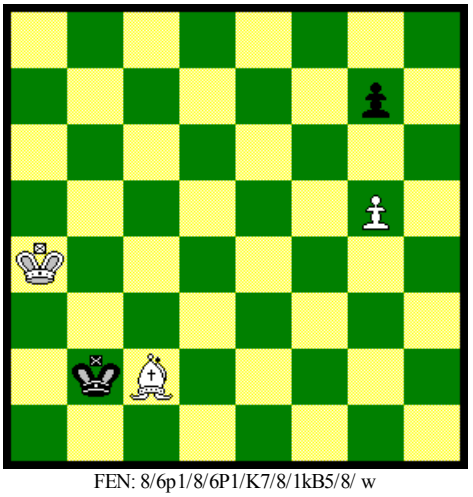
# Chess Tests: Basic Suite, Positions 36-40



Last update: 05/03/98

See the *Notes on Problem Solving*

***36.- G. Wenink, 1922***



FEN: 8/6p1/8/6P1/K7/8/1kB5/8/ w

***White to play and win: 1. Bc2-b1***

Results

| Program | CPU/Mhz | Hash table | Move | Value | Plys/Max | Time | Notes |
|---|---|---|---|---|---|---|---|
| Chess Master 2175 | P100 | 16 Mb | Bc2-b3 | +3.55 | 21 | 00:02:41 | can't see it |
| Chess Genius 1.0 | P100 | 320 Kb | Bc2-b1 | +6.72 | 19/31 | 00:09:14 | seen at 7m 49s |
| PANEK Chess Genius 5.0 | PII/266 | 16 Mb | Bc2-b1 | +6.94 | 19/31 | 00:00:39 | seen at 28s, +4.30 |
| PANEK Chess Genius 5.0 | PII/266 | 16 Mb | Bc2-b1 | +7.87 | 23/32 | 00:11:27 | |
| Rebel Decade 1.2 | P100 | 192 Kb | Bc2-b3 | +3.45 | 18 | 00:07:29 | can't see it |
| Rebel Decade 2.0 | P100 | 512 Kb | Bc2-b3 | +3.04 | 19 | 00:40:26 | can't see it |
| Comet-A.75 | P100 | 13786 Kb | Bc2-b1 | +6.60 | 21 | 00:07:45 | 13.227.541 nodes |
| Crafty 12.7 | P100 | 12+5 Mb | Bc2-b3 | +5.269 | 22/24 | 00:39:30 | can't see it |
| KAI Crafty 12.6 | Pentium Pro 200 Mhz | 24+16 Mb | Bc2-b1 | Mate24 | 17 | 00:00:55 | seen at 29 sec. |
| KAI Chess Master 5500 | Pentium Pro 200 Mhz | ? | Bc2-b1 | +9.62 | 20/24 | 00:15:36 | sees the win |

**Notes:**

This is a seemingly simple, yet *quite difficult* endgame position. White's king direct approach to the black pawn isn't any useful. Going back with the bishop to *h7* results in the black king eventually reaching *f8*, where it simply gets stalemated. Any other

retreats of the bishop along the diagonal *b1-h7* only waste time. Thus, the seemingly paradoxical solution is to sacrifice the bishop at *b1*, forcing black to lose a valuable tempo.

A human player would discover this after a while, but a program needs to search at least to *25 plies* or more to see the correct move.

**Chess Master 2175**, with a large 16 Mb hash table, is unable to see the win. It searches to its maximum hard limit of 21 plies, and actually ends the search !. It does it very quickly for such a deep search, but 21 plies are insufficient to see the solution.

**Chess Genius 1.0**, despite its small 320 Kb hash table, discovers the correct move after searching to 19 plies plus 12 extra extensions for selected lines, and sees that even losing the bishop (worth +3.00) white still achieves a +6.72 gain, that is, it sees *white's pawn promotion*.

On the other hand, its latest incarnation, **Chess Genius 5.0** does the same, discovering the same move with nearly the same value (+6.94), and looking also at 19/31 plies, but thanks to the faster hardware, to the much larger hashtable, and other improvements, it does it *15 times faster*. Continuing the search for another 4 plies (23/32) improves further the evaluation to +7.87.

