

# Tech Tips-011

## A help series

Dedicated to the dissemination of Detail model building methods and techniques.

Materials and methods presented here are not intended as the best or only solutions to the modeling challenge(s) discussed, rather as methods and procedures which have a proven record of success in actual use. Please keep experimenting with new materials and techniques as this is the only way to expand the fields of knowledge.

by *John E. McCoy Sr. NAR-15731 Nov. 2,1998 Revised Nov.02,2001, Rev-2, 04-22-2016*

### ***Paint Booths, Chambers and Cabinets:***

Recently many requests have been received asking for information on "Home" spray paint "booths", chambers and vapor/over-spray evacuation methods. I must admit this is one of those nagging problems most modelers face in all the hobby modeling fields, rocketry poses a few special needs not usually required by other hobbyist, so this writing will center on the needs of the model rocket hobbyist but may be adapted to most other crafts.

Most other modeling and crafting can use much smaller "units" in which to spray paint and/or airbrush their wares. Badger airbrush and Testors, Inc. both produce a "self-contained" filtered box "booths" with blower which sells for around \$180.00-\$350.00. But wait; We are getting a little ahead of myself, the first question one should be asking is ***where*** should we set up to apply the finish to that current working masterpiece?

Past experience, and much fan mail has shown the most widely used paint spray "booth" is the great outdoors, followed closely by the good old "Garage" and trailed in the far distance by the basement. Neither of the first two can accommodate the most critical of the ingredients for a decent spray paint job: controlled temperature and humidity. If at all possible ***never*** attempt to prime or paint a model when the ***ambient air temp.*** and ***surface to be painted are below 55 degrees F and the humidity is higher than 65%.***

Most currently available hobby spray paints and airbrush paints contain chemicals that create odors the rest of the family will not be happy about and may even be harmful if concentrated. This ***includes*** the "water based" and "Acrylic" paints. To compromise, we need to vent the vapors and over-spray from the "house" as quickly as possible while maintaining optimum temperature around 70 degrees F and humidity 50%. Well how the heck can we do that!

Personally I've been blessed with a family who tolerates my experimenting and is somewhat used to "unusual smells" coming from my Lab-bor-atory, Ha! Ha! Haaa! down Igor, Down...MORE POWER MASTER! MORE POWER!!! HO! I'm sorry that's another story... I'm back now, lets see where was I, Oh yes, unusual smells and dust coming from the basement. Some type of venting is required to allow painting indoors and a way of addressing the over-spray problem. In years past, these paint problems were addressed by building two different types of paint booths. I'll discuss both shortly however here is where I should mention the commercially available self-contained filtered paint "boxes".

Micro-Mark; a small tool specialists, located in New Jersey (1 800 225 1066) lists # 82430 15"-30'-12" spray booth at Lists for \$763.10 and sells for 399.95 plus postage. This polypropylene translucent box has a filtered back and a 110v. AC 3100 rpm blower which strains the vapors and over-spray but still exhausts into the room, I am told it does eliminate "much" of the odor but not all. I have a problem with the size, at 15" x 30" x 12" high it will work for most of the small Estes level one and two models but not much else, it is good for PMC modelers. Testors also lists a similar "box" of almost the same dimensions 10" x 12" x 20" and also filtered and blower fitted and sports about the same price tag. There are a number of others out there if buying a booth is more along the lines of interest.

