

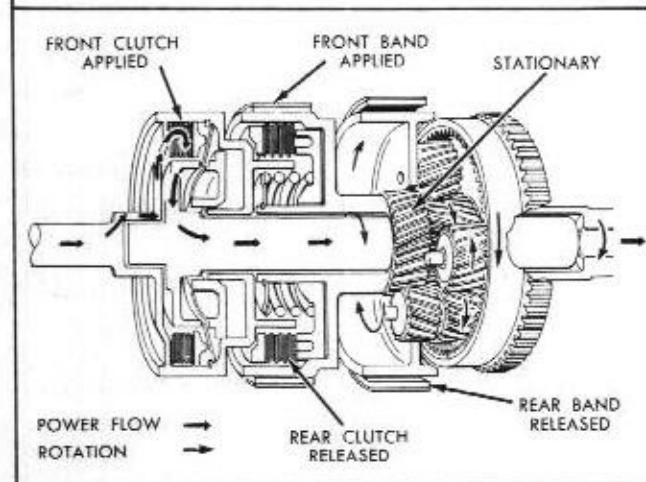
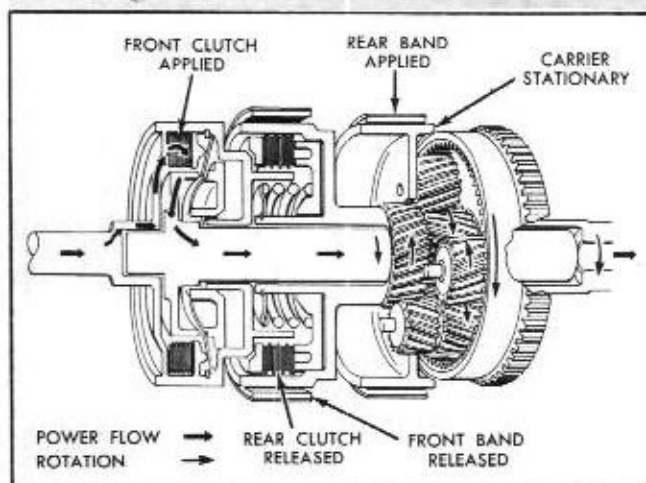
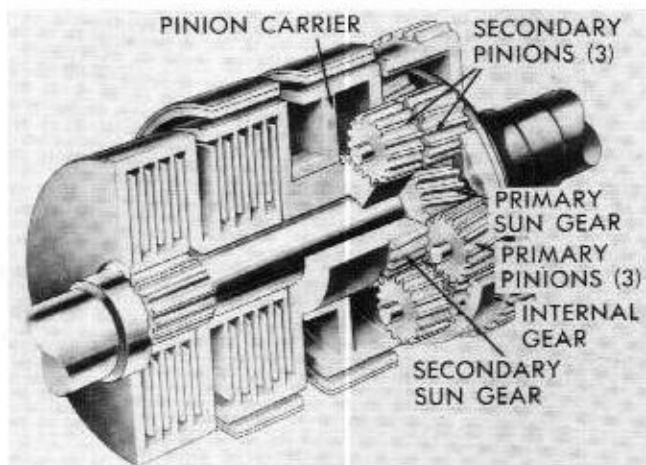
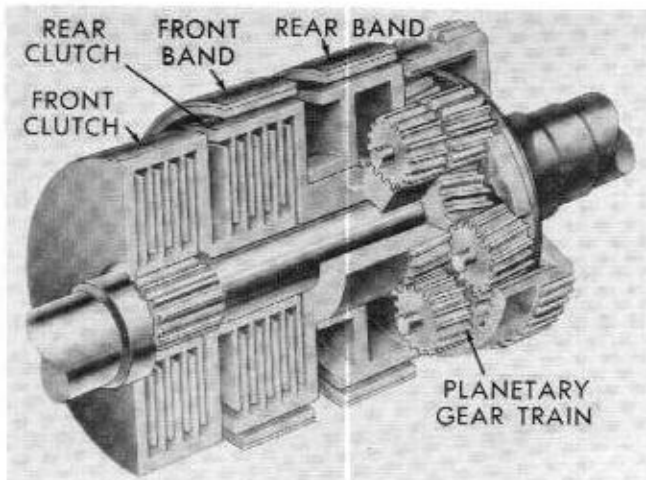
SECTION THREE—PLANETARY GEAR SYSTEM

The planetary gear system with its front and rear clutches, front and rear bands and planetary gear train, functions to provide neutral, intermediate, high, low and reverse ranges.

