

Is the Computer Going to Take Over from the Composer?

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(In my article published in Vol. 5, No. 2, "How the Computer Helps the Composer", I had the pleasure of quoting a fourfold twin from Norman A. Macleod, a helpmate in three, composed not by the author but by his program "Composer". How he did it and what other difficulties arose in the display of "Composer" are described in the following interesting paper. - Laszlo Lindner)

The computer program COMPOSER is in theory capable of producing all orthodox problems up to the size of a miniature (7 men). In practice, time and storage considerations make it impractical to deal exhaustively with problems containing more than 3 or 4 men. So far I have dealt mainly with problems with only 3 men. The following genres were considered: directmates, direct stalemates, helpmates, helpstalemates, seriesmates, seriesstalemates, series-helpmates, and serieshelpstalemates.

My results contain a small percentage of inaccuracy due to program errors that I have not yet been able to correct. In the case of directmates and stalemates, demands on storage restricted the length of problems that could be considered. For mates using K/R & K, up to #9; K/Q & K, up to #6. For stalemates, K/R & K, up to #7; K/Q & K, up to #4. For both types, K/P & K has not yet been dealt with. Otherwise, all problems of any length for all types have been produced. The output of the program consists of all distinct positions (with respect to reflection and rotation) with a single accurate solution.

(Note: "reflection" means flip-flopping the board, left-half to right-half. In "rotation" in pawnless settings, the same position can be duplicated effectively with any quarter turn of the board. Actually, in a pawnless setting, and with reference to whether the "mated" king starts or ends on x square, this square can be limited to a 10 square area: a1 to d4 to d1 to a1. The other pieces can then be set in unique relationships, except for those cases where asymmetric "reflections" occur on the a1-h8 diagonal. - Ed.)

In the case of directmates and stalemates this means a solution with at least one dual free variation. The numbers produced for each type were as follows:

Directmates.....	3978
Directstalemate.....	6120
Helpmate.....	6751
Helpstalemate.....	7568
Seriesmate.....	2946
Seriesstalemate.....	2048
Serieshelpmate.....	1466
Serieshelpstalemate.....	2580

Total 36037

Of course, the number of distinct problems is much less than this number since, although reflections and rotations have been eliminated, it is often the case that all three men may be shifted on the board without change to

the problem, or there may be optional squares for any of the three men, again without changing the problem.

So where are the gems among this large number of positions to be looked at?

Clearly, it would be pointless to publish the entire set. The task of looking through the computer output to find problems of value is almost as great as that of the composer who is looking for 3-man settings without the aid of a computer! In any case, such problems are not composed; they are already there! It is simply a matter of finding them. Of course, it is easy to check the length records.

For helpstalemates, nothing longer than $H=4$ was found, but on examining the record $H=5$ by J. Ban, I found it to be cooked. A small selection from the computer's output follows. To help in the task of finding interesting settings, I used supplementary routines on the computer; for example, to look for twins (only one man moved, piece replacement, rotation of the board, same position for two different types, etc.).

The method used by the program is first to find all final positions (\neq or $=$) for each combination of pieces. Then the program makes all possible retro-moves. The resulting positions are sorted and duplications removed. Positions without a duplicate are designated "good" and those with a duplicate "bad". Retro-moves must be made from both "good" and "bad" positions, but all ancestors of "bad" positions are "bad". Nonduplicated ancestors of "good" positions are "good". A slight variation of this procedure is needed for directmates and stalemates. Another variation was added to produce accurate multi-solution problems.

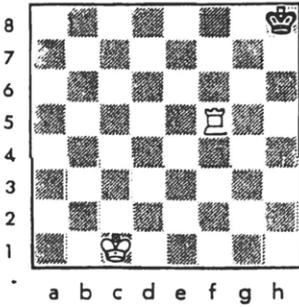
The program is capable of producing the exhaustive set of 4-man problems but the number of distinct positions would be large - I would guess on the order of 1,000,000. Also, the computer time and disk storage needed would be considerable, though not out of the question for the facilities of a university or other research establishment.

So, is the computer going to take over from the composer as well as the solver? I think not! The unexpectedly large numbers, even for problems with very few men, show that there is no chance at all of the computer exhausting the field even of miniatures, let alone problems without restriction on the number of men. The fact that the computer has made new finds in 3-man settings makes nonsense of any claim that such and such a field (for example, the orthodox 2-mover) is exhausted.

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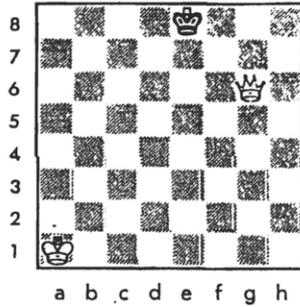
Dr. Laszlo Lindner
Nepkoztarsasag utja 54
H-1062 Budapest, Hungary

1.



