

Cylinders, Pistons and Overhead Drive Train

The cylinders, pistons and overhead drive train are the portion of the engine that develop power. The cylinder combustion chamber provides a controlled area for burning fuel/air mixture and converting that heat energy into mechanical energy. Aviation fuel and air is drawn into a cylinder during the intake stroke, compressed by the piston during the compression stroke and then ignited by a high intensity spark produced across the spark plug electrode air gap during the power stroke. As the mixture is ignited, the expanding gases force the piston to move inward toward the crankshaft.

This inward motion acting on the connecting rod and crankshaft throw is converted into circular or

rotary motion by the crankshaft. As the crankshaft throw rotates past half of one revolution, the connecting rod and piston start moving outward on the exhaust stroke toward the cylinder head. During this movement, the exhaust valve begins to open allowing the burned mixture (exhaust) to escape. Momentum from the crankshaft forces the piston toward the cylinder head in preparation of the next intake stroke event.

Proper mechanical timing between the crankshaft and camshaft allows the intake and exhaust valves to open and close in synchronization with piston position in all six cylinders.

Proper magneto internal timing and magneto to engine mechanical timing allow precise spark plug ignition, $22^{\circ} \pm 1^{\circ}$ before top dead center, during the piston's compression stroke.

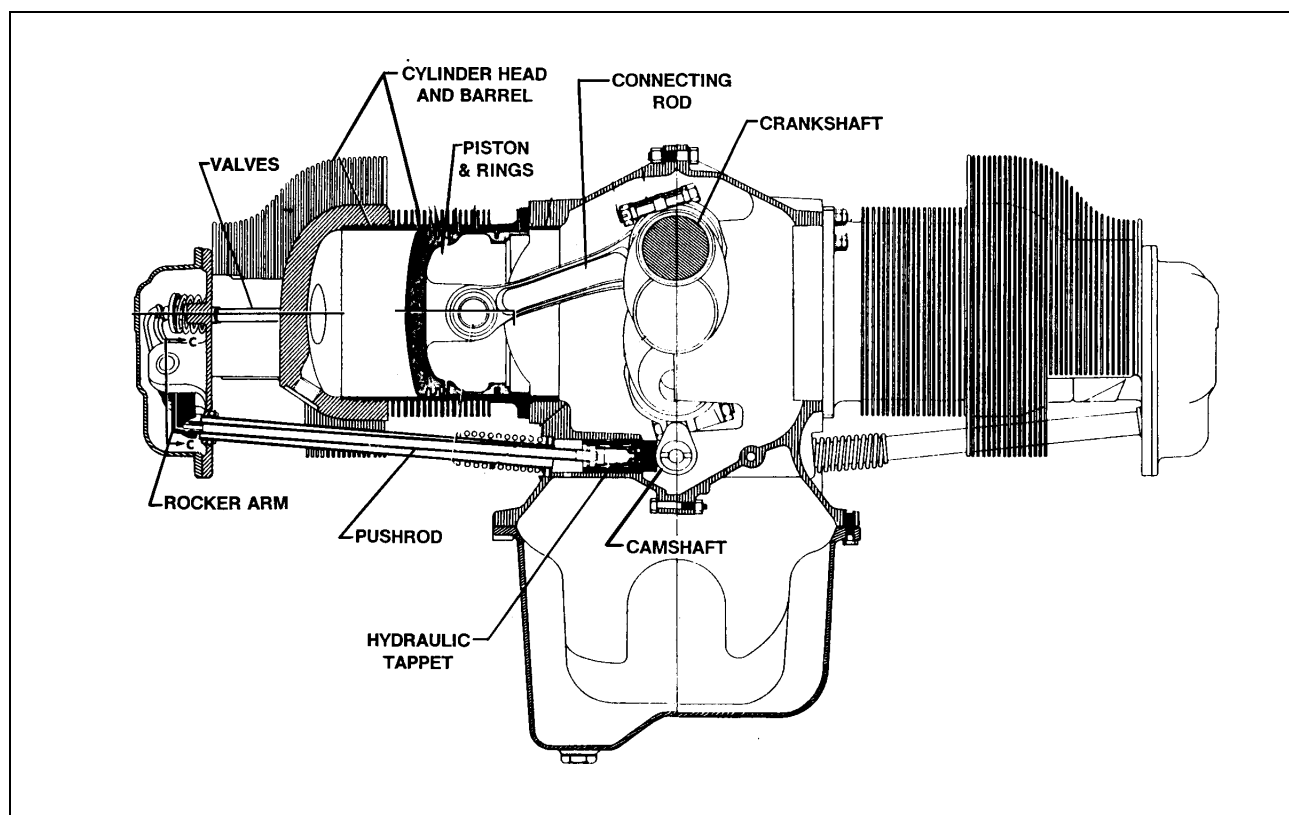


Figure 19-2
Cylinder, Piston, and Overhead Drive Train IO-520-B, -BA, -BB, -C, -CB, -M, -MB

