

## **Vacuum Fill Experiences**

### **Instructions for Epson 1280 carts (Jim Hayes, June 22, 2002):**

I've been using prototype kits from MIS to fill carts for an Epson 1280. I have a number of thoughts on the procedure. You can follow as many or as few as you like. I approached this write-up as comprehensive, and I include many details. The procedure is easier than it may sound on paper, therefore.

Generally it takes me three hours to do a complete vacuum fill of the k and color cart. This includes chip mounting and resetting, and cleaning up the tubing apparatus, and using an air compressor to dry off same. I take my time and don't hurry. I like to put music on while I work and create a comfortable place where I can sit down to do a lot of the work.

I use two incontinent pads from a pharmacy, on either side of my bathroom sink to catch ink. These are amazing in that any ink dropped immediately gets soaked up and doesn't run or stain the sink top below it. I can also recommend them under Christmas trees, if visiting relatives don't recognize what they really are. <g> I bought them some time ago for a very old cat that was sick. I find they can be reused for many cart fills.

If I use 20 ml syringes instead of the 30 ml syringes MIS supplies in their kit (more on this later), I can fit everything needed to fill the carts in a cheap \$4 fishing tackle organizer (from Wallmart made by Keter, model 3600). I even fit in the QB7 resetter, a set of Epson carts, up to two sets of virgin carts, and the vacuum pump. I simply take the box out and place it on the left side of sink, so that I can close the lid if I start splashing around too much.

Other tools I supplement or substitute for what MIS supplies:

The 30 ml syringe that MIS supplies with each refill kit, I don't use. I purchased six or seven 20ml syringes from my pharmacy. You want to get a "Luer-lok" tip, to twist on the needles. They cost me 65 cents each. Becton-Dickinson brand, reorder #309661. I like these syringes better as they are slimmer and so fit in bottles better. More important, they give greater accuracy when filling the 1280 chambers, which all take 18 ml on a virgin fill.

A small flatbladed screwdriver, or I use a folding small Swiss army knife, because it fits in my tackle organizer better.

Something to hold the k cart in place, upright as it's being filled. I use a simple 2-inch C clamp now, but there are better ways. When vacuum is drawn the walls of the cart will loosen against the clamp, and the cart may slip out and fall over. Perhaps a simple piece of cardboard bent into a U shape with a hole for k cart might work best.

Six or more corks to fit the top fill holes of the cart. At Ace hardware I found that the smallest cork they sell fits just fine, at 12 cents each. Since it's made from cork and not

rubber it could break off in hole if not careful, but this hasn't happened to me yet. And I can take a fine point sharpie and mark color position on it if I want to dedicate it to a certain color. I use the corks first instead of the black rubber balls MIS supplies to give me freedom to after all chambers are filled, to re-open them to air and stabilize. After this I then push the balls into place. If you find yourself suddenly running low on balls, you can buy any 4mm x-section metric o-ring from Ace hardware, and cut it up into short lengths. These will fit into fill hole, but a little more loosely than the balls do.

Black electrical tape. Don't use anything else. You will only need this if you decide to remove vent seal after filling, or you want to dispose of an old cart without having ink leak out all over.

A vacuum pump. This can be bought from MIS, or if you have a CIS, you already have one. This is either a 60 or a 30ml syringe connected to a t-junction with two valves. Older pumps from nomorecarts have a sharp pointy conical tip; this can be removed- connect the vacuum tubing from kit direct to the valve end.

A sharpie pen, fine point to mark and label stuff.

UPDATE (June 22, 2002): I now believe it is wiser to not use heat to install chip, so that the chip won't be damaged, and so that the nubbins on the cart remain intact in case the chip needs to be swapped out if found defective. So using a soldering iron is no longer recommended. I avoid glue also, as there is a chance it may spread from the chip board to the connector in the head and damage it.

A small exacto knife for removal of chip (removing the melted part of nubbin) from a spent factory cartridge.

Paper towels, a gallon of distilled water, a small bowl and one larger bowl to fill with tap water. An air compressor is nice but not absolutely needed. Some Fantastik to clean up sink.

You can use just one kit, but I prefer to have six on hand. You will have to rinse out ink between chambers if you use just one kit. I label the color on each piece I can; for example the magenta Y-tubing has a small "m" written with sharpie on the eight-sided plastic face of the "y", and I put an "m" on the upper green plastic of needle as well. Also on the 20 ml syringe and even the top of the cork.

