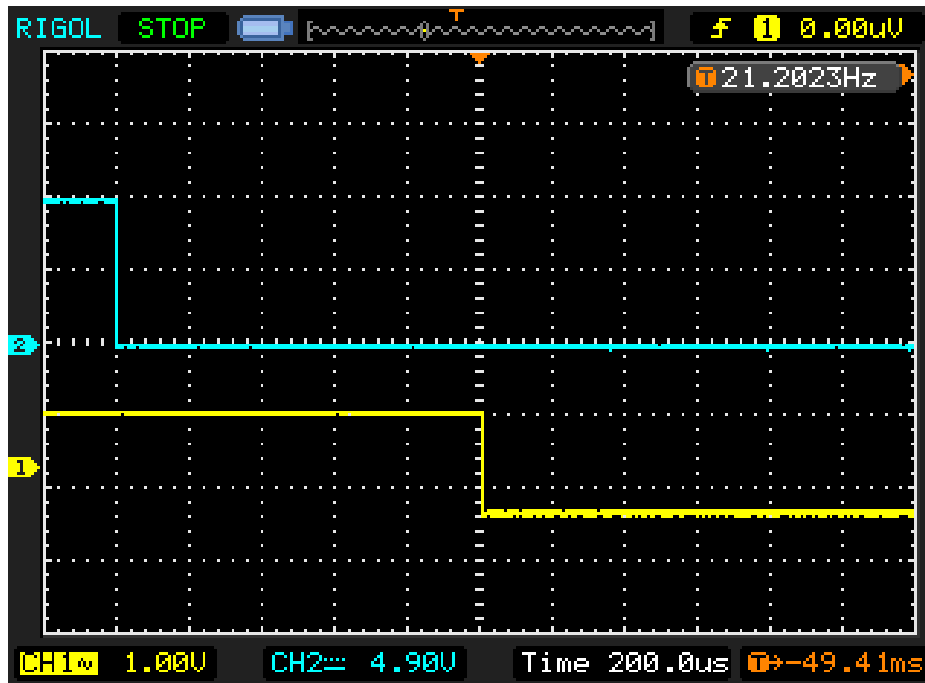


Relay Timing for the W7RY QSK Modification for the Kenwood TL-922 and the Heathkit SB-220 HF Linear Amplifiers

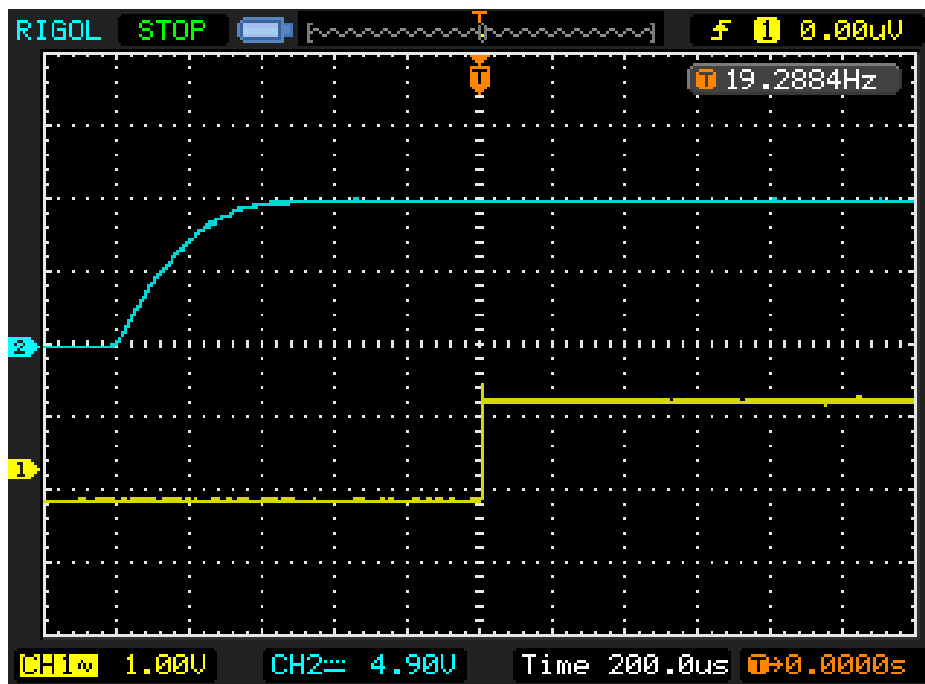
May 4, 2013

Shown below are the relay close and release times for the Jennings RJ1A-26N969 vacuum relay and the input reed relay that are used in the W7RY QSK system.

