

Chess endgame news

Article

Published Version

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(2012) Chess endgame news. International Computer Games
Association Journal, 35 (2). pp. 90-93. ISSN 1389-6911
Available at <https://reading-clone.eprints-hosting.org/29422/>

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Publisher: The International Games Association

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NOTES

CHESS ENDGAME NEWS

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Reading, UK

In the 8th round of the ICGA 2011 World Computer Chess Championship in Tilburg, ROOKIE -v- THE BARON provided a case study for tournament arbiters and endgame connoisseurs. Black correctly announced ‘mate in 30’ as advised by its Nalimov DTM(ate) EGT at KQPKQP position 65b, Figure 1a. White was ready to resign but arbiter Jan Krabbenbos’ call was to play on. A mild case of bit rot meant that THE BARON was in fact only intermittently in touch² with its somewhat flawed KQPKQP EGT and could not simply win by look-up. As the next 25 moves show, with (equi-)optimal-move marks and concessions (Bleicher, 2012) in brackets, THE BARON actually regressed in DTM terms, playing five DTM-suboptimal moves and conceding a DTM depth of 36m to ROOKIE’s 9m. However, it still reached KQPKQ with a healthy EGT and a look-up win:

65. ...Qd4+ 66. Kg2 b2 67. Qg6 Qd2+ (+8) 68. Kh3 Kc7 (+1) 69. Qe4 Kd6 70. Qf5 (-4) Qh6+ 71. Kg2 Qc1 (+15: dtm -43m) 72. Qf6+ (-1) Kc5 73. Qe7+ Kb5 74. Qb7+ Ka4 75. Qa6+ Kb3 76. Qb7+ Ka2 77. Qd5+ Ka1 78. Qa8+ (-1) Kb1 79. Qd5 Qc2+ 80. Kh3 Qe2 81. Qf7 (-3) Kc1 82. Qf4+ Kd1 83. Qf5 Ke1 84. Kh4 Qe3 (+2) 85. Kh5 Qb3 (+10: dtm -36m) 86. Qe4 Kf2 87. Qd4 Kg2 88. Qd2 Kh3 89. Qd7 Kxg3 (Figure 1b, dtc -21m, dtm -32m) 90. Qg4 Kf2 91. Qh4 Kg2 92. Qg4 Qg3 93. Qe2 Qf2 94. Qg4 Kh2 95. Qe4 Qc5+ 96. Kh4 Qc3 97. Qf4 Kg2 ... 111. (8/8/8/8/2Q5/1pq4K/2k5) Resigns 0-1.

In comparison, a DTM-minimaxing line from ChessOK (2012) is 65. ... Qd4+ 66. Kh2 b2 67. Qf7+ Kc6 68. Qe6+ Kb5 69. Qf5+ Kb4 70. Kh3 Qh8+ 71. Kg2 Qa8+ 72. Kh2 Qc6 73. Qd3 Ka4 74. g4 Kb4 75. g5 Qc7+ 76. Kg2 Qc4 77. Qf5 Kc3 78. Qf6 Qd4 79. Qc6 Kd2 80. Qb7 Qg4+ 81. Kh2 Qe2+ 82. Kg1 Qd1+ 83. Kf2 b1Q (KQPKQQ, Figure 1c; dtm = -11) 84. Qd5 Qd3 85. Qa5 Qc3 ... 0-1.

So, congratulations to the arbiter for an exemplary call which extended the challenge in this game.

