GilderAppNote
Application Hints from Gilderfluke & Co.

GilderHeadquarters ▪ 205 South Flower Street ▪ Burbank, California 91502-2102 ▪ 818/840-9484 ▪ 800/776-5972 ▪ FAX: 818/840-9485

Fountain in a Briefcase

Many of you have seen our briefcase fountain at our offices or at a trade show. It is built into a briefcase for portability. Although small, many of the lessons learned in building it can be applied to full sized fountains as well.

Only small hand tools are needed to make the fountain. All parts are either brass or plastic so there will be no corrosion. Most parts are available at your local hardware store, McMaster-Carr or other internet suppliers. Because the water pressure is low in the manifold, and the job of a fountain is to leak, you don't need to be too careful about sealing anything. We've even run these without gluing the pipes together!

You can use any briefcase that will hold water. We used a Pelican case with an inside dimensions of approximately 18" x 13". If your fountain doesn't have to be portable, you can use any type of basin.

A manifold is used to distribute the water evenly to all the valves. It is designed to reduce turbulence where the water is fed to the valves. Water from the pump is fed into the back via a tee fitting. Excess water is bled off at the front to reduce the overall height of the jets, if needed. The manifold also acts as the support for the valve bar that holds the valves and jets. The manifold isn't attached to the case. It lifts right out for service and cleaning.

The manifold is made from ¾" PVC pipe. We used clear PVC to make it easier to tell when the pump is sucking air. Reducing tees with ½" threaded outlets are used to feed the valves through the 90° barbed elbows and a bit of poly hose. Two other tees, one at the front and one at the back, are used to attach the pump and the 'bypass' ball valve, respectively. Some standard elbows and a union are used to attach the pump. The union allows the pump to be removed. We run compressed air to this inlet to dry the fountain for shipment.

Shopping List:

1) Br-miniBrick8 Controller (Gilderfluke & Co.)
8) 3-way Solenoid Valves (Peter Paul 43NK15XGM)
1) Water Pump (McMaster-Carr 4182K25)
1) 80 Mesh Strainer, $\frac{1}{2}$" NPT FM (McMaster-Carr 98755K43)
1) $\frac{3}{4}$" clear Sch. 40 PVC Pipe x 4' (McMaster-Carr 49035K24)
1) $\frac{1}{2}$" clear Sch. 40 PVC Pipe x 4' (McMaster-Carr 49035K23)
2) $\frac{3}{4}$"slip x $\frac{1}{2}$"slip x $\frac{3}{4}$"slip Reducing Tee (plumbingsupply #401)
4) $\frac{3}{4}$"slip x $\frac{1}{2}$"NPT x $\frac{3}{4}$"slip Reducing Tee (plumbingsupply #778)
4) $\frac{3}{4}$"slip x $\frac{1}{2}$" NPT x $\frac{3}{4}$"slip side out 90° (plumbingsupply #402)
3) $\frac{1}{2}$"slip clear PVC 90° Elbow (McMaster-Carr 9161K21)
1) $\frac{1}{2}$"slip clear PVC 45° Elbow (McMaster-Carr 9161K73)
1) $\frac{1}{2}$"slip M to $\frac{1}{4}$" NPT FM reducer (plumbingsupply #438)
1) $\frac{1}{2}$"slip PVC Female Union (plumbingsupply #457)
1) $\frac{1}{2}$" NPT 90° M/FM Street Elbow (plumbingsupply #412)
8) $\frac{1}{8}$" NPT male to $\frac{1}{8}$" Brass Barb (McMaster-Carr 5454K65)
8) 10-32 male to $\frac{1}{8}$" Brass Barb (McMaster-Carr 5454K63)
1) Clear Poly Tube $\frac{3}{8}$" id x 10' (McMaster-Carr 5195T732)
1) Clear Poly Tube $\frac{1}{8}$" id x 5' (McMaster-Carr 5195T62)
8) $\frac{3}{8}$" Barb x $\frac{1}{8}$" Npt M 90° Elbow (McMaster-Carr 53415K176)
8) $\frac{3}{8}$" Barb x $\frac{1}{2}$" Npt M 90° Elbow (McMaster-Carr 53415K179)
1) 1" x $\frac{1}{8}$" x 36" Brass bar stock (McMaster-Carr 8954K363)
1 pkg) 2" x 3" x 0.032" Brass sheet (McMaster-Carr 1219T11)
2) Brass 10-32 x $\frac{3}{8}$" Thumbscrew (McMaster-Carr 98816A245)
1 pkg) Brass 10-32 x $\frac{1}{2}$" Phillips (McMaster-Carr 94070A829)
1 pkg) Brass No 2 x $\frac{3}{8}$" Screw (McMaster-Carr 98685A225)
1 pkg) Brass Flat Washer #10 (McMaster-Carr 92916A350)
1 pkg) Brass Flat Washer #2 (McMaster-Carr 92916A320)
1) Fiberglass Screen, 24" x 7' (McMaster-Carr 1017A63)
1) Case 17$\frac{7}{8}$" x 12$\frac{3}{4}$" x 6$\frac{3}{4}$" (pelican-case 1520NF-BLACK)

Assemble the manifold as shown to fit your briefcase. The pump should sit with the outlet at the top so that it can self-prime. The filter is attached to the pump using the male/female street elbow. The filter screen is normally oriented straight down to keep it in the water.