Cylinder Assembly Description

Cylinder, Valve Guides, Valves, Rotacoil And Retainer - The externally finned aluminum alloy head castings are heated and valve seat inserts installed before the head is screwed and shrunk onto an externally finned steel alloy barrel to make the permanent head and barrel assembly. The cylinder barrel is nitrided for wear resistance. Intake and exhaust valve guides are pressed into the heated cylinder assembly. Special helical coil thread inserts are installed in upper and lower spark plug holes. The cylinder intake and exhaust ports are located

below the cylinder as installed. Exhaust valve faces are Stellite and stem tips are hardened. Valve stems are solid. A rotacoil assembly retains the two concentric springs surrounding the exhaust valve and is locked to the exhaust valve stem by tapered, semicircular keys which engage grooves around the stem. The controlled rotating action of this type retainer helps to prevent burning and eroding the valve and valve seat. A retainer retains the two concentric springs surrounding the intake valve and is locked to the intake valve stem by tapered, semicircular keys which engage grooves around the stem. Valve rocker covers are painted diecast aluminum.

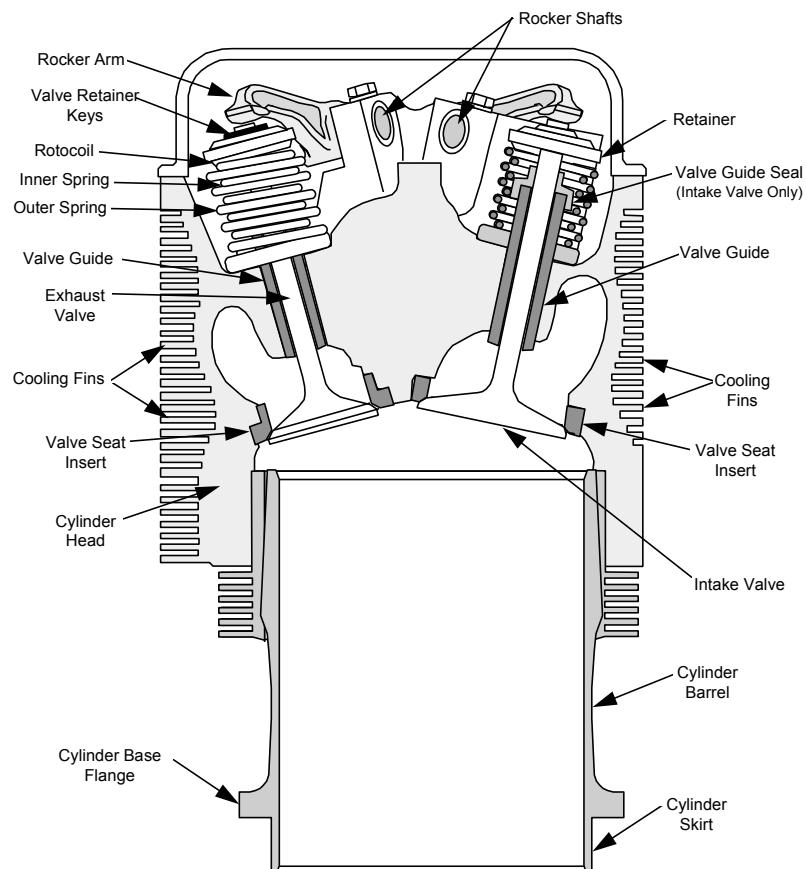


Figure 19-3
Cylinder Assembly Description IO-520-B, -BA, -BB, -C, -CB, -M, -MB

Valve Rockers, Shafts, Pushrods And Housings (Overhead Drive Train)

Valve rockers are steel forgings with hardened sockets, rocker faces and pressed in bronze bushings. They have a drilled oil passage for lubrication. The rocker shafts are held in place in

the rocker bosses by bolts and washers. Pushrods are constructed of steel tubes and pressed-in, hardened, forged steel ball ends, which are center drilled for oil passages. The pushrod housings are beaded steel tubes. The bead at the cylinder end retains washer, gasket and a second washer. The bead at the crankcase end retains a heavy spring, washer, packing ring and second washer.

