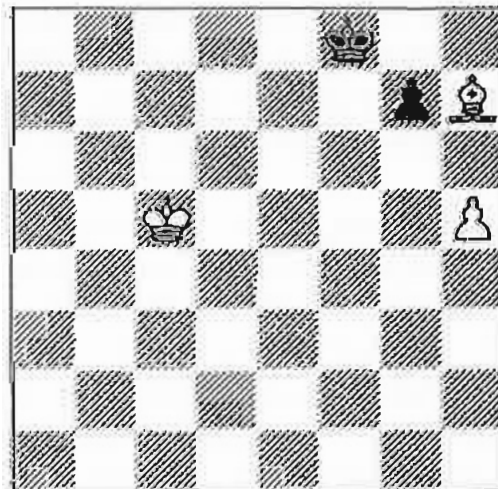
1 1

1 0

0 0

0 0

0 0



56...g5!!

5 points. "The only correct idea." All CCs chose ...♖e7 instead, for nil. ...♗f7?! is for 1; ...g6 (another idea involving eventual stalemate) nets 4.

The game finished with:

57 h6 g4 58 ♖d4 g3 59 ♖e3 ♗f7 60 ♖f3 ♗f6

...and Black has achieved his objective of drawing from an inferior position, since on 61 ♗xg3, Black simply plays 61...♗g5 and picks up the last pawn. So, on adding up the points, we have:

ME a3 Vancouver 16 on 20, Genius 68030 19,

RUGBY 23

572000 16

MONTRÉAL 14

NICKEL SPORT 22

Risc v2 on 23, Hiarcs 3.0 with 25, and the R30 just pipping it with 26 out of the 53 points on offer. (A Rook and Pawn test on these CCs was also done, which will be given next time). The results can be tabulated against the following scale:

36 +	Titled Player
33-35	Fide rated 33-35
28-34	Expert
23-27	Good Club Standard
18-22	Club Standard
10-17	Average Standard
U-10	Social Player

RESULTS

A result just in from Germany shows a good performance for Fritz 3. In the top section of the annual Bern International, Fritz made 5½ out of 11 in a Category 9 event, which is an International Master norm. Its tournament grading was 2452 Elo. From the German fax we received, we think it was running on a Pentium 90Mhz, (although it is just possible that the particular passage actually reads "I only wish it had been running on a Pentium 90 Mhz..." etc.). No German words for 'the time limits were...' spring out at us however, but they were certainly 'proper' slow tournament timings. Its best win was the the following, against a Russian grandmaster graded 2540 Elo.

□ Fritz 3 ■ Yuri Piskov *French Exchange*

1 e4 e6 2 d4 d5 3 exd5 exd5 4 c4 ♗f6 5 ♗c3 ♖e7 6 cxd5 ♗xd5 7 ♗f3 0-0 8 ♖d3 ♖g4 9 0-0 ♗c6 10 ♖b5 ♗db4 11 ♖e3 a6 12 ♖e2 ♗d5 13 ♖c4 ♖e6 14 ♖b3 ♗a5 15 ♗xd5 ♖xd5 16 ♖xd5 ♗xd5 17 ♖f4 ♖d6 18 ♖xd6 cxd6 19 b3 ♖fe8 20 ♗d2 ♗c6 21 ♖fe1 h6 22 ♖ac1 f5?! 23 ♖cd1 a5 24 ♗c3 b5 25 ♖c1 ♗b4? 26 a3 ♗a2 27 ♗c6 ♗xc6 28 ♖xc6 ♖xe1+ 29 ♗xe1 ♖e8 30 ♖f1 b4 31 axb4 ♗xb4 32 ♖xd6 ♖c8 33 ♖b6 ♖c1 34 ♖e2 ♖b1 35 ♖b5 ♖b2+ 36 ♖d1 ♗c6 37 ♗f3 ♗b4 38 ♗d2 f4 39 ♖xa5 ♗d3 40 f3 g5 41 d5 ♖f7 42 d6 ♖e8 43 ♖d5 ♗b4 44 d7+ ♖d8 45 ♖d6 ♖a2 46 ♖xh6 ♗d5 47 ♗e4 ♖xg2 48 ♖c1 ♗e3 49 ♖h7 g4 50 fxg4 f3 51 ♖f7 f2 52 ♗xf2 ♗xg4 53 ♗d3 1-0.

Ray Harper sends a report on his match between the Hiarcs 3.0 and Genius 3.0. Mr Harper played 10 games at rapidplay (30 minutes each per game), and a further 10 at Blitz (5 minutes each). In the longer time limit, Genius won 7/3 (+4, =4, -1) and in the shorter, by 6½/3½ (+4, =5, -1) - as Mr Harper says, a convincing victory overall of 13½/6½. In relative terms, quick games are not Hiarcs' forté though! The match was held on a 486DX2/66 with 512k secondary cache memory and 24Mb RAM - a top-class 486, in other words. Mr Harper also sent in the following nice win by Genius 3.0:

 □ Genius 3 ■ Hiarc3 Bishop's Opening (30 minutes each)

1 e4 e5 2 ♖c4 ♗f6 3 d3 c6 4 ♗f3 ♖e7 5 0-0 d5 6 ♖b3 ♖g4 7 h3 ♖h5 8 exd5 cxd5 9 ♖a4+ ♗c6 10 g4 ♗xg4 11 hxg4 ♖xg4 12 ♖e1 ♗d6 13 ♗e2 f6 14 ♗e3 0-0 15 c3 ♗e6 16 ♗h2 ♖f5 17 ♗f3 ♖ac8 18 ♗f1 ♖fd8 19 ♖b3 ♖g4 20 ♗g3 ♗a5 21 d4 e4 22 f3 ♖f5 23 fxe4 ♖xe4 24 ♖h6 g5 25 ♗bd2 ♗xb3 26 axb3 ♖d6 27 ♗g2 ♖xg2 28 ♖xe6 ♖xf1 29 ♖xf1 ♖f4 30 ♖xf4 gxf4 31 ♖xf6 ♖c6 32 ♖xc6 bxc6 33 ♖f2 ♖f7 34 ♖xf4 ♖e6 35 ♗f3 h5 36 ♗e5 ♖c8 37 b4 ♖f5 38 ♖h6 h4 39 ♖g2 ♖h8 40 ♖d2 h3+ 41 ♗h2 ♖e4 42 ♗xc6 ♖d3 43 ♖f4 ♖h4 44 ♖g3 ♖h6 45 ♗xa7 1-0 (56).