Bend the ⅛" brass stock to fit inside the manifold. Be sure to allow a little extra room for the thickness for two brass washers.

Drill eight pairs of ⅛" holes to hold the

Fountain Concepts:

Manifold: The object of the manifold is to keep the water flowing evenly to all the valves with a minimum of turbulence.

To accomplish this, the manifold is in a loop (or in this case, a 'rectangle').

Water enters the manifold from the pump at the back of the fountain through a tee. From there it flows to the left and right to the 'drops' where the valves get their water. You'll note that these are a large diameter where they hit the manifold. The reason for this is that a the water flowing over the end of a smaller pipe has an effect like blowing across the open top a a beer bottle: it lowers the pressure in the valves' feed lines as it 'whistles'. The larger diameter of the drop where it meets the manifold is like trying to blow across the top of a mayonnaise jar: No 'whistling'. 'Whistling' could cause the jets with drops nearer the pump to have lower pressure and jet heights.

The feed lines to the individual valves are far larger than the ID of fountain jets, and are all approximately the same length. This is to keep the pressure even and minimize turbulence.

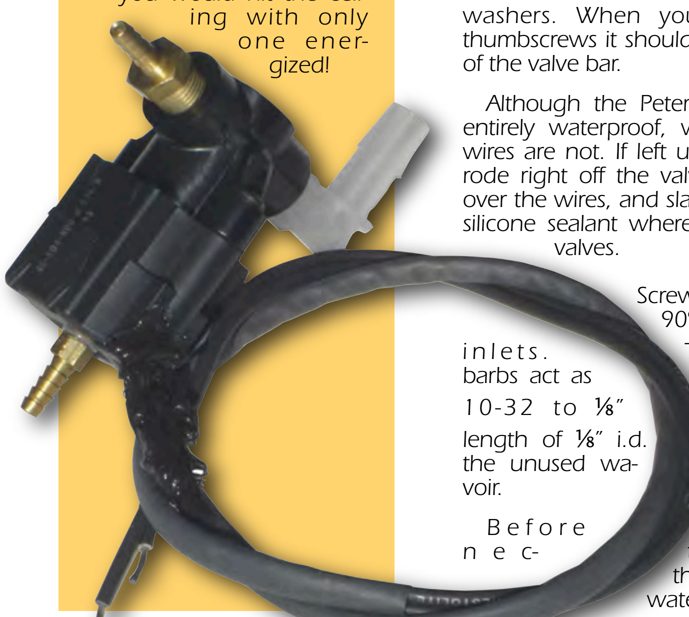
At the front, opposite the input from the pump is another tee, but this one has a 'bypass' valve on it. If the fountain is squirting

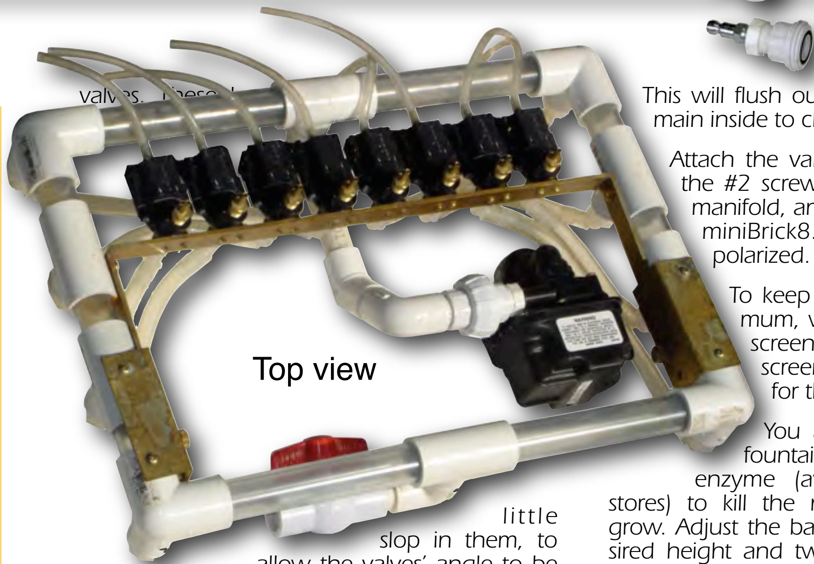
too high, this valve can be cracked open to lower the manifold pressure, and so the height of the fountain jets.

