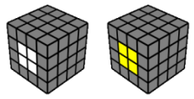
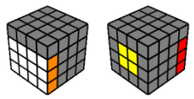
K4

Everything is taken verbatim from Thom Barlow's http://snk.digibase.ca/k4/index.htm
Arranged by Andy Klise of http://www.kungfoomanchu.com

Step 1 - Two Opposite Centers



Step 2 - 1x3x4 Block

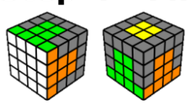


- Moves restricted to the subset <U,l,r,R,L,F,x>
- Dan Cohen's Mod is to just do the 'dedges' here

Step 3 - Centers in the M ring

- Moves restricted to the subset <(l'rR),(rR),U>. l can be used in emergencies.
- Note - do (l'rR) / 3R instead of x

Step 4 - First Layer



- Finish the last dedge and complete rest of first layer

Step 5 - F3L

- Do not perform any rotations on the cube, and always have the same color (orange) as the front face.
- Note - Double outer turns usually mean corner manipulation.
- Corner manipulation algorithms are faster to execute; so you may want to use these for every case and disregard the corners until the next step.
- This step should be mostly intuitive (after learning one or two you should be able to do them all). The algorithms are there in case you wish to use alternatives that may be faster for you.

FR Slot


to FR**u**

FUr

U^2 l' URU' l UR'
U^2 Lw' URU' Lw UR'
r' U'RU r U'R'


to FR**d**

URU' r UR'U' r'
URU l U'R'U l'
R^2 UR'U' r URU' Rw'R'


to FR**u**

FUl

URU' l' UR'U' l
URU' Lw' UR'U' Lw
URU r' U'R'U r


to FR**d**

U^2 r URU' r' UR'
l U'RU l' U'R'
RU'RUR'U'rURU'Rw'UR'

BR Slot


to BR**u**

UR'U l U'RU l'
UR'U Lw U'RU Lw'
UR'U' r URU' r'


to BR**d**

r' U'R'U r U'R
Rw'UrU'RUr'U'r
R'Rw' U'RU r U'R'U R^2


to BR**u**

Lw U'R'U Lw' U'R
(lr'R')Ul'U'RUlU'M'
B l' B'RB l B'R'


to BR**d**

UR'U r' U'RU r
UR'U' l' URU' l
U^2 LwU'R'U r' U'RUR' x

FL Slot


to FL**u**

U'L'U r U'LU r'
U'L'U Rw U'LU Rw'
U'L'U' l ULU' l'


to FL**d**

U^2 l' U'L'U l U'L
r' UL'U' r UL
Rw' UL'U' r ULU' R


to FL**u**

U^2 r U'L'U r' U'L
l UL'U' l' UL
U^2FRw'F'LFRwF'L'


to FL**d**

U'L'U l' U'LU l
U'L'U' r' ULU' r
L^2 U'LU l' U'L'U LwL

BL Slot


to BL**u**

r' ULU' r UL'
Rw' ULU' Rw UL'
B' r BL'B' r' BL


to BL**d**

U'LU r U'L'U r'
U'LU' l UL'U' l'
U^2L^2 UL'U' l ULU' Lw'L'


to BL**u**

U'LU l' U'L'U l
U'LU' Rw' UL'U' Rw
U'LU' r' UL'U' r


to BL**d**

l ULU' l' UL'
U^2 r U'LU r' U'L'
LwU'l'UL'U'lUl'

F3L Shortcuts

Inserting unpaired edge groups into the E layer; These can be applied to every slot.


BUr to FRd, FUl to FRu

r URU' l'r' UR'U' l

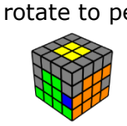

BUl to FRu, FUr to FRd

l' URU' lr UR'U' r'

Swapping pieces within the E layer; You may have to rotate to perform these in different slots.


FRu and FLu

L'RU' l' UR'U' l^2 ULU' l'


FRu and FLd

d'LRU'lUL'U'l^2UR'U'ld


FRu and BLu

ULU'r'U'RUrU'R'Ur'UL'U'r


FRu and BLd

LRU'lUL'U'l^{2}UR'U'l

Step 6 – Corners

- Solve them in one alg with CLL.
- If you're going to do it in two, (OLL/PLL maybe) try and manipulate the last layer edges too.

