



THE PUZZLING SIDE OF CHESS

Jeff Coakley

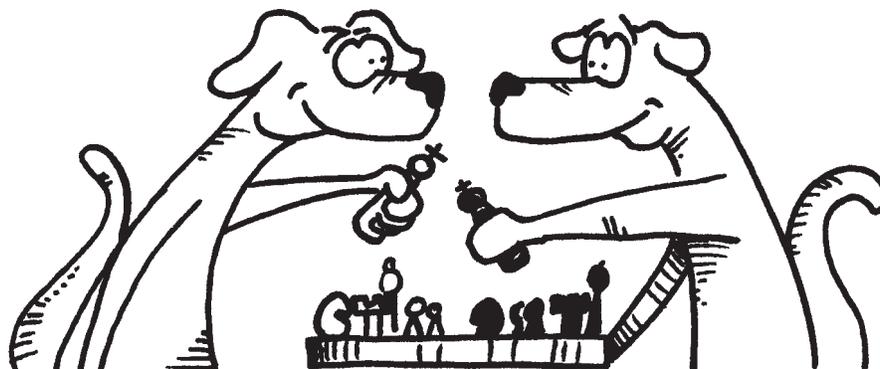
CYCLOTRONS

The Next Generation Switcheroo

number 55

December 14, 2013

This column features a normal batch of switcheroos and also introduces a new variation on this type of puzzle.



Switcheroos are a fun and sometimes challenging puzzle. The goal is to put the black king in checkmate by switching the position of two pieces. No actual chess moves are made. The pieces simply swap squares.

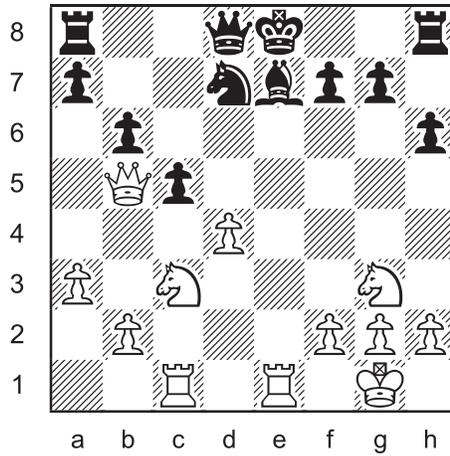
Any two pieces can switch places. Colours do not matter. You can trade white with white, black with black, or white with black. Switching the black king is a common trick.

The position after the switch must be legal. A position is legal if it could occur in an actual game. This rule implies several things.

- A pawn cannot be put on the 1st or 8th rank.
- Both kings cannot be in check.
- There must be a way to reach the resulting position with a legal white move. Impossible checks, especially double checks, are a frequent “violation”.
- In some cases, *retrograde analysis* may be required to decide if the position after a switch is legal.

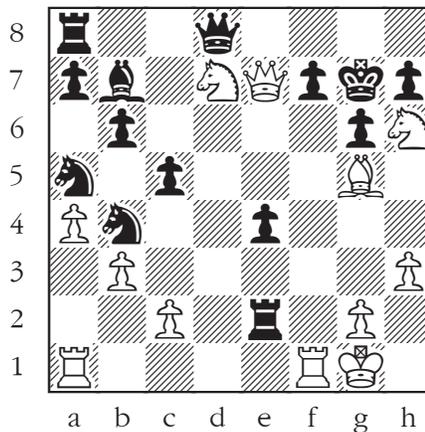
For problems 1-61 and more information on switcheroos, see the Puzzling Side archives, starting columns 4.

Switcheroo 62

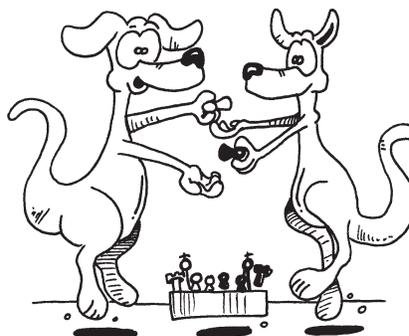


Switch two pieces so that
Black is in checkmate.

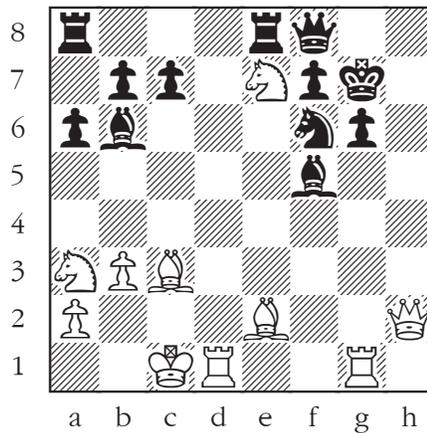
Switcheroo 63



Switch two pieces so that
Black is in checkmate.



