

HASBRO RC MOTORCYCLE THEORY OF OPERATION

The motorcycle electronics is typical of toy-grade radio control. The 27 MHz crystal-controlled transmitter output transistor is gated on and off at a 250 Hz rate to command forward and at 500 Hz to command rev. Stop is no transmitted signal.

For the transmitter, astable Q3-Q4 biases the output transistor Q1 on and off via R3. For forward, battery voltage is applied thru R7 increasing the astable time constants (and decreasing astable frequency). C2, T1, C1 form the output low-pass filter.

The receiver uses Q1 in a self-quenched superregenerative detector configuration. C3 from Q1-C to Q1-E provides more than enough feedback for regeneration so the circuit is superregenerative, bursting into oscillation and quenching itself off at an ultrasonic (100 kHz-200 kHz) rate. (Voltage builds up at Q1-E and biases it off.) The presence of a signal at the antenna results in the oscillations building up faster and consequently more quench cycles per second. More average oscillator current flows thru 3.3k resistor R4 and a small voltage at the transmitter pulse rate appears at the R4-R7 junction. 2 amplifiers in the RX3 receiver IC amplify the small voltage and filter out the quench frequency. T1-C2 in the Q1 collector determine the receive frequency. The .005 uF cap and 270 ohm resistor in Q1's base set the no-signal quench frequency. R13 between U1-5 and U1-7 sets the receiver time base. U1 counts the received pulses to determine whether fwd, rev, or no motion is being commanded.