

## **A note on testing the Lock in amplifiers before start.**

The lock-in amplifiers like SR-530 and SR-510 are complex and sensitive equipment for measurements. They can remember the setup even after having been turned off. Also prior handling might have left the lock-in amplifiers in an ill-defined status. In very seldom cases they may need a repair in which case you should look for a replacement – but make sure to only ask for that after a thorough search and when you have prepared a clear demonstration that there is in fact a problem. This note suggests a simple test.

The lab-assistants turn the lock-in amplifiers on in the morning as soon as they arrive because there is a period of increased stabilization as a result of the warming up. The warm up is not a real problem because you as students seldom get to use the lock in amplifiers from the start.

When you turn the lock-in amplifiers on yourself be sure to use the trick (check manual) for making sure that the instrument reverts to factory defaults. Your first task is to figure out how to do that.

Next, take a function-generator and set it to a sinus signal with some odd frequency value, for example 736 Hz. Connect the synch out to the “Ref-in” of the lock-in amplifier. Next turn the peak-to-peak value of the functional general signal down to the lowest possible amplitude (It should be called 10 mV peak-to-peak). Send that signal to the digital oscilloscope (set with an input impedance of 1M $\Omega$ ) and verify that the functional generator is then actually sending out a signal with a 10 mV amplitude (twice as much as the functional-generator claims it is sending out). That value corresponds to a 7 mV rms value.

Next reconnect the signal to the Lock-in amplifier “A” input socket. Set the lock-in amplifier to measure on socket “A”. Make sure that there are not any red light on or flashing (for example, no overload). Pick the sensitivity to a relevant value, select dynamical reserve.

If you are testing and using the SR-530, set that the to “R and theta choice” for measurements. If instead you are testing and using the SR-510 then use the single-channel measurement technique that the SR-510 offers but do twist the phase-offset regulator so that the value that is being reported as the measure value is at its maximum (in which case it will be equal to the “R” value that one would have read of on a SR-530).

The frequency LCD on the lock-in amplifiers should now show 736 Hz (or you have made a mistake on the “Ref in” connection). The LCD value that you read out from the “R”-window of the lock-in amplifier should now say 7 meV (it is always reporting in rms voltages). If you get that 7 mV rms value then it is likely that the lock-in amplifier is working for signal measurements.

If you do not get what you should be getting, then pay attention again to the wiring and to the fact that you must turn on the lock-in amplifier in such a way that it reverts to factory defaults (check the manual).

Good luck, looking forward to reading your report,

Best regards,

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