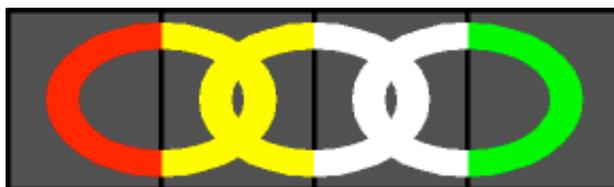


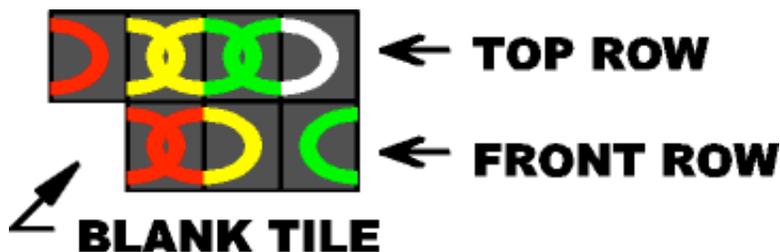
Rubik's Missing Link



Notation

For this solution, you must hold the puzzle *horizontally*, which is a lot cooler than using the term *vertically*. Unfortunately, the solution refers to each side as a *row*, which is not as cool as using the word *column*.

Each diagram will show two rows only; the **top** and the **front** using a "flat map". I have a rather poor graphics editor, making it difficult to do any mind-blowing 3-D images.



A word about the notation itself: at first it seems redundant to say "slide x-amount of tiles on the front/top row", because the blank tile can only exist in one row anyway. But just in case you get lost, at least you know if you're on the correct track or not.

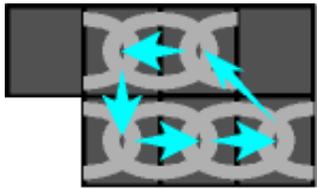
L+	Twist the LEFT ear UP
L-	Twist the LEFT ear DOWN
R+	Twist the RIGHT ear UP
R-	Twist the RIGHT ear DOWN
T+1 T+2 T+3	Slide 1/2/3 tiles on the TOP side to the RIGHT

T-1	
T-2	Slide 1/2/3 tiles on the TOP side to the LEFT
T-3	
F+1	
F+2	Slide 1/2/3 tiles on the FRONT side to the RIGHT
F+3	
F-1	
F-2	Slide 1/2/3 tiles on the FRONT side to the LEFT
F-3	
M+	Twist the MIDDLE body UPWARDS
M-	Twist the MIDDLE body DOWNWARDS

A few moves to get you started...

(Practice these moves first before diving head-first into the solution)

The first move is a general, simple move that exchanges 5 tiles around without disturbing the back or bottom rows. At only 4 steps long, it should be easy enough to memorize.

Set up: Blank tile at the left edge of the front row.	Result: Swaps five of the tiles <i>counter-clockwise</i> .
M- F-3 M+ F+3	

The following move (and its variations) shifts the blank tile from row to row. Its basic purpose is to move the blank tile without moving the bulk of the real tiles. 13 tiles do remain intact, while 2 other solid tiles will indeed switch rows.

You may ask, "Why not merely twist the ear itself (to shift the blank tile)?" The answer is that yes, you

could, but the other solid tiles on that same ear will stray far from home.

<p>Set up: Blank tile at the left edge of the front row.</p>	<p>Result: Bumps up the blank tile.</p>	<p><u>~Variations:~</u></p>		
<p>F-1 L- F+1 L+</p>		<p>Set up: Blank tile at the <i>left</i> edge of the <i>top</i> row.</p>	<p>T-1 L+ T+1 L-</p>	<p>Result: Bumps <i>down</i> the blank tile.</p>
		<p>Set up: Blank tile at the <i>right</i> edge of the <i>front</i> row.</p>	<p>F+1 R- F-1 R+</p>	<p>Result: Bumps <i>up</i> the blank tile.</p>
		<p>Set up: Blank tile at the <i>right</i> edge of the <i>top</i> row.</p>	<p>T+1 R+ T-1 R-</p>	<p>Result: Bumps <i>down</i> the blank tile.</p>

The next move (and its variations) is another swapping combo, but this time 3 tiles are exchanged instead of 5. At 8 steps long they may be hard to memorize, but that's the price you have to pay to minimize the number of swapped tiles. On the other hand there is a second-nature feel about these moves, and memorizing may not be necessary at all.

