

CMLL

CMLL is a set of 42 algorithms that orient and position the top corners simultaneously. While COLL does this while maintaining LL edge orientation, CMLL does not preserve edge orientation. With less to preserve, CMLL algorithms are shorter, and they are perfect for the Roux method.

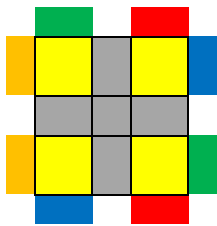
The algorithms are divided into the eight possible corner orientations. I give the full algorithm as well as an abbreviated notation to assist in memory. Some abbreviations I use:

- AUF: adjust U face
- (sexy): (RUR'U'), the "sexy move"
- (L sexy): (L'U'LU), the "sexy move" inverted
- (SH): (R'FRF'), the "sledgehammer"
- (L SH): (LF'L'F), the "sledgehammer" inverted
- (HS): (FR'F'R), the "hedgeslammer"
- (lasso): (RUR'F')
- (rebound): (R'FR2U')
- (half-S): RUR'U
- (half-AS): R'U'RU'

Oriented

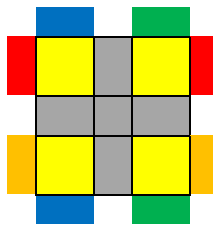
There are only two cases for oriented corners.

Matching Corners



AUF until corners are on the left
 RUR'F'-RUR'U'-R'FR2U'R'
 (lasso)(sexy)(rebound)R'
 *This is a J Perm

No Matching Corners

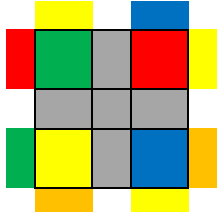


Face any side
 F-RU'R'U'-RUR'F'-RUR'U'-R'FRF'
 F(RU'R'U')(lasso)(sexy)(SH)
 *This is the Y Perm

Sune

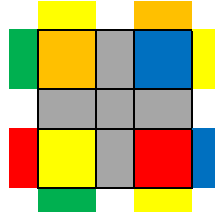
These are recognized by looking at the opposite colors on top of the corners and at the sticker on the right of the front right corner. The RFU sticker can match one of the top corner stickers or be random.

Opposites diagonal, random sticker



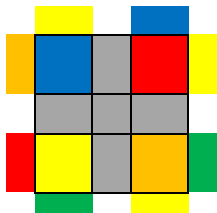
$RUR'URU2R'$

Opposites diagonal, Back-right match



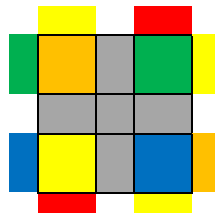
$U2-RUR'U-R'FRF'-RU2R'$
 $U2(\text{half-S})(SH)(RU2R')$

Opposites column, random sticker



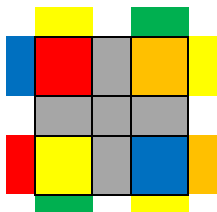
$R'F2-RU2-rU'r'-F$

Opposites column, Back-left match



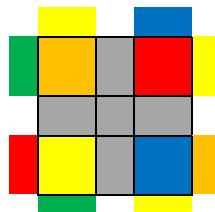
$U'-RUR'U-RU'RD-R'U'RD'R2$
 $U'(\text{half-S})(RU'RD)(R'U'RD'R2)$

Opposites row, Back-right match



$x UR'U'L-U2RU2R'$

Opposites row, Back-left match

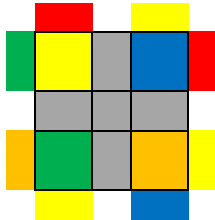


$RU'L'UR'U'L$

Anti-Sune

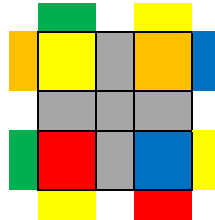
These are recognized by looking at the opposite colors on top of the corners and at the sticker on the front of the front right corner. The FRU sticker can match one of the top corner stickers or be random.

