Make Your Own Music System

CONTENTS

Here i have presented material in making a simple HI-FI music system. I have done thee explanation in modules, so any one interested in only a particular section can also refer to this documentation.

A. Introduction

The system is a cassette player with aux input for CD, and other stuff. The construction is highly affable and agog especially while making from scrap. The block diagram can be visualized in steps as: -

1.Pre-amplifier

2.special filters (like hum filter/stereo rumble filter) (OPTIONAL)

3.Buffer and 1-2 stage amplifier

4.Stereo control module or a graphical equalizers (stereo is optional)

5.A HI-FI power amplifier unit

6.A impedance matching unit and BASS/TREBLE separating unit
or Cross Over Network

Other required items are: -

7.Power supply unit: -

1.To The mechanism unit MOTOR
2.pre-amp, filters, equalizers etc
3.To the main power amplifier.

8. Fancy items like dancing LED.

I have not documented the 7th power supply unit and the 6th unit which is the impedance matching network and it's job is to match the output of the power amplifier to the respective speakers, as we know that there are three types of speakers namely the TWEETER, SQUAKER, BASE SPEAKER or WOOFER .So for best alimentary it is required that the right frequency goes to the appropriate speaker. So the highest frequencies are played by tweeter, mid frequency by squawker and the low frequency by the woofer. This job is done by the 6th unit and is readily available in the market.

The power supply unit is a piece of cake and can be easily done normally 12v is required by the motor and pre-amp, filter, equalizer, but the amplifier which i used requires +/-24vDC WOW!
So all I can suggest is you go for IN5402 types of diodes and not the IN4007 diode due to the high current requirement, if you are going for a simple tiny amplifier say the LM386 which can be used in radio do not need this, so a 12v is enough for the application.
Normally the buffer is merged in the equalizer circuit, and true in the circuit i have supplied.

B.Pre-amplifier circuit using LA3161

The Pre-amplifier takes the output of the HEAD (terminals) as its input, for stereo of course two different inputs and output are there. The pre-amplifier can be thought as a small signal amplifier or signal-conditioning amplifier. The circuit incorporates a IC LA3161.The whole circuit excluding power supply can be build for almost Rs50 i.e. <1$ The LA3161 is a low noise dual preamplifier IC and has been used in designing a 2-pole fast turn-on NAB as well as RIAA tape preamp for a normal cassette tape. The input signal is fed via 10μf capacitor .1Kpf capacitors are connected across the head to eliminate high frequency oscillations, if any. The feedback network provides (pin 2,3,6&7) high frequency compensation and also provides the gain of the circuit. To increase the gain of the circuit, decrease the value of 180ohms resistor or vice versa.

PARTS LIST

RESISTORS :

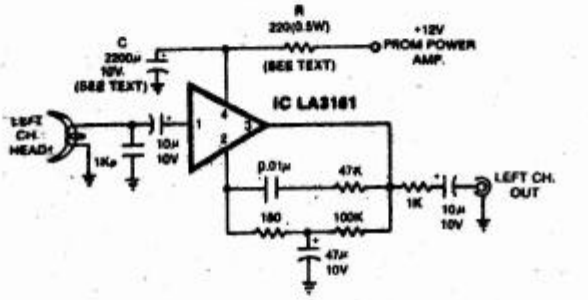
R1,6 - 180 ohms
R2,7 - 100 K
R3,8 - 47K
R4,9 - 1K
R5 - 220E (¼W)

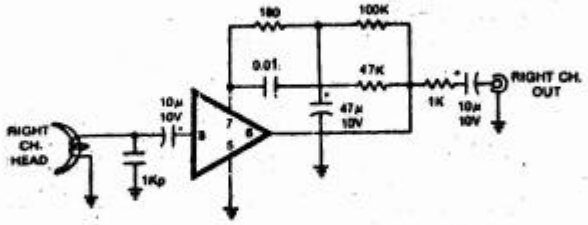
SEMICONDUCTOR

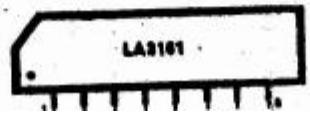
IC1 - LA 3161

CAPACITORS :

