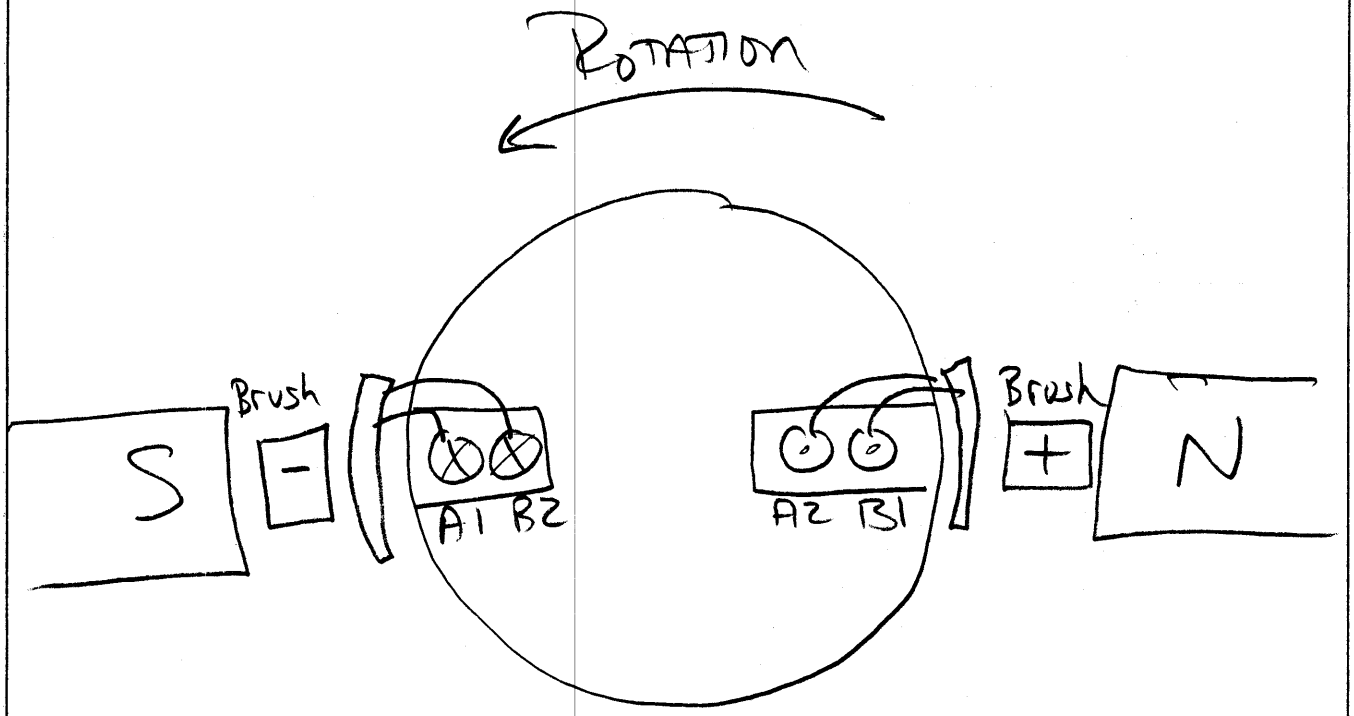
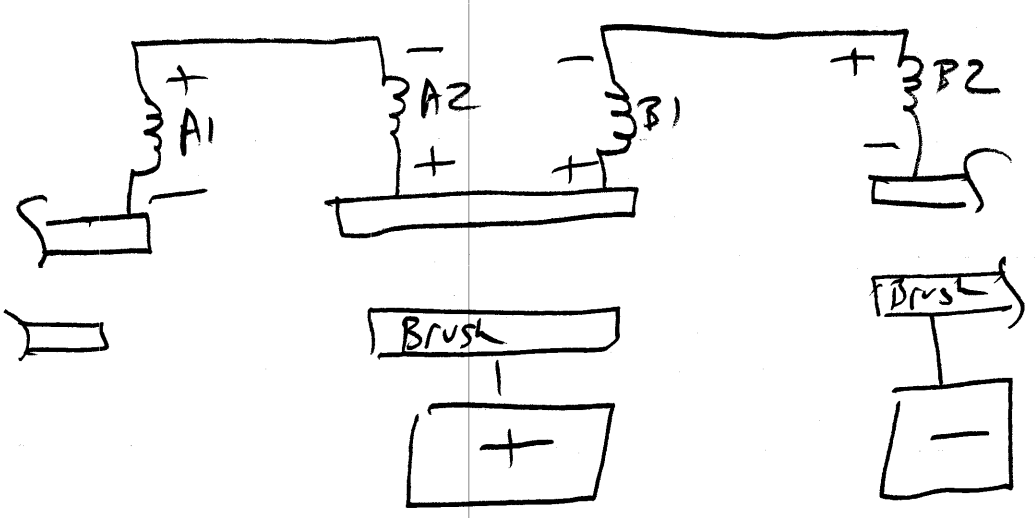
DC GENERATOR

