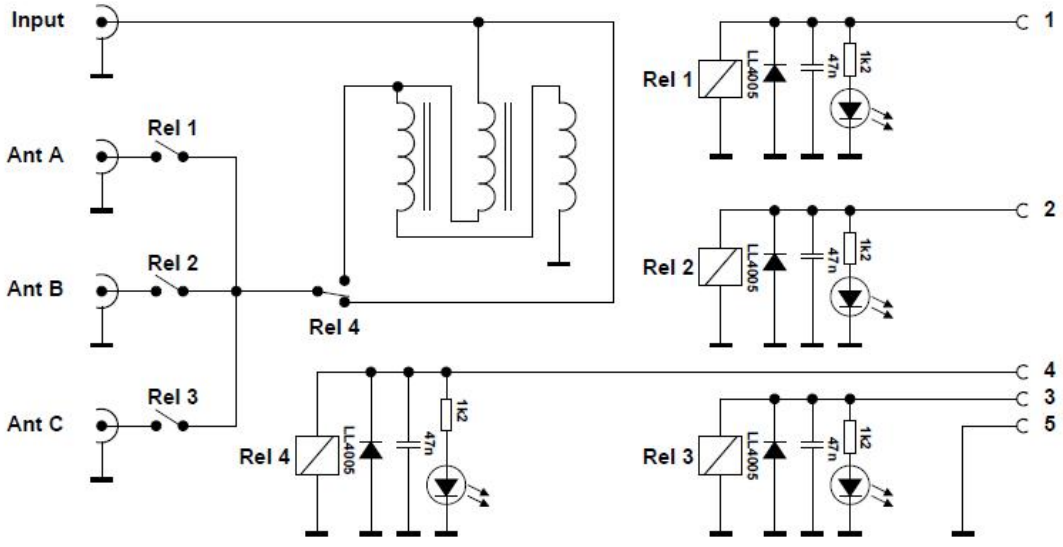
Station Automation (Holger Hannemann, ZL3IO)

ANTENNA STACK MATCH & CONTROLLER

I'm a keen contester and soon came to the problem that a single directional antenna is often pointing into the wrong direction and turning it around takes too long when running contacts at a high QSO rate. At times multiple directions are open e.g. around noon time on 15/10m you can work North America while Asia is also open. Rotating the antenna takes always too long. So I ended up having multiple antennas pointing into different directions. Being able to switch between antennas was a big improvement. The logical next step was to have the possibility to combine antennas and transmit or receive simultaneously. Stack Match units do exactly this. Jay Terleski, WX0B described already 1995 in the July/August National Contest Journal such a system and the BCC (Bavarian Contest Club) – the biggest contest group in Germany - published a detailed homemade project description on their webpage (http://www.bavarian-contest-club.de/projects/BCC-Projekte;art31,1082). Unfortunately for most of you descriptions for this and many other interesting BCC projects are in German language only.

This concept allows the simultaneous use of 1-3 antennas based on a very simply and easy to build circuit. Meanwhile I built four of the described stack matches including special controllers.