Step 7 – ELL

- You can learn these algorithms like any other, but it would be a waste of your time - they're all pretty similar and you should be able to derive your own to do different things from the first few you learn.
- Study them, but don't learn them.
- If you read this page and get completely lost, this entire step can be completed with only two algorithms (the first 3-cycle and any of the 2-cycles), however - this won't be very quick at all.
- The general idea is; solve an edge pair with the first algorithm (this means pairing it and inserting it to the correct slot), solve another edge pair with the second algorithm (opposite or adjacent), and solve the last two edge groups in a single algorithm. There are only 24 different configurations for the last two edges and it's really worth learning how to solve each of them. Most of the 24 configurations are algorithms you will likely already know, you'll just need to learn things like the 4-cycles.
- Some of the following algorithms are written in commutator or conjugate notation. With this notation, [X,Y] translates to XYX'Y', and [X:Y] translates to XYX'.

First/Second Edge Tricks


lR'U'RUl'r'U'R'URw


[F' R u^2 R' F, U]


[F' R d^2 R' F, U]


y F^{2}l^{2}DR^{2}D'M^{2}DR^{2}D'r^{2}F^2


y lFR'F'l'r'FRF'r


y lR'U'RUl'r'U'R'URw


y Rw'U'RUl'rU'R'URl'


RwUR'U'l'r'URU'R'l


B^{2}r^{2}R'U'RUM^{2}U'R'URl^{2}B^2


B^{2}l^{2}R'U'RUM^{2}U'R'URr^{2}B^2


y F^{2}r^{2}DR^{2}D'M^{2}DR^{2}D'l^{2}F^2


y r'FR'F'rlFRF'l'


y F^{2}r^{2}F'R'FM^{2}F'RFl^{2}F^2


y F^{2}l^{2}F'R'FM^{2}F'RFr^{2}F^2

3 Cycles


RUR'U'rURU'(Rr)'


L'U'LUl'U'L'U(Ll)


RUR'U'l'URU'R'l

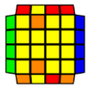

R'U'RUlU'R'URl'

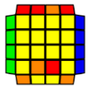

F^{2}l^{2}F'R'Fl^{2}F'RF'
R^{2}U^{2}r'D'rU^{2}r'D(Rr)R
xD^{2}r^{2}UR'U'r^{2}URU'D^2


F^{2}r^{2}F'R'Fr^{2}F'RF'
R^{2}U^{2}lD'l'U^{2}lDl'R^2


x^{2}F^{2}U'R^{2}Ur^{2}U'R^{2}Ur^{2}F^2
r'U'l'D^{2}lUl'D^{2}lr
yF'R'u'RU^{2}R'uRU^{2}F


F^{2}Rw^{2}UR^{2}U'r^{2}UR^{2}U'R^{2}F^2
lrD^{2}r'U'rD^{2}r'Ul'
yFLuL'U^{2}Lu'L'U^{2}F'


[l,U'RUxUR^{2}U'x']
U^{2}rU^{2}l'U^{2}lU^{2}r'U^{2}l'U^{2}l
l'U^{2}r'D^{2}rU^{2}r'D^{2}rl


[U'RUxUR^{2}U'x',r']
rU^{2}r'U^{2}l'U^{2}rU^{2}r'U^{2}lU^2
rlD^{2}l'U^{2}lD^{2}l'U^{2}r'


(Rr)UR'U'r'URU'R'


(Ll)'U'LUlU'L'UL


l'RUR'U'lURU'R'

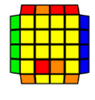

lR'U'RUl'U'R'UR

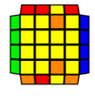

FR'Fl^{2}F'RFl^{2}F^2
R^{2}r'D'rU^{2}r'DrU^{2}R^2
xD^{2}UR'U'r^{2}URU'r^{2}D^2


FR'Fr^{2}F'RFr^{2}F^2
R^{2}lD'l'U^{2}lDl'U^{2}R^2


x^{2}F^{2}r^{2}U'R^{2}Ur^{2}U'R^{2}UF^2
l'r'D^{2}lU'l'D^{2}lUr
yF'U^{2}R'u'RU^{2}R'uRF


F^{2}R^{2}UR^{2}U'r^{2}UR^{2}U'Rw^{2}F^2
lU'rD^{2}r'UrD^{2}l'r'
yFU^{2}LuL'U^{2}Lu'L'F'


[U'RUxUR^{2}U'x',l]
l'U^{2}lU^{2}rU^{2}l'U^{2}lU^{2}r'U^2
l'r'D^{2}rU^{2}r'D^{2}rU^{2}l


