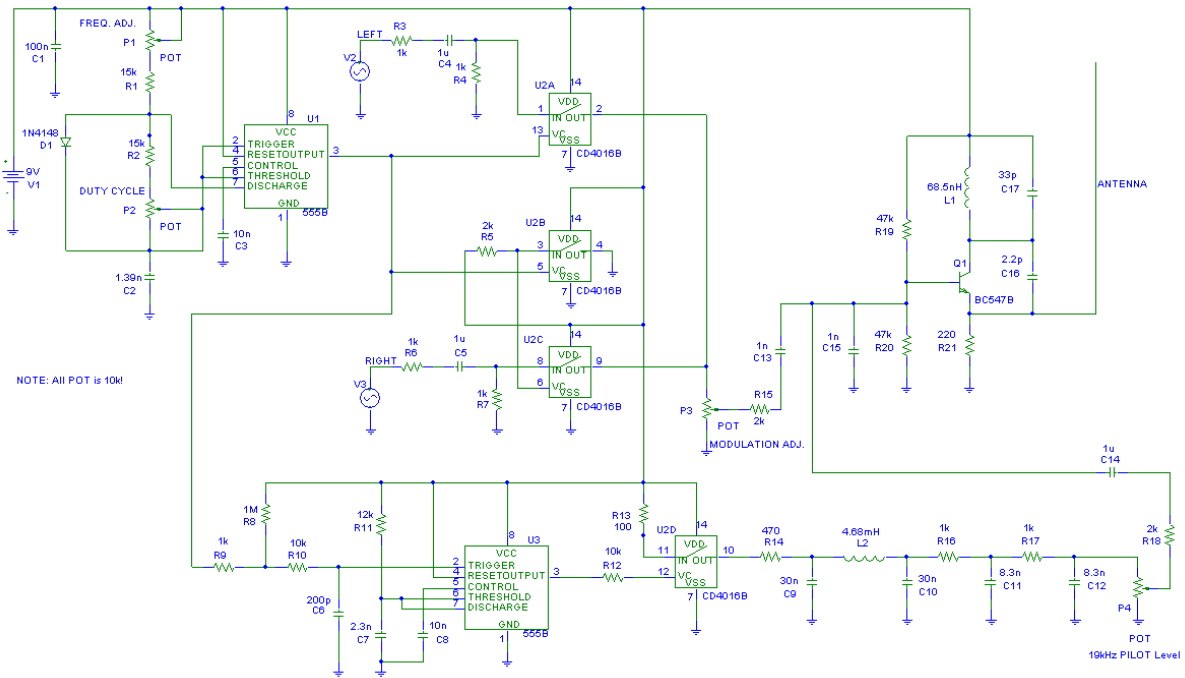


We have made an entry on the 555 contest

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The entry is an NE555 based low power (10mW) stereo FM transmitter. The signal generated by this circuit can be listened on a normal stereo FM radio (up to 100 meters distance). It accomplishes the AM-DSB/SC FM modulation mode.



