THE PUZZLING SIDE OF CHESS

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LOOPOLOGY XII
Revised History and Multiloops

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In view of recently obtained information on the origins of defensive loops, this column returns to the past to present an old problem in a new light. After rewriting the history of loopology, we proceed to the future with the latest puzzles from today.

The earliest precursor of defensive loops is this position from 1897, which appeared in a popular British magazine for boys.

E. Howland 1897
The Boy's Own Paper
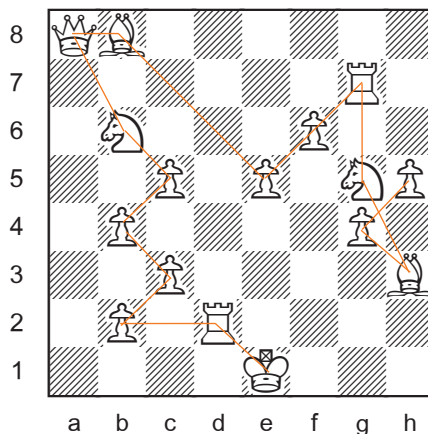
The stipulation for the puzzle was "*Start with the white king on e1 and place all the remaining White force so that each man is only guarded by the previously placed man.*"

The "chain" is not a loop because there is no requirement for the final piece (h5) to protect the king. But it is very close to being a loop.

Besides his initial and last name, no other information is available about the composer. Let's hear it for E. Howland!

The Boy's Own Paper was published from 1879 to 1967. It featured adventure stories, articles on nature, and puzzles. Contributors included Jules Verne, Arthur Conan Doyle, and Isaac Asimov. For many years, a special Canadian edition was printed in Toronto.

The next step in loop evolution occurred in 1961. The stipulation for the following problem was to "*arrange the sixteen pieces so that each piece was defended exactly once*". This position was given previously in columns 36 and 162 and credited to the authors of a 1963 math book. But it was actually composed by Fred Galvin two years earlier.

Fred Galvin 1961
Journal of Recreational Mathematics
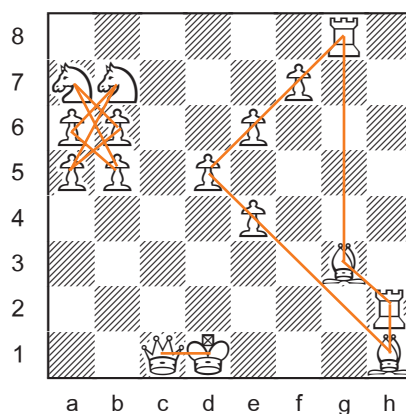
The solution is not a loop because there is no requirement for there to be a single continuous chain. There are in fact three separate *groups of defence*. The king and queen guard each other. The knights and pawns on the queenside form one loop and the remaining eight pieces another. But it is close to being a loop because every piece must be protected.

Two German composers solved the same task in 1984, with the goal of maximizing the number of defensive groups. They achieved six. (a2-b3-Ra3 / b2-Bc3 / b6-Nc7-d6-Nd7 / Be2-Qf1 / Kg3-h2 / g6-h7-Rg8). This record is the logical maximum.

Heribert Adamsky & Bernd Schwarzkopf 1984
feenschach 71
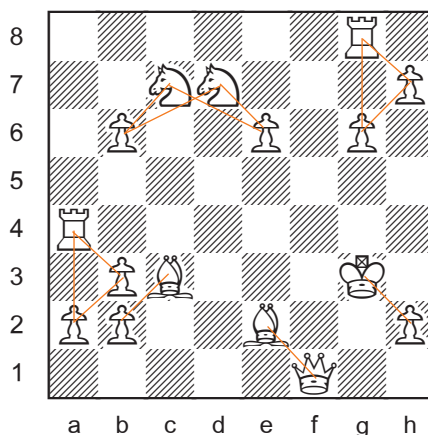
I recently became aware of several loop problems from the 1980s while browsing the website of French composer Éric Angelini. In a section called "self-protecting chess", written around 2008, reference is made to an article called "A Chess Board Chain" by Colin Vaughan in *The Problemist*, May 1980.

