

HOW TO AVOID & ANALYZE SUPERCHARGER PROBLEMS

The Kenne Bell Twin Screw is the most reliable, durable and trouble free supercharger available. If properly cared for with regular oil changes, it will give many years of trouble free service. Bearings are lubricated for life. And it's billet case, huge bearings and shafts, precision gears and rotors make it virtually indestructible. It far exceeds OEM standards. However, as with any mechanical device, it can be made to fail. Kenne Bell has many years of experience with the Twin Screw. We know their limitations. We have destruction tested / purposely destroyed superchargers under every possible condition so we can determine the true cause of ANY Kenne Bell supercharger failure. So let's talk failures and how to avoid them.

HEAT - For the most part, component failures are the result of excessive heat, boost and/or rpm, overfilling with oil, "hot air" systems from the brain dead and foreign materials entering the supercharger inlet. Just as an overheated engine seizes pistons in the cylinder bores, the spinning rotors expand and can seize in the billet case. We've never seen a rotor case or bearing actually fail (crack, chip, break, etc.) in a Kenne Bell kit. Heat is what kills the parts. Heat. The same is true for oil starved gears. They become hot, discolor from the heat and burn up from lack of oil. Note: The Twin Screw bearings (supercharger and drive) are lubricated for life so don't need outside lubrication. The rotors rotate or "float" on these huge bearings and never contact the case unless distorted from excess heat and/or rpm.

OVERFILLING - Overfilling is the most frequent cause of supercharger failure. NEVER overfill a Kenne Bell supercharger with oil. NEVER. You wouldn't overfill your engine, rear end or trans - unless your goal is to heat up and boil the lubricant. Overfilling a Kenne Bell dramatically increases the oil temperature which hardens the front case seals resulting in high oil consumption. The excessively high oil temperature (400°+) can also melt and dissolve the plastic coupler which "cushions" the drive from the supercharger. With the coupler gone, there is now a 1/2" gap and metal to metal contact and, of course, audible noise (clacking) from the front of the supercharger, particularly at idle or when on and off the gas. A melted coupler can be verified by removing the belt and checking the lash by rotating the pulley back and forth. There should be very little lash. 1/2" of lash indicates the coupler is gone and the supercharger needs to be rebuilt as the seals will also be hardened allowing the oil to now pass from the oil reservoir into the case and rotor assembly. A partially heat destroyed or worn coupler with abnormal gap can emit a slight clacking sound which is accentuated by a rough idling engine. This is NOT a problem.

See "Supercharger Gear Noise" (<http://www.kennebell.net/techinfo/ford-techinfo/Lightning54only/GearNoise.pdf>).

NO OIL / LOW OIL SUPPLY - This is easy to diagnose because the gears discolor. As with any metal to metal parts contact, a lack of oil results in excess heat which turns the gears black or blue black. The gear teeth will then wear off from lack of oil. And if the heat from the gears running without oil is sufficient, the green coupler can also melt. Any residue oil splash or spray that contacts the gears will "fry" (burn and turn black).

RACE APPLICATIONS - SEVERE USE - Let there be no mistake about this. High rpm or high boost racing conditions ALWAYS create more heat in any supercharger. "Hot Air Kits" (see "Warning: Hot Air Underhood Exposed Filters & Kits" <http://www.kennebell.net/techinfo/general-info/HotAirWARNING.pdf>) and overfilling must be avoided for severe use. An overfilled reservoir with 400°+ boiling oil often overheats the front of the supercharger sufficiently to result in rotor to case or rotor to rotor contact and a ruined supercharger. A tell tale sign is that only the front (hottest) area of the rotors will be scored. Also, the air is hottest at the front of the supercharger. Scuffing the full length of the rotors indicates LOTS OF HEAT from oil, boost and rpm. The same is true for "Hot Air" (underhood exposed filters) which can elevate supercharger temp a whopping 100°. That's the equivalent heat generated by an additional 10 psi of boost. Does anyone really believe sucking hot underhood air helps the engine or supercharger life? For high rpm/boost applications, lower oil level to 1/4" BELOW the bottom notch on dipstick with dipstick screw in.

BYPASS VALVE - The bypass valve lowers the supercharger temperature at idle and part throttle/cruise. They seldom, if ever fail, but if it does, the supercharger will run hotter. Periodically check it's operation. Always check the vacuum/boost control line to the bypass valve for leaks. The valve will be "open" at idle (vacuum) and closed under boost (pressure).