The planetary gear train consists of the primary sun gear, three primary pinions, three secondary pinions, the secondary sun gear, the pinion carrier, and internal gear.

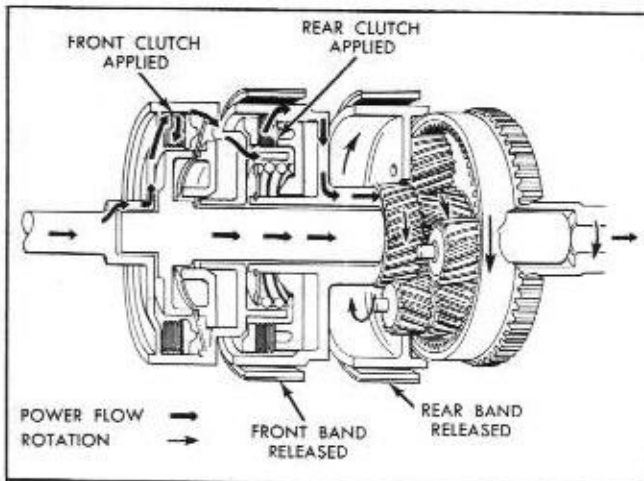
In low speed range, the primary sun gear is driven and the planet carrier is held. Power is transmitted through the primary and secondary pinions to the internal gear, which is driven in the same direction as the primary sun gear.

In intermediate speed range, the primary sun gear is driven and the secondary sun gear is held. The primary pinions drive the secondary pinions, which walk around the secondary sun gear, carrying the internal gear and output shaft around with them.

