TN's Model 1440 Microwave Level Gauge

General:

The Model 1440 Level Systems are CW ranging systems designed to control the level of material surface or material interface for industrial processes. Typical applications include controlling level in hazardous waste handling, pressured chemical processes, and other hostile situations.
The main board comprises both the processor-controller (low-frequency) and the microwave (9.55GHz to 10.55GHz) circuitry. The main board directly launches into a 0.81 inch id round wave guide, and there are not 'antenna terminals' to which the user has access. The 0.81 inch id round wave guide is connected to a dielectric rod or a horn (2" to 8") antenna. With respect to FCC Part 90 Approval the worst case antenna (highest gain antenna) is the 8" horn antenna.

Operational Description:

An approximate 3 mW signal (input into the antenna) is directed down to the surface of the process material. The return signal is mixed with the transmitter frequency, and the output of the mixer (0 to 9kHz) represents the phase difference between the transmitted and the received signal. The processor uses this phase difference, which is a function of the distance to the process material, to calculate the distance between the antenna the process material.

The starting point of the microwave output is set at the factory to 9.550 GHz @ 25°C. The frequency of the VCO is stepped by the processor from 9.55 GHz to 10.55 GHz. The microwave circuitry provides a Marker (TTL Pulse), whenever the VCO frequency is harmonically related to the 100 MHz reference frequency. Yielding a closed-loop system, where 10 Markers being feedback to the processor each time the VCO is stepped from 9.55 GHz to 10.55 GHz. Under all of the following conditions the microwave output will remain within a frequency band of 9.50 GHz to 10.60 GHz: temperature, time, and circuit tolerances.