

Race Car Foot Work

by Jim Lill

Foot work in a race car is based upon the movements you do during your daily driving but at a much more frenetic pace and with a need for certainty.

This discussion includes the four most popular, yet often misunderstood, techniques:

1. Heel/Toe
2. Double Clutch
3. RPM matching (as used with 1 and 2)
4. Left Foot Braking

Abbreviations that will be used:

- RF = right foot
- LF = left foot
- AP = accelerator pedal, throttle
- BP = brake pedal
- CP = clutch pedal

Simple Answers to Why?:

- *Heel/Toe* allows for the use of the BP combined with a blip of the AP. Blip is a quick application of throttle to raise the RPMs.
- *Double-Clutching* sends power through to the transmission even though it is in neutral to spin the gears to a desired RPM
- RPM Matching equalizes the RPMs throughout the drivetrain to minimize the lurch or abruptness, even down to the tractive tires meeting the road.
- *Left Foot Braking* allows for simultaneous application of the BP and AP

Detailed Explanations:

- *Heel/Toe* is the technique of using your RF to simultaneously press the AP and BP. Its name comes from the classic method where the RF toe is used on the BP and the RF heel on the AP. In later years, pedal placement in some cars caused some drivers to change the technique, using the RF ball on the BP and the outside of the RF on the AP. The goal is to "blip" the throttle while maintaining the desired braking force.

- *Double Clutch* is also used by large-truck drivers. It is a necessity in cars with manual gearboxes that lack synchromesh or have dogs on the gears. While truck drivers may use it for both upshifts and downshifts, typically racers only use it for downshifts. The technique involves pausing in neutral, engaging the clutch (CP up) then proceeding with the shift. This can be combined with RPM matching but they are not the same.
- *RPM Matching* can be used for two purposes.
 1. When combined with double-clutching and typically only when downshifting, it helps the gear shaft and gears speed to equalize and thus facilitate a smoother shift.
 2. It assures that the complete drivetrain speed is more closely equalized and matched to the road speed as the clutch is fully engaged. This will prevent abrupt changes in wheel speed and possible loss of traction or wheel-lock-up. This is particularly critical in RWD cars.
- *Left Foot Braking* is as the name implies. It can be used as a way to overcome turbo lag, load the suspension, or in conjunction with proper throttle application introduce yaw.

Methods:

I assume many of you would like pictures, but since you don't look at your feet when driving, I'll let you sit, move your feet, and visualize as I describe the methods!

- *Heel/Toe*, with its option of two different styles, requires two distinctly different methods.
 1. The classic true heel/toe style works best on cars with long or floor mounted AP. You place your RF ball on the BP with the heel angled to the right so as to be able prod the bottom of the AP with your RF heel. This typically involves rocking your angled foot somewhat lengthwise to achieve the prod motion.
 2. The alternate method, while hardly heel/toe at all, retains the name as the result is the same. Only the upper portion of RF is used, ball and the outside, opposite the ball. A popular technique is to keep your right knee to the left, near the steering column, and as you transition from just braking to both BP and AP, you move your knee to the right which rolls your foot to the right and the AP prod is achieved.

Pedal position and set-up can be critical with either method. In particular, if you use the alternate method, the BP must not be lower than the AP at full threshold braking.

- *Double-Clutch* is often confused with or thought to be a part of heel/toe. While they are often combined they need not be. Cars with modern syncromesh do not need double-clutching. By itself, the technique comprises these steps:

1. Disengage Clutch (CP down)
2. Shift to Neutral
3. Engage Clutch (CP up) and optionally blip throttle
4. Disengage Clutch (CP down)
5. Shift to desired gear
6. Engage Clutch (CP up)

When combined with Heel/Toe, your feet can be quite busy.

- *RPM Matching* is usually part of heel/toe but many drivers do it by itself when downshifting. It involves a throttle blip. When done to perfection, the engine RPM should not change abruptly (you can watch the tachometer when practicing) as the clutch engages.
- *Left Foot Braking* (LFB) is as simple as the name implies. Be warned it is not that simple however. If you mostly drive a manual transmission on a day-to-day basis, you lack the control finesse in your left leg. In that case, you should practice LFB every time you drive. Karting is another good way to learn.