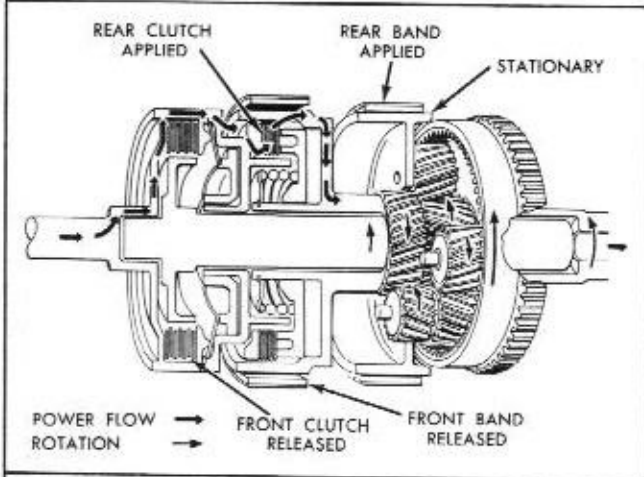


Chapter I

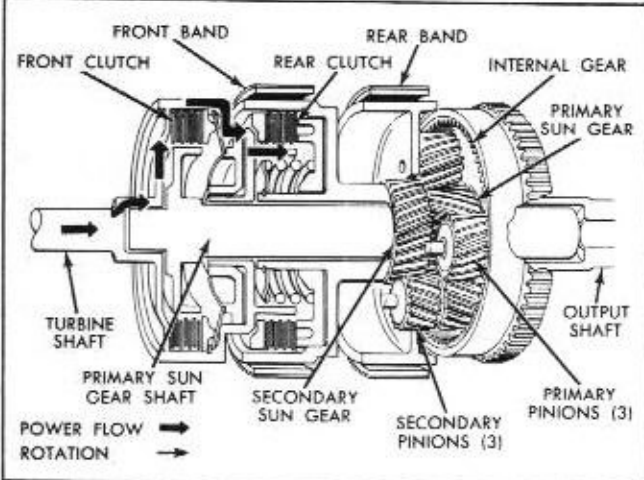
Section THREE



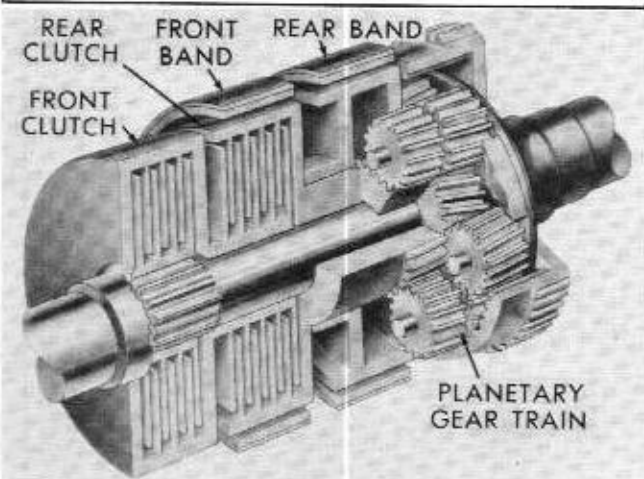
In high speed range, the primary and secondary sun gears are locked together. None of the pinions can rotate, and the entire planetary train revolves as a unit at the same speed as the turbine shaft.



In reverse, the secondary sun gear is driven and the pinion carrier is held. The secondary pinions drive the internal gear in the reverse direction. The primary sun gear and primary pinions rotate freely, having no effect upon the gear train.



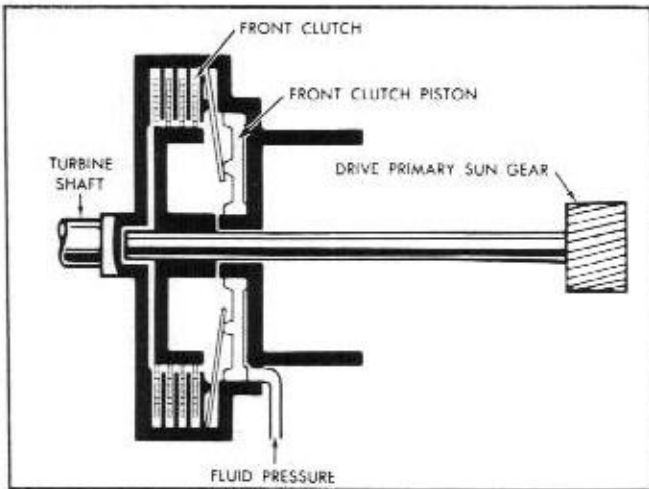
In neutral, none of the planetary parts is held or driven... and so no power is transmitted to the output shaft.



A means of holding the proper parts of the planetary gear train to obtain various speeds is required. This is accomplished by the two multiple disc clutches and the bands shown here.

Chapter I

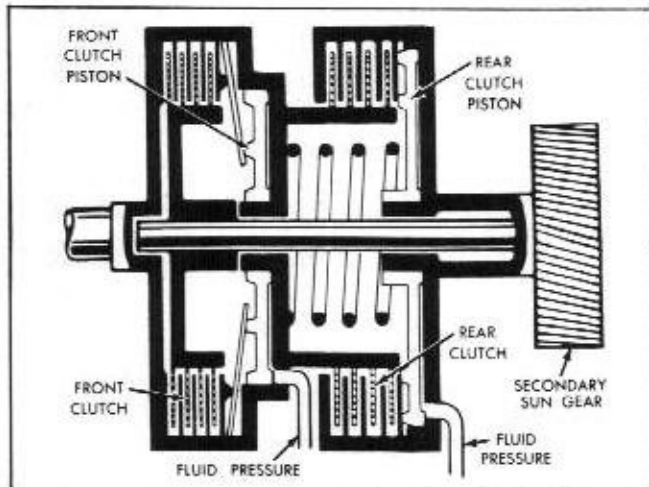
Section THREE



The front clutch drive plates are connected to the turbine shaft and the driven plates to the primary sun gear shaft. The clutch is applied hydraulically and released by spring pressure.

NOTE The diaphragm spring (release spring) provides leverage to add to apply force.

When the front clutch is applied, the primary sun gear is locked to the turbine shaft.



The rear clutch drive plates are splined to the front clutch drum, while the driven plates are attached to the secondary sun gear. This clutch is also applied hydraulically and released by spring action.

