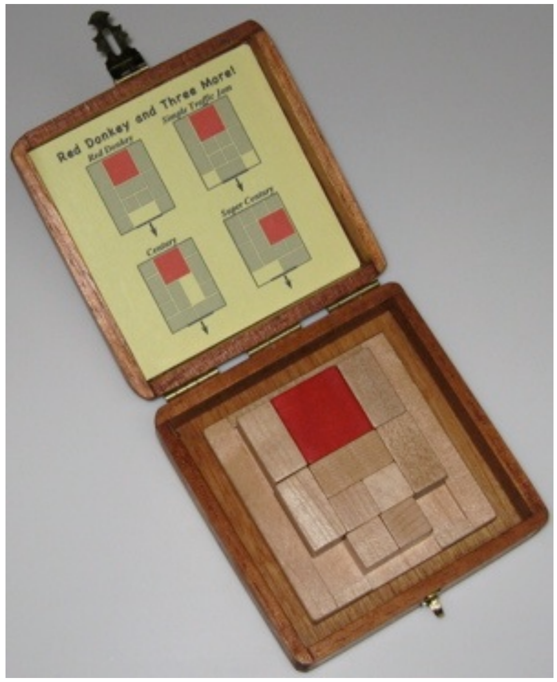
Red Donkey

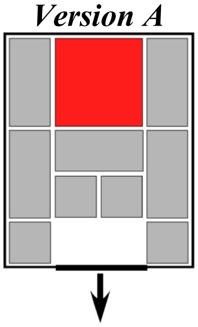
(with Simple Traffic Jam, Century, and *Super Century)*



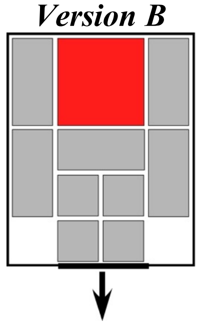
a.k.a. ***L'Ane Rouge, Which Way Out, Psychotease,***
Escaping Jail,Cao Cao Escape, Klotski
Patented in England by J. H. Fleming 1932,
this one is "Which Way Out" by T.C. Timber Brain Twisters circa 1995,
in a box made by J. A. Storer 2007.
(maple, tray and 10 pieces, 2x2 is painted red, 3.75 x 3.5 x 0.9 inches;
box is resized cigar box with brass hardware, 4.75 x 4.75 x 1.75 inches,
lid diagram also shows *Simple Traffic Jam, Century*, *and Super Century*)

Hordern's book credits the Red Donkey as the third most sold sliding block puzzle (after the *Fifteen* puzzle and *Dad's Puzzler*). It is shown in the 1996 design patent of Mendelsohn and the 200 patent of *L. Aryan*. The goal is to slide the 2x2 piece (without picking pieces up) to the bottom center so that it can pass out through the opening (we do not charge an extra move for the the 2x2 piece passing through the opening). This puzzle is like *Simple Traffic Jam*, with the 1x2 piece between the 2x2 and 1x1's. There are a number of starting position variations, the leftmost being the original French *L'Ane Rouge*:

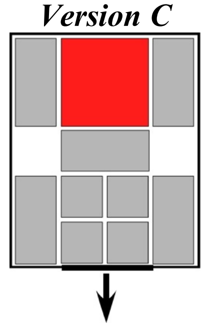
Version A



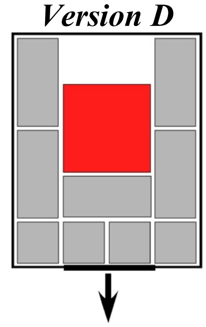
Version B



Version C



Version D



Aryan's Red Donkey Solution

The September 2000 patent of *L. A. Aryan* describes the same puzzle as the Red Donkey puzzle. Figure 1 shows the puzzle (the box lid is corrected in a revised Figure 1 at the end of the patent). Some study might be required to determine exactly what is new about this patent. The claims describe a ten piece sliding piece puzzle with a hinged lid. Figure 4 presents a (not minimal) solution of 22 positions that require multiple moves (a total of 99 straight-line moves):

