Pencil Tubes

V.Sukhanov, A. Kireev

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Below there are described some main schematics on the miniature “pencil” tubes. The schematics came to us from the far 50- 60-s of the 20- Century. The schematics with pencil tubes were used at the radio equipment that was installed practically anywhere - from tank and submarine up to space ship.

Radio # 10, 1960
Cover

Radio Frequency Amplifier

Figure 1 shows a typical schematic for a radio frequency amplifier. As usual a tube was used with plate voltage 60- V, second grid voltage 35- 45-V, and 0- V at the first grid. The RF- Amplifier works fine up to VHF- frequencies. (***I.G.: I have seen such RF amplifiers that worked up to 180- MHz***.) Practically any pencil tubes may work like a radio frequency amplifier.

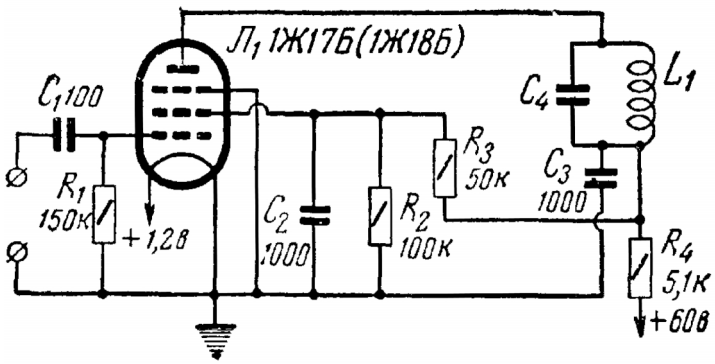
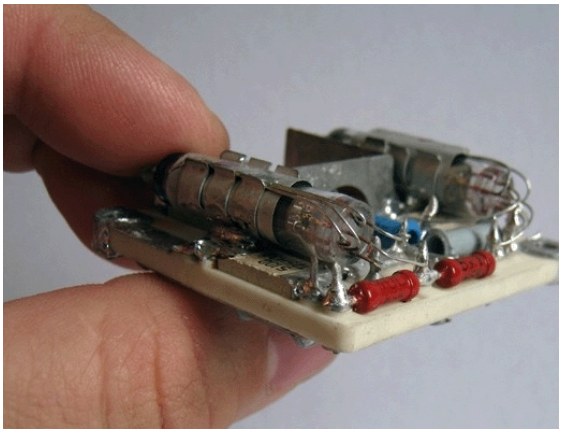


Figure 1 Radio Frequency Amplifier



Module on the Pencil Tubes

СТЕРЖНЕВЫЕ ЛАМПЫ

ОСОБЕННОСТИ ПРИМЕНЕНИЯ

В. Суханов, А. Киреев

Header of the Article

Mixer

Mixer on the pencil tubes may be made on one- grid or two grid schematic. At the one- grid schematic both input RF signal and RF- voltage from a heterodyne oscillator come on to the first grid of the tube. Voltage from a heterodyne oscillator should not be exceed 1.5- 2.0 – V or side channels may be appeared. Two- grid mixer works more stable the one –grid one. **Figure 2** shows a typical schematic of a two- grid mixer on a pencil tube. Input RF- voltage goes to the first grid and Voltage from a heterodyne oscillator goes to the third grid. Voltage from a heterodyne oscillator should not be less the 12- 15- V. Practically any pencil tubes may work like a mixer. Such mixers- one and two- grid, may work up to VHF- Frequencies.

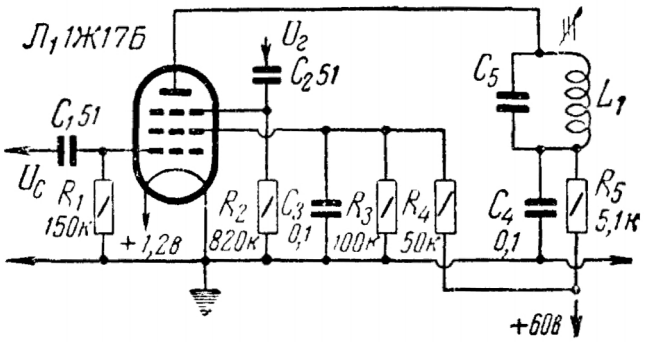


Figure 2 Two- Grid Mixer on a Pencil Tube

IF amplifier

IF amplifier made on the pencil tubes may include 3 or 4 the same stage. **Figure 3** shows one of the stages. IF amplifier made on the pencil tubes may work on frequencies from hundreds kHz up to several tens MHz.