Switcheroo 64



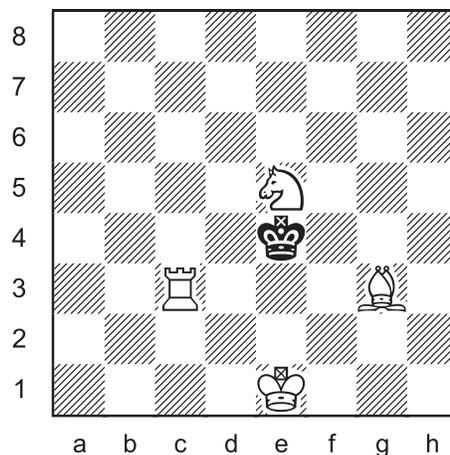
Switch two pieces so that
Black is in checkmate.

Cyclotrons

A *cyclotron* is a three-way switcheroo. Instead of switching two pieces, we switch three. The pieces trade places in a “cycle”. Piece A goes to square B, piece B goes to square C, and piece C goes to square A. Otherwise the usual rules for switcheroos are followed.

Here is a basic example.

Cyclotron 01



Cycle three pieces so that
Black is in checkmate.

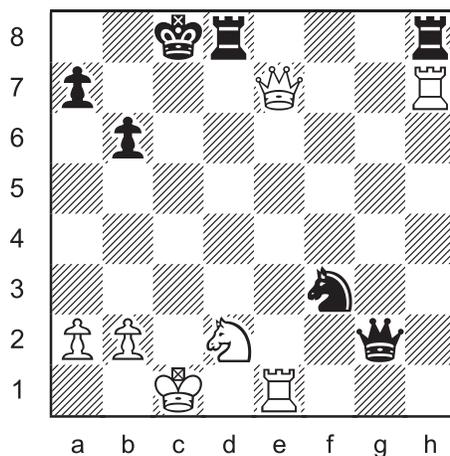
Any three pieces may trade places.

Colours do not matter.

The resulting position must be legal.

Now that the easy puzzle is out of the way, we can turn up the level on the *challenge control knob*.

Cyclotron 02

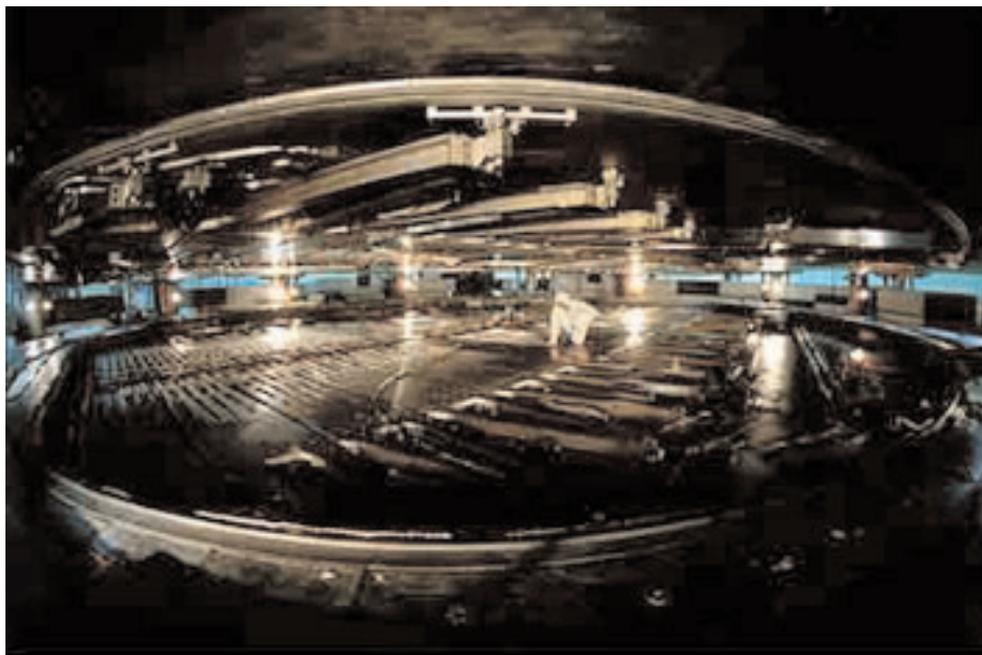


Cycle three pieces so that
Black is in checkmate.