As is usually the case in my modeling exploits I decided to build my own "chamber" years before ever seeing any of these ready made wonders. My first attempt at painting indoors was while I was an apartment dweller. This necessitated my unit be small, compact and portable, as it would have to be positioned at my patio door to vent the fumes with the help of an old 20" box fan blowing out the door from behind the painter, and have an internal light bulb "heater" to help maintain the proper temperature during those cold winter evening painting sessions. I also decided to have a two speed rotating table/stand to allow turning of the model remotely without touching or disturbing the inside of the chamber. The "turntable" was accomplished with the help of my old "steel" erector set motor chassis and gear box with a hand controlled on/off switch and manual speed selection, slow for paint application and a fast 40 rpm for drying that after some minor tweaking, all but eliminated runs and drips. This cabinet was fabricated from a 4' x 8' sheet of 1/2" Foam Core cut into 24" x 48" pieces fastened with duct tape (yes; it is a structural material Ha!) and PVC cement at the joints. The top, bottom and platform levels are 1/2" plywood scraps cut to 23" x 23" fastened to the foam Core with carpenters glue and # 8 x 1" hex head screws and # 8 washers. After installing the top and bottom flush with the ends of the foam core I measured up 3 inches to allow for the erector gear box and installed the "platform" level plywood insert and sealed all around with carpenters glue and a silicone bead. A centered 9/64" hole passed the 7" long steel 1/8" dia. launch rod piece attached to the changeable cogs in the gear box below. Originally the rod had a rubber grommet that quickly wore out and was never replaced. A short section of 3/8" dowel was center drilled and epoxied to the rod. Thus allowing 13mm, 18mm and 24mm motor casings to be slide onto the dowel to support the model being painted. In one of the rear corners a piece of 16/2 SJ electrical cord was run from the electrical connection box in the base beside the gear box through the top plywood panel and into another externally mounted utility box and cover with two on/off switches to control the lights and gear motor in the base. A hole was cut in the center of the top plywood panel to accept a standard bulb fixture and a w/p rubber bulb base grommet help to make the unit some what vapor resistant a simple duplex bulb holder was used to hold two 150watt incandescent bulbs. With this arrangement model up to 40" in length could be painted without spraying directly on the bulbs. These two bulbs produced enough heat to warm the inside of the chamber from the chilly outside winter temperatures to 70 to 80 degrees in about ten minutes. I suggest if anyone wants to build a unit like this themselves they use vapor tight fixtures to avoid the possibility of fire.

While were talking about "fire and explosion proofing I would like to dispel some of the fears I have heard about this type of painting.

Fears of aerosol spray can paints causing a fire or explosion are very remote. I ran some tests on my Foam Core paint booth a few years ago. I constructed a 36" x 60" x 84" tall plastic enclosure to simulate a very tightly closed room environment. Placed my light bulb booth unit in the structure and prepared to paint as usual without the aid of the fan. I chose a mid summer day with a temp of almost 90 degrees, the thermometer on the booth read over 110 degrees, this is much warmer than would ever be obtained under "REAL" conditions. Humidity was a dry 45%. I sprayed Krylon, Color Works, Testers, Pactra, and Duplicolor paints, along with an airbrushed home mixture of 1-Shot lettering enamel and thinned Testers model paints. All were sprayed 12" from the test pieces of scrap body tube and purposely directly on the very hot uninsulated, ungasketed 150 watt bulbs & Sockets. After repeated attempts to break the bulbs or get a spark from the fixture, I gave up. I completely covered 6 different 150watt bulbs and drenched the lamp sockets with very wet paint. On the third set of bulbs, I first wasted a half can of paint to have a dense cloud in the chamber and structure. I simply could not get the can type paint to ignite. If you spray on an open flame it does a great job of burning, but in the air the thinners and vehicle flash so quickly it apparently is not a major hazard. I would still use reasonable caution by using rubber lamp gaskets at the lamp-holders and venting the vapors with a fan blowing from behind the painting person. Why behind the sprayer? A fan motor is an open spark source so it isn't advisable to tempt fate by straining your thinners and vehicles through the electric motor. By placing a fan behind, its wind pressure will push the vapors out the open door and also greatly reduce the overspray on the floor.