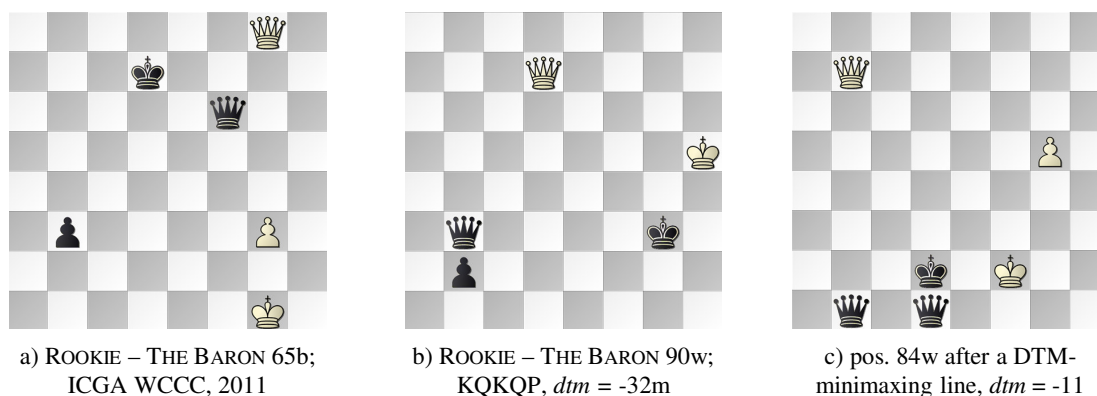


Figure 1: three positions related to ICGA WCCC 2011, ROOKIE -v- THE BARON.

More recently, the 6½-6½ deadlock in the FIDE 2012 World Chess Championship between Anand and Gelfand was broken by superior endgame technique in the KRNPkRB phase of Rapid Game 2. This began at theoretically drawn position 56b, Figure 2: White’s aim was to exchange into a KRPKR win. One might therefore ask what moves constitute the most challenging attack and resilient defence against a fallible opponent. Gelfand was facing a tricky Knight and defending a difficult position on time-increments only but Marc Bourzutschky confirms that the game was theoretically drawn³ until position 71b. Here, Bh1 was correct but 71. ... Rf5? allowed the White Knight to check, fork and exchange to advantage with 72. Ne6+ Kc8⁴ 73. Nd4 Rf8 74. Nxf3 Rxf3 (dtc 20m, dtm 34m). Black resigned after 75. Kb6 Rb3 (-2) 76. Rg8+ Kd7 77. Rb8 (dtc -15m, dtm -29m).⁵

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² A failure mode the author has not been able to reproduce by corrupting a KQPKQP EGT: all advice welcome.

³ Gelfand missed a quick draw at 58b, 8/1k6/8/1P1N2r1/3K3R/8/2b5/8: 58. ... Bd3! 59. Kxd3 (59. ~ Bxb5) Rxd5 =.

⁴ MB notes the doughty 72. ...Kd7!? 73. Nd4! Bh5 74. Rg7+! Rf7 75. Rg5! (75. Rxf7? Bxf7 =) Bd1 76. b6 1-0.

⁵ Assuming minimaxing strategies SC^M/SC^M (Haworth, 2000): 77. ...Rc3 78. Ka7 Ra3+ 79. Kb7 Rb3 80. b6 Rb2 81. Rh8 Rb1 82. Ka7 Ra1+ 83. Kb8 Rb1 84. b7 Ra1 85. Rh4 Kd6 86. Rd4+ Ke6 {a Lucena position} 87. Kc7

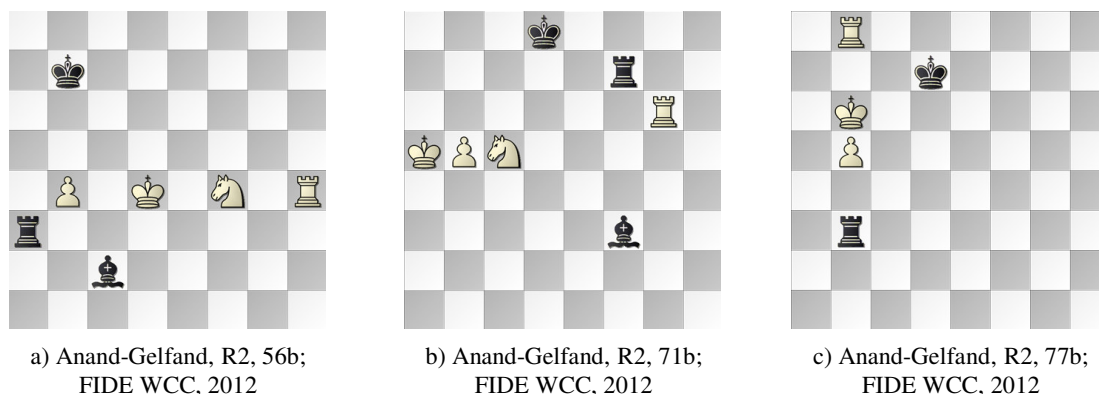


Figure 2: three positions from FIDE WCC 2012, Anand -v- Gelfand, Rapid Game 2.