<p>Set up: Blank tile at the left edge of the front row.</p>	<p>Result: Swaps 3 tiles on the left side counter-clockwise.</p>	<p><u>~Variations:~</u></p>		
<p>F-1 L- F+1 L+ L+ T-1 L+ T+1 L-</p>		<p>Set up: Blank tile at the <i>left</i> edge of the <i>top</i> row.</p>	<p>T-1 L+ T+1 L- F-1 L- F+1 L+</p>	<p>Result: Swaps 3 tiles on the <i>left</i> side <i>clockwise</i>.</p>
		<p>Set up: Blank tile at the <i>right</i> edge of the <i>front</i> row.</p>	<p>F+1 R- F-1 R+ T+1 R+ T-1 R-</p>	<p>Result: Swaps 3 tiles on the <i>right</i> side <i>clockwise</i>.</p>

		Set up: Blank tile at the <i>right</i> edge of the <i>top</i> row.	T+1 R+ T-1 R- F+1 R- F-1 R+	Result: Swaps 3 tiles on the <i>right</i> side <i>counter-</i> <i>clockwise.</i>
--	--	---	--	---

NOTE: *You really do NOT have to memorize ANY of the above moves. They are only here as a guide for the "set-up" phase during the rest of the solution.*

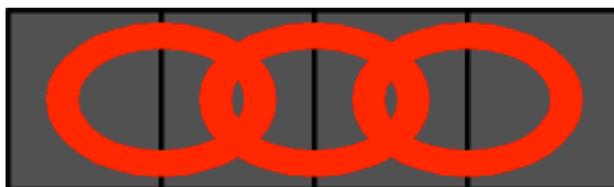
[Next: Solve the Red Links](#)

Notation

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[Solve the Yellow Links](#)
[Solve the White Links](#)
[Solve the Green Links](#)

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Rubik's Missing Link



I. Solve the Red Links

A. Get all of the Red Tiles on the Top Row.

<p>~~~~Initial Setup~~~~</p> <ul style="list-style-type: none"> • All 4 red tiles are visible on the front and top rows. • The blank tile is at the front-right. 	<p>Repeat the move: <i>(4 times max.)</i></p> <p>R+ T+3 R- L- F-3 L+</p> <p>... until a <i>non-red</i> tile is at the top-left.</p>	<p>Do the move:</p> <p>F+3</p> <p>... to get the blank tile at the front-left</p>	<p>Repeat the move: <i>(4 times max.)</i></p> <p>L+ T-3 L- R- F+3 R+</p> <p>... until another <i>non-red</i> tile is at the top-right.</p>
<p>Repeat the move: <i>(4 times max.)</i></p> <p>M- F-3 M+ F+3</p>	<p>Do the move:</p> <p>F-1 L- F+1 L+ T-1 L+ T+1 L-</p>	<p>Do the move:</p> <p>F-3</p>	<p>Do the move:</p> <p>F+1 R- F-1 R+ T+1 R+ T-1 R-</p>

... until the last *non-red* tile is at the front-middle.

Now *three* red tiles are on the top row.

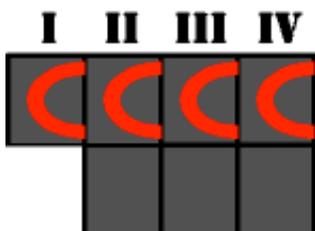
... to get the blank tile at the front-right

Now *all four* red tiles are on the top row.

B. Solve the Left Red Ear.

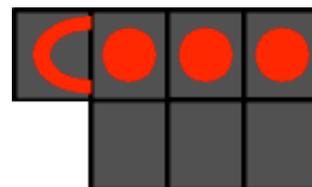
The left ear can be at any of the 4 squares on the top row, so we have 4 cases to work from.

Setup: Make sure that the *blank tile* is at the front-left (by doing an **F+3** move).



