

# Heatless (cold) Toner Transfer for PCB Making

By [simpletronic](#) in [CircuitsElectronics](#)



## Introduction: Heatless (cold) Toner Transfer for PCB Making

**Toner transfer method** for making PC boards is very practical and economical. The use of heat for the transferring is not. Large boards expand with heat (*more than the laser print*) and heat is applied to the top of the toner and not to the bottom contacting the copper layer. Too much heat melts and deforms the toner, too little heat and it won't adhere uniformly. In this **Instructable** I will describe a very simple technique I've been using for over 15 years. It is very fail-proof and involves the use of only 2 common chemicals : **Ethyl Alcohol** and

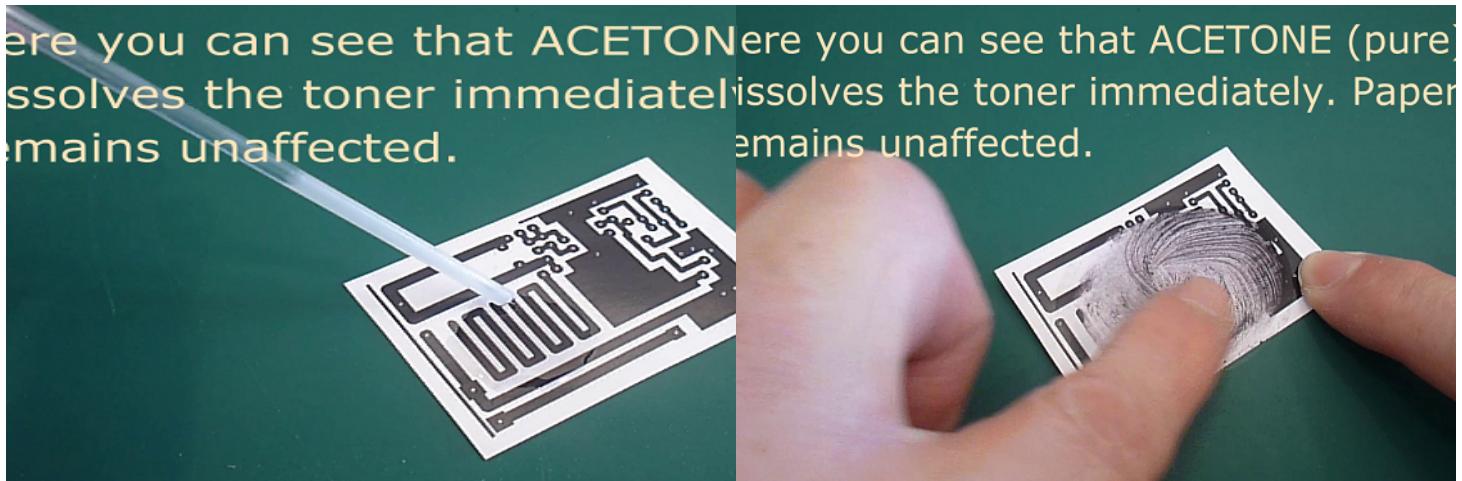
**Acetone.** You can replace the Acetone with **Toluene** or **Xylene**, but you will have to experiment with the proportions.

## Step 1: Toner Is Inert to Alcohol



Alcohol is volatile but neutral to toner or paper. Its purpose is to dilute the Acetone.

## Step 2: Acetone Reacts With Toner

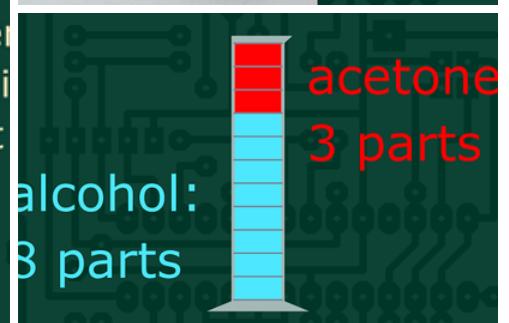


Acetone, (*pure, not nail-polish remover*) dissolves the toner **immediately**.

## Step 3: The Formula



By mixing Acetone and Alcohol in precise proportion you will obtain a solution which will SOFTEN the toner enough to make it "STICKY" but not dissolve or blur.



Experimentally I found the best **alcohol-acetone** proportion is **8:3** (8 volumes alcohol + 3 volumes Acetone) Acetone will "soften" the toner just enough to make it "sticky" but not dissolve or blur.

## Step 4: Storage



You can store the solution in an airtight container. If it is a plastic one it should be made of HDPE (high density polyethylene) which is unaffected by ACETONE. Acetone is much more volatile than alcohol so exposing the solution to air will decrease its concentration.

