Filling Bottles from Kegs

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TABLE OF CONTENTS

Overview	1
Basic Types of Fillers	2
General Filling Procedure	3
The Fillers	4
Equipment Comparison Chart Key	7
Poor Man's construction diagram	8
Equipment Comparison Chart	9

OVERVIEW

Ask any homebrewer to list the benefits of putting beer in kegs and one of the first answers will pretty much always be “no more bottling!” That's not quite accurate, however, since there will come times when you will want to enter a competition; save away the last gallon or two of that slow moving keg; give some beer as gifts; or take some beer to a picnic, party, or softball game. To provide these occasional bottles you might remember to prime a few bottles at kegging time, but then you will not be able to adjust carbonation to your liking and will have sediment in all of your bottles. Another way is to buy or build a device for filling bottles straight from your kegs.

All of these designs have the same goal: to help you get your cold, carbonated beer safely out of the keg and into a bottle with minimum degradation in the quality of the beer. All of these designs have been used successfully by many home brewers. This does not mean that they will all fit equally well into your home brewery. As you read each description, consider factors that may affect each device's performance in your environment. For instance, if you have no room to chill lots of bottles, you might do better with those designs that do not require prechilling. If your kegs are hard to move, you might not want to pick a design that requires you to move your kegs. Just remember that although any of these work for someone, only you can decide which will likely work best for you.

There are some basic concepts that hold true for all of these designs - you want to move the beer from the keg with *minimum pressure gradient* and *minimum turbulence* between the keg and the bottle. As with any supersaturated solution, carbonated beer will be very eager to give up the gas. Any turbulent flow or sharp change of pressure can cause a bubble. That bubble can provide a nucleation point for other bubbles, which cause other bubbles to form. Very quickly these bubbles can quickly escalate into a cascade of foam streaming out of the bottle and leaving you with a half a bottle of a flat beer and a big mess to clean up.

BASIC TYPES OF FILLERS

There will be an unavoidable pressure *change* on the beer since it will start out at around 10psi in the keg and end up in the bottle at atmospheric pressure on the way to the capper. The trick is to make sure the pressure on the beer changes slowly and gently. There are two basic design options to achieve this:

- *Open fillers*, where the bottle is not pressurized during filling. Since the 10psi in the keg must be reduced to 0 by the time the beer reaches the faucet, long restrictive serving lines are used to provide a slow, gentle pressure drop between the keg and the bottle.
- *Counterpressure fillers*, where the bottle is pressurized to match that of the keg before beer starts flowing. Once pressure is equal in both the keg and the bottle, the beer valve can be opened fully and the beer will not flow at all. By slightly reducing pressure in the bottle via slowly venting the pressure in the bottle, a pressure differential of a pound or two is created and the beer will flow slowly and gently into the bottle.

This one design choice will make more difference than anything else in how you will prepare, operate, and clean up your filler.

Open fillers generally

- Provide a gentle pressure gradient by using a very long (10'-15') high restriction line that gently reduces pressure on the beer until is just barely comes out of the faucet. Look up “keg balancing” for more details on how this works.
- Require prechilling of bottles and the filling device
- Will work best if you lower your serving pressure
- Will foam, causing some mess but cap-on-foam possibly provides some oxidation protection
- Require less manual dexterity to operate

Counterpressure fillers generally

- Work with room-temp bottles and filling device
- Work fine with regular serving pressure
- You have the choice to either minimize foaming or to cap-on-foam
- Use normal length lines since the pressure difference between keg and bottle is very small.
- You have to be careful to hold the device snugly in the bottle

After considering this fundamental design choice, the other differences are relatively minor since the physics involved are the same regardless of differences in configuration.

GENERAL FILLING PROCEDURE

- Open fillers
  - Sanitize bottles and filler device
  - Protect bottles and filler device from possible refrigerator contamination
  - Put bottles and filler in refrigerator (not the freezer) to chill.
  - Wait an hour
  - Lower pressure on CO_2 regulator; vent keg
  - Remove filler and a few bottles from refrigerator
  - Attach filler to keg
  - Purge bottle with CO_2
  - Fill and cap bottle
  - Clean up spilled beer
  - Rinse bottles
- Counterpressure Fillers
  - Sanitize bottles and filler device
  - Attach filler's gas connector to same gas source that is pushing the keg
  - Attach filler's beer connector to keg
  - Purge bottle with C
  - Pressurize bottle and hold
  - Open beer valve. No beer will flow.
  - Sightly open bleed valve. Beer will slowly flow
  - When bottle is full, close beer valve
  - When bottle pressure drops to ambient (a second or two), remove filler
  - Cap bottle and move directly to 6pack holder.

