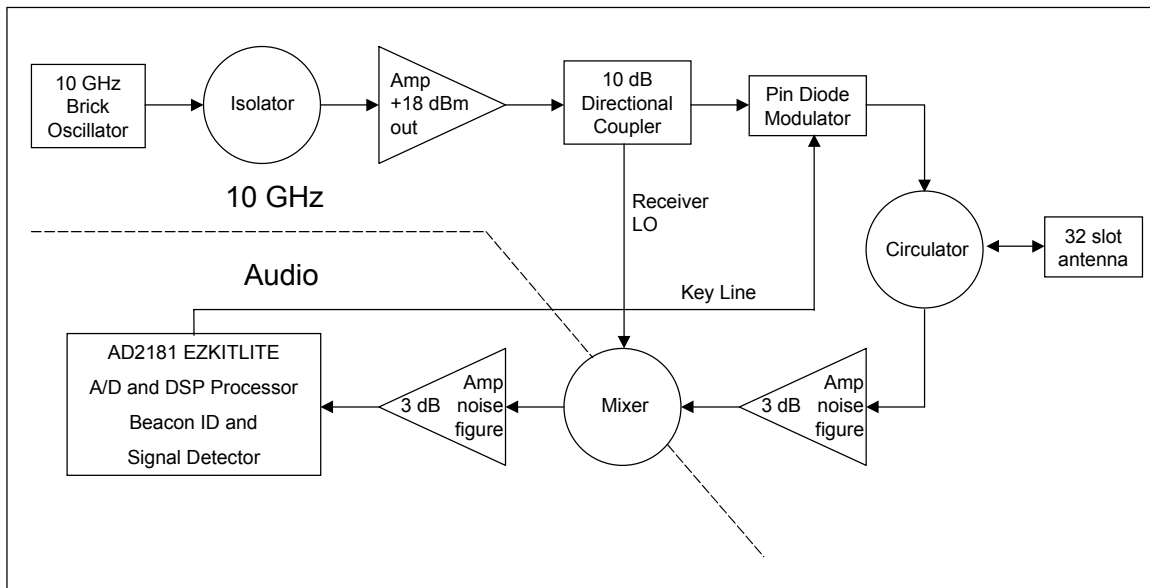


The 10 GHz Beacon at W3LPL

By W3IP

Introduction – Within the last couple of years there has been a notable increase in interest in the Baltimore/Washington DC area in 10 GHz narrow band weak signal communications. Since good test gear is difficult to come by on demand, I decided to design a 10 GHz beacon that would be useful to hams in the local area in checking out their equipment for this band. Since there were a number of new operators and systems coming on the air, this would be provide some extra value to foster band activity.

Looking at the block diagram of the basic transmitter chain of a basic beacon, (oscillator, amplifier, keyer, and antenna), it is easy to envision the addition of a circulator, directional coupler, and a mixer and you have a direct conversion receiver as well. In this assemblage of components, there is nothing to prevent both the transmitter and receiver from being active at the same time. To that block diagram I added a signal processor to evaluate the received signals. The diagram of the complete beacon is shown below.



The Installation – This beacon has been installed at the QTH of W3LPL in FM19LG. Here are the technical details.

- Tx frequency: 10368.300 MHz nominal (typically ± 2 KHz)
- Tx power at the antenna: 20 mW
- Tx antenna gain: +12 dB to -3 dB (variations due to proximity to tower)
- Ground elevation: 600 feet above sea level
- Height above ground: 190 feet
- Receiver frequency: plus or minus 3 KHz from beacon tx frequency
- Receiver sensitivity: -106 dBm

How to use the beacon

Point your antenna at W3LPL and tune in the beacon in CW mode
Set your transmitter to transmit CW exactly 3 KHz below your receive frequency
You can transmit to the beacon any time it is not IDing or repeating back another signal.
Send a minimum of 5 or 6 characters, a maximum of less than 12 seconds of CW
The beacon will repeat your CW (keep it under 40 WPM) followed by your signal strength in dBm (the minus before the number is left off). This means that

smaller signal strength numbers are stronger signals.

The acceptance bandwidth of the receiver is about one KHz. With a little practice, you can figure out what Tx offsets will work for you. For those with good receivers, you will need to have 40 dB of receiver S/N before the beacon will hear you - that is a strong signal!

If you hear the beacon repeating garbage, one of four things is likely happening:

1. It's raining at W3LPLs QTH – rain scatter of the transmitted beacon signal will appear as an increase in the noise floor of the beacon transmitter.
2. The wind is high at W3LPLs QTH – vibration of the package with respect to the tower, even in minute amounts will create signals (think doppler) that will be picked up by the receiver.
3. Somebody is trying to send SSB or FM through the CW detector (IT WON'T WORK)
4. The beacon receiver is a little noisy at times and will occasionally capture random noise. Most of those events lead to "104" or "105" signal levels (very weak).

Please send signal reports to W3IP@prodigy.net