Setting Up a Basic Model Airplane Workshop

Introduction

Many beginners who entered the hobby with ARF models are reluctant to build their first model airplane. There is a perception that building is difficult, the tools are complex, and that setting up a workshop requires the dedication of a large area of the home and the investment of large sums of money.

None of these things are true. While there are advanced modelers who have devoted entire rooms or even separate buildings to the enjoyment of model airplanes, a basic model airplane shop can be set up unobtrusively in a corner of nearly any home.

This article will guide a beginner through the setup of a simple but adequately equipped model airplane shop, sufficient for the construction of most model kits and many scratch built models as well. Where possible, it will show how common household items and a few basic tools available in the household aisle of larger grocery or variety stores can substitute for more expensive modeling tools.

Where specialized tools are available or desirable, this article will help in choosing which of several possible tools will give the biggest value, and help prioritize among the many wonderful power and hand tools available.

The Workspace

The minimum space needed to build the average R/C trainer is an area about 5 feet by 5 feet. While it may be helpful to have a larger area, this space will be adequate to construct most free flight, control line and radio controlled model airplanes. A location is needed that is close to an electrical outlet, is well lighted and is out of the way of household traffic. The space should be such that it will not be a problem if wood scraps, sanding dust and glue end up on the floor and can easily be cleaned up. One possibility is to find a carpet remnant or a large throw rug to put down under the worktable.

The Building Board

A good flat building board is the most important and basic tool; fortunately, it is also one of the least expensive. Although there are factory made building boards available, thousands of models have been built on a standard 2x4-ceiling tile, or a similarly sized piece of Celotex sheathing. Another cheap alternative is a 1/4 sheet of 1/2" or 5/8" drywall. Often one or more of these materials are available free from construction sites or friends in the trades. A good store bought alternative is a cheap cork faced bulletin board from a local variety store. Only the board itself will be used. The frame is removed and the pieces saved because there may be some use for them in models.

To keep the building board straight and free of warps, bows or twists, the building board should be laminated to a sheet of 3/4" Medium Density Fiberboard ("MDF"). Such a laminated building board can be easily picked up and moved out of sight if the workspace needs to be cleared for other activities. A heavy-duty spray mount adhesive such as 3M Hi-Strength 90 should be used to laminate the building board to the MDF substrate.

A worktable will also be needed to set the building board upon. Many modelers have discovered that a card table set up in a corner is a perfectly adequate workbench for building smaller models. Others have used a kitchen or dining room table, but this can be a source of annoyance for other family members. If a chest freezer is available, the flat top makes a nice worktable. Ideally, there will be a corner of a room where a workbench can be set up on a semi-permanent basis, and if there is room, a
hollow core door resting on ledgers mounted to the wall makes a very nice, sturdy and stable modeling workbench.

If a built in workbench is not possible, but space is available, setting a door on top of a couple of saw horses works well. A nice temporary workbench can also be built by setting the door on top of a pair of cheap filing cabinets. Sandbags placed in the base of the filing cabinets will make them more stable and free of wobble free.

If a hollow core door is used as a bench top, be aware that the quality of these doors varies. The cheapest of the hollow core doors have a cardboard honeycomb core, which does not adequately support the outer veneer layers. It is best to shop around for a better quality door with a wood lattice core. These tend to stay flat over time. Ideally, the worktable should be sturdy enough that a person can sit on it without damaging it, but with a portable worktable this may not be possible.

If a permanent workshop is set up, an L or U shaped pair of work tables along two or three adjoining walls makes an excellent family craft room where two or more people can work together, or on separate projects. These tables can be made out of hollow core doors or doubled layers of particle board or MDF, supported by wall ledgers and 2"x2" pine legs.

The most important criteria for the workbench or table is that it is stable, and that it gives a flat, clear space for a building board, where it can be left set up.

Basic Tools

To get started with nearly every model airplane kit, some basic tools will be needed. These are the tools a builder must have before starting to build.

T-Pins

Dressmaker's pins will be needed to pin parts together and to pin them to the building board. The best kind to get is T-pins. They come in several sizes, and in packages of 50 or 100. The smaller ones will be better for pinning the parts together. Bigger ones will work better for pinning large parts down to the building board. Since they are quite cheap, the best thing to do is get a package each of large and small. It is also handy to have a package of the regular round-headed dressmaker's pins around.

Hobby Knife or Utility Knife

Most of the cutting required to build the average R/C trainer can be done with a hardware store utility knife. The STANLEY 99E retractable utility knife comes with enough spare blades to finish a plane. Both the knife and the blades are readily available at variety and hardware stores.

An X-Acto knife handle and a supply of #11 blades is nice to have as a second knife, but the blades are more expensive and sometimes hard to find. Modern kits have many pre-cut parts, so an official hobby knife is not mandatory, and the utility knife will come in handy for many household chores as well.