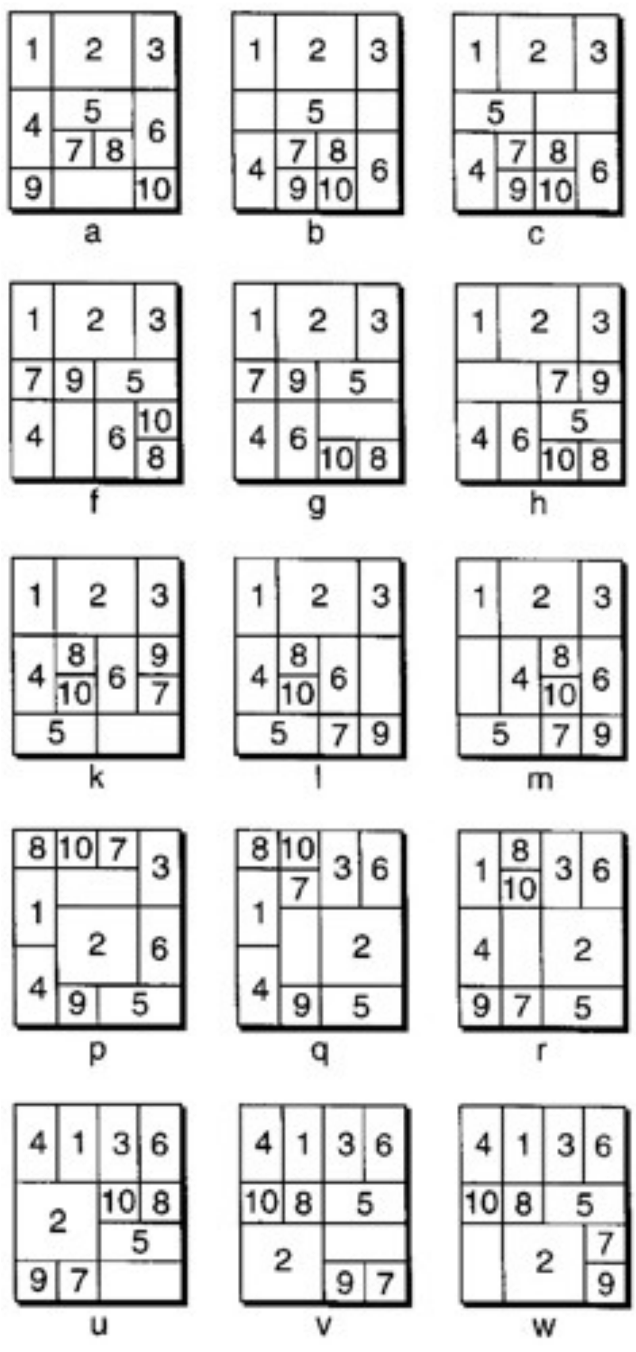
