



THE ULTIMATE HOME WORKSHOP

Getting started in woodworking is always the hardest part. But getting your shop set up right will make everything that follows a little easier. This article will show you how.



Photos by Al Parrish.

When DIY - Do It Yourself Network, asked *Popular Woodworking* to help produce its “The Ultimate Workshop” series, which first aired in May, we sent DIY (www.diy.net.com) a barrage of tips and advice the staff had accumulated over decades of professional and home-shop woodworking.

We took a look at all our advice – enough to fill a book – and boiled it down into an essential guide for anyone planning their own ultimate home workshop.

But what is an ultimate home shop? It depends on you. However, whether you’re going to build re-

production furniture using only hand tools, or make plywood shelves for the den, many of the ideas presented here will help you set up your ultimate home workshop the right way, the first time.

Location, Location, Location

Most woodworkers can put their shop one of two places: the garage or (in about half the country) the basement. If you’re lucky or wealthy you might have a separate outbuilding to consider.

If you’re in a part of the country with basements, they can make handy shops. Basements are usually pre-wired for electrical outlets and lighting, and already have plumbing and heat. But a basement shop poses problems, too. You need to get lumber, large equipment and finished projects up and down steps. The size of your doors, the number and slope of your steps and any corners you might have to turn can make a basement shop impossible.

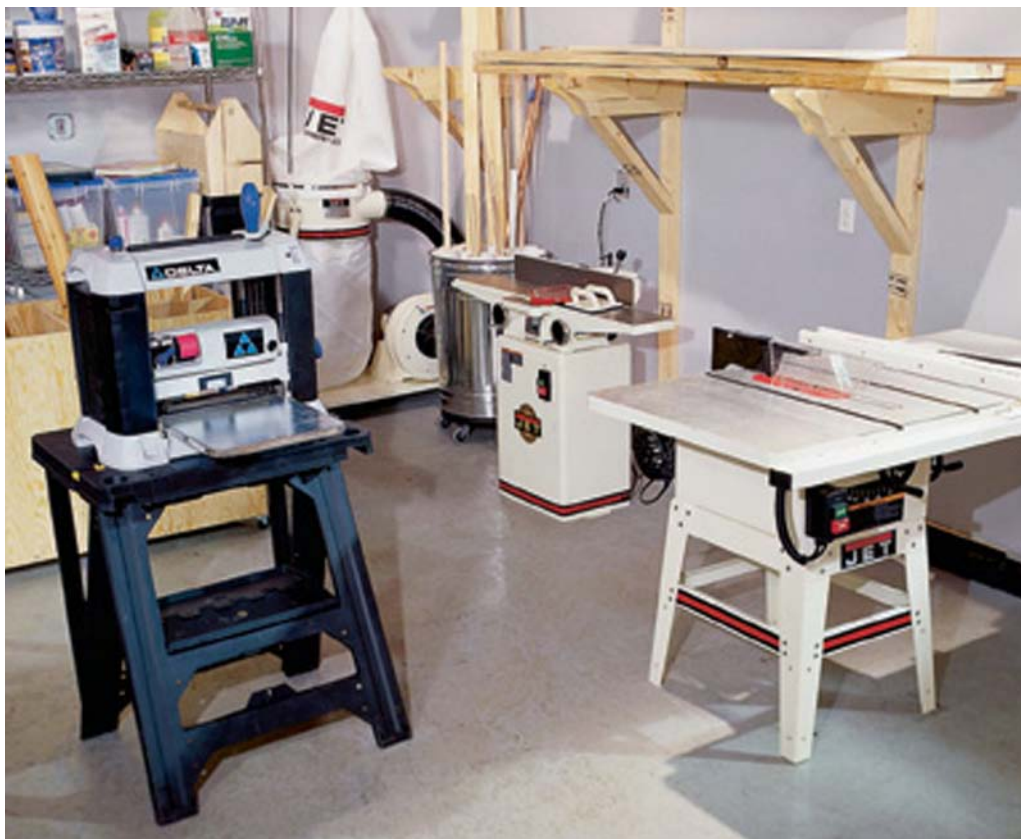
by David Thiel

Comments or questions? Contact David at 513-531-2690 ext. 1255 or david.thiel@fwpubs.com.

Another basement problem is ceiling height. Older homes may only have 6' or 7' ceilings – less than optimal when working with taller projects.

