

until you are in-flight and near cruise airspeed. This presents an additional problem to the instrument pilot because to accurately set the heading indicator, the magnetic compass must be settled in straight-and-level flight—uncommon conditions immediately after takeoff into bad weather!

All gyro heading indicators not slaved to a magnetic compass must periodically be reset to compensate for drift. Drift error in excess of three degrees per five minutes signifies impending gyro failure, and the instrument should be considered unreliable. The gyro should be reset in unaccelerated, straight-and-level flight while the compass is settled down.

You should allow the turn indicator five minutes to spin up to the correct speed before relying on it; allow three minutes for electrically powered gyros. Observe the turn indicator while taxiing. The needle should correctly indicate the direction of a turn, while the ball should move to the outside of the turn.

Preventive Maintenance

The single most important thing the aircraft owner can do to extend gyro life is to keep the air filter clean. Manufacturers tend to agree that in the long run it makes more sense to change a filter approximately every 500 hours rather than clean it. If you operate in environments where there is a lot of dust, smoke, or smog, you should increase the frequency. The filter may look clean, but dirt gets trapped inside, works its way out, and goes up the lines to the instruments. When changing the filter, you should also check the lines going out of the filter to see if they are dirty. If so, then the whole line is dirty and needs to be cleaned. The problem is that if any small particle finds its way into the gyro, it can lead to failure. Most pollution is human induced, and cigarette smoking is probably the biggest culprit, but there are others, such as face powder and cabin cleaning materials. The simple fact is that any airborne particulate matter can eat up gyro bearings.

Gyros are also extremely vulnerable to shock damage, and the part most often damaged is the bearings. Gyros should only be handled by qualified personnel, and then they should always be transported in shock-absorbent containers—even from the airplane to the shop.

For instance, if you drop a gyro from a height as little as 1 inch onto a glass table, the force is astounding. Here's why. For handling purposes, a G (gravity) is defined as the dropping distance divided by the stopping distance. Let's assume the glass flexes about .005 inches. The formula would be $1/.005$ or 200 Gs! An impact of 200 Gs would certainly cause the gyro bearing races to deform when the ball bearings press against them. The long-term result would be an early failure. If the gimbal bearing takes the shock, it will lead to excessive, sporadic precession.

New gyro instruments should be kept in their original shipping container as long as possible. Use the same container for transportation to other locations or when returning it to the manufacturer for repairs. Always use the protective wrap provided, and do not remove the indicator cover anywhere other than the designated clean area of a certified repair facility to prevent instrument contamination.

When removing a gyro instrument from the airplane, wait at least 10 minutes after shutdown to assure that the gyro has stopped spinning; never remove a gyro while it is