

Glossary:

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1. Manual Transmission Overview

Some of you may not be aware of how a manual transmission differs from its counterpart, an automatic transmission. An automatic transmission has its own ability to change the gears (5-6 gears on most passenger vehicles) based on the RPM (Revolutions per Minute) of the vehicle's drive-shaft when the transmission is set in the "D", or "drive" position.

With a manual transmission, the driver is responsible for changing the gears based on the RPM, by using the clutch pedal and gear stick. If the driver is unable to operate the manual transmission properly, engine components of the vehicle may be damaged if he or she continues to drive the vehicle at speeds.

We encourage you to practice the techniques discussed here in a controlled driving environment, meaning one that is free from obstacles as well as other motor vehicles (a large parking lot at a time when it is primarily empty is a common and practical choice). Failure to practice in a "safe" environment could result in damage to your vehicle or another vehicle.

2. Engine Ignition

As the driver of the vehicle, you must be sure that the transmission of the vehicle is in NEUTRAL (or "no gear") before you turn your vehicle key from the 'accel' stage (2) to the 'ignition' stage (3) as is shown on the housing of the key receptacle. To do this, place your right hand on the gear-stick knob and feel that the knob is in the middle position, in correspondence with the "no gear" position indicated by a graphic on the top of the shifter knob on most vehicles. The gear stick should be sitting "loosely" in the gearbox (a common technique is to shake or wiggle the stick; if you are unable to shake the stick freely, the transmission is in gear.)

If the car is not in neutral, and is in any one of the gears 1-6, including reverse, you must return the gear stick to the neutral position before starting the vehicle's ignition process.

3. Manual Gear Selection Techniques

Now that your vehicle is running and the engine is not engaged in any gear (in neutral) you will choose either the 1 (First) or R (Reverse) gear depending on which direction you want to move the vehicle. Refer again to the diagram graphic on the top of the shifter knob to determine the location of these gears in the gearbox. Locate the gear, and then follow these steps in exact order:

A: Fully depress (all the way to the floor) the clutch pedal.

B: Use your right hand to move the gear stick from neutral to the location of the gear, and remember to refer again to the knob-top graphic as you move the gear stick to ensure the correct path (any combination of over-left, over-right, up, down) for moving the gear stick.

The gear stick will “click” or “lock” into position when it has been directed into a specific gear. In simpler terms, the gear stick will feel rigid and firm and will not move any further in the direction of that gear as indicated on the knob-top graphic.

C: Continue to keep a steady hold of the gear stick and ensure that the clutch pedal remains fully depressed.

4. Manual Gear Engagement

Now your vehicle is in gear. When you release the clutch pedal from the floor, the gear you have chosen will be engaged with the drive train of the car at a rate of speed that is determined by the aforementioned RPM that the engine is running, or “idling”, at. It is necessary to increase the RPM of the engine before releasing the clutch pedal to allow the engine to successfully move the vehicle without stalling (causing the engine to fail and stop running) or straining the engine. This is achieved by depressing the accelerator pedal while at the same time releasing the clutch pedal, but it is a sensitive procedure and often the most difficult to master. The procedure is detailed in the following steps, which also need to be followed in exact order:

A: First, familiarize yourself with your clutch pedal’s dynamics (feel) by using the $\frac{3}{4}$ -engagement technique. This technique involves using the clutch pedal only, with no use of the fuel pedal, and may result in the stalling of the engine. This is fine and is a natural progression in learning how to use your clutch.

$\frac{3}{4}$ Engagement Technique:

While your car is in first gear and running at idle, ensure that the parking brake is off and the brake pedal is uncovered. VERY SLOWLY release the clutch pedal until you “feel” the gear engage with driveshaft of the engine. The vehicle will move forward at a very slow rate of speed, despite the fact that you are NOT depressing the accelerator pedal. Depress the clutch again and allow the vehicle to roll to a stop or stop the vehicle with the brake pedal. Repeat until the technique is mastered.

You should now have a strong understanding of the “engagement point” for your clutch.

B: Repeat the $\frac{3}{4}$ -engagement technique, releasing the clutch slowly and depressing the accelerator pedal immediately before the engagement point of the clutch. Depress the fuel pedal to a level varying from $\frac{1}{6}$ to $\frac{1}{3}$ of the pedals depth (distance to floor) depending on the type of start (slower or faster, slower is always safer and easier on your engine) you want for your vehicle. A depth of $\frac{1}{6}$ to $\frac{1}{5}$ is most common for a typical start in most driving situations. A $\frac{1}{4}$ or $\frac{1}{3}$ depth will naturally result in a quicker start with a more rapid increase in speed.

For safety and control concerns, the reverse gear almost always requires a slower rate of engagement. After the desired reverse distance is achieved, the car is braked to a stop and the first gear is selected to move the vehicle forward. The procedure detailed in B is repeated to achieve forward movement with the 1 gear.

