

## New Engine Break-in

If you asked five different RC car drivers how to break-in your engine properly, you would probably get five different answers. Some say to idle the engine on one tank of fuel; half throttle on the second and full throttle on the third. Some say to run it super-slobbering rich for a few tanks and then lean out the needles. Some say heat cycle with a race tune. Some say just to fuel it up, lean it out, and go, go, go! I've tried them all and think that the best way incorporates a little of each, with the exception of the last theory (if I ever see the guy who told me that, I'm going to take his glow starter away from him). If you follow the engine advice I'm about to give you, you'll find that your new powerplant will last longer and run more reliably.

---

## Heat Cycle Break-in



A heat cycle involves getting the engine to an operating temperature of 190 degrees. This temperature is critical so that the metals that make up both the piston and sleeve can expand and conform to the proper size. For proper engine break-in, run your engine for three minutes and a total of five times, letting the engine cool between runs. I like to run the engine rich, making sure the engine still gets up to temp so its heat has cycled. Don't lean it out to get the temps up, as valuable lubricants in the fuel are essential during the break-in process. The richer the better: Just make sure the engine gets up to temp. You can use a temperature gauge to check the temps. Quality units can be purchased from Tempgun.com, OFNA, DuraTrax and other manufacturers.



**STEP 1:** By using aluminum foil, heat tape or header wrap for full-size cars to block off cooling fins on the heat sink, you can somewhat manipulate the engine's temperature so the engine can reach optimum temperature faster. Of course, that's only if it's not warm enough outside to allow the engine to build heat quickly enough.

**Warning:** Engines that have excessively tight pinch at top dead center (TDC) can wear out a connecting rod quickly, meaning you'll have to invest in a new piston and sleeve even sooner. Getting the engine up to temperature properly will help prevent this problem.



**STEP 2:** While the engine is idling and warming up, leave the glow driver attached to the glow plug. This reduces the chance the engine might flame out early. Avoid revving the engine wide open to warm it up faster: that will actually wear out the piston and sleeve more quickly. You might see some of the guys at the local track doing it but believe me; this does more harm than good. You can give it some short moments of 1/4 throttle to help build engine temp and to keep the engine running while on the starter box.

**ALTERNATE Step 2:**

Otherwise, a more fun method is to simply place it on the ground and start running figure eight patterns while driving smoothly at low throttle. Ease on and off the throttle. Try not to blip the throttle too much, as this puts a lot of extra stress on the rod and crank pin.



**Step 3:**

While the engine cools between break-in runs, always, I mean ALWAYS make sure the piston is bottom dead center (BDC) when the engine is cooling.

**Step 4:**

After this first 15-minute break-in period, you should then run the engine in three 5-minute intervals. Again, make sure to let your engine cool down sufficiently between runs. Run at no more than half throttle with some short full-throttle burst. Again, make sure the engine gets up to temp and the piston is BDC (bottom dead center) each time when cooling. When the break-in process I described is finished, you will have a total of 30 minutes run time and break-in on the engine.

## Piston and Sleeve Dynamics



Our nitro engines are a lapped piston and sleeve design. This means that the bore becomes gradually smaller as the piston reaches the top of the sleeve. This gives you that pinch at TDC (Top Dead Center). The pinch is required to keep the piston and sleeve sealed when the engine gets up to temp. That is why it's important to get the engine up to 190 when breaking-in. If you don't, the sleeve will never expand and the piston will wear out faster. The piston will end up wearing down as a result of friction, tapering the head of the piston to match the size of the sleeve. When the engine finally does get up to temp and the sleeve expands, the piston is now too small, allowing for blow by. That means the cylinder pressure blows by the piston down to the crankcase, and it will cause the engine to overheat and stall. Unfortunately, the only way to remedy this is a complete rebuild with new piston, sleeve and connecting rod.

## CONCLUSION

Well, that's all there is to it: Your engine is now properly broken-in. As you start tuning for racing, just remember that running rich is better, but the engine must get up to temp. Take your time when breaking-in your engine. Don't rush the break-in process. If you rush it, you will only be rushing to the hobby shop to buy a new engine. The better you treat your engine during break-in, the better your engine will treat you.

### Helpful Tip



#### TIP

After each run, make sure the piston is BDC (Bottom Dead Center) when the engine is cooling. You can do this simply by putting a mark on the back of the flywheel with a Sharpie or any type of permanent marker. The easiest way is to look through the exhaust (before you mount the header) and spin the engine until the piston is BDC. Then, mark the flywheel on the back so a starter box won't wear off the mark. It is always good practice to make sure the piston is BDC after each run, and not just after break-in.