Airbrush paints were another matter. By using turpentine, or other thinners to prepare these paints for spraying we are introducing some very volatile chemicals into an enclosed area. In my experiments I did not get these to explode but I did get several fire flashes when I sprayed directly into the loosened, unprotected lamp-holders. That said I still could not burst the bulb by direct spray application nor did spraying at normal distance cause any adverse reaction. I will stress again if you are careful and relatively responsible with where and how you direct you paint you should not have any trouble with the units we will be discussing. I have used these chambers extensively for more than 40 years while never having a single problem.

This small chamber has served me very well and is still in use at the time of this writing for some of the smaller models or when I have several models to paint. I did not vent this chamber instead the front door was fitted to allow leakage around the top, bottom and sides at the hinges, a plastic film tarp was placed under the wheeled unit to collect the leaking over-spray. As for the fumes, well as I said this unit was wedged in the patio door and a box fan directed the fumes out above and below the unit. It was a little chilly in the living room for a brief period but, with the door on the unit shut, the model spun in 70 to 80 degree comfort. See drawing tech-tip 11a at the end of this article for more detail, and an idea of what this crazy thing looks like. One "improvement" made to this chamber was to install a 1/8" clear acrylic window in the door with a simple thermometer foam taped to the inside to monitor air temperature. Cost for this complete unit at today's prices is just under \$ 55.00 dollars without the erector set motor, I can't find one to price!

During the early 1980's I found and purchased to \$85.00 dollars a "Portable Paint Chamber with blower". I have no idea from which mail order catalog I found this prize and have not seen any add for them since. Over the past 30 some years I have modified this booth to accept models up to 78" in length.

The "Booth" is actually a 36" wide by 36" deep and 84" tall folding round tubular steel X frame covered or more accurately inserted in a 12 mil thick Clear Vinyl plastic "Bag" enclosure with rear Velcro ringed blower windows and front snap fastened full length "door" and upper 18" x 24" wide sprayers window. I will furnish a drawing and parts list using materials anyone can find at the local lumber yard and hardware store to build a very slightly modified version of my booth, see Tech-Tip drawing 11b for the parts list. The back of my chamber has three 6" x 6" blower openings at three different levels. In the 30 or so years I've had this tool I have never change the blower location so I will only show one opening in the drawing.

This all brings us to the most important and also the most expensive part of the booth; **"The Blower"**. A 4.0" mini wheel (Squirrel Cage) blower with a 4" dryer hose adapter plate is essential for proper operation inside your dwelling. I have 25 feet of dryer hose I drag over to the basement door mounted exhaust port and store the hose behind the unit when not in use. The blower of this size will set you back \$80.00 to \$125.00 dollars depending on what C.F.M. rating is chosen. W. W. Granger is a good source to start our search for this item, but not by any stretch the only source.

I can hear people out there saying "Hay, I don't have the 12 mil clear vinyl enclosure bag!" Yes I know, we'll make one just like I made my replacement. Lowe's and Home Depot sell a material called "Visqueen" which is an industrial weight clear vinyl sheeting and it comes in 8, 10 and 12 mil thickness. Purchase a 25' roll at least 6 feet wide, that's about \$ 12.00-14.00. Cut a piece 20 feet long, than half the section. use a large black magic marker and straight edge (a piece of 2"x 4" wood will work) to mark lines at 36" and 84" along the 72" width and crease the panels by folding the vinyl along the 120" length. You now have all the plastic needed to form the enclosure bag, with excess to double the bottom and form the door panels and flaps. Most of the 36" x 36" top **EDGE** area can be trimmed leaving at least 4 inches front and back, completely double the bottom and fold the corners up at least 3". The SEALING process can be done a couple of ways using a "Monocote" iron or a cloths iron set on low with the Vinyl under and between terry cloth towels.