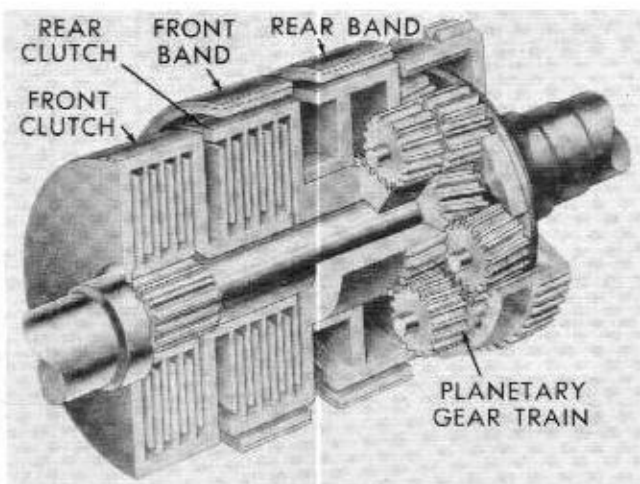
NOTE The piston applies force directly on the plates.

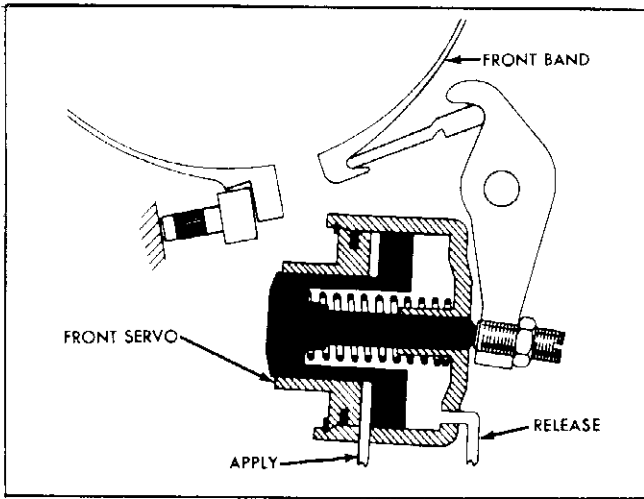
When the rear clutch is applied, the secondary sun gear is locked to the turbine shaft.

The front and rear bands, which have linings bonded to them, play vital roles in the operation of the Fordomatic and Merc-O-Matic transmissions. It is important to understand band operations, because they are directly affected by servo adjustments.

The front band, when applied, holds the rear clutch drum, and prevents rotation of the secondary sun gear.

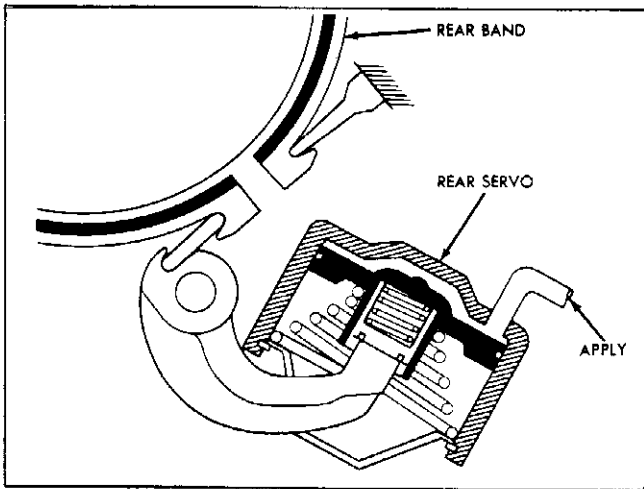
The rear band, when applied, holds the pinion carrier, and prevents rotation of the carrier.





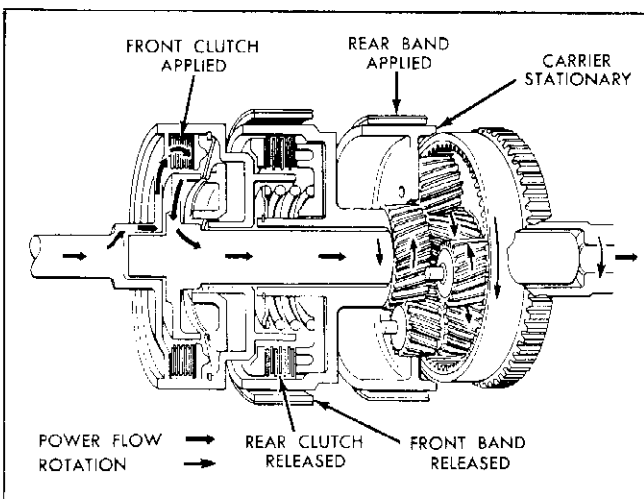
Each band is operated by a servo, which is a hydraulic unit consisting of a piston operating within a cylinder. The servos control band operation through mechanical linkage.