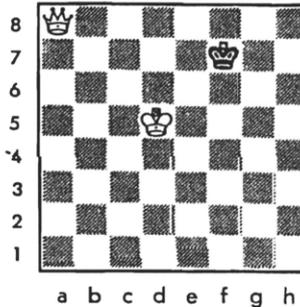
≠9 b)BKh7 c)WKA5

2.



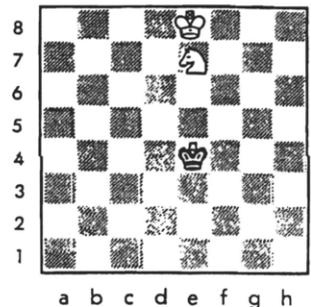
H≠4 b)WKh7

3.



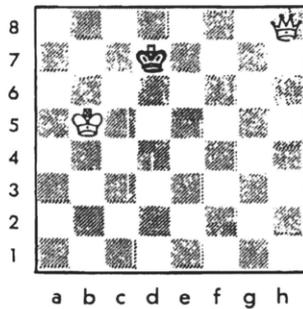
Stalemate in 4

4.



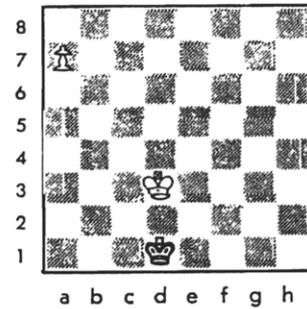
H=4 b)Sa5 c)WKc1
d)WKc4 e)further Sd5

5.



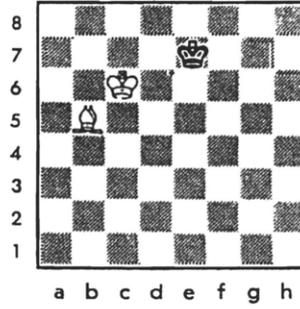
H=2 b)WKf6 c)Qh7
d)Qb7

6.



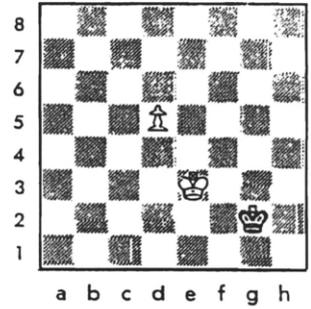
H=2 with set play
b)Pb7

7.



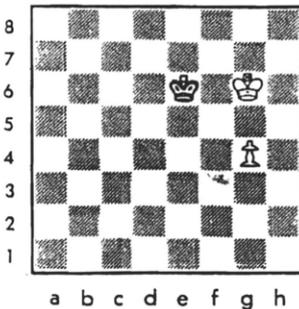
H=3 white to move
b)BKe6 c)WKg7

8.



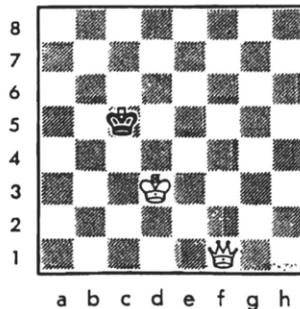
H=4 b)turn 180°
c)turn 90° clock-
wise

9.



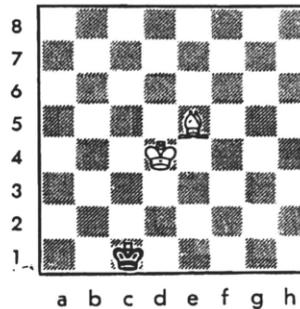
H=4 b)WKh8

10.



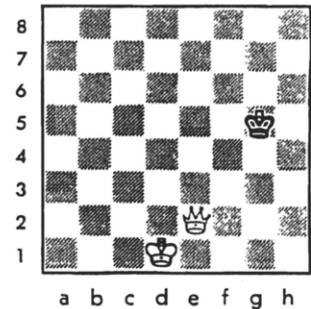
(i)H≠2 (ii)H=2
b)Qd8

11.



H≠3 white to move
(3 solutions)

12.