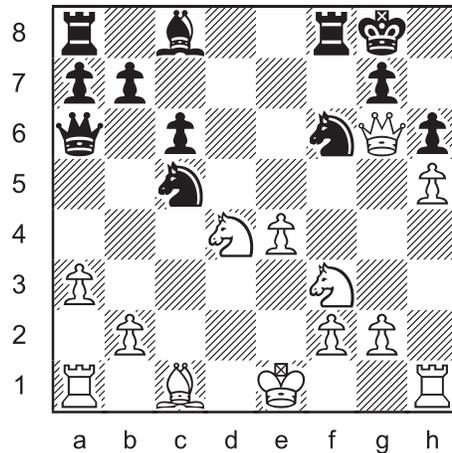
Cyclotronic Trivia

A cyclotron is a machine that uses magnetic and electric fields to accelerate subatomic particles in a spiral motion. It was invented in 1932 by Ernest Lawrence at the University of California, Berkeley.

The largest cyclotron in the world is at the University of British Columbia in Vancouver. See photo below. With a diameter of 18 meters, it can accelerate protons to three-quarters the speed of light. At that velocity, you could travel from the Earth to the moon in two seconds. Hang on.



Cyclotron 03



Cycle three pieces so that
Black is in checkmate.

The cyclotron is a natural extension of the switcheroo. But there is no reason to stop at three pieces.

American master Ronald Kensek from Albuquerque, New Mexico has already taken the next step. His entries in the *Chess Cafe Puzzlers Cup* featured cycles of four and five pieces. He calls these puzzles “psycho cycles”. Perhaps that’s because solving them may drive you crazy!

His problems have one additional requirement. A correct solution must consist of a single continuous cycle. You may not use two separate cycles, where pieces A, B, and C trade places in one cycle, and pieces D and E trade places in another.

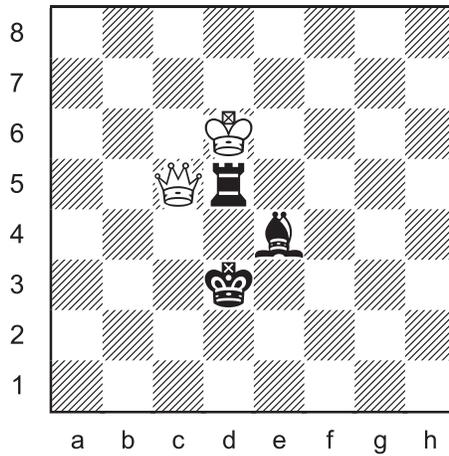
The next puzzle stipulates a cycle of five pieces. Since there are only five pieces in the position, it’s not too hard to figure out which ones are involved.



Cyclotron 04

Ron Kensek

Psycho Cycle, Five Pieces



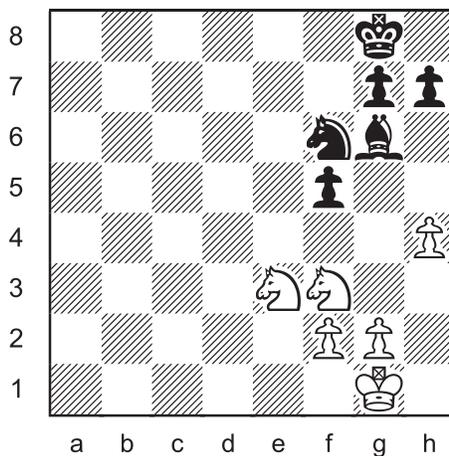
Cycle five pieces so that
Black is in checkmate.

The final two problems are approximate twins, the first with a cycle of four, the second with a cycle of five.

Cyclotron 05

Ron Kensek

Psycho Cycle, Four Pieces

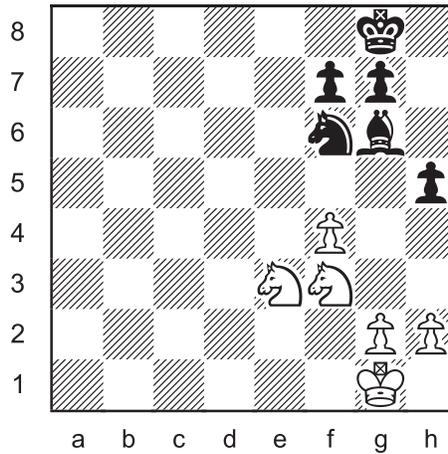


Cycle four pieces so that
Black is in checkmate.

