

GAUGING SMALL and MEDIUM BORES

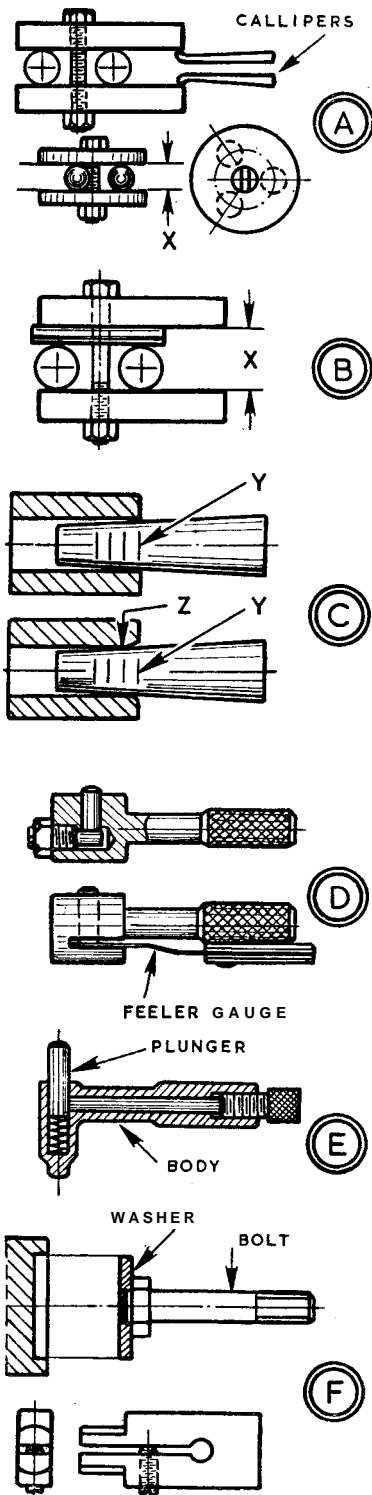
If you have a standard outside micrometer and inside callipers, a great variety of small and medium sized bores and short length dimensions—both outside and insides—can be verified to a high standard of accuracy. For merely checking a bore, its size is carefully taken by the inside callipers, and these are used in the micrometer to obtain the actual dimension.

In machining a bore, close checks can begin when it is still several thousandths undersize. The micrometer is set, say, 0.010 in. under the dimension, and the callipers are adjusted to it. Then fairly heavy cuts can be taken until they will just enter the bore. For important work, this may be the time to sharpen the tool and take two or three fine cuts to eliminate slight bell mousing from trial cuts, see the sort of finish produced, and ensure that all is satisfactory.

If there is doubt about the lathe cutting parallel, this procedure should be adopted well before the finished dimension, while ample metal still remains for you not to risk running near the finished size in making testing cuts after adjustments.

There are, of course, many variations from this basic method, some employing callipers. If the bore is to be finished by a reamer, you can take the size from it, boring out a suitable washer in the chuck until the reamer will enter to finished size—the washer then serving as a reference for the callipers. As most reamers have a taper at the end, a second and undersize washer provides for a pre-check, with the callipers used well into the bore to verify parallelism.

Dimensions may be taken with the callipers in two pieces of flat plate which are lightly bolted to rollers or to short pieces of silver steel rod, A. This material is usually very accurate. Three steel balls may be similarly employed with stiff flat washers to obtain their dimension, X;



WORKSHOP HINTS and TIPS

By GEOMETER

while four pieces of accurate rod and a pair of plates, B, provide a larger dimension, X. These methods can be useful when you have no micrometer to ensure a high standard of accuracy. For preliminary undersize testing, the callipers can be adjusted loosely in the plates; and should oversize be necessary, shimstock can be used with the rod or balls.

For precise spacing of plates, drill shanks may not be sufficiently accurate—which goes for many square lathe tools even though they may be ground all over. Preferably both should be checked before use.

For gauging directly without use of callipers, silver steel rod makes a good substitute for an ordinary plug gauge. Tapered at the end, it indicates the approach of finished size. Long tapers can be turned on pieces by angling the top slide, but slight chamfers require only careful work with a smooth file and emery cloth.

Care is required in checking bores with a taper gauge when it is not to be entered fully. If a bore is parallel throughout its length, a taper gauge, C, can be let in to a reference mark Y, which may be the size from which a reamer is used; should the bore be bell-mouthed (from trial cuts, or the tool cutting keenly at the start), mark Y may still be flush, but with the bore at a smaller diameter, Z. This could leave too much for the reamer. A right-through taper gauge, or a check with callipers, reveals the error.

For special cylinder bores, an accurate check in machining and lapping is kept with a plunger plug gauge, D. It may have a screw at the end with an eccentric diameter for adjustment; or there can be a slot into which feeler gauges or strips of shimstock can be slipped beneath the plunger. For larger bores, a telescopic gauge, E, can be used, its plunger extended by a spring and locked by a rod and screw in the body. Either can be set or checked by micrometer.

For checking a recess, a quickly-made gauge, F, consists of a washer soldered to the shouldered head of a bolt, and then turned to size. The other gauge for smaller and deeper diameters is machined from rectangular mild steel and provided with an adjusting screw. □