

Bob's TechTalk #39
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Grid Dip Oscillators (Dip Meters)

The Grid Dip Oscillator:

Recent discussions on the ten meter net involved the "Grid Dip Oscillator" (GDO). Of course "Grid" is an old vacuum tube element term, and almost all new meters of this type are solid-state, thus the alternate term "Dip Meter". However the acronym GDO still often used even for the solid-state devices.

For years the GDO has been one of the handiest and most popular pieces of test equipment for hams who build transmitters, amplifiers and antennas. One reason for this is that it is a low cost device that has many practical uses, and is easy to operate.

How it works:

The GDO consists of a variable oscillator that covers a large range of frequencies using plug-in coils and a variable capacitor with a calibrated scale. The coil is external to the chassis and is the sensing device. A meter is connected so that it measures the level at which the oscillator is oscillating. This was accomplished on the original grip dip meters by measuring the grid current drawn by the oscillator tube, hence the name.

When the coil of the GDO is placed next to a tuned circuit to be measured and the GDO capacitor is tuned, the meter will dip when the GDO is tuned to the same frequency as the tuned circuit. If the coupling between the GDO and the tuned circuit is high the dip is quite broad. But once the dip is found the GDO can be moved away until the dip is small and very sharp. At this point the oscillator frequency can be read on the capacitor dial. The GDO capacitor scale doesn't have very good resolution nor accuracy, so one trick is to also listen for the oscillator signal

in an accurate receiver. The tuned circuit doesn't have to be a coil and a capacitor, it can be a trap or even an element of an antenna, a length of coax, or a wire antenna.

Remember the meter is measuring the strength that the oscillator is oscillating. When a nearby circuit is resonant at the same frequency as the GDO it absorbs some of the energy from the oscillator by mutual coupling, causing the oscillator to weaken.

Absorption Wave Meter Function:

Most GDOs also have an absorption wave meter function (AWM). When in this mode the oscillator is disabled and is replaced by a diode detector. If the GDO's coil is placed near an oscillating circuit and tuned to that frequency, the meter will move upscale. Many GDOs also have a jack for earphones so you can listen to a modulated signal. The wave meter function is good for detecting parasitic oscillations in transmitters and oscillators as well as determining if an oscillator operating or is on frequency.

The GDO can also be used as a crude signal generator for troubleshooting and checking radios. With its external coil and small capacitor scale, it isn't accurate, but again the frequency can be set by using a good communications receiver; that's something most hams have in their shack today, even if it's the receiver part of your transceiver.

What a GDO Can Do:

The GDO or Dip Meter can perform many tasks, here are just a few:

- a. Receiver alignment (GDO mode): Preset tuned circuits; use as signal generator for aligning RF and (if in range) IF stages.
- b. Transmitter adjustment: (GDO mode): Preset tuned circuits. (AWM mode): determine frequency, peak tuned circuits;

- perform final stage neutralization; check for parasitic oscillations.
- c. Adjust traps (GDO mode): Adjust series and shunt traps in transmitter and receiver circuits.
 - d. Measuring Components (GDO mode): Determine unknown values of capacitors, coils, and toroid coils.
 - e. Measure Q (GDO mode): Determine the relative Q of coils.
 - f. Field Strength Meter (AWM mode): Use to measure field strength in the shack and around antennas.
 - g. Feedline Measurements (GDO mode): Use to measure and adjust quarter and half-wavelength stubs and sections. Measure SWR on oven line feeders.
 - h. Antenna adjustments (GDO mode): Check antenna traps; adjust element resonance; measure bandwidth. Roughly measure antenna front to back and front to side ratios.

There are a lot more uses for this inexpensive piece of test equipment.

For more information on dip meters (GDO's) look in almost any Amateur Radio Handbook going back to the forties!

73, from AF6C



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