THE FILLERS

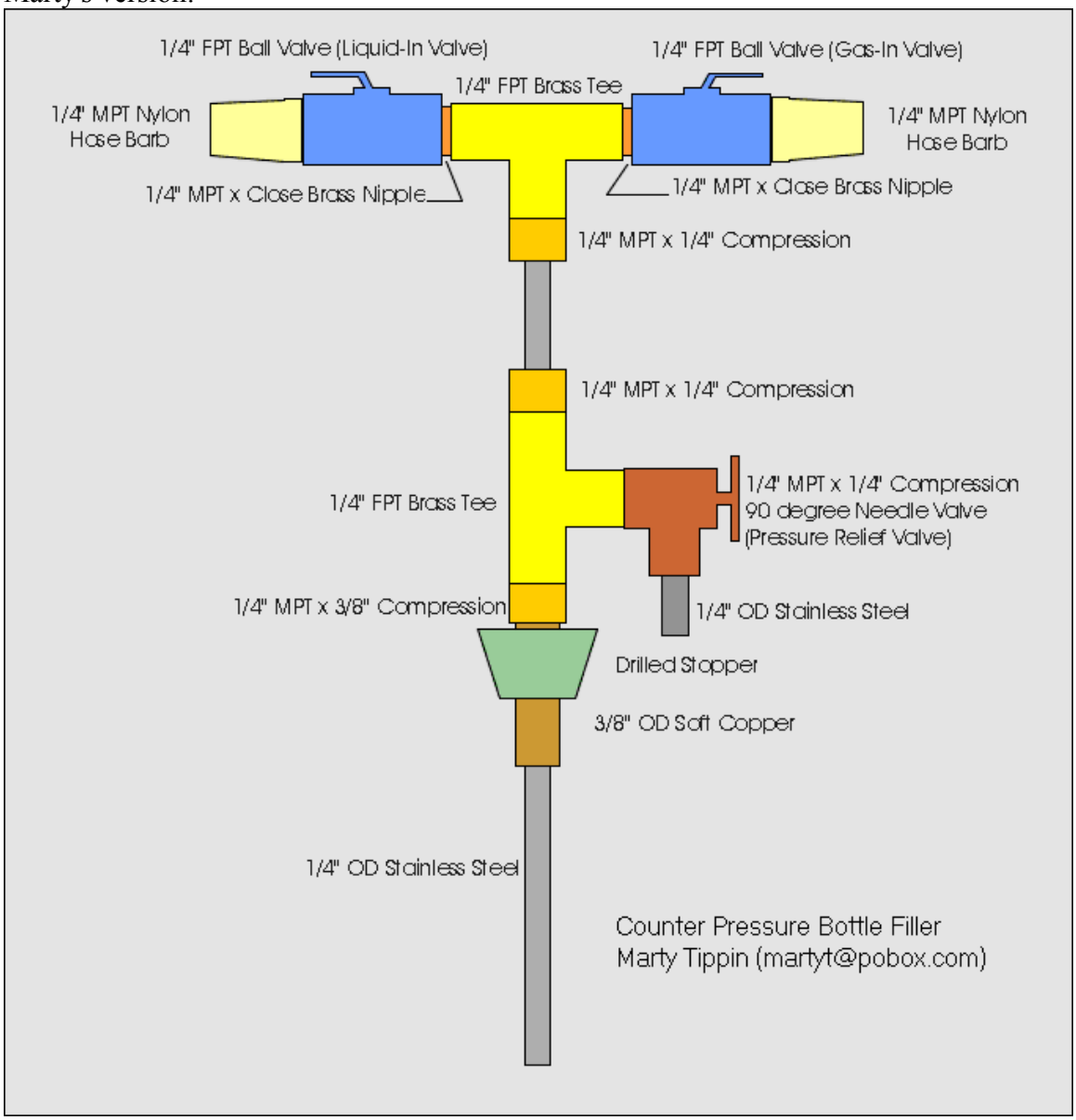
Here are the five fillers we tested, in no particular order along with notes explaining some of the up/down designations on the attached Equipment Comparison Chart.