Cyclotron 06

Ron Kensek

Psycho Cycle, Five Pieces



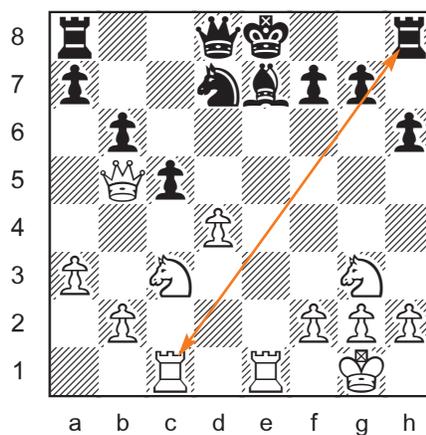
Cycle five pieces so that
Black is in checkmate.

SOLUTIONS

All switcheroos and cyclotrons 1-3 are by J. Coakley. Switcheroo 62 is from *Winning Chess Puzzles For Kids* (2006), 63 and 64 from *Volume 2* (2010). Cyclotrons 1-3 are *ChessCafe.com* originals (2013).

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.

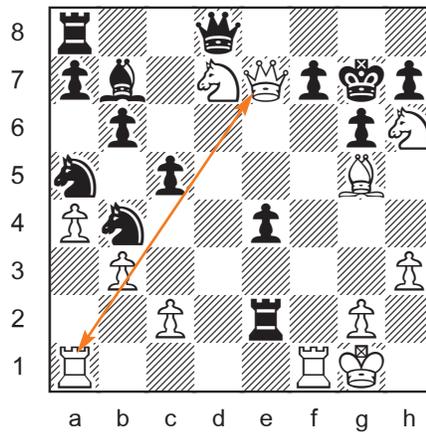
Switcheroo 62



Rc1↔Rh8

The mating move was 1.Rh7-h8#. It wasn't easy for the white rook to reach h7, but it can be done legally.

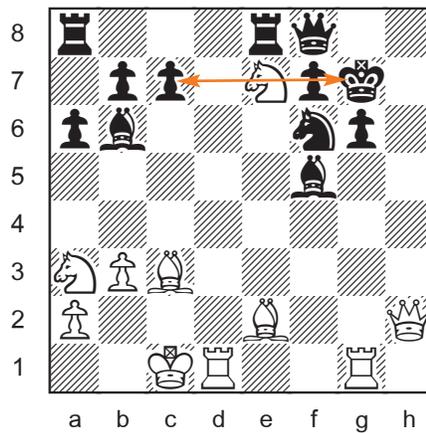
Switcheroo 63



Ra1↔Qe7

A strategic retreat by the white queen.

Switcheroo 64



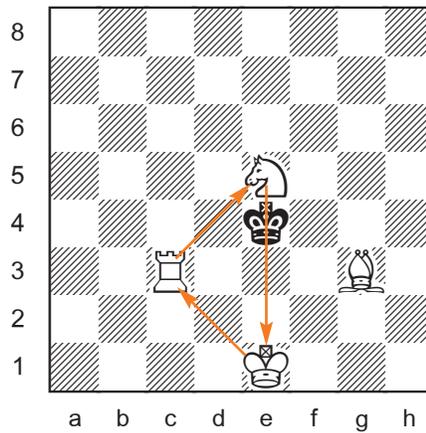
c7↔Kg7

A surprising switch by the black king to an apparently safe part of the board.

(g6↔Kg7? is an impossible double check.)

(Na3↔Bf5? puts both kings in check.)

Cyclotron 01

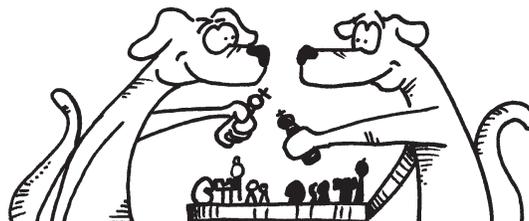
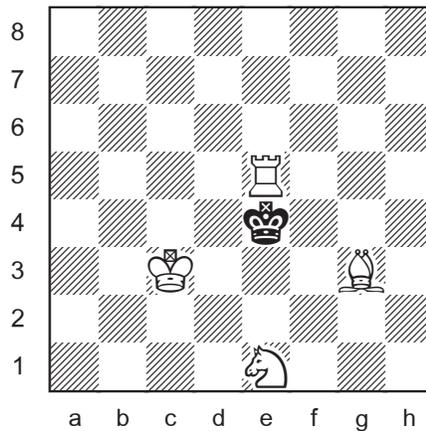


