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The ARC-44 airborne FM transceiver operates from 24.0 to 51.9 MHz in 280 channels, spaced by 100kHz. The frequency deviation is 20kHz, the -6dB bandwidth is 75kHz, the RF output power is 8W. The set has an external dynamotor to obtain 150Vdc and 300Vdc, all from the aircraft +27Vdc bus.

This page gives some background on the RF part, that are the 24-52MHz circuits in the RF module and those at 7 MHz in the variable IF module and the sideband oscillator module.

The ARC-44 is a double superhet, with Xtal controlled local oscillators. The first LO Xtals are selected by the MHz rotary switch on the control panel in 28 steps, and the second LO Xtal is selected by the tenth-MHz rotary switch.

The switch positions are sent each to the ARC-44 over 5 lines, some of which are connected to ground. Those lines that are not grounded, are interconnected (called a re-entrant code).

### RF module

The RF module is built around a 7-section variable capacitor (varco), tuning 4 circuits in the transmitter and 3 in the receiver between 24 and 52 MHz.

### Receiver RF part

The receiver part is on the front in this picture. From left to right is the RF amplifier, a double-tuned filter, then the local oscillator (the Xtals on the turret and connected via the 3 contacts on the isolation material), and the mixer to the first IF at approx. 7MHz. The transmitter is on the other side of the varco, with the final amp tubes standing upright.

The first local oscillator frequency is set by one of 14 Xtals, mounted on a turret. The turret makes two complete revolutions, the first with the LO frequency above the signal frequency, the second turn with the LO frequency below the signal frequency. Because the frequency step halfway is 14MHz, this implies a first intermediate frequency of 7MHz.

The turret is coupled to the 7-section varco, which makes a half turn when the turret makes two turns, both corresponding to 24–52 MHz signal frequency. Because the (dc) drive motor (common for 1MHz and 0.1MHz selections) is unidirectional, the turret makes a small step when the set frequency is increased by 1MHz, but makes nearly 4 complete revolutions when the frequency is decreased by 1 MHz. This takes 7 seconds.

The second local oscillator frequency is always above the first IF, and results in a fixed second IF of 2.987 MHz. The second LO frequency and first IF frequency must decrease with increasing tenth-MHz setting for the channels up to 38MHz, however, they should increase for the channels above 38MHz. This inversion is done in the SB-327 control panel, which simply sends the complementary code for these channels.

To speed-up the selection, the other half turn of the first IF varco is used as well, and the Xtal selector has another 10 position in this half-turn, connected to the proper Xtals of the first half turn. This gives two valid positions of the tenth-MHz shaft. The one that occurs first, is used.

The other half turn of the RF varco however is not used. A microswitch in the gear train keeps the drive motor running to skip the unused half-turn. Two other microswitches select the antenna filter with a low-pass cutoff at either 40MHz or 55MHz.

### Transmitter

The transmitter uses the same local oscillators as the receiver. To make the transmit frequency equal to the receive frequency, a third oscillator (sidestep oscillator) is used at 2.987 MHz, frequency-modulated with the microphone signal. The sidestep oscillator frequency then is mixed with the second LO frequency, filtered in the first IF tuned filters and mixed with the first LO frequency.

The RF power amplifier has two pre stages, and a final stage with two 5763’s in parallel. Because +25V is applied to the cathodes, these tubes are normally cut-off. With high RF drive signal, intermittent anode current will flow. A ring-core transformer matches the output to 50 ohm.

The average anode current of each tube is 40mA. The RF output is 8W minimum.

### Antenna filters

This filter reduces the harmonics of the transmitter. The transfer function has a cut-off at 40MHz for the first 140 channels, or 55MHz for the last 140.