5. Changing Gears

Now that your vehicle is in motion, you will need to be able to change gears both upwards and downward while the vehicle is in motion to achieve optimum or desired speed. The exact time for changing gears is determined by two factors:

1. The RPM of the engine as displayed by the tachometer on the dash of the vehicle.
2. The sound of the engine. If the pitch (height or level of sound) of the engine sounds high or strained, it is a result of the vehicle moving at a speed that is too high for the current gear.

Generally speaking, when the engine reaches an RPM of 2,300 to 3,000 RPM, (this variance is dependent on vehicle, engine size and capacity, transmission specifics / design) it is time to “gear up”, or move into a higher gear that is better suited to work with the speed of the vehicle and its related drive-shaft speed.

To change gears properly:

A: Fully depress the clutch pedal and fully release the accelerator pedal simultaneously (at the same time)

B: Use your right hand to slowly but steadily move the gear stick to the next highest gear, (1 to 2 in this case as the vehicle has been traveling in first gear to this point) with a split-second pause at the gearbox’s neutral position. Naturally, this step is dependent on your having memorized the location of your gears as per the diagram graphic on the knob-top of the gear stick.

C: After ensuring the second gear has been “locked in”, simultaneously release the clutch pedal and depress the accelerator pedal to an appropriate depth based on the desired speed (1/6 to 1/5 is recommended again, unless a significant increase in vehicle speed is desired)

D: Repeat step 3 again when the RPM of the vehicle is again displayed in the area of 2,300 to 3,000 RPM and / or the engine sound suggests the need for a higher gear, this time moving from the 2nd to 3rd gear.

The procedure explained in step 3 can be repeated up to the highest gear available in the transmission (usually 4 or 5 in most vehicles). It should be noted that the 5th gear of a vehicle is used almost always at highway-speeds only and according at speeds that are inappropriate for (or illegal) in city or suburban areas. Use discretion.

6. Gears for Speed Control and Braking

The gearbox for the manual transmission can also be used to control the speed of your vehicle when a decreased, or slower speed is required while the vehicle is in motion or coming to as stop.

Downshifting

In the same way that the engine’s RPM, as displayed by the tachometer, and engine noise indicate the need to gear up, they also contribute to your decision to gear down, meaning that moving the transmission from a higher to lower gear can aid in decreasing the speed of the vehicle. This can be done with or without the use of the brake pedal.

As an example, imagine that you are traveling along an open stretch of road in 4th gear and the speed of your vehicle results in you catching up to a group of vehicles traveling at a lower rate of speed in the same single lane. If you leave your vehicle in 4th gear while slowing to the speed of the vehicles ahead, your tachometer will display an RPM rate that is extremely low and your engine may begin to operate in a noticeably awkward way. You need to gear down, or downshift, your transmission to a lower gear that is better suited for the new speed you must travel at.

To downshift successfully:

A: Repeat the clutch depression / fuel pedal release procedure explained in section 5.

B: Using your right hand, move the gear stick from the current gear to the one immediately beneath it in the order (4-3 for example, or 3-2)

C: Release the clutch but **DO NOT RESUME DEPRESSING THE ACCELERATOR PEDAL***. Slight braking is acceptable to find a comfortable speed for the new gear.

* (This is key because you want the existing RPM of the engine to adjust to the speed of the newly engaged gear)

D: Repeat steps A-C depending on the extent of decreased speed you need to achieve, down to a minimum of second gear if the vehicle is to continue consistent movement without coming to a complete stop.

Downshifting can also be used to slow a vehicle to a complete stop more smoothly than braking alone. If done correctly, it will minimize the number of times you need to depress the brake pedal and the amount of pressure required for each press of the pedal.

To downshift as a means of assisting a complete stop:

A: Repeat steps A-D listed above, depressing the brake pedal slightly with each consecutive release of the clutch pedal until you determine the vehicle can be brought to a complete stop with only a short but firm depressing of the brake pedal. (Note the difference from the above procedure that this form of downshifting **CAN** incorporate the use of the first (1) gear right before bringing the vehicle to a complete stop.)

7. Gears for Parking of the Vehicle

After parking your vehicle, it is recommended that you place your vehicle in gear before turning off the ignition to prevent the movement of your vehicle should your parking brake fail for any reason, or if you should forget to engage it before proceeding to exit the vehicle with the transmission in neutral.

This part is very simple. After coming to a complete stop in your desired position, continue to depress the brake pedal and then depress the clutch to select either the first (1) or second (2) gear. Turn off the ignition before you release the clutch, release the brake pedal and then engage the parking brake. Remove your keys from the ignition and exit the vehicle. Lock your vehicle.

(A tip for when your vehicle is parked facing downhill – engage the reverse (R) gear to ensure the vehicle will not move forward should the parking brake fail or you forget to engage it.)

You should now be ready to begin learning and practicing how to operate a vehicle with a manual transmission. Remember to practice in a controlled and safe environment don't become frustrated if you stall the vehicle or engage in "choppy" starts frequently in the

beginning. Practice makes perfect and in no time you will be able to operate a vehicle with either an automatic OR manual transmission.