**Main Identity**

**From:** "Joe Ruggieri" <pyrojoe@prodigy.net>
**To:** "Joe Ruggieri" <pyrojoe@prodigy.net>
**Sent:** Tuesday, October 26, 2004 9:39 PM
**Subject:** Re: Macom PLO Infromation

It has become apparent that many people don't understand how Macom PLOs operate because I keep getting this same question "What is the multiplier".

All PLOs of this style operate in the same manor with typically the same reference frequency and cavity oscillator range.
The input requires an external reference or internal crystal in the range of 90-110MHz that phase-locks the high power cavity oscillator. This oscillator typically tunes in the range of 1.4 - 1.9GHz and is fed via a probe to the step
recovery diode located just ahead of the output filter assembly.
There are two factors which make up the "multiplier"
number and there are dozens of different multipliers for any PLO.
The first factor can be either 14,15,16,17,18 or 19 depending on where you tune the cavity frequency. The second factor is from the (SRD) which multiplies by all integer values 1,2,3,4,5,6,7,8,9,10,11,12 etc.
This output filter is adjustable with and without modifications over a wide frequency
range but it's band-width is narrow enough to select the desired output frequency
from harmonics generated by the SRD.
Here is an example if one that I setup for a customer in Germany.
He wanted 9.60000GHz so I used a 100.000MHz reference and tuned the oscillator to 16 x 100 = 1.6GHz and tuned the filter to 9.6GHz. You can see in this case the SRD multiplier is x 6. 1.6GHz x 6 = 9.6GHz and the total "multiplier" is 96. Depending on the range of the cavity oscillator and SRD multiplier, you
will be able to find several reference frequencies to yield the exact output frequency you desire.

Joe Ruggieri

**Main Identity**

**From:** "Joe Ruggieri" <pyrojoe@prodigy.net>
**To:** "Joe Ruggieri" <pyrojoe@prodigy.net>
**Sent:** Friday, October 22, 2004 10:04 AM
**Subject:** Macom External reference instructions

Once you remove the back cover, foam pad over the oven and the oven lid you can pull the xtal from the socket with thin needle nose pliers.

Now look directly at the oven and you will see a small molded type axial lead inductor directly to the upper left of the oven. The external 92MHz injection needs to be done to the bottom (lower) lead of this inductor. Solder a 500-1000pf capacitor from this lead to the center terminal of the xtal monitor SMA connector after first removing the coax center lead from the center pin. The capacitor value is not critical but only for ac coupling. This inductor lead is connected via the PCB to one of the xtal socket pins.
You will also need to remove the Xtal when operating with an external reference.
Let me know if you have any more questions.

Joe

**Main Identity**

**From:** "Joe Ruggieri" <pyrojoe@prodigy.net>
**To:** "Joe Ruggieri" <pyrojoe@prodigy.net>
**Sent:** Saturday, November 13, 2004 11:36 AM
**Subject:** Macom PLO adjustment procedure

Here is a rough procedure.
First remove the doubler/mixer block from the main body. The 3 Philips screws are under the top label.
This next step is optional but sure makes things easier.
Sweep the filter from the RF output connector for return loss from 11.5 to 13.5GHz.
You will see the current filter frequency indicated by a couple of negative pips.
starting with the last filter adjustment screw (closest to the SMA connector) start adjusting inward to move the pips down toward 12Ghz until the last 5 screw adjustments bring the pattern centered on the 12GHz frequency on interest. Do not adjust the first filter screw next to the doubler diode at this time.

Now, install the filter block back on the PLO body centering the probe in the hole 180 degrees from the original mounting.
This now gives you access to the filter screws while completing adjustments.
I use a plastic clamp to hold it in position but a guess rubber band would also work.

Power up of PLO and put 96MHz into the input @ 2-5dBm while monitoring the output frequency, output power and the DC voltage on the Phase output pin.

Adjust the cavity frequency screw using an insulated tool until you read 12.096GHz and then stop adjusting when the phase voltage nulls leaving this voltage at 4.0V.
You will find 3-4 other frequencies which will also null and phase lock.

Now is the time to set for max power out.
During this part of the procedure be sure the phase lock voltage is has not gone above 4V and the frequency is still correct.
Re-adjust the same 5 filter screws for peak power.
Next adjust the first filter screw next to the diode for peak power.
I believe this is a matching adjustment and has a lot of effect with very little movement.
You should now have 12.096GHz at about 12-14dBm power.

The 8.1 GHz bricks I sell on Ebay will adjust up to 10.4GHz with the same basic procedure with the additional requirement of changing the xtal frequency and trimming the filter posts of the last 4 filters .02-.025" using a file.

You need to try the adjustments first and if all the filter adjustments will peak and then come back over the peak while adjusting the screws counter clockwise, then you don't need to file the filters
You will only need to file the post of the filters that are keeping you from peaking for enough power.
Opening the filter assembly requires that you first remove the output SMA connector

from the left cover plate and then all the screws from that plate. The connector pulls (unplugs) off of the plate so you can get to the screw under the connector threads. The blank plate also needs to be removed so you can unsolder the diode tab connecting to the filter section. The back of this blank plate has the filter posts, one for each of the filter adjustment screws.

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