Free sample from The RC Car Driving & Tuning Planner. This is worksheet 6 of 12. Get all 12 worksheets: rccarcalc.com/kit/rc-car-driving-and-tuning-planner

Gearing & Temperature Decision Sheet

Change one tooth at a time, measure the motor, and let the number decide the next step

Driver	**Date**
Car	**Cells**

Gearing is the one tuning change that is easy to measure. This sheet uses the free gear ratio, pinion swap and motor KV calculators on this site for the numbers, and the motor temperature guide for the limits. Take every temperature reading the same way: infrared thermometer on the motor can, right after the car stops, at the same spot each time.

Your gearing, from the free calculators

Setup	Pinion	Spur	FDR	Theoretical mph	Realistic mph (x 0.85)
Stock (from the manual)					
Current					
Next to try					

FDR = (spur / pinion) x internal ratio. mph = KV x cells x 3.7 / FDR x tire diameter (in) x 3.1416 x 60 / 63,360. Realistic is about 85 percent of theoretical on stock tires. On the same spur, one pinion tooth changes speed by about 100 / pinion teeth percent.

The decision table (commonly cited ranges, from this site's motor temperature guide)

Motor can after 2 to 3 min	Finger test	Next step
Under about 150 F	Can hold a finger on it for 5 seconds	OK to try one tooth up if you want more speed; re-check after the next pack
About 150 to 160 F (brushless)	Uncomfortable before 5 seconds	Hold this gearing; do not go up. Check the drivetrain for binding

Motor can after 2 to 3 min	Finger test	Next step
Above about 160 to 170 F	Pull away in a second or two	Gear down one or two pinion teeth before the next pack, and let everything cool
Near 200 F or a burnt smell	Too hot to touch	Stop for the day. Check bearings, binding, the pack and the mesh before running again

Brushed 540/550 motors are commonly treated as tolerating a little more, up to about 160 to 180 F. These are commonly cited rules of thumb, not a manufacturer specification: if your motor or ESC maker publishes a limit, that limit wins. Check the ESC temperature too; the motor and ESC share the same current path.

Before any gearing change

- [ ] Drivetrain spins freely by hand with the pinion out of mesh (no grit, no tight spots)
- [ ] Pack is healthy: every cell within about 0.05 V of the others on a cell checker
- [ ] Pitch matches exactly (48P with 48P, 32P with 32P, Mod 1 with Mod 1), and the bore fits the shaft
- [ ] Mesh set with a strip of paper between the gears, then removed: a tiny amount of play
- [ ] Changing 3S from 2S? Most manuals list lower gearing for the higher cell count; start there

Gearing log

Date	Pinion / spur	Cells	Surface	Motor F	ESC F	Keep, revert or next

Named above, from the site's own catalog

Real listings from this site's own catalog.

- **Budget infrared thermometer**: Turns the finger test into a number you can write in the gearing log, run after run.
- **Infrared thermometer with auto-hold**: Keeps the last reading on screen, which helps when you pull the gun away from a hot motor before reading it.
- **48P pinion set, 19T to 23T, 3.175 mm bore**: Five sizes in one set, so you can step one tooth at a time instead of guessing. Confirm your pitch and shaft size first.
- **48P pinion set, 13T to 17T, 3.175 mm bore**: The smaller range, for gearing down a hot 3S setup or a heavier truck. Same pitch and bore check applies.

Current prices and our latest picks for each item: **rccarcalc.com/kit/rc-car-driving-and-tuning-planner/gear/**

Researched guidance, not professional advice. Always follow the manual for your vehicle and the instructions printed on your battery and charger. Never charge a LiPo unattended, and never drive near people, pets or roads.