AIR SOURCES FOR AIRBRUSHING

One of the absolute necessities for air brushing is a reliable air source. Without a source of compressed propellant an airbrush is just an expensive steel tube.

An airbrush is a remarkably simple piece of machinery. Paint is held in a reservoir, whether it is a bottle on the bottom or a cup on the top or side doesn't matter, and a source of propellant is applied to the brush. When the trigger is pressed on the airbrush the propellant is allowed to flow around the nozzle which causes paint to be pulled out of the reservoir. That is an important and frequently misunderstood point: The propellant does NOT blow paint through the nozzle, it flows around the nozzle and pulls the paint out of the reservoir because of the vacuum created at the tip. If pressure were applied to the nozzle it would cause the paint to blow back through the reservoir and cause some nasty problems.

The airbrush does not care what kind of propellant it uses, which is why I have so far refrained from using the term "Air". The propellant can certainly be, and frequently is, compressed air but it does not have to be. Carbon Dioxide, Nitrogen, and some other inert gases also work quite well as sources of propellant for an airbrush. The only requirements for a source of propellant for an airbrush are:

1. The propellant must be within the proper pressure range for the airbrush. Large compressors frequently pressurize their tanks to 100 psi (pounds per square inch) more. This is FAR more than would ever be used with an airbrush, so the pressure must be regulated down to a value that the airbrush can use.
2. Sufficient volume. Volume is related to pressure, but they are not the same. An example is a garden hose with an adjustable nozzle on it. The PRESSURE of water in the hose is controlled by how far you open the faucet to which the hose is connected. The actual VOLUME of water that flows through the hose is controlled by how far you open the nozzle at the end of the hose. Regardless of how much you open or close the nozzle at the end of the hose, the pressure never changes. The volume, how much water actually flows out of the hose, does change based on how you set the nozzle. An airbrush is similar in that it requires a certain volume of air to be able to pull the paint from the reservoir.
3. The propellant needs to be dry. When air is compressed the moisture that has been absorbed into the air is squeezed out. This moisture collects in the tank and hoses and is picked up by the air flowing through the system. Eventually it will be blown out of the airbrush in the form of water droplets. Seeing a paint job you have worked on for a good while ruined by a drop of water getting spit out of an airbrush will make you realize how important a dry source of propellant is.

Based on these criteria, you have several choices for a propellant source:

? **Propellant Cans** – There are canned sources of propellant available for airbrushing. They are marketed under several brand names, and are basically just like a can of spray paint without the paint. Their advantage is that since they use an inert gas instead of air the propellant is very dry when it leaves the can. Their disadvantages, however, far outweigh that single advantage.

First is the fact that as the cans are used they get very, very cold. After just a few minutes of use ice will actually start to form on the outside of the can. As the gas is chilled the pressure in the can drops, and as the pressure in the can drops the supply pressure to the airbrush also drops. This means that virtually as soon as you start spraying you have to start adjusting the paint flow on your airbrush. You will constantly have to open the needle more and more just to compensate for the lower pressure in the can. Then, when you stop spraying and the can starts to warm back up, the pressure increases so that when you start

spraying again the paint volume is much higher than you expected. This problem can be alleviated somewhat by sitting the propellant can in a dish of warm (NOT hot!) water while it is in use. This will not eliminate the problem but it will help keep the can temperature more stable.

The next disadvantage of propellant cans is that they become quite expensive over time. It might seem cost-effective at first to purchase a $10 can or propellant instead of a $100 compressor, but in the long run a compressor is cheaper.

- **Propellant Tanks** – These "Tanks" are far more than just a can of gas. They are commonly seen as propellant sources for soft-drink dispensers or for welding. They contain gas under very high pressure or gas that is in a liquid state and returns to a gaseous state when it is released. Unlike the propellant cans these tanks, even though they will chill somewhat when used, typically have enough reserve pressure that there is no reduction in the pressure seen at the airbrush.