2 Pole field – 2 Brush sets – Pole Pitch (Coil Pitch) 180°
2 Slots (One Coil Per Slot, One Conductor per Coil)



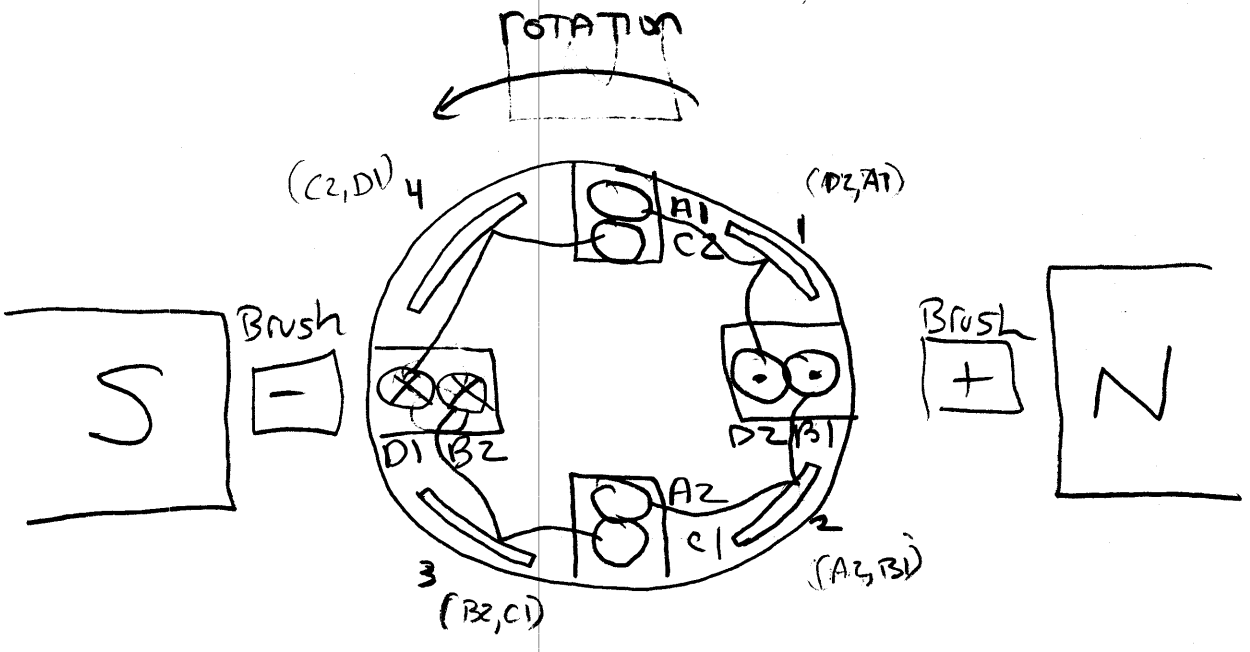


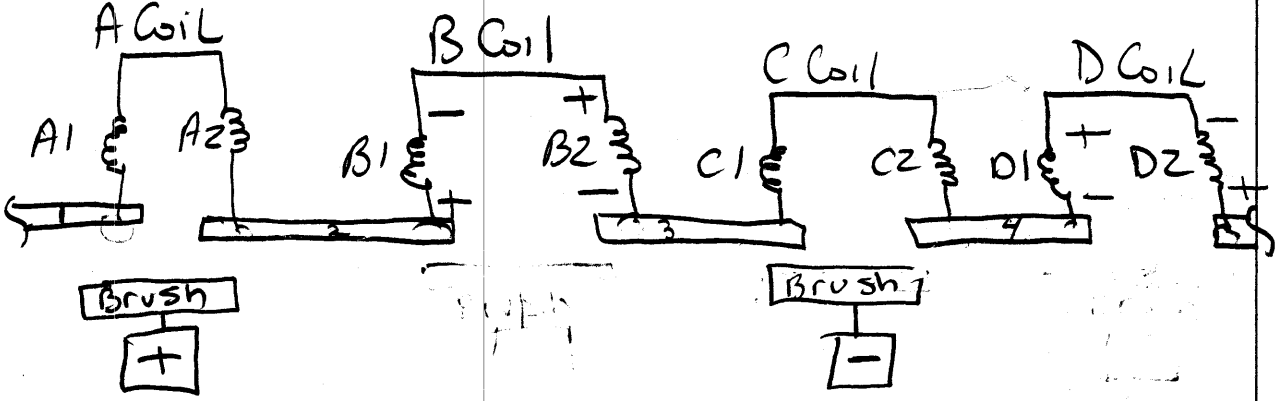
$$\#\ \frac{\text{Pulse}}{\text{Cycle}} = \frac{2\ \text{Slots}}{2\ \text{Pulses}} * 2 = 2\ \text{Pulse}$$