Ke1→c3 R3c3→e5 Ne5→e1

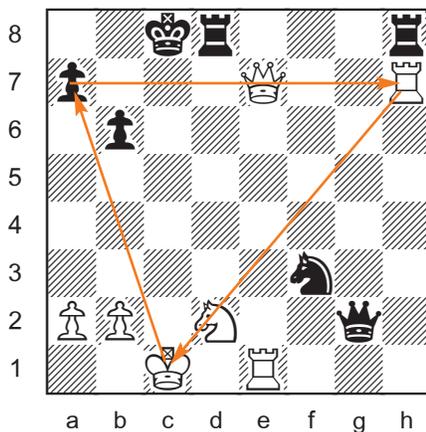
The order in which the pieces are cycled is not important. The resulting position will still be the same.

In this puzzle, all three cycled pieces are white. But this is not a requirement. Like switcheroos, the pieces changing places in a cyclotron may be of either colour.

The diagram below shows the position after the cycling of pieces.

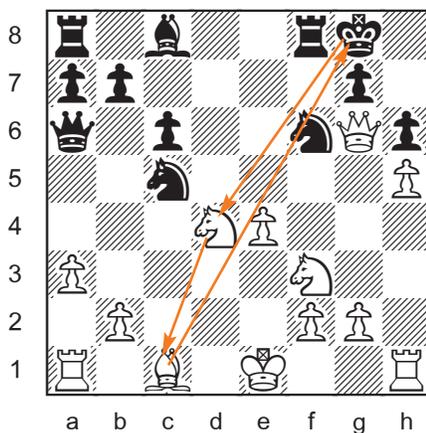


Cyclotron 02



a7→h7 Rh7→c1 Kc1→a7
A lengthy triangular cycle.

Cyclotron 03



Bc1→g8 Kg8→d4 Nd4→c1

Another centralized king bites the dust. The bishop on g8 covers c4.
The knight on c1 covers d3.

These two cycles yield an impossible double check.

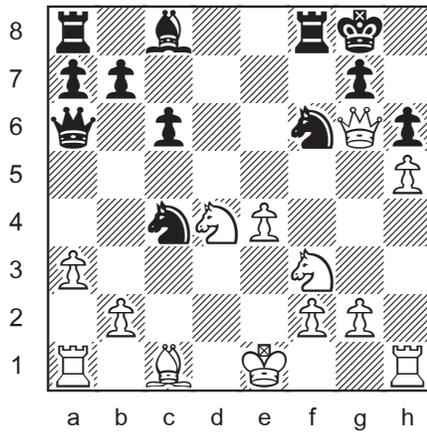
Nd4→g8, Kg8→f6, Nf6→d4?

Nf6→g8, Kg8→h6, Ph6→f6?

Other cycles with the black king on h6 are also illegal.

In the twin problem below, the black knight has slipped from c5 to c4.

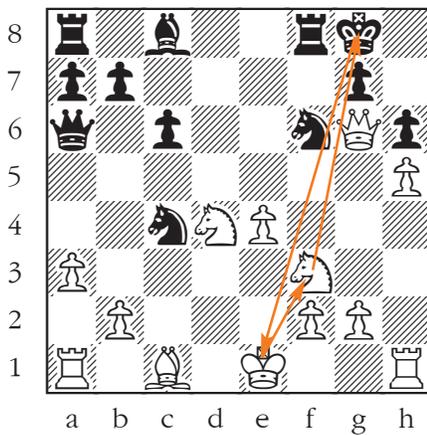
Cyclotron 03b



Cycle three pieces so that
Black is in checkmate



Cyclotron 03b solution



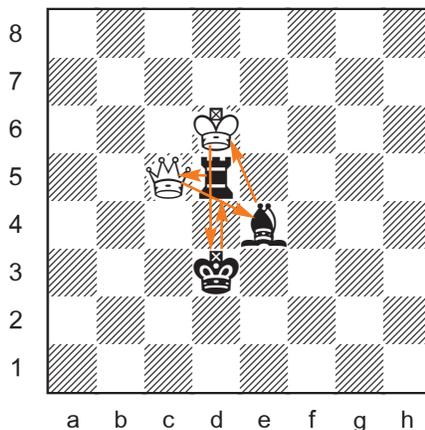
Ke1→f3 Nf3→g8 Kg8→e1

A strange position, but legal.