Three-Way Valves: The valves used in the Briefcase Fountain are what are called 'Three-Way' valves. Water from the manifold flows into the large nylon fitting from the bottom. When no power is applied to the solenoid, the water flows back out of the valve and into the basin through the hose fitting at the solenoid end of the valve. When the solenoid is energized, the water flows from the input to the ⅛" hose barb that is used as the nozzle.

Since water is always flowing, there is no change in the manifold pressure as valves are turned on and off.

If you were to block all the valves' 'bypass' outlets, you will see what would happen if you were using 'two-way' valves: With all valves energized, the jets would all be squirting to the same height. As more valves are de-energized, the remaining jets would get higher and higher until you would hit the ceiling with only one energized!





valves. These little slop in them, to allow the valves' angle to be adjusted. Two 10-32 brass screws near the bends hold the brass bar to the manifold, while allowing the angle to be adjusted. Drill two 3/16" diameter holes in the ⅛" bar for these ½" from the bends. Drill and tap two matching 10-32 holes into the manifold. Drill and tap two more 10-32 holes for the brass thumbscrews about 6" away.

Two 2" x 3" pieces of sheet brass are bent to hold the front of the valve bar. Slots allow the angle of the bar to easily be adjusted. They are attached to the manifold using four more of the 10-32 screws. The slots should line up with the tapped 10-32 holes near the ends of the valve bar.

Attach the valve bar to the manifold using the 10-32 machine screws, with a washer on each side. Screw the thumbscrews into the valve bar with two washers on each. Sandwich the slots in the 1/32" brass between these washers. When you tighten the thumbscrews it should lock the angle of the valve bar.

Although the Peter-Paul valves are entirely waterproof, we have found that the wires are not. If left unprotected, they will corrode right off the valves. We ran shrink wrap over the wires, and slathered them liberally with silicone sealant where the wires attach to the valves.

Screw the ⅛" NPT to ⅜" barb 90° elbows into the valve inlets. The eight ⅛ NPT to ⅛" barbs act as the nozzles. The eight 10-32 to ⅛" barbs have a short length of ⅛" i.d. hose attached to feed the unused water back into the reservoir.

Before you make the final connections to the valves, fire up the pump and run some water through the manifold.

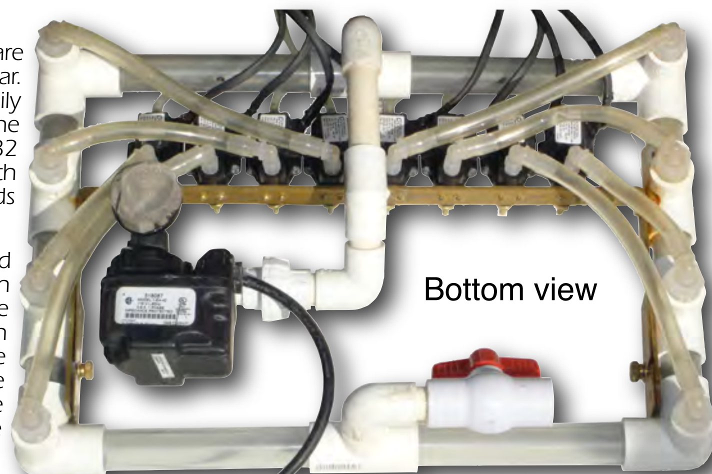
This will flush out any debris that might remain inside to clog up the valves.

Attach the valves to the valve bar using the #2 screws. Plumb the valves to the manifold, and screw the wires to the Br-miniBrick8. These valves are non-polarized.

To keep splashing down to a minimum, we use a fiberglass window screen in an aluminum window screen frame. We cut small holes for the nozzles to pass through.

You are now ready to fill your fountain with water. Add a little enzyme (available from spa supply stores) to kill the munge that will inevitably grow. Adjust the ball valve to give you the desired height and tweak the valves to aim the water where you want it to go (the ideal landing zone is the middle six inches, about three inches from the front edge of the fountain). With the pump that we used, it should shoot about 18" high.

You can add to your briefcase fountain by using the Br-miniBrick8's DMX-512 output to run



RGB LED lighting, or the servo motor outputs to control moving water jets, just like the Bellagio fountain!

If you want to add music, you can add an Sd-25, or switch to an all-in-one Sd-50/08. If you go to an Sd-50/40, you can then control as many as forty jets!

Because our systems are modular, you can keep adding jets and the GilderGear to control them. There are no practical limitations to the number of jets that can be controlled.

Except for needing bigger pumps, pipes, valves and nozzles, a full sized fountain is made in pretty much the same way as this briefcase fountain. Because of the bigger coils, larger solenoid valves are often driven by our Pb-DMX/nn boards. These will provide up to three amps on each output, and DMX-512 networking will allow them to be placed near the valves. ~ G