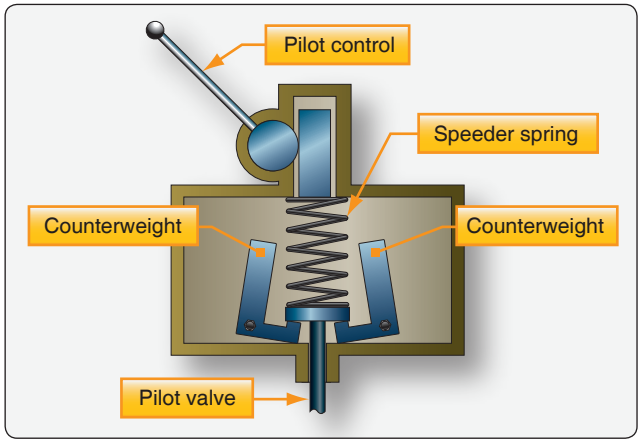

Figure 7-17. *Underspeed condition.*

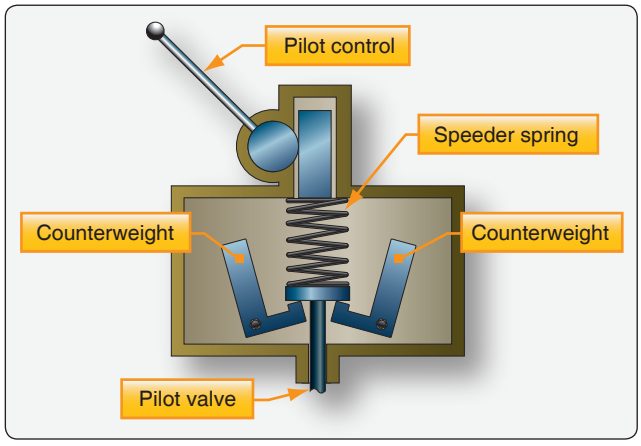

Figure 7-18. *Overspeed condition.*

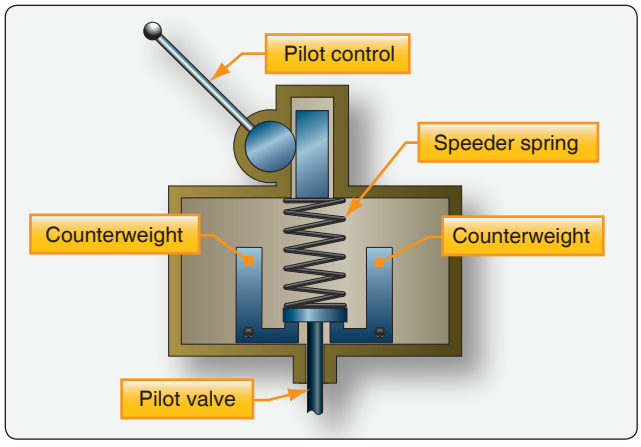

Figure 7-19. *On-speed condition.*

changing attitude. The governor, as a speed-sensing device, causes the propeller to maintain a set rpm regardless of the aircraft attitude. The speeder spring propeller governing range is limited to about 200 rpm. Beyond this rpm, the governor cannot maintain the correct rpm.

Governor System Operation

If the engine speed drops below the rpm for which the governor is set, the rotational force on the engine-driven governor counterweights becomes less. *[Figure 7-17]* This allows the speeder spring to move the pilot valve downward. With the pilot valve in the downward position, oil from the gear type pump flows through a passage to the propeller and moves the cylinder outward. This in turn decreases the blade angle and permits the engine to return to the on-speed setting. If the engine speed increases above the rpm for which the governor is set, the counterweights move against the force of the speeder spring and raise the pilot valve. This permits the oil in the propeller to drain out through the governor drive shaft. As the oil leaves the propeller, the centrifugal force acting on the counterweights turns the blades to a higher angle, which decreases the engine rpm. When the engine is exactly at the rpm set by the governor, the centrifugal reaction of the counterweights balances the force of the speeder spring, positioning the pilot valve so that oil is neither supplied to nor drained from the propeller. With this condition, propeller blade angle does not change. Note that the rpm setting is made by varying the amount of compression in the speeder spring. Positioning of the speeder rack is the only action controlled manually. All others are controlled automatically within the governor.

Propellers Used on General Aviation Aircraft

An increasing number of light aircraft are designed for operation with governor-regulated, constant-speed propellers. Significant segments of general aviation aircraft are still operated with fixed-pitch propellers. Light sport aircraft (LSA) use multiblade fixed-pitch composite propellers on up to medium size turbo prop aircraft with reversing propeller systems. Larger transport and cargo turbo prop aircraft use propeller systems with dual or double-acting governors and differential oil pressure to change pitch. Some types of propeller system are beyond the scope of this text, but several propellers and their systems are described.

Fixed-Pitch Wooden Propellers

Although many of the wood propellers were used on older airplanes, some are still in use. The construction of a fixed-pitch, wooden propeller is such that its blade pitch cannot be changed after manufacture. *[Figure 7-20]* The choice of the blade angle is decided by the normal use of the propeller on an aircraft during level flight when the engine performs at maximum efficiency. The impossibility of changing the blade pitch on the fixed-pitch propeller restricts its use to small aircraft with low horsepower engines in which maximum engine efficiency during all flight conditions is of lesser importance than in larger aircraft. The wooden, fixed-pitch