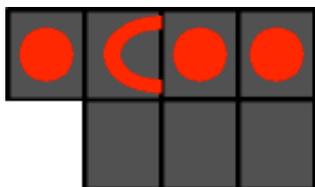
Case #1:

The left ear is already located at the leftmost top tile, so you can continue onto part C: *Solve the Right Red Ear.*



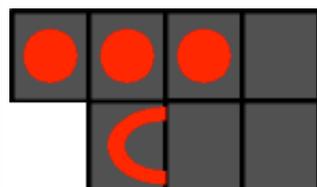
Case #2:

The left ear is at the 2nd tile of the top row.



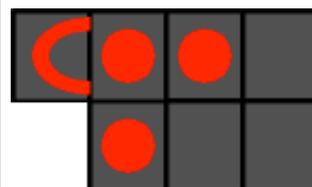
Do the move:

**L+ T-3 L-
R- F+3 R+**



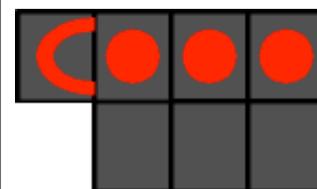
Do the move:

**L+ T-1 L-
T+1
L- F-1 L+
F+1**



Do the move:

**F-2 R- F-1 R+
T+2 L+ T+1
L-**



Result: the left ear is now where it is suppose to be.

Case #3:

The left ear is at the 3rd tile

Do the move:

**L+ T-3 L-
R- F+3 R+**

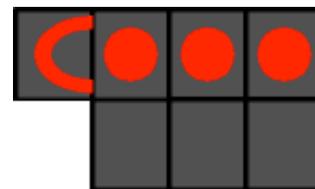
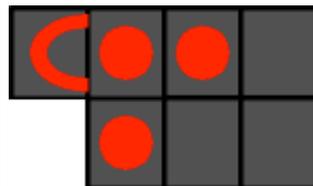
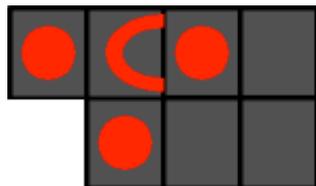
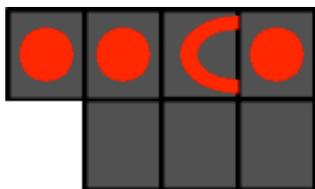
Do the move:

**F-1 L- F+1
L+
T-1 L+ T+1
L-**

Do the move:

**F-2 R- F-1 R+
T+2 L+ T+1
L-**

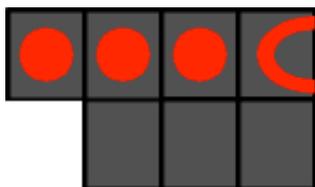
of the top row.



Result: the left ear is now where it is suppose to be.

Case #4:

The left ear is at the rightmost tile of the top row.



Do the move:

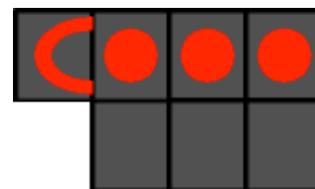
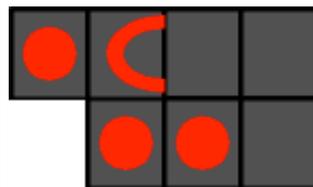
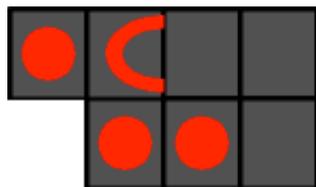
**L+ T-3 L-
R- F+3 R+
L+ T-3 L-
R- F+3 R+**

Do the move:

**F-1 L- F+1
L+
T-1 L+ T+1
L-**

Do the move:

**F-2 R- F-1 R+
T+2 L+ T+1
L-
F-2 R- F-1 R+
T+2 L+ T+1
L-**



Result: the left ear is now where it is suppose to be.

C. Solve the Right Red Ear.

The left ear is at the leftmost tile of the top side.
Now we have to get the right ear at the rightmost tile of the top side.