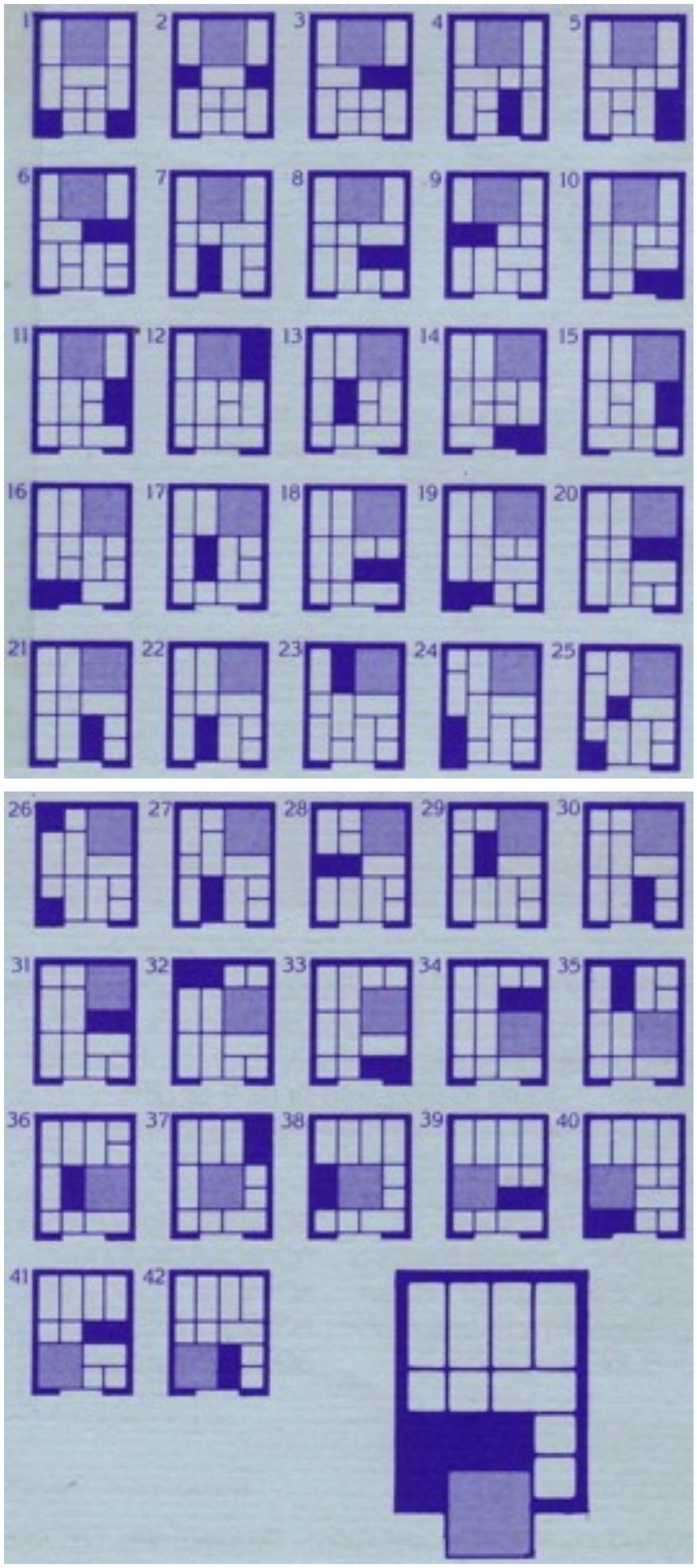