Opposites diagonal, Back-right match



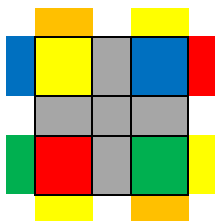
$R'U'RU'R'U2R$

Opposites diagonal, Front-left match



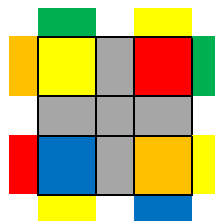
$R'U'RU'-R'U-R'FRF'-UR$
(half-AS)(R'U)(SH)(UR)

Opposites column, random sticker



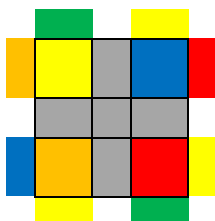
$U2-R2DR'UR-D'R'UR'U'RU'R'$
 $U2(R2D)(R'URD')(R'U)(half-AS)R'$

Opposites column, Front-left match



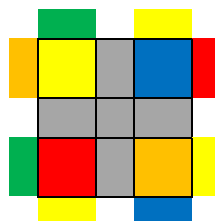
$U2-RU2R'U2-R'FRF'$
 $U2(RU2R'U2)(SH)$

Opposites row, random sticker



$U2-F'-rUr'-U2-r'F2r$

Opposites row, Back-right match

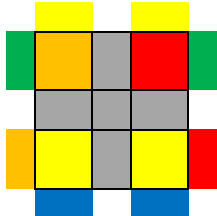


$U2-R'FRF'-rUr'$
 $U2(SH)(rUr')$

Headlights

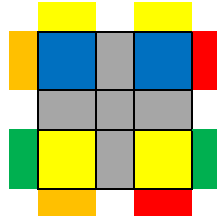
These are recognized by looking at the stickers on the top of the back corners (UBL and UBR) and on the front of the front corners (FUL and FUR).

Front Row



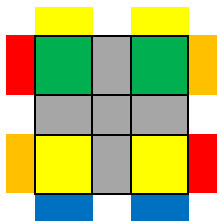
$R'U'RUR'U^2R^2UR'URU^2R'$
(half-AS)(R'U²)(R²UR'U)(RU²R')

Top/Back Row



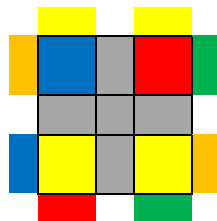
$U'-F-RUR'U'-F'$
 $U'F(\text{sexy})F'$

2 Rows



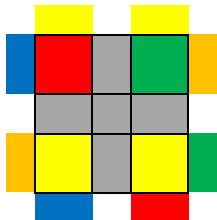
$R'FRUR'R'U'RUR-R'F'-RUR'U'-R'FRF'R$
 $R'F(RU'R'U')$ (lasso)(sexy)(SH)R

Slash



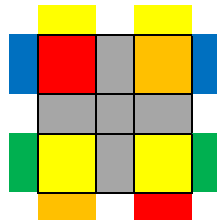
$(rU'r'U')^*2-F'U^2F$

Backslash



$R'FRUR'F-RUFU^2F'$

X

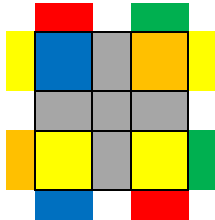


$U^2-R'FU'R-FR'URF'$

Blinkers

These are recognized by looking at the stickers on the top of the back corners (UBL and UBR) and on the front of the front corners (FUL and FUR).

Left Column

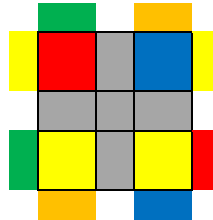


$U'-RUR'U'-R'FRF'$

$U'(\text{sexy})(SH)$

*Left column starts with left trigger

Right Column

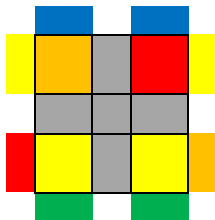


$U-L'U'LU-LF'L'F$

$(U)(L \text{ sexy})(L SH)$

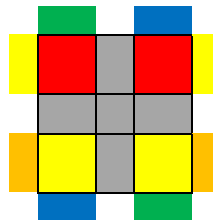
*Right column starts with right trigger

Front Row



$R'UrU2-R2FRF'r$

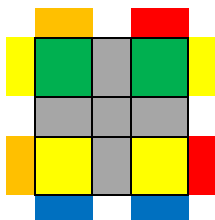
Top/Back Row



$U2- F-RUR'U'-RU'R'U'-RUR'F'$

$U2(\text{sexy})(RU'R'U')(\text{lasso})$

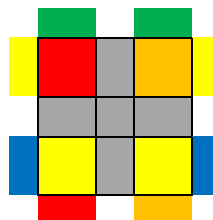
2 Rows



$F-R'FR2U'-R'U'RUR'F2$

$F(\text{rebound})(R'U')(\text{lasso+extra } F')$

2 Columns

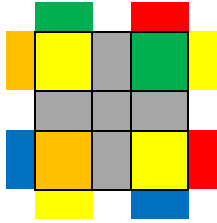


$U2-r2D'-rUr'-D-r2U'-r'U'r$

Bowtie

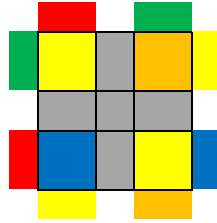
These are recognized by looking at the stickers on the top of the two misoriented corners (UBR and UFL) and by comparing the front of the front right corner (FUR) with the top of the back right corner (UBR). The relationship between two stickers can be same, opposite, or random (neither same nor opposite).

