

Chapter Two

A gyroscope mounted inside the instrument case remains in a fixed position relative to the earth. Quite literally the instrument case, and the entire airplane for that matter, rotate around the gyro, causing the instrument to display true pitch and roll information regardless of the attitude of the aircraft or its turn rate. How that is possible can best be seen in Figure 2-11. A horizon line (artificial horizon) is fixed to the gyro so it always parallels the earth's surface. Older attitude indicators require the pilot to set, or "cage," the gyro after engine start. To do this, the pilot pulls the caging knob, which forces the two gimbals into vertical and horizontal positions, orienting the gyro with the horizon. Upon releasing the knob, the gimbals are free to rotate, allowing the gyro to remain parallel to the earth's surface.

There are several problems associated with the attitude indicator, primarily in the form of bank and pitch errors. They are most significant during shallow banks and after 180-degree turns. The instrument will indicate slightly less than the actual bank of the aircraft, and after rollout from a 180-degree turn, it will indicate a slight bank in the opposite direction. The instrument will also be slightly off on pitch, causing the uninformed pilot to fly the airplane into a shallow descent. It is imperative that the attitude indicator always be substantiated with a good cross-check of other instruments. Fortunately the errors are very small and a built-in erecting mechanism will correct them quickly once straight-and-level flight has been reestablished.

Attitude indicators are also susceptible to acceleration and deceleration errors. As the aircraft accelerates, the attitude indicator tends to give an erroneous, slight nose-up

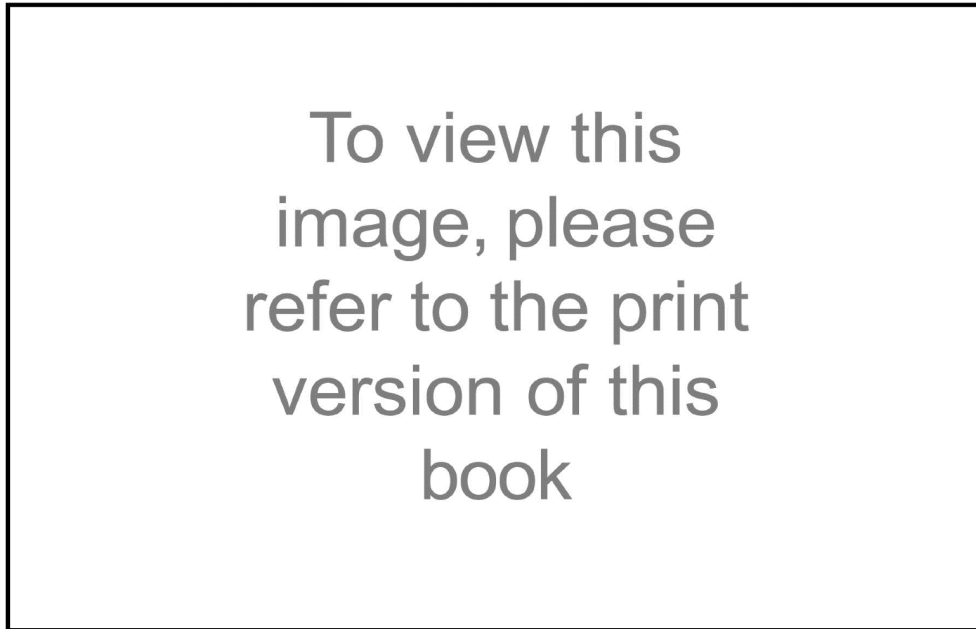


Fig. 2-11. *Air-driven attitude indicator.*