  These types of tanks are excellent propellant sources for airbrushing. The gas, typically carbon dioxide or nitrogen, is completely dry so no moisture trap is needed. A tank, depending on the size, will last most hobbyists six months to a year before it needs refilling and even then, refilling the tank is typically inexpensive. In many cases the places that fill them will lease a person a tank, however it is the responsibility of the person to provide their own regulator set. The regulators must be able to handle the very high pressure of the tank on the inlet side, so a typical compressor-type regulator is not at all suitable.

  One very important consideration when using a compressed gas tank is that the tank absolutely must be solidly secured so that it cannot be knocked over. What typically happens when a tank is knocked over is that the regulator or neck of the tank is broken. When that happens the gas begins to escape and it is under very high pressure. The tank frequently becomes a projectile and can cause serious damage or injury. They are dangerous and must be protected from damage.

  Another consideration is that your choice of gas must be something that is not flammable and not toxic to breathe. Oxygen, hydrogen, helium, gases of this type would not be suitable. Carbon dioxide or nitrogen work very well.

- **Air Tanks** – Many people use an air tank that is typically used for inflating a flat tire as an air source. They will take the tank by their local service station and pump it up with the station's compressor. When the pressure gets low they just go by and refill it again. This works well in most cases, however it does take some work to get the tank set up properly. The tanks are available at many hardware and auto parts stores, however they normally have a fittings suitable for inflating tires not use as an airbrush air source. This requires the addition or changing of some of the fittings.

- **Hobby Compressors** – "Hobby" compressors, in my opinion, are those that are designed strictly for the purpose of a hobbyist to use on an occasional basis. These would include the inexpensive compressors from manufacturers such as Testors. Many of the airbrush manufacturers also have "Budget" compressors that would fall into this category. This is not to insinuate that these compressors are inferior or "Cheap" just that they are not designed for continuous or heavy duty use. These types of compressors are generally inexpensive, ranging from about $50 to $200, and are typically very quiet. They will work quite well for a while but may start giving trouble over time or if they are exposed to heavy use.

- **Airbrush Compressors** – I use this term only to differentiate this type of compressors from the Hobby compressors. This category of compressor contains those that are specifically designed for high-volume airbrushing. They are frequently used by nail salons, t-shirt artists, and those who use an airbrush for hours at a time. They are robust and able to provide a lot of air for a long period of time without overheating. They are normally completely silent when

in operation. The drawback is that they can be quite expensive, ranging from several hundred dollars up.

? **General Purpose Compressors** – Another phrase that was invented and doesn't really mean anything. General Purpose compressors are those that can be found at many home improvement or hardware stores. They can either have a tank or be tankless, and are designed for tasks other than just driving an airbrush such as high-capacity sprayers, air tools, and so forth.

More About Compressors ….

Since compressors are the most dominant source of propellant for an airbrush I want to spend a little more time discussing them.

In general, ignoring the categories I mentioned above, compressors fall into one of two categories. They will either be "Diaphragm" compressors or "Piston" compressors.

"Diaphragm" compressors have an air cavity and a flexible membrane in them, along with a pair of flexible valves. The flexible diaphragm is made to vibrate at a relatively fast rate. This can be accomplished by any of several methods, but the result is that is the diaphragm is pulled away from the air cavity air is pulled into the cavity from the outside. As the diaphragm is pushed into the cavity air is expelled from the air cavity and made available for use. The flexible valves are positioned so that the inlet valve opens when air is drawn into the cavity and closes as air is expelled from the cavity. The outlet valve operates in an opposite manner and closes as air is drawn into the cavity and opens when air is expelled.

"Piston" compressors use a piston connected to an electric motor by an eccentric shaft. As the motor rotates the shaft causes the piston to rise and fall within a sealed cylinder. As the piston falls air is drawn into the cylinder and as it rises the air is forced from the cylinder. As with the diaphragm compressor there are sets of flexible inlet and exhaust valves that control how the air is routed through the compressor.

