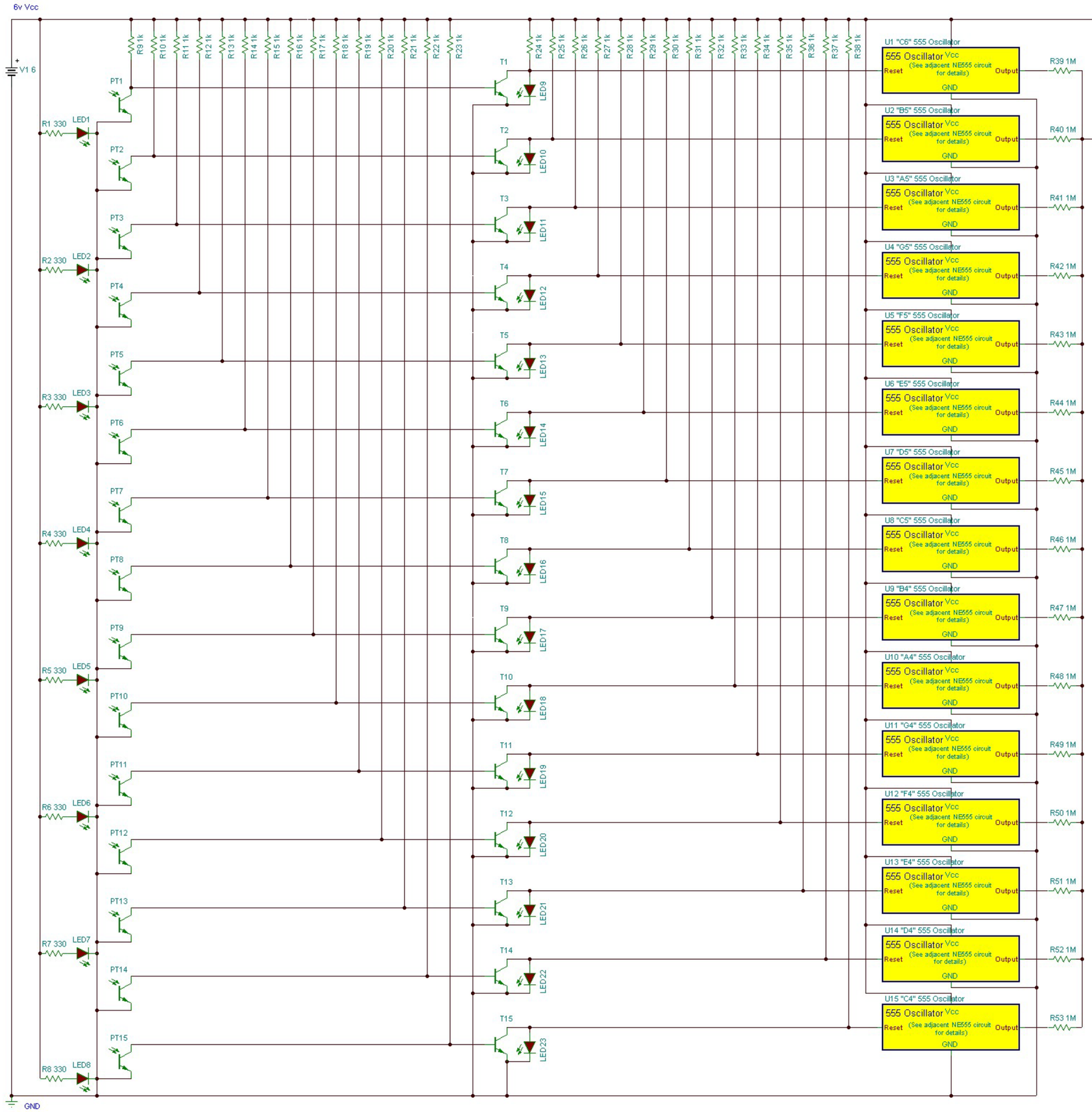
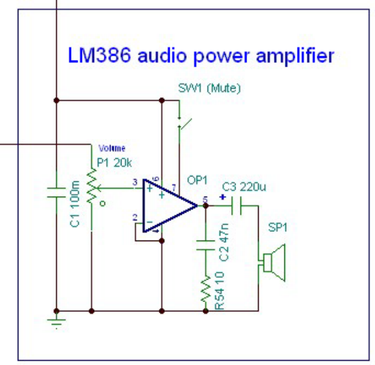


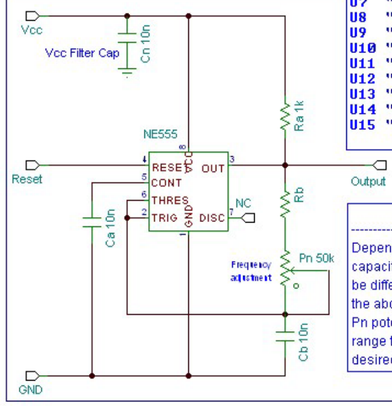


LM386 circuit corrections:
Connect Pin 4 to Ground.
Connect Pin 1 to one side of a .01uF Capacitor with the other side connected to ground. Do this for Pin 8 as well.