Fig. 4(a)-(w)

Which Way Out Solution

Here is the solution idea that came with *Which Way Out*. Many of these positions represent several moves (a total of 118 moves straight-line moves):



A Shorter Red Donkey Solution

Here is a solution of 90 straight-line moves for *Version A*; it can be converted to 81 rectilinear moves by combining steps 10/11, 14/15, 24/25, 39/40, 47/48, 52/53, 55/56, 79/80, and 88/89:

```
6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7
6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7
8 5 5 9 | 8 5 5 9 | 8 5 5   | 8   5 5 | 8   5 5 |   8 5 5 |   8 5 5 |   8 5 5
8 1 2 9 | 8 1 2 9 | 8 1 2 9 | 8 1 2 9 | 8   2 9 |   8 2 9 | 3 8 2 9 | 3 8 2 9
3     4 | 3   4   | 3   4 9 | 3   4 9 | 3 1 4 9 | 3 1 4 9 |   1 4 9 | 1   4 9

6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7
6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7
    5 5 | 5 5     | 5 5 2   | 5 5   2 | 5 5 4 2 | 5 5 4 2 | 5 5 4 2 | 5 5 4 2
3 8 2 9 | 3 8 2 9 | 3 8   9 | 3 8   9 | 3 8   9 | 3   8 9 |   3 8 9 |     8 9
1 8 4 9 | 1 8 4 9 | 1 8 4 9 | 1 8 4 9 | 1 8   9 | 1   8 9 | 1   8 9 | 1 3 8 9

6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7
6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7
    4 2 | 4     2 | 4 2     | 4 2 8   | 4 2 8 9 | 4 2 8 9 | 4 2 8 9 | 4 2 8 9
5 5 8 9 | 5 5 8 9 | 5 5 8 9 | 5 5 8 9 | 5 5 8 9 | 5 5 8 9 | 5 5 8 9 |     8 9
1 3 8 9 | 1 3 8 9 | 1 3 8 9 | 1 3   9 | 1 3     | 1     3 |     1 3 | 5 5 1 3

6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X   | 6   X X |   6 X X | 4 6 X X
6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X 7 | 6 X X   | 6   X X |   6 X X |   6 X X
4   8 9 | 4   8 9 | 4 8   9 | 4 8 9   | 4 8 9 7 | 4 8 9 7 | 4 8 9 7 |   8 9 7
  2 8 9 | 2   8 9 | 2 8   9 | 2 8 9   | 2 8 9 7 | 2 8 9 7 | 2 8 9 7 | 2 8 9 7
5 5 1 3 | 5 5 1 3 | 5 5 1 3 | 5 5 1 3 | 5 5 1 3 | 5 5 1 3 | 5 5 1 3 | 5 5 1 3

4 6 X X | 4 6 X X | 4   X X | 4 X X   | 4 X X 7 | 4 X X 7 | 4 X X 7 | 4 X X 7
2 6 X X | 2 6 X X | 2   X X | 2 X X   | 2 X X 7 | 2 X X 7 | 2 X X 7 | 2 X X 7
  8 9 7 | 8   9 7 | 8 6 9 7 | 8 6 9 7 | 8 6 9   | 8 6   9 | 8 6 1 9 | 8 6 1 9
  8 9 7 | 8   9 7 | 8 6 9 7 | 8 6 9 7 | 8 6 9   | 8 6   9 | 8 6   9 | 8 6   9
5 5 1 3 | 5 5 1 3 | 5 5 1 3 | 5 5 1 3 | 5 5 1 3 | 5 5 1 3 | 5 5   3 | 5 5 3  

4 X X 7 | 4 X X 7 | 4 X X 7 | 4 X X 7 | 4 X X 7 | 4     7 |     4 7 | 2   4 7
