Oil Temperature

The oil temperature gauge probe is located where the oil enters the engine. Whether measured electrically or mechanically, oil temperature is displayed on an indicator divided into four ranges.

There are two red lines defining the maximum and minimum permissible oil temperatures, a green normal operating range, and a yellow cautionary range. The latter indicates a potential overheating hazard, which is an area of concern with high-viscosity oil in low-operating-temperature conditions.

Before takeoff, oil temperature should be in the green. If the temperature never rises into the green range even after a suitable warm-up period, it probably is due to a bad instrument. A takeoff may be made, provided the engine does not hesitate during full throttle application. Any hesitation should dictate an abort and further investigation.

If during climbout an excessively high temperature develops, power reduction and leveling off to increase airspeed (cooling airflow) should restore the temperature to normal range. A series of such short climbs is known as "step climbing." An excessively cold indication means insufficient lubrication for the engine and may result in dangerous power surges at high power settings.

MANIFOLD PRESSURE GAUGE

The manifold pressure (m.p.) gauge senses the absolute pressure in the engine intake manifold and displays it on a gauge, which typically is calibrated from about 10 to 30 inches of mercury (inches Hg.). Twin-engine aircraft typically will have only one instrument but with two superimposed pointers—one for each engine.

In aircraft with fixed-pitch propellers, the tachometer is sufficient to set power, but with a constant-speed prop, the RPM remains constant (within limits) while the throttle controls m.p. Normally, the engine turns the propeller, but if m.p. falls below the green arc, the windmilling prop begins to drive the engine.

Power developed is proportional to the amount of fuel burned, which is based on mass airflow to the cylinders. Airflow is difficult to measure, so intake absolute pressure (just prior to entering the intake valve) is used as the method of measurement.

For instance, if we look at the m.p. gauge when the engine is shut down, it should read the ambient air pressure, which is 29.92 in. Hg. at sea level under standard conditions. With the engine at idle, the m.p. will be very low (15 inches Hg.) because the pistons demand more mixture than the carburetor allows, creating a lower-than-atmospheric pressure. At high power, the m.p. will be 26 or 27 inches Hg. Normally aspirated engines never reach atmospheric pressure when they are running, and as altitude increases, the m.p. decreases.

When the pilot selects a higher m.p. with the throttle, the result is an increase in the fuel/air mixture entering the cylinder on each intake stroke. Supercharged engines have ambient air compressed before entering the intake manifold and are capable, especially at sea level, of producing manifold pressure several times greater than ambient. Generally, supercharged engines cannot use full throttle on takeoff or at low altitudes due to the potential for overpressuring or "overboosting" the cylinders.