

SMALL WOODEN PATTERNS FOR MODEL ENGINEERING

by Syd Pipe (Australia)

Part II

Tools and Equipment

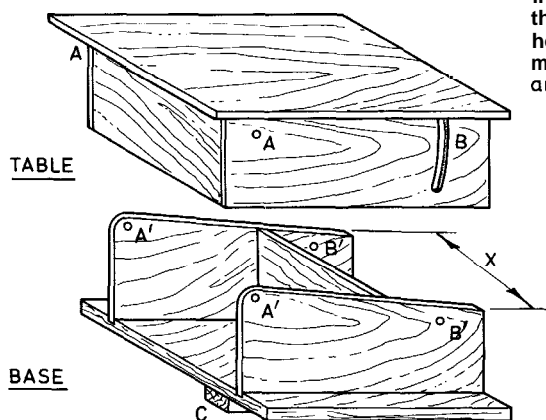
The (American) Pattern Makers Manual lists a comprehensive range of tools and equipment for the professional pattern maker. This range fills several pages. The list includes many of the tools used by the fitter and turner and by the cabinet maker, carpenter and joiner. The model maker, with his requirement for small castings, can produce creditable patterns with a relatively small range of hand tools and a couple of machines, plus some ingenuity.

Some form of wood turning lathe is essential. In his book *Modern Wood Turning*, Gordon Stokes claims that a small lathe operated by a portable electric drill can produce excellent work. I have never tried this out, but as most pattern turning relies on "scraping" to size, rather than "cutting" as in ornamental turning, this arrangement should be adequate for small work. A few turning gouges, a parting tool and various scrapers are the required tooling for the lathe. A disc sander is invaluable. A sander and stand can be made relatively easily to fit the lathe. The disc should be the maximum standard diameter the machine will accept. Abrasive discs from 5 in. to 36 in. dia. in various grits, are commercially avail-

able. A bandsaw, a finisher, a drill press, a circular saw and surfacer all make the job easier, but suitable hand tools can do the work just as well but not as speedily.

A bench and a woodworker's vice are both necessary. My choice is the Black and Decker "Workmate", which I use almost exclusively. With a couple of home made fixtures and a selection of G clamps (one can't have too many of these) the "Workmate" has many advantages; for those considering purchasing one I would recommend the largest model. A surface plate or a piece of plate glass is required for marking off, as are one or two small angle plates. The latter can be made of scraps of timber or of plywood but cast iron is preferable. For tool sharpening one needs a bench grinder, oilstones and gouge slips. With the exception of the lathe tools, all other cutting tools should be razor sharp to produce the best work. After grinding they need finishing on the oilstone, followed by "stropping" on a leather pad. On the subject of grinding I prefer to use an aluminium oxide wheel as specified for grinding high speed steel on a tool and cutter grinder (Norton spec. 38 A60 JVBE, Carborundum spec. 6A 60

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Material plywood or chipboard.
Table should fit snugly over base in direction X. Hinge with a pin thru holes A-A' after positioning holes A so that the table can be moved about the hinge pin above and below the horizontal

Clamp with a screwed pin and wingnut through slot B and hole B!

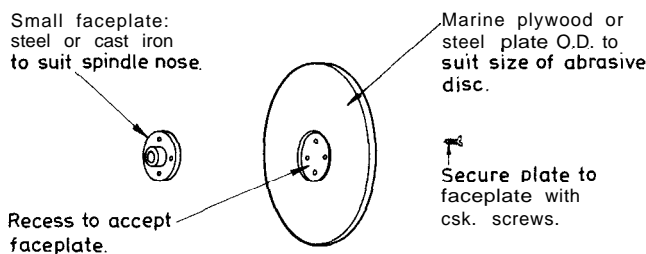
Fit stop C against lathe bed so that table is at right angle to lathe axis. Clamp base to lathe bed.

Table surface will be more durable if faced with a plastic laminate (e.g. formica.)

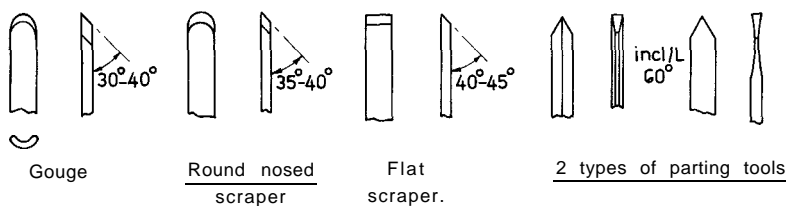
Finished height of assembly to be on ϕ of lathe spindle.

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SANDING TABLE



DISC SANDER



The angles for grinding are indicative only.

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WOOD TURNING TOOLS

J8V75). These wheels are relatively cool cutting but have the disadvantage that they wear rather quickly and consequently need frequent dressing.

The list of hand tools can be as extensive as one chooses, but for those who are not fortunate enough to possess woodworking machines, the following list should be adequate for all but the most complicated work.

Scriber — with one end pointed and the other knife-edged, or a fitter's scriber and a scalpel (there are a number of substitutes for the latter)..

Dividers — 6 in.

Mortice Gauge — the type with a roller cutter is best.

Square — Engineers.

Protractor.

Straightedge.

Rules — The choice of graduation is yours, contraction rules are available from patternmakers suppliers, graduated for various metals and in various lengths.

Screwdrivers.

Universal surface gauge.

