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What is an Optispark and why do they fail?

The GM Optispark is an optically-triggered ignition distributor used on the LT1, LT4 and L99 engines. The "opti" has two parts, a low-voltage optical section and a high-voltage cap and rotor section.

What is it? The GM Optispark is an optically-triggered ignition distributor used on the LT1, LT4 and L99 engines. The "opti" has two parts, a low-voltage optical section and a high-voltage cap and rotor section.

Where is it? The opti is mounted on the front of the LT1, above the crank snout and behind the water pump. To replace it the water pump must be removed.

How does it work? The optical section consists of a disk with 360 slots in it, representing 360 degrees of crank rotation. A small laser/eye unit throws a beam through the disks and reads the pulses created as the slots pass through the beam. In this way, the PCM knows the precise location of the crank at all times. Spark pulses are timed through the cap/rotor side and injector pulses are also timed from this. When its working right, the opti is an extremely accurate timing mechanism.

GMHTP's Opti article is an excellent in-depth treatment of how the opti works.

Why do optis fail? Due to its location, the optispark is subject to moisture from several sources. First, driving through high water can submerge the opti completely. Automatic car washes with undercarriage wash can also soak the opti. Secondly, if the water pump suffers bearing failure and coolant comes out the weep hole, the opti can be soaked with coolant. Lastly, NEVER WASH AN LT SERIES MOTOR WITH A HOSE OR HIGH PRESSURE SPRAYER. To wash your motor, use a damp soapy rag and take your time.

Moisture buildup inside the opti can cause the precise parts of the optical side to rust up. The bearings are also weak and prone to failure, particularly from misalignment or a too-long cam dowel pin distorting the drive mechanism. Last, high voltage causes ozone buildup inside the cap...which is to be considered a wear item just like any traditional cap/rotor distributor. Aftermarket ignition amplifiers make the ozone buildup worse and can significantly shorten the life of your opti.

What are my replacement/upgrade options? There are four basic options. (1) replace with a new GM unit. (rebuilt parts store units are of questionable quality). MSD now makes an upgraded cap/rotor of supposedly higher quality than stock if your optical section is in good working order. (2) The Dynaspark is a totally re-engineered unit with a billet body and improved moisture sealing. (3) the LTCC is an LS1 coil-pack conversion adapter to which you supply your own coils. It uses the signal from the optical section of your opti to work, so if you suffer optical section failure you'll still have to replace the opti. But, by removing the high voltage section from operation, you can significantly prolong opti life. (4) the Delteq opti eliminator converts the LT1 to a Northstar coilpack setup using either the Opti optical section or a stage 2 which eliminates the Opti all together.

For a dissection and pictures, visit Mike Chaney's Optispark Dissection Page

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