This article is the modern source for the 1897 chain by E. Howland. More importantly, it also gave birth to the *defensive loop!*
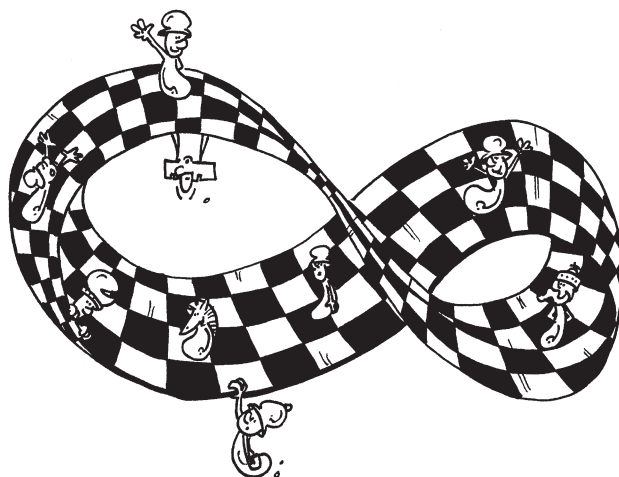
Based on current information, the oldest examples of defensive loops are three positions by Gordon Pollard, Somo Ylikarjula, and Jexon Secker. The fathers of the loop. Here is the original puzzle from 1980.

Full Set Loop

*"16 White men placed successively
to guard and be guarded once only"*
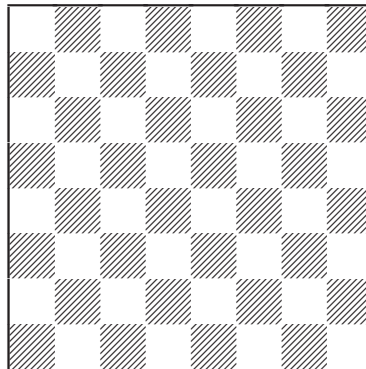
Place the sixteen pieces on the board so that each piece is defended exactly once and each piece defends exactly one other piece. Pawns may not be placed on the 1st rank. Bishops must be placed on opposite-colour squares.
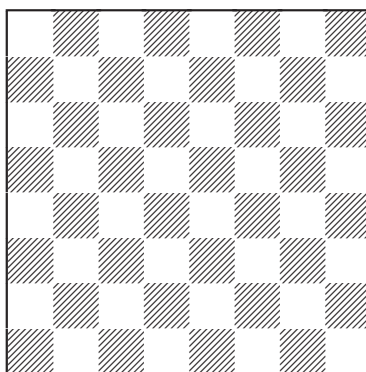
The defensive chain should form a continuous loop. The first piece guards the second piece; the second guards the third; the third guards the fourth; ...; and the sixteenth guards the first.
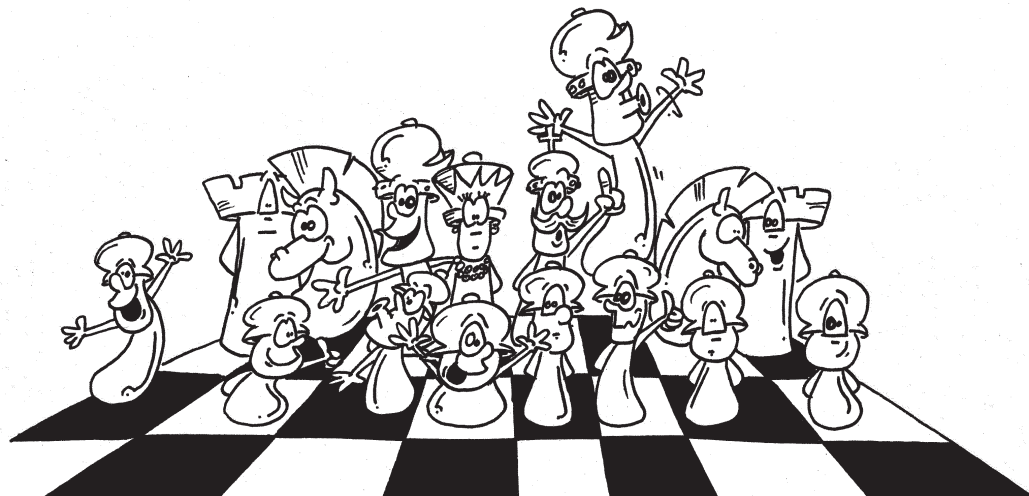
In November 1984, there was an article in the German problem magazine *feenschach* by Bernd Schwarzkopf titled "Wer deckt wen?". Deutsch for *Who defends whom?*

