A Simple Sequencer for W1GHZ Transverters

A simple sequencer for simple Transverters

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The Transverters designed by Paul, W1GHZ, take a minimum of sequencing for correct operation. This article will show a simple sequencer to go along with the Simple Transverters. The signal levels encountered while operating are not sufficient to cause damage to either the Transverter or to the IF rig in the event of incorrect operation of the sequencer.

As with any project, a plan is needed to insure correct operation. To allow for the antenna relay to fully switch, a longer delay is needed than for the simple voltage switching. Voltage switching can be accomplished in a few milliseconds.

The Omron G6Y antenna relay takes 10 ms to energize and transfer to "Transmit", with a typical switch time of 5 ms. The release time back to "Receive" is 5 ms with 1.5 ms typical. These switching times would indicate that 100 ms total RC time would be satisfactory for the overall operation of the sequencer.

The sequencer circuit operates off +13.6 VDC and is designed for 100 ms and is adjustable out to 200 ms by adding a second 22K resistor in series with the existing 22K resistor. The actual RC time constant components are a 22K resistor and a set of 5 .1 MFD capacitors that charges up completely to 13.6 VDC and takes a time of 100 ms.

With the Sequencer sitting at rest and in the Receive condition, the following events need to take place to sequence into the transmit mode:

1. The "Manual" sequencer switch is thrown to "Transmit".
2. +13.6 VDC is applied to the RC time constant components and timing starts.
3. At 4 ms, +8 VDC is removed from the Transverter Receiver +8 VDC buss.
4. At 8 ms, the Transmit-Receive relay is energized for Transmit mode.
5. At 55 ms, the Transverter Transmit +8 VDC is powered up to +8 VDC.
6. At 70 ms, raise +13.6 VDC to power up the IF Transmit Source.
7. At 100 ms, the sequencer has set the Transverter for Transmit Mode.

You are now ready to Transmit.

These times are approximate.

To go to Receive Mode on the Transverter, the "Manual" sequencer switch is thrown to "Receive" and the following events take place:

1. The RC time constant components are switched to a Discharge timing mode.
2. At 30 ms, +13.6 VDC is removed from the IF transmit Source.
3. At 46 ms, the Transverter Transmit +8 VDC is removed.
4. At 90 ms, the Transmit-Receive relay is de-energized to go to the Receive mode.
5. At 96 ms, the Transverter Receive +8 VDC is applied to the Receive buss.
6. At 100 ms, the sequencer has set the Transverter for Receive Mode.

You are now ready to Receive.

This circuit is a Manually operated circuit and requires the operator to throw the switch and wait 100 ms, or less, and the hit the Key or actuate the Microphone. Yes, you will forget to throw the switch in the excitement of operating, but, with only 1 mw of IF transmit driving power, it is unlikely to damage the simple Transverters.

Here is how the “magic” is worked. Figure 1 shows the operation of an LM339

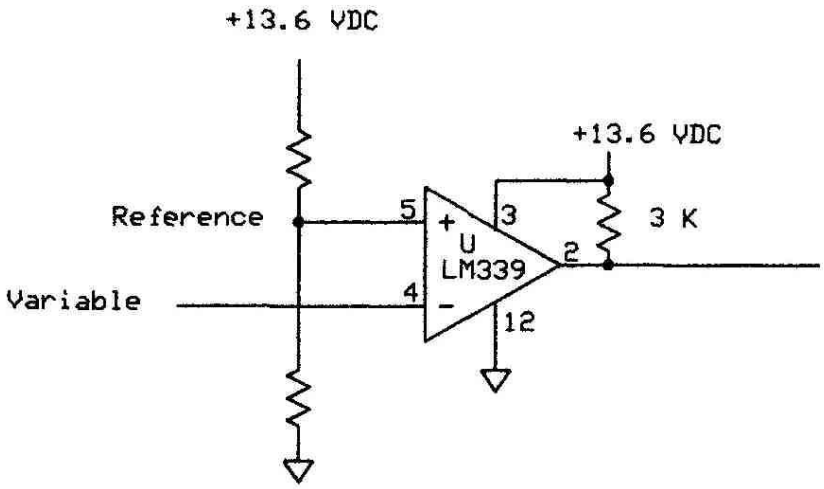

Figure 1. An LM339 Voltage Comparator.

Assume that the voltage divider places 2.0 vdc on Pin 5, the Reference pin. When the Variable Voltage is below 2.0 vdc, the LM339 is “Off” and is NOT sinking any current. At such a time that the Variable Voltage goes above 2.0 vdc the LM339 will turn “ON” and start sinking current and the Output pin goes “Low” to about 400 mv or less. This ”Low” voltage will turn on a 2N3906 PNP Pass stage and turn on the +8 vdc or +13.6 vdc to where it is needed.

