

## Tuning a Probe

**WARNING:** If you are a new user and you don't know how to do this or are unsure, **GET HELP**. Do not attempt to just "figure this out". Equipment can be damaged. Tuning probes may not be allowed in other NMR labs on campus so please check with the lab manager before attempting to tune probes elsewhere.

Tuning the probe reduces the reflected power. Probe tuning requires adjusting the tune wands very carefully to reduce the reflected power to the 0 to 1 range. (Note: Carbon and nitrogen will not tune to zero on the Bioselect probes (6001 & 6002).) Tuning the probe will insure that the 90-degree pulse width determination will be accurate and the pulse width will be as short as possible. If the sample is high in salt, the probe may not tune down to 1.

1. To tune the probe, first setup the correct frequencies through the computer. To do this, load the experimental parameters, i.e. setup s2pul with **tn=H1**. Then do a **>su**.

This sets up channel 1 on the tune box to be proton. Channel 1 is always equal to the **tn** (transmitter nucleus). Channel 2 will become the nucleus the **dn** (decoupler nucleus) is set to.

2. The ACQI window *must be* closed or tuning won't work.

3. Take this opportunity to double check that the instrument is cabled correctly for the nucleus observed.

4. From the preamp, move the "probe" cable to the "probe" outlet and the "output" cable to the "output" port. Move only the cables, not filters. If adjusting more than the transmitter nucleus, the "probe" cable may start at a filter instead of the "probe" port on the preamp. (On 8001, move only the probe cable.)

5. Change the channel to 1 (if appropriate). Check that the attenuation is set at 9.

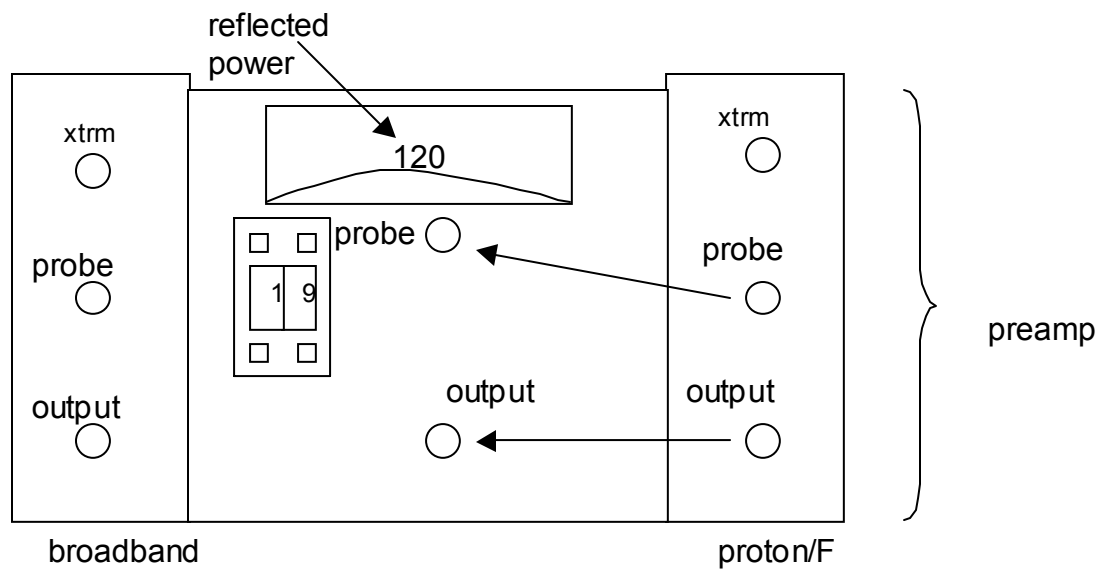
6. If the meter reading is very large or off-scale, lower the attenuation.

7. Tune using the appropriate wand (top part is tune, bottom is match).

Adjust them to minimize the reflected power on the meter. Raise the attenuation back to nine (if necessary) as the reading decreases. Users should be able to reach a reading of 0-1. Always end with the attenuation at 9.

8. Change the channel back to 0. Replace the cables.

*Tuning Tips:* The wands can be very sensitive. Try to make small adjustments. If minimizing both the tune and the match and the reading doesn't go any lower, try moving the match part either clockwise or counter-clockwise to slightly increase the signal. Then try to minimize the signal again using the tune part. If the signal improves, continue to move the tune part in the same direction and repeat. If the signal does not improve, try adjusting the tune part slightly in the opposite direction to increase the signal and try to minimize again with the match part. This process should help get out of any local minimum it is trapped in.



**Figure 7:** To tune the probe on proton, move the proton cable to the proton port from the proton preamp and move the output cable from the proton preamp to the output port. Change the channel setting to channel 1 (if  $tn=H1$ ) and adjust the tune wands to reduce the reflected power to 0-1.