**N5ESE's Classic RF Probe**

What's an RF probe, and how does it work?

**Diagram:**

The RF probe is a device that allows you to measure RF voltages in circuits where a conventional voltmeter would not be able to do so. It consists of a diode connected to a resistor, which forms a voltage divider. The probe is connected to the DC Voltmeter, allowing the measurement of RF signals.

**Details:**

1. **Diode:** Any diode with good RF characteristics can be used. A popular choice is the 1N34A, which has a reverse breakdown voltage of 40V, forward voltage of 0.3V, and a high peak current capability.
2. **Resistor:** The resistor value depends on the impedance of the RF circuit. For a 50-ohm circuit, a 1000-ohm resistor is a good choice.
3. **Shielded Wire:** A shielded cable is used to minimize interference and reflection from the ground plane.
4. **Ground Plane:** A large metal plate, usually a chassis or a ground plane, is used to couple the RF signal into the probe.

Before we use it, a few precautions are in order. Don't use the probe in any circuit where the highest DC supply voltage is above 5V. Also, make sure the diode is rated for the RF voltage present in the circuit.

_So, how do we use this thing?

**Diagram:**

1. **Connect the Probe:** Connect the diode and resistor circuit to the banana-plug end of the probe. Connect the other end to the +/- jacks of your DC Voltmeter.
2. **Connect to Circuit:** Connect the shielded wire's terminal to the ground plane, and the center conductor to the pad with the resistor.
3. **Test Circuit:** Place the probe on a circuit and observe the voltage readings. You can also couple it into the circuit, causing erroneous readings. We'll also shield our leads all the way back to the Voltmeter, as shown.

**Broadcasting Leads:** For circuits over 30 MHz, use 10-12 inches for the ground lead, and 5-8 inches for other leads, to minimize interference.

**How do we read RF voltages?**

**Diagram:**

1. **RF Probe Circuit:** The RF probe consists of a high-value resistor (R) in series with a diode (D), which acts as a voltage regulator. The voltage across the resistor is measured by the Voltmeter.
2. **Measurement:** The voltage measured is the peak voltage of the RF signal, assuming it is a sinusoidal waveform. For non-sinusoidal signals, the peak voltage can be calculated using the resistance divider formula.

**Formula:**

\[ V_{out} = V_{in} \times \frac{R_{load}}{R_{total}} \]

**Example:**

For a 50-ohm circuit and a 1000-ohm resistor, the voltage measurement formula becomes:

\[ V_{out} = V_{in} \times \frac{1000}{50+1000} \]

**Conclusion:**

RF probes are a quick and easy way to measure RF voltages in circuits where a conventional voltmeter would not be able to do so. With a little bit of DIY work, you can build your own RF probe for just a few dollars.