

MODEL M15 VHF AIRCRAFT BAND RADIO RECEIVER/TRANSMITTER

INTRODUCTION

The Mentor Model M15 receives and transmits on up to six discrete channels in the vhf aviation band between 118 and 137 MHz (25 KHz channel spacing). It operates from a 14 v dc supply, and is intended for both vehicular and airborne application as well, and can also be used as a base station. Its advanced design features and surface mount construction provide compactness, light weight and high reliability. The only external components required are a suitable antenna with coaxial cable, an aviation-type microphone and a 4- or 8-ohm speaker.

CIRCUIT DESCRIPTION

The receiver is a single-conversion superheterodyne with four varactor-tracked r.f. tuned circuits and dual-gate MOSFET transistors in the r.f. amplifier and mixer stages. The local oscillator uses 3rd overtone crystals, and is followed by a MOSFET frequency tripler stage. Receiver selectivity is primarily determined by a six-pole 10.7 MHz crystal filter connected between the mixer and i.f. amplifier. the latter consists of two cascode integrated circuit amplifier stages. Automatic gain control is applied to the r.f. amplifier and the first i.f. amplifier stages. A conventional diode detector is followed by a noise limiter, audio amplifier, squelch "gate" and an integrated circuit audio power amplifier capable of delivering 4.5 watts of audio power into a 4-ohm speaker.

The transmitter oscillator also uses 3rd overtone crystals, followed by varactor-tracked MOSFET tripler and buffer amplifiers. Three untuned broadband stages boost the transmitter carrier power to approximately 5 watts. Amplitude modulation is applied to the last two stages, the "driver" and "final" amplifiers. The transmitter signal passes through a 7-element Tchebychef low-pass harmonic filter which also contains two PIN diodes functioning as a T-R switch. The transmitter modulator is separate from the receiver audio amplifier, and includes an audio AGC amplifier that automatically adjusts for variations in operator "microphone technique". This circuit also prevents overmodulation. The modulator power amplifier consists of an integrated circuit amplifier followed by complementary bipolar transistors. This arrangement eliminates the need for an audio transformer, resulting in less low frequency distortion while minimizing the size and weight of the radio.