En Passant

Paul Willcox sends us this exciting game versus his Berlin. Paul does wonders to draw in the end, coming back from a -800 evaluation against him! Berlin 68000 - Paul Willcox: 1 e4 c5 2 ♗f3 ♗c6 3 d4 cxd4 4 ♗xd4 e6 5 ♗c3 a6 6 g3 ♗ge7 7 ♖g5 ♗c7 8 ♗db5 axb5 9 ♗xb5 ♗a5+ 10 ♖d2 ♗a4 11 ♗d6+ ♖d8 12 ♖e3 ♗a5+ 13 c3 ♗g6 14 ♗xf7+ ♖e8 15 ♗xh8 ♗xh8 16 a4 ♗f7 17 ♖b5 b6 18 b4 ♗a7 19 ♗h5 ♗xb4 20 cxb4 ♖xb4+ 21 ♖e2 ♖a6 22 ♖d4 ♗b7 23 ♗xh7 e5 24 ♖hb1 ♖f8 25 ♖e3 ♖xb5+ 26 ♖xb5 ♖c8 27 ♖xb6 ♖c2+ 28 ♖d1 ♗c7 29 ♗g6 ♖c3 30 ♖ab1 ♖xe3 31 fxe3 ♗c4 32 ♖d2 ♖c5 33 ♖b8+ ♖e7 34 ♗xg7 ♖xe3+ 35 ♖xe3 ♗c3+ 36 ♖f2 ♗d2+ 37 ♖f3 ♗d3+ 38 ♖g4 ♗e2+ 39 ♖h3 ♗h5+ and a draw by perpetual check on move 44.

The Novag Sapphire / Diamond seems to have provoked more correspondence than any other CC we can remember; next issue a withering blast from Anthony Curtis, meanwhile this from Bernard Hill.

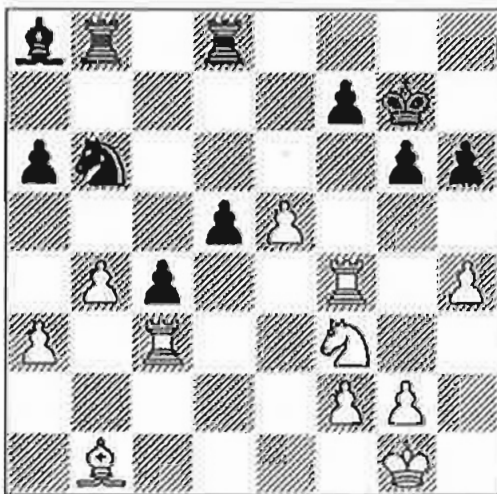
'In response to your letter from John Randall (SS054) about the Sapphire's mate in ten announcement when a mate in 7 via underpromotion was available, I would like to make the following comment: It is not possible to deduce anything from this lack of mate in 7 announcement about the Sapphire's abilities. The situation is analagous to a human's discovery of mate; if I see a forced mate (say in 3 - I'm not up to 10!) then I will play the move immediately. On reflection there may have been a mate in 2 - from the same starting move - by a method I did not spot originally, so I will play that new move instead next move. No problem at all! Either way I win! Now what I suspect is happening is exactly this. The analysis of promotion to queen will be made first and then I suspect the Sapphire is doing what most programs do, in that a check causes an immediate search extension to one more move and in this way the mate in ten is spotted first and so immediately played as it wins outright. It does not follow that the machine cannot perform underpromotions; it just shows that - quite reasonably - it searches the queen promotion first. Now the fact that there is actually a mate in 8 available from the position using a queen promotion is an additional argument that my description of events is true: the search extension found the mate in 10 before the mate in 8. To evaluate the capabilities of the Sapphire for underpromotion you would need to switch it to search for a mate in 7 from the given position. Without knowing the machine, I would like to bet that it finds it.'

Learning the Obvious

*Do computers influence the way you play?
Unless you have a Master title, perhaps they should...*

Anyone in the chess computer business is well used to being asked "What's the point in my buying a fancy top-end computer when it will beat me every time?"

There are, of course, a number of powerful reasons for doing precisely this, regardless of your own standard, and this little piece only deals with one of them. This particular 'good reason' why I bought an R30 is reinforced to me almost every time I go through one of my own club matches with the Tasc in analysis mode, and the following is just a typical example. Playing for my club in an away match, against an opponent graded more than 15 BCF points higher (so victory would have been especially sweet), I had the following position to play, as Black:



Obviously, I would like to push the d-pawn down and charge, but that is impossible as there would then be two pieces on it and it would be snaffled, so I played 29...♘a4 instead. True I was short of time, but even so, a glance at the diagram

(especially now you know there's something there!) will show that this is hardly an excuse. The game was agreed drawn a few moves later.

Back home at close to midnight, the R30 pointed out at least half-a-dozen moves from the preceding 28 where I could definitely have done better, and at the diagram position, after all of four seconds' consideration, declared 29...d4!

The whole point about this diagram is not that I failed to see some wizz-bang combination while the R30 served it up; ...d4, although a pleasing move to the eye, is nonetheless one that anyone graded over 50BCF could easily see and play - provided they step outside the stereotyped patterns and thought-clichés that go through one's head when deciding on a move ('of course I can't do that, because it'll be attacked twice' etc.). Yet both I and my opponent overlooked the possibility for just such reasons.

Strong computers help you to bust these internal clichés, and powerfully remind and encourage you to look at the actual placement of the pieces as they themselves do, rather than just the 'patterns' and 'lines of force' apparent on the board. Such pattern recognition is, of course, the principal advantage humans have over computer players; but it is equally our chief defect, causing us to overlook what would otherwise be obvious. Combinations don't have to be seven moves deep and played by a grandmaster to be deeply satisfying to the one who makes them, and knowing that the R30

will later be casting a critical eye over my performance has undoubtedly made a positive difference to my play. A strong computer truly opens one's eyes to the striking opportunities that can present themselves even in games between ordinary club players, and makes one strive to find them that much more intently. The extent to which one is successful depends on talent, which is an attribute computers cannot affect by one iota - our querying customer is right about that.

