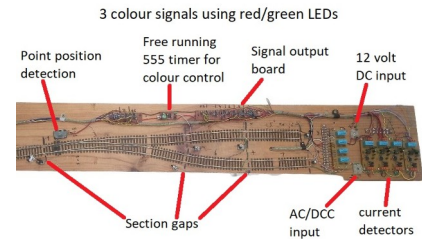# Signal display board – three colours from red/green LEDs

This display is setup to show how the signalling system works on our large club layout.

On the board there are seven detected sections, two at the tail, one over the point and two in each siding. A microswtich to detect the point position. The detectors and signal circuits.
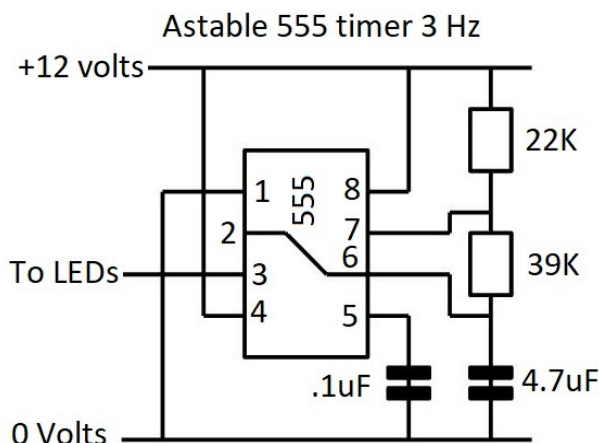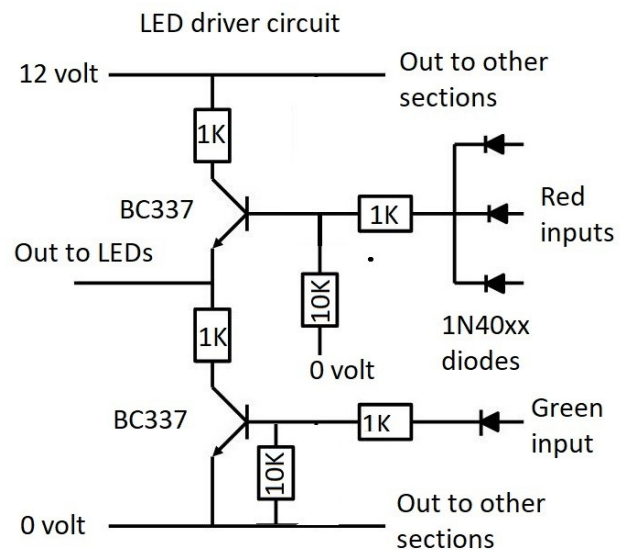At the end of the line the LEDs are always red as per the prototype and the next section back can only be red or amber as this is part of the tumble down and is an early warning of the next signal at red.

3 colour signals using red/green LEDs

Point position detection — Free running 555 timer for colour control — Signal output board — 12 volt DC input

Section gaps — AC/DCC input — current detectors

The detection boards are based on a circuit by Rob Paisley and they, along with the signals were built by a previous member to give a simple red/green aspect using two wire LEDs, these are really just two back to back LEDs in one package and work by reversing the polarity to change the colour. The biggest problem with this method is that there are only two states, clear and stop, there is no early warning of an upcoming stop signal.

To overcome this without rebuilding all the signals to three colours, the detector outputs were modified to give two separate outputs, both positive, one for green and one for red. The two outputs feed a signal board which outputs a current limited positive for red and negative for green dependant on the input signal, only one of which will normally be on at a time.

LED driver circuit

The output is fed to one leg of the LED and the other leg is connected to the 0–12 volt square wave output of an astable 555 timer. The 555 timer has an output limit of 200mA so about 16 signals can be run from it. Because of the square wave, the LEDs are actually flashing on and off but as the output is running fast your eyes just see it as a solid colour. To get the third colour, the red output from the next signal, if on, is fed to the red input of the signal behind via a diode to prevent back feed, so that both the red and green are on together. Because the colours are alternately flashing on and off and due to the persistence of vision your eye sees this as amber. If the signal was already at red then the extra input makes no difference, so the red danger aspect still holds true and the green aspect can only be on when both the local and the next block are clear.

Astable 555 timer 3 Hz

The circuit has a switch to slow down the 555 timer by adding a second capacitor so that you can see the LEDs flashing. The high/low ratio of the timer output can also be altered to vary the colour tone of the amber by changing the resistance of one of the timing resistors.

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