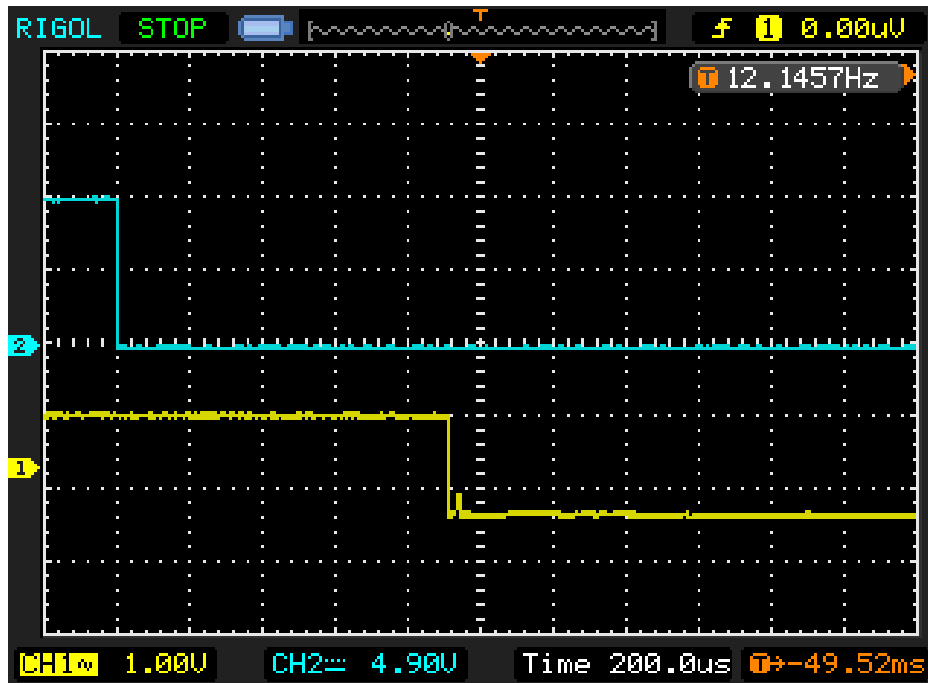
All traces are with an Icom IC-7200 modified to remove the relay from the amplifier keying circuit and replace with a 2N2222 with its base supplied from T8 (transmit 8 volts) through a 3.3k Ohm resistor. This is shown on the blue trace. The Yellow trace is the QSK relay grounding 13.8 volts DC through a 100 ohm resistor. Removing the relay does nothing to speed up or slow down the relays in the amplifier. What it DOES do, is speed up the time to close the amplifier relays before RF starts flowing. Although, the IC-7200 has sufficient time built into it to prevent hot switching of the QSK relays even with using the stock amplifier switching relay in the radio. What removing the stock relay does do is eliminate the contact bounce and speed up (by ~ 2.0 ms) the amplifier relay switching before RF is applied. With the stock amplifier switching relay in the IC-7200, there is more than enough time to engage the amplifier QSK relays before RF is generated from the radio. The IC-7200 with the stock relay is ~ 3.6 ms before RF is applied. The W7RY QSK modification relay switching time is 1 ms so there is plenty of relay closure time before RF is applied. All of the scope traces shown below are taken with the CW speed of 30 WPM and the IC-7200 set for bull break in.



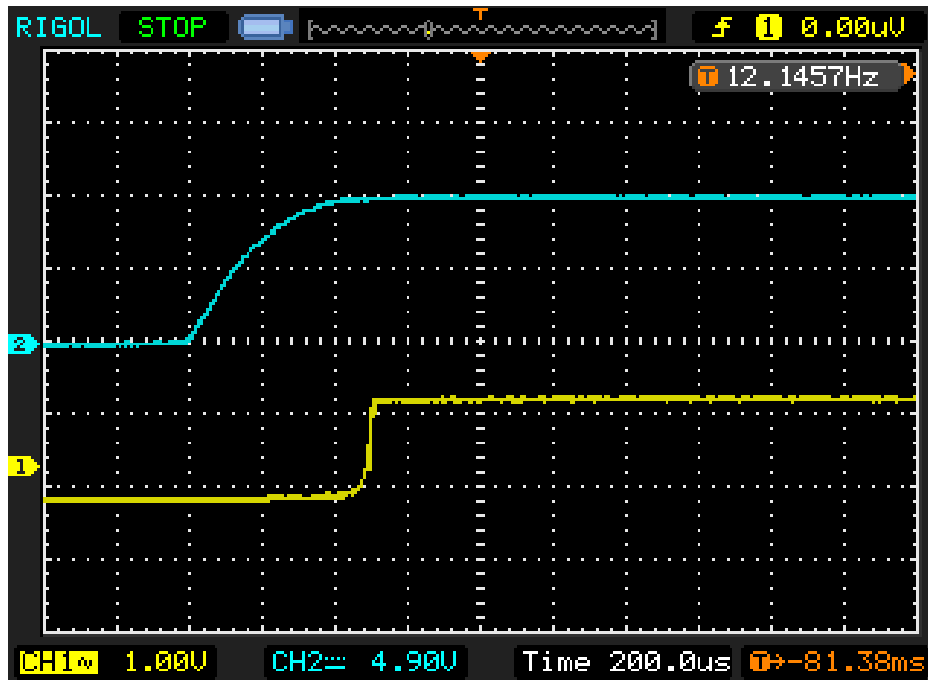
Jennings RJ1A-26N969 from receive to transmit, ~1ms to close, (200 us per division).



Jennings RJ1A-26N969 transitioning from transmit to receive, ~1ms to open (200 us per division).



Input reed relay from receive to transmit, ~850 us to close, (200 us per division).



Input reed relay from transmit to receive, ~500 us to open, (200 us per division).