Among other things, it included three defensive loops using 8 officers that were previously published in *The Problemist*, January 1983. These loops anticipate the same task that appeared on the *Puzzling Side of Chess* in 2012 (column 15).

Eight Officer Loop

Place the eight officers so that each piece is defended exactly once and each piece defends exactly one other piece.
The defensive chain should form a single continuous loop.

For an extra challenge, try these secondary stipulations.

Make an eight officer loop that:
A. fits on the smallest board possible (7 x 3).
B. maximizes the number of unattacked squares.
**C.** minimizes the number of unattacked squares.
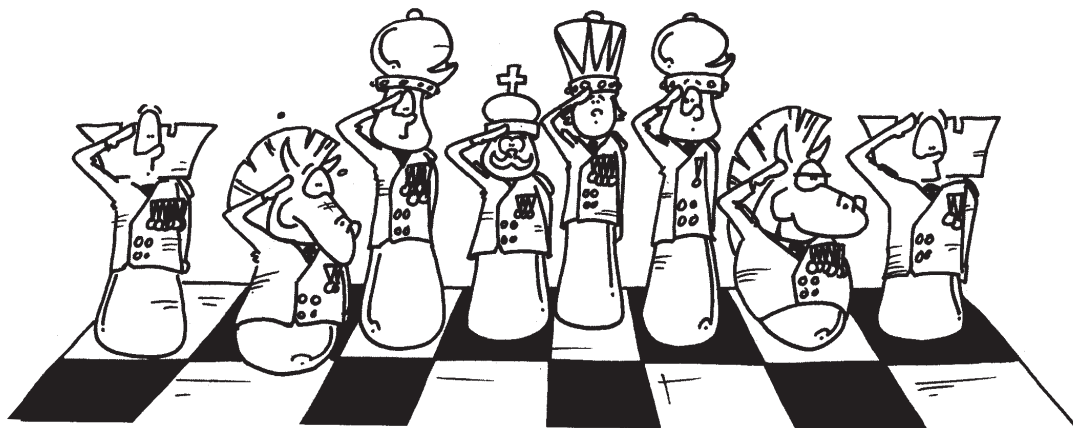
As reported in Loopology XI, mathematics professor Erich Friedman from Stetson University in Florida posted numerous defensive loops on his website in 2007.

Optimal solutions were given for the following single loops, all with an equal number of each piece: KR KB KN QN RB RN BN RP NP KQN KRB KRN KRP QBN QRN KQBN QRBN QBNP. Past columns will be edited to acknowledge his pioneering work.

Here is one example of what he calls a "chess attack loop".