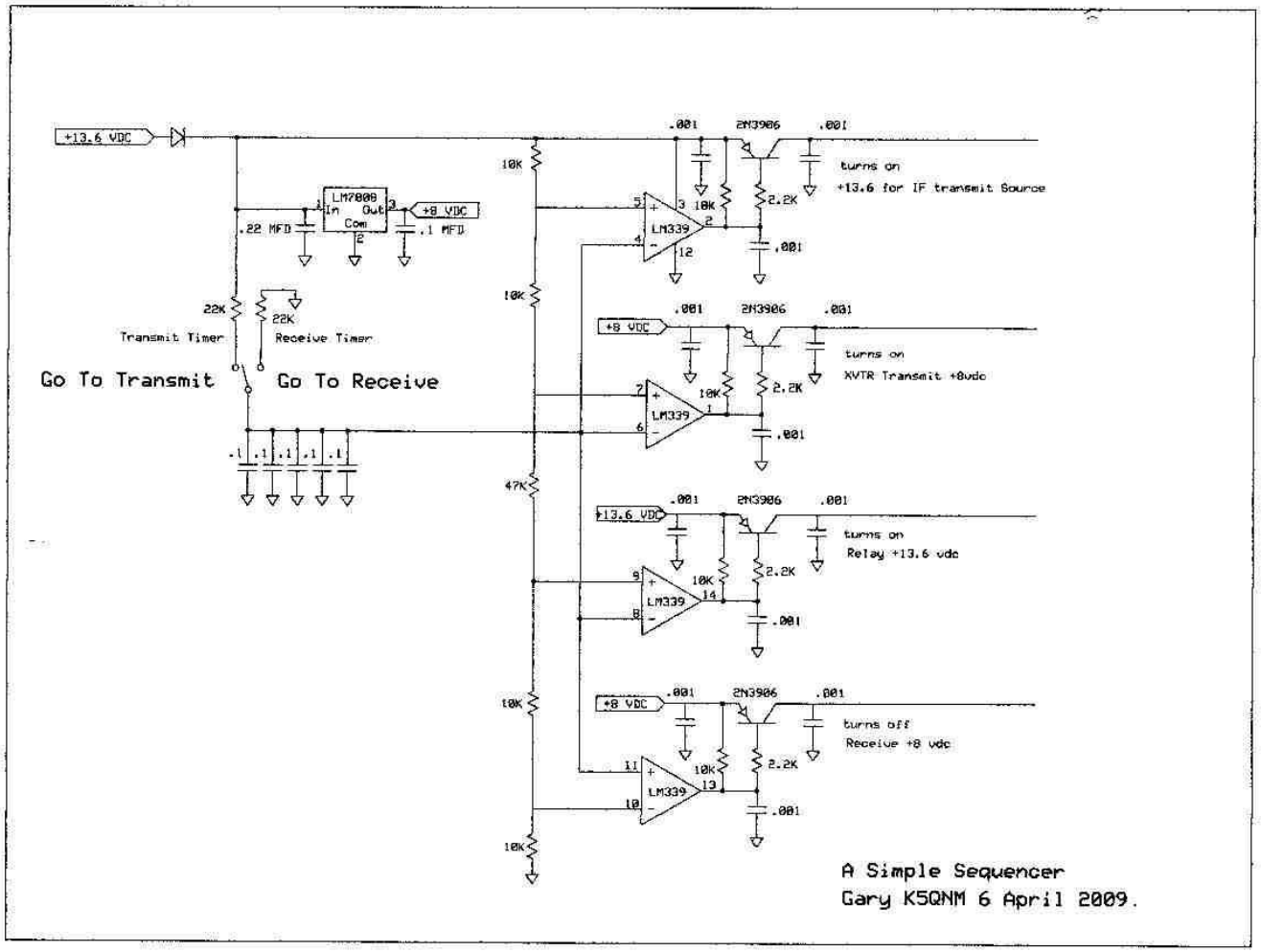

Figure 2. The Schematic.

This circuit can be made inexpensively on perforated PCB material using a Wire Wrap style of wiring. All components are through-hole leads and if the PCB assembly is made the same size as the Transverter PCBs additional features may be added. It would be simple to add LEDs with a series resistor to ground to visually indicate the circuit operation.

References:

1. Sequencer Logic, 2005 CSVHF Conference, by Steve Kostro, N2CEI.

2. A Fool-Resistant Sequenced Controller and IF Switch for Microwave Transverters, by Paul Wade, W1GHZ, QEX, May 1996, Pages 14-22.

3. The LM339, National Semiconductor, AN-74, A Quad of Independently Functioning Comparators, October 2002.