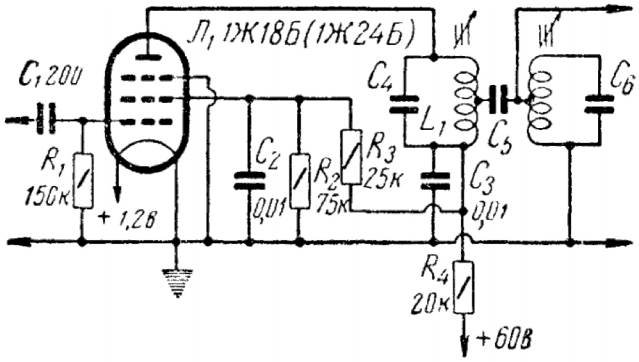


Figure 3 One Stage of a multistage IF amplifier

RF Oscillator

Pencil tubes may work at any common schematic of the RF- oscillator where usual tubes are used. Practically any type of pencil tubes may work in RF Oscillator.

As usual a Colpitts oscillator is used at the VHF- band for producing RF- Frequencies up to 300- MHz. **Figure 4** shows Typical Schematic of a Colpitts Oscillator. For stable work the tank L1C1 is tuned to the frequency twice below that LkC8 is tuned.

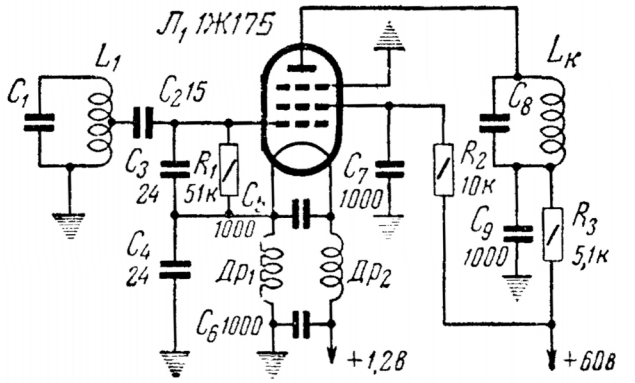


Figure 4 Typical Schematic of a Colpitts Oscillator on a Pencil Tube

RF Power Amplifier

Tube 1P24B as usual is used for RF Power Amplifier. The tube may produce RF- power up to 2.5- Wtt. **Figure 5** shows a schematic of an RF Power Amplifier for frequencies up to 100- MHz. **Figure 6** shows chart of the main characteristics Vs optimal (Roe) load for the RF Power Amplifier shown on the **Figure 5**.

Figure 7 shows schematic of an RF Power Amplifier for frequencies higher the 100- MHz. It is usual Push-Pull amplifier. Tubes used at the amplifier should be a matched pair. As usual tubes from one produced batch are the matched pair to each other.

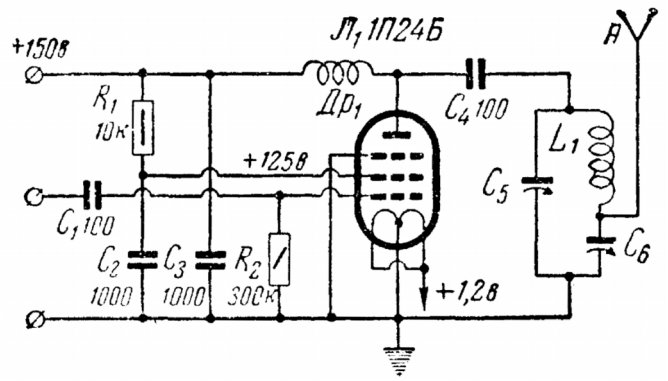


Figure 5 Schematic of RF Power Amplifier for Frequencies up to 100- MHz

1P24B- Tube that usually is used to RF Power Amplifier
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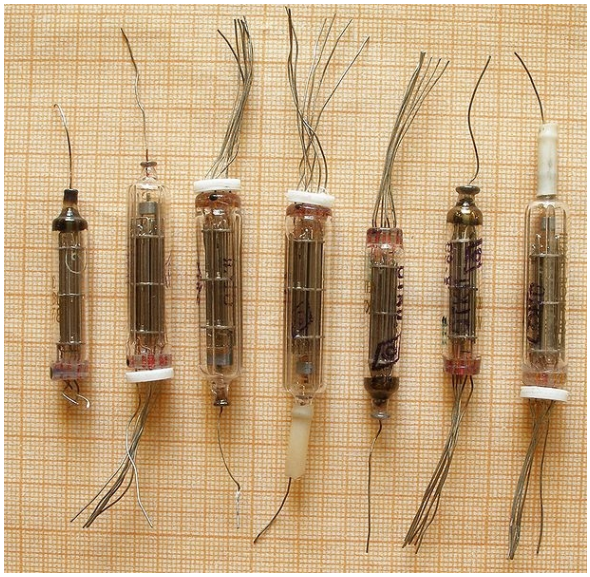

