49. 860 MHz Air Rebound 6V stunt vehicle #91797
Operational Description

The Air Rebound stunt vehicle is a 6V NiCD powered, radio controlled toy vehicle. It is designed to operate on a single fixed frequency in the 49.82 – 49.90 MHz band. See the attached block diagram and schematic.

The vehicle receiver receives and demodulates the AM transmitted signal from the transmitter, using a standard super-regenerative AM receiver/demodulator circuit comprised of A1, Q4, L1, L2, L3, C12, C13, C15, C16, C17, C18, C21, R20, R21 and R24. L2 is a tunable core slug inductor that is used to tune the receiver for maximum sensitivity. The output of the AM receiver/demodulator is AC coupled to a high input impedance CMOS inverter stage of the RX2C decoder IC biased into their linear region through C19, C20, C23, R22, R23, R25, R27 which amplify, filter and shape the data. After the last inverter stage the incoming waveform is a digitized enough to be fed into the SI pin for on-chip decoding.

A Zener regulator circuit comprised of C9, C10, D10, Q3, R17, and R18 creates the supply voltage, VDD for the super-regenerative radio, decoder IC and Comparator section

Drive motors M1and M2 are controlled by the RX2C decoder IC, low power switching transistors Q7, Q8, and Q13, Q14 and a high power H-bridge comprised of Q5, Q6, Q9, Q10, and Q11, Q12, Q15, Q16 respectively. R32 and R37 are current sense resistors that permit a proportional sense voltage to be developed above them that is proportional to the amount of current through the bridge. The M1 Sense and M2 Sense signals are fed into low pass filters composed of R9 & C6 and R3 & C3 which filter transisent current spikes and then into U1A and U1B, 2 sections of an LM339 quad comparator. These two signals are independently compared to identical reference voltages established by R1&R2 and R5&R6 that establish the trip point for the output of U1A and U2A, the over current output.

By using negative logic the outputs can be OR'ed together to generate and common over current condition output. This output drives a high gain buffer/sink stage comprised of Q17, R41, and Q18. When the output is active, over current is true, C8 will begin discharging through R15 through Q18. The time constant is component programmed for 3 seconds with the values presented in the schematic. After 3 seconds the voltage on pin 8 of U1C is less that the reference voltage established by R7 & R8 causing the Shutdown output on pins 14 to switch to Vdd. This inturn sinks the over current input to U1C to ground and latches the motors off via Q2, D6, D7, D8, and D9. The wheels of the vehicle are "freewheeling" at this point and can only be reactivated when the control output (joystick control) signal is released and reengaged. D1, D2, D3, D4, and R4 act to monitor joystick states as control signals at the output of the decoder IC. When the joystick is released the output of U1D toggles state, resets the latch and the vehicle is returned to its normal play state.