$$\text{Conduction degrees} = \frac{360^\circ}{2\ \text{Pulse}} = 180^\circ$$

DC GENERATOR

2 Pole field - 2 Brush Sets - Pole Pitch (Coil Pitch) 180°
4 Slots (one Coil Per Slot & one turn Per Coil)





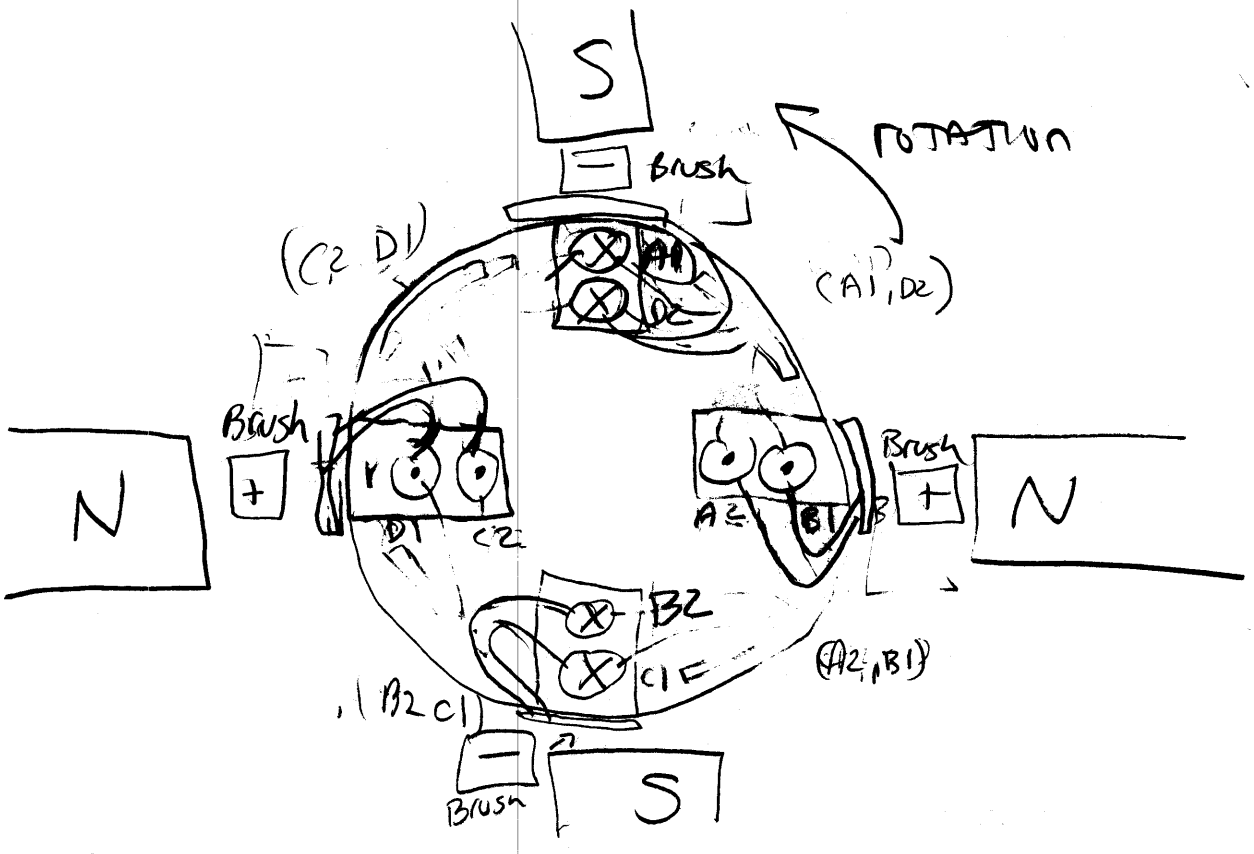
movement of Armature
Commutating Sections

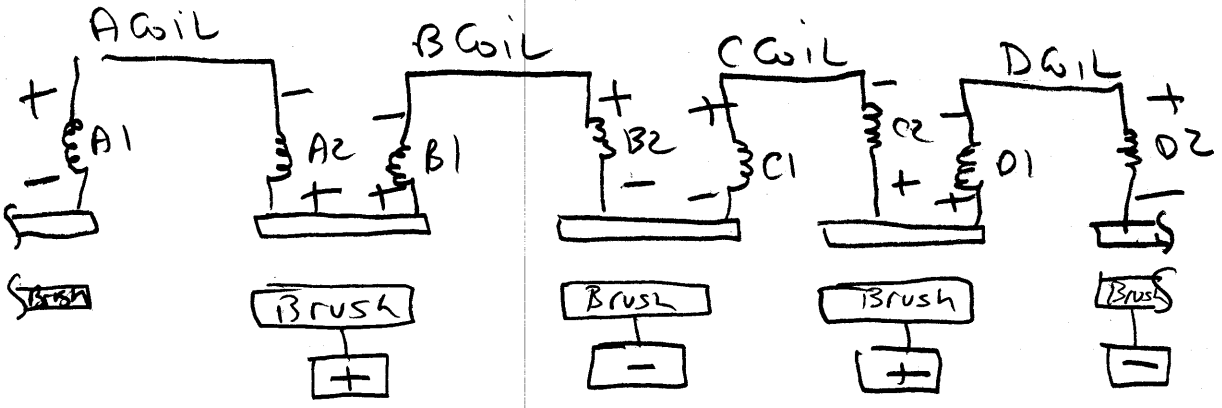
$$\#\ \frac{Pulse}{cycle} = \frac{4\ Slots}{2\ Poles} * 2 = 4\ Pulse$$