[r',U'RUxUR^{2}U'x']
U^{2}l'U^{2}rU^{2}r'U^{2}lU^{2}rU^{2}r'
rU^{2}lD^{2}l'U^{2}lD^{2}l'r'


Rw^{2}U'R^{2}U'r'UR^{2}U'rU^{2}Rw^2
Rw'U'RU'r^{2}UR'U'r^{2}U^{2}Rw
r^{2}UlD^{2}l'U'lD^{2}l'r^2


Lw^{2}U^{2}lU'L^{2}Ul'U'L^{2}U'Lw^2
l^{2}r'D^{2}rU'r'D^{2}rUl^2


Lw^{2}r'D^{2}rUr'D^{2}rU'Lw^2


Rw^{2}lD^{2}l'U'lD^{2}l'URw^2


Rw^{2}U^{2}r'UR^{2}U'rUR^{2}URw^2
r^{2}lD^{2}l'UlD^{2}l'U'r^2


Lw^{2}UL^{2}UlU'L^{2}Ul'U^{2}Lw^2
l^{2}U'r'D^{2}rUr'D^{2}rl^2

Lw^{2}Ur'D^{2}rU'r'D^{2}rLw^2

Rw^{2}U'lD^{2}l'UlD^{2}l'Rw^2

2x2 Cycles

(Rw^{2}B^{2}Rw^{2}U)*^{2}
lrD^{2}l'r'UlrD^{2}l'r'U'

r'U'l'D^{2}lUrU^{2}r'U'l'D^{2}lUrU^2

r^{2}U^{2}r^{2}Uw^{2}r^{2}u^2
Rw^{2}Fw^{2}U^{2}r^{2}U^{2}Fw^{2}Rw^2
Uw^{2}Rw^{2}U^{2}r^{2}U^{2}Rw^{2}Uw^2

R'U^{2}R^{2}UR'U'R'U^{2}Rwl'URU'Rw'l

blrD^{2}l'r'UlrD^{2}l'r'U'b'

f'r'U'l'D^{2}lUrU^{2}r'U'l'D^{2}lUrU^{2}f

[BwBr' : lrD^{2}l'r'UlrD^{2}l'r'U']

[F' R u^2 R' F, U]

(Rw^2'F^{2}Rw^{2}U')*^{2}
r'l'D^{2}lrUr'l'D^{2}lrU'

lU'rD^{2}r'Ul'U^{2}lU'rD^{2}r'Ul'U^2

[LwF'R'FLw' : r^{2}U^{2}r^{2}Uw^{2}r^{2}u^2]

M'UM'UM'U^{2}MUMUMU^2
M'UM'UM'UM'U^{2}M'UM'UM'UM'

f'l'r'D^{2}lrUl'r'D^{2}lrU'f

b'lU'rD^{2}r'Ul'U^{2}lU'rD^{2}r'Ul'U^{2}b

[BwBr' : lU'rD^{2}r'Ul'U^{2}lU'rD^{2}r'Ul'U^2]
[f'by^2 : [F' R u^2 R' F, U]]

[F' R d^2 R' F, U]

2 Cycles

rU^{2}rU^{2}xU^{2}rU^{2}l'x'U^{2}lU^{2}r^2

r'U^{2}xlU^{2}l'U^{2}x'r^{2}U^{2}rU^{2}r'U^{2}F^{2}r^{2}F^2

l'U^{2}l'U^{2}xU^{2}l'U^{2}rx'U^{2}r'U^{2}l^2
l'U^{2}l'U^2(l'r)U^{2}l'U^{2}lU^{2}r'U^{2}l^2

rU^{2}r'U^{2}r'U^{2}lU^{2}r'U^{2}rU^{2}F^{2}r^{2}F^{2}l'

4 Cycles

r^{2}B^{2}r'U^{2}r'U^{2}B^{2}r'B^{2}rB^{2}r'B^{2}r^{2}B^2

rU^{2}r^{2}U^{2}r'U^{2}rU^{2}r'U^{2}r^{2}U^{2}r

rU^{2}l'U^{2}rU^{2}rU^{2}r'U^{2}rU^{2}r^{2}U^{2}lr'U^{2}r'

l^{2}F^{2}l'U^{2}l'U^{2}F^{2}l'F^{2}lF^{2}l'F^{2}l^{2}F^2

r'U^{2}r^{2}U^{2}rU^{2}r'U^{2}rU^{2}r^{2}U^{2}r'

rU^{2}rl'U^{2}r^{2}U^{2}r'U^{2}rU^{2}r'U^{2}r'U^{2}lU^{2}r'