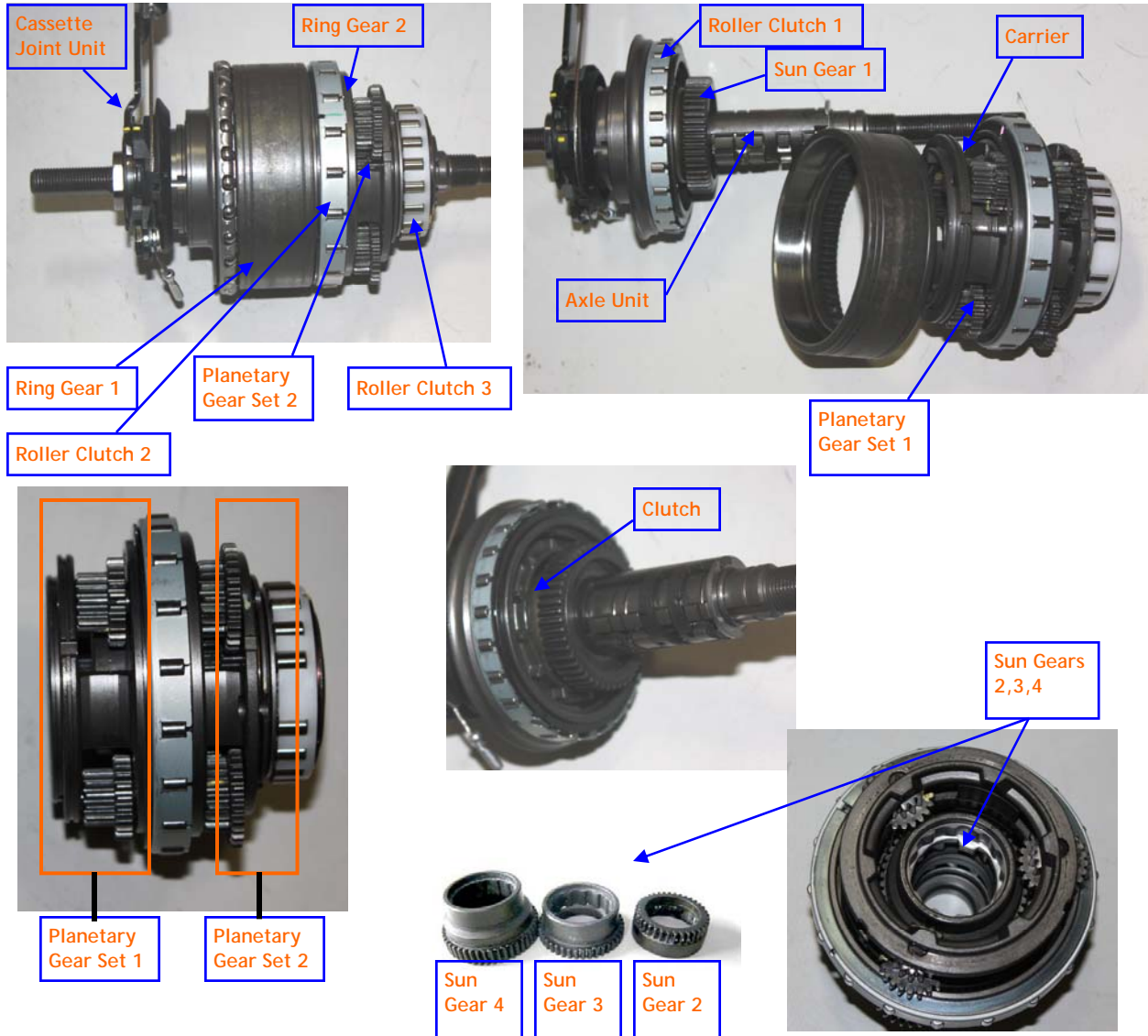


# Basic Structure of an 8 Speed Hub



- Planetary Gear Set 1 slows down the rotation of the hub, Planetary Gear Set 2 speeds up the hub. They are used in combination to achieve the 8 different gears.
- The clutch engages in 5th–8th gear, turning off Planetary Gear Set 1.
- 5th gear is the direct drive gear, none of the gears are used.
- Planetary Gear Set 1 uses 1 set of planet gears, 1 sun gear and 1 ring gear.
- Planetary Gear Set 2 uses 3 sets of planet gears, 3 sun gears and 1 ring gear.