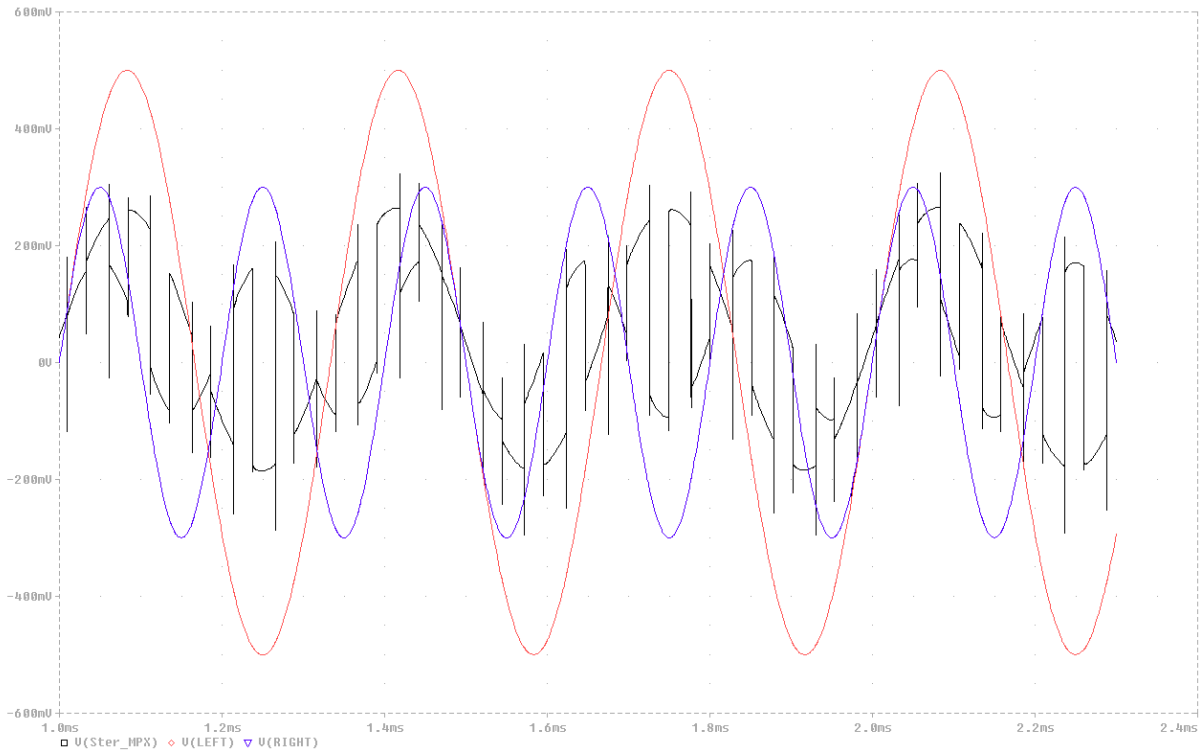
The main parts of the circuit

1. FM modulator (based on a BC547B transistor)
2. NE555 based square-wave generator (38 kHz, 50% duty cycle)
3. multiplexing circuit, which alternates the input left/right channels' signal (it uses three gates of the CD4016)
4. NE555 based monostable with a signal-shaping circuit (with the fourth gate of the CD4016), which generates the 19 kHz pilot signal

Connections between these parts

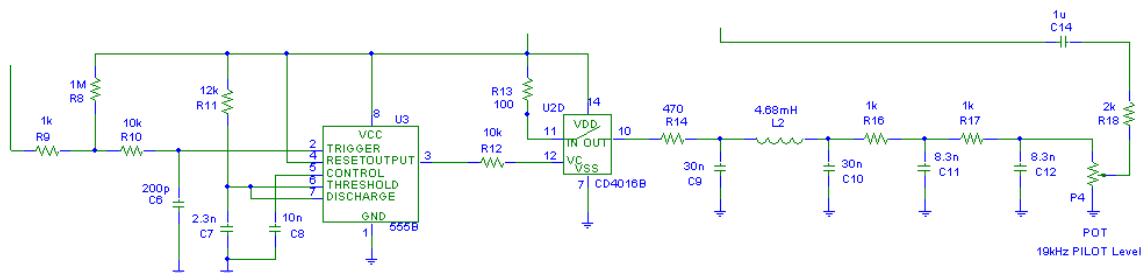
The square-wave generator controls the multiplexer, which turns the input signals' channels to the FM modulator alternatively. To that signal it combine with the monostable generated 19 kHz signal, which controls the decoder of the radio receiver. The FM modulator generates the frequency-modulated radio waves, which can be listened on the nearby radios.

The attached schematic contains two NE555 and a CD4016 (or CD4066) IC-s, one transistor and a diode, four trimmer potentiometer, and some resistors and capacitors.



The peaks are shown in the simulation program only, on a real scope they are not exists.

Generating the 19 kHz pilot-signal



According to AM-DS/SC mode, the pilot signal's level has to be 8-10% of the maximal modulating input signal level. The left channel is indicated by the pilot-signal's zero transition and the following entering edge to the receiver's stereo decoder (which controls the decoder's alternator circuit), so it is important to work phase-right.

The 38 kHz square-wave (which controls the multiplexer) triggers the NE555 based monostable. The width of the output pulse was set to trigger the monostable on every second edge. The output 19 kHz square-wave's duty cycle is not 50%. The output is separated by the last gate of the CD4016 (U2D) from the signal-shaping stage.

The signal-shaping consist of two segments. The first segment creates the regular sinus waveform, while the second segment pushes it to the correct phase. It is really important for a good quality broadcast, without it the receiver's decoder cannot separate the channels and perceives it like a mono signal.

The acceptable level of the pilot signal can be set with a properly tuned stereo receiver. First set the potentiometer P4 to minimum, then raise the level until the stereo sign on the receiver is not

showing up. This is the minimal needed level, we have to raise the level a little bit more (5-10%) to safe function. This step must be made after we set the distortion-free mono signal with the potentiometer P3.

Conclusions

While this device works from a 9V battery, it uses around 17mA of current. If we are using an AC adapter, then we have to connect 10nF capacitors in parallel with each diode of the Graetz-bridge, because of the noise and hum of the AC network.