Fold and temporarily tape the seams to be sealed with masking tape, don't use too much. Lay a towel under and one on top of the seam. Iron until the edges appear to be clear and flat. Remember; you are working on the inside of the bag, so think in reverse. Continue all around the bag until all four corners, top and bottom are sealed and seams are solid. Rough cutout the top front window and the rear blower window where shown on the drawing. Center slit from the bottom of the front window to within 3 inches of the bottom vertically, then along the bottom horizontally leaving 2" on each side. Keep all the scraps as they will become door flaps and the main window flap. We will also be adding a 2 inch wide overlap strip to the front and bottom slits cut with the earlier rough openings. Reinforce all corners with triangular scraps and apply strips of 1" wide Velcro to the blower opening(s). If a snap setter is not available in your tool box, "Velcro" could also be used for the front closure hardware however, I do not recommend it. Set the button snaps 6 inches apart along all of the front overlapping door halves and the three sides of the upper spray access flap. Trim excess vinyl to 3/4 to 1" and turn the "bag" right side out.

If we substitute 1" x 1" square lumber for the tubing and round all the shape corners it should be possible to construct the fold flat X frame for about \$20.00 using 4 screw steel "L" brackets at all inside corners. 1/4-20 x 2 1/2" round head machine bolts are used as the pivot points and wing nuts on the inside. Insert the frame in the bag and unfold gently spreading the frame to snugly fill the bag. You will need 2 pieces of 1-1/2" x 1-1/2" x 1/8" aluminum angle to form the inside stiffener and slide out shelf. If you choose to not make the shelf removable be sure to allow some method of swinging the shelf down for models larger than 22 inches. Attach the blower to two 84" sections of 1/2" PVC or other stiff rails and apply Velcro around the intake opening adjust for a proper fit and you should be ready to paint.



Several years ago I wanted to find a fairly inexpensive paint chamber that I could use for Micro and Mini models under 15" long. After looking again at the major hobby suppliers, I was a bit frustrated by the very high cost for very little space. All the models from Micro-Mark, and several on-line sources were the type with internal filtered exhaust blowers still costing over \$200.00-700.00 dollars. What I was looking for was something around the same size but with an external squirrel cage type blower or none at all that I could adapt to my needs. It took over a year but I finally found something suitable a Harbor Freight Supply of all places.

This little all steel construction "box" is only 12" x 12" x 22" long with an acrylic clear window along one 12" x 22" side and a very nice 4" squirrel cage blower mounted on the back. At the time I paid 80 bucks for the complete unit. I haven't seen this item in their flyers for the last couple years but it's worth looking into.

I adapted this small paint chamber to work with my existing 4" dryer hose exhaust system mating it with an in-line T section that can be close off if I am using only the large paint chamber or both open when doing multi models at the same time. To hold models I've altered a spring driven Microwave turntable with a spent 18mm motor casing centered on the top and a 3" thick Styrofoam 6" diameter disc with holes to hold 1/4" hardwood dowels for mounting micro models while painting. Having a micro booth has taking most of the heavy work from my original small paint booth. Having both large and small booths in the basement means I can paint whenever needed.

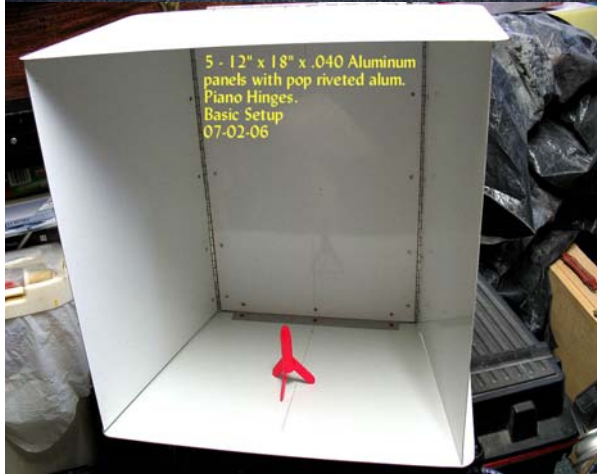


### **My Answer To the Cardboard Box Paint Booth:**

As is almost always the case I've run into a couple occasions that I'd like to have a small Micro or Mini size portable spray booth to take on long vacations trips or to building sessions for demo's and outreach groups. To that end I came up with what I call "My answer to the cardboard Box spray paint booth".