**Rebel Decade 1.2** searches to 18 plies, examines *9.170.143 positions*, yet it does not see the winning move, neither does it see black pawn's capture. Each additional ply was taking more than 3 times longer than the preceding, so if 25 plies were needed, it could take longer than a month !.

The new **Rebel Decade 2.0** does no better. Even searching one ply deeper, at 19 plies, and examining *36.669.713 positions* it neither finds the correct move nor sees any gain at all. Also, it searches to 19 plies *4 times slower* than CG1.0, which found the correct move at that depth.

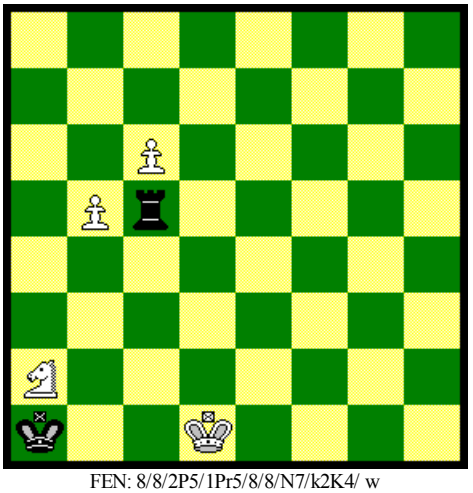
**Comet-A.75**, a strong freeware program, has the benefit of a large 13 Mb hash table, so it can search 2 plies deeper than RD2.0, 21 plies, but more than *5 times faster*, discovering the correct Bishop sacrifice with a large +6.60 gain. It evaluated more than *13 millions positions* to find the win.

**Crafty 12.7**, using a large 12 Mb hash table plus an additional 5 Mb one for pawn structures, searches to 22 plies, plus 2 for selected extensions, examines *61.218.855* nodes, of which 43.961.440 are evaluated, but it does not see the correct move. Its +5.269 evaluation reflects the +3.00 material advantage of the extra bishop, plus the +1.00 material value of capturing the black pawn, and the positional score of white's advanced, passed, protected pawn and black king's confinement near the edge. What it does not understand is that the black king at *f8* can only be stalemated.

Its younger brother, **Crafty 12.6**, running on much faster hardware, with much larger hash tables, and most importantly, using *endgame tablebases*, needs to look at only 17 plies to find, in *less than a minute*, both the correct move and the fact that ***it's a mate in 24*** or less !!. *Amazing !*. The move itself is considered best after less than half a minute, and the other half is spent discovering it's a mate in 24 (or less). So much for endgame tablebases, CPU, and RAM !.

**Chess Master 5500** cannot outperform this without endgame tablebases, but it looks at 20/24 plies on a reasonable time, and finds the correct move and the maximum gain possible, short of mate (+9.62), so it sees the promotion, if not the mate itself.