Sandpaper

An assortment of sandpaper will be needed. The 3M company sells an assortment of five sheets that has Very Fine (220) Fine (150) and Medium (100). One of these packages and a package of
coarse (60) should be bought.

A good sanding block can be made from a sanding belt and scrap piece of 3/4" Medium Density Fiberboard cut down to whatever size will fit tightly inside the sanding belt. If one is made with a coarse sanding belt and one with a fine sanding belt, they will last through three or four planes. This is highly recommended. Good quality sanding belts should be used for these blocks, and when they get clogged up with wood fibers or glue, they can be run under a faucet and cleaned with a scrub brush. They will last a long, long time if this is done.

**Giant Sanding Slab**

It is also recommended that a full sheet sanding block be made from a 9"X11" slab of MDF or particleboard. A sheet of 60-grit sandpaper is laminated to one side and 150-grit to the other using spray mount adhesive. This block will lie flat on your workbench and is very handy for truing up the joints on the many sticks and pieces that go into a model airplane.

**Ruler**

A grade school ruler is sufficient, but a good quality steel ruler much preferred. A twelve-inch ruler is a necessity. I also find it very useful to have a steel yardstick, which does double duty as a straightedge, and an architect's or engineer's scale, the triangular kind.

**Glue**

A stock of several types of glue should be kept. These are the types commonly and traditionally used for model building.

- **Duco Cement**
  
  Many modelers still use this for general purposes. It is available it at the grocery store or the corner drug store. This is a solvent based wood glue that dries clear, fairly quickly, but gives some time to pull things apart if mistakes are made. Hobby stores sell a similar glue called Ambroid, which is like Duco, but it has a pretty amber color.

- **Carpenters Glue**
  
  Yellow carpenter's or woodworking glue also works very well for building model airplanes. It has the advantage of being water based and therefore less toxic. Also, plain old Elmer's White Glue does a good job of gluing the woods used in model airplanes. For most purposes, white glue is stronger than the woods used, and is easy to clean up. The yellow glues tack up and dry more quickly, but they are more expensive and more difficult to clean up.

- **Epoxy Glue**
  
  Thirty-Minute Epoxy Glue is traditionally used to glue firewalls to fuselages, install landing gear mounts and join together wing halves. It is fuel proof and very strong.

- **Cyanoacrylate Glue**
  
  Cyanoacrylate glues are sometimes called CA or Super Glue. CA comes in three varieties; regular, sometimes called thin, medium, and thick. CA is very fast setting, and
strong. It is also relatively expensive.

To use CA, the joint must be fabricated very carefully, and the parts are clamped or held tightly together. A drop of CA is placed on the joint, which is almost instantly welded together. This is convenient, however, if care is not taken, the glue will penetrate through the pores of the wood and stick clamps or fingers to the model airplane.

CA gives off a fine, smoky mist that can really sting eyes and noses. These fumes can cause severe allergic reactions. Some people build up a heightened chemical sensitivity to CA over time. It is important to have good air circulation in the building area if any possibly toxic glue is used, but this is especially important with CA.

Covering Iron

Most beginning modelers will cover airplanes with plastic iron on, heat shrink film. This is the cheapest and fastest way to get a nice, fuel proof finish on models. If a lot of planes are going to be built, the builder will want to get a specially made hobby iron and also a hobby heat gun, however, a plain laundry iron can be used in a pinch, and is fine for the first plane. Inexpensive irons can be bought at a thrift store by those on a tight budget.

Secondary Building Tools

There are some other tools that may be needed to finish an airplane. They may not be needed right away, but they will come in handy before construction is complete.

Combination Square

A six-inch combination square is very useful to line up the pieces as everything is glued together. They cost about six dollars. A combination square has a steel ruler that slides back and forth. It will help in making accurate 45-degree and 90-degree corners, and to mark out repeated measurements. Stanley Tools and Johnson Tools make good ones. If a six-inch combination square cannot be found, a 12-inch can be used but this will be awkward to use on model airplanes.

Protractor

The plain, grade school variety of protractor in the familiar semi-circular shape is all that is required for laying out and measuring angles.

Compass or Dividers

The grade school type compass does the job of laying out circles and arcs, but a set of good quality wing dividers also does a nice job of transferring measurements from drawings to wood.

Drafting Triangles.

Although these are not strictly necessary, they are very helpful to line up parts and for making sketches of assemblies. Standard 45-degree and 30-60 degree triangles are very useful in all
types of layouts.

**Razor Saw**

The razor saw is another tool that is not strictly necessary, but well worth the price of 8-10 dollars. A razor saw makes much faster straight or angle cuts in balsa and hardwood stock.

**Coping Saw**

A coping saw is also not strictly necessary, but for sawing out irregular shapes in thick balsa or in aircraft plywood, it is much faster than using a knife. Again, this is well worth the price of 8-10 dollars.

