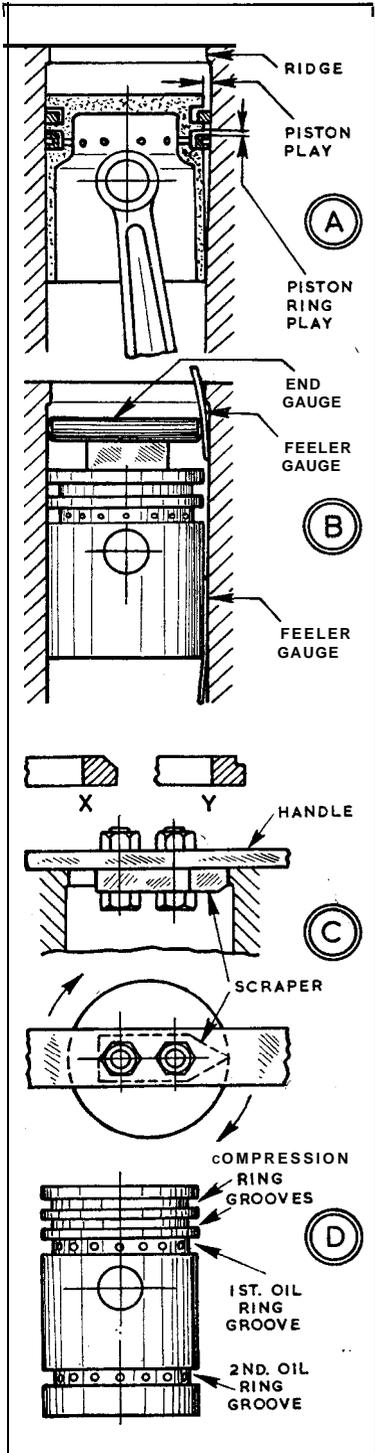


# Cylinder and piston ring wear



**A** PRINCIPAL factor in assessing the condition of an engine is the extent of wear of cylinders, pistons and rings. Smoking at the exhaust, increased oil consumption, reduced compression and heavy carbon formation are all symptoms suggesting wear and the need for investigation.

Most wear in a cylinder occurs at the top where the direction of motion of the piston is changed, and wear even to the extent of a few thou can be felt with a finger as a change in the diameter of the bore. Wear to the extent of several thou offers a ridge, as at A, against which a finger nail can be hooked. Obviously, then, the piston has increased side play, and with the fingers on top it is possible to rock it in the cylinder.

As a result of the widening of the cylinder at the top (causing, in effect, a taper) and of the rocking of the piston when its direction of motion is changed, the piston rings are subjected to an opening and closing action as they traverse the length of the cylinder, together with a radial movement in the grooves in the piston.

This movement naturally occasions wear, and the rings acquire vertical play in the grooves, so as the piston reciprocates they move alternately to the top and bottom of the grooves—an action which, in conjunction with the rocking movement of the piston, results in oil being transferred from the underside of the rings, round the inside to the top and thence to the combustion chamber.

With the unworn portion of the cylinder above the ridge serving as a reference diameter, a check can be made of wear immediately below the ridge. In the absence of an internal micrometer or other suitable gauge, a reasonably accurate check can be made with an end gauge and feeler gauges, as at B. The end gauge can be of mild steel rod with rounded ends, and filed or ground to length to just fit across the unworn part of

the bore—or in conjunction with a feeler gauge a few thou thick.

The engine should be set with the piston close to t.d.c. and a parallel block placed for the gauge to rest on, to maintain it square in the cylinder and facilitate checking with feeler gauges. The extra feeler gauges necessary for the test below the ridge represent the extent of wear in the cylinder—which is generally greater on the diameter where thrust is taken on the piston.

With the piston at t.d.c. and the top land at the crown in the unworn portion of the cylinder, a check can be made of play using a narrow feeler gauge or a strip of sheet metal curved by tapping on a block of piston radius, since a feeler gauge or strip several thou thick will not readily bend to piston radius—a fact not to overlook when checking the cylinder. Given the original play or clearance the piston should have, this test reveals wear that has occurred subsequently.

With the piston removed, vertical play of rings in the grooves can be checked with feeler gauges: when a micrometer is available, this can be used to measure rings. Clearance in grooves with new pistons and rings is between 0.001 in. and 0.002 in.—and the greater the clearance from wear, the heavier oil pumping is likely to be. A check of clearance on the piston skirt is made as at B, using a feeler gauge with the piston in the cylinder.

Rings of chamfered or stepped section, as at C, X Y, obviate contact with wear ridges in cylinders. They can also be scraped out—for which work, when the top of the cylinder is unobstructed, a special scraper of tempered cast steel bolted to a flat bar offers better control than a hand scraper.

Pistons provided with two oil ring grooves, as at D, may be fitted when new with only one oil ring, the second below the gudgeon pin being fitted when oil consumption increases. □