2x2 Algorithms: The Ortega Method

The Ortega method solves a 2x2 in three steps with 12 algorithms. First you make one face (no algorithms). Then you make the opposite face one color (7 algorithms, called OLL). Finally you put both layers in place at once (5 algorithms, called PBL). It's a popular next step once you can solve a 2x2 with the beginner corner method. To solve one particular position, use the 2x2 solver.

The diagrams use yellow on top and white on the bottom.

Step 1: Make One Face

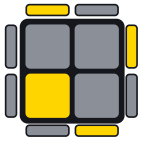
Make the white face, and hold it on the bottom. Unlike the beginner method, the sides of that layer **don't need to match** yet. Four white stickers on the bottom is enough. This step is done by sight with a few turns, and step 3 sorts out the rest.

Step 2: OLL: Make the Top One Color

Count the yellow stickers facing **up** on top:

- **None:** H or Pi.
- **One:** Sune or Antisune.
- **Two:** U, T or L.

Then turn the top until the yellow stickers on the sides match one of the diagrams, and do its algorithm. The names are the same as the corner cases of 3x3 OLL, but some algorithms are shorter here, because there are no edges to keep intact. The 2x2 H is 5 moves, for example.



Sune

`R U R' U R U2 R'`

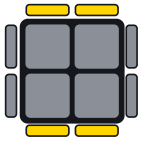
Algorithm: J Perm



Antisune

`R U2 R' U' R U' R'`

Algorithm: J Perm



H

`R2 U2 R U2 R2`

Algorithm: J Perm



Pi

`R U2 R2 U' R2 U' R2 U2 R`

Algorithm: J Perm



U

`F R U R' U' F'`

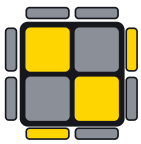
Algorithm: J Perm



T

`R U R' U' R' F R F'`

Algorithm: J Perm



L

`F R' F' R U R U' R'`

Algorithm: J Perm

Step 3: PBL: Put Both Layers in Place

Now the top and bottom are each one color. Look at each layer from the side. Each one is in one of three states:

- **Solved:** every side shows one color in that layer (after turning it).
- **Headlights:** exactly one side shows two matching stickers. Two neighboring corners need to swap.
- **Diagonal:** no side matches. Two opposite corners need to swap.

The five cases are named by what the top and bottom need. If only the **bottom** is wrong, or it's headlights on the bottom and diagonal on top, turn the whole cube over first (**x2**). Then:

- **Adj U** (headlights on top, bottom solved): hold the headlights on the **left**.
- **Diag U** (diagonal on top, bottom solved): any angle works.
- **Adj/Adj, Adj/Diag, Diag/Diag** (both layers wrong): turn the top and bottom layers until your cube matches the diagram.

After the algorithm, turn the top layer if needed to line it up.



Adj U top: headlights · bottom: solved

`R U R' U' R' F R2 U' R' U' R U R' F'`

Algorithm: J Perm



Diag U top: diagonal · bottom: solved

`F R U' R' U' R U R' F' R U R' U' R' F R F'`

Algorithm: J Perm



Adj/Adj top: headlights · bottom: headlights

`R2 U' B2 U2 R2 U' R2`

Algorithm: J Perm



Adj/Diag top: headlights · bottom: diagonal

`R U' R F2 R' U R'`

Algorithm: J Perm



Diag/Diag top: diagonal · bottom: diagonal

`R2 F2 R2`

Algorithm: J Perm

FAQ

How many algorithms is the Ortega method?

Twelve: 7 for OLL and 5 for PBL. The first step uses no algorithms.

Do I need all 12 to start?

No. If you already solve a 3x3, you know several of them: the OLL cases are the same corner cases you meet in 2-look OLL, and Adj U and Diag U are the T perm and Y perm. Learn the double-layer PBLs last.

Is the 2x2 notation the same as the 3x3?

Yes, for these moves. There are no middle layers on a 2x2, so you'll only see face turns and whole-cube rotations. See Rubik's Cube notation.

These are established, widely taught algorithms, not the only good ones. Which feels fastest depends on your hands.

The algorithms are the standard Ortega set as listed by J Perm (each card links to the source). Every one is checked by our cube engine, which models a 2x2 as the corners of a 3x3: each diagram is exactly the position its algorithm solves, every OLL algorithm keeps the bottom face, and the cases cover every possible position. The hold rules above (headlights on the left, the diagonal case from any angle, turning the cube over when the bad layer is on the bottom) are checked against all 1,152 positions with both faces done. Diagrams are cross-checked against SpeedCubeDB.

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