VEGAKIT®

29A ELECTRONIC HARMONIUM

So much is being said and done about electronic music now a days that you may be interested to have hands on experience in this field. To get you started here is an easy to make project.

This harmonium can generate 15 different notes of music (one at a time). It has a PCB with 15 parallel copper strips. Each strip corresponds to one note. So as you put the probe on a strip , the instrument plays a corresponding note.

The heart of the circuit is a 555 timer IC. Here the IC is used as an oscillator (or 'free running multivibrator' as it is technically called) which can produce square waves of different frequencies. The frequency produced depend on the note selected by the probe. A glance at the circuit diagram tells us that when we put the probe on different strips, we are effectively changing the resistance between pin 7 and pin 2 (and 6) of 555. For convenience we may denote this resistance by Rk.

Now let us have a look at a the functioning of 555 as an oscilliator. If we assume that 555 has been given a 9 volt power supply across pins 1 and 8,it exhibits the following properties :

1. When voltage on pin 2 falls below 3V,output at pin 3 is switched to +9V and pin 7 acts as open circuited. Any change in voltage level at pin 2 will not change the state of IC now.

2. When voltage on pin 6 goes above 6V,pin 3 switches to 0V level & pin 7 acts as if it has been short circuited to ground. Any change of pin 6 will not change the state now.

In our circuit, we have connected pins 2 and 6 together. So if we assume that output at pin 3 is 9V, at a particular instant the combination of R1 and RK (R2 to R16) charges capacitor C3 and voltage across the capacitor keeps on increasing. When it becomes slightly more than 6V,pin 6 senses it and changes output voltage at pin 3 to 0V and pin 7 starts acting as if it has shorted to the ground. So C3 starts discharging through RK. As soon as pin 2 senses that voltage across the capacitor is less than 3V, output is switched back to 9V so the cycle repeats itself. This way we get square waves at pin 3 since capacitor C3 charges and discharges through RK,the charge and discharge times can be varies by changing values of RK and in turn the frequency of square wave can be changed. The values of R2 to R16 (which represent RK) have been calculated to give the correct ratio within 2 per cent tolerance.

For a sweet musical sound,it is required to have symmerical square wave (which is in high and low state for equal periods of time) Thus R1 is kept small compared to RK in order to achieve a nearly symmetrical waveform.

The type as speaker used is not critical,you can use almost any speaker. For a loud sound use at least 10CM speaker. You may solder resistors R2 to R16 directly on the PCB of keyboard.

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PART LIST :

RESISTORS :

R1	-	10K
R2	-	82K
R3,R5	-	68K
R4,R10,R12		33K
R6,R7	-	47K
R8,R13,R14		22K
R9	-	39K
R11	-	18K
R15	-	12K
R16	-	180K

CAPACITOR :

C1	-	10UF/16V
C2	-	.01UF
C3	-	.002UF

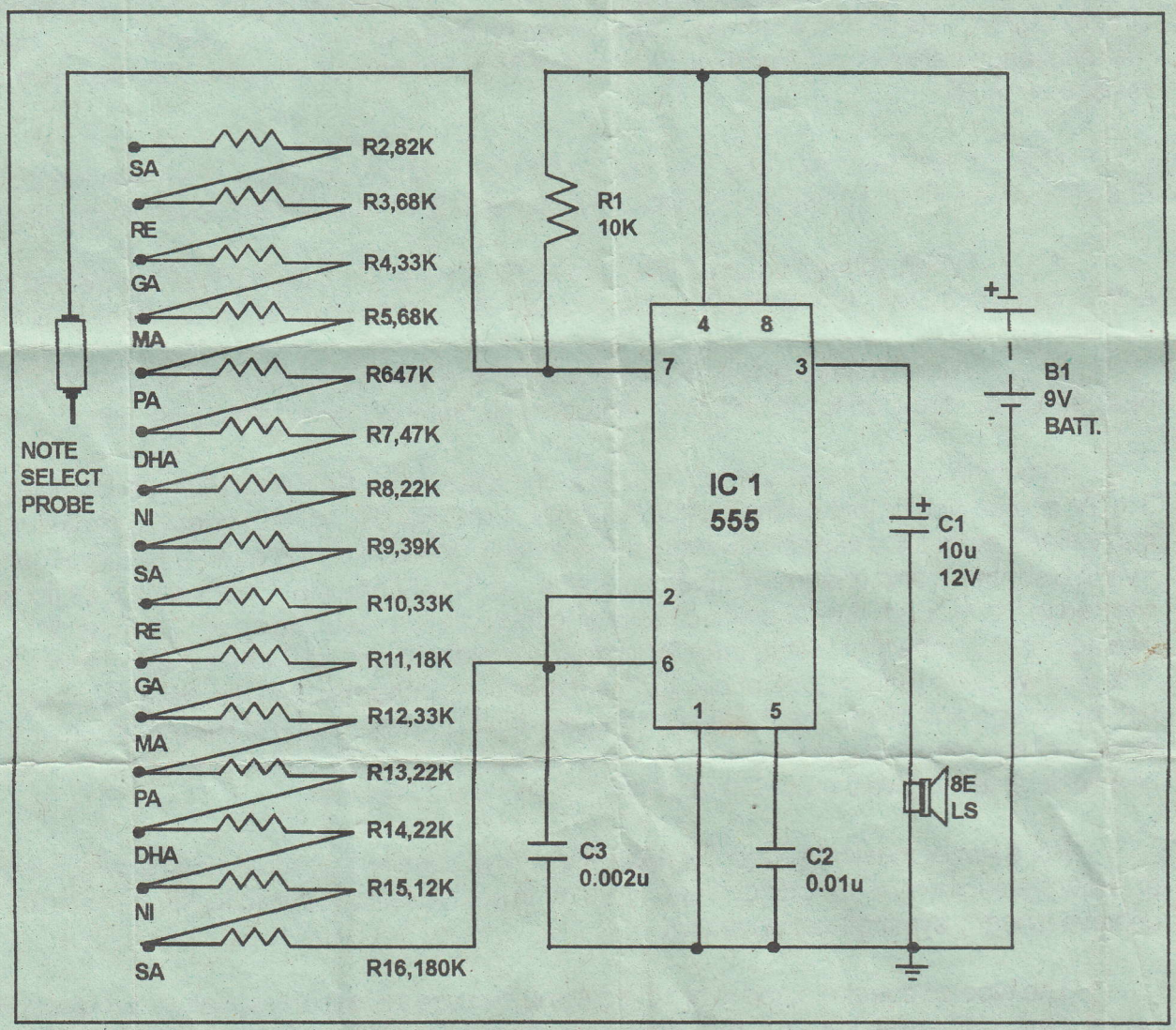
SEMICONDUCTOR:

IC1 - 555

S1- S15- 2 PIN PUSH ON SWITCH

9V BATTERY SNAP

SPEKER - 8E LS WT



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