Setup: Make sure that the

Do the move:

**R+ T+3 R-
L- F-3 L+**

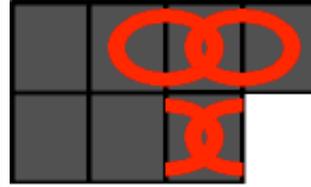
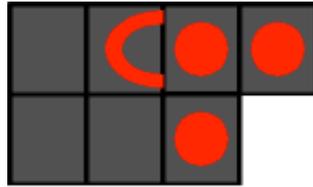
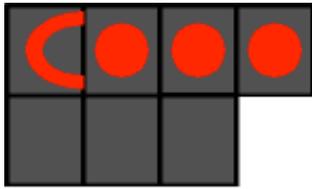
**Repeat the move:
(2 times max.)**

**F+1 R- F-1
R+
T+1 R+ T-1
R-**

Do the move:

**F+2 L- F+1
L+
T-2 R+ T-1
R-**

blank tile is at the front-right
(by doing an **F-3** move).



... until you have
double red links on
the top row



Result: All of the red
links are solved.

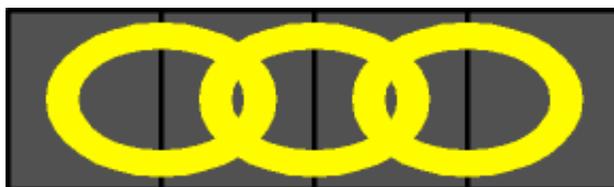
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Notation

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[Solve the White Links](#) [Solve the Green Links](#)

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Rubik's Missing Link



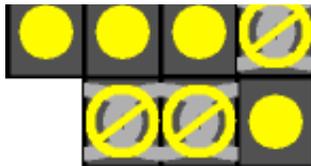
II. Solve the Yellow Links

A. Get all of the Yellow Tiles on the Top Row.

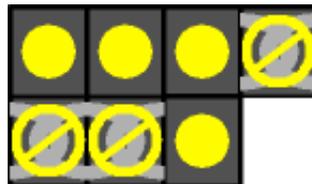
<p>~~~~Initial Setup~~~~</p> <ul style="list-style-type: none"> • !IMPORTANT! All 4 red tiles are on the back row. • All 4 yellow tiles are visible on the front and top rows. • The blank tile is at the front-right. 	<p>Repeat the move: <i>(4 times max.)</i></p> <p>R+ T+3 R- L- F-3 L+</p>	<p>Do the move:</p> <p>F+3</p>	<p>Repeat the move: <i>(4 times max.)</i></p> <p>L+ T-3 L- R- F+3 R+</p>
<p>Repeat the move: <i>(4 times max.)</i></p> <p>M- F-3 M+ F+3</p>	<p>... until a <i>non-yellow</i> tile is at the top-left.</p>	<p>... to get the blank tile at the front-left</p>	<p>... until another <i>non-yellow</i> tile is at the top-right.</p>
<p>Repeat the move: <i>(4 times max.)</i></p> <p>M- F-3 M+ F+3</p>	<p>Do the move:</p> <p>F-1 L- F+1 L+ T-1 L+ T+1 L-</p>	<p>Do the move:</p> <p>F-3</p>	<p>Do the move:</p> <p>F+1 R- F-1 R+ T+1 R+ T-1 R-</p>



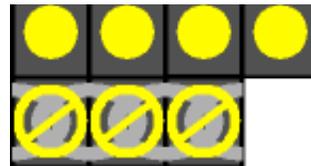
... until the last *non-yellow* tile is at the front-middle.



Now *three* yellow tiles are on the top row.



... to get the blank tile at the front-right

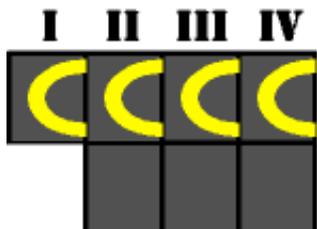


Now *all four* yellow tiles are on the top row.

B. Solve the Left Yellow Ear.

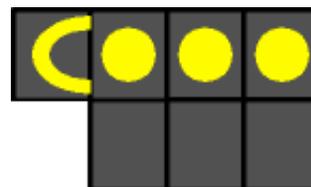
The left ear can be at any of the 4 squares on the top row, so we have 4 cases to work from.

Setup: Make sure that the *blank tile* is at the front-left (by doing an **F+3** move).