The chess studies magazine EG published by ARVES continues to provide varied and accessible fare for the reader under its new editor Harold van der Heijden: the contribution of the computer to endgame knowledge is a persistent theme with an excellent column edited by Emil Vlasák. Bourzutschky and Konoval (2011a/b, 2012) have started a serialisation of their sub-8-man findings there with an outstanding combination of computational and chessic authority. The first instalment has been welcomed (Haworth, 2011) and the next two are reviewed here. The 7-man endings covered so far are KBPPKBP, KBPPKNP, KNPPKBP, KNPPKNP, KPPPKPP, KQPPKQP and KRPPKRP. The articles include DTC(onversion)-minimaxing lines from the maxDTC outposts at the extremities of chess, admittedly under their current pragmatic constraint that P-promotions from 7-man endgames are to Queen only. These positions with authors' notes are listed in Table 1. There are also games in which one or more half-points were exchanged: Table 2 indicates the position at which the first 7-man error was made and the total of yielded (half-)points. Some newly 'cooked' studies (van der Heijden, 2010) are featured: Table 3 gives the 'cook position' at which Black improves on the composer's main line.

The square-colour profile of endgame positions involving Bishops has a fundamental effect on their nature. Therefore B&K (2011b) distinguish between *KBPPKBP*s with same-colour Bishops and *KBPPKBPO* with opposite colour Bishops. An extension of the GBR code (e.g., 0040.21_20 for *KBPPKBP*s⁶ and 0040.21_11 for *KBPPKBPO*) would in fact provide a notation to identify all Bishop profiles: *KBPPKBB* is 0080.10_20 with *ab* any of 44, 53, 62, 71 or 80 corresponding to⁷ square-colour splits Bb/Bb (the normal profile without obtrusive force), BBb/b, bb/BB, Bbb/B and BBbb/-.

BK#	Endgame	EG GBR	FEN position	DTC	1 of ..	Note
2.01	KBPPKBP~	0040.21_20	8/8/2p5/4k1b1/8/8/1KP4P/B7 w	78	3	all three positions are similar
2.02	KBPPKBP~	0040.12_20	5b2/4p3/4p3/4B3/8/2K5/1P6/2k5 w	38	15	pos. with same P-structure
2.09	KBPPKBPo~	0040.21_11	8/2p5/1k6/8/5P2/8/P4b2/K2B4 w	52	146	four different P-structures, each with its own winning method
2.10	KBPPKBPo~	0040.21_11	8/7k/5p2/2B5/8/8/2PP4/K6b w	52	146	
2.11	KBPPKBPo~	0040.21_11	8/7k/4b3/2B5/1Pp5/8/6P1/K7 w	52	146	
2.12	KBPPKBPo~	0040.21_11	1k6/4p3/2B5/8/8/8/1P4Pb/2K5 w	52	146	
2.13	KBPPKBPo~	0040.12_11	8/8/8/2B1k3/8/6p1/4P1p1/K6b w	24	38	all with P(g3, g4) and B(h1)
2.21	KBPPKNP~	0013.21	8/3p4/8/8/k7/8/3P2P1/K3B1n1 w	87	4	all four positions are similar
2.22	KNPKBPP~	0031.12	b4k2/1p5p/1P6/8/5N2/8/K7/8 w	29	4	all reachable in FR-chess only
2.23	KNPKBPP~	0031.12	8/3p4/3p4/6P1/2N5/K6b/8/k7 w	27	1	
3.01	KNPPKBP~	0031.21	8/2p5/8/8/6b1/1PP5/K7/1N5k w	102	1	! No P-move after 9. b4
3.02	KBPKNPP~	0013.12	8/8/B2p4/3p4/8/P6n/1K6/7k w	40	23	three different doubled-pawn P-structures
3.03	KBPKNPP~	0013.12	k7/p7/2K5/p7/1n6/7P/8/2B5 w	40	23	
3.04	KBPKNPP~	0013.12	8/K2n2p1/6p1/8/7B/8/P6k/8 w	40	23	
3.13	KNPPKNP~	0004.21	8/3p4/4N3/7n/8/1P6/2P5/k1K5 w	110	1	
3.14	KNPPKNP~	0004.12	8/4p3/1K4p1/8/1P6/8/6n1/1N3k2 w	44	8	v difficult, interesting win
3.23	KPPPKPP~	0000.32	3k4/4p2p/8/8/8/4PP2/5P2/1K6 w	36	6	all six positions are similar
3.24	KPPPKPP~	0000.23	8/8/3p4/3p4/3pk3/1K6/1P1P4/8 w	26	9	all nine positions are similar