### *37.- M. Liburkin, 1931*



FEN: 8/8/2P5/1Pr5/8/8/N7/k2K4/ w

***White to play and win: 1. Na2-c1! Rc5-d5+ 2. Kd1-c2 Rd5-c5+ 3. Kc2-d3 !!***

Results

| Program | CPU/Mhz | Hash table | Move | Value | Plys/Max | Time | Notes |
|---|---|---|---|---|---|---|---|
| Chess Genius 1.0 | P100 | 320 Kb | Na2-c1 | +2.00 | 18/30 | 04:27:37 | sees 3. Kd3 !! |
| PANEK Chess Genius 5.0 | PII/266 | 16 Mb | Na2-c1 | +0.52 | 11/23 | 00:00:12 | sees 3. Kd3 !! |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PANEK Chess Genius 5.0 | PII/266 | 16 Mb | Na2-c1 | +12.77 | 20/32 | 12:00:00 | sees 3. Kd3 !! |
| Rebel Decade 2.0 | P100 | 512 Kb | Na2-c1 | +1.48 | 18/24 | 03:53:37 | sees 3. Kd3 !! |
| Comet-A.75 | P100 | 13786 Kb | Na2-c1 | +0.00 | 14 | 00:34:11 | can't see 3. Kd3 |
| Crafty 12.7 | P100 | 6+1 Mb | Na2-c1 | +3.740 | 16/24 | 02:09:40 | sees 3. Kd3 !! |
| Crafty 12.7 | P100 | 6+1 Mb | Na2-c1 | +4.756 | 17/23 | 05:51:50 | sees 3. Kd3 !! |
| KAI Crafty 12.6 | Pentium Pro 200 Mhz | 24+16 Mb | Na2-c1 | +0.000 | 15 | 00:12:43 | can't see 3. Kd3 !! |
| KAI Chess Master 5500 | Pentium Pro 200 Mhz | ? | Na2-c1 | +1.75 | 14/28 | 00:09:20 | sees 3. Kd3 !! |

## Notes:

This is a also a *seemingly simple* endgame, which nevertheless has *one or two surprises*. In the main variation, black manages to sacrifice its rook in the promotion square in such a way that if white promotes to a queen or rook, *black's stalemated !*. However, white *underpromotes to a bishop* and goes on to perform a classical mate of king, bishop and knigth vs. lone king, well within the 50-move rule limits !

**Chess Genius 1.0** sees the correct first move at all ply depths. However, by the time it reaches 18/30 plies, it evaluates it at *+2.00*, and sees the correct main variation ***1. Na2-c1! Rc5-d5+ 2. Kd1-c2 Rd5-c5+ 3. Kc2-d3!!***. *Only this difficult third move wins*, other king moves just draw.

**Chess Genius 5.0** sees the correct 1st and 3rd moves unbelievably quickly, while looking at only 11/23 plies, though with a low +0.52 evalution. Continuing the search for *12 hours*, it reaches an amazing depth of 20/32 plies, and predicts this *Principal Variation*:

***a2c1**, c5d5+, d1c2, d5c5+, **c2d3!**, c5c1, d3d4, a1a2, d4d5, c1d1+, d5c5!, d1c1+, c5d6!, c1d1+, d6c7, d1f1, b5b6, f1f7+, c7c8, f7f6, c8b7*

with the highest value among all programs tested, *+12.77*.

**Rebel Decade 2.0** sees the correct move *and* the winning ***3. Kc2-d3 !!*** very early, at 12 plies in 1m 58s, but with a very low +0.18 evaluation. One ply deeper, at 13 plies, it raises the evaluation to a still low +0.61, taking 5m 3s. By the time it reaches 18 plies, it has examined *210.247.233 positions* and the evaluation raises to an unremarkable +1.48, nothing to write home about but enough to guarantee it sees the win.

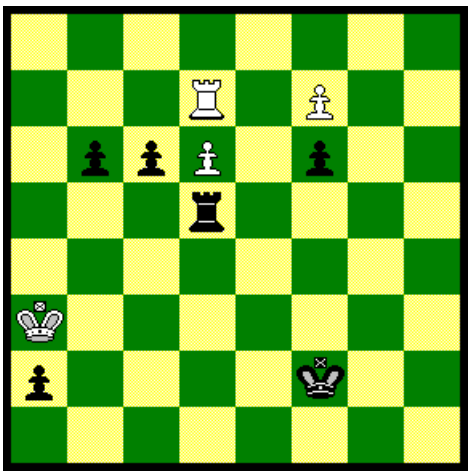
**Comet-A.75**, uses a 13 Mb hash table, but although it evaluated *60.082.618 positions* while searching 14 plies deep in some half an hour, it couldn't find the essential ***3. Kc2-d3 !!***. It sees the correct move, but merely evaluated as a draw, *+0.00*. It does not recognize the win.