Erich Friedman 2007
Math Magic Chess Archive
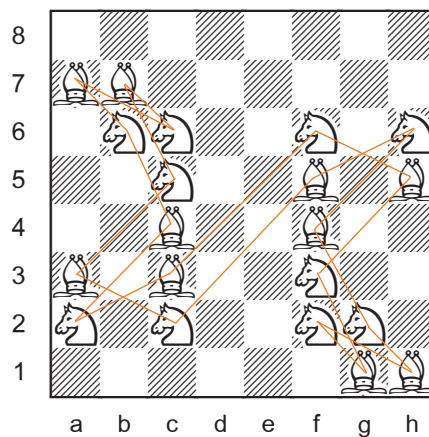
BN Loop / record 10B + 10N

A reflected version of a position given in Looplogy V (column 162). The arrangement would be beautifully symmetrical on an 8 x 7 board.

That concludes this version of loop history. Time now for the future.

The positions shown earlier on pages 2-3 with multiple *groups of defence* gave me an idea for a new kind of problem: multiloops!

In a *multiloop*, two or more identical groups of pieces are placed so that each group forms an independent loop. Pieces in one group may not attack a piece in another group. For convenience in the tasks below, one loop is made with white pieces, the other with black. When a group has two bishops, they must be placed on opposite colours.

The difficulty of the four puzzles might be categorized as A: easy, B: medium, C: hard, D: stumpy. At first, I thought the eight officer multiloop was probably impossible. Luckily, François was there to lend a hand.

Multiloops
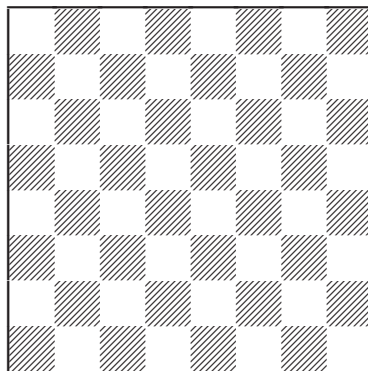
Place the following pieces on the board so that
each white and black group forms an independent loop.
A piece may not attack a piece of the opposite colour.

A. ♔♕♖♗♘ ♚♛♜♝♞

B. ♔♕♖♗♗♘ ♚♛♜♝♝♞

C. ♔♖♖♗♗♘♘ ♚♜♜♝♝♞♞

D. ♔♕♖♖♗♗♘♘ ♚♛♜♜♝♝♞♞

Loopology will return later in the year. The temporarily postponed *Double Loops with Unequal Pieces* has not been forgotten.

SOLUTIONS

PDF hyperlinks. You can advance to the solution of any puzzle by clicking on the underlined title above the diagram. To return to the puzzle, click on the title above the solution diagram.

Archives. Past columns and a detailed index of problem-types and composers are available in the *Puzzling Side of Chess* archives.
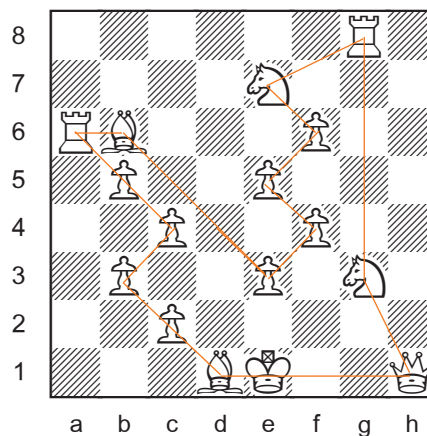
Full Set Loop

Gordon Pollard 1980
*The Problemist*
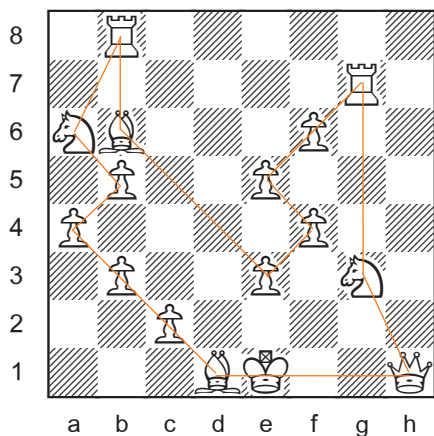
Somo Ylikarjula 1980
The Problemist

In *A Chess Board Chain*, author Colin Vaughan wrote that it was Gordon Pollard who pointed out the possibility of making a chain in which the last piece guards the first, thus creating a closed chain. In other words, a "loop".