Table 1: the 18 maxDTC positions in Bourzutschky and Konoval (2011b, 2012).

Rc1+ 88. Kb6" Rb1+ 89. Ka6" Ke5" 90. Ra4" {defending the bridge to b8} Kd6" 91. Ka7" Kc7" 92. b8=Q+ 1-0.

⁶ A 'White' piece is indicated by a '1' and a 'Black' piece by a '3': '.wb' indicates the number of White and Black pawns.

⁷ The 'second-colour' squares can be such that $b \leq a$, given the freedom of an $a \leftrightarrow h$ flip of the board.

BK#	Endgame	first 7-man FEN position	first error		yielded		date, ECO, players
			val.	not ...	but ...	res. points	
2.03	KBPPKBP	68b: 8/8/3Pbk2/2K5/B4p2/P7/8/8	=	71...Res	...Kd4!!	1-0 0.5	1979, E64, Kuzmin-Bouaziz
2.04	KBPPKBP	67w: 8/3P4/kBK5/p7/P6b/8/8/8	1-0	67. Kc7	Bg1	1-0 1.0	2000, A18, Poluljahov-Ivanov
2.05	KBPPKBP	69w: 8/8/6pK/4P3/k3b3/8/Bp6/8	0-1	74...g5	...Kb4!	0-1 1.0	2008, C12, Gashimov-Korchnoi
2.14	KBPPKBP	79b: 8/8/2pB3P/8/1p6/1k1b4/8/K7	=	80. Res	Be7	0-1 0.5	1988, C43, Makarichev-Ye Rongguang
2.15	KBPPKBP	84b: 8/8/4p3/3bk1B1/8/1pK3P1/8/8	=	93. Bh4	Bh6	0-1 0.5	2002, D30, Iskusnyh-V Malakhov
2.16	KBPPKBP	53w: 8/2B5/8/1P1b4/7k/2P5/5Kp1/8	=	53...Kg4	...Bc4/Kg5	1-0 0.5	2008, C89, Bacrot-Sargissian
2.24	KNPKBPP	74b: 8/3K4/6pk/6Np/7P/8/8/b7	0-1	74...Bd4	...Bf6!!	= 1.5	1876, C46, L Paulsen-Anderssen
2.25	KNPKBPP	102b: 4b3/8/p7/N1k2P1p/7K/8/8/8	=	102...Bf7	...Kd6!	= 0.5	1954, A34, Kotov-Byrne
2.26	KBPPKNP	58w: 8/8/8/1k6/4n1BP/4p3/6PK/8	1-0	58. Be2+	h5+!!	= 0.5	1982, E24, Spassky-Hübner
2.27	KBPPKNP	80w: 5n2/8/5k1p/8/4B1PK/5P2/8/8	1-0	80. Bf5	Kh5!!	= 0.5	2007, D38, Eljanov-Arutinian
3.05	KNPPKBP	66w: 8/4k3/2b5/PpP5/5N2/3K4/8/8	1-0	66. Kc3	a6!!	1-0 1.0	1945, C04, Boleslavsky-Rudakovsky
3.06	KBPKNPP	56w: 8/8/pn4p1/3k2P1/5K2/2B5/8/8	0-1	56...Nc4+	...Nd7!	= 0.5	1975, A41, Portisch-Timman
3.07	KBPKNPP	56w: 8/3n4/K2k4/1P6/6p1/6p1/8/7B	=	58. Res	Kb5!!	0-1 0.5	2002, A75, Akhmetov-Bu Xiangzhi
3.08	KBPKNPP	58w: 8/p1k5/n7/5B2/2P2K1p/8/8/8	=	58. Kg4	Bc2!!	= 1.0	2004, C10, Topalov-Milov
3.15	KNPPKNP	59w: 8/8/8/3k4/5P2/4n1Kp/5N1P/8	1-0	59. Kxh3	Kh4!!	= 0.5	1939, C90, Keres-Reshevsky
3.16	KNPPKNP	54b: 8/5k2/5n1p/4KP2/5N2/7P/8/8	=	59...Nc5	...Ke7!!	= 1.0	1971, E42, Gligoric-Ivkov
3.17	KNPPKNP	79w: 8/8/6k1/3Np3/2P1n1P1/8/5K2/8	=	81...Ne6	...Nb3!!	1-0 0.5	1982, C92, Tal-Rubineti
3.18	KNPPKNP	45w: 4k3/1n6/8/5p2/2P2N2/7P/8/6K1	1-0	53. Kc3	Ke3	= 1.5	1989, E32, Karpov-Andersson
3.25	KPPPKPP	55b: 8/8/8/p1p1k3/2P4K/8/P1P5/8	0-1	57...Kb2	...Kxc4!	0-1 1.0	1960, B47, Belkadi-Pachman
3.26	KPPPKPP	52w: 8/8/pk6/1p6/1P1K1Pp1/8/8/8	=	53...a5	...g3	= 1.0	1970, B47, Barczay-Reshevsky
3.27	KPPPKPP	54b: 8/5p2/4k2p/7P/5PP1/6K1/8/8	=	58...Res	...Kd6/8	1-0 0.5	1981, C96, Psakhis-Savon
3.28	KPPPKPP	56w: 8/8/2p5/2p5/1p4P/1k4K1/8/8	0-1	56...Kxc4	...Ka2/3	= 0.5	2002, B08, Lechtynsky-Vajda