**Crafty 12.7**, using a 6 Mb hash table plus an additional 1 Mb for pawn structures, also finds the correct first move at all ply depths, but it's convinced it's *a dead draw, +0.000* for plies 12,13,14 and 15, because it does not see the winning ***3. Kd3*** in the main variation, but rather ***3. Kd2*** which just draws by repetition. However, when it reaches 16/24 and 17/23 plies, it discovers the wonders of ***3. Kd3*** and evaluates the move as *+3.740* and *+4.756*, respectively, in times bracketing that of CG1.0.

**Crafty 12.6**, running on faster hardware and with larger hash tables, looks at 15 plies in a reasonable time, but insufficient to see anything but the draw, as it does not see the essential move *3. Kd3!!*. It would need to look one or two plies deeper still to see the win.

However, **Chess Master 5500** shines with this one. It finds the correct move and sees the win after looking at only 14/28 plies (vs. 16, 17, 18) in the second shortest time, more than *10 times faster* than **Chess Genius 1.0**, for instance. But **Chess Genius 5.0** does a lot better, needing only 11/23 plies and taking much less time.

### *38.- A. Herbstmann, 1954*



FEN: 8/3R1P2/1ppP1p2/3r4/8/K7/p4k2/8/ w

***White to play and win: 1. Ka3-b2 !!***

## Results

| Program | CPU/Mhz | Hash table | Move | Value | Plys/Max | Time | Notes |
|---|---|---|---|---|---|---|---|
| Chess Genius 1.0 | P100 | 320 Kb | Ka3xa2 | +7.00 | 16/28 | 04:11:33 | can't see it |
| NEW Rebel Decade 2.0 | P100 | 512 Kb | Ka3xa2 | +6.95 | 16 | 06:04:52 | can't see it |
| Crafty 12.9 | P100 | 6+1 Mb | Ka3xa2 | +8.608 | 17/18+HT | 21:17:16 | can't see it |
| NEW Crafty 12.9 | P100 | 48 Mb + 80 Kb | Kb2 | +9.034 | 17/31 | 50:29:47 | seen at 34:01:39 |

## Notes:

This is a **truly amazing** test position, that combines a deceptively simple aspect (few pieces, Rooks and pawns endgame) with being *incredibly difficult* for a chess program to solve. In fact, it cames as nearly as possible to be a ***Never Concept*** position *without* actually being one.

In fact, the solution is readily *understood* by any human player: both White and Black are threatening to *promote pawns*, but there's the fact that White's King is nearly *trapped* by Black's King, Rook and Pawns.

White can inmediately capture the about-to-promote Black pawn, ending that threat, but in doing so, Black gains the *tempo* it needs to fully close the trap, as this variation shows:

**1. Kxa2 ? f5; 2. Ra7 Re5 !**

Now White can promote its pawns, or make any other move, but it cannot avoid perpetual check by the Black Rook, and it can neither escape, nor capture the Rook which is protected against capture by the other Black pieces.

White needs to *gain that tempo*, and this can only be done by leaving the Black pawn alone, and playing instead *1. Ka3-b2 !!*. The *Principal Variation* goes like this:

**1. Kb2 !! a1=Q+; 2. Kxa1 Ra5+; 3. Kb2 Rb5+; 4. Kc3 Rc5+; 5. Kd4 f5; 6. Ra7 Rd5+;**
**7. Kc3 Rc5+; 8. Kb2 Rb5+; 9. Ka1 Re5; 10 Ra2+ and wins**

where everything depended on a single *tempo*.

How well did the programs tested ? *Badly*. The human chess player readily understands that the King will get trapped *forever*, but no program can understand this. They have to found this fact by sheer calculation, and as the White King can wander over 16 squares, the search must go *more than 30 plies deep* to ascertain that the position repeats unavoidably and so it's either a *draw by perpetual check* or a *draw by repetition*.

Till that depth is reached, the programs evaluate the position as extremely favourable to White, as they see that the pawn cannot be stopped. Let's see actual results:

**Chess Genius 1.0** goes to 16/28 plies in 4 hours, and it merrily considers that taking the pawn is *extremely favourable* to White, at *+7.00*. In fact, after that capture the evaluation for White is *actually +0.00, a draw*, but CG1.0 would have to see that the position actually repeats, and that would not happen *until ply 30*, at least, so it *grossly misevaluates* the position.