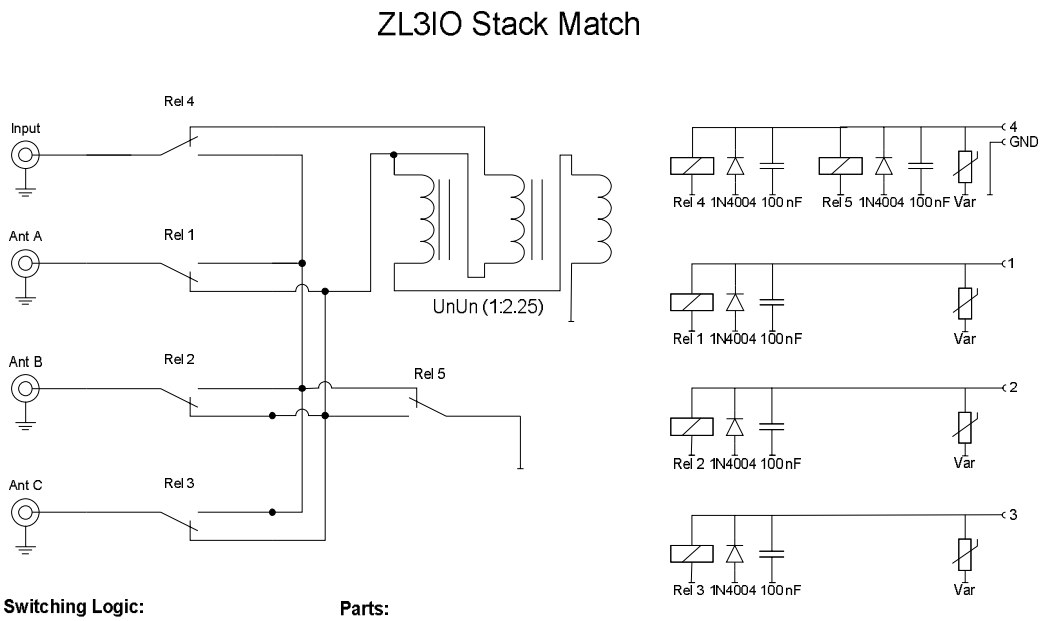
A simple relays circuit is built around an UnUn with an ratio of 1 : 2.25. A ratio of 1:2.25 means for 50 Ohm antennas the matched impedance will be 56.25 Ohm for two and 37.5 Ohm for three parallel antennas. That is SWR wise still a good compromise and can be managed by most radios/amplifiers without the need of a tuner. If a single antenna is used, the UnUn is bypass and the antenna directly connected to the radio. For any combination of antennas they are connected via the UnUn.



Picture 1: BCC stack match (Bavarian Contest Club)

For HF applications it is recommended to use a FT240-61 for the UnUn. For up to 750-1000 W a single core should be sufficient. If you run more power two toroid's should be used. About 4 windings of 2-2.5 sqmm enameled copper wire showed best result for broadband applications. If

used only up to 7 MHz five windings are also okay. For good performance especially on the higher HF bands the wires need to be as close as possible to each other and to the core.

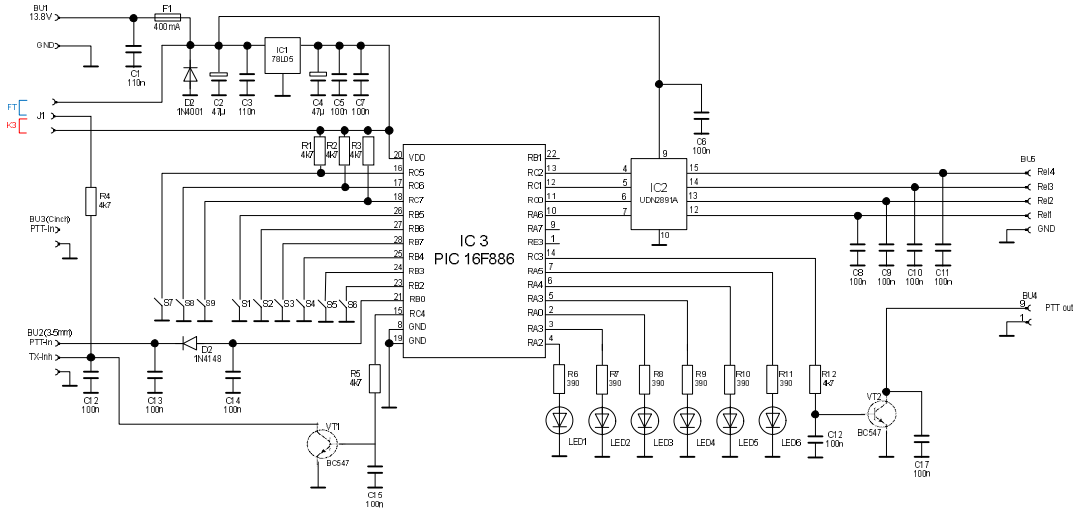


Picture 2: ZL3IO stack match with 5 relays to ground unused antennas.

Picture two shows the circuit as used by me. It incorporates five relays. Mats, SM2MWV/SJ2W offers high quality pcb's (www.sj2w.se). A Hammond aluminum box type 1550G is used to install the stack match hardware.

Picture 3: pcb with UnUn and relays circuit

The controller is based on a PIC 16F886 with a little program that allows independent combinations for receive and transmit plus interlocking during transmit to prevent from switching under power.



Picture 4: Control Circuit for stack match

Attached are a few more pictures.


A
B
C
ZL310


4,5
4,5
4,5
4,6