Jexon J. Secker 1980
The Problemist

François Labelle has computed that there are 1926 solutions, not counting reflections. 182 have the king on e1.

See columns 36 and 162 for my solutions from 2010.
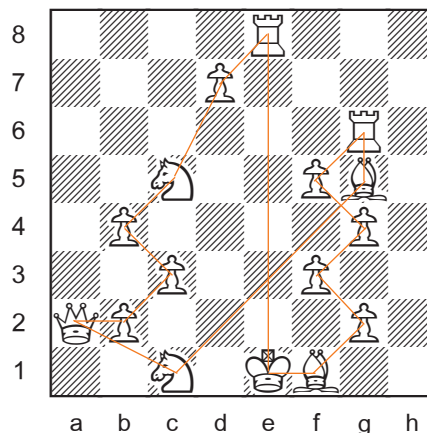
About 2008, Éric Angelini posted a *full set loop* on the internet, without knowing of the precedents. Bernd Schwarzkopf replied with the reference to Colin Vaughan's article and to another by himself in *feenschach*, November 1984. Such is the winding path of knowledge.
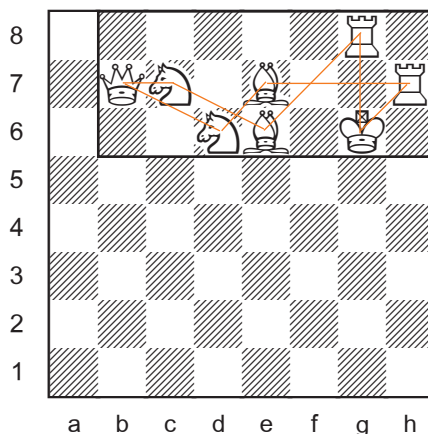
Eight Officer Loop

A. smallest board

Colin Vaughan 1983
The Problemist

7 x 3 rectangular board

The exact same position appeared in the Argentinian puzzle magazine *El Acertijo*, issue 10, 1994, and was credited to Héctor San Segundo and Rodolfo Kurchan. It seems that the chess loop, with its natural simplicity and charm, has been created anew time and time again around the globe.

Eight Officer Loop

B. most unattacked squares

Clive Grimstone 1983
The Problemist
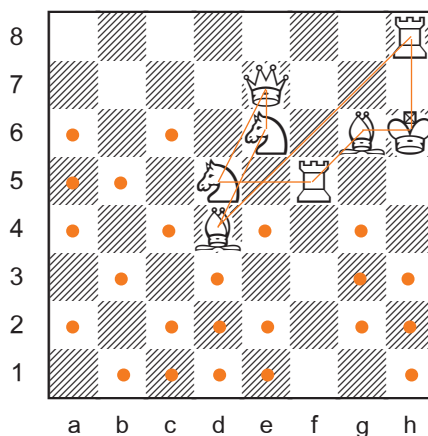
23 unattacked squares

François Labelle has verified that 23 is the maximum, with 11 solutions.
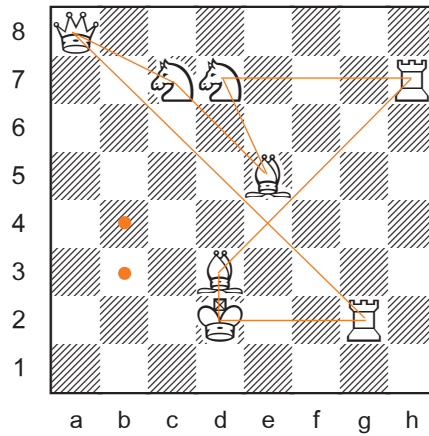
Bernd Schwarzkopf noted in *feenschach* that this pattern fits on a 5 x 5 board.