Too deep. Not utterly impossible, as the 100 plies required for truly ***Never Concept*** positions, but too deep nevertheless. It would take CG1.0 many weeks or months to reach that depth in this hardware.

**Rebel Decade 2.0** fares no better. It looks at 16 plies in some 6 hours, examines *323.637.898 positions*, but can't resist the temptation to take the pawn, evaluating the fatal mistake as a fully winning +6.95. Nope.

Same goes for **Crafty 12.9** when using a 6 Mb hash table. It reaches 17 full plies plus an indeterminate number of extra extension plies (they finally use a hashtable entry) taking nearly *a full day*, yet it also inmediately takes the pawn, and thinks White is nearly a whole Queen up *(+8.608)* when in fact the position is now drawn *(+0.000)*.

Just out of curiosity, I left **Crafty** running this position for another ply, to reach 18 full plies in all, and it took *250 hours*, nearly ***two weeks*** of continuous, dedicated computation on a Pentium 100. Yet it didn't saw the position repeat, so it didn't assign it the +0.000 value that would save the day.

NEW ***However**, when using a hash table 8 times bigger (48 Mb), things do change a lot. See the **Addendum** below.*

Let's look at a resume of **Crafty**'s analysis with the 6 Mb hash table. Comments follow after it:

```
depth    time    score    variation
 11->    1:05    7.288    Kxa2 Ra5+ Kb3 Ra8 Re7 Rf8 d7 Rd8 Re8
                           Rxd7 f8=Q Rd3+ Kc4 Rf3 Qd6
 12->    2:15    8.116    Kxa2 Ra5+ Kb3 Ra8 Re7 Rf8 d7 Rd8 Re8
                           Rxd7 f8=Q Rd3+ Kc2 Rf3 Re6 c5 Rxb6
 13->    3:34    8.116    Kxa2 Ra5+ Kb3 Ra8 Re7 Rf8 d7 Rd8 Re8
                           Rxd7 f8=Q Rd3+ Kc2 Rf3 Re6 c5 Rxb6
 14->   14:12    8.415    Kxa2 f5 f8=Q Ra5+ Kb3 Rb5+ Kc4 Rc5+
                           Kd4 Rd5+ Kc3 Rc5+ Kd3 Rd5+ Kc2 Rc5+
                           Kb2 Rb5+ Ka1 Ra5+ Kb1 Rb5+ Kc1 Rc5+
                           Kd2 b5
 15->   65:10    8.474    Kxa2 f5 f8=Q Ra5+ Kb3 Rb5+ Kc4 Rc5+
                           Kd3 Rd5+ Kc2 Rc5+ Kd2 Rd5+ Kc1 Rc5+
                           Kb1 Rb5+ Ka1 Ra5+ Kb2 Rb5+ Ka3 Ra5+
                           Kb4 Rb5+ Kc3 Rd5
 16-> 477:03    8.558    Kxa2 f5 f8=Q Ra5+ Kb3 Rb5+ Kc4 Rc5+
                           Kd3 Rd5+ Kc2 Rc5+ Kd2 Rd5+ Kc1 Rc5+
                           Kb1 Rb5+ Ka1 Ra5+ Kb2 Rb5+ Ka3 Ra5+
                           Kb4 Rb5+ Kc3 Rc5+ Kd4 Rd5+ Kc4
 17->1277:16    8.608    Kxa2 f5 Ra7 Re5 f8=Q Re2+ Kb3 Re3+
                           Kc4 Re4+ Kd3 Re3+ Kd4 Re4+ Kc3 Re3+
                           Kd2 Re2+
```

As you can see, **Crafty** is caught in a nasty case of *self-deception*. After *1. Ka3xa2* it sees the position is extremely favourable for White (>+7.000). Then, as the search goes deeper and deeper, it discovers *it cannot stop the checks*, and it begins to find more and more *repetitions* of the position, which lower the evaluation to a frustrating +0.000.

