In the 1950’s and 1960s radio astronomers often used gas discharge tubes mounted inside the receiver waveguide to calibrate the radiometer. In simple terms, the gas discharge results in a plasma of electrons which is optically thick to microwaves. The noise temperature output is equal to the electron temperature which is typically around 10,000 K. The modern energy saving bulb, currently available in the supermarkets is a high intensity discharge (HID) in mercury-vapor. The lamps are all made in China and probably are pretty similar from one brand to another. The most common brand is GE and the discharge tubes are either helical or loop up and down. Wattage ranges from 15 to 30 (equivalent light output to about 50-100 w incandescent). The electronics in the base produces a high starting voltage (most likely around 1 kv) generated from a frequency (derived from a transistor oscillator) in the range of 50 to 90 KHz. The high frequency is used to reduce the 120 Hz flicker. There are two problems associated with the use of these lamps for VSRT tests, demonstrations and experiments:

1] There is often a 50-90 KHz modulation of the microwave output which can be confused with the modulation produced in the detector by interferometric fringes.

2] There is often a variation in the microwave output with a period in the range 10-20 seconds.

Both of these problems appear to be a minimum in the large lamps. The GE Biax electronic 27 W 120 VAC 60 Hz 400 ma FLE27QBX/2/SW gave the best results. I measured a brightness temperature of about 5000 K for this lamp. The tubes appear to be optically thin at 12 GHz so the maximum output occurs when the tubes pointed towards the antenna.
27w 100w
Soft White 100
Energy Saving Bulb*

- Long Life means less bulb changes
- Flicker-free
- Soft white light

This bulb saves $43.80 in energy costs.
Mercury is an essential ingredient for most energy-efficient lamps. Fluorescent lamps and high intensity discharge (HID) lamps are the two most common types of lamps that utilize mercury. Fluorescent lamps provide lighting for most schools, office buildings and stores. HID lamps, which include mercury-vapor, metal halide and high-pressure sodium lamps, are used for street lights, floodlights and industrial lighting. A typical fluorescent lamp is composed of a phosphor-coated glass tube with electrodes located at either end. The tube contains mercury, of which only a very small amount is in vapor form. When a voltage is applied, the electrodes energize the mercury vapor, causing it to emit ultraviolet (UV) energy. The phosphor coating absorbs the UV energy, causing the phosphor to fluoresce and emit visible light. Without the mercury vapor to produce UV energy, there would be no light. A four-foot fluorescent lamp has an average rated life of at least 20,000 hours. To achieve this long life, lamps must contain a specific quantity of mercury. The amount of mercury required is very small, typically measured in milligrams, and varies by lamp type, date of manufacture, manufacturing plant and manufacturer.