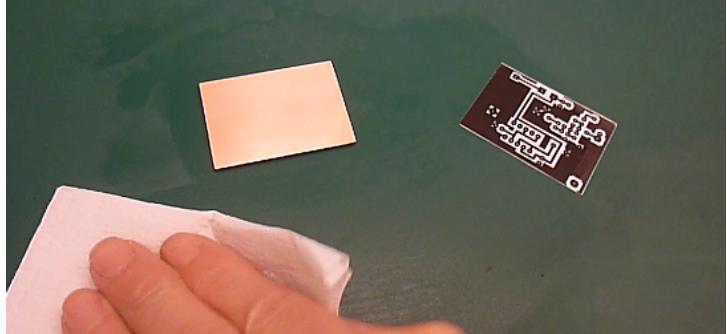
You can store the preparation for a very long time but the container must be absolutely **airtight**. Acetone is much more volatile than Alcohol so exposing to air will degrade acetone concentration. The container should also survive the action of acetone. If plastic, it should be **HDPE**(high density polyethylene, often used in kitchenware)

## Step 5: Cleaning

Clean the copper surface of the board with soap and water as you normally do. Rinse with water and dry with kitchen paper.



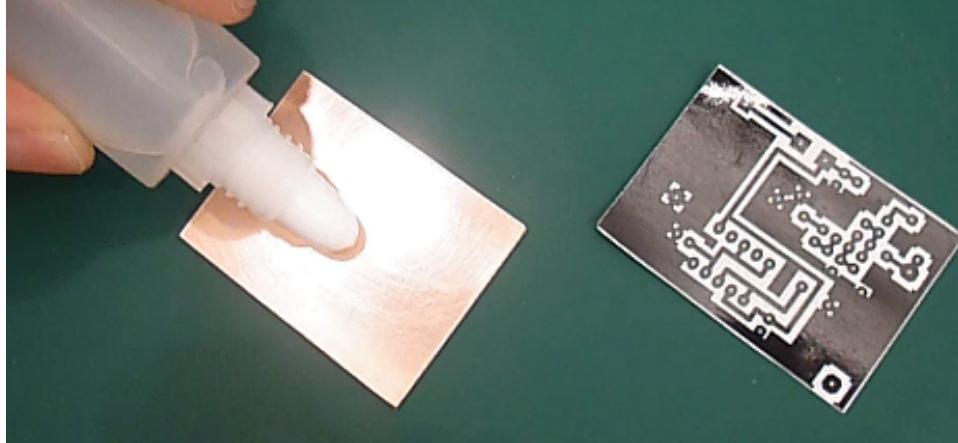
Spray board and LASER print with alcohol and water with kitchen paper. This will remove any oil and fingerprints. Do not touch.



This step is the same you would do for any other toner transfer method.

## Step 6: Procedure

Pour a small quantity of acetone-alcohol solution onto the copper side of board. Spread uniformly with fingertip (clean!).

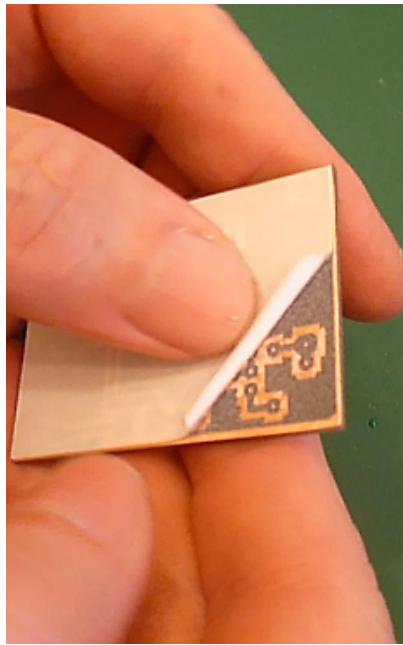


Place the print on the board and quickly position it avoiding perpendicular pressure. Gently push down (no pressure yet) until the entire print is in contact with the solution.



