- Circuit Description

- Assume:-

- 1. Motor is stationary,

- 2. Throttle is at minimum, ie. V_r = -0.6 Volt,

- 3. C1 is charged to +14 Volt.

Now advance the throttle until V_r = 2.7 Volt (for example).

- Y will switch from +14 V to -14 V since V_r > X.

- C1 will charge towards -14 V.
- When V_1 = -8.9 V the Op Amp output V_0 switches from -14 V to +14 V.

Diode D5 turns on and the power circuit applies +14 V to Motor.

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V_t thus goes from 0V to +14 V.

- So X goes from 0V to +9.5 V thus X > V_r, therefore Y goes high (+14 V).

C1 charges (via R5 & R6) towards +14 V.

- When V_1 = +8.9 V, V_0 goes low and this terminates the power pulse.

- V_t falls from +14 V to a potential determined by the motor EMF (which is proportional to its speed)

Since one pulse will not be sufficient to accelerate the motor to the required speed, X will be less than V_r.

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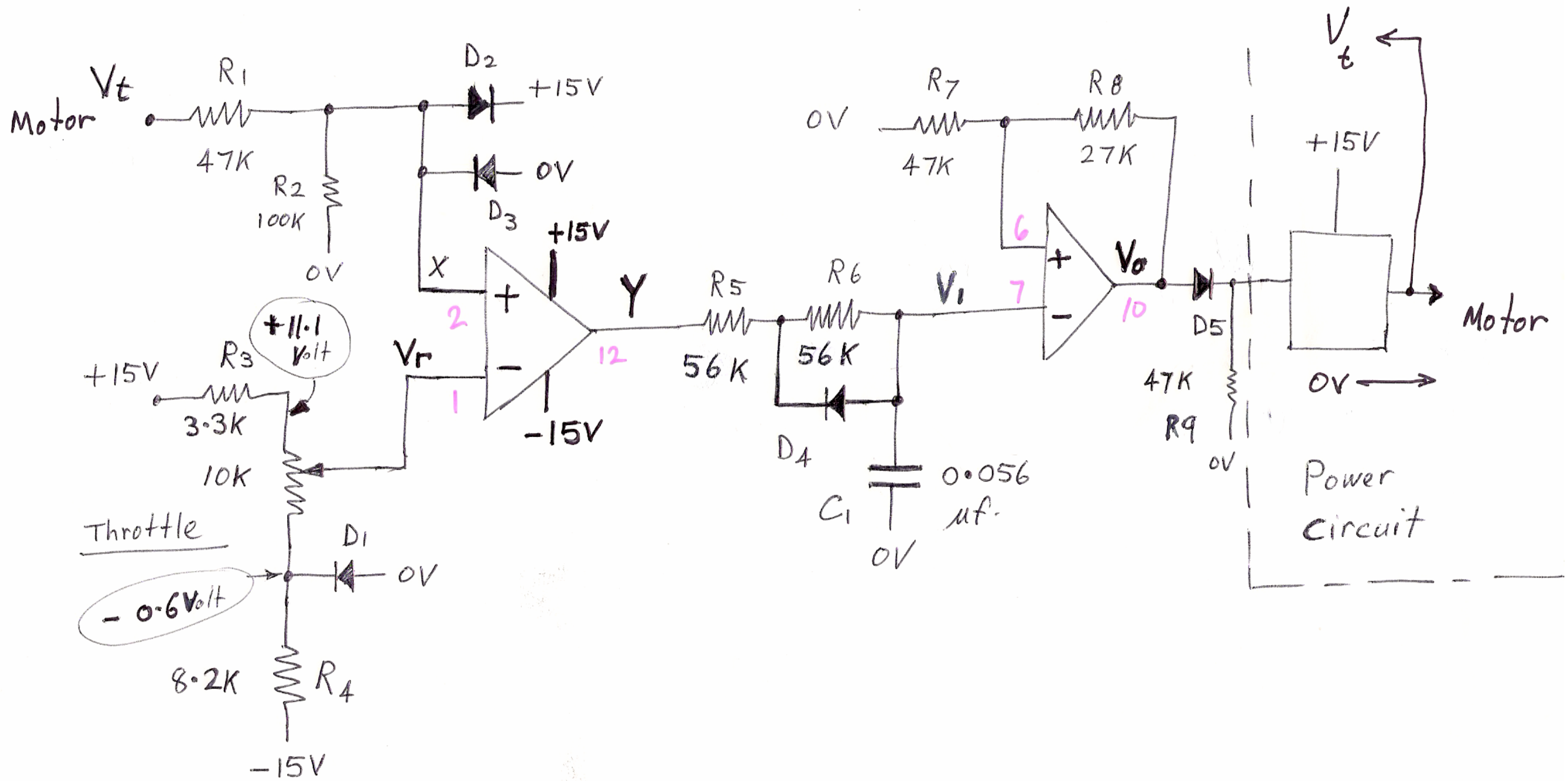
Therefore, Y goes low and C1 discharges via D4 & R5.
This cycle repeats until the motor has reached the desired speed.