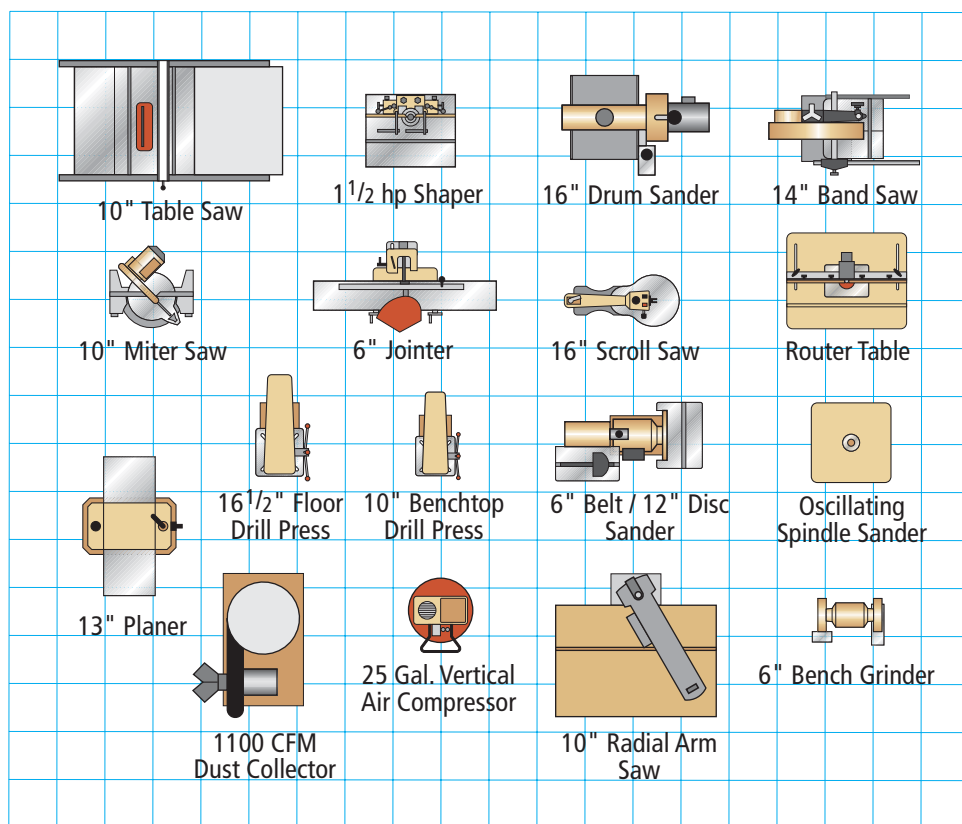
Finally, basement shops test the patience of your family with the dust and noise. Here’s a tip for quieting your basement shop: If there’s drywall on the ceiling, add a second layer. If the ceiling is open rafters, so much the better. Add insulation, then add a layer of drywall.

If you don’t have a basement, or it’s already got a pool table in it, a two-car garage makes a great workshop, offering easy access



This corner essentially makes up the "machining" area in the shop. Lumber is stored within easy reach above the jointer, with the planer positioned ready to be used by simply turning around from the jointer. With the wood milled, it's a simple step to the table saw to cut the pieces to final size. The stand for the planer is designed to knock down quickly and fold flat against the wall. The planer itself stores under a cabinet, or even under the right-hand wing of the table saw. The portable dust collector is stored in the corner, but it can be attached quickly to any of the three machines in this corner for clean and safe working conditions.

We know that not everyone has the same size workspace, so we thought we'd give you some templates to photocopy and cut out to plan your own shop. The grid is a 1/4" pattern in full size (one square equals 1'), which will work with most graph paper you buy in tablets at the store. (Trust me, paper tools are much lighter to move around.) Also, when organizing your tools, remember to include space for the wood on the infeed and outfeed sides.



through large doors, a solid poured concrete floor and a location that's unlikely to get you in trouble when you make dust.

With a garage shop, your first decision is whether the cars will stay out permanently or just when you're woodworking. If your workshop will include some major machinery, the cars will be experiencing some weather.

Other concerns with a garage shop include: upgrading your electrical system (more outlets and perhaps 220-volt service); plumbing and lighting the shop (and heating in colder climates).

