

US4LEB ATU for HF- Bands

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The ATU is used T-circuit for matching transceiver output with antenna. However, the features of the ATU is a Ball variometer and RF-Relays . The variometer is the variable inductor of the ATU. Using the Ball variometer allows to simplify the ATU design. RF relays switch on the coils of the variometer and it makes needed inductance.

Relays K1 and K2 allow hook up the coils in bridge or in serial that depends on used HF band. On the 10- meter Band an additional coil L3 may be needed connected in bridge to the variometer coils. The coil L3 is switched on with the relay K3. So, the combining of the L1, L2 and L3 allows find needed inductance for the ATU at the working band. Switch S1 does bypass antenna to the transmitter output.

All of this allows simplify mechanical design of the ATU. **Figure 1** shows schematic of the ATU. **Picture 1** shows the Ball Variometer used in the ATU. It was used a Ball Variometer from old military Russian Radio R-140. However it is possible use any ball variometer with maxima inductance of 30- micro Henry and with independent coils (that is not connected together in the design).

Relay K4 connected RF transformer that provide symmetrical output. ATU was assembled in a metal cabinet. All connection wires from the coils to RF relays should have a minimal possible length. Variometer and L3 should be placed at distance at least 20- mm from the metal case. Capacitors C1 and C2 are mounted on an insulation plate.

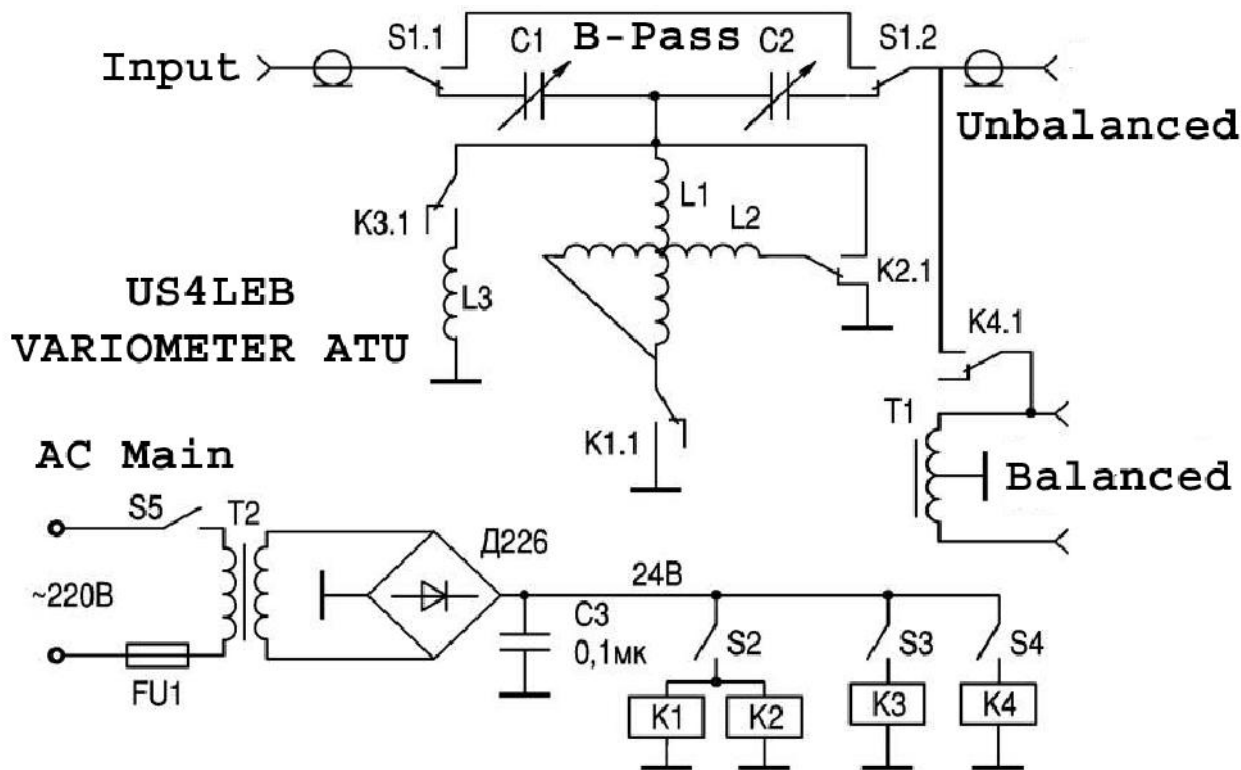


Figure 1 Design of the US4LEB ATU for HF- Bands

Parts:

Variable capacitors C1 and C2:

If the ATU would be used at power up to 100- 150 W it may be used usual variable capacitors 2 x 12- 500- pF from old tube receiver. If the RF power would be large it should be used variable capacitors with proper gap between plates.

Inductor L3:

It is home-made inductor contains 4 turns of the copper wire in diameter of 2.5- mm (10- AWG). Diameter of the turn is 50- mm. The inductance of the coil should be adjusted by stretching at the ATU when it is tuned at 10- meter band.

Relays K1- K4:

It may be used any high power RF relays. Symmetrical transformer T1:
It may be used any symmetrical transformer, commercial or home- made, that will be stand the RF power at the ATU.

Switch S1:

It was used RF rotary switch. However it is possible use any RF switch that can stand the power going to the ATU. It is possible use to instead of the RF switch a pair of RF relays- it will be simplified the design of the ATU.

Switches S2- S5:

It may be used any DPDT, SPDT, SPST switches that available for amateur.

Main transformer T2:

Any transformer that provides voltage and power for switching of the RF relays.

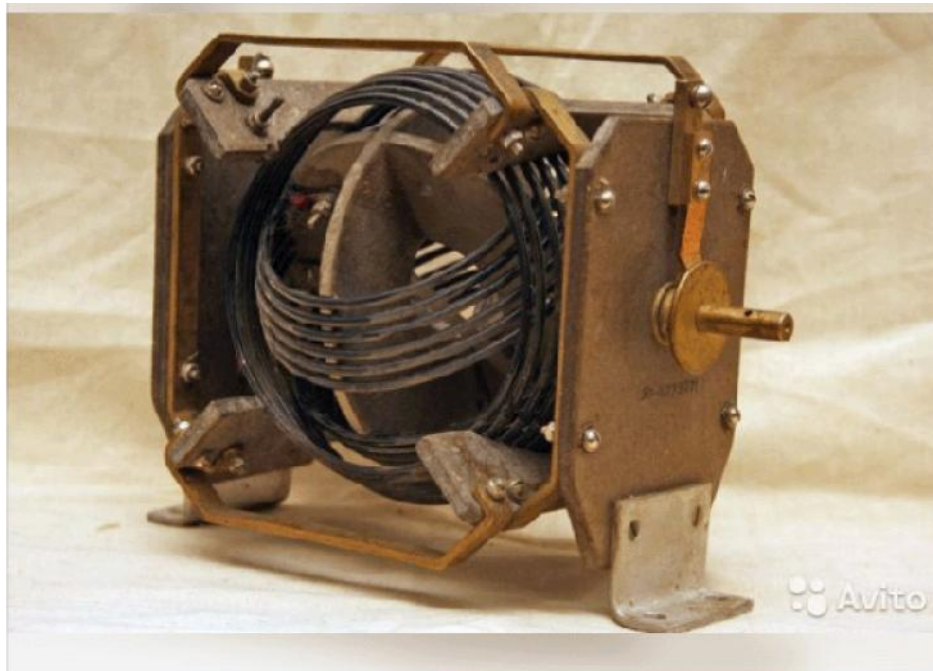
Operating with the ATU:

Operating with the ATU is very simple. By combining the Switches S2 and S3 then rotating the C1 and C2 find minimum SWR at the ATU.

References:

- S. Bunin, L. Yaylenko: Radio-amateur Handbook.- Kiev, P.H.: Technica, 1984
- Z. Benkovsky, E. Lipinsky: Amateur's HF and VHF Antennas.- Moscow, P.H.: Radio and Svyaz, 1983
- I. Grigorov, ATU // Radioamateur HF and VHF,- 1997, # 10, P.: 32

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Picture 1 Ball Variometer from R140