ANALYSIS - Analysis of problems is easy. Depending on the rpm and run time, an overfilled supercharger will reek of burned oil when disassembled. The oil may appear "jelled" or as sludge. Also present may be the smell of the dissolved plastic coupler. Draining the above and filling with fresh oil may look good on the dipstick, but the tell tale damage remains. The seals didn't just decide to harden, the oil doesn't boil all by itself, nor does the coupler decide it's time for a melt down. Conversely, a lack of oil will always result in discolored (blue and black) gears, worn out teeth and metal shavings. Gears don't "fail." They merely burn up from lack of oil. Defective or worn gears don't turn blue or black. These extremely hot rotating gears also transfer heat to the front of the rotors, causing them to overheat, expand and seize in the case. Not

much different than an engine that melts down from a lack of oil.

ROTOR FLEX - Rev anything high enough to exceed it's design limits and you introduce excessive stress, load and flex. When rotors are revved beyond the manufacturers safe rpm, they can flex - enough to contact the case and seize the rotors. This condition is evidenced by end and center rotor contact. Here is a quick summary of the DON'TS.

- DON'T use "Hot Air" Underhood Inlet Kits.
- DON'T overfill the supercharger with oil.
- DON'T exceed 26 psi boost.
- DON'T over rev the supercharger beyond 18000 rpm.
- DON'T de-activate the bypass valve.

NOISE	CAUSE & CURE
Growling	Debris in rotors or slight rotor to case contact. It'll NEVER be a bearing. Rebuild supercharger if case and rotors are useable.
Clacking	Coupler melted. Coupler worn. If clacking at idle, rev engine. If noise goes away, it's rough engine idle from cam or poor tune (see "Supercharger Gear Noise" http://www.kennebell.net/techinfo/ford-techinfo/Lightning54only/GearNoise.pdf). If supercharger isn't using oil, front seals are O.K. New coupler can be installed with supercharger on car. A melted coupler creates debris that usually damages front seals.
Whistling	Normal air flow through supercharger and inlet tract can make a slight whistling noise. That is normal. The rotors and bearings are silent since there is no rotor to case contact and the bearings ride on oil. Whistling may also be from a vacuum leak.
Gear Whine	Worn gears. Rare unless run low on oil or out of oil. Supercharger must be rebuilt. Gear shavings will damage front seals.
Noise Increase w/ Smaller Pulley	HP/air flow is noisy. Can't be avoided. Smaller pulley - more boost - more HP - greater air flow (noise) - more noise.
Just Noisy	Remove belt and rotate supercharger. If free and quiet, check alternator, water pump, idler pulley etc. Supercharger often gets blamed for other worn engine parts.
Vibration	Supercharger is balanced. Vibration is from engine or drive.

RUNNING HOT - It's an air compressor or air tank, even at idle. Compressing air creates heat. It's unavoidable in any supercharger. There is NOTHING else in the supercharger that will make it run "hot" or "hotter" except 1. overfilled oil, 2. excess boost and 3. disabled bypass.

LEAKING OIL - An oil leak can only occur between the front cover and billet case. This area is factory sealed. If front cover has been removed, it must be indexed with an alignment tool and resealed.

USES OIL - Unless there is a leak in the front cover, the oil can only escape 1. by damaged or worn front seals (won't har the supercharger) or 2. out case or drive vent (old style) or pulley bolt vent (new style).

BLOWING OIL OUT VENTS OR DRIVE FRONT SEAL LEAKING OR BLOWN OUT - Racing only. Indicates extreme pressure in front oil cover from high rpm/boost racing and 1. overfilled with oil, 2. drive or front cover vent plugged off (old style) or 3. "catch can" (old style) line is not teed into drive vent line and/or front seals damaged. Install as per Kenne Bell instructions or convert to new vent bolt drive.

LOWER OIL LEVEL (20-26 PSI)

The recommended oil level (with the dipstick screwed in) covers a wide range from the top mark (maximum) to 3/8" below the bottom mark. For higher boost levels (20-26 psi) lower the oil to 1/4" below bottom mark on dipstick as shown. Air temperature also has an effect on your supercharger oil temp i.e. those "hot air" exposed underhood filters we continually warn about. Remember to CHECK LEVEL FREQUENTLY. 3/8" below bottom mark is MINIMUM oil level. Keep oil in this - 1/4" to -3/8" range with 20-26 psi boost.

We hope this information will help you to better understand the limitations of your supercharger and avoid any future problems.

TECH NOTE:

Higher rpm and boost will increase oil temperature in any supercharger or engine. For competition and especially high boost street applications, dropping the oil level reduces oil turbulence from the gears and lowers oil temperature and internal pressure.

OIL LEVEL GUIDE

- 6-15 PSI Between 2 marks
- 16-19 PSI Between bottom mark and 1/4" below
- 20-26 PSI 1/4" below bottom mark