Calipers — Inside 6 in.

— Outside 6 in.

Claw Hammer — small.

Nail Punches.

Cutting Nippers.

Plane — No. 3, smooth, bench.

Chisels — Patternmakers' paring chisels (and gouges) are much longer than other woodworking chisels. They are fairly expensive; a 1/2 in. and 1 in. are suggested initially. Firmer, bevel edged

chisels could be substituted but are not as versatile.

Gouges — Patternmakers' gouges are preferable, say 1/4 in. to 1/2 in. to begin with.

Spoon Gouges — 1/8 in. and 1/4 in. are indispensable for cutting in fillets.

Bits — Your choice will naturally depend on the drilling equipment at your disposal. Various sizes will be needed. To cut holes accurately for position, size and cleanness there is no substitute for "Forstner" bits, unfortunately they are expensive.

Saws — Rip saw, 4-1/2 ft, 26 in.

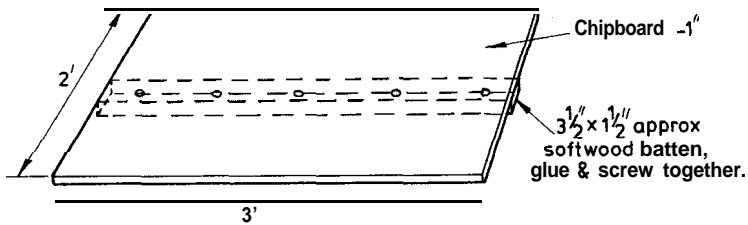
Panel saw, 10 ft, 22 in.

Coping saw.

There are small, fine toothed saws available from model shops which are very useful, mine are called "razor saws".

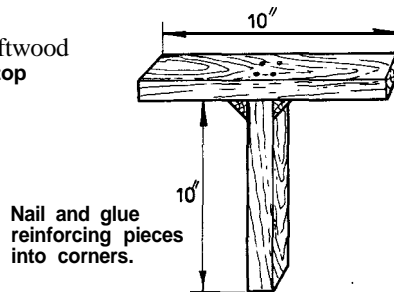
Materials — As we are dealing with wooden patterns, the main material will naturally be wood. Any timber product or well seasoned wood can be used, but with limitations. Some woods split when nailed, others are too open grained to permit a fine finish, others are difficult to work, especially turn or carve, some are naturally oily and do not glue well. Those who are familiar with the vagaries of different timber species will be selective when using scrap pieces. The timbers listed below are those recommended for pattern making; if none are available in your area, seek advice from a timber merchant or a timber advisory department.

Jelutong — from Malaysia, a soft close grained even textured timber, light coloured, works easily, carves easily, accepts nails and glue readily. An



DEMOUNTABLE BENCH TOP FOR WORKMATE

Make up from 4"- 2" dressed softwood nail and glue. Punch nails in top face well below surface.



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PARING BLOCK FOR WORKMATE OR VICE

excellent all round timber for a low to medium run of castings. A bit too soft for finely detailed work, damages easily.

Sugar Pine — USA. Similar to jelutong to work but somewhat harder and longer in the grain. Sometimes has hard resin veins which make carving across the grain somewhat difficult. Supplied in various grades.

Lime — England. Probably the best all round timber for a small number of castings. Carves easily to fine detail. (In Australia very difficult to obtain) **(Pear wood also, Ed).**

Huon Pine — Tasmania. Similar to English lime but somewhat oily. Difficult to obtain outside Tasmania.

Maple — Queensland. Fairly hard, works well with sharp tools. Carves well, accepts nails and glue readily.

Mahogany — African, Honduras, Brazilian. Similar to maple to work. Open grain, needs filling to obtain a smooth surface.

Other species which are recommended but with which I have had no experience for patternmaking include Cedars-various types, Idaho Pine — Northern White Pine (USA), Poplar, Pacific Maple (some grades), Nyatoh (Malaysia), Klinkii Pine (New Guinea), Redwood (Sequoia-USA), Cherry, Beech (Australia — good if you can get it), Philippine Mahogany (Meranti — includes a number of species, some work very well), Myrtle (Australia) and Teak.

Other Materials:

Glue — PVA glue should meet all requirements, except for very oily timber.

Nails — General purpose jolt head, including brads and panel pins.

Woodscrews.

Wooden dowel rods — various sizes.

Plastic wood for filling and fillets.

Body filler for filling and fillets.

Wax fillets — obtainable from patternmakers' suppliers.

Shellac — Make up a varnish by filling a container with flakes then just covering with methylated spirits (Methyl Alcohol). Note — fill once, allow to settle, then top up.

Powder Pigment — Red, Yellow and Black. Mix with shellac solution if you want to colour-code your patterns.

Wood Grain Filler.

Beeswax — for filling and forming small fillets.

Abrasive Paper or Cloth -your choice, the cheaper grades work well on jelutong and sugar pine.

Abraders in various shapes and several grades are available commercially and are very useful.

Abrasive Discs — for your power sander.

Steel Wool — fine finishing.

Plywood — thicknesses as required — marine ply is recommended for long runs, but for a few off, interior grade is O.K.

Veneer — for laminating thin sections. Aluminium sheet can also be used, rough up the surface to clean and provide a key, glue up with epoxy (Araldite).

Lead pencils — 2H, sharpen to a chisel point, use to accentuate scribed lines.

Lumber crayon — for surface marking (see text later).

Continued