

Tamarack Series 142 Vacuum Contact Printer Operations Manual



This user manual is not be removed from the Mask Making Room.

Purpose

The Tamarack Series 142 Vacuum Contact Printer is used to produce a copy of a master plate at a sizing ratio of 1:1. The Series 142 is able to image a patterned emulsion plate to a photoresist coated chromium plate or from a patterned and etched chromium plate to a photoresist coated chromium plate with an identical pattern transfer. With filters installed, the Tamarack is capable of exposing emulsion plates using either a patterned emulsion plate or a patterned chromium plate as a master plate. If the user chooses to use the machine for this purpose, then they should expect the resulting emulsion pattern to be a negative image of the master plate.

Reference Documents

Tamarack Vacuum Contact Printer Series 142 Technical Manual Rev. 9/76

Materials Required

Emulsion coated plate 5" X 5" (127 X 127 mm)
Photoresist coated chrome reticle plates
5" X 5" (127 X 127 mm) or 4" X 4" (100 X 100 mm)
AZ917MIF Developer for Positive PR
AZ300MIF Developer for nLoF 2020 Negative PR
CR-4 Chromium photomask etchant
PF-95 Photomask Fixer
PD-86 Photomask Negative Developer

Operations

1. Turn on the lamp power supply.
 - The lamp power supply is below and to the right of the copier.
 - The power switch is the left white switch.
2. On the lamp power supply, press and release the "start" switch.
 - The right switch should be pressed down and then released.
 - Allow 3-5 minutes for proper lamp warm up.
3. Press the "Power On" switch located on the copier's main control console.
 - The switch will illuminate as well as the "Stop/Ready" and "Copy" indicator switches.
4. Unlatch the door and open it.
5. If you need to change the plate holders are not trained to do so, contact lab staff.
 - If you have been trained and you need to change the master and copy plate holders use the following steps:
 - The two selected printing frames are secured in a diagonal orientation by four screws on each.
 - When installing the printing frame in the master chamber, orient the two nylon locating guides toward the lower right side.
 - When installing the printing frame in the copy chamber, orient the two guides toward the left and opposite the single guide on the master frame.
 - In this manner, the white guides alternate and do not interfere with each other when the door is raised

6. Load master plate in master chamber with the pattern side out.
7. Press "Master" switch to apply a holding vacuum to the master plate.
 - The switch will illuminate.
8. Load copy plate in copy chamber with the chemical side up and raise the door a little so the copy vacuum starts.
9. Check to see that the copy plate has good vacuum by trying to move it.
10. Carefully raised the door and latch the door shut.
11. Press the "Purge" switch. The switch will illuminate.
12. Wait 5 seconds and press the "Purge" switch again to stop the purge cycle. The switch light will extinguish.
13. Apply and hold some pressure to the door and press the "Chamber Vacuum" button. The switch will illuminate.
 - Look at the 3 gauges and make sure that they are all around 20 then let go of the door.
14. Press the "Copy Force" switch to apply force to clamp the master and copy plates together. The switch will illuminate.
 - The left vacuum gauge and the middle one will decrease in vacuum. Make sure that they stabilize and read around 9.
15. Set desired exposure time on the Timer.
 - Emulsion plate 12 seconds.
 - Positive PR Chromium plate: 20 seconds.
 - Negative (nLof 2020) PR Chromium plate: 60 sec
16. Check the filters in the slots inside the printer. (Figure 1 in Appendix)
 - For a chrome copy, use only the rear filter.
 - It is difficult to see. It is behind the rubber and should always be in.
 - To make an emulsion copy, use all three filters.
 - Emulsion plate filters will be inserted in the two slots on the front side of the rubber.
17. Press "Exposure Start," wait until you hear the shutter close, then press Exposure Start again.
 - "Shutter Open" switch will also illuminate but, during shutter open time only.
18. Press the "Exposure Start" switch again, after the timer counts down and you hear the shutter close.
19. Press the "Copy Force" switch to remove the forces clamping the plates together. The switch light will extinguish.
20. Press the "Purge" button to separate the two plates.
21. Wait 5 seconds then press "Purge" again.

22. Wait 3-4 seconds then press the "Chamber vacuum."
23. Unlatch and carefully open the door.
 - The vacuum holding the copy plate will be released automatically and the "Copy" indicator light will extinguish.
24. Remove the copy plate.
25. While holding the master plate, depress the "Master" switch to remove the vacuum on the master plate. The switch will extinguish.
26. Return the door to the closed position and latch it shut.
27. Press the "Power On" switch on the copier to turn the machine off.
28. Turn off lamp power supply.
29. Develop the copy plate.