A third option may or may not be available to you. If you have an outbuilding on your property (or the space and funds to build one) they make great shops without the noise and dust concerns. If you're building, this also allows you to get everything just the way you want it.

Once you've decided where your workshop will be, it's time to decide how it will be used.

Not Just for Woodworking

We all know that a lot more happens in a home workshop than just woodworking. Hundreds of home fix-up projects take place there, from painting a closet door to rewiring a lamp.

So even though you're planning on lots of woodworking, don't overlook the needs of other projects. Plan on extra storage for paint cans, mechanic's tools and a drawer or two for electrical tools and supplies. But before we worry about storage, let's pick some tools and machines.

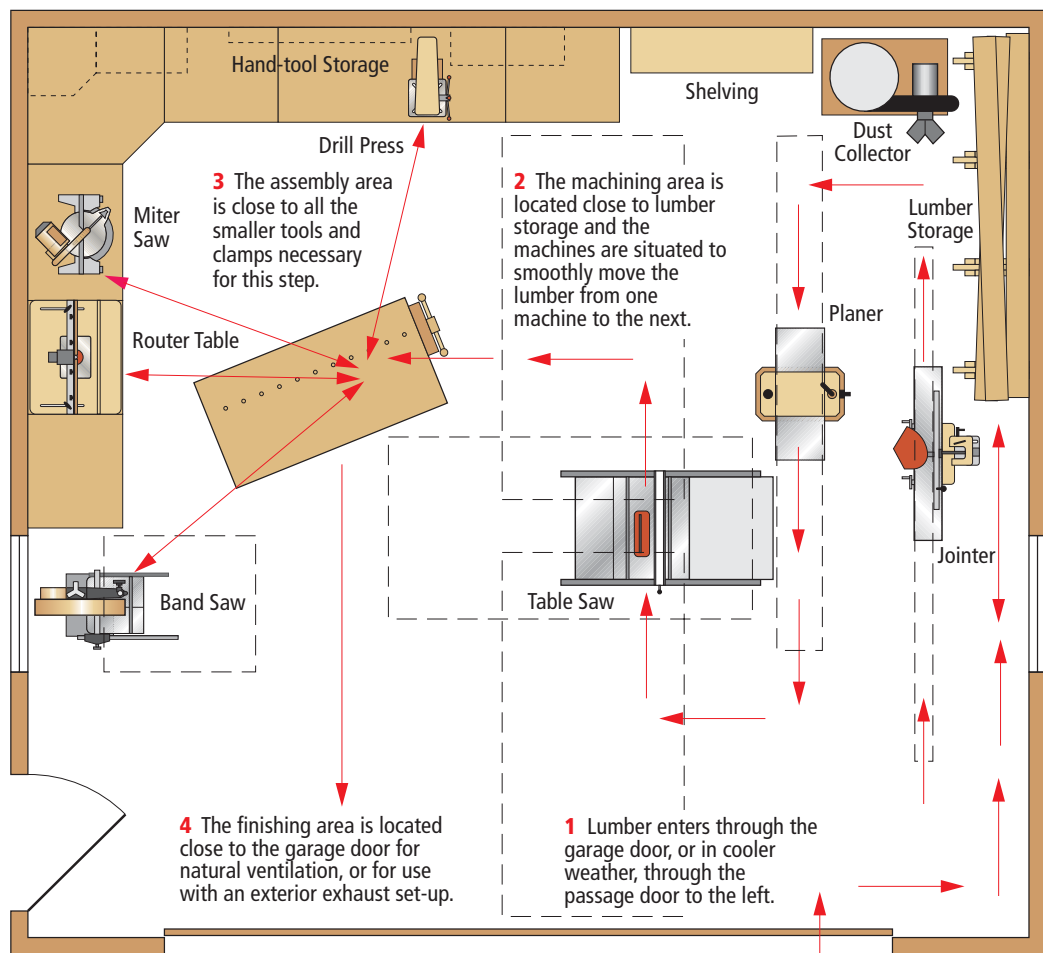
Picking Your Tools

If woodworking will be an occasional activity, or space is at a high premium, consider buying benchtop machines. You can do a lot of work with a benchtop drill press, planer and band saw. While not as versatile as their floor-model big brothers, we recommend them for the small shop.