Conduction degrees: $\frac{360}{4\ Pulse} = 90^\circ$

DC Generator

4 Pole – 4 Brush sets – Pole Pitch (Coil Pitch) 90°
4 Slots (one Coil Per Slot & one turn Per Coil)



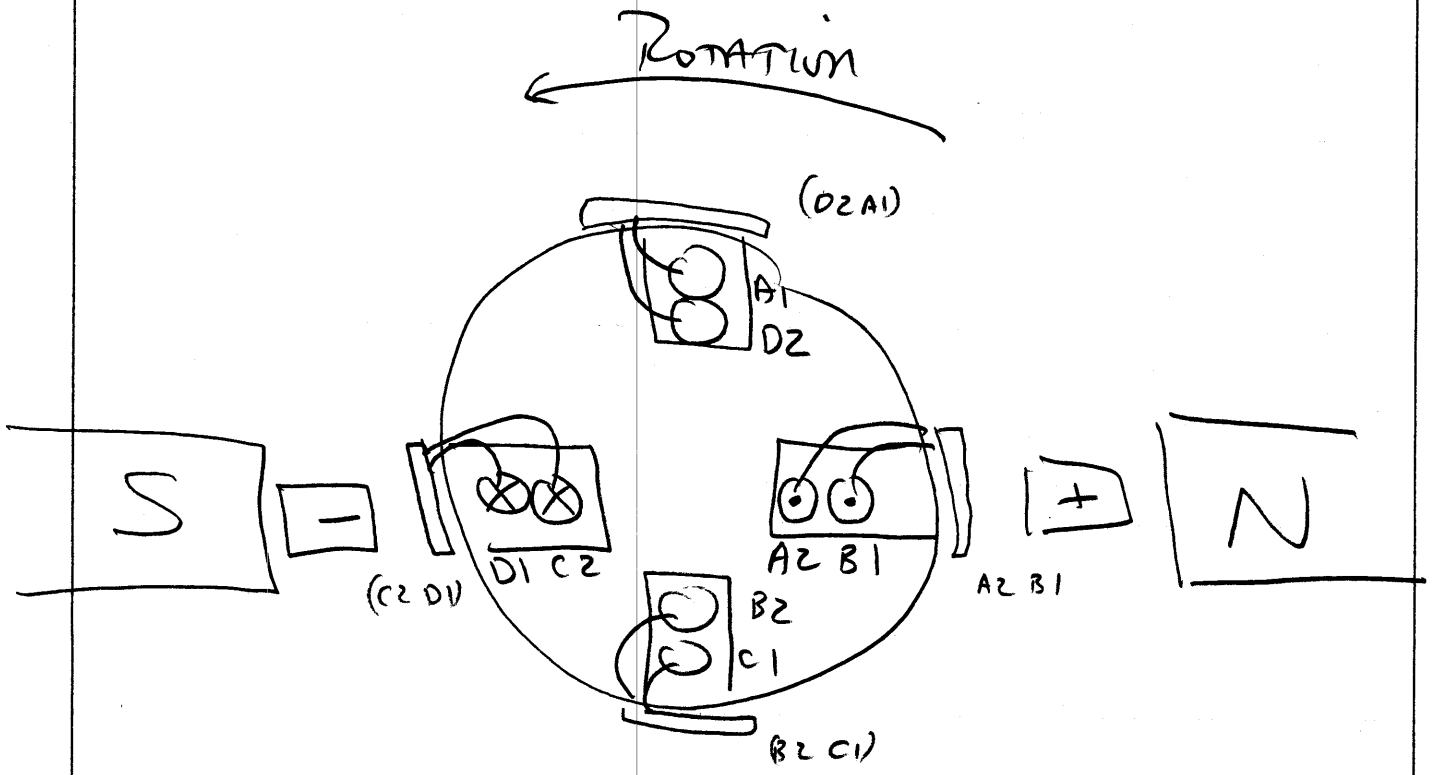


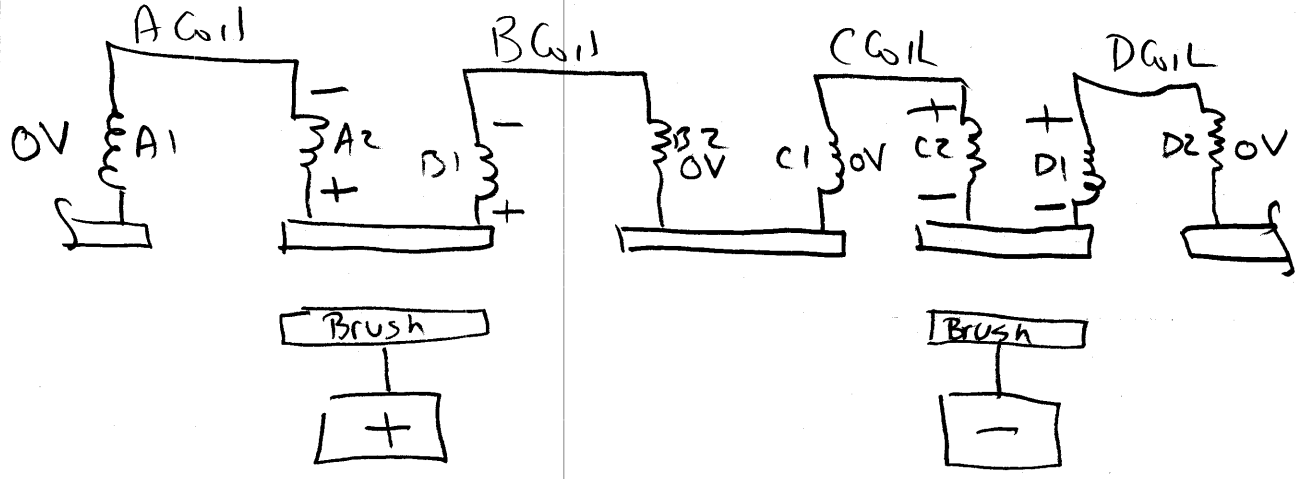
Commutating sections of Armature Movement

$$\frac{\#\text{Pulse}}{\text{Cycle}} = \frac{4\text{ Slots}}{4\text{ Poles}} * 2 = 2\text{ Pulse}$$

$$\text{Conduction degrees} = \frac{360}{2\text{ Pulse}} = 180^\circ$$

What if we use 2 Pole field w/ Armature w/ 90° Pole Pitch?





movement of Armature Commutating Sections

Works However → #1 E_o < than if 4 Pole field used.

#2 Arcing higher since commutating segments NOT exactly at Neutral PT

Coil Pitch Always equal to (or slightly less than) Pole Pitch.

Summary DC Generator/MTR

What effect on DC Ripple does increasing the Number of Slots/Pole achieve?

Pole = # Brushes

Slots = # Coils (for our class) = # Commutating Sections

$$\#\text{Conductors}(z) = (\#\text{Slots})\left(\frac{\#\text{Coils}}{\text{Slot}}\right)\left(\frac{\#\text{Turns}}{\text{Coil}}\right)\left(\frac{2\text{ Conductor}}{\text{Turn}}\right)$$

(GEN) $E_0 = \frac{Z n \phi}{60}$ or $n = \frac{60 E_0}{Z \phi}$ (MOTOR)

IF flux constant → $\frac{E_{01}}{n_1} = \frac{E_{02}}{n_2}$

DC motor

$I_{START} = \frac{E_S}{R}$ $I_{RUN} = \frac{E_S - E_0}{R}$

$P_m = E_0 I = \frac{T n}{9.55}$ $T = \frac{Z \phi I}{6.28}$

$P_E = E_S I = P_m + P_{Loss}$

Reverse motor Direction → #1 Reverse Armature I_a
#2 Reverse field I_f

Reverse Generator Polarity → #1 Reverse field I_f
#2 Reverse direction of rotation

$T_0 = \frac{J n^2}{131.5 P_1}$ { for DYN Brake – T_0 = Time for ½ speed
for Plugging $2T_0$ = Time to stop.