dividual devices they will power. This is analogous to an octopus with its numerous arms reaching out all over the aircraft performing various tasks.

The second method is a motorized actuator dedicated to each specific device, thereby eliminating long-running flexible shafts coming from a single motor. For instance, there might be a single, dedicated motor with direct drive shaft on each aileron. The advantage is the reduced likelihood of loss of control of a given device due to a damaged flexible shaft in the event of catastrophic failure elsewhere on the aircraft. And while there appears to be a slight preference in the military and air transport markets toward local motorized actuation, it is unlikely that electromechanical systems will take over hydraulic systems in the near future on any class of aircraft.

SYSTEM APPLICATIONS

Of the many different types of hydraulic systems, the most common is the independent brake system. Older, light aircraft use a single-unit diaphragm master cylinder and brake actuator. The master cylinder contains the fluid, and when the pilot pushes on the pedal, the fluid fills the wheel cylinder and applies pressure to the brake. Hydraulic brake systems on newer, light aircraft, and on all larger aircraft, require a reservoir to hold more fluid and to compensate for temperature change.

Take, for instance, Piper's PA 28-161 Warrior II. Because this aircraft has fixed landing gear, there is a very simple hydraulic system to operate the toe, hand, and parking brake system. It is a highly effective system requiring minimal maintenance. The reservoir, located on the top left, front face of the firewall, is easily accessible for preflight inspection. The system works so well, it is essentially duplicated in other larger Piper aircraft, such as the twin-engine PA 34-220T Seneca III, which has a separate hydraulic system for its retractable landing gear.

On the opposite end of the spectrum is the pressurized system shown in Figure 14-5. System pressure is maintained by an accumulator, essentially a metal sphere. The sphere is split in half by a rubberlike diaphragm. On one side is a dry-air precharge; on the other is system fluid. In addition to absorbing system shocks, the compressible air allows pressurization of the system as fluid pushes against the rubber diaphragm. An automatic unloading valve, which senses system pressure, locks the system, trapping the pressure, and reroutes the continuous stream of fluid from the pump back to the reservoir. As system pressure decreases, the valve senses the reduction, opens, and allows the pump to continue the flow of fluid into the system until the pressure builds up again. While effective, such a system is very costly, complex, and has a greater tendency to wear and leak.

The open center system in Figure 14-6 is found most commonly on light, general-aviation aircraft. It has no accumulator or constant system pressure. When there is no demand on the system, fluid travels from the pump through the open center of each selector valve and back to the reservoir. When hydraulic power is required, the valve rechannels the fluid to the actuator and the fluid from the opposite side of the actuator goes to the reservoir. This is a much less costly and simpler system and is better suited to light aircraft.