Since it has to be small and has to fold up nearly flat I decided to use 5- .040" x 12" x 18" white aluminum sign blanks as the building materials for this project. Combined with 4 pieces of 2" aluminum piano hinge and about a dozen pop rivets this little fold down box makes a GREAT little outdoor spray paint chamber. With 18" of clearance it is possible to paint some fairly large rockets. It would be fairly easy to extend the 18" sides of this booth using other materials like 1/4" plywood or hardboard to enlarge this fold up booths capacity without causing to much overspray or blow over concern. It does require the use of a plastic tarp or drop cloth to catch the overspray as the front is completely open. Outside this chamber is pretty much breeze proof once faced opposite the prevailing wind. It provides good shade which helps control tack time during hot weather. In the winter the model should be removed immediately after spraying is complete to the inside of the house. It should be remembered that the model and the spray paint should be at about the same 50+ degree temperature while spraying in cold weather. Warming the can in hot tap water is a great way to accomplish this.

Below are a few photos of this little outdoor spay booth that may be of help. Completed this 12" x 12" x 18" folding booth cost about 35.00 to build including the sign blanks, hinge and rivets.



All Aluminum, portable. Store & Use Outdoor Micro Spary Booth. "Answer to the Cardboard box:D" First Use. Priming two micro models. 07-02-06

All Aluminum, portable. Store & Use Outdoor Micro Spary Booth. "Answer to the Cardboard box:D" First Use. Priming two micro models. Top closed 07-02-06



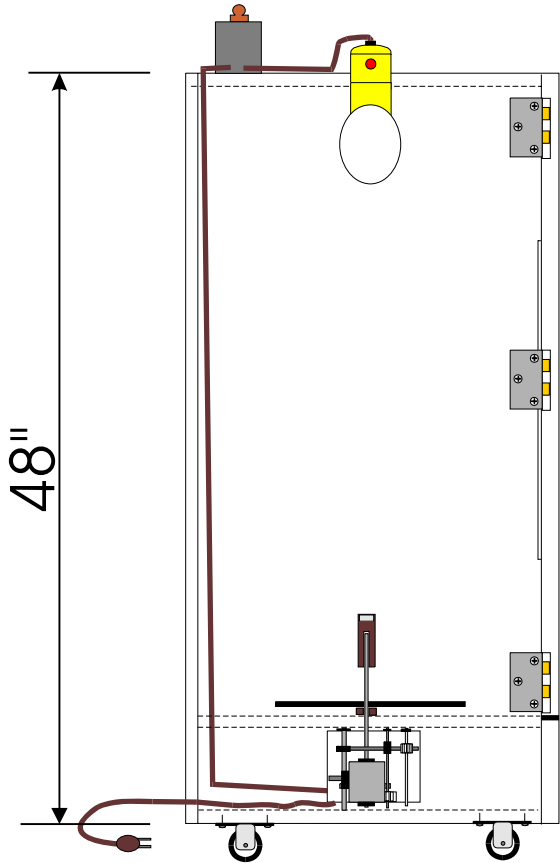
I'm sure I have missed or omitted something along the way so pay close attention to the drawing and photos as you go. I can suggest any of these booths for the most serious modelers. The large booth will easily cost somewhere around \$150.00 to \$225.00 depending on the Blower chosen. If you are handy, I'm sure there are other ways of adapting the basic plans to fit your individual needs. As always if I can be of further help with this or any of the Tech-Tip series please contact me directly.

Keep em flyin well painted.