- When the power pulse terminates, X will not fall below V_r so Y
- will remain high until the motor EMF decays to the point where X < V_r.
- C1 is charged towards –14 V.

- When V_1 reaches -8.9 V, V_0 goes high and starts another power pulse.
- The motor speed will thus oscillate around the required value.

If the throttle is advanced until V_r > 10.5 V, then X can never reach V_r. Thus continuous power is applied to the motor.



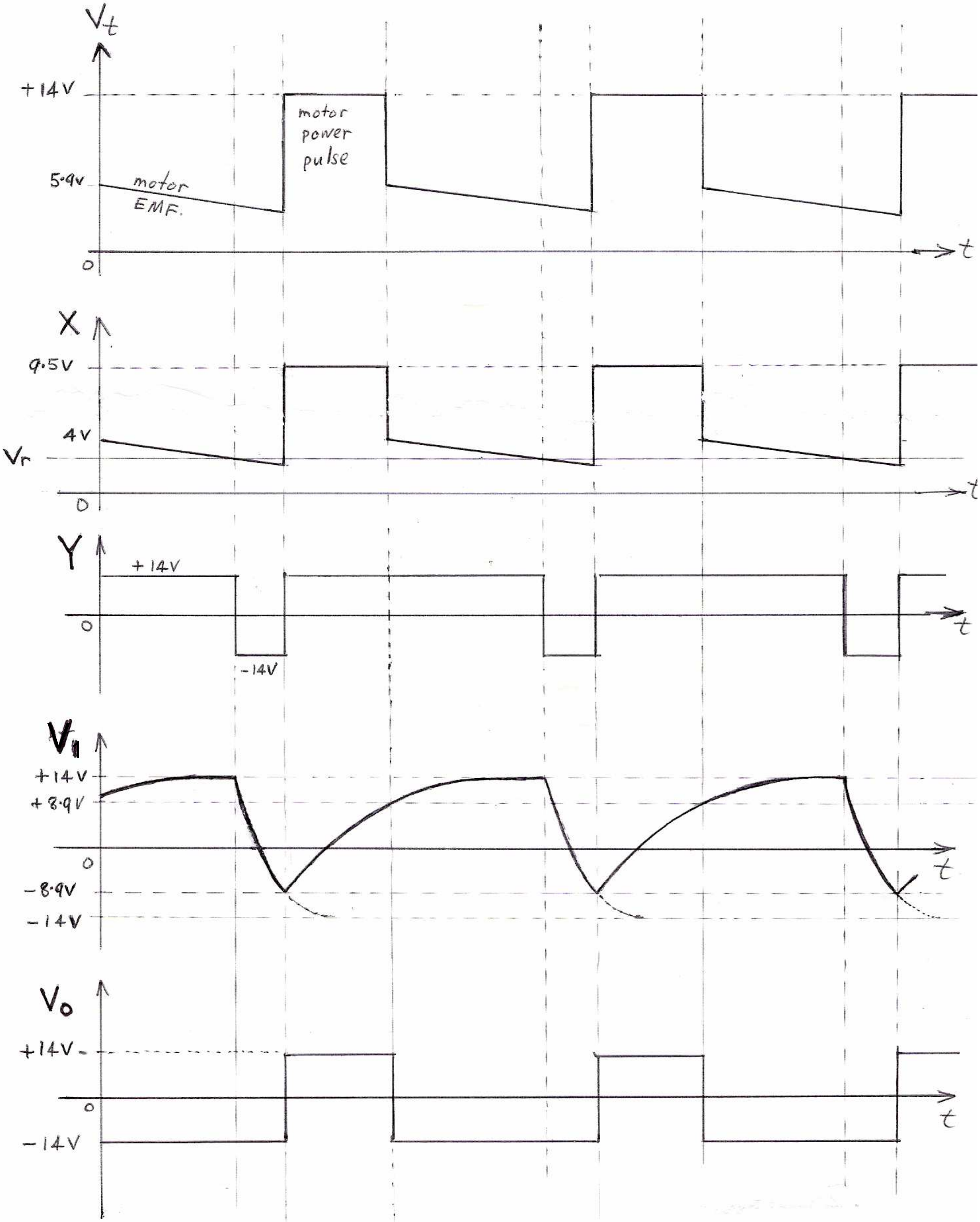
I C → 747.

Diodes → Si signal diodes. IN 4148 or similar.

All resistors ½ Watt, 5%.

Capacitor 18 Volt or better.

Train Speed Control



Steady State Waveforms.