MIS recommends using only virgin empties, and I tend to go along with this, you will have less trouble. I discovered a similar procedure/ hardware on the WeInk site, if I'm correct, which alluded to being able to refill a cart again using the vacuum fill method IF the one use plastic plugs that MIS and WeInk both sell are used. Since I have not tried this I will not go into whether it would work or not. But using MIS metal rivets or nomorecarts EZ plugs will not cut it.

Make sure that the virgin carts are sealed at the bottom and at the vent holes.

Examine your Vacuum fill kit(s). The most interesting piece on the tubing assembly is the funny looking “Y-adapter”. At the bottom of the “y” you will see a very very short piece of clear tubing attached. Mine is only  $\frac{1}{4}$  inch long, but I saw a production kit that had a length of  $\frac{3}{8}$  inch. This tubing is slid on part way- not quite to the step in the bottom of “Y”. This bit of tubing serves to wedge itself into the fill hole on top of cart, and form a seal. You push it gently into the hole, twisting back and forth just a little. You might want to test it now to see how well this works. If you use too much force the tubing will ride up higher onto the Y until it hits the step on it. If you don’t use enough force the Y will fall out of fill hole. I also discovered over time that my  $\frac{1}{4}$  inch length after about 4 uses got a little loose, after rinsing in warm water, and stayed that way. So now I have to watch for the tubing slipping a bit as I insert it. I now have extra tubing for when this becomes a problem- I can replace it with say a  $\frac{5}{16}$  inch piece.

At the top of the “y” we have a vertical branch in line with bottom, which ends in an eight sided plastic piece with a  $\frac{3}{16}$  diameter yellow flexible circle in the middle. We will call this rubber circle the “septum”. It is the heart of the whole procedure. This is where we will be injecting ink with the 20ml syringe/needle.

Springing off at a 45 degree angle from the last side of the “Y”, we have a length of tubing which has recently been changed by MIS from  $3\frac{1}{2}$  inches long to about  $5\frac{1}{2}$  inches long. A blue pinching clamp straddles this length of tubing. At the far end of this tubing, a translucent endpiece is attached which will fit over the valve at the end of your vacuum pump; it also will screw into a syringe if you want it to. More on this later.

UPDATE (June 22, 2002): Mounting the chip is now the last step- so that the chip is not damaged by static discharge. I no longer use a screwdriver as MIS does not recommend it, and as they have begun to enlarge the holes on the newer chips, which makes them easier to put on with mere finger pressure.

I will have given my six bottles of bulk VM ink a few shakes a few hours before and the ink should be settling down now. I start with the k cart. Bringing the K bottle out, I check the label to be sure it’s the right ink, then insert it into a cardboard holder, something like the bottle rack that goes with CIS systems. You can bend up some cardboard into a box or a U shaped thingamajig, then put a bottle-sized hole in it. This will keep that ink from tipping over and spilling all over if it gets hit with the 20ml filling syringe or your hand etc.

I put a new virgin cart for k on the incontinent pad such that the part that faces towards inside of printer is down, or the forward face. Resting like this the bottom port is near the bottom; the fill hole on top surface of cart is now on side facing me. You should look at the pictures on the MIS site here, it is important to get these carts in the right orientation. The important thing is always remember that the bottom port should be low, just above

pad. Hopefully, for the k cart you have something that keeps it from flopping over on its side as discussed above, like a c clamp or cardboard widget.

Do not proceed until you have looked at the MIS site pictures of the procedure and understand the correct orientation for filling carts.

Now, here is a very important point that you must adhere to, or your filling experience may not be successful. Uncap the 20ml syringe. Notice that the 21 gauge, 1 ½ inch long SHARP needle is in a sheath of plastic tube. Do not remove the sheath yet. We will use it as a wrench. Twist the green plastic end of needle into the tip of 20ml syringe. Twist on clockwise. Notice that using the needle sheath you get a better grip on the needle than without, and that you can twist it more firmly into position, as much as two turns into the “Luer-lok”. Don’t use a real wrench on this or he-man force, you can put too much force on it. What you want is a good enough seal at the junction of syringe/needle, so that no air can get sucked in or pushed out. If not tight enough, your vacuum will be lost, and you could get foamy bubbles in your ink when you go to withdraw it from ink bottle. If this happens on any of the chambers, that chamber WILL NOT FILL correctly.