2 X X 7 | 2 X X 7 | 2 X X 7 | 2 X X 7 | 2 X X 7 | 2 X X 7 | 2 X X 7 |   X X 7
8 6 1 9 | 8 6 1 9 |   6 1 9 |     1 9 | 1     9 | 1 X X 9 | 1 X X 9 | 1 X X 9
8 6 3 9 | 8 6 3 9 | 8 6 3 9 | 8 6 3 9 | 8 6 3 9 | 8 6 3 9 | 8 6 3 9 | 8 6 3 9
5 5     |     5 5 | 8   5 5 | 8 6 5 5 | 8 6 5 5 | 8 6 5 5 | 8 6 5 5 | 8 6 5 5

  2 4 7 | 1 2 4 7 | 1 2 4 7 | 1 2 4 7 | 1 2 4 7 | 1 2 4 7 | 1 2 4 7 | 1 2   7
  X X 7 |   X X 7 | 8 X X 7 | 8 X X 7 | 8 X X 7 | 8 X X 7 | 8     7 | 8   4 7
1 X X 9 |   X X 9 | 8 X X 9 | 8 X X 9 | 8 X X 9 | 8 X X 9 | 8 X X 9 | 8 X X 9
8 6 3 9 | 8 6 3 9 |   6 3 9 | 6   3 9 | 6 3   9 | 6     9 | 6 X X 9 | 6 X X 9
8 6 5 5 | 8 6 5 5 |   6 5 5 | 6   5 5 | 6   5 5 | 6 3 5 5 | 6 3 5 5 | 6 3 5 5

1 2   7 | 1 2 7   | 1 2 7 9 | 1 2 7 9 | 1 2 7 9 | 1   7 9 |   1 7 9 | 8 1 7 9
8 4   7 | 8 4 7   | 8 4 7 9 | 8 4 7 9 | 8   7 9 | 8 2 7 9 | 8 2 7 9 | 8 2 7 9
8 X X 9 | 8 X X 9 | 8 X X   | 8   X X | 8 4 X X | 8 4 X X | 8 4 X X |   4 X X
6 X X 9 | 6 X X 9 | 6 X X   | 6   X X | 6   X X | 6   X X | 6   X X | 6   X X
6 3 5 5 | 6 3 5 5 | 6 3 5 5 | 6 3 5 5 | 6 3 5 5 | 6 3 5 5 | 6 3 5 5 | 6 3 5 5

8 1 7 9 | 8 1 7 9 | 8 1 7 9 | 8 1 7 9 | 8 1 7   | 8 1   7 | 8   1 7 | 8   1 7
8 2 7 9 | 8 2 7 9 | 8 2 7 9 | 8 2 7 9 | 8 2 7   | 8 2   7 | 8 2   7 | 8   2 7
6 4 X X | 6 4 X X | 6   X X | 6 X X   | 6 X X 9 | 6 X X 9 | 6 X X 9 | 6 X X 9
6   X X | 6   X X | 6   X X | 6 X X   | 6 X X 9 | 6 X X 9 | 6 X X 9 | 6 X X 9
  3 5 5 | 3   5 5 | 3 4 5 5 | 3 4 5 5 | 3 4 5 5 | 3 4 5 5 | 3 4 5 5 | 3 4 5 5

  8 1 7 | 6 8 1 7 | 6 8 1 7 | 6 8 1 7 | 6 8   7 | 6 8 7   | 6 8 7 9 | 6 8 7 9
  8 2 7 | 6 8 2 7 | 6 8 2 7 | 6 8   7 | 6 8   7 | 6 8 7   | 6 8 7 9 | 6 8 7 9
6 X X 9 |   X X 9 | X X   9 | X X   9 | X X 1 9 | X X 1 9 | X X 1   | X X 1  
6 X X 9 |   X X 9 | X X   9 | X X 2 9 | X X 2 9 | X X 2 9 | X X 2   | X X   2
3 4 5 5 | 3 4 5 5 | 3 4 5 5 | 3 4 5 5 | 3 4 5 5 | 3 4 5 5 | 3 4 5 5 | 3 4 5 5

6 8 7 9 | 6 8 7 9 | 6 8 7 9 | 6 8 7 9 | 6 8 7 9 | 6 8 7 9 | 6 8 7 9 | 6 8 7 9
6 8 7 9 | 6 8 7 9 | 6 8 7 9 | 6 8 7 9 | 6 8 7 9 | 6 8 7 9 | 6 8 7 9 | 6 8 7 9
X X 1 2 | X X 1 2 | X X 1 2 | X X 1 2 |     1 2 | 1     2 | 1 2     | 1 2 5 5
X X     | X X 5 5 | X X 5 5 | X X 5 5 | X X 5 5 | X X 5 5 | X X 5 5 | X X    
3 4 5 5 | 3 4     | 3     4 |     3 4 | X X 3 4 | X X 3 4 | X X 3 4 | X X 3 4

6 8 7 9 | 6 8 7 9 | 6 8 7 9
6 8 7 9 | 6 8 7 9 | 6 8 7 9
1 2 5 5 | 1 2 5 5 | 1 2 5 5
X X 3   | X X   3 |   X X 3
X X   4 | X X   4 |   X X 4
```

