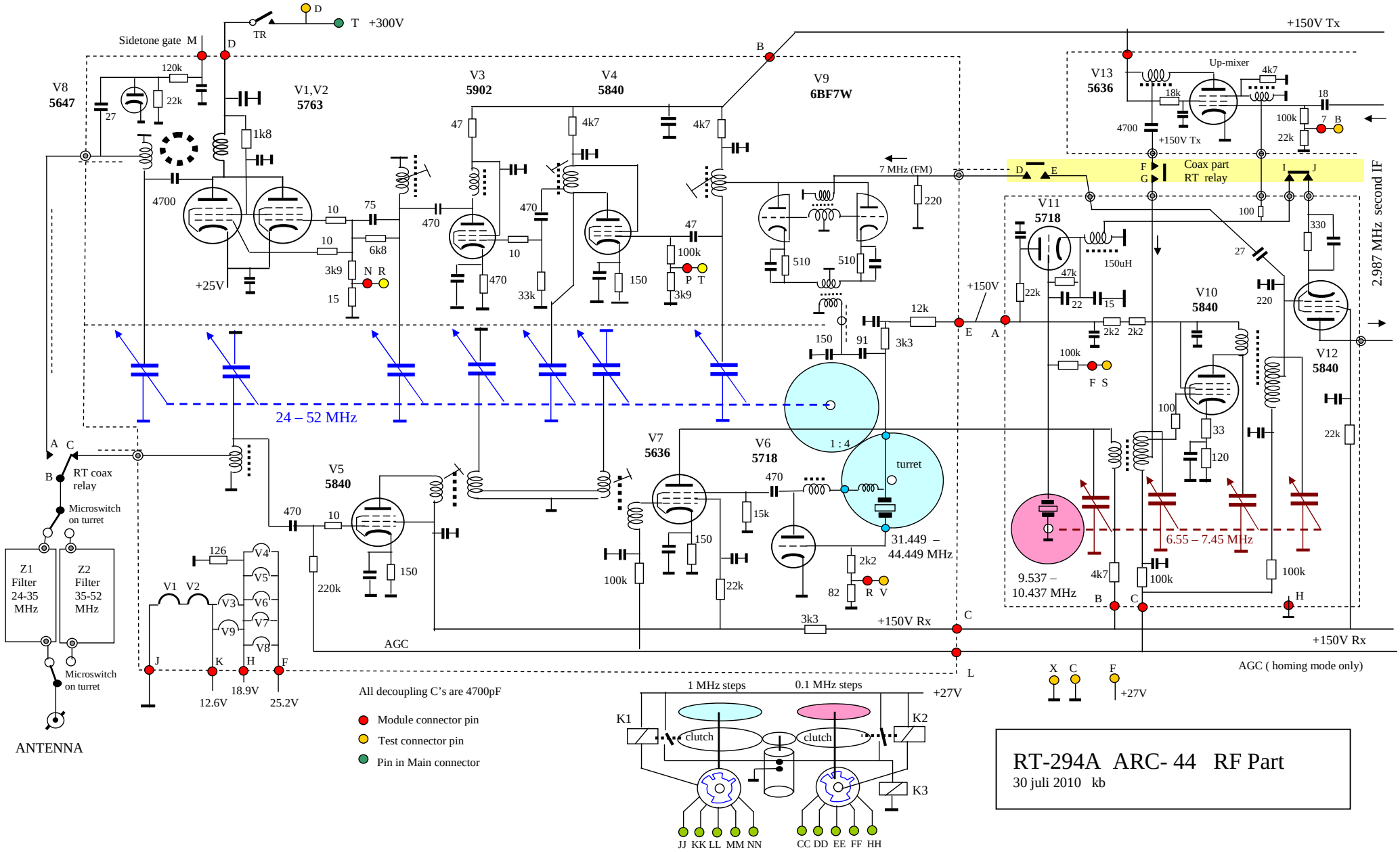



# RT-294A ARC- 44 RF Part

30 juli 2010 kb

## RT-294A / ARC-44 RF part

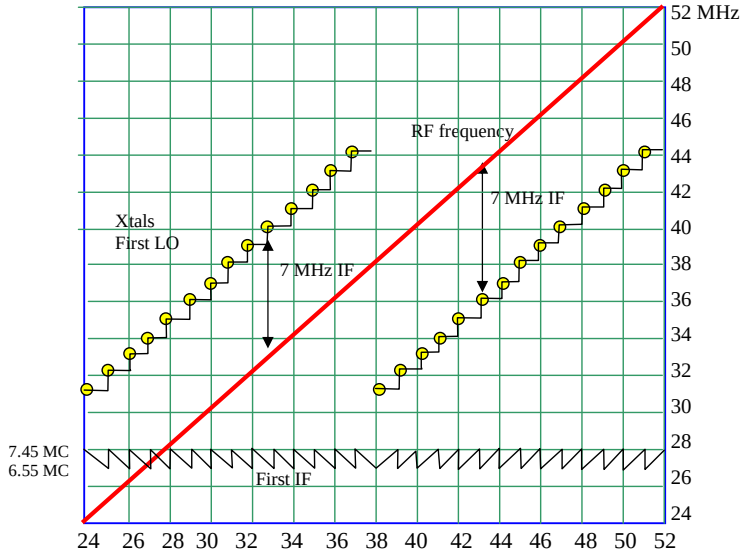
The ARC-44 airborne FM transceiver operates from 24.0 to 51.9 MHz in 280 channels, spaced by 100kHz. The frequency deviation is 20kHz, the -6dB bandwidth is 75kHz, the RF output power is 8W. The set has an external dynamotor to obtain 150Vdc and 300Vdc, all from the aircraft +27Vdc bus.
This page gives 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 are 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 L.O. has 10 Xtals, selected by the same half-turn as the 4-section varco of the first IF filter. At 24.0MHz, the varco is fully open, and the *highest* Xtal is selected. With more tenth-MHz selected in the control panel, the second LO and IF frequency drop until at XX.9 MHz the varco is closed and the lowest Xtal is used.

*Horizontal: dials on control panel SB-327/AR*
*Vertical: frequency from various oscillators, IF filter, and received or sent signal frequency in red.*

As can be seen from the graph above, the second LO frequency and first IF frequency must **de**crease 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 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.

Used Xtal frequencies:

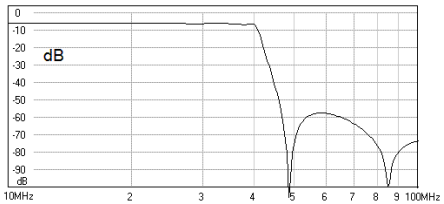
| | First LO (turret) | Second LO |
|---|---|---|
| Y 1 | 31.44 945 MC | 9. 5375 MC |
| Y 2 | 32.44 945 MC | 9. 6375 MC |
| Y 3 | 33.44 945 MC | 9. 7375 MC |
| Y 4 | 34.44 940 MC | 9. 8375 MC |
| Y 5 | 35.44 940 MC | 9. 9375 MC |
| Y 6 | 36.44 940 MC | 10. 0375 MC |
| Y 7 | 37.44 935 MC | 10. 1375 MC |
| Y 8 | 38.44 935 MC | 10. 2375 MC |
| Y 9 | 39.44 935 MC | 10. 3375 MC |
| Y10 | 40.44 930 MC | 10. 4375 MC |
| Y11 | 41.44 930 MC | |
| Y12 | 42.44 930 MC | |
| Y13 | 43.44 925 MC | |
| Y14 | 44.44 925 MC | |

### 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.

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