After a few uses, if you’ve been too rough, the sheath will become “stripped”, and no longer serve as a good wrench. Simply use another sheath from another ink or a spare needle.

If you are unconfident as to whether you have a good enough seal, you can draw up some water (or ink) with the plunger, keeping just the tip of needle in the water, if you get a lot of air in the syringe, it’s coming from the luer-lok. After you get the hang of it, it’s really not a big deal-just something to watch for.

With the syringe/needle sheath put to the side, it’s time to hook up the “Y dingus”. Get out your vacuum pump with either a 30 or a 60 ml syringe on it. Attach the fitting from the 5 ½ inch long tubing end over the valve that is inline with the syringe, NOT the valve at right angles, sprouting from center of “t”. Just snug it on a little, it doesn’t need much. Grab the Y by the eight sided plastic plate and insert the short piece of tubing into the fill hole gently, twisting just a little from side to side (rotating) as you insert it into hole. Hopefully, the tubing will not have slipped up the shank of the bottom of Y. It’s sort of a gagily fit- it looks like the Y may fall out but it doesn’t.

Now make sure the vacuum plunger is at bottom of syringe. Pull back and hold for three seconds. Then push in. You will hear some air escape. Pull back again and hold, then push. A little less air will be expelled. A third time will get rid of most of the air. To be safe, pump at least 6 times. I do ten.

In about the middle of the tubing carefully slide the blue tubing pincher over by putting a finger closely on either side of the clamp and pushing the blue plastic over the tubing with your thumb. This will take some force but is made easier if you keep a finger on either side. This will keep the vacuum from claiming a bigger space (up the tube to valve), and also keep ink from backflowing up to the vacuum valve.

Remove the bottle lid and the sheath from the syringe. The needle is sharp! Keep it that way, as the septum will last longer. Insert the needle into the bottle, first making sure you have pushed the syringe plunger forward all the way. Since it is a small needle, drawing up ink will take time, don't rush pulling up on plunger. Have some paper towels in a 4 x 4 inch wad ready. Draw up about 5ml slowly. Now push plunger back down. Listen for a squirt of air into the ink. Draw up another 5 ml and push back into bottle. The air sound will be less. This removes excess air from being drawn up into the syringe from the inside volume of the needle. With the third draw, continue slowly until the BACK of the black rubber lines up with the "20ml" mark. This means you have really drawn up 18 ½ ml of ink (if you got the same 20ml syringe that I did<g>). It's just hard to see because the front of the plunger is black like the ink, and it's hard to see where it's at.

Touch the paper towel wad to the needle tip as you raise the tip into the air straight up. Look for air bubbles, and eject just a tad (1/2 ml of ink) onto towel. When the first clear plastic flange that is JUST behind the black plunger is forward of the 20 ml line, stop. You might want to look at an empty plunger to see what I'm talking about. That's 18 ml of ink ready to go.

Take the syringe and attempt to aim for the Septum. Since it is so small a diameter, you may have to use two hands on the syringe to home in on it. What you want to do is puncture the septum with the needle point and insert about ½ to one inch. Keep needle steady and DO NOT TOUCH PLUNGER. The plunger will depress itself! Since there is a vacuum, the plunger will push forward and the ink will empty into the chamber, and a little may backflow up the tubing to the blue clamp. When plunger has stopped, carefully remove needle from septum without much sideplay or you'll tear the hole. The septum is good for many more jabs.

Put the needle down away from your fingers. Remove the Y from the fill hole and insert the Ace hardware cork, or the black ball from MIS if need be. You can also use electrical tape. I really like the corks, particularly on the color cart. Remove the other end of the tubing from the vacuum pump. If this is the k cart, you can turn it right side up now and put it in a safe place. If it's the color cart, you must fill all five positions.