To avoid that, it finds very *convoluted paths* for the White King to avoid repeating the squares it visits, thus pushing the dreaded repetition *over the horizon*:

**Kb3 -> Kc4 -> Kd3 -> Kc2 -> Kd2 -> Kc1 -> Kb1 -> Ka1 -> Kb2 -> Ka3 -> etc, etc**

The only escape to this nightmarish situation is when the search goes so deep that the repetitions get over the horizon and the program can see them. Only then will the evaluation drop to its real value of +0.000, thus forcing the program to find another more promising continuation.

The problem is, a search deeper than 30 plies is needed, and that can take from *weeks to months* when using even a reasonably large hash table, 6 Mb. **However, things are quite different** if a much larger hash table is available. See the **Addendum** below. *Astonishing indeed*, for such a seemingly simple endgame !.

## NEW Addendum:

After upgrading the RAM in one of my scratch PCs to 64 Mb, I decided to have another go at this position, using again trusty old **Crafty 12.9** but this time with the largest hash table it would accept under 64 Mb, which happens to be 48 Mb.

This is 8 times larger than the previous attempt (6 Mb), and I let it run the whole weekend, from Friday to Monday morning. Much to my surprise, it found the correct move **1. Kb2 !!** in some 50 hours !!

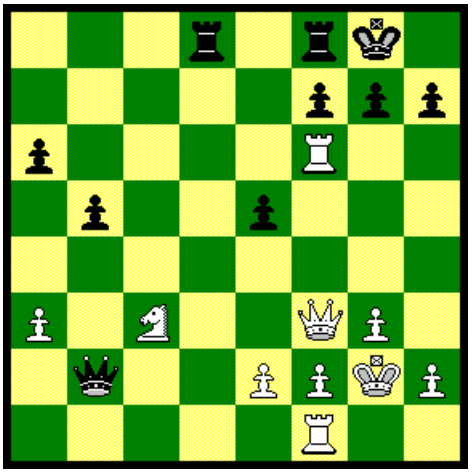
This is a short resume of **Crafty 12.9**'s analysis with the 48 Mb hash table. Comments follow after it:

```
depth    time    score    variation
 17    355:06    8.440    Kxa2 f5 Ra7 Re5 f8=Q Re2+ Kb3 Re3+
                           Kc4 Re4+ Kd3 Re3+ Kd4 Re4+ Kc3 Re3+
                           Kd2 Re2+ Kc1 Re1+ Kc2 Re2+ Kb1 Re1+
                           Kb2 Re2+ Ka3 Re3+ Kb4 Re5
 17  2041:39       ++    Kb2!!
 17  3029:47    9.034    Kb2 a1=Q+ Kxa1 Ra5+ Kb2 Ra8 Rc7 f5
                           d7 Rd8 Rxc6 f4 Rc8 Rxd7 f8=Q Rd4 Rc2+
                           Kf3 Qa8+ Kg4 Qc8+ Kf3 Qh3+ Ke4 Re2+
                           Kd5 Qe6+ Kc5 Re5+ Kb4 Qxb6+
```

Notice how after 34 hours, the correct move is found to fail high, so the fact is printed and the search proceeds with an enlarged window, till 16 hours later (*50 hours total*), the correct *Principal Variation* is output, with a large *+9.034* value.

As the software and the hardware were exactly the same in both tests, it follows that *a larger hash table really pays*: 48 Mb and 50 hours can do what 6 Mb and 250 hours were unable to, all other things being equal.

