Overview

U5A is a retriggerable one-shot used as a missing pulse detector and is set, using R10, to have a period slightly longer than the longest anticipated repetition rate of closure and release of S2, a magnetic reed switch actuated by pedaling the bike. U1 and U2 are 7555 timers (CMOS 555's) and are connected like a ring counter, with U1 having a pulse width of 30 seconds, adjustable with R4, and U2 having a period of up to about 50ms, adjustable with R6. U3 is a binary down-counter and is used to generate mutually exclusive sequential outputs from U4, a 3-to-8 line demultiplexer which is used to drive Q3 through Q8, which are the playback switches for the eight voice recorders in the system. U4-14, which goes high momentarily after 180 seconds of continuous pedaling, also triggers U5B, a one-shot used to actuate K1, the relay which is needed to turn on the "bells and whistles" after a succesful three minute ride, for as long as the display needs to stay active, that time being determined by R11 and C7.

In use, the rider mounts the bicycle and starts pedaling. Once the LED comes on and stays illuminated continuously, s/he presses the START switch, which will trigger U1 and load binary 1000 (decimal 8) into U3. Then, after 30 seconds of successful pedaling have elapsed, U1 will time out and its low-going edge will trigger U2. The high-going leading edge of the output from U2 will clock U3 and make it count down to decimal 7, which will, after the delay introduced by R18 and C8, make U4-9 go true and turn on Q3, starting the first 20 second voice recorder.

The delay is necessary because it takes time for U3 to count, and if the same signal which caused it to count is applied upstream, before the count is done, the ballgame will be over.

So, what'll happen is that as long as the pedal speed is fast enough, every thirty seconds after the START switch is pressed the counter will select a new voice recorder and a short pulse will be sent to trigger it and it'll do what it's supposed to do.

To finish up, when U4-15 goes high, it'll turn on Q1, which will reset U1 and U2 and stop them dead in their tracks until S1 is pressed while the LED is ON, starting a new cycle.

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CN9 and CN8 are terminal blocks to be hooked to remote switches. SW1 and SW2 are board mounted to make it easy to test and calibrate without the need to have it connected to the remotes.

CN1-6 are outputs that will trigger a digital voice recorder to playback encouraging words. CN1 goes off at 30 seconds, CN2 at 60... CN10 also allows an additional bells and whistles device to be triggered at the end of 3 minutes.