On the other hand, we don't recommend benchtop table saws for any but the tiniest of shops. While a benchtop saw might be smaller, it's also less powerful and less accurate. Find a way to squeeze a contractor saw or cabinet saw in your shop on a mobile base.

The same goes for the jointer. Like the table saw, benchtop jointers just don't satisfy the needs of most woodshops. We recommend carving out a section of floor space along the wall for a stationary 6" or 8" jointer.

With these five machines (and an assortment of portable and hand tools) you'll be ready to build cabinets and shelves. However, if turning is your passion, a lathe may be at the top of the list, and the jointer and planer may disappear altogether. It's your choice.



Our example of work flow in a two-car garage. This is the same shop as shown in the other photos, so you know it works on more than paper. Just follow the red arrows to the easiest path for woodworking. The dotted lines show approximate infeed and outfeed room for lumber.

There are other tools that you'll want to have (or may own already), including a miter saw, scroll saw and bench grinder, but these can be added as you go along, and they don't take up much space.

Placing Your Machines

Once you know what machines will be in your workshop, you need to determine their location. Allow for infeed and outfeed space and place them near machines they're used with most frequently.

Each machine requires space for itself and space to use the tool. With a table saw, you need to be able to maneuver a 4' x 8' sheet of plywood to the back, front and left side of the saw. This means a pretty big footprint for the ma-

chine when in use (you can overlap the "in-use" footprints of multiple machines). We've added a diagram above that shows the necessary working footprint for each major machine. We suggest you draw up your shop on graph paper, cut out the tools (at left) and start trying different arrangements to see what works.

The trick to positioning your machines in your shop is to create an orderly flow of work from raw lumber to the finished product. The work flow always starts where the wood is stored, or where it enters the workshop. Next, the lumber is prepared for use by jointing, planing and sawing to the proper dimensions. Conveniently, the machines required for these

steps are also the ones that need the most power and create the most dust, allowing you to locate your power and dust collection in a "machining" area, with these machines close to one another.

From the machining phase, the next step is joinery and assembly, usually requiring hand tools, a band saw, drill press and hand-held power tools, such as a router, biscuit joiner and brad nailer. A stable workbench or assembly table are ideal for this step.

The assembly area should be located out of the way of the machining area, but not so far away that you end up carrying lots of milled lumber across the shop. Your hand and small power tools should be easily accessible (stored



The cabinets you choose for your shop can be premade kitchen cabinets, cabinets you make yourself, or cabinets designed for your woodworking needs, as shown in the photo. These cabinets offer simple drop-in platforms for a variety of benchtop tools, with slide-in/slide-out storage for easy access. Storage options include drawers and doors, depending on your needs. Each of the units is capable of easy dust collection hook-up for any benchtop tool, and one of the drop-in panels will allow the cabinet to function as a downdraft table. But don't forget the lowly pegboard for storing hand tools. It still provides the easiest, least expensive and most adjustable hanging storage around.

in handy drawers or on the wall), and quick access to clamps will make things easier as well.

Once assembly is complete, the third phase is finishing. No matter what finish you use, a clean, well-ventilated area is required.

When applying a varnish or shellac finish, the vapors given off as the finish dries are flammable and should be kept away from any ignition points, such as water heaters or space heaters. In concentrated exposure, the vapors can also be harmful to you, so ventilation is important. Also, when storing solvent-based finishes (such as varnishes) a fireproof storage cabinet is a must.

If you're going to use a spray-on finishing system, ventilation is even more critical to move the overspray away from your lungs.

From here, the rest of your shop will fall into place in the space left. Keep in mind that to save space, many tools can be stored under cabinets until needed.

Putting Things Away

While we've talked about where your lumber storage should be in

the work triangle, we haven't talked about how to store it.

There are three types of wood stored in a workshop: sheet goods (such as plywood), rough or full-size lumber, and shorts and scraps. Shorts and scraps are the pieces you can't bring yourself to throw away. Not only are there usually more of these pieces, but they're harder to store than plywood or rough lumber because of their odd shapes and sizes. Let's start with the easy stuff first.

Plywood takes up the least amount of space when stored standing on edge. Most of us aren't storing more than a few sheets of plywood, so this can often be stored in a 10"- to 12"-deep rack that can slip behind other storage or machinery. This keeps it out of the way but accessible.

