

DESCRIPTION & OPERATION

TRANSMISSION DESCRIPTION

The transmission features include:

- Six speeds.
- A fully automatic transmission.
- Direct electronic shift control.
- Optional power take-off.

The main operating components include:

- A torque converter clutch.
- Six multiple-disc friction clutches.
- Two mechanical diode One-Way Clutches (OWC).
- Three planetary gear sets.

RANGE SELECTION

The transmission has seven range positions: P, R, N, (D), 3, 2 and 1.



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Fig. 2: Identifying Range Position Indicator
Courtesy of FORD MOTOR CO.

Park

In the PARK position:

- There is no powerflow through the transmission.
- The parking pawl locks the output shaft to the case.
- The engine can be started.
- The ignition key can be removed.

Reverse

In the REVERSE position:

- The vehicle can be operated in a rearward direction, at a reduced gear ratio.

Neutral

In the NEUTRAL position:

- There is no powerflow through the transmission.
- The output shaft is not held and is free to turn.
- The engine can be started.

Overdrive

Overdrive is the normal position for most forward driving.

The OVERDRIVE position provides:

- Automatic shifts.
- Apply and release of the torque converter clutch.
- Maximum fuel economy during normal operation.

Third Position - 3rd Gear

This position provides:

- Third gear start and hold.
- Improved traction and engine braking on slippery roads.

Second Position - 2nd Gear

This position provides:

If this position is selected at higher speeds, the transmission will downshift into a lower gear, and will downshift into second gear after the vehicle decelerates to the correct speed. The transmission will not downshift if it will cause an engine over speed condition.

- Second gear start and hold.
- Improved traction and engine braking on slippery roads.

First Position - Manual Low Gear

If this position is selected at higher speeds, the transmission will downshift into a lower gear, and will downshift into first gear after the vehicle decelerates to the correct speed. The transmission will not downshift if it will cause an engine over-speed condition.

This position provides:

- First gear operation only.
- Engine braking for descending steep grades.

Tow Haul

The Tow Haul feature was designed to assist the driver when towing a trailer or a heavy load. All transmission gear ranges, including all five forward gears, are available when using the tow haul feature.

The tow haul function is activated and deactivated through a switch located on the end of the shift lever. The indicator light that is located at the end of the shift lever will illuminate when the tow haul is activated and will go off when deactivated.

With the tow haul activated, the transmission will have the following features:

- Shifts will occur at higher vehicle speeds for a given accelerator pedal position to improve vehicle acceleration, reduce excessive shifting and increase the coast braking capability.
- The torque converter will lock up at lower vehicle speeds than normal with a given accelerator pedal position to improve transmission cooling and efficiency.
- Upshifts are temporarily delayed while decreasing accelerator position during hill cresting to reduce excessive transmission shifting and to prepare for a possible grade braking downshift event.
- Engine braking is provided in all forward gears without the requirement of moving the shift lever.
- Manual 1, 2 or 3 will still be available.
- Grade braking downshift feature provides increased coast braking automatically to assist driver in maintaining desired speed while descending a grade. This reduces duty cycle on the brake system and increases brake pad longevity.
- Grade braking downshifts are automatically commanded when:
 - Positive vehicle acceleration is sensed (natural acceleration from grade descent).
 - A near zero accelerator pedal position is obtained.
 - A minimum amount of time has expired since the last grade braking downshift.
- Grade braking downshift mode is immediately exited should the tow haul mode be deactivated or if the accelerator pedal is depressed beyond a minimum threshold.

SHIFT PATTERNS

The transmission upshifts and downshifts are firmer with tow/haul on than when tow/haul is off.

Upshifts

Transmission upshifting is controlled by the Powertrain Control Module (PCM). The PCM receives inputs from various engine or vehicle sensors and driver demands to control shift scheduling, shift feel and Torque Converter Clutch (TCC) operation.

Downshifts

Under certain conditions the transmission will downshift automatically to a lower gear range (without moving the transmission range selector lever). There are four categories of automatic downshifts; Coastdown, Torque Demand, Forced or Kickdown shifts and grade braking.

Coastdown

The coastdown downshift occurs when the vehicle is coasting down to a stop.

Torque Demand

The torque demand downshift occurs (automatically) during part throttle acceleration when the demand for torque is greater than the engine can provide at that gear ratio.

Kickdown

For maximum acceleration, the driver can force a downshift by pressing the accelerator pedal to the floor. A forced downshift into a lower gear is possible below calibrated speeds. Specifications for downshift speeds are subject to variations due to tire size, engine and transmission calibration requirements.

Grade Braking

During tow/haul operation, depending on conditions, automatically scheduled downshifts may occur to increase the level of engine braking, particularly on down grades.