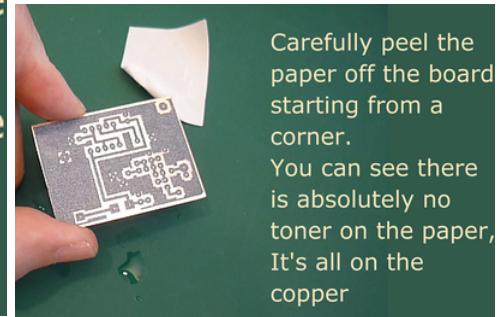
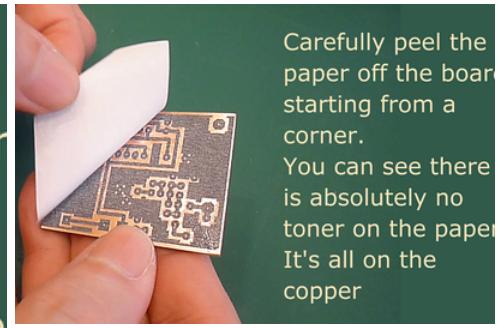
Pour the solution on the board (*not on the print*) and **quickly** spread to cover all its surface (**quick!**, acetone is **volatilizing**). Place the print on the board and center it in place without pushing down. Now press **gently down**, fully contacting the solution. Wait **5-10 seconds** before finally **pressing down** to adhere to board (**only perpendicular pressure**). During those seconds, acetone is reacting with the toner rendering it "sticky". Use some kitchen paper to spread pressure evenly and absorb excess liquid. Let dry, and dip in water.

## Step 7: Release the Paper



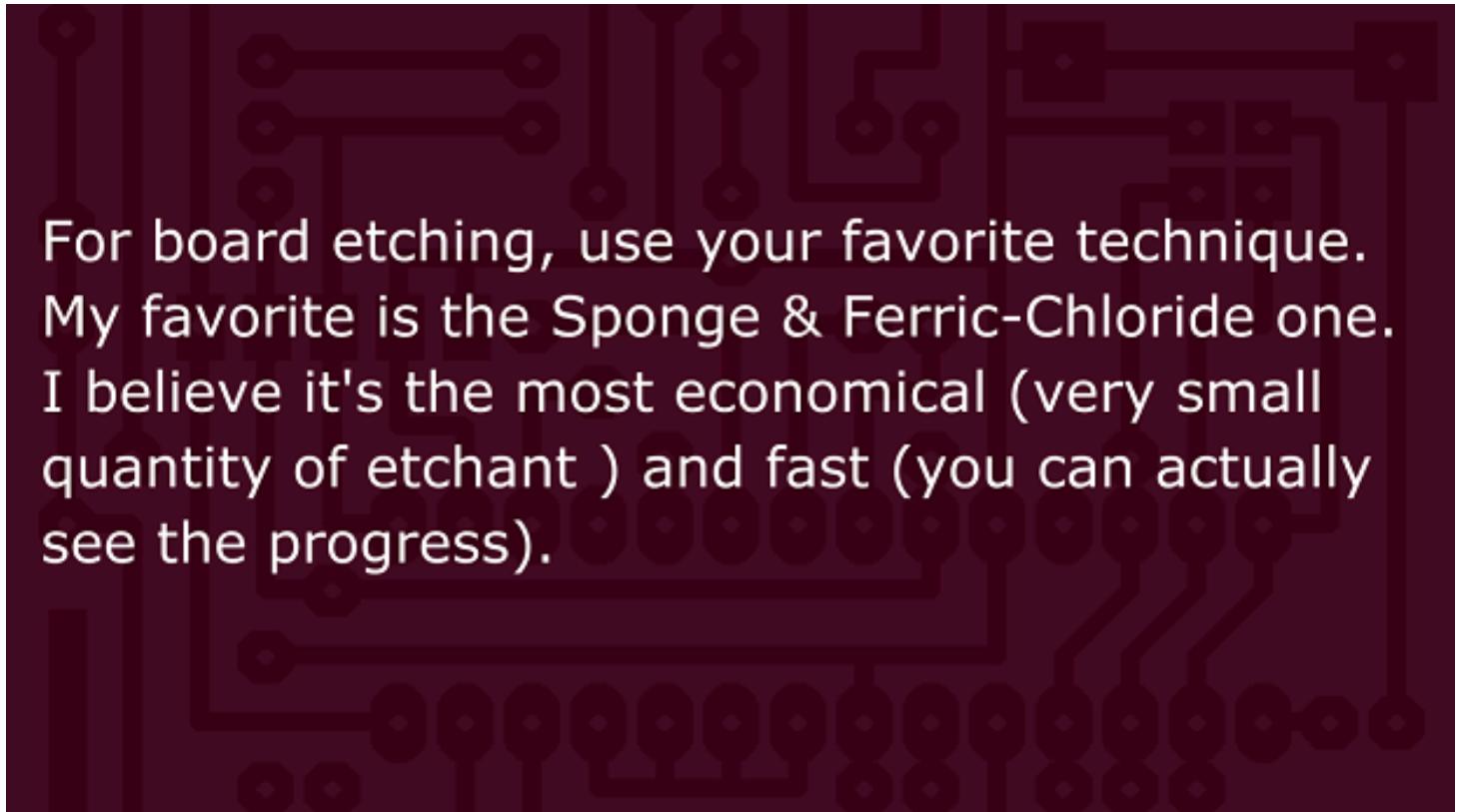
Carefully peel the paper off the board starting from a corner.

