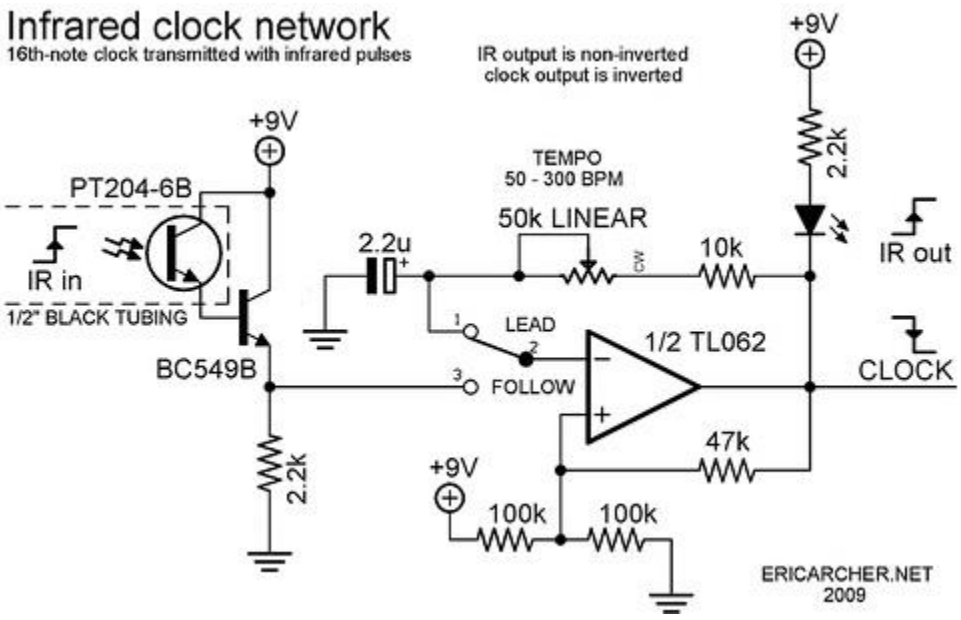
IR Sync



Minimal infrared wireless network for synchronizing music sequencers

This is the original schematic for IR Sync as implemented in Andromeda Space Rockers mini drum machines. IR Sync is a minimal infrared wireless network for communicating tempo / clock between electronic music sequencers. It is designed to be easily understood for educational purposes.

It can generate tempo internally (lead), or respond to external clock (follow). The LED output acts as a repeater to the next device. A 940 nm LED is recommended, narrow beam type (less than 20 degrees).

In LEAD mode, the op amp is configured as a relaxation oscillator with square wave output at 16th-note intervals. Duty cycle is approximately 50 percent. Tempo can be set between 50 - 300 BPM with the potentiometer.

In FOLLOW mode, the op amp is configured as a comparator with hysteresis. This shapes the phototransistor's output into a square-ish waveform. Don't forget that the clock pulse is inverted with respect to the IR input. In other words, the moment the IR light goes on, the clock output will make a high-to-low transition. So the sequencer listening to this clock should be configured for falling-edge clocking. Connect a logic inverter gate if necessary.

In some common situations, IR sync doesn't work. Daylight and incandescent bulbs have lots of ambient infrared light that causes interference. The circuit works fine under fluorescent, CFL, and LED light. A 1/2 inch length of black plastic tubing should be slipped over the phototransistor to help block ambient light.

The maximum working distance of the infrared link is about one foot (30 cm). An interesting quirk is that the lag time from IR in to IR out varies depending on distance. Greater distances cause longer lag, up to about 10 milliseconds.

In practice, up to 12 units can be chained together maximum. The pulse length shortens each time it is repeated, ultimately becoming zero after too many links in the chain.

Phototransistor: PT204-6B
IR LED: QEC112

TL062 is recommended instead of '072 or '082 for most battery powered applications.

Video demo: http://vimeo.com/7193961

In this video, a Drone Commander serves as the master clock for Andromeda Space Rockers by connecting an IR LED to the Drone Commander's clock output.

> >Oh, in the Starcruzer video where you have a DC chained to some MDM's is
> >that a 330R with the big blue IR emitter hooked into the DC?

yes indeed. actually its a 1k resistor. the LED is 940nm infrared emitter, narrow angle type. IR Sync is pretty magical, you can just plug an IR LED into the clock output of modular synths etc and it works. So thats what I made, a 1/4" plug w/ resistor and LED…

> >Just built one of those and it works great (already had a similar LED,
> >but wasn't sure of the wavelength — I don't think it matters too much if
> >you mismatch 880nm with 940nm). I added Banana sockets and a visible
> >light LED to make it a great little CV/gate to IR converter. Now, I'm
> >wondering about the reverse — an IR detector to convert to voltage… 

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