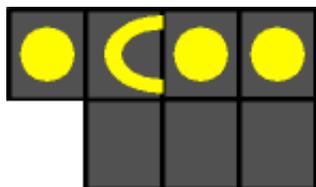
Case #1:

The left ear is already located at the leftmost top tile, so you can continue onto part **C: Solve the Right Yellow Ear**.



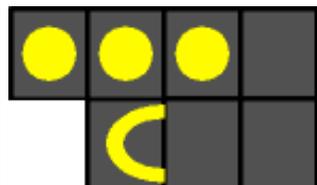
Case #2:

The left ear is at the 2nd tile of the top row.



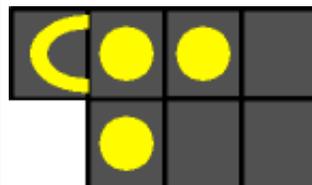
Do the move:

**L+ T-3 L-
R- F+3 R+**



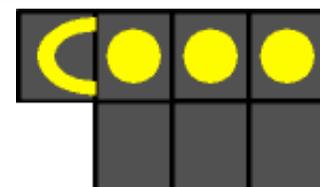
Do the move:

**L+ T-1 L-
T+1
L- F-1 L+
F+1**



Do the move:

**F-2 R- F-1 R+
T+2 L+ T+1
L-**



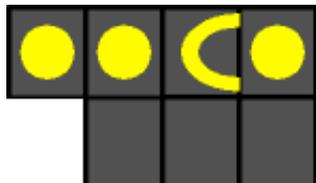
Result: the left ear is now where it is suppose to be.

Do the move:

Do the move:

Case #3:

The left ear is at the 3rd tile of the top row.

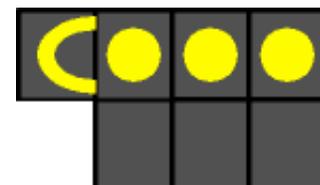
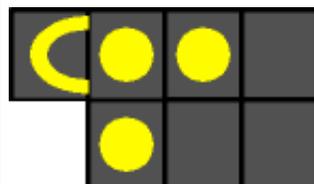
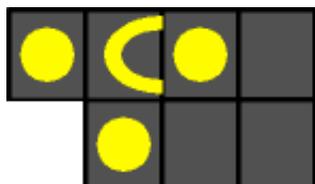


Do the move:

**L+ T-3 L-
R- F+3 R+**

**F-1 L- F+1
L+
T-1 L+ T+1
L-**

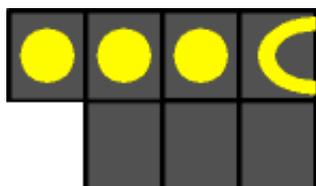
**F-2 R- F-1 R+
T+2 L+ T+1
L-**



Result: the left ear is now where it is suppose to be.

Case #4:

The left ear is at the rightmost tile of the top row.



Do the move:

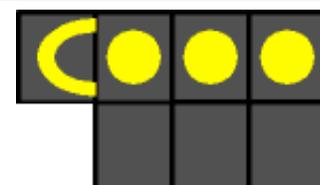
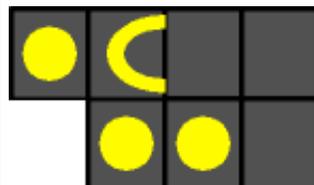
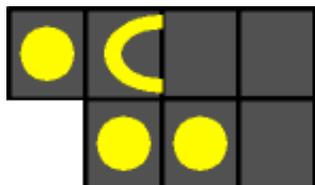
**L+ T-3 L-
R- F+3 R+
L+ T-3 L-
R- F+3 R+**

Do the move:

**F-1 L- F+1
L+
T-1 L+ T+1
L-**

Do the move:

**F-2 R- F-1 R+
T+2 L+ T+1
L-
F-2 R- F-1 R+
T+2 L+ T+1
L-**



Result: the left ear is now where it is suppose to be.

C. Solve the Right Yellow Ear.

The left ear is at the leftmost

Do the move:

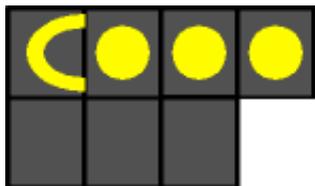
**Repeat the move:
(2 times max.)**

Do the move:

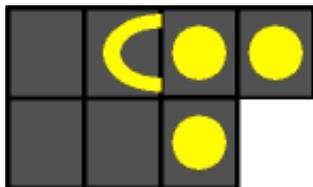
F+2 L- F+1

tile of the top side.
 Now we have to get the right ear at the rightmost tile of the top side.