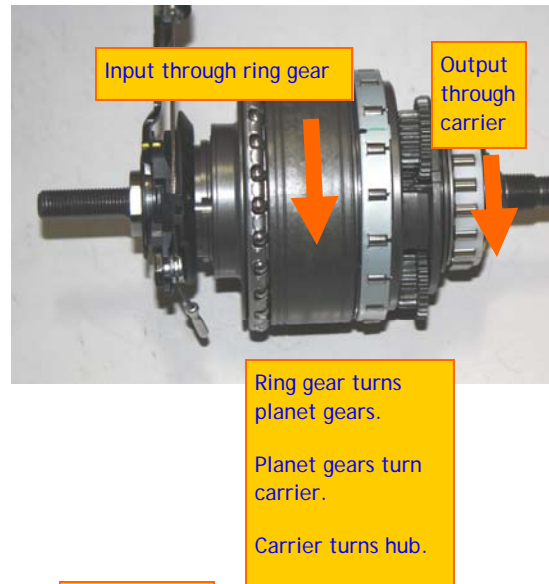


# Route of Power Transmission for 8 Speed Hubs

## 1st Gear (0.53)

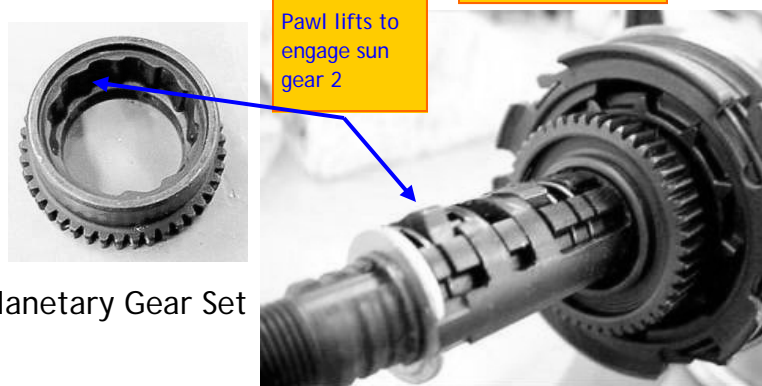
In 1st gear, only Planetary Gear set 1 is used. This slows down the rotation of the hub as much as possible.

The cog turns the driver which turns ring gear 1 via roller clutch 1. Ring gear 1 turns the planetary gears which rotate around sun gear 1 which is stationary. This rotates the carrier at a ratio of 0.53. The hub is turned by roller clutch 3 attached to the carrier.



## 2nd Gear (0.64)

Shifting into 2nd gear, one of the pawls on the axle unit is raised and one of the sun gears inside Planetary Gear Set 2 is held stationary. This activates Planetary Gear Set 2 which speeds up the hub.



Since Planetary Gear Set 1 is still active. The hub is slowed down by PGS 1 and then sped up by PGS 2.

Planetary Gear Set 2 turns ring gear 2 which is directly beneath roller clutch 2.

The hub is now driven by the roller clutch on ring gear 2 instead of the one on the carrier.