### *39.- Korchnoi vs Hjartarson, 1988*



FEN: 3r1rk1/5ppp/p4R2/1p2p3/8/P1N2QP1/1q2PPKP/5R2/ b

***Black to play and win: 1. ... e5-e4 !!***

Results

| Program | CPU/Mhz | Hash table | Move | Value | Plys/Max | Time | Notes |
|---|---|---|---|---|---|---|---|
| Chess Genius 1.0 | P100 | 320 Kb | g7xf6 | +0.00 | 11/23 | 06:05:14 | can't see it |
| PANEK Chess Genius 5.0 | PII/266 | 12 Mb | g7xf6 | +0.00 | 13/25 | 06:25:20 | can't find it |
| Rebel Decade 1.2 | P100 | 192 Kb | g7xf6 | +0.45 | 11 | 00:29:29 | can't see it |
| NEW Rebel Decade 2.0 | P100 | 512 Kb | e5-e4 | +0.38 | 12 | 01:40:54 | finds e4 |
| Crafty 12.7 | P100 | 12+5 Mb | e5-e4 | +0.290 | 11/12 | 00:10:02 | finds e4 |

## Notes:

This interesting position is taken from the 4th game of the Candidates Match between **Korchnoi** and **Hjartarson**, which took place at Saint John (Canada) in 1988. **Hjartarson** finally won the match 4.5-3.5.

In this position, **Korchnoi**, playing White, has just taken a Knight with his Rook, sacrificing the exchange for what he believed to be a winning attack: if black takes the Rook *1. ... g7xf6*, then *2. Nc3-e4 !*, threatening *3. Qf3-f5 !* as well as *3. Ne4xf6+*. But **Hjartarson** found an excellent tactical coup over the board, *1. ... e5-e4 !!* and went on to winning the game.

**Chess Genius 1.0** fails to find the winning move, and while it looks at a quite deep 11/23 plies (taking several hours), it captures the Rook, and thinks it's at least drawing, +0.00, which it isn't.

Its big brother, **Chess Genius 5.0**, running in a *very* powerful hardware (more than 5 times faster) and with a *40-times* greater hashtable (12 Mb vs. 320 Kb) can look two extra plies deeper, 13/25, which still takes several hours (instead of *days !*) but even so it finds exactly the same capture, and equally evaluated at +0.00, a draw.

**Rebel Decade 1.2** searches also to 11 plies (extensions unknown), examines more than *20 million positions*, but also captures the Rook, though it thinks it's up for almost half a pawn. Nope.

The newer version, **Rebel Decade 2.0**, improves over the older one and does find *1. ... e4!!*, though it takes very long. It sees the winning move first at 11 ply, evaluated at +0.47. At 12 ply, the evaluation drops a little, +0.38, taking nearly 2 hours to reach that depth, evaluating as many as *97.001.914 positions*. Nevertheless, better performance than both **Chess Genius** programs.

**Crafty 12.7**, uses a 12 Mb hash table plus a 5 Mb one for pawn structures, searches to 11/12 plies, like the other programs, yet it *resists* the temptation to capture the Rook, and *does find* **Hjartarson**'s winning move, and quite fast, too !.

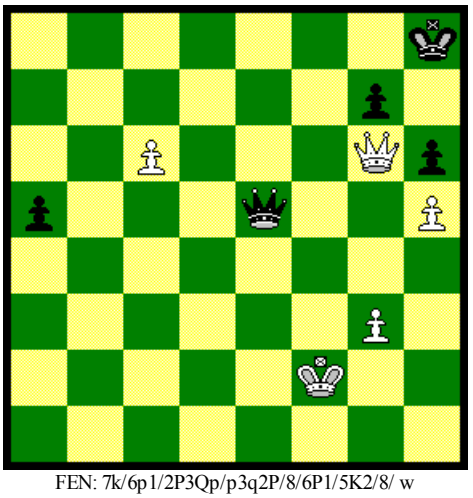
In this excerpt from Crafty's analysis, you can see the precise moment when it changes it's mind and desists from capturing the Rook, after it fails low:

```
depth    time    score     variation
 10->    2:03    0.504     gxf6 Qxf6 Qc2 Qxe5 Rfe8 Qg5+ Qg6 Qf4
                           Qc6+ Qf3 Qxf3+ Kxf3 Rd2 Rd1
 11      2:48      --      gxf6
 11      8:09    0.074     gxf6 Ne4 Qc2 Nxf6+ Kh8 e4 Qd2 Qf5
```

```
                              Qh6 Nd7 Rfe8 Qxf7
11     10:02    0.290         e4 Nxe4 gxf6 Qg4+ Kh8 Qh4 Qd4 e3 Qd5
                              Kg1 Qe5 Nxf6
```

Continuing the search up to 12, 13, 14, and 15 plies (which takes over 2 hours), still prefers the pawn advance over the Rook capture.