C1 - 1 KPF
C2,5,8,11 - 10µF/10V
C3,9 - .01 µF
C4,10 - 47µF/10V
C6 - 2200µF/10V
C7 - 1 KPF







Preamplifier using la3161

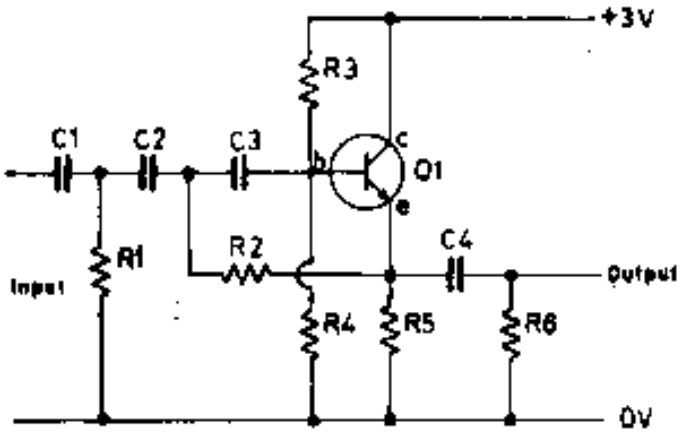
C.Filters like stereo rumble filter

The stereo rumble filter is an **optional** filter and not found much in a modern electronic tape recorder circuitry. This was basically used in those happy days when we used the pickup, but still can be used to remove any unwanted signals arising due to mechanical vibrations etc. Normally it is good to remove to use high pass filters to reduce the objectionable rumbling sound to acceptable level, and as bass response seldom extended below 50Hz a simple RC filter with 6 db per octave roll-off below 50Hz was considered adequate. So to take input from a pickup we can employ this circuitry.
I have shown a circuit diagram for a mono rumble filter, which can be duplicated to have a stereo one.

RESISTORS
R1 - 56K
R2 - 47K
R3 - 470K
R4 - 1M
R5,6 - 12K

CAPACITORS
C1 - 0.12uF POLY
C2,3 - 0.39uF "
C4 - 0.47uF "

SEMICONDUCTOR
Q1 - BC109 or similar for stereo
2 off each of the above parts are needed.
(Above partlist is for Mono)