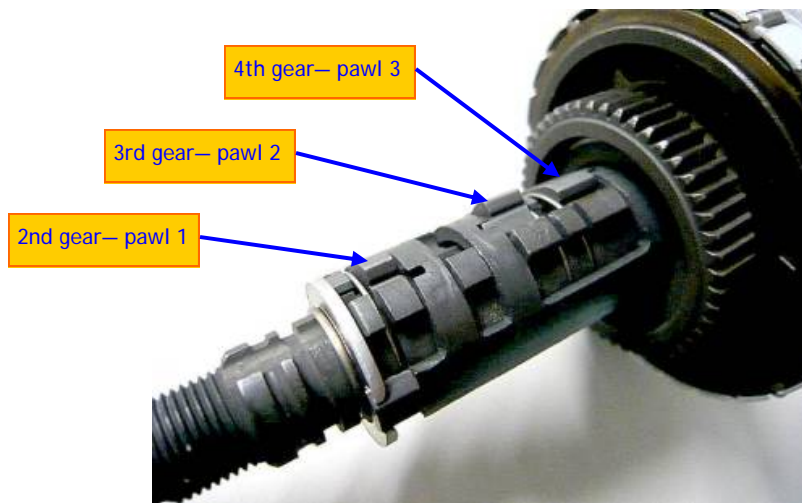


## Route of Power Transmission for 8 Speed Hubs

3rd Gear (0.75)

4th Gear (0.85)

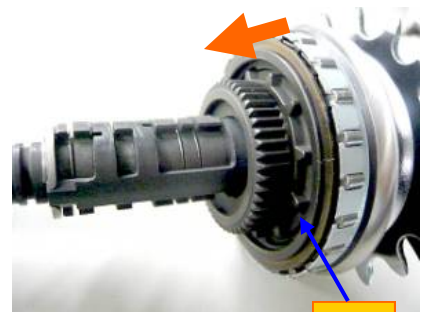
3rd and 4th gear are very similar to 2nd gear. Power follows nearly the same path through the hub. The only difference is that in each gear a different pawl lifts to engage a different sun gear with a different gear ratio.



5th Gear (1.00)



The clutch engages with the carrier. This bypasses ring gear 1 and Planetary Gear Set 1.



5th Gear

In 5th gear, the clutch engages which disables Planetary Gear System 1. There is no longer a mechanism that slows the hub down. Since no pawls are raised to activate Planetary Gear Set 2, there is also no mechanism to speed up the hub. The hub is driven directly by the carrier and a 1 to 1 ratio is achieved.

# Route of Power Transmission for 8 Speed Hubs

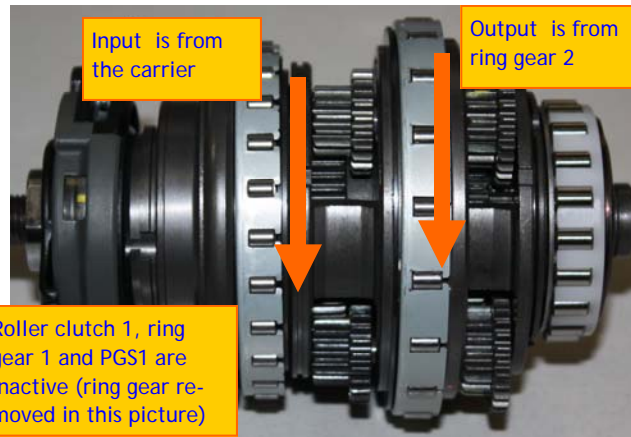
6th Gear (1.22)

7th Gear (1.42)

8th Gear (1.61)

6th, 7th and 8th gear function similar to 2nd, 3rd and 4th gear. Each one uses a different pawl and sun gear to speed up the hub by different amounts. The only difference is that the clutch is

engaged so Planetary Gear Set 1 is not active to slow the hub down.



Gear	Input	Output	Clutch	Planetary Gear Set 1	Planetary Gear Set 2 Sun Gear 2	Planetary Gear Set 2 Sun Gear 3	Planetary Gear Set 2 Sun Gear 4
1st	Ring gear 1	Roller Clutch 3		Yes			
2nd	Ring gear 1	Ring Gear 2		Yes	Yes		
3rd	Ring gear 1	Ring Gear 2		Yes		Yes	
4th	Ring gear 1	Ring Gear 2		Yes			Yes
5th	Carrier	Roller Clutch 3	Yes				
6th	Carrier	Ring Gear 2	Yes		Yes		
7th	Carrier	Ring Gear 2	Yes			Yes	
8th	Carrier	Ring Gear 2	Yes				Yes