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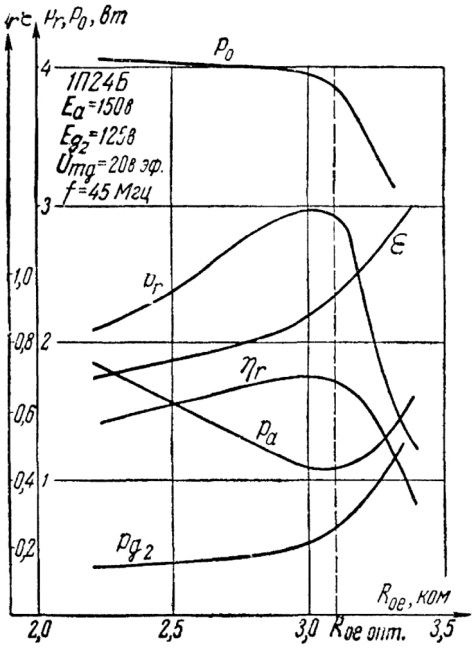

Figure 6 Chart of the Main Characteristics Vs optimal (Roe) load

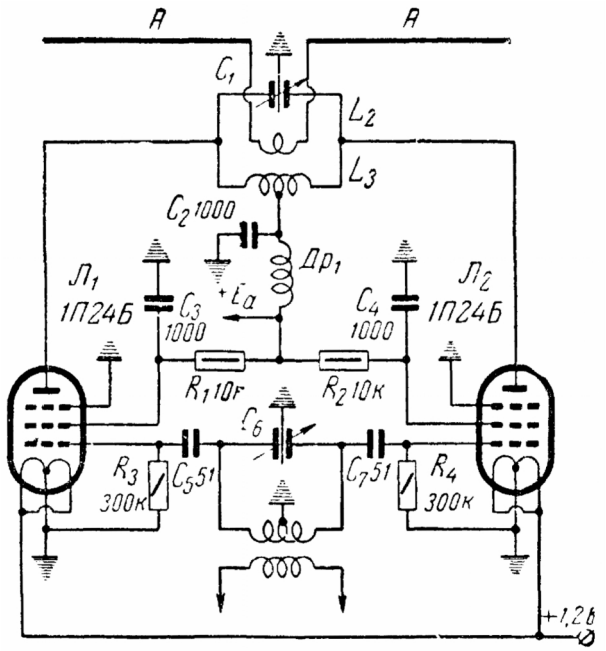

Figure 7 Schematic of RF Power Amplifier for Frequencies Higher the 100- MHz

Superregenerative Detector

Receivers made on pencil tubes that was contained a Superregenerative Detector were widely used in military and special application. **Figure 8** shows a typical schematic of the Superregenerative Detector. Regenerative circuit made on tube 1, quench generator made on tube 2. Quench voltage at the second grid of the tube 1 should be in limits 20- 25- V. Level of the voltage more the 25- V just follows to increasing of the pass band. Level of the voltage less the 20- V just decreases sensitivity and stability of the Superregenerative Detector. Sometimes (when saving battery power plays role) regenerative cascade and quench generator combine in one tube. But stability and sensitivity are suffered at this.

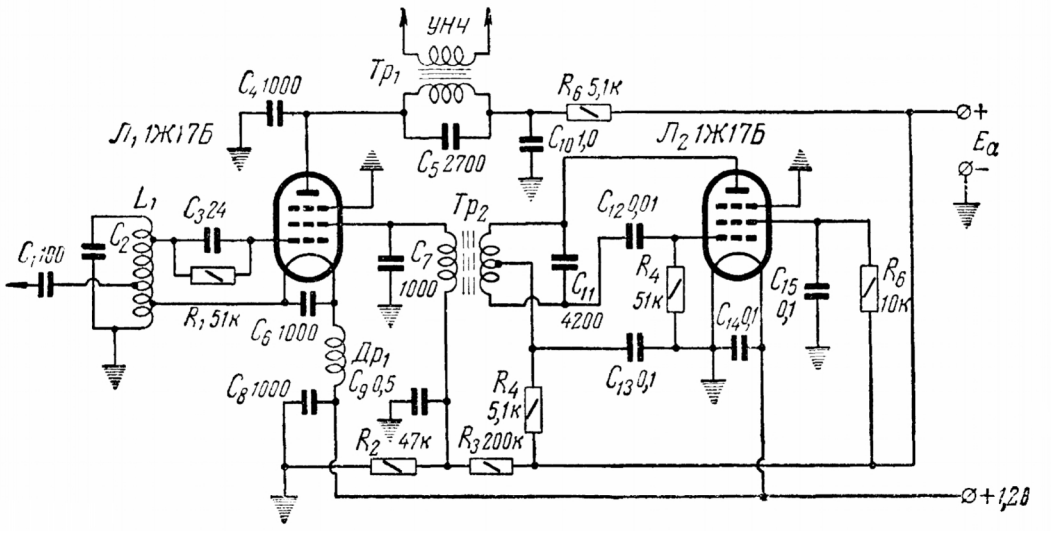

Figure 8 Typical Schematic of the Superregenerative Detector