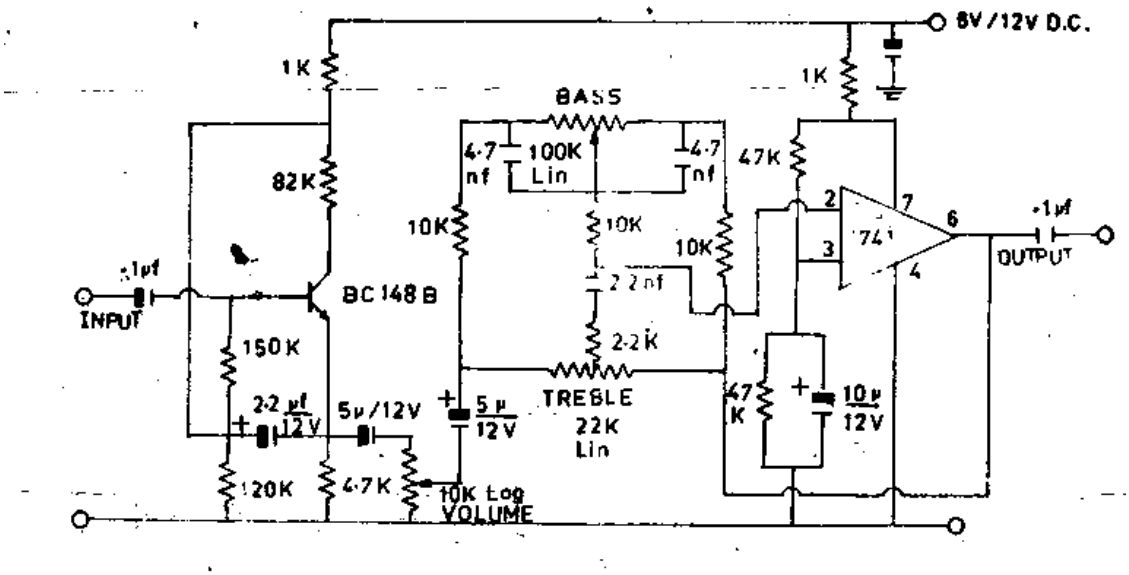
Stereo rumble filter

D.Stereo control module

A stereo control module or graphical equalizer is the perk of the music system because we all love to have control over the output of the system (Everybody dreams to be a DJ guy) especially over the frequencies like the high, middle, lower frequency. Normally we judge a system performance by looking at the power output in PMPO, quality of output, and the equalizer system. The system with 10+10 graphics equalizer is obviously the best one than one with 5+5.Nowadays every thing is going digitalized so there is no exception for this one also, and when we buy a good music system we get a digital equalizer and not the analog one .The digital equalizer give a precise control and normally we select a preset from the pop, rock, jazz and so on… and the system output is cool. But the analog counterpart is still in the field because of the low cost and simplicity, so a low cost music system still employs the analog module.
I aplomb you that this circuit do perform well while testing, This circuit consists of input BC148b transistor, I suggest to replace this BC 148b with BC149c transistor, due to low noise characteristics of this particular transistor and I have tested it and no need to change any other parameters.
The first stage is a emitter follower circuit with separate RC circuit for Bass and Treble to give distinct Bass& Treble tone. The next stage is a simple amplifier wired around the opamp 741,whose input is pin no 2 and out put is pin no 6.and the output is given through a coupling capacitor of 0.1μf.

PARTS LIST

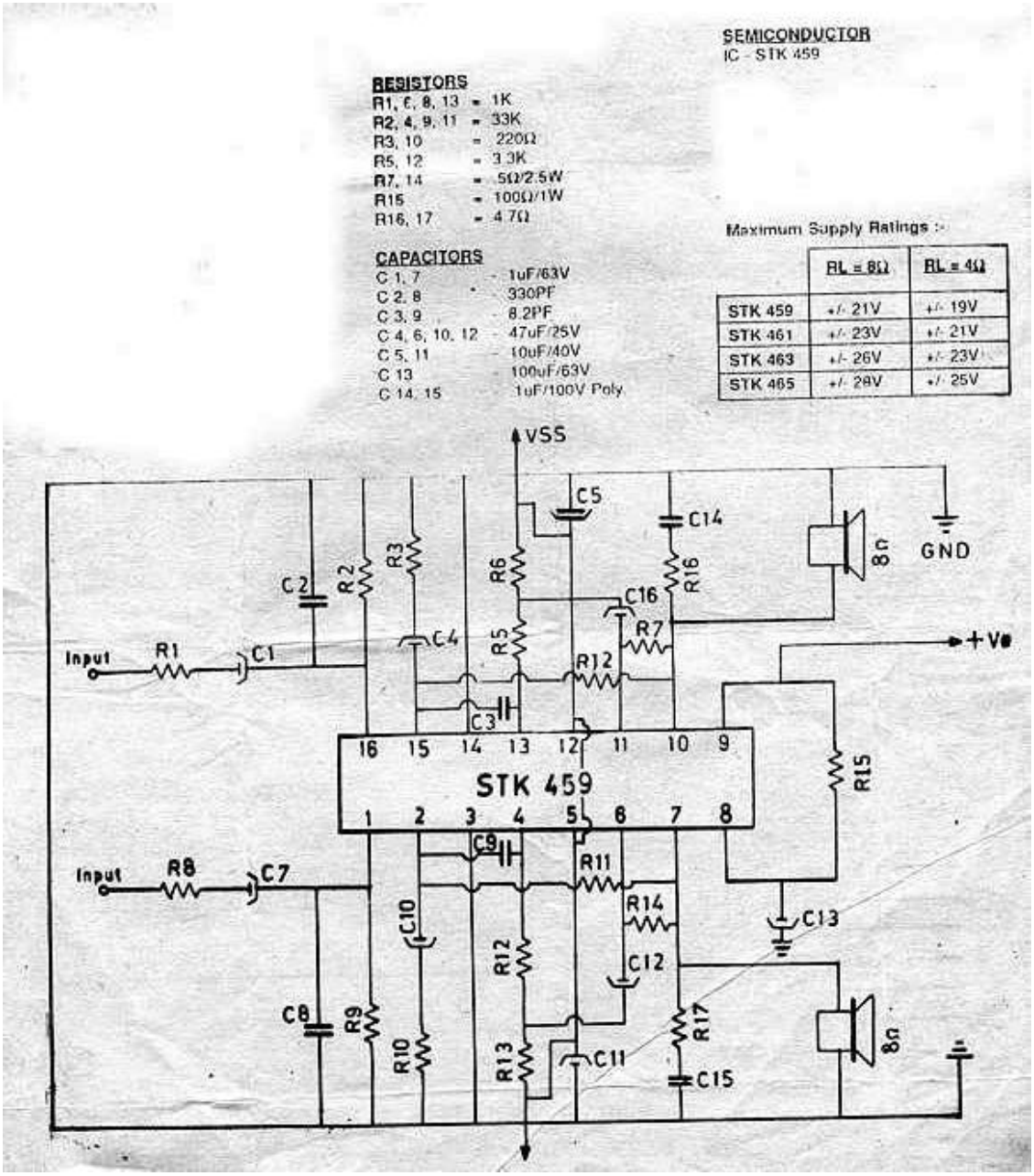
RESISTORS		CAPACITORS		SEMICONDUCTORS	
4.7k	- 2 Pc	.1µf disc	4 Pc	IC 741	2 Pc
120k	- 2 Pc	2.2µf/16V	2 Pc	BC148B	2 Pc
150k	- 2 Pc	4.7µf/16V	4 Pc		
82 k	- 2 Pc	220µf/16V	4 Pc		
1k	- 4 Pc	10µf/16V	2 Pc		
47k	- 4 Pc	47nf	4 Pc		
10k	- 6 Pc	2.2nf	2 Pc		
2.2k	- 2 Pc				
10K log v/c	- 2 Pc				
100k lin Bass	- 2 Pc				
22k lin Treble	- 2 Pc				