(one move = sliding one piece any number of units in one direction)

Similarity of Red Donkey Start Variations

The solution presented on the preceding page for Version A (and also the 81 rectilinear moves solution that is presented in *Hordern's book* - Puzzle C27d) is minimal and reaches exactly the same position at Step 4 as does a minimal 81 rectilinear moves solution (90 straight-line moves) for the Version B and C start positions (and so step 4 onward can be used for all three puzzles):

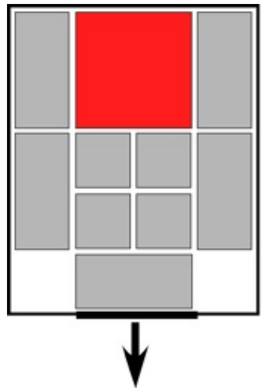
	Step 0	Step 1	Step 2	Step 3	Step 4
	6 X X 7	6 X X 7	6 X X 7	6 X X 7	6 X X 7
	6 X X 7	6 X X 7	6 X X 7	6 X X 7	6 X X 7
Version A	8 5 5 9	8 5 5 9	8 5 5	8 5 5	8 5 5
	8 1 2 9	8 1 2 9	8 1 2 9	8 1 2 9	8 2 9
	3 4	3 4	3 4 9	3 4 9	3 1 4 9
	6 X X 7	6 X X 7	6 X X 7	6 X X 7	6 X X 7
	6 X X 7	6 X X 7	6 X X 7	6 X X 7	6 X X 7
Version B	8 5 5 9	8 5 5 9	8 5 5 9	8 5 5	8 5 5
	8 1 2 9	8 1 2 9	8 2 9	8 2 9	8 2 9
	3 4	3 4	3 1 4	3 1 4 9	3 1 4 9
	6 X X 7	6 X X 7	6 X X 7	6 X X 7	6 X X 7
	6 X X 7	6 X X 7	6 X X 7	6 X X 7	6 X X 7
Version C	5 5	8 5 5	8 5 5	8 5 5	8 5 5
	8 1 2 9	8 1 2 9	8 1 2 9	8 1 2 9	8 2 9
	8 3 4 9	3 4 9	3 4 9	3 4 9	3 1 4 9

The *Winning Ways book* shows the Version D start position. Step 6 of a minimal solution for this variation is exactly the same as Step 4 above, and so this variation has a minimal solution (for both straight-line and rectilinear moves) of 2 moves longer than Versions A, B, and C (pieces 1, 2, 3, 4 must be renamed to 3, 1, 2, 4):

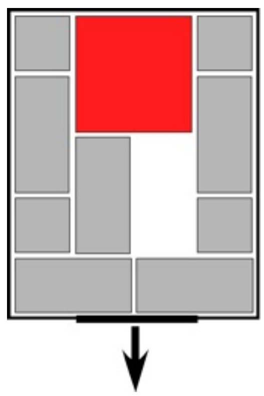
Version D

Step 0	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6
6 7	6 X X 7	6 X X 7	6 X X 7	6 X X 7	6 X X 7	6 X X 7
6 X X 7	6 X X 7	6 X X 7	6 X X 7	6 X X 7	6 X X 7	6 X X 7
8 X X 9	8 9	8 5 5 9	8 5 5 9	8 5 5 9	8 5 5	8 5 5
8 5 5 9	8 5 5 9	8 9	8 3 9	8 3 9	8 3 9	8 3 9
1 2 3 4	1 2 3 4	1 2 3 4	1 2 4	1 2 4	1 2 4 9	1 2 4 9

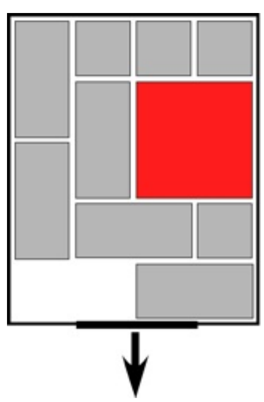
Three Other Fun Puzzles Made from the Same Pieces



Simple Traffic Jam
Shafir Games 1981;
minimal solution of 64 rectilinear moves.

