

TUNE UP PROCEDURE FOR THE K BAND BEE III ANTENNA

The output power of the transmitter at the fundamental frequency (24.15 GHz) comes directly from a Gunn diode oscillator with no amplifier stages. The Gunn diode is not very efficient, that is, does not convert much of the DC input power to RF. The operating voltage of the Gunn diode is fixed and set for optimum performance over the operating temperature range. Typically for a K band diode the voltage is set at 5.5 volts DC. The operating current is around 0.35 Amps. The power output of the oscillator is controlled mainly by the setting of the output coupling of the oscillator cavity to the output waveguide, not the voltage applied to the Gunn diode.

A basic tune up procedure for the K BEE III antenna (transmitter) follows:

1. The oscillator, duplexer, horn antenna with dielectric lens, and receiver mixer are assembled by an assembly operator.
2. A test technician installs the assembly onto a test set that has NIST traceable calibration for the frequency and power meters. Power is applied to the oscillator and the frequency and power are preliminarily set with the transmitter's adjustment screws. The Gunn oscillator minimum and maximum operating voltages are then determined by observing the power and frequency while the Gunn oscillator voltage is being varied. A fixed operating voltage between the two limits is then chosen. The oscillator power supply voltage is set to the proper operating voltage and the transmitter power and frequency is then fine tuned with the correct voltage applied. The spectrum of the oscillator output is observed on a spectrum analyzer. Short term frequency drift and stability are observed. The action of the receiver mixer is checked at an IF frequency of 20 MHz.
3. Following the setup, an assembly operator finishes assembling the transmitter. The integral regulated power supply voltage is set to the correct operating voltage as determined in the previous step. The weather sealed radome is installed.
4. Following final assembly, the transmitter is checked for the correct power and frequency with NIST traceable calibrated instruments. Some or all of the transmitters may be temperature cycled and retested for correct power and frequency for quality assurance purposes.
5. Following the final test, a serial number label with the FCC ID number is installed. The label acts as a tamper proof seal. The transmitter is factory serviceable only and the user does not have access to any power or frequency adjustments.