The front servo is applied by hydraulic pressure and generally released by a combination of spring and hydraulic pressure. Under some conditions, it is released by spring pressure alone.

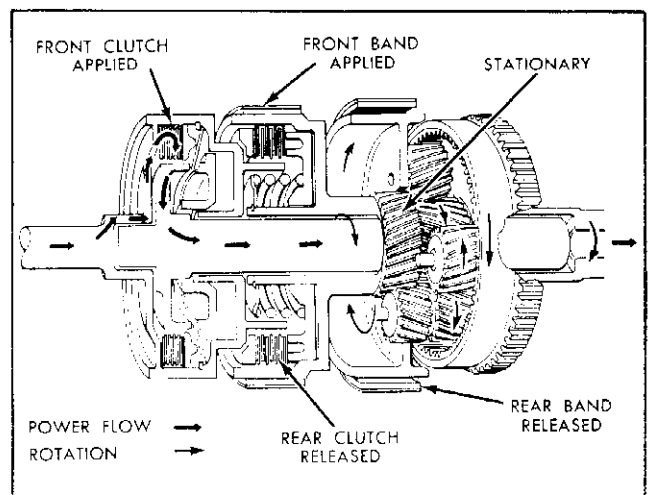


The rear servo is applied by hydraulic pressure and released by spring pressure.

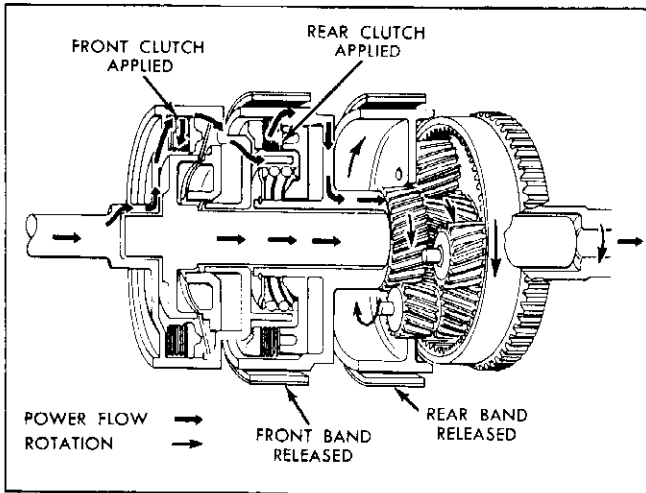
Coordination between band and clutch is absolutely vital to proper operation. Just how important this is can best be seen by examining the relationship of clutches and bands at various ratios.



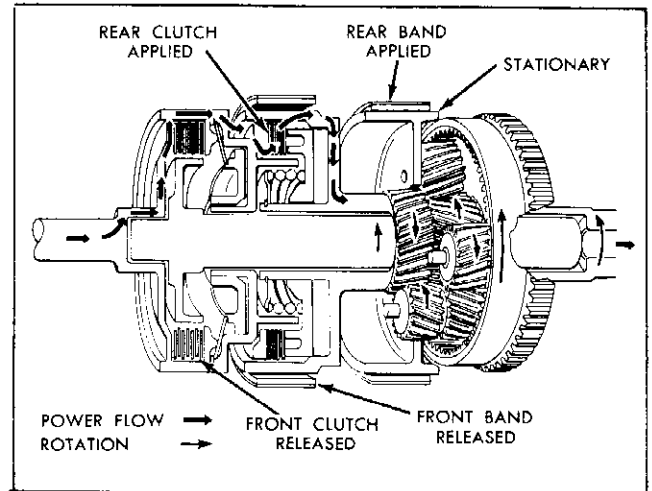
In low speed range, the front clutch and rear band are applied, while the front band and rear clutch are released.