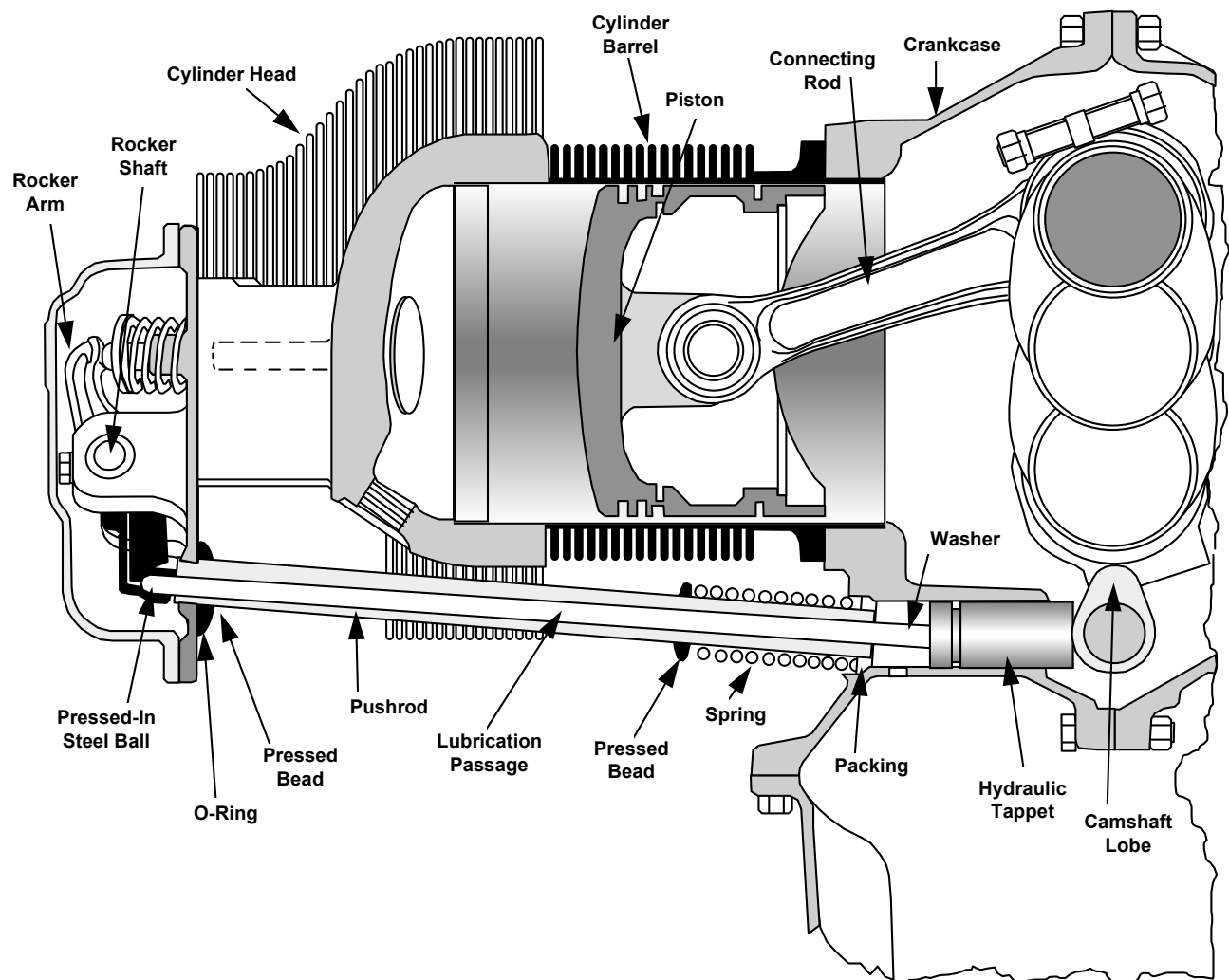


Figure 19-5
Overhead Drive Train IO-520-B, -BA, -BB, -C, -CB, -M, -MB