Calculating the Resistance of Old-Fashioned Tungsten Filament Light Bulbs

(this does not apply to CFL or LED bulbs; only the old “incandescent” ones)

The cold and hot resistances are very different. Of course, the filament heats rapidly and the resistance at the heated condition is what we want to know.

Some simple math determines this:

Power = Volts x Amps (a slight oversimplification but close enough for AC work)
A 100 Watt bulb run at 120 VAC causes 0.833 amps to flow through it.
100/120 = 0.833

Now we know the voltage and the amperage so we can use Ohm’s law to figure the ohms:

E=IR (volts = amps x ohms)
120 volts = 0.833 x R
120/0.833 = 144 ohms

According to some old data I have seen published, the above formulas run about 4% high so multiply the 144 ohms by 96% to get a little closer to the actual number:

144 x 0.96 = 138 ohms

In actual practice, the true value might vary a little from this calculated figure due to manufacturing variations, but this is close to the true value...and close enough for us.

Can a light bulb be used for a dummy load? Sure; this has been done for probably 100 years or more. Just be sure to use the proper sized bulb for the RF ***output*** of the transmitter in use. Don’t try to send 100 watts of RF to a 60 watt lightbulb.

And keep your fingers off the connections...