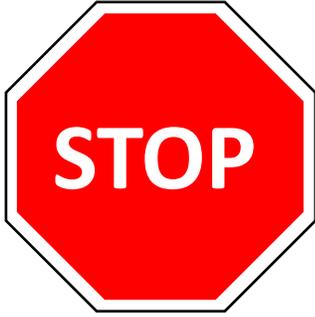


DO NOT USE THIS HEATER !

UNTIL YOU READ HOW IT WORKS



The Twin Hornet 22 was designed to:
Facilitate EASY STARTING
Eliminate wear caused when starting a cold engine
Be certified safe in areas with combustible gases

There are several misconceptions about what causes wear on an engine when it is started in cold weather. The primary cause of this wear is the fact that the rings are made of a high-grade cast iron and the cylinders are made of aluminum. Once the temperature drops significantly, the differential of contraction between these two metals causes a loss of the clearance between the cylinder walls and the rings. This has nothing to do with a lack of lubrication. This lack of clearance also creates more friction between the two surfaces, this increases the drag and torque required to turn the engine over. When you add the increased drag to the lower cranking amps available from the battery, the engine turns over at much slower rate.

The Twin Hornet 22 must be placed in the top of the engine because heating from the bottom up creates the following problems:

Condensation is a by-product of combustion and is found in all engines. However, when an engine is heated from the *bottom-up* the moisture that is entrained in the oil evaporates. This moisture will then condense in the upper part of the engine where it is colder (furthest point from the heat source).

Bottom-up heating can be a source of premature corrosion and should never be used.

Top-down heating improves the dynamic process of engine starting through:

- Higher cylinder temperatures will result in better fuel atomization and more complete combustion of fuel.
- Cold cranking amps delivered by the battery are increased with higher temperatures.

Another misconception held by many pilots is that the oil must be *WARM*. According to Aero-Shell, viscosity is guaranteed down to -15°C on Aero-Shell 15W-50. Our heaters will maintain an oil temperature of 45 to 55 degrees, please do not let this be a concern as this is much warmer than required for adequate lubrication.



Typical Properties of Shell AeroShell Oil W Multigrade 15W-50		
	Test Method	
Product Code		60070
SAE Viscosity Grade		15W-50
Property		
Viscosity:		
@ -15°C, cp	D 2602	3150
@ 100°C, cSt	D 445	19.6
@ 100°F, SSU	D 445	588
@ 130°F, SSU	D 445	300
@ 210°F, SSU	D 445	98.9

Temperature readings:

Readings from EGT gauges, laser measurement devices, or thermometers placed in any location *other than the baffled off area directly behind the prop* will yield no meaningful data. The only accurate test is to place a digital thermostat inside the cowl directly behind the prop. If this reading is above 60°F, the aircraft engine will turn over freely and ignition should be instantaneous (on an engine that is mechanically sound). Our heaters heat the cylinders and conduction will heat the rest of the engine; this heats the engine from the inside out and it is why temperature readings can be misleading.

Conduction:

Our heaters use convection to heat the air, *BUT* conduction is how heat is transferred throughout the engine. This is the most effective method of transferring heat in an engine. Once the cylinders are heated, heat will migrate to the piston, down the connecting rods to the crank, valves and all other inner-connected parts. Heat always migrates to the cold; this is a fundamental heat transfer principles. Because of this, warm cylinders will yield an engine that will not experience excessive wear when started.

We spend countless hours each year in phone conversations with pilots regarding the heating needs of an aircraft engine. We respectfully ask that you disregard any preconceived ideas concerning adequate engine heating. Your cylinders will *FEEL COLD* to the touch; this is attributed to the fact that they are colder than your body temperature.

Please use as directed and the heater will perform flawlessly.

- **Place the heater in the cowl directly behind the prop**
- **Leave plugged in; the thermostat will maintain 70-80°F**
- **Allow up to 48 hours when heating a cold soaked engine**
- **Crank engine IMMEDIATELY after priming, this minimizes fuel coalescence**



Place two heavy moving blankets over the cowl or use an insulated cover and....

YOUR ENGINE WILL EASILY START, WE GUARANTEE IT!