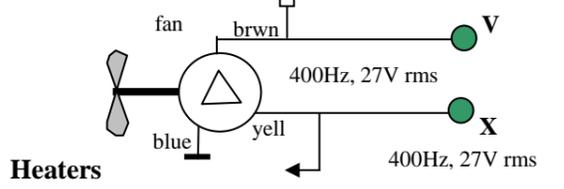


- K1 Whole MHz clutch
- K2 Tenth MHz clutch
- R/T Receive-Transmit relay
- K3 Tuning relay
- K4 Carrier detect (Retransmit)
- K5 Homing

- Testpoint on frontside connector
- Pin on main connector



RT294A / ARC-44 LF Part
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ARC-44 IF and Audio part

The description and diagram of the ARC-44 is given in two documents, one on the RF part, and this document on the IF and audio part.

Transmitter circuits

The microphone signal is pre-amplified in the SB-329 cockpit-based panel, ending with a cathode follower. The cathode circuit is completed in the RT-294A/ ARC-44 when the TR relay is energized. The higher frequencies in the audio signal are emphasized at the grid of V17, then the signal is clipped in V16, and applied to the reactance tube V15. The special feedback around this tube make the anode behave as a capacitor, controlled by the audio signal.

This variable capacitor modulates the frequency of the oscillator around V14. Special care was taken for the frequency stability of this oscillator, and for the immunity to supply voltage variations.

The oscillator at 2.987 MHz is stable to 2 kHz.

The nominal FM deviation is 20kHz, and audio overdrive into the clip limits will not give more than 35kHz frequency deviation.

Receiver circuits

V18 and V19 are selective IF amplifier modules at 2.987 MHz . V20 and V21 amplify and limit the IF signal, so the discriminator produces the same audio signal whether the antenna signal is 1uV or 10 mV.

The AGC bus is grounded in normal operation, so all RF and IF amplifiers have their maximum gain.

FM Discriminator and deemphasis

The Foster-Seeley discriminator produces +20V when the IF signal is 50kHz above nominal, or -20V when the signal is 50kHz below nominal, whatever the received signal strength was.

The de-emphasis network in the noise detector module has a decreasing frequency characteristic form +6dB (250Hz) via 0 dB (1kHz) to -12dB (6 kHz), which is the opposite from the preemphasis in the transmitter.

Receiver homing circuit

The ARC-44 installation can be extended with two extra antenna's, one on each side of the aircraft. A small dc motor with a cam wheel connects either the left or the right antenna to the input of the ARC-44. The ARC44 has a provision to modulate the IF signal with 400Hz (from the fan supply) followed by an AM detector. The AGC line is active in homing mode. The cam in the antenna keyer is such that the

left antenna is connected in a "dah-dit-dit" pattern, (Morse character D), while the right side antenna has a "dit-dit-dah" pattern (Morse U). If the transmitting station is right ahead or behind, a steady 400Hz tone is heard.

Transmit is made impossible in homing mode.

Noise detector

The highest frequencies on the output of the Foster-Seeley discriminator are rectified in the noise detector module. Because of the high gain (no AGC) of the IF amplifier, there is high noise when no signal is received. Without RF input signal, the

Audio amplifier

The audio amplifier has a triode preamplifier (half V24) and a balanced output amplifier (V25 and V26) to produce 50mW into 150 Ω load. Only one grid of the output stage is driven, the other is grounded for signals. Because the triodes have a common cathode resistor, the sum of the anode currents is constant. If one rises, the other must decay.

The preamplifier stage has a high gain, so the heavy feedback makes the input a virtual ground for signals.

Three audio signals are fed to this virtual ground input. Only one is active by relay switching in supply lines:

- The signal from the FM discriminator, via the audio adj potmeter (only in normal mode)
- The signal from the microphone (in transmit only)
- The signal from the AM Homing detector via homing adj potmeter (only in homing mode)/

Squelch

The audio summing point can be grounded by the squelch tube (other half V24), which silences all 3 signals when its grid voltage is higher than its cathode voltage (normally +8V).

Without input signal, the voltage from the noise detector is +8V, and the squelch tube conducts, blanking the signal. With 1uV input signal, the noise detector drops to +6V, and the squelch tube blocks, so the signal is passed.

Retransmit

The same voltage applied between grid and cathode of the squelch tube is also applied to the retransmit tube V25, and operates the retransmit relay. Some aircraft are equipped with two ARC44 sets, and these can be used to retransmit a signal, received by one, and retransmitted by the other. In such systems, the retransfer relay K4 controls the TR relay of the other set. The audio in,- and outputs are cross connected.

Heater circuit

All 29 heaters are 6.3V types, and series/parallel connected for $4 \times 6.3 = 25.2V$, consumption is 1.65A. A small series resistor (not in SEN25 compatible sets) matches the heater circuit to the 26-27Vdc aircraft dc bus.

24V version

There are ARC-44 units with "24V" stamps on all sides. In these units, the 25.2V heater rail is connected to ground, and the "12.6V" rail is connected to the 24V supply via a 4Ω / 35W series resistor, mounted on the fan. There are also small modifications in some modules, where they use 26V from the heater circuit as bias voltage.

TR relay

This relay has a coaxial part for the antenna and some 7MHz connections, and 4 leave contacts to switch the 300Vdc, 150Vdc, microphone circuit and to reduce its own coil current once energized.

This last one should open last. Otherwise the then last contact will not close fully. Adjustment of the timing of these contacts is rather tricky.

Testconnector and test switch

On the frontside behind the handle is a door with a testconnector behind it and a small toggle switch. This switch operates the TR relay, and hence the transmitter. When the door is closed, the switch automatically returns to the receive position.

The testconnector connects to the AN/ARM-8 test set, in fact an analog voltmeter with a 20-way switch at its input. This unit is sufficient for most adjustments.

Fan

The fan has a 3-phase winding intended for 27Vac, 400Hz, and makes 9000 rpm.

The fan can also be operated from a single phase 27V-400Hz supply, in which case a 3.3uF capacitor must be connected between V and X of the main connector, and the single phase supply must be connected between V and ground.

The copper resistance between any two lines of the motor is 51Ω