

Universal RF - Amplifier of a QRP- Transceiver

By: Igor Grigorov, UZ3ZK

Credit Line: Radiokonstruktor # 7, 1999, pp. 2-3.

QRP design- it is very specific design, where ham wants to use as little parts as possible. The amplifier gives the possibility because it can be used twice- like RF- PA and like RF- RX- Amplifier.

Technical Data for the amplifier:

Supply Voltage: 12-V

Gain: near 15 (Pout/Pin) (at 28.0- MHz) – 20 (Pout/Pin) (at 1.8- MHz)

Input/Output Impedance: Close to 100- Ohm (amplifier was designed to work with 75-Ohm Coaxial Cable). **Figure 1** (p.71) shows schematic of the amplifier.

The schematic of the Universal RF Amplifier is simple. It is typical Push- Pull. For properly work of the amplifier it needs to install the same collector current (with R3 and R6). Value for the current is 15-25-mA. Transistors VT1 and VT2 should be a matched pair (have the same gain at third different collector currents- 10, 50 and 200-mA.

R4C3 and R5C4 are lowered the gain but rise the stability. Sometimes (when the Amplifier is used at range 1.8- 14.0- MHz and matched antenna is used) it is possible do not install them. Gain is raised up to 25 (Pout/Pin) at this case. With the transistors (KT606A, DATA for the transistors at: <http://www.antentop.org/008/bip008.htm>). The amplifier work out up to 1-Wtts output power. However, do not drive into the amplifier more the 50-mWtts because the output waveform signal may be distorted.

Figure 2 (p.72) shows the commutation between a QRP- transceiver and the amplifier. For switching RX/TX a two small relays are used. At TX mode the Amplifier should be matched with a QRP- Transceiver. Separate circuit (like L or pi- circuit) for matching transceiver with antenna is used for each band. At RX mode the matching circuit is used for filtering of the input signal. At my design the Amplifier at RX- mode was loaded on to balanced diode mixer.

Parts: All capacitors should have low losses at RF. All transformers are wound by pair of twisted wires (two twist on 1-cm length) in diameter 0.3- mm (29- AWG). Core- OD- 7...15 mm, height- 3- 7- mm, permeability- 400... 600. Numbers of winding for each transformers is 20. It is uniform winding along all length of the core. However, for best efficiency of the amplifier the number of winding for each transformer should be experimentally chosen.

Design: The amplifier is assembled on a PCB by sizes 40x 50-mm. Two holes for VT1 and VT2 are drilled at the PCB. The transistors are installed on aluminum plate with sizes equal to PCB. Parts- resistors/transformers/capacitors are installed on the transistors pins and small circles cut on the PCB. Try to keep the leads from the parts as short as possible. Relays are installed near output and mixer of the QRP- Transceiver and connected with the Amplifier with a thin Coaxial Cable.

