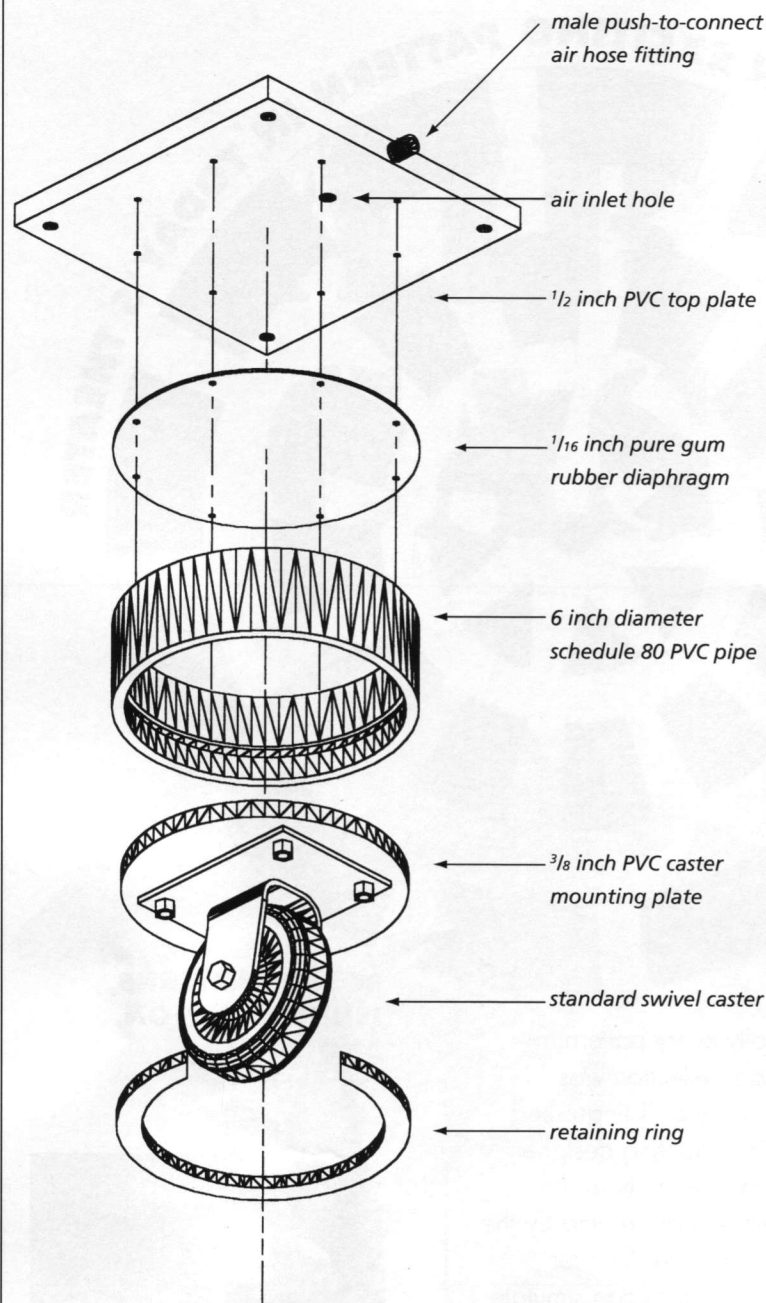




Because the pressurized air pushes against most of the surface area of the caster mounting plate, a high level of lifting force is generated with a relatively low pressure. The caster mounting plate has a bit less than 25 square inches of surface area. Using air pressurized to 10 pounds per square inch (psi) the Air-Lift Caster has a lifting force of well over 200 pounds [Pressure (psi) x Area (sq. ins.) = Force (lbs.)].

I tested the Air-Lift Caster under increasing air pressures. At about 40 psi, giving the unit almost 1000 lbs. of lifting force, there was some bulging of the top plate, but no air leakage. A substantial leak between the top plate and the diaphragm developed at about 65 psi, but the unit never actually "blew out." Even when shock-tested at 120 psi it only bulged and hissed, automatically relieving excess pressure.

I have built 80 Air-Lift units since 1989, and I have never had a unit fail in use. Maintenance consisted of occasionally removing the caster/caster mounting plate assembly and air-blowing out any dirt or debris, usually done only when I wanted to change to a different size caster.

In September, 1993, I built 32 Air-Lift units and spent just under \$300 on materials—PVC sheet and pipe, diaphragm rubber, air inlet hose fittings, screws and caster mounting bolts (but not the casters themselves)—less than \$10 for each unit. A scenic unit fitted with Air-Lift Casters can be connected directly to your stage air system, using a long hose running offstage to a regulator set at 10–15 psi. But for a self-contained, truly portable scenic unit I recommend purchasing the following: a 125 psi pressure storage tank (about \$30), a pressure regulator (\$10), and a 3-way, 2-position pneumatic valve (about \$20).

Listed below is the step-by-step cutting, machining and assembling process I used to build 32 Air-Lift Caster units. Alternative tools can be used in place of those listed (e.g. a table-mounted router instead of the shaper, or a stationary belt sander instead of the stationary disc sander).

CUTTING

1. The top plates were cut from 1/2 inch-thick PVC sheet to 7 inches by 7 inches, using the table saw.
2. The cylinders were cut from 6 inch diameter, schedule 80 PVC pipe to 1 7/8 inches long, using a V-block pipe cutting jig on the band saw.
3. The caster mounting plates were cut from 3/8 inch-thick PVC sheet to a 5 5/8 inch diameter, using a circle cutter on the drill press.
4. A 1/4 inch-thick slice of 6 inch, schedule 80 PVC pipe for was cut for each retaining ring, using a V-block jig on the band saw. A 3 inch-long section of the circumference of this slice was cut away with the band saw.
5. The rubber diaphragms were cut from 1/16 inch-thick pure gum rubber to a 6 3/4 inch diameter, using shop scissors.