Table 2: the 22 games with 7-man errors selected for Bourzutschky and Konoval (2011b, 2012).

BK#	Endgame	HH		EG	GBR	dbIV#	stip.	val.	FEN position	move		date, composer(s)
										not ...	but ...	
2.06	KBPPKBP	0040.21	_20	23790	=	0-1			3b: 8/3p3k/5K2/bPB5/8/5p2/8/8	3...Be1	3...Bc3+!!	1949, L Nyevezkey
2.07	KBPPKBP	0040.21	_20	27020	1-0	=			4b: 2B5/4pp2/8/2K2k2/3P4/7b/8/8	4...e6	4...Ke4!	1954, B Sakharov
2.08	KBPPKBP	0040.21	_20	31413	1-0	=			1b: 3K4/4P3/8/2p5/b7/1k1B4/1P6/8	1...c4	1...Kxb2!!	1960, A Herberg
2.17	KBPPKBP	0040.21	_11	3865	1-0	=			7b: 8/2k5/8/PK6/1P2B3/b1p5/8/8	7...Kb8	7...c2!!	1898, T Breede
2.18	KBPPKBP	0040.21	_11	13362	=	0-1			3b: 7k/3b4/3B4/2p5/2P4K/8/p7/8	3...a1Q	3...Kg7!	1929, V De Barbieri
2.19	KBPPKBP	0040.21	_11	47448	1-0	=			3b: 8/8/5K1P/B1p5/5p2/1b6/2k5/8	3...Bg8	3...f3!	1979, N Kralin
2.20	KBPPKBP	0040.21	_11	44834	=	0-1			4b: b7/2k3B1/8/7K/5p2/6pP/8/8	4...Kd6	4...Kc6!	1977, F Zorin
2.28	KBPPKNP	0013.21		47350	=	0-1			3b: 8/8/8/8/b2pP3/1p1N4/k7/2K5 b - e3	3...dxe3	3...Bb5!!	1979, G Amiran
2.29	KBPPKNP	0013.21		12522	1-0	=			1b: 8/2P5/1p6/1K2N3/5k2/8/4p3/2b5	1...Ke3	1...Kxe5!!	1928, J Hasek
2.30	KBPPKNP	0013.21		57523	1-0	=			6b: 6b1/1p2N1K1/4kP2/3p4/8/8/8/8	6...Bf7	6...d4!	1989, I Melnichenko
2.31	KBPPKNP	0013.21		31039	1-0	=			4b: 8/8/P7/3p4/p3N1k1/8/3K4/7b	4...Bxe4	4...Kf4!	1960, V Tyavlovsky
3.09	KNPPKBP	0031.21		11408	=	0-1			1b: n7/3K4/1P1p4/8/1B6/2k5/2p5/8	1...Kxb4	1...Kb3!	1927, A Herbstman
3.10	KBPKNPP	0013.12		33744	1-0	=			4b: 6K1/n7/1p1p4/8/4B1P1/8/5K2/8	4...Ke3	4...Nb5!	1964, P Vatarescu
3.11	KBPKNPP	0013.12		39573	1-0	=			4b: 8/5p1K/2kp4/3n4/3P4/5B2/8/8	---	4...Kb5!	1971, L Kopá