Eight Officer Loop

C. fewest unattacked squares

François Labelle 2019
Puzzling Side of Chess
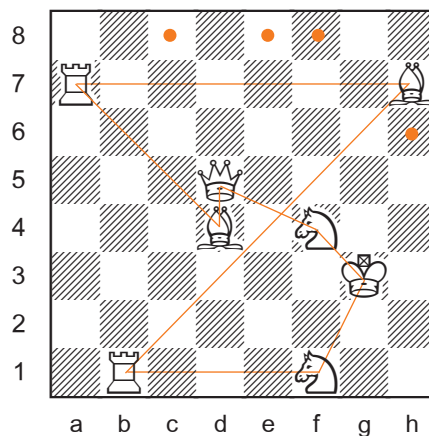

2 unattacked squares

A unique pattern discovered with the magic of computer wizardry.

This position breaks the old record of four unattacked squares.

Colin Vaughan 1983
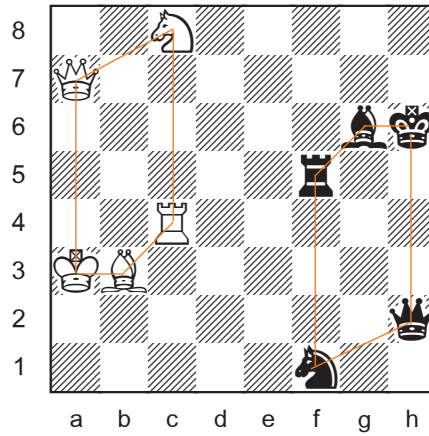*CaissasScholssbewohner*
feenschach 71 (1984)

4 unattacked squares

Multiloop

A. KQRBN
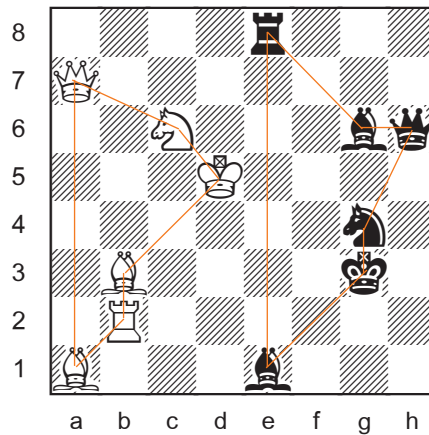
Jeff Coakley 2019
Puzzling Side of Chess

Two symmetrical handfuls of pieces.

Multiloop

B. KQRBBN

Jeff Coakley 2019
Puzzling Side of Chess
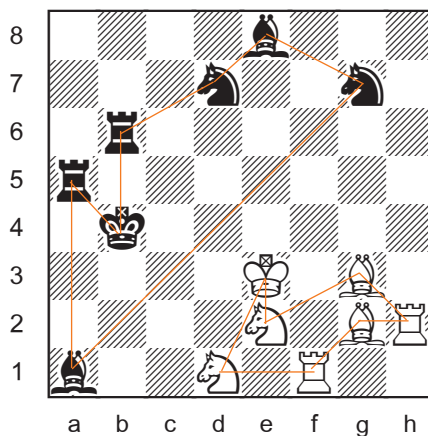

Splitting the board sideways.

Multiloop

C. KRRBBNN

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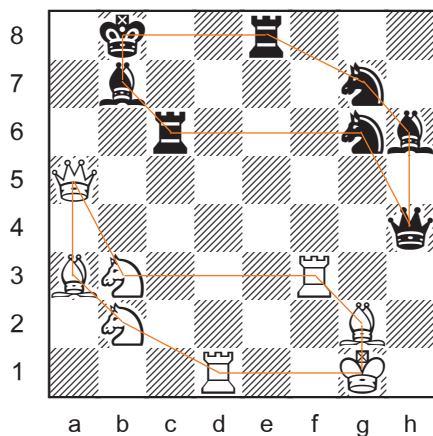*Puzzling Side of Chess*

Compact White, sprawling Black.