Top Random, Stickers Opposite



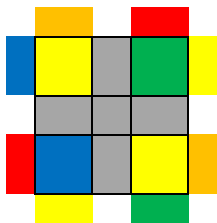
$U2-RU2R'U'-(RUR'U')*2-RU'R'$
 $U2(RU2R'U')(sexy)*2(RU'R')$

Top Random, Stickers Same



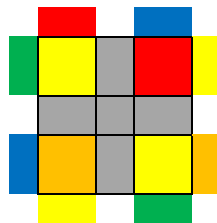
$U2-R'U'RUR'F'-RUR'U'-R'FR2$
 $U2-R'U'(lasso)(sexy)(rebound\ w/o\ U')$

Top Opposite, Stickers Same



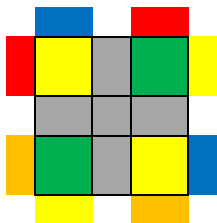
$FR'F'R-URU'R'$
 $(HS)(URU'R')$

Top Opposite, Stickers Random



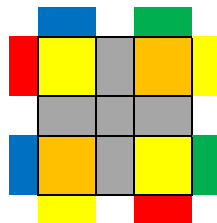
$F-RU'R'U'-RUR'F'$
 $F-RU'R'U'(lasso)$
 *This is the first half of the Y Perm.

Top Same, Stickers Random



$U2-RUR'U'-R'FRF'-U2-R'FRF'$
 $U2(half-Sune)(SH)U2(SH)$

Top Same, Stickers Opposite

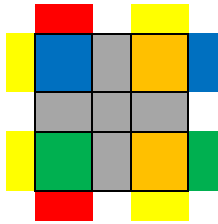


$RUR'U'-R'FR2U'R'U'-RUR'F'$
 $(sexy)(rebound)(R'U)(lasso)$

Pi

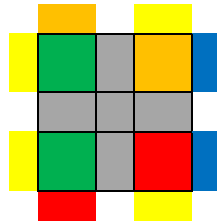
These are recognized by looking at the stickers on the top of the four corners.

Right Column



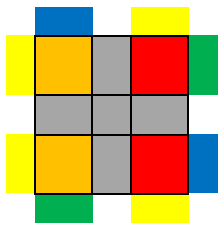
$F-(RUR'U')*2-F'$
 $F-(sexy)*2-F'$

Left Column



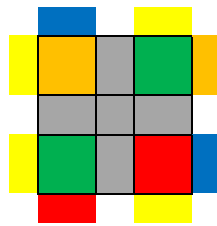
$U'-R'U'-R'FRF'-RU'R'U2R$
 $U'(R'U')(SH)(RU'R'U2R)$

2 Columns



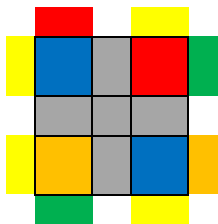
$U2 R'URU'R2F-R2UR'U'-F'R$

Slash



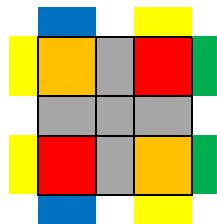
$RU2R'U'-RUR'U2-R'FRF'$
 $(RU2R'U')(RUR'U2)(SH)$

Backslash



$U-FR'F'R-U2-RU'R'U-RU2R'$
 $U(HS)(U2)(RU'R'U)(RU2R')$

X

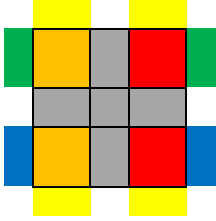


$U'-R'FRU-FU'-RUR'U'-F'$
 $U'(R'FRU)(FU')(sexy)(F')$

Double Headlights

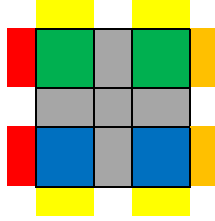
These are recognized by looking at the stickers on the top of the four corners.

