Module 4: Standard Transmissions

Terms and Definitions

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<td>Auto shift allows the automated (electronic) shifting of a standard transmission.</td>
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<td>Countershaft is an intermediate shaft that receives motion from an input shaft and transmits it to the main shaft.</td>
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<td>Note: There may be more than one countershaft.</td>
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<td>Gear is a cylinder or cone-shaped part having teeth on one surface that mate with and engage the teeth of another part, which is not concentric with it.</td>
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<td>Gear ratio is the number of revolutions the driving gear must make to turn the driven gear one revolution.</td>
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<td>Gear timing assures that the countershaft gears will contact the mating mainshaft gears at the same time, allowing the mainshaft gears to center on the mainshaft and equally divide the load.</td>
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<td>Helical gears are gears with slanted teeth, and they are usually found in constant mesh synchronized transmissions.</td>
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<td>Note: The teeth are positioned diagonally across the face of the gear.</td>
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<td>Idler gear is a gear in the transmission used to change direction of rotation of the output shaft.</td>
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<td>Input shaft is the shaft carrying the driving gear by which the power is applied to the transmission.</td>
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<td>Main shaft directs power received from the countershaft(s) to the output shaft, propelling the vehicle down the road in a gear selected by the driver.</td>
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<td>Multi-mesh occurs when gears are in time, or synchronization, with other gears.</td>
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<td>Example: Countershafts are in mesh with the main shaft at all times.</td>
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<td>Output shaft is a shaft or gear that delivers the power from a device (transmission) to the rest of the power train.</td>
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<td>Overdrive transmission is a transmission in which the gear ratio is less than one to one.</td>
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<td>Note: This permits the vehicle, under favorable conditions, to maintain a higher road speed with any given engine speed or given road speed at a lower engine revolutions per minute (RPM).</td>
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<td>Power take-off (PTO) drive gear is used to drive the PTO input gear to operate additional equipment.</td>
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<td>Remote shift linkage is used to connect the shift tower to the shift bar housing when the shifter is not located directly over the transmission. It is used primarily on cab-over-engine vehicles.</td>
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<td>Shift bar housing is the top cover of the transmission and contains the parts necessary to engage the sliding clutches for the gear selected at the gear shift.</td>
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<td>Spur gears are gears with straight teeth.</td>
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<td>Note: Spur gears are usually used in sliding gear mechanical transmissions.</td>
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<td>Synchronizer is a device in the transmission that allows two gears being shifted together to rotate at a given speed.</td>
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<td>Transmission is used to multiply engine torque and vary vehicle speed by means of gears arranged so that different ratios can be selected to meet various operating requirements.</td>
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Types of Standard Transmissions

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<tr>
<td>Single countershaft.</td>
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<tr>
<td>Twin countershaft.</td>
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<tr>
<td>Triple countershaft.</td>
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<td>Marine gear.</td>
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## Parts of a Single Countershaft Transmission

**READY FOR REVIEW**

- Shift bar housing.
- Yokes and bars.
- Clutch housing.
- Case.
- Main shaft.
- Input shaft.
- Idler gear.
- Countershaft.

## Parts of a Twin and Triple Countershaft Transmission

**READY FOR REVIEW**

- Twin and triple countershaft transmissions contain the same parts, with the only difference being that there is an extra countershaft on triple countershaft transmissions.
  - Shift bar housing.
  - Yokes and bars.
  - Clutch housing.
  - Case.
  - Input shaft.
  - Idler gears.
  - Front box countershaft.
  - Auxiliary countershaft.
  - Countershaft brake.
  - Front box main shaft.
  - Auxiliary main shaft.
  - Auxiliary shift cylinder.

## Parts of a Front Section Countershaft

**READY FOR REVIEW**

- Front cone.
- Drive gear.
- PTO gear.
- First gear.
- Second gear.
- Third gear.
- Key.
- Roll pin.
- Rear cone.

## Parts of a Front Section Case

**READY FOR REVIEW**

- Inspection cover.
- Cross shaft.
- Bushings.
- Grease or zerk fitting.
- PTO covers.
- Magnetic or nonmagnetic drain or fill plugs.
- Magnetic discs.
- Dowel pins.