If, in a position you sense to be critical (another of our human advantages, about which Francis Monkman talks elsewhere in this issue), you look but don't find, there is little point in berating oneself too fiercely; a shrug of the shoulders is a more sensible response. But when you don't find because you haven't even *looked*, then, as we all know, the pain can be acute...

So, perhaps our best answer to the original question is that the inspiration a top-class chess computer provides genuinely helps you to use more fully whatever talent you were born with, and one can't ask for more than that.

Of course, our customer could point to the diagram and say "Any halfway-decent computer would find that; why does it prove I need a very good one?" One answer to this is that, alas, the average player's sense of criticality is unreliable, running off an alternating current at best, and subject to frequent periods of total power-down.

One doesn't always know when to stop and really look, either in the game itself or in the subsequent inquest. When, for example, I was doing the post-mortem on my game, my 29...♖a4 didn't seem so very unreasonable, and I would only have allotted the R30 ten seconds thinking time or so before moving on - there are, after all,

a lot of moves to get through in an average game. But the R30, (along with the Genius 68030, Berlin Pro, et al) can find things in ten seconds that lesser machines need a minute for, and discover moves in a minute that might take the others all night long, if at all.

If I only wanted a computer that "can give me a good game - something which will beat me as often than I beat it" (A. N. Customer again) then a good middle-order machine like the Modena or GK2100 would be fine, and will also point out howling misses like ...d4 in not much longer than the exotic ones take.

Certainly, I don't mean to impugn these excellent computers; many customers do not play competitively, and like chess enough to spend £150 on a machine, but have other things they'd rather spend another thousand pounds of disposable income on - all this pre-supposes an interest greater than that.

Indeed, the questioner who sparked off this train of thought was someone who would be prepared to spend the extra if they can see a tangible benefit for themselves by doing so. Analysing with machines that are only as good or slightly better than oneself is still very useful indeed, pointing out just such oversights as the one above in next-to-no-time.

However, there is nonetheless the danger that a computer roughly on a par with you will create the comfortable illusion that in the main, you play pretty well, and don't miss too much. The stronger the computer you study with, the more you will discover that, unfortunately, this just isn't so...

PS: Just in case there's anybody out there who still can't see it, the reason 29...d4 is not only desirable but extremely playable, despite White's rook and knight is ... No! I just can't bring myself to tell you. You'll have to ask a computer I'm afraid. SK

Genius Busted!

Iceland, with its population of perhaps a million, has a remarkable 58 names in the FIDE International Rating List. One player - not included in this group - seems to have developed a formidable technique for beating CCs. Few would argue that Genius 3 is objectively the strongest program available - in either dedicated or PC form - and most would think a GM title necessary to stand much chance against it at Blitz. But, as this letter from Einar Karlsson shows, there is a way through its armour. Five-minute games they may be, but of consistently high quality nonetheless. Eyjolfur Arnmannsson's approach can give us all some pointers as to how a strong but untitled player can beat the Genius. However, what percentage of the time he does so, the letter doesn't say...

With this letter I send you the Genius games I told you about over the phone yesterday. The player is a friend of mine, Eyjolfur Arnmannsson. He is rated around 2100 Elo but he is relatively much stronger in speed chess. If you examine the games you will see that he has found a way of beating Genius by launching an attack while Genius is picking up material and not listening to the warning bells that would sound loudly in the heads of every human player.

I hope you will forward this material to Richard Lang. I feel that it would be a challenge for him to improve the defensive side of Genius and let the program avoid such positions as those in these games.

I believe that Arnmannsson has found a winning pattern against chess computers not well-known, since many people believe that computers are much stronger in speed chess than in longer time limits. These games show that a strong player can get good results against computers even in 5-minute games.

I want to underline that Arnmannsson is a very strict guy. I myself was present in over ten of these games and can verify that no takebacks took place and I know for sure that all the games were in fact finished within the time limit.

Four Knights

- Eyjolfur Arnmannsson
 ■ Genius 3 (486/50)
-

1 e4 e5 2 ♘f3 ♘f6 3 ♘c3 ♘c6 4 ♙b5
 ♙b4 5 O-O O-O 6 d3 ♙xc3 7 bxc3 ♜e7 8
 ♙g5 h6 9 ♙h4 d6 10 h3 ♙e6 11 d4 g5 12
 ♘xg5 hxg5 13 ♙xg5 a6 14 ♙xc6 bxc6 15
 f4 exd4 16 f5 ♙d7 17 ♞f3 c5 18 ♞g3 ♖h7
 19 ♜f3 ♙c6 20 ♞g4 ♖g7 21 ♜g3 ♘xg4
 22 ♙xe7 1-0.

Trompowski

- Eyjolfur Arnmannsson
 ■ Genius 3 (486/50)
-

1 d4 d5 2 ♘f3 ♘f6 3 ♙g5 ♘e4 4 h4 ♘xg5
 5 hxg5 ♙f5 6 e3 e6 7 ♙d3 ♙g6 8 ♙xg6
 fxg6 9 ♜d3 ♖f7 10 ♘e5+ ♖g8 11 f4 ♘d7
 12 ♘d2 ♘xe5 13 dxe5 c6 14 O-O-O a5
 15 ♘f3 ♙c5 16 ♞h3 a4 17 ♞dh1 a3 18 b3
 ♜a5 19 ♘h4 ♜a6 20 c4 ♖f7



21 ♖xg6 ♜hd8 22 ♜xh7 b5 23 ♖h8+
 ♜xh8 24 ♜xh8 bxc4 25 ♜xa8 ♜xa8 26
 g6+ ♗e7 27 bxc4 ♜a7 28 cxd5 ♗xe3+ 29
 ♗b1 ♜b7+ 30 ♜b3 ♜xb3+ 31 axb3 exd5
 32 g3 d4 33 ♜h7 ♗f8 34 f5 ♗g5 35 ♗a2
 ♗g8 36 ♗xa3 d3 37 ♗b2 ♗e3 38 ♗c3 d2
 39 ♗c2 ♗g5 40 ♜h2 ♗e7 41 ♜xd2 1-0.