- **Blichman Beer Gun**, an open-type filler designed for one handed purging and filling. The Beer Gun gets a ▲+ on purging because it is the only one that puts the heavier CO2 in the bottom and vents out the top. Cleaning takes some time because it has to be disassembled each time you use it – the double wall tube will have unrinsable beer in between the walls after a session. For testing we chilled the bottles and Beer Gun for at least 15 minutes, and lowered the dispensing pressure as the instructions dictate, but but that must not have been enough. Foaming was copious and trying to top the bottles off just made more foam. I have successfully used this device before, so I presume the bottles and Beer Gun needed to be colder.
- **Beer, Beer, & More Beer KEG800 Counterpressure Filler**: This model has been superseded by the KEG801 with different beer and gas valves. The price listed on the chart is for the KEG801. The T shape of this filler makes it the most bulky and hardest to store. The cleaning challenge with this one is that beer foam is vented out the gas vent so you have to make sure to take that apart after each use. Although the large size and T shape makes it easy to grab, I found squeezing the beer valve cramped my hand after a while. In testing this model provided a consistent fill that we could speed up or slow down as foaming conditions dictated by twisting the vent valve.
- **CounterPhil from Listermann Mfg**: The CounterPhil is an elegant and unique design that pressurizes the bottle then fills it not through slight pressure differential like other counterpressure fillers, but by siphon. This makes for the most gentle transfer of any of these fillers because the beer is always at exactly the same pressure until the filler is removed for capping. One downside to this filler is that you have to move your keg up to a tabletop to get enough height difference for the siphon to work. Another potential downside is that whatever gas is in your bottle will end up in your keg. Since this filler does not do a great job of purging the bottles (you can only "burp" the stopper as CO_2 is filled from the top) it is more likely you will be introducing some air to your keg and thus shortening the shelf life of the beer remaining in the keg. In testing we found this filler provided a consistent, smooth fill with no foamover. We could not control the speed, though, other than raising the keg to a higher table.
- **Poor Man's Counterpressure Filler**: Originally designed by Ken Schwartz, the PMCF is the least expensive of these fillers, the easiest to clean, and the smallest to store. This one can be very uncomfortable to hold for many bottles in a row, since there is no firm structure protruding above the stopper. The operator has to pinch the stopper to hold it in and this can cause thumb cramps in short order!
- **Long Line filling with a dip tube**: We built a 7' jumper to attached between a threaded corny quick disconnect and a 6' dispensing line to make a 13' long line between the QD and the picnic faucet. Then an 8" piece of vinyl tubing (same

stuff used for the PMCF) was inserted inside the faucet nozzle. With chilled bottles and lines, and a full open faucet, we had so much foam that only about ¼ of the bottle was filled before the foam started pouring out as fast as we could fill the bottle. I know other people are successfully using this technique, but it was easily the worst of the ones we tested. Perhaps more chilling would help, perhaps different pressures will work better, perhaps a dip tube that fits over the nozzle would work better than the one that fits inside. It did appear that the foam started right at the faucet, so perhaps a different faucet would help.

BUILDING YOUR OWN

A quick search on Google will find you many different plans for building fillers. Some of the more elaborate are like C.D. Pritchards at http://home.highertech.net/~cdp/cpfill/c_press.htm which I'm sure work great if you have a drill press and a background in a machine shop. A simpler one is Marty's Counter Pressure Bottle Filler at http://hbd.org/mtippin/pfiller.html which looks like it can be assembled with basic hand tools you probably already own. Below is a diagram of Marty's version:



The Poor Man's is even simpler to construct, if not quite as robust as the above examples. That diagram has been included at the end of this document.

EQUIPMENT COMPARISON CHART KEY

The last sheet of this report is a grid-style summary of the tested fillers, with “thumbs up/down” notations for each characteristic we thought important. Some clarification of these characteristics is in order:

- **Uses serving pressure**: You don't have to adjust your regulator from whatever you normally use for serving. I consider this a convenience and also wonder if lowering pressure on a stable keg makes it less stable and contributes to foaming, but that's an experiment for another day.
- **Stationary keg**: The relative positions of the keg and the bottler are irrelevant. A ▼ means the keg has to be moved, potentially stirring up sediment and certainly causing one extra step in the filling process.
- **Can be foamless**: You have the option of filling without having foam coming over the lip of the bottle and runnning down the side. ▼ means you have to get a drip tray, mop up aferwards, and rinse all your bottles when you are done filling them.
- **Use with bottling bucket**: as an added bonus, can be easily used to fill purged bottles with still, primed beer.
- **Comfortable**: Certainly a subjective measure, but ▼ fillers hurt my hand or were otherwise hard to handle.
- **Works at room temp**: I find this to be a major convenience, as I often want to fill a few bottles right out of storage in my hot garage when I am on my way to a meeting or something. I usually don't have the 30 min or more to wait for the bottles and filler to chill.
- **Whole bottle purging** and **purging direction**: CO2 comes in one end of the bottle, air is vented out the other. I suspect this produces a more completely purged bottle than one that fills and vents from the same side, such as filling from the top and venting out the side of the stopper.
- **Storage space**: Relatively large and bulky to store gets a ▼. Small gets a ▲.
- **Easy to clean**: Again, a very relative, subjective measure, but some of these fillers have lots of connections and valves and are harder to be sure they are clean, and others are simple and easy to see.

Ken Schwartz's “Poor Man's Counterpressure Filler” from
http://home.elp.rr.com/brewbeer/
Presented 12/16/04 and 2/23/06 at DBG meeting by Danny Williams http://bubrew.org
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