



RACEPROVEN.COM

Professional racing **Starters & alternators**

Overview & Selection of a Racing Charging System

Today's race car charging and starting systems are more complex and demanding than ever before and in some cases they exceed the design limits of the OEM units, justifying the need for specialized starters, alternators and batteries.

Race car alternators used on **NASCAR, World Rally, Indy, Road Course, Off Road Baja**, etc., operate under the following conditions:

- A- They are always at constant load. There is no "down time"
- B- They may not have good or appropriate ventilation.
- C- They have to function under high operating and environmental temperatures.
- D- They operate in high vibration environments.
- E- They operate at very high rpms.
- F- They are not always properly monitored or maintained.
- G- They are required to be light weight.
- H- They are required to be small and compact.
- I- Race Teams use very small and light batteries, mainly to start the car only, not to protect the alternator of a possible system overload.
- J- Off Road and Rally applications operate under high dust, sand and "debris" environment.
- K- NASCAR, Indy, Formula, Road Course, Circle Track, applications operate under a high sand and rubber residue environments and quite often small metal "debris".

THE ALTERNATOR IS THE HEART OF RACE CAR'S ELECTRICAL SYSTEM. It provides electrical current for the ignition, fans, blowers, cool box, solenoid, etc... also it must maintain the battery in a fully charged state.

Before purchasing a racing alternator, you need to understand how it operates. A quick overview... The charging systems has three main components:

- A- The alternator.
- B- The voltage regulator (inside alternator).
- C- The battery.

The alternator uses electromagnetism to transform mechanical energy from the crankshaft, into electrical energy. The output of an alternator is direct current; however AC current is actually created and then converted through the rectifier to DC. As current leaves the alternator on its route to the battery and the electrical loads, the regulator monitors both battery and stator voltages. Depending on the measured voltages (Based on system load), the regulator will adjust the amount of rotor field current to control the unit's output ensuring that the system loads are met and recharging the battery to a state after an engine start.

The battery is a "reservoir" of chemical electrical power. Its primary purpose is to crank the engine. It also supplies power to vehicle accessories when the electrical load is higher than the alternator's output this make pulley ratio selection very important since alternator speed has to be high enough at idle, caution flag situations and "pit stops" in order to maintain the race car's electrical system.

As the race car's electrical system forces a load on the alternator, it creates "resistance" which transforms into heat, which in turn will affect the alternators overall output. Such resistance translates into an average 20% alternator power loss of the rated output at 80F°. Race Proven products are rated both at 80 and 220 Degree Fahrenheit, showing the potential power loss at high operating temperatures enabling a more accurate alternator selection.