73! Igor Grigorov, va3znw



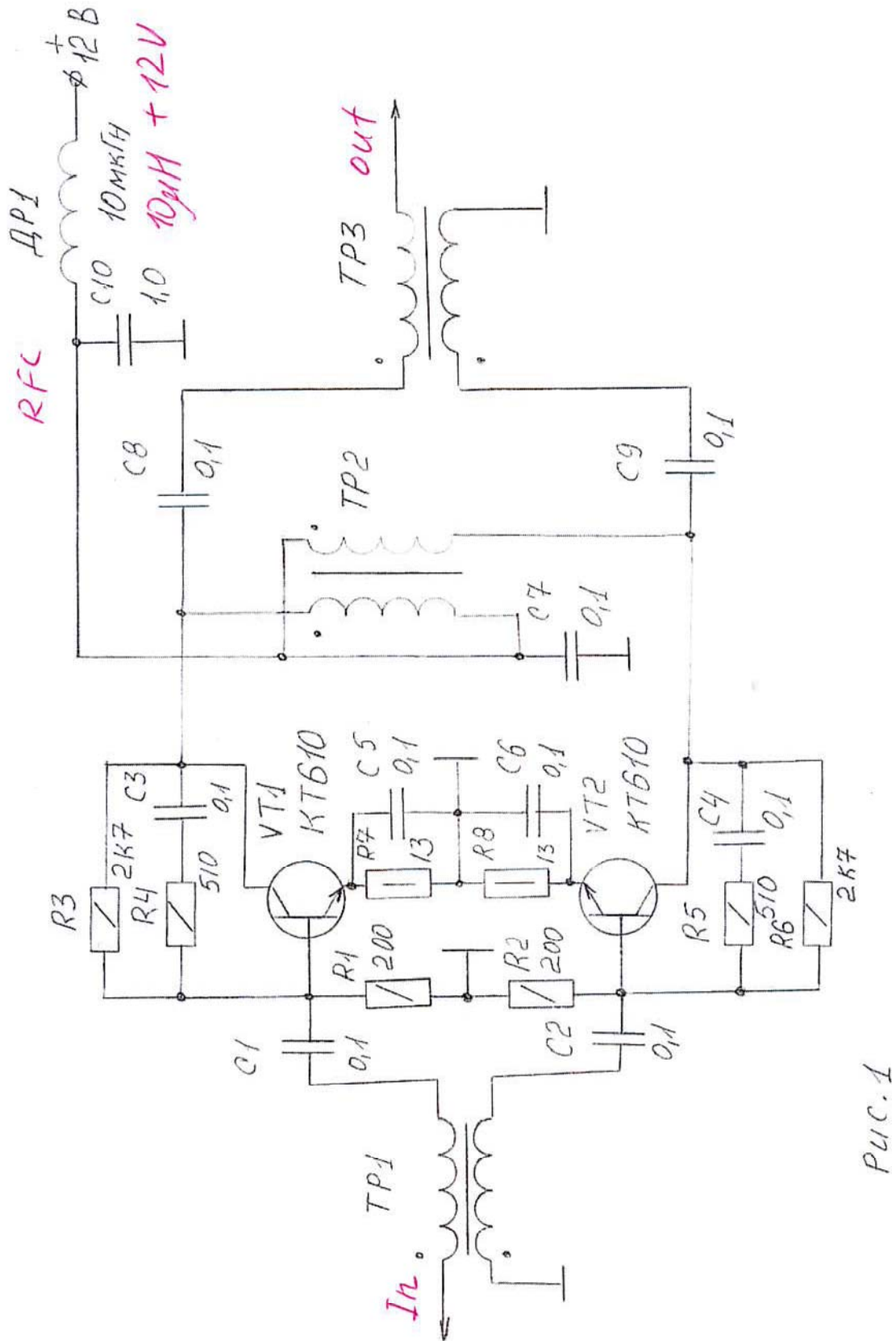


Figure 1 Schematic of the Universal RF Amplifier

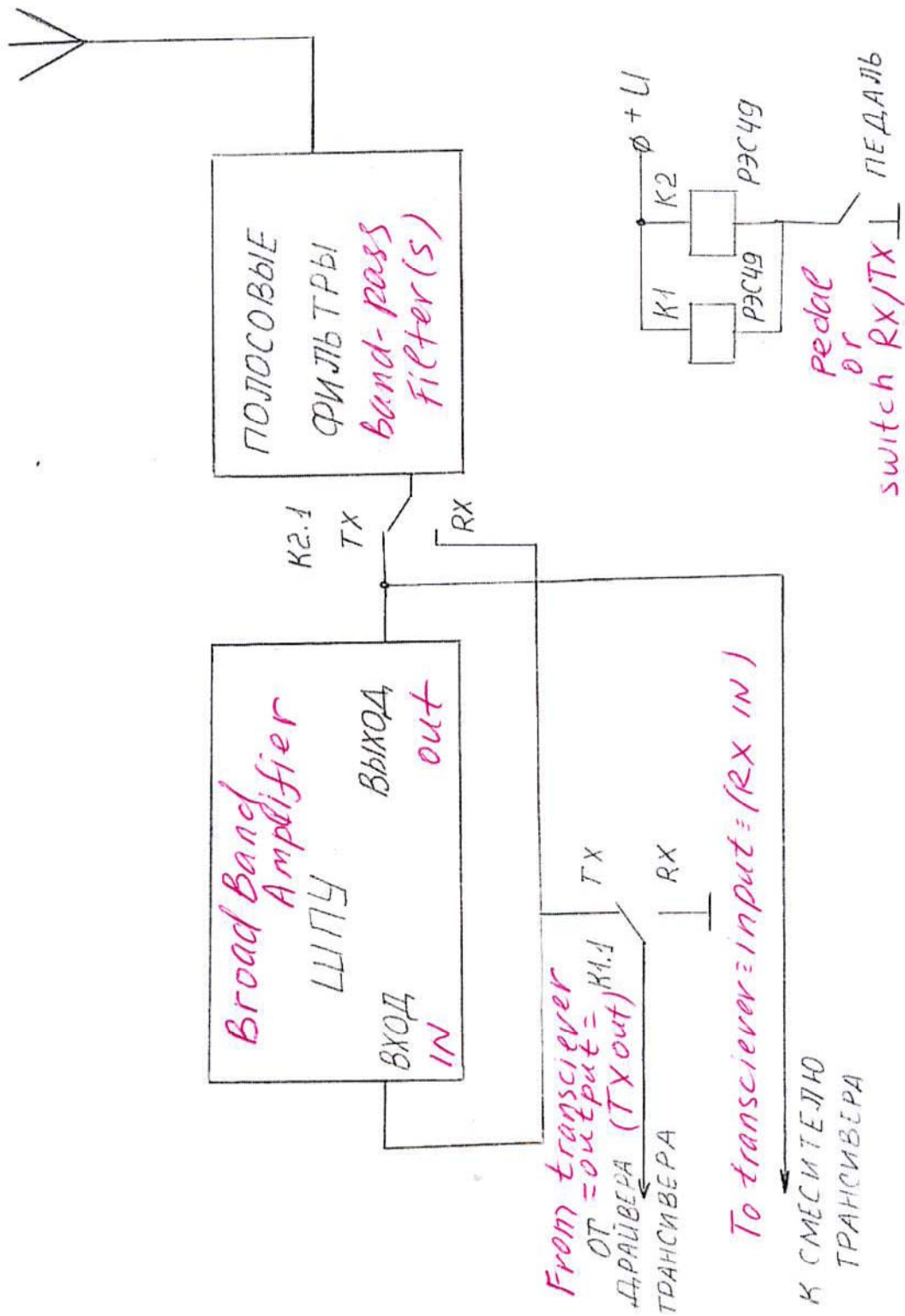


Рис. 2

Figure 2 Commutation between a QRP- transceiver and the Universal RF Amplifier