**Screw driver**

A Lutz or Enderes Tools 2 in 1 or 4 in 1 screwdriver has have both straight and Phillips tips. The small 4 in 1 tool will probably fit every screw on as airplane except for the socket head screws or "Allen head screws" on an engine. Over time, builders will probably acquire a set of miniature or jeweler’s screwdrivers and other miniature tools for fastening nuts, bolts and screws.

**Lineman's Pliers**

A set of heavy-duty lineman's pliers does a variety of jobs in the model airplane shop, from bending landing gear to forming push-rod ends.

**Needle Nose Pliers**

Needle nose pliers are very useful for reaching into tight model airplane spaces.

**Vice**

Everyone needs one good vice. For models, a small machinist's or blacksmith's vice with three-inch jaws and a small anvil is great for forming and shaping light metal parts.

**Advanced Tools**

These are tools that are nice to have, but may not be necessary until several models have been constructed. First models can probably be successfully built without them.

**Allen Wrenches or Ball Drivers**

A set of Allen wrenches will be needed to fit the socket head screws on an engine. Ball drivers are similar to Allen wrenches, except that they have a rounded tip that allows driving socket head screws from an angle. This makes socket head screws quite convenient to use in inaccessible areas of the airplane. These will not be needed right away, but as modeling activities advance, more and more uses will be found for these.
Drill and Drill Bits

A drill is very nearly a necessity, but will probably only be needed for a few holes on the first airplane. It is placed in this category because the builder may get by borrowing one. Eventually, however, the builder will want to get a variable speed reversing drill. A corded type will work, as will the higher voltage cordless drills, but a 7.2-volt cordless is very convenient and can be bought for around $35. Hand powered drills will work too, but good ones are getting hard to find, and are awkward to use and quite expensive.

A 13 drill bit assortment, in sizes from 1/16” to 1/4” will cost about $15, and will probably handle every hole you need to drill on the first airplane.

Taps and Tap Wrench

A tap is a tool that is used to cut or grind machine screw threads in metal. If the kit has metal motor mounts, the builder may need to drill and tap bolt holes in the mounts. There are sets available that contain both the tap and the matching drill bit, and these are nice to have, but the builder may want to just buy the size needed when it is needed. A set should have the 2-56, 4-40 and 6-32 sizes commonly needed for models. If the wing is mounted with nylon bolts instead of rubber bands, 10-24, 10-32 or 1/4-20 sizes will be needed as well.

Dies

The counterpart to taps are dies. These make threads on metal rod, wire, or even wooden dowels. These are not needed very often, but are nice to have.

Clamps

No wood working shop can ever have too many clamps. For model airplanes, builders frequently get by using lots of rubber bands, but a small selection of clamps is very useful. Clamps should always be bought in pairs. Two (2) or three (3) pairs of woodworker’s parallel beam hand screws should be sufficient. The 8 or 10-inch sizes are great for many modeling purposes, depending on whether larger planes or smaller ones are built. Jorgensen brand is about the best, and is well worth the price. A pair of 3 or 4-inch C-clamps is useful too. The cast iron type is preferred over the stamped steel clamps.

Power Tools

There are various power tools that are nice to have and considered a necessity by some builders. These are not required by beginners but make the job much easier in some cases if they are available.

Palm Sander

Sometimes called a finishing sander or orbital sander, a palm sander fits in the palm of the hand and uses 1/4 or 1/6 of a sheet of sandpaper. A palm sander is useful for rapidly shaping balsa blocks into finished cowls and wingtips. However, if care is not used, a palm sander will grind away half of the model it is realized. It must be used carefully and sparingly, if at all.
Scroll Saw

A scroll saw is a stationary, powered, coping saw, some times called a jigsaw. The scroll saw uses a reciprocating blade. A scroll saw makes short work of cutting out irregular shapes especially in hardwood and plywood.

Band Saw

The band saw has a continuous steel band with teeth on one edge. The band saw does many of the jobs that a scroll saw will do. Properly set up, the band saw makes cleaner cuts than a scroll saw, and will handle much heavier materials, but it cannot cut as tight a radius and it cannot make enclosed cuts.

Drill Press

A drill press makes short work of precision holes in wood, plastic, or metal, and has a variety of other uses such as slot milling, precision grinding and sanding.

Specialty Tools

There are many power tools made especially for modeling. One that has become quite popular is the Dremel Moto-Tool. These hand held motors can drive a variety of attachments from drill bits to cut off wheels, grinders and sanding attachments.

The Great Planes company has recently introduced a tool they call a “Slot Machine” that makes short work of cutting hinge slots.

There are also small table saws, stationary belt and disc sanders, surfaced planers and an infinite variety of other power and hand tools that can be useful in a shop. Those who are experienced woodworkers or machinists will already be familiar with some of them.

A builder's budget is the guide but many championship models have been built on card tables with a minimum kit of hand tools.

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