Developing and Etching

Emulsion plate

1. Use PD-86 developer to develop the emulsion plate for 1 min.
2. Rinse the plate in DI water for 1 min.
3. Put the plate in fixer PF-95 for 2 to 5 min.
4. Rinse the plate in DI water for 1 min.
5. Rinse the plate with methanol.
6. Place the plate in the slotted Teflon plate holder and let air dry
 - Alternatively, blow dry the plate with nitrogen

Chromium plate – Positive Resist:

1. Develop the plate in AZ917MIF for 20-25 seconds.
2. Rinse in DI water for 1 minute and inspect
3. Etch the exposed chromium in CR-4 until the chromium is removed (~ 65 sec).
4. Rinse in DI water for 1 minute and inspect
5. Rinse the plate with ACE/IPA to remove the remaining resist.
6. Strip any residual photoresist in the Drytek ~5 min.

Chromium plate – Negative (nLof 2020) Resist:

1. Develop the plate in AZ300MIF for ~45 seconds.
2. Rinse in DI water for 1 minute and inspect
3. Etch the exposed chromium in CR-4 until the chromium is removed (~ 65 sec).
4. Rinse in DI water for 1 minute and inspect
5. Rinse the plate with ACE/IPA to remove the remaining resist.
6. Strip any residual photoresist in the Drytek ~5 min.

Common Lab Recipes Summary:

Positive PR Masks (lab supplied)

Tamarack Exposure time – 20 sec

Develop – AZ 917MIF – 25 to 30 sec

Negative (nLof 2020) PR on Blanks (Dr. Snider Purchased – FOR ICFAB ONLY)

5 mL – Spin 4000RPM for 30 sec

Soft Bake – 90C for 60 sec

Tamarack Exposure – 60 sec

Post Exposure Bake – 120C for 60 sec

Develop – AZ300MIF – 40 to 60 sec

Appendix

Figure 1 Tamarack Filter Placement

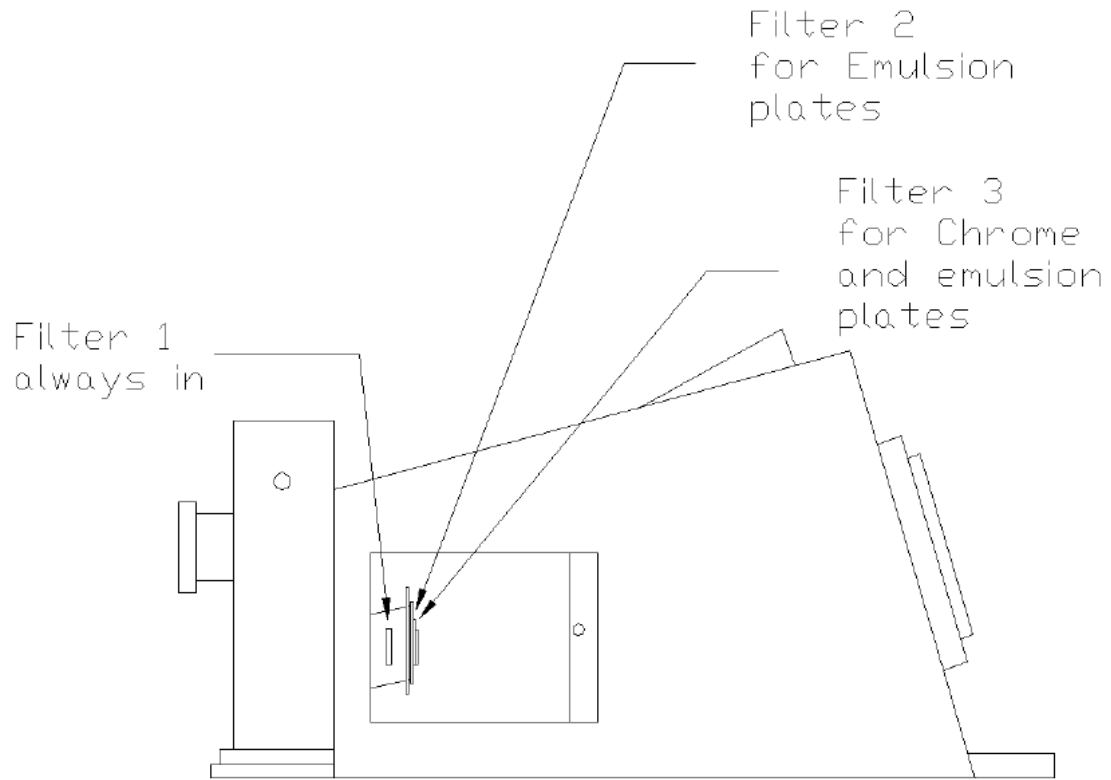


Figure 1 Tamarack Filter Placement