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MMT-2007C and MMT-3150 Device Descriptions

MMT-2007C
Refer to the MMT-2007C Hybrid schematics 9011072-001.

Transmitter Section
The transmitter section gets the digital transmit signals TxI and TxQ from the Processor IC at logic levels (peak = 3V). These are the quadrature-modulated components of the data, which are generated within the Processor IC based on a 131 kHz carrier and at a data rate of 4096 bits per second. The in-phase and quadrature-phase transmit signals, TxI and TxQ, go to buffers whose outputs couple directly into the coil antenna during the transmit. The antenna is a ferrite rod coil. The antenna circuit is tuned with series capacitors to approximately 131KHz. The maximum DC input power is 18mW.

Antenna
The MMT-2007C antenna is a ferrite rod coil that is inside the hermetic titanium housing. This antenna meets the requirements of 47 CFR 15.203 because it is integral and is not accessible to users. There is no means of connecting an external antenna.

Receiver Section
The receiver section receives the RF signal through the antenna. The antenna circuit resonates at approximately 131KHz. An IC switch couples the antenna circuit to the receiver circuit. The output of the switch goes into a pi filter tuned at 131KHz. Then the signal is amplified using amplifier stages (some tuned) comprised of NPN/PNP transistor pairs. The amplifiers only amplify at 131KHz; There are no intermediate frequencies or mixing to other IF frequencies.

Mixer
A differential-input I and Q mixer pair is implemented in the Processor IC for conversion of the RF signal to baseband. The quadrature-phase clock signals for the I and Q channels are generated inside the Processor IC from the 1.049MHz crystal oscillator contained on the Processor IC. The mixer outputs contain the I-Q data information (131KHz) and this information is decoded by digital logic to recover the data. All of the mixing and processing of the data is done in the Processor IC.

Oscillators

The IU has two crystal oscillators running at 1.049MHz; one in each of the Processor ICs. These oscillators are used for generating logic clocks and for generating the 131KHz transmit and mixer signals.

MMT-3150 RF Circuit Operation
Refer to the MMT-3150 PPC RF Board schematic 9051080-001.

Transmitter Section
The transmitter section gets the digital transmit signals TxI and TxQ from the Processor IC at logic levels (peak = 3V). These are the quadrature-modulated components of the data which are generated within the Processor IC based on a 131 kHz carrier. The TxI and TxQ signals go to buffers whose outputs couple directly into the coil antenna during transmit. The PPC uses a loop antenna with a Faraday shield and is tuned with series capacitors to approximately 131KHz. The maximum DC input power is 30mW.

Antenna
The antenna of the PPC is a shielded loop coil type that is mounted on a circuit board and sandwiched between another circuit board.
This antenna meets the requirements of 47 CFR 15.203 because it is an integral antenna which is not accessible to users. There is no means of connecting an external antenna.

Receiver Section
The receiver section receives the RF signal through the antenna. The antenna circuit is resonant at approximately 131KHz. An IC switch couples the antenna circuit to the receiver circuit. The output of the switch goes into two cascaded pi filters tuned at 131Khz. Then the signal is amplified using amplifier stages (some tuned) comprised of NPN/PNP transistor pairs. The amplifiers only amplify at 131KHz. There are no intermediate frequencies or mixing to other IF frequencies.

Mixer
A differential-input I and Q mixer pair is implemented in the Processor IC for conversion of the RF signal to baseband. The quadrature-phase clock signals for the I and Q channels are generated inside the Processor IC from the 1.049MHz crystal oscillator contained on the Processor IC. The mixer outputs contain the I-Q data information (131KHz) and this information is decoded by digital logic to recover the data. All of the mixing and processing of the data is done in the Processor IC.

Oscillators
The PPC has one 1.049MHz crystal oscillator in the Processor IC that is used to generate logic clocks and for generating the 131KHz transmit and mixer signals. There is also a 1.8432MHz oscillator on an UART chip that is used for an IrDA (Infra-red) link.