3.12	KNPPKBP	0031.21		54129	1-0	=			4b: 8/1b6/8/4N1K1/2k1p3/4P3/5P2/8	4...Kc3	4...Kb3!	1985, A Yusupov
3.19	KNPPKNP	0004.21		28393	1-0	=			3b: 8/3n2k1/6/3K1Pp1/6P1/8/5N2/8	3...Nf6+	3...Kf7	1955, Y Averbakh
3.20	KNPPKNP	0004.21		29714	=	0-1			2b: 8/4K3/8/1P6/8/5N2/4n1pP/7k	2...Nc3	2...Nd4	1958, A Koranyi
3.21	KNPPKNP	0004.21		37849	1-0	=			4b: 1n5K/4p3/2kP4/8/N5P1/8/8/8	4...exd6	4...e5!	1969, H Backe
3.22	KNPKNPP	0004.12		38115	=	0-1			2b: 8/8/8/p3P3/p2K4/2n5/1k6/N7	2...Nb5+	2...a3!	1970, A P Kuznetsov, A Motor
3.29	KPPKPPP	0000.23		8989	1-0	=			4b: 8/1p6/7p/P6K/2k3p1/8/5P2/8	4...Kb5	4...Kd5!!	1923, A Troitzky
3.30	KPPKPPP	0000.23		28893	=	0-1			5b: 8/6p1/4p3/5Pp1/6P1/8/1k6/3K4	5...exf5	5...e5!	1956, K Stoyanov
3.31	KPPKPPP	0000.23		34155	1-0	=			2b: 8/2K5/8/4pP1/3pk3/8/3P4/8	2...f4	2...Kd3!	1964, E Pogonyants
3.32	KPPKPPP	0000.23		43756	1-0	=			3b: 8/8/3P4/p7/5p2/K1k1p3/4P3/8	3...f3	3...Kd2!	1976, H Reddman

Table 3: the 23 cooked studies selected for Bourzutschky and Konoval (2011b, 2012).

Vlasák (2012) notes two other promising approaches to super-6-man endgames. First, Pedro Pérez Romero (2012) offers a free Chess EGT generator FINALGEN, albeit with the restriction that there must be at most one Q/R/B/N piece per side in the initial position. Like Bleicher's FREEZER (2004), it exploits the restricted placement of advanced and/or facing Pawns to produce reduced-sized EGTs quickly. It has analysed positions with up to 11 men. FINALGEN's depth metric, DTP, is the new 'moves to P-conversion or mate'. Significantly, it then seeks mate after P-conversion by creating a Win/Unknown_value 'WU' EGT.