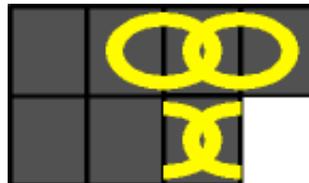
Setup: Make sure that the *blank tile* is at the front-right (by doing an **F-3** move).



**R+ T+3 R-
 L- F-3 L+**

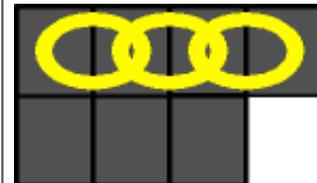


**F+1 R- F-1
 R+
 T+1 R+ T-1
 R-**



... until you have *double yellow links* on the top row

**L+
 T-2 R+ T-1
 R-**



Result: All of the yellow links are solved.

[Next: Solve the White Links](#)

Notation

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Rubik's Missing Link



III. Solve the White Links

A. Get all of the White Tiles on the Front Row.

<p>~~~~Initial Setup~~~~</p> <ul style="list-style-type: none"> • All green and white tiles are visible on the front and top rows. • The blank tile is at the front-right. 	<p>Repeat the move: <i>(4 times max.)</i></p> <p>R+ T+3 R- L- F-3 L+</p> <p>... until a white tile is at the top-left.</p>	<p>Do the move:</p> <p>F+3</p> <p>... to get the blank tile at the front-left</p>	<p>Repeat the move: <i>(4 times max.)</i></p> <p>L+ T-3 L- R- F+3 R+</p> <p>... until another white tile is at the top-right.</p>
<p>Repeat the move: <i>(4 times max.)</i></p> <p>M- F-3 M+ F+3</p>	<p>Do the move:</p> <p>F-1 L- F+1 L+ T-1 L+ T+1 L-</p>	<p>Do the move:</p> <p>F-3</p>	<p>Do the move:</p> <p>F+1 R- F-1 R+ T+1 R+ T-1 R-</p>

... until the last white tile is at the front-middle.

Now *two* white tiles are on the bottom row.

... to get the blank tile at the front-right

Now *all three* white tiles are on the front row.

B. Solve the Left White Ear.

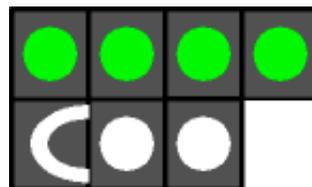
The left ear can be at any of the 3 squares on the front row, so we have 3 cases to work from.

Setup: Make sure that the *blank tile* is at the front-right (by doing an **F-3** move).



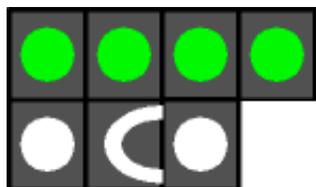
Case #1:

The left ear is already located at the leftmost front tile, so you can continue onto part *C: Solve the Right White Ear*.



Case #2:

The left ear is at the middle of the front row.



Do the move:

**R+ T+3 R-
L- F-3 L+
R+ T+3 R-**

Do the move:

**L- F-1 L+
F+1
L+ T-1 L-
T+1**

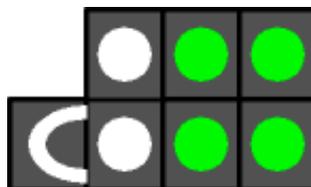
Do the move:

**T-2 R+ T-1 R-
F+2 L- F+1 L+
T-2 R+ T-1 R-**

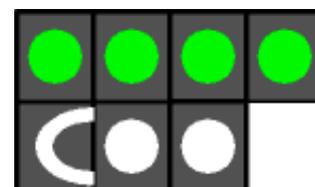
...to get all white tiles at the *swapping position*.



...to get the left ear at the *starting position*.



Result: all 3 white tiles are at the front, while the left ear is where it's suppose to be.