H≠3 b)H=3

SOLUTIONS TO PROBLEMS FOUND BY "COMPOSER":

- 1) (a) 1.Kd2! Kh7, 2.Ke3 Kg7, 3.Kf4 Kg6, 4.Kg4 Kh6, 5.Rg5 Kb7, 6.Kh5 Kh8, 7.Kg6 Kg8, 8.Rf5.
 (b) 1.Rg5! Kh6, 2.Rg1! Kh5, 3.Kd2 Kh4, 4.Ke3 Kh5, 5.Kf4 Kh6, 6.Kf5 Kh7, 7.Kf6 Kh8, 8.Kf7. 4....Kh3, 5.Kf4 Kh2, 6.Rg3 Kh1, 7.Ke3/f3 Kh2, 8.Kf2.
 (c) 1.Rf7! Kg8, 2.Rd7! Kf8, 3.Kb6 Ke8, 4.Kc7 Kf8, 5.Kd8 Kg8, 6.Ke8 Kh8, 7.Kf7 Kh7, 8.Rd6.
 Different strategy in each part.
- 2) (a) 1.Kd7 Qb1, 2.Kc6 Kb2, 3.Kb5 Kc3, 4.Ka4 Qb4
 (b) 1.Ke7 Qg1, 2.Kf6 Kg2, 3.Kg5 Kf3+, 4.Kh4 Qg4
 The WQ has to make a long move in order for the WK to intercept it. I think the best of this set, not easy to solve.
- 3) 1.Ke5 Kg6, 2.Qf8 Kg5, 3.Qf5+ 1....Kg7, 2.Qe8 Kh6, 3.Kf6. 1....Ke7, 2.Qd5 Kf8, 3.Kf6. Three accurate variations.
- 4) (a) 1.Ke5 Sg6+, 2.Kf6 Sf8, 3.Kg7 Ke7, 4.Kh8 Kf7=
 (b) 1.Kf5 Sc6, 2.Kg6 Se7+, 3.Kh7 Kf7, 4.Kh8 Kg6=
 (c) 1.Kd3 Ka2, 2.Kc2 Ka3, 3.Kb1 Sd5, 4.Ka1 Sc3=
 (d) 1.Ke5 Kd3, 2.Kf6 Ke4, 3.Kg7 Kf5, 4.Kh8 Kg6=
 (e) 1.Kf5 Sf6, 2.Kg6 Kd5, 3.Kg7 Ke6, 4.Kh8 Kf7=
 Five different stalemate settings with K/S.
- 5) (a) 1.Ke7 Qf6+, 2.Ke8 Kc6= (b) 1.Kc7 Qh1, 2.Kd8 Qc6=
 (c) 1.Ke8 Kc6, 2.Kf8 Ke7= (d) 1.Kd8 Kc6, 2.Kc8 Qb6=
 BK stalemated on four different squares.
- 6) (a) 1...Pa8Q, 2.Ke1 Qf3= 1.Kc1 Pa8Q, 2.Kb1 Qa3=
 (b) 1...Pb8Q, 2.Kc1 Qb3= 1.Ke1 Pb8Q, 2.Kf1 Qg3=
- 7) (a) 1...Ba4! 2.Ke8 Kd6, 3.Kd8 Bd7= Tempo move by W piece.
 (b) 1...Kd5, 2.Ke7 Bd7, 3.Kd8 Kd6= Tempo move by W king.
 (c) 1...Bc4, 2.Ke8 Kf6, 3.Kf8 Bf7=
- 8) (a) 1...Pd6, 2.Kg1! Pd7, 3.Kf1 Pd8Q, 4.Ke1 Qd3=
 (b) 1...Pe5, 2.Kc8 Pe6, 3.Kd8 Pe7+, 4.Ke8 Ke6=
 (c) 1...Pe6, 2.Ka3 Pe7, 3.Ka4 Pe8Q+, 4.Ka5 Qc6=
 The only rotational 3-man triplet.
- 9) (a) 1.Ke7 Pg5, 2.Kf8 Kf6, 3.Kg8 Pg6, 4.Kh8 Kf7=
 (b) 1.Kf6 Kg8, 2.Kg6 Kf8, 3.Kh7 Pg5, 4.Kh8 Pg6=
- 10) (a) (i) 1.Kb5 Kc3+, 2.Ka4 Qa6+ (ii) 1.Kb4 Kc2, 2.Ka3 Qc4=
 (b) (i) 1.Kb4 Kc2, 2.Ka3 Qa5+ (ii) 1.Kb5 Qc7, 2.Ka6 Kc4=
 Reciprocal change.
- 11) 1...Bf4+, 2.Kc2 Bd2, 3.Kd1 Kd3= 1...Kc4, 2.Kc2 Bb2, 3.Kb1 Kb3=
 1...Kd3, 2.Kb1 Bb2, 3.Ka2 Kc2=
 Problems with three accurate solutions are rare.
- 12) (a) 1...Ke1, 2.Kh4 Kf2, 3.Kh3 Qh5+
 (b) 1...Qf2, 2.Kg4 Ke2, 3.Kh3 Kf3=
 Another possibility of the theme shown is doubled in #10.

Note: In order to ensure accuracy, the above solutions were not retyped.

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