Four Knights

□ Eyjolfur Armannsson

■ Genius 3 (486/50)

1 e4 ♖f6 2 ♖c3 e5 3 ♖f3 ♖c6 4 ♗b5
 ♗b4 5 O-O O-O 6 d3 d6 7 ♗g5 ♗xc3 8
 bxc3 ♜e7 9 d4 h6 10 ♗h4 g5



11 ♖xg5 hxg5 12 ♗xg5 a6 13 ♗xc6 bxc6
 14 f4 ♜e6 15 f5 ♜e7 16 ♜f3 ♗g7 17 ♜g3
 ♗xf5 18 exf5 ♜g8 19 ♗xf6+ ♗xf6 20
 ♜h5 ♜xg3 21 ♜h6+ ♗xf5 22 ♜f1+ ♗e4
 23 hxg3 ♗d5 24 c4+ ♗xd4 25 ♜d1+
 ♗xc4 26 ♜e3 ♜e8 27 a4 ♜g8 28 ♜d3
 ♜b8 29 ♜e4+ ♗c5 30 ♜c3+ ♗b6 31
 ♜b3+ ♗a7 32 ♜xb8 ♜xb8 33 ♜xc6 ♜b7
 34 ♜d7 f6 35 ♜e6 ♜b1+ 36 ♗h2 ♜b4 37
 ♜xf6 ♜xa4 38 ♜f5 a5 39 g4 ♗b6 40 g5
 ♜h4+ 41 ♗g3 ♜h5 42 ♜g4 ♜h7 43 g6
 ♜g7 44 ♜f5 a4 45 ♜f7 ♜xf7 46 gxf7 a3 1-0.

Trompowski

□ Eyjolfur Armannsson

■ Genius 3 (486/50)

1 d4 ♖f6 2 ♗g5 ♖e4 3 h4 ♖xg5 4 hxg5

e6 5 ♖f3 ♗e7 6 e3 ♗xg5 7 ♗d3 h6 8
 ♖bd2 ♗e7 9 ♜e2 d5 10 O-O-O O-O 11
 ♜dg1 c5 12 c3 ♖c6 13 g4 c4 14 ♗c2 f6 15
 ♜f1 a5 16 ♜h3 b5 17 ♖h4 b4 18 ♖f5
 ♜f7 19 ♖xh6+ 1-0.

Giuoco Piano

□ Eyjolfur Armannsson

■ Genius 3 (486/50)

1 e4 e5 2 ♖f3 ♖f6 3 ♗c4 ♖c6 4 ♖g5 d5 5
 exd5 ♖a5 6 d3 h6 7 ♖f3 e4 8 dxe4 ♖xc4
 9 ♜d4 ♖b6 10 O-O ♗e7 11 c4 c5 12 ♜d3
 ♗g4 13 ♖bd2 O-O 14 e5 ♖fd7 15 b3
 ♗g5 16 ♗b2 ♗xd2 17 ♖xd2 ♜g5 18 f4
 ♜h5 19 ♜ae1 ♗f5 20 ♜c3 ♜g6 21 h3
 ♜fe8 22 ♗h2 h5 23 ♖f3 ♜ad8 24 ♖h4
 ♜h7 25 ♜f3 ♜e7 26 ♜g3 ♗c2 27 ♜ee3
 ♗b1 28 ♜g5 ♖c8 29 ♜eg3 g6 30 f5 ♖f8
 31 e6 fxe6 32 fxe6 ♖b6 33 ♜f3 ♖xe6 34
 dxe6 ♜f8 35 ♜d1 ♜xe6 36 ♜xb1 ♜f7 37
 ♜xg6+ ♜xg6 38 ♜xg6+ ♗f8 39 ♜d1 ♗e8
 40 ♜e6+ ♜e7 41 ♜e2 ♜xe6 42 ♜xe6+
 ♜e7 43 ♜xe7+ ♗xe7 44 g4 hxg4 45 hxg4
 ♖d7 46 ♗g3 ♖f8 47 ♗f4 ♖e6+ 48 ♗f5
 ♗f7 49 g5 ♖g7+ 50 ♗e5 ♖e8 51 g6+ ♗f8
 52 ♗e6 ♖g7+ 53 ♗xg7+ ♗xg7 54 ♗f5
 b6 55 ♖f3 a6 56 ♖d2 a5 57 ♖e4 ♗g8 58
 ♗f6 1-0.

Sicilian

□ Eyjolfur Armannsson

■ Genius 3 (486/50)

1 e4 c5 2 ♖f3 d6 3 d4 cxd4 4 ♖xd4 ♖f6 5
 ♖c3 e6 6 g4 ♖c6 7 g5 ♖d7 8 h4 a6 9 ♗e3
 ♗e7 10 ♜d2 O-O 11 O-O-O ♖xd4 12
 ♗xd4 b5 13 ♗d3 ♗b7 14 f4 b4 15 ♖e2
 d5 16 e5 ♜c7 17 ♖g3 ♖c5 18 ♗xc5
 ♜xc5 19 ♜e2 a5 20 ♗b1 a4 21 ♜h5 g6
 22 ♜h6 ♗h8 23 ♖h5 ♜g8 24 ♖f6 ♗xf6
 25 gxf6 ♜f8 26 ♜g5 b3 27 a3 bxc2+ 28
 ♗xc2 ♜c5 29 h5 ♜gc8 30 ♜c1 1-0.

Caro-Kann

□ Eyjolfur Armannsson

■ Genius 3 (486/50)

1 e4 c6 2 f4 d5 3 e5 ♟f5 4 d4 ♞d7 5 ♟d3
 ♟xd3 6 ♞xd3 e6 7 ♞e2 c5 8 c3 cxd4 9
 ♞xd4 ♞e7 10 ♟e3 ♞g6 11 ♞d2 ♟c5 12
 O-O-O O-O 13 h4 ♞xh4 14 ♞h3 h6 15
 ♞dh1 ♟xd4 16 cxd4 ♞xg2 17 ♞g1 ♞h4
 18 ♞f3 ♞f5 19 ♟f2 ♞c7+ 20 ♟b1 ♞fc8
 21 ♞h4 ♞e7 22 f5 exf5 23 ♞xf5 ♞xf5 24
 ♞xf5 ♞f8 25 ♟e3 ♞g6 26 e6 ♞f8 27
 ♟xh6 gxh6 28 ♞xh6 1-0.

