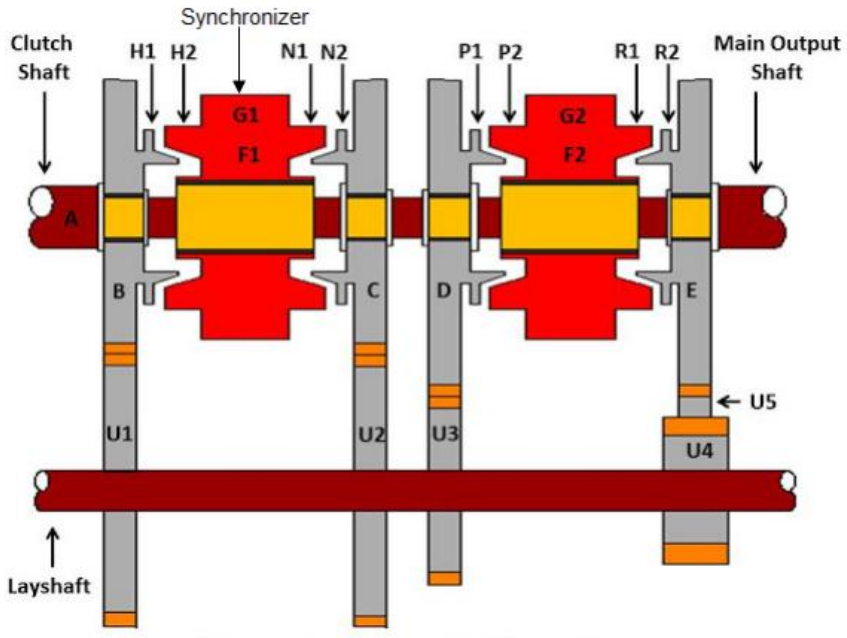
LAYOUT OF SYNCHROMESH GEARBOX

INTRODUCTION

The latest version of the Constant mesh model is the Synchromesh gearbox. This is a manually operated transmission in which transmission changes occur between rotating gears at the same speed. The gears can roll freely or they can be locked on the layout shaft in this sort of gearbox. Synchromesh is an upgrade on the dog embrace, really.

The synchronizer is the main component of this speed stabilizing transmission. A synchronizer is a clutch that allows components to rotate at various speeds. The cone friction speeds are used to synchronize. It consists of two parts, Synchro cone and Baulk ring, which are synchronized. Cone is an array part and the synchronizer part is the ring part. Once they spin at correct speeds, the bag ring stops the gears being engaged. As the ring slides into the circle, friction slows down or speeds up the gear wheel. Finally, the synchronizer and gear speeds will be balanced and rotate at the same speed. The shaft gears are connected to them, while the shaft's gears are free to rotate.



MAIN PARTS

1. **Main shaft Gears:** A spline shaft is used as the output shaft over which the synchronizers and gears are mounted. According to the diagram B, C, D, E are the gears that can freely rotate on

the main shaft in mesh with corresponding gears in the lay shaft. As long as shaft A is rotating all the gears in the main shaft and lay shaft rotates continuously.

2. **Lay Shaft Gears:** It is the intermediate shaft over which gears with suitable size are mounted and is used to transmit the rotational motion from clutch shaft to the final output shaft. According to the Fig. U1, U2, U3, U4 are the fixed gears on the countershaft (lay shaft).
3. **Clutch Shaft:** It is the shaft used as an input shaft in the gearbox as it carries the engine output to the gearbox.
4. **Cone Synchromesh:** The side of the gear to be engaged has two features. One is hollow-cone, and the other is cone surrounded by the ring of dog teeth. The gear is made the cone and teeth that the synchromesh mechanism contacts.
5. **Synchronizers :** They are the special shifting devices used in the synchromesh gearbox which has conical grooves cut over its surface that provide frictional contact with the gears which is to mesh in order to equalize the speed of the main shaft, lay shaft and clutch shaft which in turn provides smoother shifting of gears.
6. **Gear lever:** It is the shifting lever operated by the driver and is used to select the appropriate gear i.e. 1, 2, 3, 4, 5 or reverse gear.

CONSTRUCTION

- The synchronizer is placed between two gears. So, we can use one unit for two gears.
- G1 and G2 are the ring-shaped members which are having the internal tooth that fits onto the external teeth.
- F1 and F2 are the sliding members of the main shaft. H1, H2, N1, N2, P1, P2, R1, R2 are the friction surface.

WORKING

- In synchromesh gearbox Lay shaft is connected to the engine directly, but it rotates freely when the clutch is disengaged. Because the gears have meshed all the time, the synchro brings the lay shaft to the right speed for the dog teeth to mesh to achieve desire speed of output shaft.
- For first gear, the ring shaft member and the sliding members i.e., G2 and F2 moves towards left till the cones P1 and P2 rub each other. Then friction makes their speed equal. Once their speeds are equal G2 is further pushed towards left and it engages with the teeth L2. A motion

is carried from clutch gear B to the lay shaft gear U1. Then it goes to lay shaft U3, and the motion is moved to the main shaft gear D. From there the motion is transferred to F2 which is the sliding member and then to the main shaft for the final drive.

- For second gear the ring shaft and the sliding members i.e., G1 and F1 moves towards the right till the cones N1 and N2 rub each other. Then the friction makes their speed equal. G1 is further pushed towards the right so that it meshes with the gear. The motion is transferred from clutch gear B to the lay shaft gear U1. From U1 the motion is transferred to U2. From U2 it is shifted to the main shaft gear C. Then the motion is transferred to the sliding member F1. Then it goes to the main shaft for the final drive.
- For top gear or direct gear, the motion is shifted directly from clutch gear B to the sliding member F1. Then from F1 to the main shaft. This is done by moving G1 and F1 to the left.
- For reverse gear, the motion is transferred from clutch gear A to the lay shaft gear U1. From there it is transferred to lay shaft gear U4 and then to the intermediate gear U5. From there to the main shaft gear E and then to the sliding member F2 and then to the main shaft for the final drive. This is done by moving G2 towards the right. Intermediate gear helps to achieve reverse gear.

ADVANTAGES

- Smooth and Noise free shifting of gears which is most suitable for cars.
- No loss of torque transmission from the engine to the driving wheels during gear shifts.
- Double clutching is not required.
- Less vibration.
- Quick shifting of gears without the risk of damaging the gears.

DISADVANTAGES

- It is extortionate due to its high manufacturing cost and the number of moving parts.
- When teeth make contact with the gear, the teeth will fail to engage as they are spinning at different speeds which causes a loud grinding sound as they clatter together.
- Improper handling of gear may easily prone to damage.
- Cannot handle higher loads.