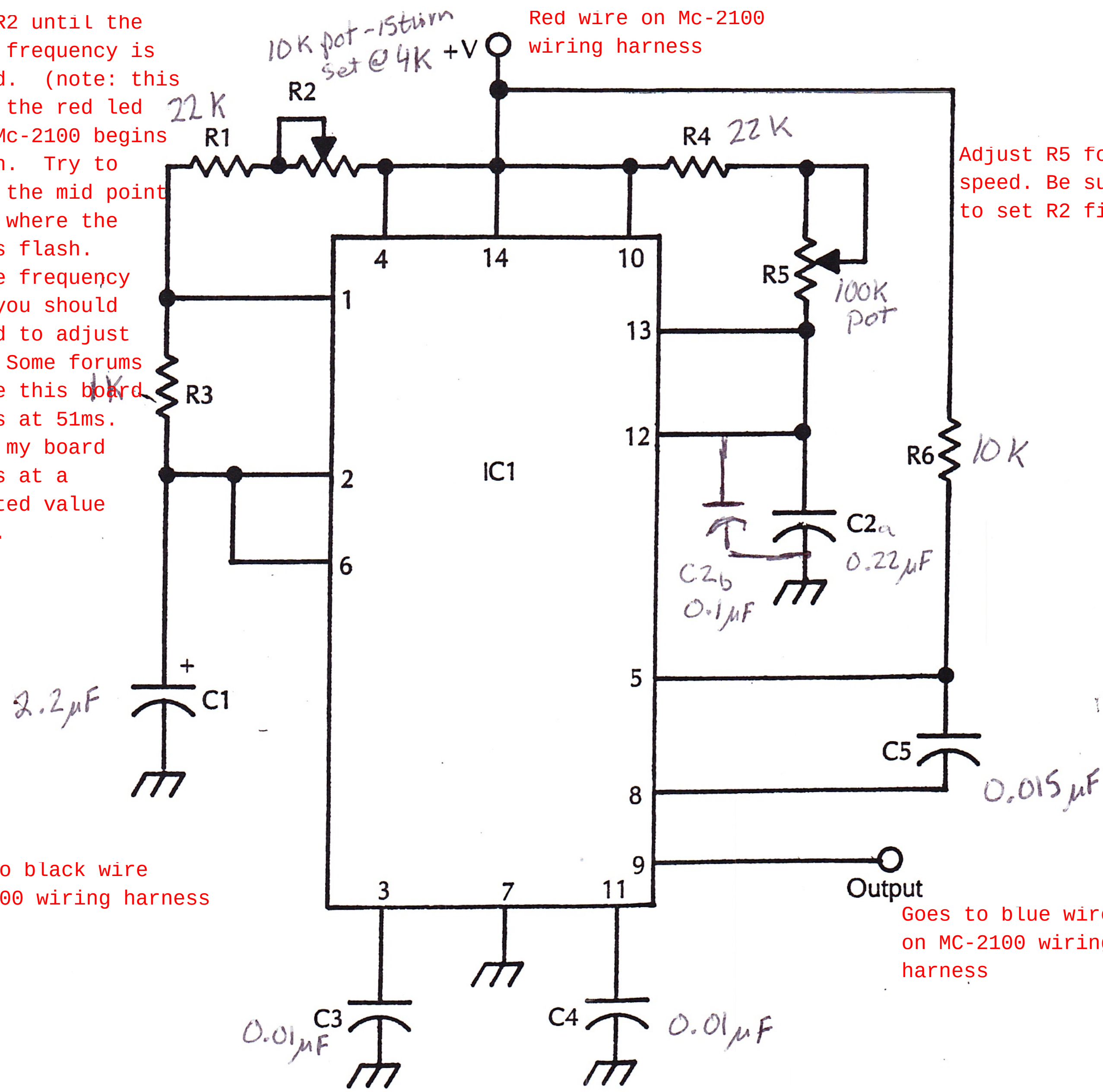
One of the most crucial drawbacks of the 555 astable multivibrator is that the generated frequency and the duty cycle are interdependent. When you change one, the other changes too. Usually manual control is set up through a variable resistance, because wide-range variable capacitors are expensive and hard to find. Unfortunately, the same resistances in the circuit control both the output frequency and the duty cycle of the generated waveform.

The circuit shown in Fig. 3-10 shows a neat way around this problem, using both sections of a 556 dual-timer IC. The first stage is an astable multivibrator with a manually variable frequency through potentiometer R2. The value of resistor R3 is relatively small, so the duty

Adjust R2 until the desired frequency is achieved. (note: this is when the red led on the Mc-2100 begins to flash. Try to turn to the mid point between where the led does flash. Once the frequency is set you should not need to adjust again. Some forums indicate this board operates at 51ms. I found my board operates at a calculated value of 43ms.

Red wire on Mc-2100 wiring harness

Adjust R5 for speed. Be sure to set R2 first.



Ground to black wire on Mc-2100 wiring harness

Goes to blue wire on MC-2100 wiring harness

Fig. 3-10 *Project 16: Variable-frequency/variable-duty-cycle rectangle-wave generator.*

Astable Multivibrator - first half of 556 dual timer

$$T(frequency) = \frac{1}{0.693\ x\ C1\ x\ (Ra + 2R3)}$$

		Working Scenario
Factor		0.693
C1	2.2 µF	0.0000022
R1	22 k	22,000
R2	10 k pot	4,000
Ra = R1+R2		26,000
R3	1.0k	1000
Frequency	=	23.43
Millseconds	=	42.69

Monostable Multivibrator - sencond half of 556 dual timer

$$T(pulse\ width) = 1.1\ x\ Rb\ x\ C2$$

Factor		1.1
C2a + C2b	0.33 µF	0.00000033
R4	22 k	22,000
R5	100k pot	50,000
Rb = R4+R5		72,000
Pulse width (seconds)		0.0261
Downtime (seconds)		0.0166
		0.0427
Duty cycle		61.2%

<u>Parts List</u>

IC1	556 dual-timer	R1	22 k
C1	2.2 µF, 35 volt electrolytic	R2	10 k pot @ 4 k
C2a	0.10 µF	R3	1.0 k
C2b	0.22 µF	R4	22 k
C3	0.01 µF	R5	100 k pot
C4	0.01 µF	R6	10 k
C5	0.015 uF		

note: c5 Should be 0.001uf; 1nf; or 1000pf