Four Knights

□ Eyjolfur Armannsson

■ Genius 3 (486/50)

1 e4 e5 2 ♞f3 ♞c6 3 ♞c3 ♞f6 4 ♟b5
 ♟b4 5 O-O O-O 6 d3 ♟xc3 7 bxc3 ♞e7 8
 ♞e1 d6 9 ♟xc6 bxc6 10 ♟g5 ♞b8 11 ♞e3
 ♟g4 12 h3 ♟h5 13 g4 ♟g6 14 ♞h4 h6 15
 ♟xf6 ♞xf6 16 ♞f5 ♞b2 17 ♞f3 ♞e6 18
 c4 ♞fb8 19 ♟h2 h5 20 ♞d2 hxg4 21 hxg4
 ♟xf5 22 gxh5 ♞h6+ 23 ♞xh6 gxh6 24 f6
 ♞xc2 25 ♞g1+ ♟h8 26 ♞g7 ♞f8 27 ♟g2
 ♞g8 28 ♞fg3 ♞xg7 29 ♞xg7 ♞xa2 30
 ♞xf7 ♟g8 31 ♞xc7 c5 32 ♟g3 ♞a3 33
 ♟g4 a5 34 ♟f5 ♞a1 35 ♟e6 ♞f1 36 ♞c8+
 ♟h7 37 f7 ♞xf2 1-0.

Sicilian

□ Eyjolfur Armannsson

■ Genius 3 (486/50)

1 e4 c5 2 ♞f3 e6 3 b4 cxb4 4 d4 ♞f6 5
 ♟d3 d5 6 e5 ♞e4 7 h4 ♟e7 8 ♞g5 ♞xg5
 9 hxg5 ♟xg5 10 f4 ♟e7 11 ♞g4 g6 12
 ♞d2 ♞c6 13 ♞f3 h5 14 ♞h3 ♟f8 15 g4
 ♟g7 16 ♟e3 ♞a5 17 ♟e2 hxg4 18 ♞xg4
 ♞xh1 19 ♞xh1 b6 20 ♟xg6 fxg6 21
 ♞xg6+ ♟f8 22 ♞h7 ♞a6+ 23 ♟f2 ♞b7
 24 ♞g5 b3 25 cxb3 ♞b4 26 f5 exf5 27
 ♞xg7 ♞d3+ 28 ♟g1 ♞xg7 29 ♞e6+
 ♟xe6 30 ♟h6 ♞xh6 31 ♞xh6+ ♟e7 32

♞g7+ ♟d8 33 ♞f8+ ♟c7 34 ♞xa8 a5 35
 ♞a7+ ♟c6 36 ♞b8 ♞f4 37 ♞d6+ ♟b7
 38 ♟f2 ♟c8 39 ♟f3 ♞e6 40 ♞xd5+ ♟a7
 41 ♞c4 ♟b8 42 d5 ♞c7 43 d6 ♞e6 44
 ♟f2 ♟d7 45 ♞a6 b5 46 ♞xa5 ♟b7 47 a4
 bxa4 48 bxa4 f4 49 ♞b4+ ♟c8 50 a5 ♟c6
 51 a6 ♟d7 52 a7 ♟d8 53 ♞b6+ 1-0.

English

□ Genius 3 (486/50)

■ Eyjolfur Armannsson

1 c4 ♞c6 2 ♞f3 e5 3 d4 e4 4 d5 ♞b8 5
 ♞d4 d6 6 ♞c3 f5 7 e3 ♞f6 8 ♟e2 ♟e7 9
 O-O O-O 10 b4 ♞e8 11 ♟b2 a6 12 a3
 ♞g6 13 ♞e1 ♞g4 14 ♟xg4 fxg4 15 ♞c2



15... ♞f3 16 ♞xf3 gxh3 17 g3 ♟f5 18 ♟h1
 ♞d7 19 ♞b1 ♞g4 20 ♞g1 ♞f8 21 ♞d2
 ♟f6 22 ♞ab1 ♟xb2 23 ♞xb2 ♞e5 24 ♞f1
 ♞h3 25 c5 ♞g4 26 cxd6 cxd6 27 ♞c7
 ♟d7 28 a4 ♟xa4 29 ♞e7 ♞f6 30 ♞d8+
 ♟f7 31 ♞c7+ ♟g6 32 ♞e7 ♟b5 33
 ♞xe4+ ♟h6 34 ♞xg4 ♞xg4 35 ♞d2 ♟e2
 36 e4 ♞g6 37 ♞c2 ♞g5 38 ♞c3 ♞h5 0-1.

Philidor

□ Genius 3 (486/50)

■ Eyjolfur Armannsson

1 e4 e5 2 ♞f3 d6 3 d4 f5 4 dxe5 fxe4 5
 ♞g5 d5 6 e6 ♟c5 7 ♞f7 ♞f6 8 ♞e2 c6 9
 ♞xh8 ♟xe6 10 f3 ♞d7 11 fxe4 O-O-O
 12 e5 ♞xe5 13 ♟e3 ♟xe3 14 ♞xe3 ♞e8
 15 ♟e2



15...dxc4 16 ♖f3 ♖xb2 17 O-O ♖xa1 18 dxc3 ♖b2 19 ♙xc4 dxc4 20 dxf7 ♖b6+ 21 ♖h1 ♖c7 22 dfg5 dff6 23 ♖e1 ♙d7 24 ♖xe8+ ♙xe8 25 ♖e2 ♙f7 26 dxf7 ♖xf7 27 g3 ♖d7 28 ♖d2+ d5 29 ♖g1 ♖f3 30 dxd5 ♖xd5 31 ♖c3 ♖c5+ 32 ♖g2 ♖g5 33 ♖xc4 ♖d5+ 34 ♖xd5+ cxd5 35 ♖f3 ♖d6 36 ♖e3 ♖c5 37 c3 b5 38 ♖d3 a5 39 a3 g5 40 g4 h6 41 h3 a4 42 ♖d2 ♖c4 43 ♖c2 d4 44 cxd4 ♖xd4 45 ♖d2 ♖c4 46 ♖c2 b4 47 axb4 ♖xb4 48 ♖b2 ♖c4 49 ♖a3 ♖d4 50 ♖xa4 ♖e4 51 ♖b4 ♖f4 52 ♖c4 ♖g3 53 ♖d4 ♖xh3 0-1.

