Technics/Micro RIE 800 Operating Instructions

Description

The Technics/Micro etcher is controlled through the front bottom panel. Everything is done in manual mode, so the start/stop button and the timer are not used (the timer is broken). There are two toggle switches to turn the vacuum and vent on/off. Base pressure is 60-70 mTorr, shown on the middle display on the right. See Figure 1.

Emergency off is the big red button on top (Figure 1).

There are two gas input lines shared between three gases. Gases 1 and 2 have two control buttons: the toggle switches control whether or not that gas flows at all, while the knobs control internal needle valves. There is no pressure knob, so pressure is controlled by continuously pumping on the system and varying the needle valves to change the steady state flow. Gas 1 splits into two pipes outside the system, each with a blue valve. The blue valve on the left carries in SF6, while the blue valve on the right carries in a mixture of CF4 + O2. Gas 2 carries in O2 only.

Figure 2 shows a close-up of the switches and valves described above. Figure 3 shows a close-up of the blue valves in the back.

Plasma power is controlled in the same way: a toggle switch to turn power on/off, and a knob to vary the “on” power. The power is shown in the top right display.

Figure 1. The Technics Micro RIE. The emergency off button is on the top left.
**Operation**

**Starting out**: Begin by filling out the log book. Check the status: vac off, vent off, power off, gases off, manual mode, both blue valves closed. The system is left in a pumped-down state without the pump still running.

**Gas 1 prep**: If Gas 1 is used, there is a chance that some gas was left between the blue valves and the internal Gas 1 toggle switch valve. After ensuring that both blue valves are closed, turn vac on and pump to base (60-70 mTorr). Flip the Gas 1 toggle switch and slowly open the needle valve. If the pressure rises due
to residual gas in the line, keep slowly opening the needle valve while maintaining pressure below 200 mTorr. Wait until base pressure is achieved again, then turn the Gas 1 toggle switch off.

**O2 pre-clean:** If vac is not already on, turn it on now. Turn on Gas 2 toggle switch and open the needle valve until the pressure stabilizes at 200 mTorr. Flip the power switch on and tune it to 150 Watt. Wait 5-10 minutes (using your own timer) for the O2 to clean the chamber, and then turn the power and Gas 2 toggle switches off. Wait for base pressure.

**Set conditions:** It is a good idea to set the needle valves to the appropriate positions for the desired pressures before putting your sample in. If you are using Gas 1, open the appropriate blue valve. If you are using either Gas 1 or Gas 2, flip the appropriate toggle switch and adjust the needle valve until the system stabilizes at the right pressure. Turn power on and adjust the power level. The plasma will briefly cause the pressure to spike, but the pressure will restabilize. You can verify that the plasma has struck by looking for a purple glow through the somewhat-coated window. Once you are satisfied that you have the right steady state values tuned up, turn off the power and gas 1 toggle switches without touching the knobs. If you want to use both Gas 1 and 2, repeat the procedure for the other gas and leave its needle valve in the right position. Wait for base pressure again and turn vac off. Vent for around a minute until you can open the chamber, then turn vent off.

**Load sample:** place your sample anywhere on the bottom electrode, so long as it does not cover the center hole (this is not for fastening your sample). Stop venting if you are, then turn vac on and wait for base pressure. Turn on the appropriate gas toggle switch and wait for the pressure to stabilize. Flip plasma power on, and the pressure should equilibrate to the same value you tuned it up to before. Check for a purple glow through the window and start your own timer. Note the conditions in the log book.

Note: there is a chance that the repeatability will not be good and that the final pressure will not be what you set it to before. You may either wait and see if the pressure stabilizes to the correct value after a certain time, or you can try tuning it slightly on the fly to maintain the correct value.

After you are done etching, turn the power and gas toggle switches off. Wait for base pressure, turn vac off, vent on. You can open the lid after a little under a minute, when you can then stop venting and unload your sample. If you have more samples, repeat the procedure.

**Chamber post-clean:** Once you are done using the machine, close the lid and pump until base pressure is achieved. Using the same needle valve positions as you used during the etch, turn on the same gas at the same pressure and power. If you etched metal, it probably has contaminated the chamber, so run this dummy etch for as long as your longest single etch was. Otherwise wait 5 minutes, and proceed below.

If Gas 2 only was used: turn the power and Gas 2 toggle switches off, wait for base pressure, and turn vac off. The system is left in this pumped-down state with the pump off.

If Gas 1 was used: turn the power switch off and close whichever blue valve you opened. With the Gas 1 toggle switch still on, keep pumping until you achieve base pressure. Slowly open the needle valve to pump out this shared section of pipe faster, but keep the pressure below 200 mTorr. Once 60-70 mTorr is
achieved, turn the Gas 1 and vac toggle switches off. The system is left in this pumped-down state with the pump off.

Complete the log book entry.

Thanks to Will McFaul for putting these instructions together.