Diaphragm compressors tend to have more pulsation in the air flow than piston compressors do. I don't know exactly why they do, but they do. Anyone who has held their finger over the end of the hose of an aquarium air pump knows exactly what the pulsation feels like.

Compressors are also categorized as "Tanked" or "Tankless". A "Tankless" compressor does not have an air tank and the exhaust from the compressor is fed directly to the device (in our case and airbrush). When a compressor has a tank the exhaust from the compressor is fed into a tank and the tool uses air from the tank. The tank, therefore, acts as a reservoir for the air.

All "Tanked" compressors will have an automatic pressure switch of some sort. When the compressor is turned it is actually the pressure switch that is enabled. The pressure switch monitors the pressure in the tank, and when it drops below a certain preset low pressure level the pressure switch turns on the compressor motor. As the tank pressure reaches another preset high pressure level the compressor motor is turned off. This keeps the pressure in the tank between within a certain range.

Many people, myself included, will turn their compressor on and let the tank fill. Once it fills they turn the pressure switch off and just use the air in the tank until it is exhausted. The 15 gallon tank on my compressor will allow me to paint for most of the day with only one filling.

Noise …

One important consideration when looking at compressors or other air sources is noise. Compressors are frequently noisy. And when I say noisy I mean that literally. Mine can be heard anywhere in the house when it is running. It would be completely unsuitable for anyone living in an apartment or condominium because every time it was turned on the complaints would start.

If quietness is a consideration, then you need to give it due consideration. Make sure that the compressor you are considering is actually quiet. Manufacturers tend to be quite optimistic when it comes to slapping "Quiet Operation" labels on their compressors, and in fact mine is touted as being a "Quiet Operating" compressor. If it is I would hate to be in the same building with a "Noisy" one! Hobby or airbrush compressors are generally much quieter than "General Purpose" compressors. In fact many are completely silent, but many times you will pay for that silence in the price of the compressor. Compressed gas tanks are completely silent with the only noise the hiss of escaping gas.

Other Necessary Devices ….

Pressure Regulator -- As mentioned near the top of this document a pressure regulator is frequently necessary to keep the compressor pressure at a level usable by an airbrush. Most compressors will generate much more pressure than is necessary for airbrushing. In fact many compressors can generate enough pressure to cause an airbrush hose to rupture. The compressor I use has a tank pressure of 140 psi and I seldom use anything over 15 psi for airbrushing. If I were to connect the airbrush directly to the tank pressure (assuming nothing ruptured) I would blow through a paint cup in only a couple of seconds and would never be able to control the flow. A regulator is absolutely necessary to reduce the pressure to something that is useful for our purposes.

Moisture Trap – Also as mentioned earlier moisture is a common enemy of compressed air, and it must be dealt with unless you are willing to run the risk of ruining a paint job. Moisture traps are used to separate water droplets from the air before it is expelled through the tool. They should be located as close to the tool as possible so that they capture all of the moisture before it gets out.

Particle Filter – Tanks and fittings rust over time because of the moisture in the air. This rust can flake off and be blown down the air line. A filter to capture these particles is important. Luckily most moisture traps also double as particle filters.

Keep in mind that with inert gas tanks neither a filter or moisture trap is really necessary. The gases used are completely dry.

Warranty – Compressors tend to destroy themselves. They generate a lot of heat and unless this heat is properly dealt with it will eventually damage the compressor. A good warranty, in my opinion, is very important. I purchased a compressor in December, 2003. In October, 2004 it died. It took nearly 8 weeks to get the parts to repair it, and when it was finally fixed it lasted another three months before it died again. This was, in my opinion, a fault of the manufacturer but since the compressor was out of warranty I chose not to have it repaired again. I purchased another compressor and this time splurged for a 3-year extended warranty.

Note that this commentary is just my own personal opinion, and others may differ. If you would like to add your comments to this document feel free to email them to me and I will be glad to include them.

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