Vienna

□ Eyjolfur Armannsson
 ■ Genius 3 (486/50)

1 e4 d6 2 d3 e5 3 ♙c4 d6 4 d3 ♙c5 5 ♙e3 ♙xe3 6 fxe3 O-O 7 ♖f3 da5 8 ♙b3 d6 9 dge2 ♙g4 10 ♖g3 dxb3 11 axb3 ♖d7 12 O-O dh5 13 ♖h4 a6 14 ♖f2 ♖ae8 15 ♖af1 d6 16 d3 c6 17 d5 ♙xf5 18 ♖xf5 ♖h8



19 ♖xf6 gxf6 20 ♖xf6+ ♖g8 21 ♖f3 ♖g4

22 ♖g3 ♖xg3 23 hxg3 ♖e6 24 ♖f5 ♖fe8 25 d6 e2 ♖8e7 26 g4 ♖h8 27 d3 ♖g6 28 dh5 h6 29 ♖c8+ ♖g8 30 ♖f5 ♖g6 31 ♖h2 a5 32 d3 ♖h7 33 ♖h5 d5 34 d5 ♖c7 35 exd5 cxd5 36 c4 e4 37 dxe4 dxc4 38 bxc4 f6 39 dh4 ♖g5 40 ♖e8 ♖xg4 41 d5 ♖g8 42 ♖b5 ♖g5 43 c5 ♖h5+ 44 ♖g1 ♖g5 45 ♖b6 ♖f7 46 ♖xa5 d7 47 ♖b6 ♖g6 48 b4 h5 49 d4 ♖e5 50 b5 ♖ee7 51 c6 bxc6 52 bxc6 ♖a7 53 d5 ♖a1+ 54 ♖f2 ♖a2+ 55 ♖f3 ♖e8 56 c7 ♖c2 57 d6 ♖f8 58 ♖b7 ♖c3 59 c8=♖ ♖cxc8 60 dxc8 ♖f7 61 ♖d5 ♖g7 62 d6 ♖e7 63 ♖f5+ 1-0.

Centre Gambit

□ Eyjolfur Armannsson
 ■ Genius 3 (486/50)

1 e4 e5 2 d4 exd4 3 c3 dxc3 4 dxc3 d6 5 ♙c4 ♙b4 6 d3 d6 7 O-O ♙xc3 8 bxc3 ♖e7 9 ♖e1 d6 10 ♙g5 h6 11 ♙h4 O-O 12 ♖c2 ♙e6 13 ♙d5 g5



14 d3 xg5 hxg5 15 ♙xg5 ♖fe8 16 ♖e3 d6 17 ♖g3 ♖h8 18 d1 ♙xd5 19 exd5 d6 20 ♖e3 ♖d8 21 d1 e1 ♖xe3 22 ♖xe3 ♖g8 23 ♖g3 ♖f8 24 ♖e2 ♖e7 25 ♖e3 ♖d8 26 ♙h6+ ♖g8 27 ♖g3+ ♖h8 28 ♙g7+ 1-0.

Giucoco Piano

□ Eyjolfur Armannsson
 ■ Genius 3 (486/50)

1 e4 e5 2 d3 d6 3 ♙c4 d6 4 ♖e2 ♙c5

5 d3 d6 6 c3 O-O 7 ♖g5 h6 8 ♗h4 ♖g4 9
h3 ♗h5 10 g4 ♖g6 11 g5 hxg5 12 ♗xg5
♗a5 13 ♗bd2 ♗xc4 14 dxc4 ♗e7 15 O-
O-O ♗e6 16 ♖dg1 a5 17 ♗h4 ♗h5 18
♗d3 ♗xf2 19 ♖f1 ♗h7 20 ♖xf2 ♗xg5 21
♗f5 ♖g6 22 ♖g1 ♗h7 23 h4 ♗f6 24 ♗g3
a4 25 ♖h2 a3 26 h5 axb2+ 27 ♗xb2
♗xh5 28 ♖xh5 ♗f6 29 ♖h2 ♗xf5 30 exf5
g6 31 fxg6 ♗f5 32 gxh7+ ♗xf7 33 ♗g7+
♗e6 34 ♖h6+ ♖f6 35 ♖gg6 ♖xg6 36
♖xg6+ ♗xg6 37 ♗xg6+ ♗d7 38 ♗e4 b6
39 ♗f7+ ♗c8 40 ♗e8+ ♗b7 41 ♗e6 ♖h8
42 a4 ♖h2+ 43 ♗b3 ♖h7 44 ♗d5+ ♗a7
45 a5 bxa5 46 ♗xa5+ ♗b8 47 ♗a6 ♖e7
48 c5 1-0

Reti

□ Eyjolfur Armannsson
■ Genius 3 (486/50)

1 ♗f3 ♗f6 2 g3 b6 3 ♖g2 ♗b7 4 O-O c5

5 d4 cxd4 6 ♗xd4 e6 7 ♖g5 ♗c5 8 ♗h4
d5 9 ♗bd2 ♗bd7 10 ♖ad1 O-O 11 c4 h6
12 ♗xh6 gxh6 13 ♗xb6 ♗g4 14 ♗h5
♗xf2 15 ♖xf2 ♗xf2+ 16 ♗xf2 ♗f6 17
♗g1 ♗xb2 18 ♗g5 ♗f6 19 ♗h6 ♗d4+
20 ♗h1 ♖ac8 21 ♖f1 ♗xd2 22 ♖xf6
♗c1+ 23 ♖f1 ♗xf1+ 24 ♗xf1 dxc4+ 25
♖g2 ♗xg2+ 26 ♗xg2 ♖fd8 27 ♗h7+
♗f8 28 ♗xf7# 1-0.