Case #3:

The left ear is at the rightmost tile of the

Do the move:

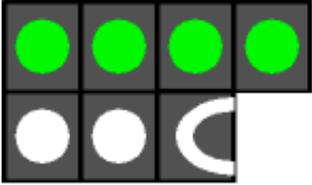
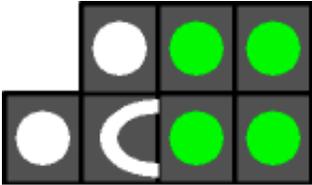
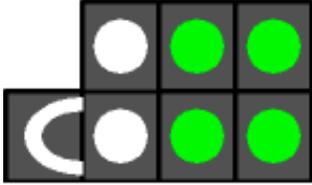
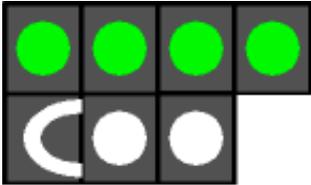
**R+ T+3 R-
L- F-3 L+
R+ T+3 R-**

Do the move:

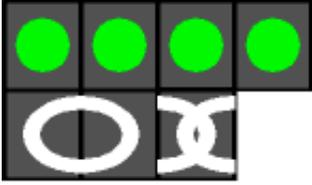
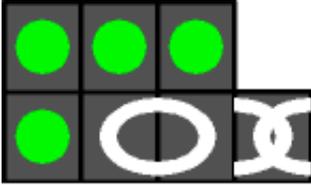
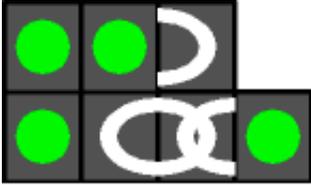
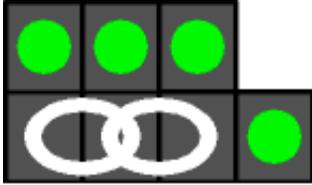
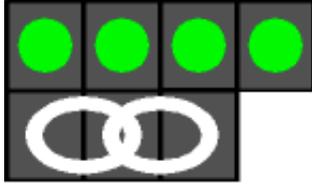
**T-1 L+ T+1
L-
F-1 L- F+1
L+**

Do the move:

**T-2 R+ T-1 R-
F+2 L- F+1 L+
T-2 R+ T-1 R-**

front row.			
			
	<p>...to get all white tiles at the <i>swapping</i> position.</p>	<p>...to get the left ear at the <i>starting</i> position.</p>	<p><i>Result: all 3 white tiles are at the front, while the left ear is where it's suppose to be.</i></p>

C. Solve the Right White Ear.

	<p>The left ear is at the leftmost tile of the front side. Now we have to get the right ear at the rightmost tile of the front side as well.</p> <p>Setup: Make sure that the <i>blank tile</i> is at the front-right (by doing an F-3 move if necessary).</p>		
<p>Do the move: F+3 L+ T-3 L-</p>	<p>Do the move: R- F+1 R+ F-1 R+ T+1 R- T-1</p>	<p>Do the move: T+2 L+ T+1 L- F-2 R- F-1 R+</p>	<p>Do the move: T+1 R+ T-1 R-</p>
			 <p>...to get the last green tile off of the front side. End result: All of the white links are solved.</p>

[Next: Solve the Green Links](#)

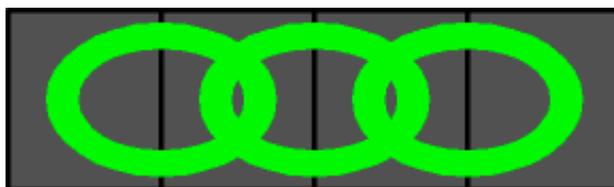
Notation

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Rubik's Missing Link

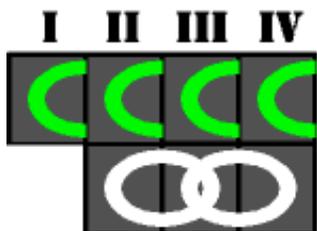


I. Solve the Green Links

A. Solve the Left Green Ear.

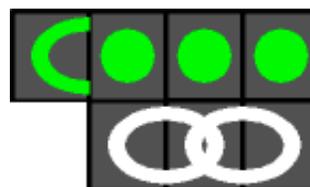
The left ear can be at any of the 4 squares on the top row, so we have 4 cases to work from.

