

**School Bus Driver
Behind the Wheel**



Skills Level 3

Transmission Control

And

Shifting Procedures

The purpose of this skills level on Transmission Control and shifting procedures is to present the concept, theory, develop comprehension and the practical application of the critical tasks for transmission control. The development of progressive competency must be implemented in the following logical sequence.

Objectives

To teach the critical tasks for transmission control:

1. Throttle control
2. Clutch use (if equipped)
3. Establishment of transmission shift points
4. Shifting procedures
5. Shift graph preparation
6. Shift chart preparation

The shifting chart and shifting graph are resources to assist you in understanding the transmission and shifting.

Glossary of Terms

Downshift. Shifting the transmission to a lower gear.

Engine Speed. Measured by the revolutions per minute (rpm) on the tachometer.

Exact Shift Point. A point at which the gears in the transmission (engine gears), which are controlled by the engine speed, are rotating at exactly the same speed (synchronized) as the gears in the transmission (wheel gears), which are controlled by the road speed.

Gear Range. The range between the top road speed and the bottom road speed of a gear as recorded on the speedometer.

Gear Split. The range between the top rpm and the bottom rpm of the next higher gear as recorded on the tachometer.

Reestablishing Road Speed. After a top road speed for a certain gear has been established and a shift to a higher gear has been completed, returning the vehicle to the road speed established prior to the shift.

Road Speed. Miles per hour (mph) the vehicle is traveling as recorded on the speedometer.

Rolling Rpm. Changing engine rpm gradually by throttle adjustment.

Speedometer. An instrument that records the road speed of the vehicle in mph or in kilometers (kph).

Sustained Lugging. Over fueling the engine for a long period of time; for example, climbing a long grade in an improper gear.

Tachometer. An instrument that records engine rpm. Tachometers are usually graduated in hundreds.

Temporary Lugging. Over fueling the engine for a short period of time; for example, pushing the throttle all the way to the floor just after completing an upshift.

Throttle Control. The regulating of engine rpm by the driver through the use of the accelerator pedal.

Top Tachometer Setting. The top rpm at which the engine operates most efficiently. Consult the owner's manual, mechanical personnel, or manufacturer for detailed information.

Upshift. Shifting the transmission to a higher gear.

Automatic Transmissions

An automatic transmission may be allowed to shift on its own (automatically), or it may be shifted manually by the driver's selecting and controlling each gear range as needed.

Preselection (manual shifting) means selection of a range to match driving conditions.

Preselection allows for better control when driving at less than freeway speeds, on slick or icy roads, and down or up hills. Downshifting to a lower range also increases engine braking. The selection of the proper gear range when running at less than freeway speeds will prevent the transmission from cycling or hunting for the proper gear range. This will provide a smoother ride and prolong the life of the transmission and drive train components.

It is important that the trainee become proficient in the use of automatic transmissions for driving on grades. It is essential that the bus be traveling at a safe speed when descending a grade. The correct gear range must be preselected to minimize brake use.

Downshift Inhibit Feature

The transmission's hydraulic system will inhibit (prevent) the driver's shifting into any gear range at a speed that will cause engine over speed. Any lower forward range may be selected at any time, but the actual downshift will not occur until the road speed is reduced to the top speed of the selected gear range.

Upshift Feature

The transmission incorporates a hold feature that prohibits upshifting above the range selected during normal driving. For downhill operation, however, the transmission may upshift above the selected gear when the engine-governed speed is exceeded, and engine damage may occur.

Shifting Procedures for an Automatic Transmission

The procedures for establishing exact shifting points are as follows:

1. Determine the top tachometer setting to be used.
2. Shift into the lowest gear range.
3. Accelerate to the top tachometer setting.
4. While holding the throttle steady at the top tachometer setting, note the road speed (mph).
5. Now that the top road speed has been established for that range, move the shift lever to the next higher gear range.
6. In the next gear range, reestablish the top road speed of the last gear range. Be sure the bus is traveling at exactly the noted road speed and the throttle is steady. On the tachometer note the engine speed (rpm). This is the exact shifting point into the next gear range at that road speed.
7. Repeat this procedure for each gear range in the transmission. By establishing the exact shift points for up-shifting and downshifting and establishing the gear splits for an automatic transmission, a driver can manually control the vehicle in most situations.

Some reasons for manually shifting an automatic transmission are the following:

1. Avoid undue searching by the transmission for the required gear. (This generally occurs at less than freeway speeds.)

2. Avoid unnecessary lugging while climbing grades.
3. Control the vehicle's speed and help avoid overheating the brakes while descending grades.

Example Shift Chart

Gears	GEAR RANGE (MPH)			GEAR SPLIT (RPM)		
	Bottom	Mid Range	Top	Bottom	Mid Range	Top
1	0		10	800		2000
2	10		25	1000		2000
3	25		35	1400		2000
4	35		45	1500		2000
5	45		55	1700		2000

Shift Graph from the above Chart