Three Knights

□ Eyjolfur Armannsson
■ Genius 3 (486/50)

1 e4 e5 2 ♗f3 ♗f6 3 ♗c3 ♗b4 4 ♗c4 d6 5
d3 O-O 6 ♖g5 ♗c6 7 O-O h6 8 ♗h4 ♗a5
9 ♗d5 g5 10 ♗xg5 ♗xe4 11 dxe4 hxg5
12 ♗h5 gxh4 13 f4 ♗e6 14 f5 ♗xd5 15 f6
♗b6+ 16 ♗h1 ♗xf6 17 ♖xf6 ♗e3 18
exd5 ♗d8 19 ♗d3 ♖e8 20 ♖af1 ♗f4 21
g3 1-0.

Letter to the Editor

Re: History Corner... (page 8, SS054)

Dear Sir,

I have 'Sensor Computachess' which is an 8-level portable peg sensory computer, made in the early-to-mid 'eighties by Diversified Products Corporation, the program is copyright of White & Allcock Ltd., Hong Kong. Size 17cm x 12cm. The board is missing one black knight.

If your correspondent can put this computer to good use (just what does he want all these computers for? I'm intrigued!) I can send it to him. The computer is so basic, and plays so badly (even on top level) I don't feel I could justify asking anything for it, but maybe after I've sent it he would refund the postage.

Yours faithfully, D. Thompson.

Thank you Mr Thompson. I'm sure our CC collector will shortly be in touch. Ed.

The S/S Rating Guide

For the benefit of new readers, the hieroglyphics on the back cover are explained...

The internationally recognised standard for assessing the strength of chessplayers is called the Elo Rating System, after its inventor Professor Arpad Elo. For UK players, there is also the system operated by the British Chess Federation. Both systems express strength in the form of a score based on results. The Elo figure can be translated into BCF by the formula 'Elo minus 600, divided by 8'.

Our back cover has two rating lists, both of which have been built up over many years. The *Selective Search* list (abbreviated to 'S/S') contains games played at 'Game in 60 minutes' or longer, whilst the *Ply* list only has games played at 40 moves in 2 hours, the most frequently used time setting in international tournaments. 'Ply' is the name of a Swedish magazine devoted to chess computers, and their rating list is run as part of an ongoing university project. It is therefore free of commercial considerations of any kind. They kindly allow *Selective Search* to make use of their data.

Unfortunately Elo points are not identical from one country to the next, so one should add 100 points to the *Ply* figures to arrive at an 'English translation'; i.e. a Swedish player with an Elo of 2259 would be regarded as around 2359 over here. Beware of manufacturer's claims regarding 'USCF' grades. This is the American system, and runs at another 100 points higher than the UK, or 200 points more than *Ply*!

All the computers are ranked in strength order according to the S/S list, which just shows 'name, rank and number' plus the quantity of games on which

the grade is based. The *Ply* list shows the Elo rating (without the 'add 100' adjustment mentioned above), the BCF equivalent, the number of games taken into consideration, plus another column marked '+/- Elo'. This indicates the margin of error. For example, a computer graded at 2259 on the basis of 250 games has a margin of error of 59 Elo; i.e. the figure of 2259 might actually be as low as 2200, or as high as 2318; however the median figure is more likely to be correct than those at the extremes. The higher the number of games played, the more reliable the grade, so this 'plus or minus' figure comes down progressively as more and more games are played.

Fortunately, the ratings of humans are not subjected to such rigours - your grade is your grade, for a whole year at a time!

To put the figures into context, 1000 Elo (BCF 50) is beginner standard. From here to 1400 (BCF 100) is good hobby player / weak club player territory. 1600 (125) would be regarded as a slightly better than average club player, and 2000 (175 BCF) as a very good one.

Anyone over 2200 (BCF 200) is seriously strong by most standards, very likely playing for his county or in the top section of weekend congresses. A 2350 (219 BCF) player might well hold a title (perhaps FIDE Master, abbreviated to FM); a 2400 (BCF 225) player could be an International Master (IM), and 2500 (BCF 237) is Grandmaster (GM) standard. World Champion Garry Kasparov is Elo 2805 at the moment, or 276 BCF - the highest rating of all time.

