

Necessary Bandwidth

The necessary bandwidth calculation under 2.202(b) for the H25TAC2001 repeater's transmitter, falls under the general FM formula:

$$BW = 2M + 2DK \quad K = 1$$

$$D = 2.5 \text{ kHz}$$

$$M = 3 \text{ kHz}$$

$$\text{Estimated BW} = 11 \text{ kHz}$$

Emissions Designator

The emissions designator based on measurement is 11K2F3E. This emissions designator indicates that this is a NBFM audio channel transmitter with an occupied bandwidth of 11.2 kHz.

Intended Use

This device is intended to be used under the Police Radio Service section of the Public Safety section of Part 90 for short-term undercover surveillance operations.

Description of Transmitter Circuitry

The active RF circuitry on the Exciter (driver) board consists of an integrated circuit VCO, U3 and buffer/driver stage, U4, and the RF-Mosfet final amplifier stage Q1. The final amplifier is followed with a multi-section harmonic filter. The output signal is further amplified by the Power Amplifier board. The antenna connection from this board is via a bandpass duplexer. 1.7 Watts of output power are delivered to the antenna terminal. Harmonics and other spurious signals are highly attenuated by the duplexer filters. High phase angle mismatches are handled with the final amplifier circuit on the PA board.

Modulation for the Exciter as supplied from the receivers discriminator via a low pass filter is delivered to U1 for additional gain adjustment, clipping and filtering. Thus U1 acts as a splatter filter system with active over-deviation limiting. The repeater is "flat" and thus has no Pre-emphasis or De-emphasis circuitry. Deviation is set by RV1. The processed audio directly frequency modulates the VCO via varactor diode, D1.

Frequency generation and stability is achieved by using a 9.6MHz temperature compensated crystal oscillator (TCXO) U6 in conjunction with U5, the frequency synthesizer IC. Components, L8, R17, R18, C13, C14, R19 and C15 comprise the synthesizer's loop filter.

Factory synthesizer programming and channellization is performed by U8, the microcontroller IC. This device has its own 65.535 kHz reference crystal. Any 12.5 kHz channel bandwidth frequency in the band 150-174 MHz may be factory programmed.

Voltage regulation is performed by U11 and U12, two micropower regulators.

The transmitter is active when a carrier is detected (breaks squelch on RX). A Time-Out-Timer circuit is included. Transmitter life using the associated battery box is less than 14 hours.