You can see there is absolutely no toner on the paper. It's all on the copper



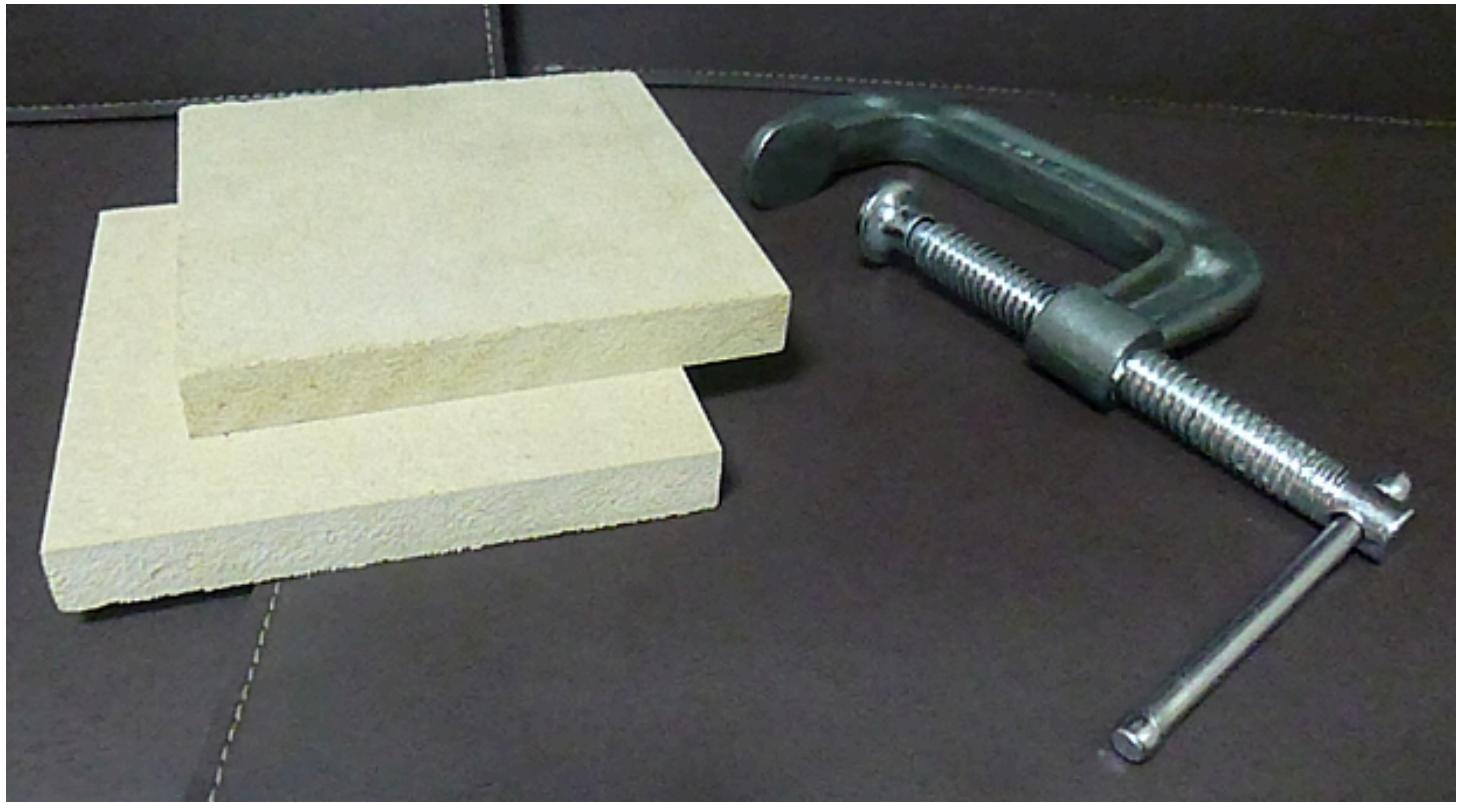
After a few minutes (*don't be anxious*) peel the paper off starting from a corner. There should not be any toner on the paper. Rinse the board in water to remove any remaining paper particles.

## Step 8: Etching



For board etching, use your favorite technique. My favorite is the Sponge & Ferric-Chloride one. I believe it's the most economical (very small quantity of etchant) and fast (you can actually see the progress).

## Step 9: Large Boards



For larger boards, I place board and print between two blocks of wood and press together with a **C-Clamp**. Place a layer or two of kitchen paper between print and wood to distribute pressure and allow for evaporation.