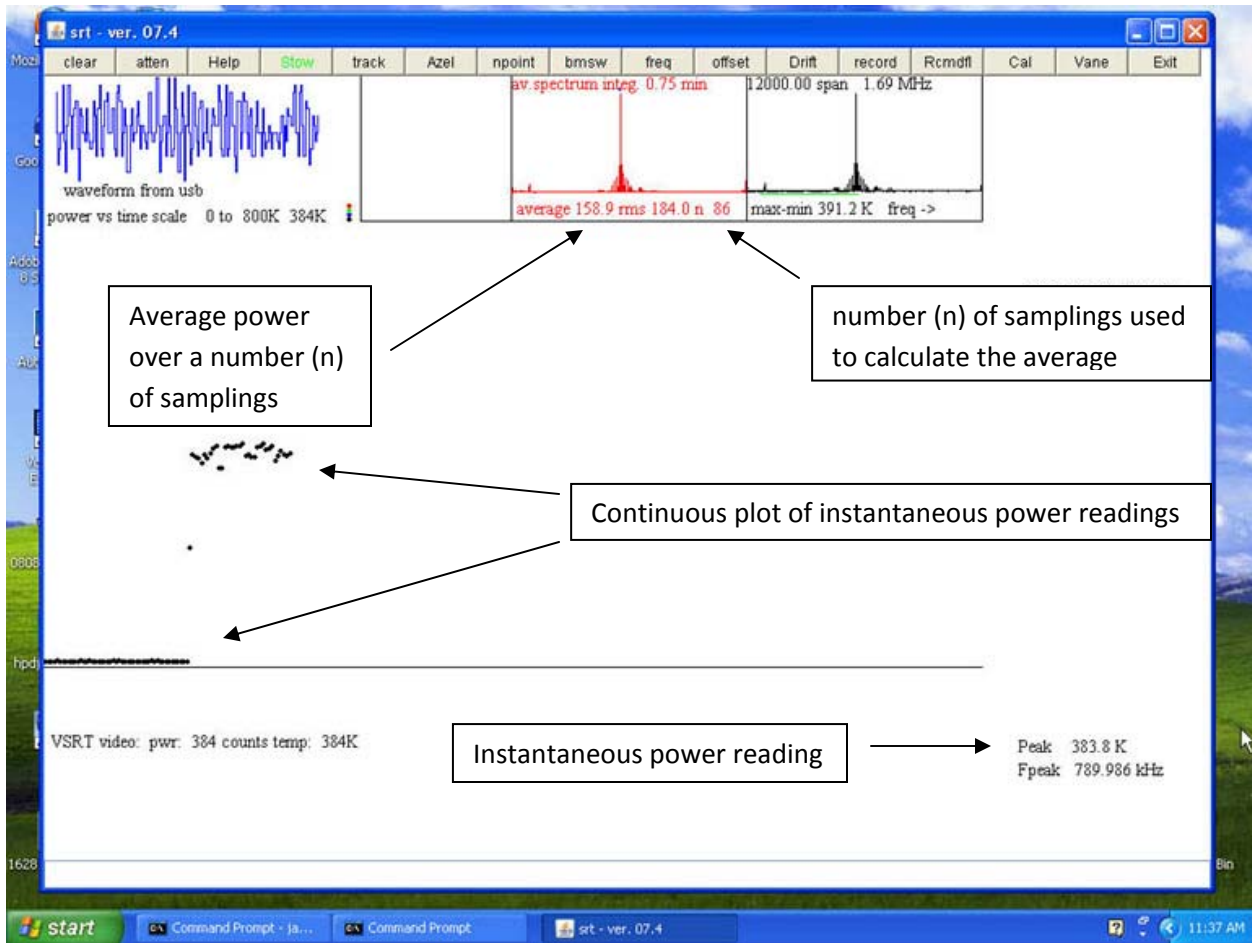


Basic VSRT Operation:

Display screen snapshot & readouts



Reading the Computer Screen

In the middle box at the top of the screen (red), the average spectrum integration box shows the average value of n (the number of readings) for that trial. The rms is the root mean square of the differences between the individual readings and the average value.

At the bottom right of the screen the "Peak" value is the instantaneous power value measured in [K].

Note: The power (energy/time) is expressed in Kelvin [K], as is the tradition in radio astronomy. $E \sim kT$, where E is the energy in Joules, k is Boltzmann's constant in Joules/Kelvin, and T is the absolute temperature in Kelvin. When calibrated, this measures the equivalent blackbody temperature.

Terms

LNBF is the acronym for **low noise block-down-converter feeds** used as the detectors of radio waves. The VSRT LNBF's are centered at a frequency of about 12 GHz.

CFL is the acronym for compact fluorescent light, which is a source of radio waves in the microwave range, which includes 12GHz.

Baseline refers to the distance between the centers of the 2 active feeds on the LNBF's.

Helpful Hints

1 INCH = 2.54×10^{-2} m = 2.54 cm. Choice of SI or English Common units is left to the instructor.

The phase center of the LNBF is about 0.75 inches inside the plastic front cover. The CFL radiates from the entire lamp so the effective radiation center is close to the middle (about 2 inches from the end) of the lamp.

When the source is too close to the detectors saturation of the detectors occurs. This explains the departure from the inverse square law when the lamp is as close as 2 feet. At larger distances the departure from the inverse square law is reduced

Minimal length is 2 ft from source(s) to detectors. It has been found that in the near field (less than 2 feet) the LNBF interferometer does not perform with the desired consistency.

Leftmost detectors only!! It does not matter which connector the cable is attached to. The detector to the left (when the detectors are on the bottom & the connectors are on the top) is the active feed.

Both cables must be of the same length for the interferometer to work properly (same time delay).

Place detectors at edge of table to avoid table reflections. This means that for activities in which something is placed between the source and the LNBF's (such as transmission or absorption investigations) some method of supporting the object(s) is required.

Zero the average spectrum integration box before each measurement. If a change is made to the material between the source and the detectors the order of operations would be: 1) change the material, 2) zero the average spectrum integration box to begin a new number count, 3) record the reading.

CFL sources: Please refer to VSRT Memo Series #6 to find recommendations for the Compact Fluorescent Lamp that is most appropriate for this project.