Setup: Make sure that the *blank tile* is at the front-left (by doing an **F+3** move).



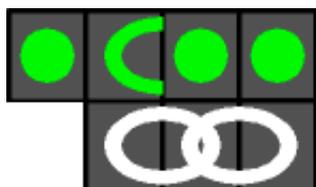
Case #1:

The left ear is already located at the leftmost top tile, so you can continue onto part **C: Solve the Right Green Ear.**



Case #2:

The left ear is at the 2nd tile of the top row.



Do the move:

**L+ T-3 L-
R- F+3 R+**



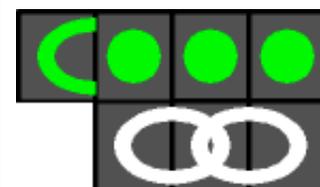
Do the move:

**L+ T-1 L-
T+1
L- F-1 L+
F+1**



Do the move:

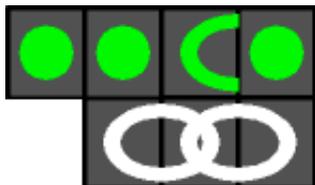
**F-2 R- F-1 R+
T+2 L+ T+1
L-**



Result: the left ear is now where it is suppose to be.

Case #3:

The left ear is at the 3rd tile of the top row.



Do the move:

**L+ T-3 L-
R- F+3 R+**



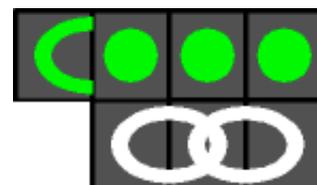
Do the move:

**F-1 L- F+1
L+
T-1 L+ T+1
L-**



Do the move:

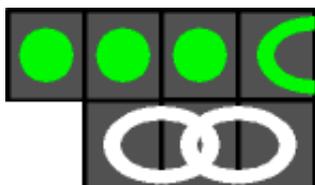
**F-2 R- F-1 R+
T+2 L+ T+1
L-**



Result: the left ear is now where it is suppose to be.

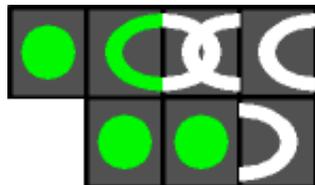
Case #4:

The left ear is at the rightmost tile of the top row.



Do the move:

**L+ T-3 L-
R- F+3 R+
L+ T-3 L-
R- F+3 R+**



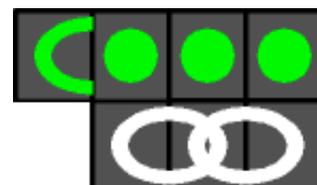
Do the move:

**F-1 L- F+1
L+
T-1 L+ T+1
L-**



Do the move:

**F-2 R- F-1 R+
T+2 L+ T+1
L-
F-2 R- F-1 R+
T+2 L+ T+1
L-**



Result: the left ear is now where it is suppose to be.

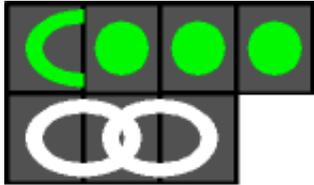
B. Solve the Right Green Ear.

Repeat the move:

Do the move:

The left ear is at the leftmost tile of the top side.
 Now we have to get the right ear at the rightmost tile of the top side.

Setup: Make sure that the blank tile is at the front-right (by doing an **F-3** move).



Do the move:

**R+ T+3 R-
 L- F-3 L+**



(2 times max.)

**F+1 R- F-1
 R+
 T+1 R+ T-1
 R-**



... until you have double green links on the top row

DO the move:

**F+2 L- F+1
 L+
 T-2 R+ T-1
 R-**



Result: All of the green links are solved.
 In fact, the entire puzzle is solved.

You are probably wondering; why solve the red links adjacent to the yellow links? And why solve the green links last?. The answer is: you can build up the Missing Link puzzle at any color combination you want. However, it is important that you build the first two sides of any color (that use 4 tiles total each) adjacent to each other. It is then important that you build the WHITE row (with only 3 tiles) immediately afterwards. The other 4 tiles are solved last, regardless of the final color of that row.

Notation

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