I now fill a small bowl with distilled water and a larger bowl with tap water. Actually, we have well water here, right from the Rockies. Tastes good, but too many minerals, calcium, even gravel. That's why I finish with distilled water. First, I rinse the outside of needle under tap. Then I insert into tap water bowl and draw out three syringes of water and squirt out. Then I do one of distilled. Then I put sheath on needle and twist it out of syringe and put back in tackle box. Then I fill the syringe with tap water fully and screw the fitting on the end of the tubing that was just on the vacuum pump valve. I hold the tubing over sink with water running, and I point the bottom of Y down towards drain. I release the blue clamp and then push the plunger – all the ink goes straight down the drain this way. Then I simply fill the tubing by drawing the plunger in with the Y in the tap water bowl a few times and push out again, followed by a distilled water rinse. I shake the tubing and put back in box. Then I just work the plunger a few times after

tubing is disconnected to clear any water in syringe itself. Putting the syringe back in box, I'm ready for next color.

The color cart needs no prop to stand it up. I do mark each fill hole with the sharpie to denote color ink to fill it with, and I mark both carts with the date filled. The sequence of ink for the 1280 color cart from left to right, chip facing away from you is: C, PC, M, PM, Y. After I have filled all five chambers I set it right side up. I rest the back bottom edge of both K and color carts on a ¼ inch thick piece of something, so cart top is level. You may remember that I still have corks in my fill holes. I get several paper towels ready by twisting up little fingers that are each about 1 inch long and 1/8 inch in diameter or so. When I remove the k cart cork I get no surprises, I may have to just insert one or two towel fingers into the fill hole to prevent overflow. Then I let the k cart sit for an hour with fill hole open.

Turning to the color cart, I remove the Y cork first. A little ink overflows, easily caught by a towel finger. But, the interesting thing is, that when I remove the adjacent PM cork, the PM fill hole overflows a little... NOW Y hole starts overflowing much more, so I have to be ready to catch ink from the fill hole not just from the just uncorked hole, but the hole next to it as well. This is true for removing all the corks. It seems that as corks are removed, the internal walls of color cart expand, and compress the adjoining chamber, if uncorked as well. It's as if the sponges or chambers have not yet come to equilibrium after the vacuum experience, and need a few minutes to an hour to stabilize. Thus, I use corks, and only insert balls permanently after one hour. This is not a big deal, just be prepared to sop up a few extra drops of ink from a fill hole when you uncork its neighbor holes.

I blow compressed air through the tubing /needles to further dry it. Be careful with the needles- if you feel you can't hang onto them safely, don't dry them. Do not use compressed air on the syringes- they will turn into missiles. The air works best on the Y tubing assembly.

UPDATE (June 22, 2002): I now install the chip as a last step, right before I'm going to load it into printer. I use an anti-static wrist strap and mat, you may just want to touch metal ground before you pick up chip with fingers and install on nubbins on cart. With the newer chips it should be easy to use finger pressure to install chip, first aligning on the slot, then inserting the pin through the hole end of chip. I don't use anything more than finger pressure now to install chip, and I don't melt the nubbins or use glue, but I do make sure that chip is fully seated. MIS gives further details on their site on how to install a chip.

I use the QB7 chip resetter. After the balls are inserted flush with cart surface (with my trusty flat bladed penknife) and while the vent hole seal is intact, you can turn the carts over briefly and reset them on the QB7. Hold them there for at least 6 seconds. The K cart is easy to reset. The color cart needs to have the included plastic wedge put under the QB7 first. This makes the aligning of the color cart with the QB7 a bit unsure, but it usually hits the right spot; it just takes more care than the k cart. I have experimented

with shim devices that act as additional guides for the color cart, but in the end, the extra guiding is not really needed.

If you want to remove and then reseal the vent seal, or just want to reseal an Epson cart vent hole, the electrical tape comes in handy. You can also seal the fill holes in a pinch with it, or cover all the open holes on a spent cart to keep ink from leaking all over.

I usually found that except for a few drops out the fill holes when uncorked, the carts didn't get overfilled. But if you wanted to withdraw ink from a cart, and the fill holes already had balls fully wedged in them, you might be able to go through the vent holes. I don't know if the vent holes would have to be enlarged, or if enlarging them would damage the cart.

UPDATE (June 22, 2002):I now am trying unplugging printer after I have sent carriage over to left. Then I quickly swap out the cart with the chip on it. I do this as a tip I learned from MIS so as not to disturb the new reset on the chip as it brushes against the connector fingers in the head on cart install. I then move carriage to the right fully, and plug in printer.

I usually find I still wind up doing two cleaning cycles upon installation of a new self-filled cart. Your experiences may be different.

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