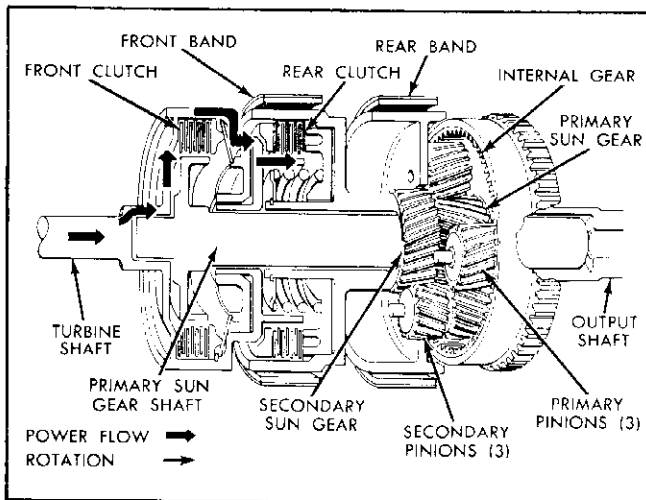
In intermediate speed range, the front clutch and front band are applied, while the rear band and rear clutch are released.



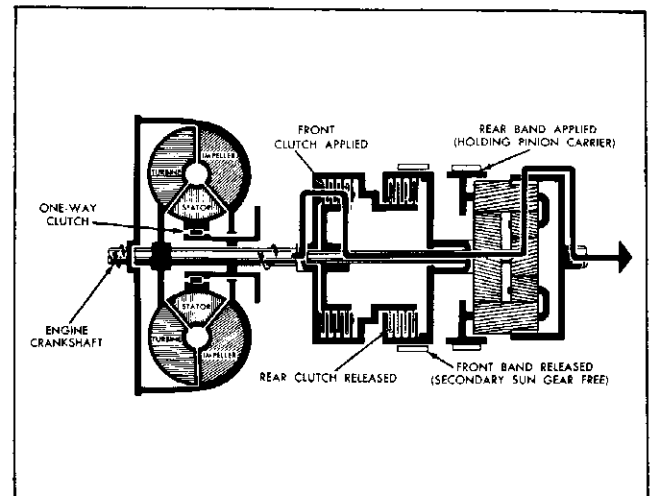
In high speed range, the front clutch and rear clutch are both applied, and both bands are released.



In reverse, the rear clutch and rear band are applied and the front clutch and front band are released.



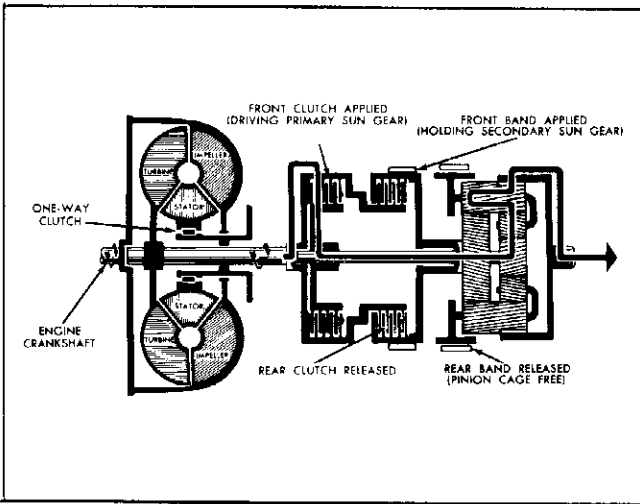
In neutral, no clutches or bands are applied. (From this sequence, it can be seen that, with different bands and clutches being released and applied in each shift, the need for exact band and clutch timing is vital.) If bands and clutches don't take hold and release properly - rough shifting, slippage and even serious damage can result. Understanding power flow is also equally important - especially for sound diagnosis.



In low range, power flows through -

1. Impeller
2. Turbine
3. Turbine Shaft
4. Front Clutch
5. Primary Sun Gear Shaft
6. Primary Sun Gear
7. Primary Pinions
8. Secondary Pinions
9. Internal Gear
10. Output Shaft

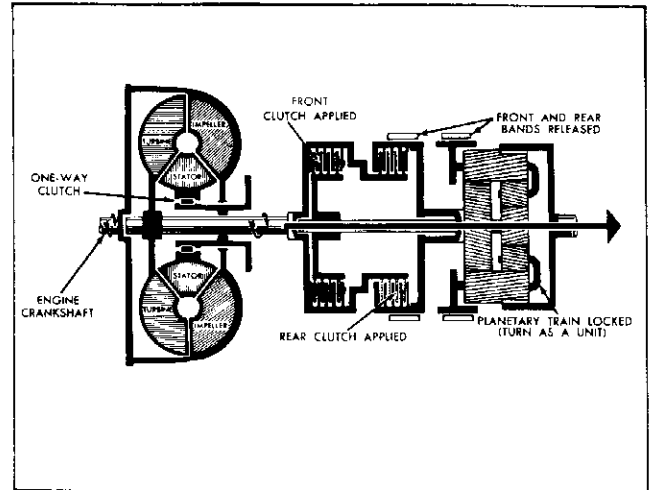
Front clutch-on Front band-off
Rear clutch-off Rear band-on
Secondary Sun Gear turns free.