Rough lumber is best stored flat and well-supported to keep the wood from warping. Keeping it up off the floor also keeps it away from any water that may get into your shop. A wall rack with a number of adjustable-height supports provides the easiest access while keeping the wood flat

and dry. See our "\$30 Lumber Rack" in the April 2002 issue, which is available for sale at www.popularwoodworking.com.

Shorts are the hardest to store, but a rolling box with a number of smaller compartments holding the shorts upright allows easy access to the pieces, and it keeps them from falling against and on top of each other. For plans for a good bin (and 24 other shop projects), get a copy of the book "25 Essential Projects for Your Workshop" (published by *Popular Woodworking Books*).

Carrying on with the storage concept, one category that deserves special attention is finishing materials. While waterborne finishes are gaining in popularity, flammable finishes in cans, bottles and jars should be stored in a fireproof storage box and kept clean and organized at all times. A tall cabinet with lots of adjustable shelf space makes room for the many sizes of finishing supplies. For more details, see the "Flexner on Finishing" article on page 86 in this issue.

Other workshop storage needs

fall into the cabinet and shelving category. Just because there's a tool sitting on the floor against the wall doesn't mean you can't hang a cabinet or shelving above it. In fact, in many cases there are accessories and supplies you need near that tool that belong on a shelf right above it. And don't hesitate to go all the way to the ceiling with storage. Even though the top shelves are harder to get to, we all have things in our shops that don't get used very often.

Many of us have purchased a tool that had a base tossed in to sweeten the deal. It seems like a good idea, but if you stop and think about it, it's truly wasted space. Throw away that stamped-steel base and build a storage cabinet to go underneath the tool.

When choosing base storage cabinets, you'll have to decide whether you need drawer cabinets, door cabinets or both. If you're storing large, odd-shaped items (belt sanders, arc welders) a drawer can be a real problem. They're designed to fit only so much. A door cabinet is a better place to store bulky items.

On the other hand, if you're storing smaller items (door hinges, glue, seldom-used jigs) a door cabinet can be a great place to lose these items. Items seem to migrate to the back of the cabinet; and until you're down on your knees peering into the hole, you won't find them. While drawers can get pretty junky if you're not careful, you'll at least be able to stand up and stare down into the drawer looking for your lost metric tape measure.

Beyond doors or drawers, you have two general choices in cabinets – buy 'em or make 'em. If you make your own cabinetry, you will almost certainly get exactly what you need for the best space utilization. You'll also likely save some money, but it'll take a fair amount of time.

Buying shop-grade cabinets

from a home center can work out well. There are any number of utility cabinets available in all shapes, sizes and finishes.

One other option is plastic or metal storage units, such as the Tool Dock cabinets shown below, designed specifically for a workshop. These units offer features that are set up to maximize tool use and convenience.

Beyond cabinets, open shelves are good for storage, but they're a bit of a trade-off. While you can easily see what you're looking for, so can everyone else – whether it's attractive or not.

Wire-frame shelving is not a good choice for storing small pieces. And knowing the weight limit of the shelves will keep you from picking up all of your wood screws from the shop floor when the shelf collapses. Also, while

you may view deeper shelves as being capable of storing more, (which they are) recognize that smaller items on the shelf can get pushed to the back and get lost.

Where'd I Put That Hammer?

Certain hand tools (hammers, screwdrivers, chisels and hand saws) are always being reached for – frequently when only one hand is free. For that reason these and other hand tools are usually stored hanging within easy reach on the wall.

There are all sorts of ways to hang hand tools on a wall. Some woodworkers build special cabinets for their hand tools. The more common solution is pegboard. It's inexpensive, versatile and easy to mount. With a variety of hooks to choose from, you can make pegboard storage adapt

to almost anything. And pegboard doesn't have to be dark brown. More frequently it's being offered in colored plastic, or you can simply paint your own.

But pegboard isn't the only simple option for hanging tools. You've likely seen "slat wall" in department stores holding up socks and ties. This material is essentially a $\frac{3}{4}$ " board with T-shaped grooves cut in it and a colored plastic laminate on top. It provides much of the versatility and convenience of pegboard, but looks nicer doing it. It'll cost a little more, but it's your choice.

