How to use Tutioune1600/Minitioune to lock on low SR

We'll find all the most important steps to fully lock onto the signal:
After the compensation of the signal (DC offset, IQ imbalance ...) and action of the AGC we have to

Lock Frequency and Symbol Rate.

These two stages are interleaved with a double PLL derotator

The first thing to do to acquire a TS in Tutioune: Having the 2 first LED going green. Timing(SR) and Carrier PLL are locked. As long as one does not have these 2 green LED, no need to look further.

Many settings can help us to lock better and faster:

- Indication of the actual frequency closest to the true value
- Derotator Starting Offset indicator
- Scan Width can be reduced
- Indication of starting Symbol Rate
- SR scan width reduced (2% instead of 25% as standard)
- Setting the SR increment step
- type of algorithm used (Costas, ...) for the detection
- PLL compensation value setting

A big part of the settings are made by default, but you can work on some parameters and even have your own lock strategy.
When the 2 LEDs “Carrier Lock” and “Timing Lock” are green, the demodulator will then look for the "puncture rate" (punching rate, FEC) and phase (0 °, 90 °, 180 ° and 270 °) and adjust the possible reversal of IQ.

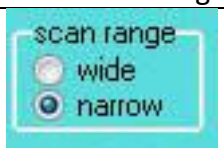
The secret weapon: the Locking Strategy at low SR

This new command panel will allow you to build your own strategy.

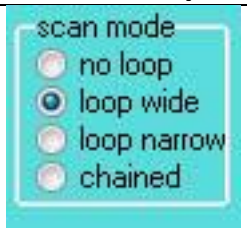
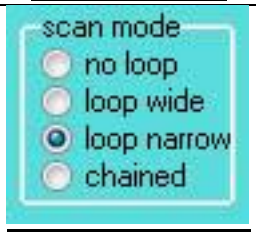
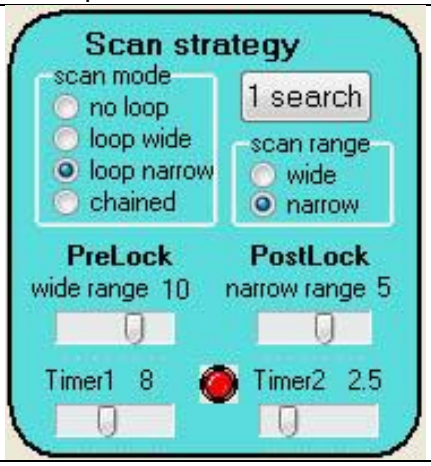
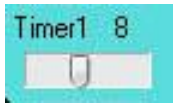
Each time you chose a new frequency or a new SR, the derotator will start a Search automatically. It will scan in zigzag around its stating value, going farther and farther up to **the scan range** you that is set.
So Scan Range is the first choice to have in mind. I have divided the scan range in 2 categories: wide and narrow

Scan mode no loop

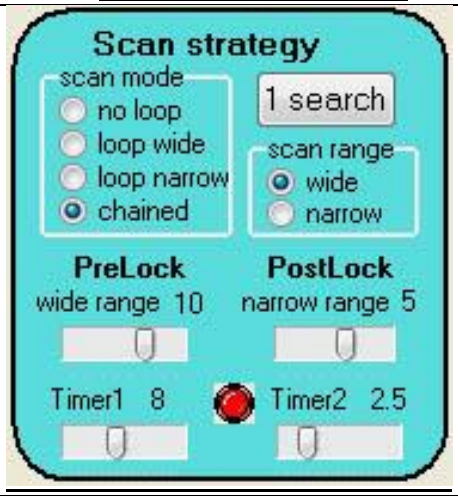
Scan range

Wide range	Narrow range
	
	
You can use the « **1 search** »button to restart the search at the beginning	
	

Scan mode loop

Wide loop	Narrow loop
	
Loop wide => scan range is wide And Loop Timer = Timer1	**Loop narrow** ➔ scan range is narrow and Loop timer =Timer2
	
Wide range	**Narrow range**
	
	
You don't need to click on "1search" button, the loop mode will restart automatically the search according to the time = Timer value	
Timer1 for wide loop = 8 sec 	Timer2 for narrow loop = 2.5 sec 
You can also use the « **1 search** »button to restart the search at the beginning if you don't want to wait for the timing loop restart	
	

Scan mode : Chained

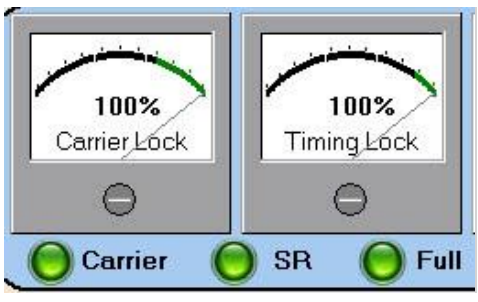
Chained before lock	Chained after lock
	
The idea here is to chain wide loop before lock with narrow loop after lock	

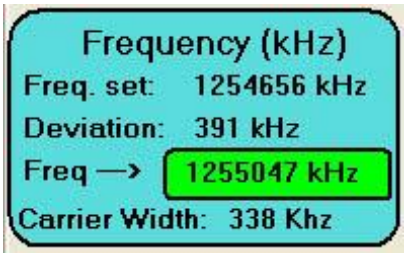
Remark : all the choices (wide or narrow loop, range values and timers values) can be preset in the tutioune1600.ini file

The final adjustement: The Pll correction parameter

This last parameter well set will allow to lock more quickly at very low level signals.
It depends on the SR used and the modulation shape.
At SR250 for my Dektec modulator I use 0.
At SR250 with the UglyPIDATV modulator I use 3.
At SR250 with the DTX1 modulator I use 2.

When you will be locked,..... You can read the real frequency received





Yes, with such a tool we could conquer the Low SR world!