Cyclotron 04 *Psycho Cycle, Five Pieces*

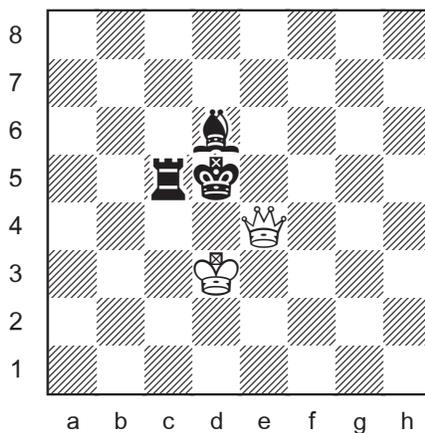
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Qc5→e4 Be4→d6 Kd6→d3 Kd3→d5 Rd5→c5

It's like juggling five balls.



The following try is incorrect because it splits the solution into two separate cycles:

cycle 1

Qc5→e4 Be4→c5

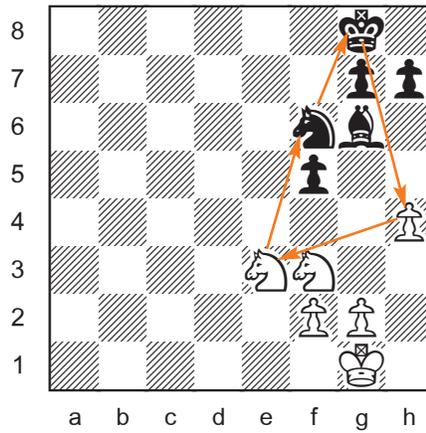
cycle 2

Kd3→d5 Rd5→d6 Kd6→d3

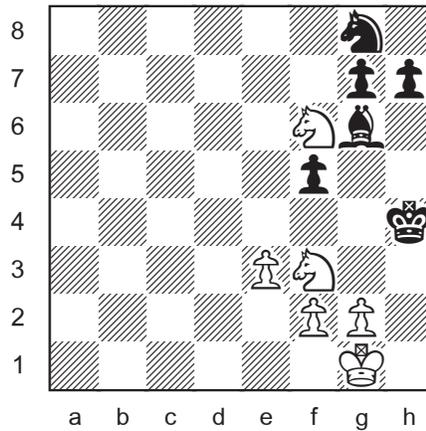
Cyclotron 05 *Psycho Cycle, Four Pieces*

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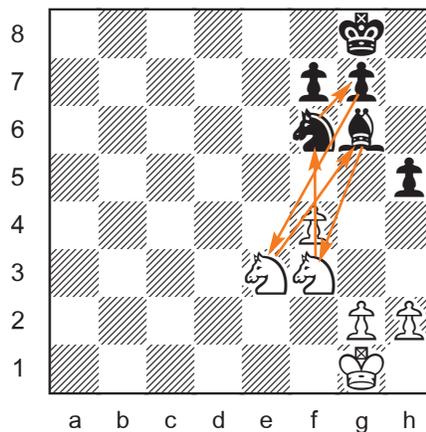
Ne3→f6 Nf6→g8 Kg8→h4 h4→e3



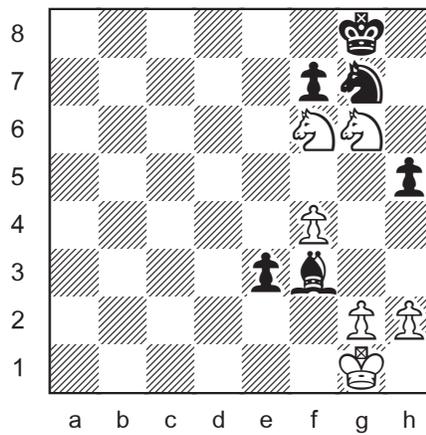
Cyclotron 06 *Psycho Cycle, Five Pieces*

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Ne3→g6 Bg6→f3 Nf3→f6 Nf6→g7 g7→e3



The following try, which results in the same position, has two separate cycles and is therefore incorrect.

cycle 1

$Ne3 \rightarrow f6$ $Nf6 \rightarrow g7$ $g7 \rightarrow e3$

cycle 2

$Nf3 \rightarrow g6$ $Bg6 \rightarrow f3$

Thanks for the great puzzles, Ron.

Until next time!

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