## Parts of an Auxiliary Section of a Nine-Speed Transmission

**READY FOR REVIEW**

- Hi-lo fork.
- Auxiliary countershaft assembly.
- Synchronizer assembly.
- Output shaft assembly.
- Auxiliary case and rear bearing assembly.
- Range cylinder assembly.
- Auxiliary countershaft cover.
- Air filter regulator assembly.
- Rear bearing assembly.

## Types of Shift (Top) Covers

**READY FOR REVIEW**

- There are four types of shift (top) covers.
  - Standard position, standard shift pattern.
  - Forward position, standard shift pattern.
- Forward position, “x” shift pattern.
- Standard position, “x” shift pattern.
### Parts of a Manual Shift Bar Housing

**READY FOR REVIEW**

- Shift bar housing.
- Gasket.
- Breather.
- Air valve shaft.
- Neutral light switch.
- Reverse light switch.
- Spring.
- Steel ball.
- Actuator pin.
- Yoke bar (Reverse/Lo).
- Shift yoke (1st/2nd).
- Yoke bar (1st/2nd).
- Shift block (1st/2nd).
- Shift yoke (3rd/OD).
- Yoke bar (3rd/OD).
- Shift block (3rd/OD).
- Plunger.
- Plug.
- Interlock pin.

### Parts of an Electronic Shift Bar Housing

**READY FOR REVIEW**

- Shift bar housing.
- Gasket.
- Shift sensor switch.
- Neutral switch.
- Actuating switch pin.
- Sensor update kit.
- Spring.
- Steel ball.
- Roll pin.
- Plug.
- Shift yoke (Reverse/Lo).
- Yoke bar (Reverse/Lo).
- Shift yoke (1st/2nd).
- Yoke bar (1st/2nd).
- Shift block (1st/2nd).
- Shift yoke (3rd/4th).
- Yoke bar (3rd/4th).
- Shift block (3rd/4th).
- Actuating shaft switch.

### Parts of a Shift Lever Assembly

**READY FOR REVIEW**

- Clamp.
- Boot.
- Snap ring.
- Retainer plates.
- Lever.
- Spring washers.
- Housing.
- Set screw.

### Parts of a Remote Shift Control Assembly

**READY FOR REVIEW**

- Housing.
- Bushings.
- Shaft.
- Straps.
- Boot.
- Outer shift lever.
- Inner shift lever.
- Set screws.
- Lock wire.
- Socket.
- Adjusting rod.
Air Flow for Range Shifting

READY FOR REVIEW

- A constant air supply for all ranges flows from the air brake reservoir to the supply port of the air filter and regulator assembly, and from there, air flows to the slave valve.

- **Operation in low range.**
  - Air flows from the slave valve to the selector valve and back to the pilot port of the slave valve.
  - Air flows to the LO range port on the piston housing.
  - Air pressure moves the range piston to the rear of the range cylinder, which actuates the yoke bar to put the transmission in LO range.
  - Air pressure puts the shuttle valve in the CLOSED position.
  - Air pressure moves the splitter piston to the front of the bore.

- **Operation of high range with splitter in DIR range.**
  - Air flows from the slave valve to the selector valve and is exhausted from the pilot port of the selector valve.
  - The exhausted air moves the spool valve (inside the slave valve) so that air flows to the HI port on the piston housing cover.
  - Air pressure moves the range piston to the front of the range cylinder, which actuates the yoke bar to put the transmission in the HI range.
  - Air pressure puts the shuttle valve into the CLOSED position.
  - Air pressure moves the splitter piston to the front of the bore.

- **Operation of high range with splitter in overdrive range.**
  - Air flows from the slave valve to the selector valve and is exhausted from the pilot port of the selector valve.
  - The exhausted air moves the spool valve (inside the slave valve), so that air flows to the HI port on the piston housing cover.
  - Air pressure moves the range piston to the front of the range cylinder, which actuates the yoke bar to put the transmission in the HI range.
  - Air pressure puts the shuttle valve in the OPEN position.
  - Air pressure moves the splitter piston to the rear of the bore.