### *40.- Bogoljubov vs Stahlberg, 1933*



FEN: 7k/6p1/2P3Qp/p3q2P/8/6P1/5K2/8/ w

***White to play and win: 1. Qg6-c2 !!***

Results

| Program | CPU/Mhz | Hash table | Move | Value | Plys/Max | Time | Notes |
|---|---|---|---|---|---|---|---|
| Chess Genius 1.0 | P100 | 320 Kb | Kf2-g2 | +0.00 | 14/26 | 05:57:06 | can't see win |
| PANEK Chess Genius 5.0 | PII/266 | 16 Mb | Qg6-c2 | +0.42 | 13/25 | 01:00:25 | sees winning move |
| Rebel Decade 1.2 | P100 | 192 Kb | Kf2-g2 | +0.40 | 10 | 00:33:12 | can't see win |
| Rebel Decade 2.0 | P100 | 512 Kb | Kf2-g2 | +0.34 | 11 | 00:36:51 | can't see win |
| Comet-A.75 | P100 | 13786 Kb | Kf2-g2 | +0.02 | 14 | 03:41:40 | can't see win |
| Crafty 12.7 | P100 | 12+5 Mb | Kf2-g2 | +0.000 | 14 | 04:19:20 | can't see win |

## Notes:

This is another very difficult Queens endgame, similar to **Test 35**, but this one originates in a real game between famous grandmasters **Bogoljubov** and **Stahlberg**, instead of being a composed position.

Here, most programs just manage to find a *draw by perpetual check*, but **Bogoljubov** was able to find the winning line:

**1. Qc2!! Qh5; 2. Qc4! Qf5+; 3. Kg2 Qc8; 4. c7 a4; 5. Qc6**

**Chess Genius 1.0**, though it looks at a quite deep 14/26 plies, finds only the perpetual check, valued at +0.00, taking several hours to reach such depths. For this kind of endgames, it is severely handicapped by its small hashtable. However, it could find the *second* White move in the winning line, *2. Qc4!*, after looking at 11/23 plies in 00:10:26, with a value of +0.60. At shallower depths, it thought it lead also to a perpetual check.

**Chess Genius 5.0** does much better. The combination of more advanced programming, much faster hardware and much bigger hashtable allow it to find the winning move even looking at a ply less, 13/25, after exactly one hour. Before that, it had found the perpetual check move, **1. Kf2-g2**. Continuing the search for two extra plies, 15/27, takes exactly 3 hours, but sticks to the correct move *1. Qg6-c2*, with nearly the same value, +0.39. The predicted *Principal Variation* is:

**g6c2!, e5xh5, c2c4, h5f5+, f2g2, f5c8, c6c7, a5a4, c4c6, h8h7, c6e4+**

which is correct up to and including *5. Qc4-c6*.

**Rebel Decade 1.2** examined *26.403.906 positions* while looking at a depth of 10 plies, but only saw CG1.0's drawing move, the perpetual check.

Same does the new version, **Rebel Decade 2.0**, which goes one ply deeper, at 11 plies, in a similar time, and examines *30.003.662 positions*, yet it doesn't find the winning move either.

**Comet-A.75**, with a 13 Mb hash table, is also unable to find the win. After nearly 4 hours and 14 plies, it has evaluated as many as *337.962.681 positions*, yet it didn't see the winning move.

**Crafty 12.7**, using a large 12 Mb hash table plus an additional 5 Mb one for pawn structures, searches also to 14 plies in more or less the same time, yet it only sees the move which draws.

The last line of **Crafty**'s analysis clearly shows the *perpetual check*:

```
depth   time   score    variation
 14    259:20  0.000    Kg2 a4 c7 Qe2+ Kh3 Qf1+ Kh4 Qc4+ Kh3 Qf1+
```