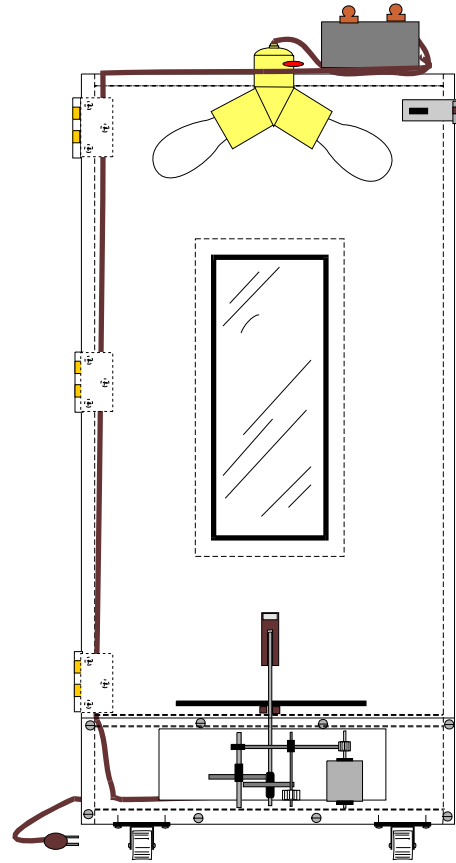
# Tech-tip 11a

## 24" X 24" X 48" BOX TYPE PAINT CHAMBER

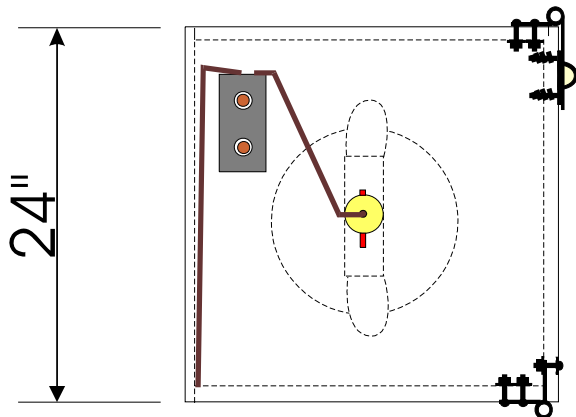
side



front



24"  
**TOP**

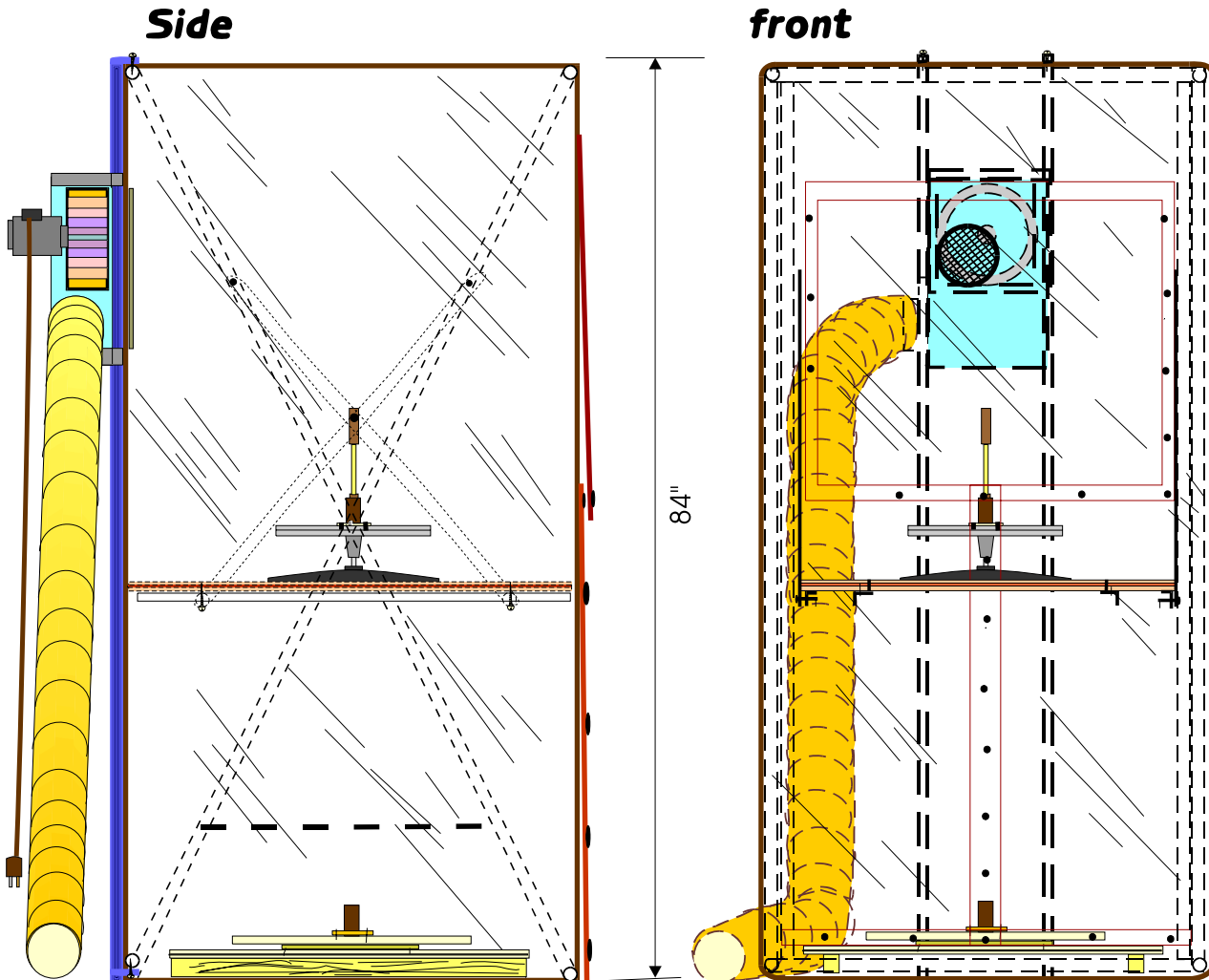


parts list:

- 1- 48" x 96" x 1/2" Foam Core
- 3- 23" x 23" x 1/2" Plywood
- 1- 10" x 15" x 1/8" clear acrylic plastic.
- 1- 12" dia. x 1/8" acrylic disc.
- 4- 1/2" caster wheels with screws
- 1- erector set electric gear box or equal
- 14 feet- 16/2 lamp cord wire with plug.
- 1- Std. lamp socket
- 1- dual lamp adaptor
- 1- utility electrical box with blank cover
- 2- 10 amp spst switches
- 3- 1 1/2" butt hinges
- 1- 1 1/2" hasp with hook.
- 23- 6/32 x 3/4" R.H.M.S. with nuts and washers
- 50"- double faced VHB tape (for window)

# Tech-tip 11b

36" x 36" x 84" Blower driven paint booth



## Parts List:

- 43'- 3/4" tubing or 2" x 2" lumber
- 25' x 10' roll 8mil visqueen clear plastic
- 1- 3100 rpm 4" or better blower (120 volt)
- 12' - 1" hook and loop fastener
- 8' - 1/16" x 3/4" flat iron
- 5' - 3/16" round rod (leg spreaders)
- 6' - 2" x 2" x 1/8" alum. angle
- 1'- 1" x 1" x 1/8" alum. angle (shelf to flat iron clips)
- 1- 36" x 36" x 3/4" Plywood
- 2 - 1/4-20 x 2 1/2" R.H.M.S with nuts and washers
- 4- 3/16" hitch pins with clips
- 8 - 1" x 1" steel corner angles or rolled tubes
- 25' - 4" dryer hose
- 20 - # 6 x 1/2" R.H. S.M.S
- a monocote iron or a cloths iron.
- snaps and a snap setter.