2 Columns



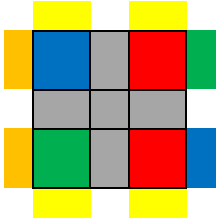
$RU2R'U'-RUR'U'-RU'R'$
 $(RU2R'U')(sexy)(RU'R')$

2 Rows



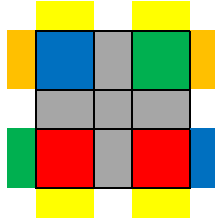
$F-(RUR'U')*3-F'$
 $F-(sexy)*3-F'$

1 Column



AUF until the column is at the front.
 $[U]-RU2-R2FRF'-U2-R'FRF'$
 $[U](RU2R')(SH)(U2)(SH)$

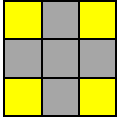
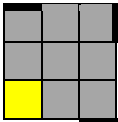
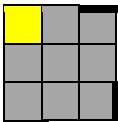
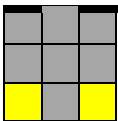
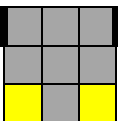
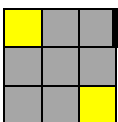
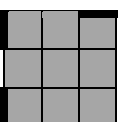
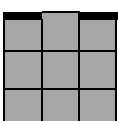
1 Row



AUF until the row is at the front.
 $rU'r'F-U2-r2F-rU'r$

CMLL Quick Reference

Recognition hints are given in parentheses.

| | | | | | | |
|---|---|---|---|--|--|---|
|  | (solved) Start LSE! | (Headlights F) U RUR'F'- RUR'U'- R'FR2U'R' | (Headlights L) RUR'F'- RUR'U'- R'FR2U'R' | (Headlights B) U' RUR'F'- RUR'U'- R'FR2U'R' | (Headlights R) U2 RUR'F'- RUR'U'- R'FR2U'R' | (!Headlights) FRU'R'URU- R'F'-RUR'U'- R'FRF' |
|  | (RFU=!U, d) RUR'URU2R' | (RFU=!U, c) R'F2RU2rU'rF OR L'U2LU2LF'L'F | (RFU=UBR, r) x UR'U'L- U2RU2R' | (RFU=UBL, c) U' RUR'U- RU'RD- R'UR'DR2 | (RFU=UBL, r) RU'L'UR'U'L | (RFU=UBR, d) U2 RUR'U- R'FRF'-RU2R' |
|  | (FRU=UBR, d) R'UR'UR'U2R | (FRU=!U, c) U2 R2DR'UR- D'RUR'UR'UR' | (FRU=!U, r) U2 F'-rUr'U2- r'F2r | (FRU=UFL, c) U2 RU2R'U2- R'FRF' | (FRU=UBR, r) U2 R'FRF'-rUr' | (FRU=UFL, d) R'UR'RU'- R'UR'FRF'-UR |
|  | (Front Row) R'UR'UR'U2- R2UR'URU2R' | (2 Rows) R'FRUR'UR'U- R'F'-RUR'U'- R'FRF'R | (Slash) (rUr'U)*2- F'U2F | (X) U2 R'FU'R- FR'URF' | (Backslash) R'FRUR'F'- RUFU2F' | (U Row) U' F-RUR'U'-F' |
|  | (2 Rows) FR'FR2U'- R'URUR'F2 | (Front Row) R'UrU2- R2FRF'r | (R column) U L'U'LU- LF'L'F | (U Row) U2 FRUR'U'- RU'R'URUR'F' | (L column) U' RUR'U'- R'FRF' | (2 columns) U2 r2D'-rUr'-D- r2U'-r'U'r |
|  | (d, FRU oUBR) U2 RU2R'U'- (RUR'U')2- RU'R' | (s, FRU!=U) U2 RUR'U- R'FRF'-U2- R'FRF' | (o, FRU=UBR) FR'F'-RURUR' | (o, FRU!=U) FRUR'U'- RUR'F' | (s, FRU oUBR) RUR'U'- R'FR2U'R'- URUR'F' | (d, FRU=UBR) U2 RU'RUR'F'- RUR'UR'FR2 |
|  | (R Column) F-(RUR'U')2-F' | (Backslash) U FR'F'R-U2- RU'R'U-RU2R' | (X) U' R'FRU-FU- RUR'U'-F' | (Slash) RU2R'U'- RUR'U2- R'FRF' | (2 Columns) U2 R'URUR'2F- R2UR'U'F'R | (L Column) U' R'U'-R'FRF'- RU'R'U2R |
|  | (2 Columns) RU2R'U'- RUR'U'-RU'R' | (Back Row) U2 rUr'F-U2- r2FrU'r | (Left Column) U' RU2- R2FRF'-U2- R'FRF' | (Front Row) rUr'F-U2- r2FrU'r | (Right Column) U RU2-R2FRF'- U2-R'FRF' | (2 Rows) F-(RUR'U')3-F' |