Then there are the workshop experts who mount things right to the wall. By using drywall mollies (or covering your walls with painted particleboard) and a variety of hanging storage accessories available in any home-center



A good workbench is one item you should build into your plans from the start. We've put the bench in this shop so it's central to all the activity. It's just a short step away from the saw and planer, and only a few feet away from all the hand tools and other benchtop tools. And with it isolated in the center of the room, all four sides of the workbench can be used. You can order complete plans for this bench (which costs just \$175 to build) from our web site at www.popularwoodworking.com. The plans are \$9.95.



Here's a little closer look at the interchangeable drop-in panels and dust-collection hook-ups for the benchtop tools.

store, you can make a wall of tools that will be uniquely your own. In fact, many folks add outlines of the tools on the wall (or on pegboard) so they know exactly where it belongs, and more importantly...if it's missing.

Power, Lights, Ventilation

Now that you know where everything belongs, it's time to power it up. While it's one thing to be able to check the tool manuals for the power requirements, it's quite another thing to go about hooking up that power yourself. If you're uncertain about adding new breakers or running wiring, we recommend you get a licensed professional to help you out. But you can help them out by determining the voltage requirements for your tools, whether 110 or 220 volts, and also how many amps each tool requires.

You'll need to provide adequate amperage for each grouping of tools. A contractor's saw will usually require a 110-volt,

20-amp connection, but you can use that same circuit for your planer or jointer because these machines are seldom used simultaneously. Band saws and drill presses can also share a circuit. Another way to improve motor performance and safety is to use a heavier-gauge wire (12 gauge versus 14 gauge) for your stationary tools.

Other things to include in your power requirements are lighting, bench outlets and any ambient air cleaners. Even if you're blessed with lots of windows in your shop, we all work on cloudy days and in the evenings. So proper lighting can be critical. Make sure you have plenty of general lighting throughout your shop, and add task lighting over dedicated work areas such as your workbench and tools that require careful attention to detail, such as the band saw or scrollsaw.

Don't skimp on power outlets. Heck, put one everywhere you can imagine plugging in a tool, radio or fan. Make sure there is a

good power strip with numerous outlets mounted near your bench because cordless-tool battery chargers will use them up fast.

Wood dust is bad for the lungs. By properly using dust collection to keep the larger dust particles out of the air to start, and air cleaners to pull the smaller particles out of the air, the workshop can be a safe and lung-friendly place.

Dust collection is usually set up one of two ways – either with a central collection system using metal or plastic ductwork and a single large dust collector, or with multiple dedicated collectors (though often these can be shared by more than one machine).

A central dust-collection system is a fairly involved topic that entire books have been written about (see "Controlling Dust in the Workshop" by Rick Peters [Sterling Publications]). You need to determine the amount of air movement required to collect from the many different machines, make sure your collector is capable of that performance, and locate and use blast gates in the duct work to maximize the performance of the machine. If a central dust-collection system is your preference, you should spend some in-depth research time on the topic and maybe even consult a professional for advice.

Smaller portable dust collectors are often more affordable and can provide adequate collection for a couple of machines. By using multiple hoses and closeable gates to control which machine is being collected, one machine can do double or triple duty. Each machine is rated by the "cfm" (cubic feet per minute) of air that it is capable of handling. We've included a quick reference chart that rates each machine by the suggested cfm required to extract dust. By using the chart you can easily determine the size and num-

ber of dust collectors you need.

Ambient air cleaners pull the dust from the air that the dust collectors miss. They are designed to exchange a specific amount of air determined by the size of your shop. Choose the air cleaner (or cleaners) to best serve your space, then let them go to work. Air cleaners require less attention than a dust collector, but you do need to clean or change the filters on a regular basis so they operate properly.

Another air-quality decision is finishing. Because of the volatile and harmful vapors given off by solvent-base finishing products, they will be labeled for use in a well-ventilated area. Whether that means a dedicated finishing area with appropriate air-extraction equipment, or just making sure the garage door is open and a good fan is in use, finishing should take place in an area that ensures safety from explosion, or inhalation of fumes. **PW**

MACHINE DUST-COLLECTION STATISTICS

Machine	Req'd CFM
12" Planer	350
13" + Planer	400
Shaper	400
Band saw	400
Radial arm saw	350
Table saw	350
Disc sander	300
Jointer	350
Drill press	300
Scroll saw	300

Static Press. Loss/ft.

4" Duct	.055 in./ft.
5" Duct	.042 in./ft.
6" Duct	.035 in./ft.
7" Duct	.026 in./ft.
8" Duct	.022 in./ft.