In intermediate range, power flows through -

- | | |
|---------------------------|----------------------|
| 1. Impeller | 6. Primary Sun Gear |
| 2. Turbine | 7. Primary Pinions |
| 3. Turbine Shaft | 8. Secondary Pinions |
| 4. Front Clutch | 9. Internal Gear |
| 5. Primary Sun Gear Shaft | 10. Output Shaft |

The pinion carrier is turning.
 Front clutch - ON Front band - ON
 Rear clutch - OFF Rear band - OFF
 Secondary Sun Gear can't turn.

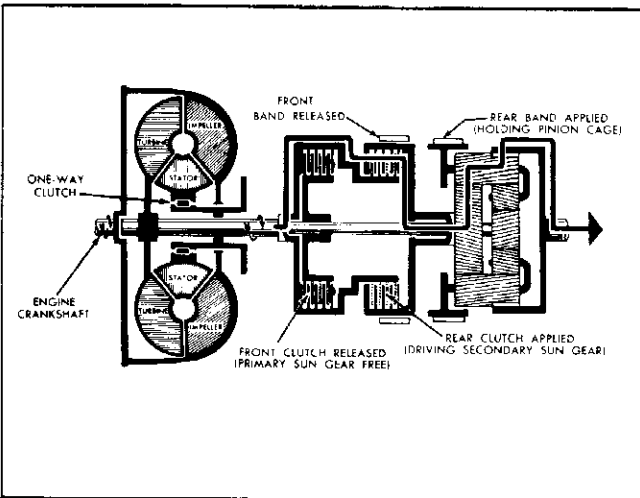


In high range, power flows through -

- | | |
|------------------|-----------------------------|
| 1. Impeller | 4. Primary Sun Gear Shaft |
| 2. Turbine | |
| 3. Turbine Shaft | 5. Secondary Sun Gear Shaft |
| | 6. Output Shaft |

Both clutches - ON Both bands - OFF
 Primary and secondary sun gears locked together.

Entire planetary train turns as a unit.
 Therefore, output shaft turns at same speed as turbine shaft.

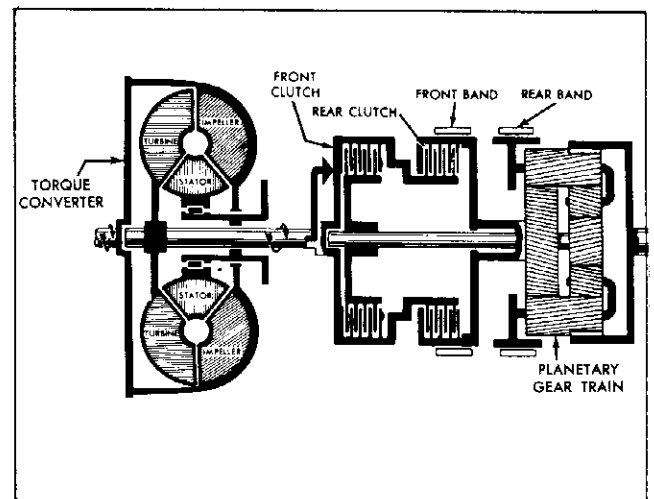


In reverse, power flows through -

- | | |
|-----------------------------|-----------------------|
| 1. Impeller | 6. Secondary Sun Gear |
| 2. Turbine | |
| 3. Turbine Shaft | 7. Secondary Pinions |
| 4. Rear Clutch | 8. Internal Gear |
| 5. Secondary Sun Gear Shaft | 9. Output Shaft |

Primary Sun Gear and primary pinions are turning free.

Front clutch - OFF Front band - OFF
 Rear clutch - ON Rear band - ON



In neutral, power flows through the impeller, turbine, and turbine shaft. With no clutches or bands applied there is no further power flow through the transmission.