With the help of FINALGEN, Bryant (2012) analysed the interesting KBP(g4)P(h5)KNP(h6) position *p1w*, 2n5/7k/5B1p/2K4P/6P1/8/8/8 w. Rusz (2012) conjectured that *p1w* is a *Vital Zug* (Haworth and Rusz, 2011), i.e., that *p1b* (*p1w* with btm) is vital to White winning. Bleicher used FREEZER to create an EGT for a Chess Variant with *p1b* set to *draw*: *p1w* then being a draw confirmed that it is indeed a *Vital Zug*. In Chess, *p1w/p1b* have DTC 46m/-10m so DTC zugdepth is 36m and *p1w* becomes the DTC-deepest *Vital Zug* known to the author. Black forces an albeit losing line of DTC/P-(equi-)optimal moves through *p1b* as follows:

(dte 46m, dtp 55m) **1. Bd4" Ne7" 2. Kd6" Ng6" 3. Be3'** (3. Be5' Nh4" 4. Kd5" Nf3" 5. Bf4" Ne1" 6. Kc4" Kg7" 7. Kd4" Kh7" 8. Kc3" Ng2" 9. Bd2" Nh4" 10. Kd3" Nf3" 11. Bf4" Ne1+" 12. Kd2" *p12b*) **Nh4" 4. Ke5' Nf3+" 5. Ke4" Ne1" 6. Bd2" Nc2" 7. Kd3" Na3" 8. Bf4" Nb5" 9. Kc4" Na3+" 10. Kb4" Nc2+" 11. Kc3" Ne1" 12. Kd2" *p12b* Nf3+" 13. Ke3" Ne1" 14. Bg3" Nc2+" 15. Kd3" Nb4+" 16. Kc4" Nc6" 17. Kc5" Na5" 18. Bf4" Kg7" 19. Kb6" Nc4+" 20. Kb5" Na3+" 21. Kb4" Nc2+" 22. Kc3" Ne1" 23. Kd2" Nf3+" 24. Ke3" Ne1" 25. Be5+" Kg8" 26. Bc3" Nc2+" 27. Kd3" Na3" 28. Be5" Kf7" 29. Bf4" Kg7" 30. Kc3" Kh7" 31. Be5" Nb1+" 32. Kc2" Na3+" 33. Kb3" Nb5" 34. Kb4" Na7" 35. Kc5" Nc8" 36. Bf6"** (dte -10m, dtp -19m) 1-0.

Completely different in character, scale and scope is the 7-man Chess EGT generation programme at the M. V. Lomonosov Moscow State University. The MVL team (2012) are principally using a T-Platform super-computer, currently 22nd on the 'Top 500' list (HPC, 2012), also named LOMONOSOV in honour of the outstanding 18th century Russian polymath. This has 40,000 64-bit Intel Xeon cores each with 1.5GB RAM. This initiative pioneers major intra-EGT-computation parallelism and conveniently uses up to 2,048 cores on each of several concurrent EGT-generation tasks. Welcome innovations include partial, 6-way rank-based endgame Pawn-slicing and a depth metric in symmetric, information-retentive plies rather than winner's moves. Computation times for the KQRKQB DTM EGT, 374 seconds (512 cores), 214" (1k cores) and 140" (2k cores) naturally show sublinear speed-up: inter-task parallelism is also used. All sub-7-man and 4+3(p) 'no castling' DTM EGTs have been generated. The current prediction is of 100TB of EGTs by end-2012 with the completion of the 5+2(p) 'no castling' EGTs. WDL and DTC EGTs are also in prospect.

The challenge of ensuring that the EGTs correctly represent chess itself is an important and difficult one (Hurd and Haworth, 2010): EGT-generation errors can be subtle and are certainly infectious (Schaeffer et al., 2003). Although this giant supercomputer is not without its network and disc issues, EGT-verification code, as independent as possible from the EGT-generation code, is not yet available. So further evidence of defensive programming and of EGT correctness will be welcome and no doubt forthcoming.

My thanks to Eiko Bleicher, Marc Bourzutschky, Marcel van Kervinck, Jan Krabbenbos, the MVL team, Richard Pijl, Pedro Pérez Romero, Árpád Ruzs, Emil Vlasák and Harvey Williamson for their inputs.

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