E.Audio Power Amplifier using STK459

“I got the powerrrrrr, yeahhhhhh” - coyote ugly

Indeed as the song says I got the power, the audio amplifier built in STK459 has good power output. The more the power output more is the cost and system performace. The output of the STK459 is 50W RMS that is lot, so convert it to PMPO with respect to the speaker and you get a real cool system. This IC is made by the giant company SANYO and hence is guaranteed to be good. The STK series of IC are thick film type, built in towards looking the goal of low distortion and higher power output. The IC STK459 requires a big heat sink, if the system has to work for many hours then I recommend a FAN also. To have higher output use the IC STK465 (replace), which delivers more power, output at a sacrifice that we have to give +/-25V for 4ohms load and +/-28v for 8ohms load. I have used STK459 for 4ohms load, but for 8ohms load it requires +/-21v.



F.Miscellaneous

Dancing LED/Sound Level Indicator

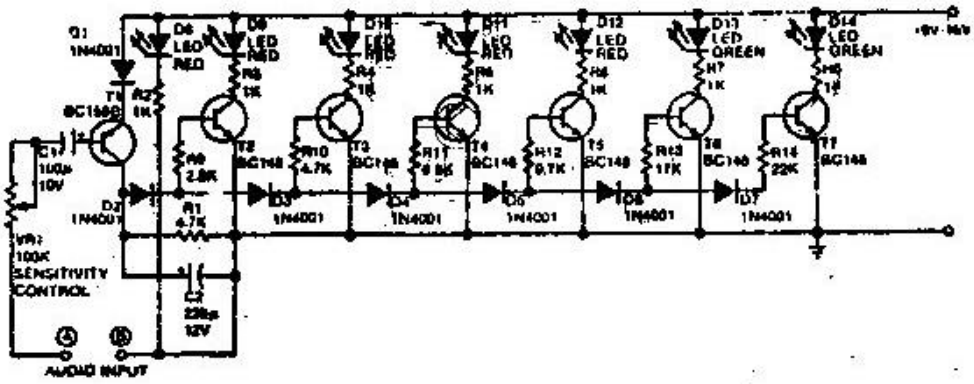
The visualization is a method of attracting people's attenction. This LED's can be fitted at the front panel of the music system. Here is a simple circuit that can be used for dancing lights or as a sound level indicator.

PART LIST

RESISTORS :
R1,10 - 4.7K
R2,3,4,5- 1K
R6,7,8 - 1K
R9 - 2.2K
R11 - 6.8K
R12 - 10K
R13 - 18K
R14 - 22K
VR1 - 100K

CAPACITORS :
C1 - 100uF/10V
C2 - 220uF/16V

SEMICONDUCTORS :
T1 - BC 158B
T2..T8 - BC 148
D1..D7 - IN 4001
D8..D14 - LED



Cross over network

The cross over network does the function of matching the output of power amplifier to that of the sub-speaker system, so as stated above it does the function of separating higher, middle and lower frequency and delivers it to the tweeter, squaker and woofer respectively.

So the cross over network can be imagined as a passive filter network, hence can be fitted in the speaker system itself without any need for power supply. The cross over network uses non-polar type of capacitors.

Speaker system

The most important part is the speakers, as the system PMPO also depends on this .So try to get the best speaker money can buy (of course max from our budget). Simple speaker box are made by adding wooden saw particles .The speaker box should also have a hole for pumping it out. A WOOFER and TWEETER are main, while a SQUAKER is more or less optional. So when buying a boxed speaker always check the speaker output for very high volume.

Cassette mechanism

This consists of a mechanism fitted with a simple DC motor of 6-12V DC and a audio HEAD. Normally a mechanism is designed for a particular box.

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- This document was partially made using K-Office for Linux.