

## Pneumatic Systems

The system works but has disadvantages. It is relatively heavy because it requires an oil separator. It is also complicated, and oil sometimes finds its way to the wrong part of the system, causing contamination of the de-ice boots and control valves. And the oily exhaust air always leaves a streak on the underside of the fuselage.

Probably the biggest drawback of the wet-pump pneumatic system is that instrument flying is limited to lower altitudes. The problem is that the low-density air found at high altitudes is insufficient for the pump to create enough vacuum to drive the gyros. If the wet-pump is used in high-altitude operations, the gyros and the rubber de-icing boots, located on the pressure or downstream side of the pump, could be ruined by oil contamination.

### DRY-PUMP SYSTEM

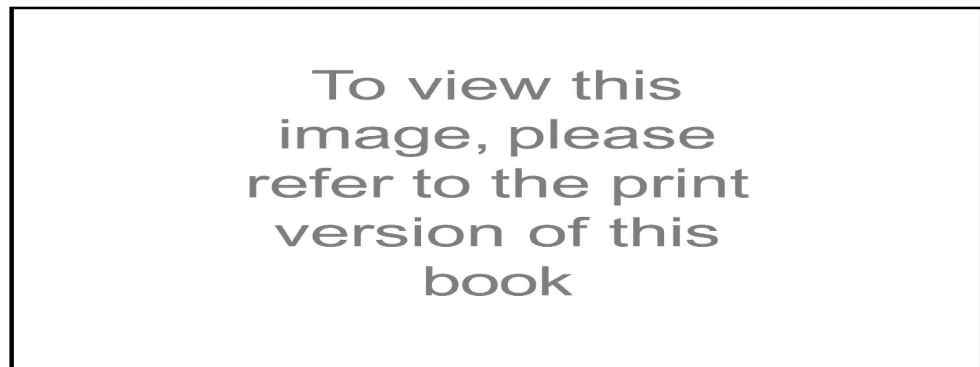
The solution to the many problems of the wet-pump came with the invention of—you guessed it—the dry-pump system. The simple, lightweight, dependable, and self-lubricating dry-pump system has no oil contamination or cooling problems. Because it can power either a vacuum or pressure system, it is able to drive the gyros and the de-ice boots as well as pressurize the aircraft door seals.

### VACUUM VERSUS PRESSURE SYSTEMS

The most common type of aircraft pneumatic system is the vacuum system shown in Figure 15-3. Air from the cabin is drawn into the system through a central air filter. It then goes through the gyro instruments, past the vacuum (suction) gauge, and through the relief valves. At that point it goes into the vacuum side of the pump, out the pressure side, through an air/oil separator, and is discharged overboard.

Twin-engine aircraft vacuum systems work essentially the same with one pump per engine. This provides a safety margin because either pump alone creates sufficient vacuum for normal operation. Both pumps connect to a common manifold and share the same tubing and valves.

Vacuum systems are more common than pressure systems in light aircraft because these aircraft generally operate at lower altitudes. The vacuum side of the pneumatic



**Fig. 15-3.** Typical pump-driven vacuum system.