555 Oscillator circuit

The 555 circuit below is what is used in each of the U1 - U15 Oscillator blocks shown on the left. The component list is the same for each circuit except for the Rb resistor which is different in some of the blocks to ensure that the potentiometer has sufficient range to allow the oscillator block to be tuned to the appropriate musical "key" frequency.

IC#	Key	Resistor in Ohms
U1	"C6"	Rb value = 62k
U2	"B5"	Rb value = 62k
U3	"A5"	Rb value = 62k
U4	"G5"	Rb value = 62k
U5	"F5"	Rb value = 100k
U6	"E5"	Rb value = 100k
U7	"D5"	Rb value = 100k
U8	"C5"	Rb value = 120k
U9	"B4"	Rb value = 120k
U10	"A4"	Rb value = 150k
U11	"G4"	Rb value = 180k
U12	"F4"	Rb value = 220k
U13	"E4"	Rb value = 220k
U14	"D4"	Rb value = 220k
U15	"C4"	Rb value = 270k



---------- NOTE ----------
Depending on tolerances of the Cb capacitor, the Rb value may need to be different than the ones listed in the above table to ensure that the Pn potentiometer has sufficient range to tune the oscillator to the desired frequency.

Title	**Music Box Player using 555 Timers** **Created by Francis Bauer**	
Size **C**	Document No.	Rev **A**
Date **February 2011**	Sheet **1** of **1**	

Component list

Quantity	Designation(s)	Value	Description
1	C1	.1μF	Audio amp. Vcc filter capacitor
1	C2	.047μF	Audio amp. Filter capacitor
1	C3	220μF	Audio amp. output filter capacitor
15	Ca	.01μF	U1-U15 (pin 5) control voltage
15	Cb	.01μF	U1-U15 timing capacitors (with good tolerance & temperature specs)
15	Cn	.01μF	Vcc filter capacitor (1 per U1-U15)
Note: The working voltage of the capacitors are not critical, 2x Vcc or larger should be fine.			
8	LED1-LED8	Red	Any T1¾ high intensity LED will work as long as their wavelength is within the (PT) phototransistor's spectral range and they have at least a 20° viewing angle.
15	LED9-LED23	Red	Any LED will work and are only needed if you want to see each musical note triggered/played.
1	OP1	LM386	Audio Power Amplifier IC
1	P1	20$k\Omega$ ¼w	Trim potentiometer
15	Pn	50$k\Omega$ ¼w	Trim potentiometer (U1-U15 timing capacitor charge resistor)
15	PT1-PT15	PT202C (Everlight)	3mm phototransistors (400-1200nm spectral range) (visible to infra-red)
Note: Pretty much any 3mm phototransistor could be used, just ensure that your LED's output is within the spectral range of the phototransistors.			

Quantity	Designation(s)	Value	Description
8	R1-R8	330Ω ¼w	LED current limiting (Discrete resistors or DIP/SIP network resistors could be used.)
30	R9-R38	1$k\Omega$ ¼w	Transistor collector pull-up (Discrete resistors or DIP/SIP network resistors could be used.)
15	R39-R53	1$M\Omega$ ¼w	U1-U15 output summing (Discrete resistors or DIP/SIP network resistors could be used.)
1	R54	10Ω ½w	Audio Amp. filter resistor
15	Ra	1$k\Omega$ ¼w	U1-U15 output pull-up
15	Rb	(see table)	U1-U15 timing capacitor charge resistor
1	SP1	8Ω	Any speaker of 1w or greater
1	SW1	SPST	Audio Amp. mute switch
15	T1-T15	2N2222	NPN transistors
15	U1-U15	NE555	555 timers IC (Or use 8 556 dual timers)

Additional items:

Depending on how you put the circuit together you may need 8 or 16 pin IC sockets for the NE555 timers and/or DIP resistor networks.

I used 16 pin wire-wrap sockets and SIP sockets when constructing the LED/Phototransistor assembly. This allowed me to easily insert the LEDs and Phototransistors as well as the DIP resistor networks I used.