Multiloop

D. KQRRBBNN
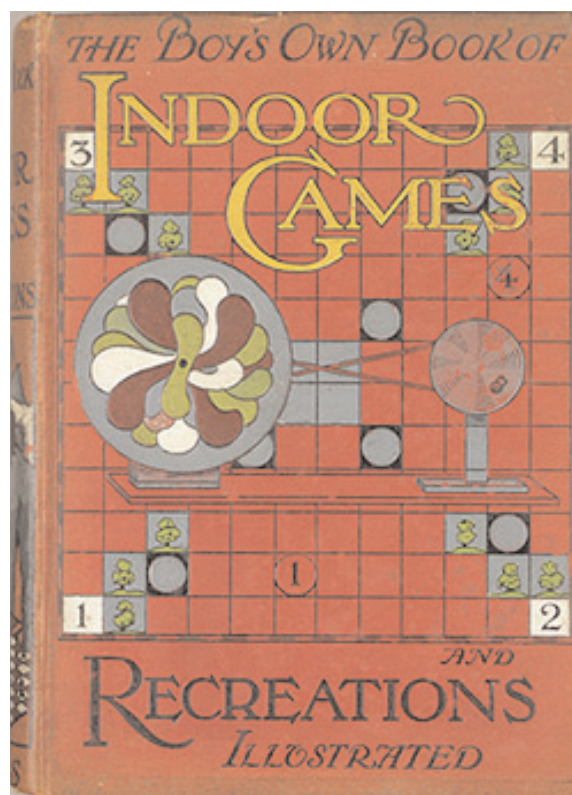
François Labelle 2019

Puzzling Side of Chess

A symmetrical gem.

There are 203,175 solutions for a single eight officer loop, but just 9 solutions for an eight officer multiloop. The diagram shows the only multiloop in which both loops have the same pattern. The other solutions are given on the next page.

Eight officer multiloops:

Ba6 Rf1 Ba1 Kd4 Rc5 Nb4 Qb3 Na5 / Rg2 Kg7 Rh6 Nd6 Qe8 Bd8 Nb6 Ba8

Nh7 Qf6 Bh6 Re3 Ka3 Na2 Rc1 Bc2 / Bg2 Ra8 Na7 Qb5 Kd7 Bc7 Nh2 Rg4

Nh7 Qf6 Bf2 Re3 Ka3 Na2 Rc1 Bc2 / Bg2 Ra8 Na7 Qb5 Kd7 Bc7 Nh2 Rg4

Re5 Ke3 Ne2 Rc1 Ba1 Nb2 Qa4 Ba2 / Kh2 Bh3 Rf5 Nh5 Rg7 Nb7 Qd8 Bb8

Re1 Kb1 Ra2 Ba4 Nb5 Qd4 Nc4 Ba5 / Rg3 Ng5 Rh7 Bh5 Ng6 Qf8 Kc8 Bb8

Ng6 Rh4 Ka4 Ba5 Re1 Nd1 Qb2 Bb1 / Rg3 Ng5 Rf7 Na7 Qc8 Ba8 Kd5 Bd6

Bb4 Rc3 Nf3 Kg1 Bf1 Re2 Nb2 Qa4 / Bg3 Rb8 Bb7 Rd5 Kf5 Ng4 Qh6 Nh5

Kc4 Nc3 Qb1 Bc1 Rd2 Nf2 Rh1 Bf1 / Kf4 Rg5 Ng7 Qe8 Bc8 Ra6 Na8 Bc7

Qa5 Ba3 Nb2 Rd1 Kg1 Bg2 Rf3 Nb3 / Qh4 Bh6 Ng7 Re8 Kb8 Bb7 Rc6 Ng6 *

* diagram

Until next time!