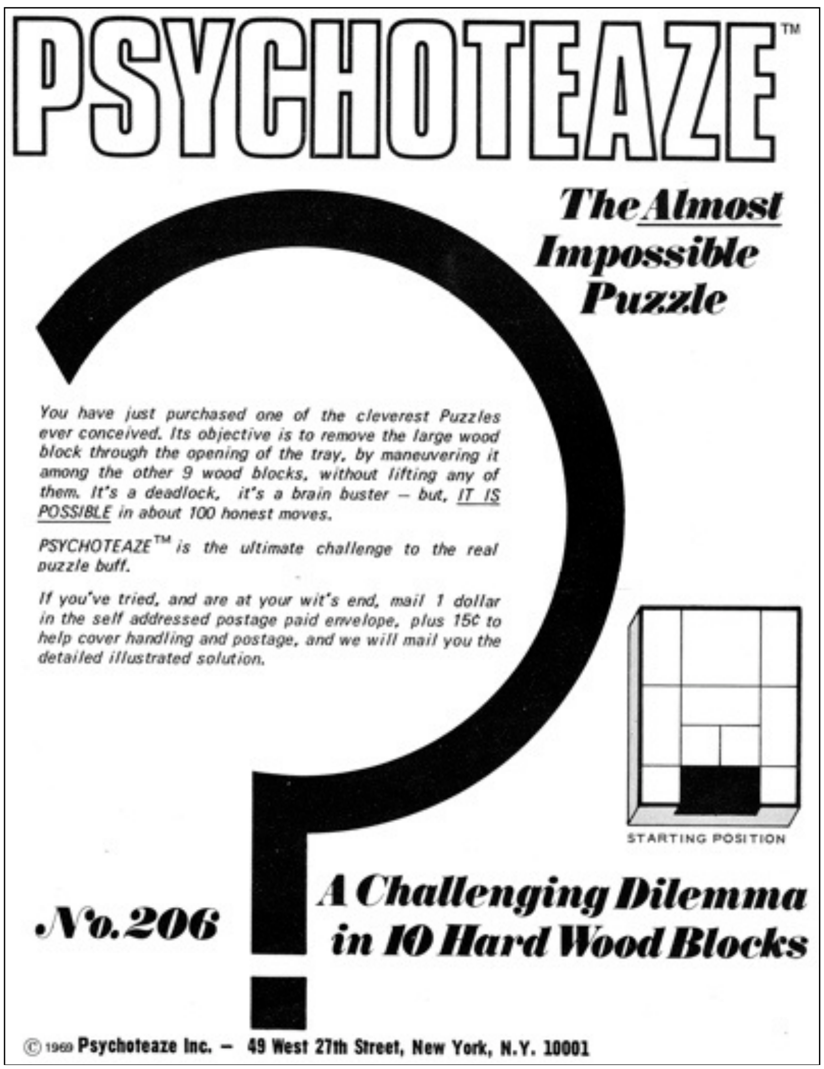


Century
Designed by J. H. Conway 1975;
minimal solution of 99 rectilinear moves.



Super Century
Designed by Gil Dogon 2004;
minimal solution of 138 rectilinear moves.

Other Versions of Red Donkey



Psychotease, copyright 1969.
(cardboard box and 10 wood pieces, 9 x 11 x 1.5 inches)

Other Versions of Red Donkey, Continued

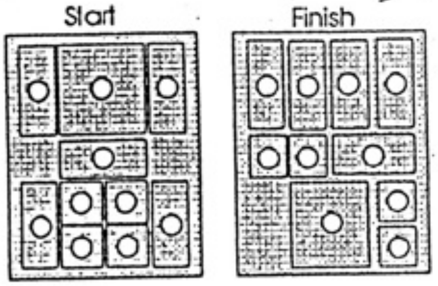
Escaping Jail, copyright University Games Co. 1993, made by Raintree Puzzles.
(wood box and 10 wood pieces, 4.4 x 3.25 x 1.2 inches)

Other Versions of Red Donkey, Continued

CAO CAO - ESCAPE

(015, 015/1, 016)

Adapted from The Classic Chinese Stories Of The Three Kingdoms.
The Battle At Chibi. How Cao Cao who lost the battle make his escape
through the encirclement of Guan Yu and his guards.
The biggest block represents Cao Cao and the other nine (9) smaller ones
are Guan Yu and his guards. Slide Cao Cao (biggest piece) until he is able
to go to the lower edge of the board. That means Cao Cao has accomplished
his escape.



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Cao Cao Escape, LEO Marketing, 1995
(wood box and 10 wood pieces, 3.8 x 3.125 x 3/4 inches)

Further reading:

Wikipedia Klotski Page, from: http://en.wikipedia.org/wiki/Klotski
Pegg's Page, from: http://www.maa.org/editorial/mathgames/mathgames_12_13_04.html
Baxter's Page, from: http://www.puzzleworld.org/SlidingBlockPuzzles/4x5.htm
Aryan Patent, from: www.uspto.gov - patent no. 6,116,600
Armendariz Design Patent, from: www.uspto.gov - patent no. 367,502
Mendelsohn Design Patent, from: www.uspto.gov - patent no. 388,840