S/S

Ply

S/S

Ply

Rank	Computer	BCF	Games	Elo	BCF	+/-	Games
					equiv. Elo		
1	Meph Genius 68030	228	49	-	-	-	-
2	Meph Berlin Pro	225	232	2264	208	50	211
3	Tasc R30 (Active)	225	38	-	-	-	-
4	Meph Lyon 68030	218	374	-	-	-	-
5	Meph Vanc. 68030	216	472	2235	204	37	451
6	Meph Risc IMB	216	714	2216	202	28	683
7	Meph Port 68030	214	460	-	-	-	-
8	Saitek Retl.Sparc 20	214	471	2215	202	33	471
9	Saitek Risc 2500	210	864	2201	200	25	812
10	Novag Sapph/Diam'd	206	27	-	-	-	-
11	Meph Vanc. 68020/12	204	933	2165	196	25	892
12	Meph Lyon 68020/12	204	2492	-	-	-	-
13	Meph Vanc. 68000	202	835	2103	188	25	816
14	Meph Berlin	202	658	-	-	-	-
15	Meph Port. 68020	200	1713	-	-	-	-
16	Fid Elite 68030 V9	199	379	2121	190	40	372
17	Meph Lyon 68000	197	1325	-	-	-	-
18	Meph Almeria 68020	196	1003	-	-	-	-
19	Meph Port. 68000	193	1478	-	-	-	-
20	Fid Mach 4/Elite V7	193	1396	-	-	-	-
21	Mephisto Nigel Short	191	39	-	-	-	-
22	Saitek Brute Force	188	223	-	-	-	-
23	Fid El. 68000 x2 V5	188	258	-	-	-	-
24	Meph Roma 68020	186	1043	-	-	-	-
25	Meph Polgar 10	186	609	-	-	-	-
26	Novag Diablo/Scorpio	185	951	2007	176	23	928
27	Meph Almeria 68000	184	1025	-	-	-	-
28	Meph Dallas 68020	184	996	-	-	-	-
29	Fid Mach 3 68000 v2	180	2371	1995	170	14	2343
30	Meph Milano	180	811	1961	170	26	740
31	Meph MMS	180	1319	-	-	-	-
32	Meph Polgar 5	179	1615	1972	171	17	1594
33	Meph Dall./Mon.Dall	178	2283	-	-	-	-
34	Nov S.Forte/Exp. 6C	178	2371	-	-	-	-
35	Meph Roma/Montreal	176	2267	-	-	-	-
36	Meph Academy	175	2000	-	-	-	-
37	GK2100/President	175	22	-	-	-	-
38	Meph Modena	173	1204	1924	160	22	1020
39	Meph Amsterdam	173	2373	-	-	-	-
40	Nov S.Forte/Exp. 6B	173	1343	-	-	-	-
41	Meph Mega 4	172	2435	-	-	-	-
42	Fid Mach 2B/C 68000	172	2909	-	-	-	-
43	Saitek Gal-Ren D10	172	1209	-	-	-	-
44	T'Matr./Trompowski	170	505	-	-	-	-
45	Meph S.Mond2/MC4	170	224	-	-	-	-
46	Novag Ruby/Emerald	169	529	1877	160	31	492
47	Meph MM4	169	2866	-	-	-	-
48	Saitek Travel Champ	169	45	-	-	-	-
49	Nov S.Forte /Exp. 6A	168	1155	-	-	-	-
50	Saitek Turbo King II	166	894	1867	-	24	883
51	Meph MonteCarlo	166	262	-	-	-	-
52	Saitek Gal. / Ren. C8	166	313	-	-	-	-
53	CXG Sphinx Galaxy	165	1567	1883	-	18	1558
54	Conchess Ply.Vict.5.5	165	697	-	-	-	-
55	Fid Mach 2A 68000	164	338	-	-	-	-
56	Saitek GK2000	164	558	1902	163	30	553
57	Novag Expert 5/6	161	532	-	-	-	-
58	Fid Club 68000	161	1459	-	-	-	-
59	Novag Jade / Zircon	161	18	-	-	-	-
60	Novag Forte B	159	1917	-	-	-	-
61	Meph Rebell	159	2121	-	-	-	-
62	Fid Avant Garde 5	159	1721	-	-	-	-
63	Fid Par E./Des. 2100	158	2538	-	-	-	-
64	Saitek Stratos /Corona	158	3053	-	-	-	-
65	Novag Forte A	157	2202	-	-	-	-
66	Meph S.Mondial 1	157	1420	-	-	-	-
67	Conchess Plymate 5.5	157	2169	-	-	-	-

Rank	Computer	BCF	Games	Elo	BCF	+/-	Games
					equiv. Elo		
68	Saitek Simultano	157	364	-	-	-	-
69	Saitek Gal/Ren.	157	976	-	-	-	-
70	Conchess 6	155	107	-	-	-	-
71	Fid Excellence 4	155	1740	-	-	-	-
72	Novag Expert 4	155	962	-	-	-	-
73	Conchess Plymate 4	153	372	-	-	-	-
74	Saitek Turbo Kasp 4	153	512	-	-	-	-
75	Fid Elite C	152	182	-	-	-	-
76	Mephisto MM2	151	781	-	-	-	-
77	Saitek Gal. / Ren. B4	151	37	-	-	-	-
78	Fid Exc./ Des. 2000	150	1646	-	-	-	-
79	Saitek Prisma / Hlitz	149	306	-	-	-	-
80	Conchess 4	148	509	-	-	-	-
81	Novag Super Const.	147	3689	-	-	-	-
82	Novag Super Nova	147	411	-	-	-	-
83	Novag Supremo	144	28	-	-	-	-
84	Meph Europa/M.Polo	143	240	-	-	-	-
85	Novag Super VIP	143	335	-	-	-	-
86	Fid Prestige / Elite A	142	856	-	-	-	-
87	Fid Sensory 12	141	1340	-	-	-	-
88	Saitek Superstar 36K	139	997	-	-	-	-
89	Conchess 2	139	1096	-	-	-	-
90	Novag Const. 3.6	137	825	-	-	-	-
91	Novag Quattro	137	585	-	-	-	-
92	Novag Primo / VIP	137	354	-	-	-	-
93	Meph Mondial 2	136	31	-	-	-	-
94	Fid Elite B / Original	133	236	-	-	-	-
95	Meph Mondial 1	131	247	-	-	-	-
96	Novag Const. 2.0	130	1289	-	-	-	-
97	CXG S.Ent/Adv.Star	128	922	-	-	-	-
98	CXG 3000	123	17	-	-	-	-
99	Fid Sensory 9	121	1114	-	-	-	-
100	Saitek Ast/Comq/Cavl	121	61	-	-	-	-

PC Programs

1	Mephisto Genius 2 (486/50-66)	-	-	2346	220	39	369
2	ChessMachine 30Mhz (King 2.0, aggressive)	-	-	2320	216	29	733
3	ChessMaster 4000(486/50)	-	-	2314	215	42	345
4	ChessMachine 30Mhz (Schroeder 3.1)	-	-	2312	211	35	476
5	M-C Pro 3.5 486/50-66	-	-	2302	210	39	365
6	Chess Genius 1 (486/50-66)	-	-	2291	210	41	358
7	Meph. Gideon Pro (486/50-66)	-	-	2289	201	38	372
8	ChessMachine 30Mhz (Schroeder 3.0)	-	-	2279	200	62	168
9	M-Chess Pro 3.12 (486/50-66)	-	-	2276	199	37	427
10	Chess Genius 1 (486/33)	-	-	2264	195	50	211
11	Kallisto 1.82 (486/50-66)	-	-	2247	194	55	177
12	M-Chess Pro 3.12 (486/33)	-	-	2245	191	55	179
13	Hiarcs Master 2.0 (486/33)	-	-	2213	186	48	215
14	C-Machine 16Mhz (Schroeder, ARM2)	-	-	2200	179	29	619
15	M Chess 1.1-1.71 (on 486/33)	-	-	2195	178	44	326
16	CM The King 512k	-	-	2184	176	35	413