Fig. 7-3. *Turbocharger flow diagram.*

HIGH-ALTITUDE OPERATIONS

There also are special circumstances to consider when operating at the higher altitudes that become available through the use of a turbocharger. Fuel vaporization is one such problem.

Engine-driven pumps pull fuel to the intake manifold, which at high altitude invites vapor lock. So the aircraft must be equipped with tank-mounted boost pumps to feed fuel to the engine-driven pump under positive pressure. Boost-pump failure can cause cavitation, and eventually failure, of the engine-driven pump as well as vapor lock and engine fuel starvation.

Another problem associated with high-altitude operation, though not turbocharger related, is worth mentioning. It is the electrical conductivity of the rarefied atmosphere. Magnetos and wiring harnesses require special care and protection to prevent electrical problems that cause engine roughness and possible failure.

MISCONCEPTIONS

A number of misconceptions surround the use of turbochargers. It is commonly believed that turbochargers increase fuel efficiency. They don't, but they do allow you to take advantage of higher true airspeeds and more favorable winds at higher altitudes.

Some operators think the increased fuel/air mixture causes greater stress on the engine. It would seem logical, but the opposite is true; a turbocharged engine has less operating stress. Remember, a normally aspirated engine has four piston strokes: intake, compression, power, and exhaust. Compression, power, and exhaust strokes occur in a positive-pressure condition, causing fundamentally the same type of pressure on the piston, rings, and connecting rod. The intake stroke, however, creates suction, which causes a significant change of force on the piston. This force change is transferred to the crankshaft via the piston connecting rods. The faster the engine operates, the worse the effects of the pressure change.