Circuits

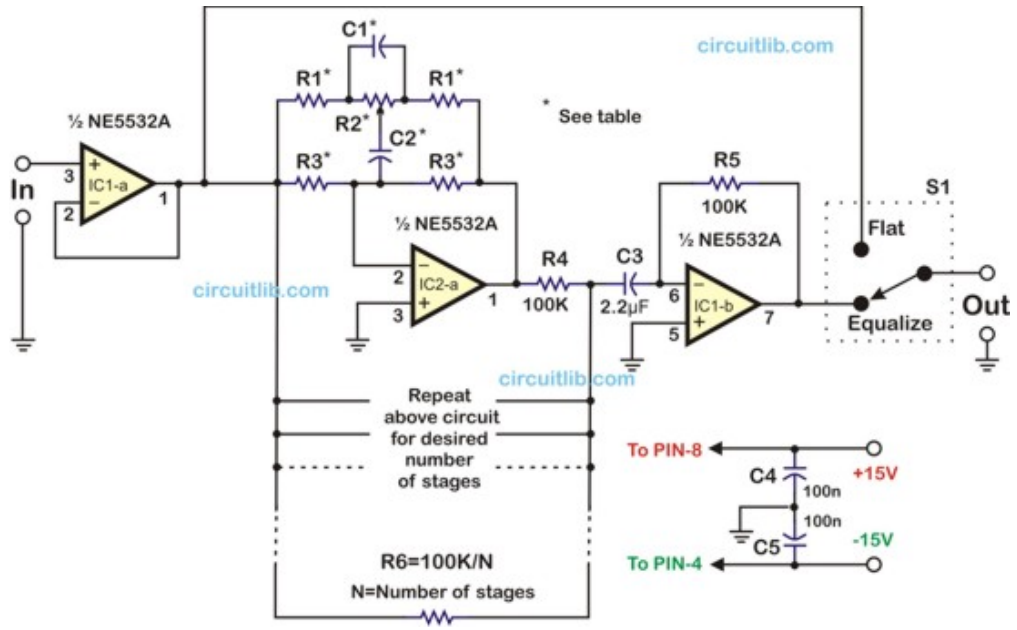
Audio Graphic Equalizer

By **Amer Iqbal** March 6, 2022

Below we present an Audio Graphic Equalizer circuit, based on Philips Semiconductors Application Note 142 (published on October 1984). The circuit itself has great performance and uses a top performance operational amplifier; the NE5532.

The graphic-equalizer consists of an input buffer (IC1 -a), a variable-boost/ cut active filter (IC2-a), and an output summing amplifier (IC1-b). The IC1-a circuit is designed for unity gain and is used mainly for impedance-matching between

the input source and the equalizer filters. The filter is a variable-bandpass or notching device, depending on the setting of the control potentiometer R2.



Any number of equalizer filter-stages can be used within the range of about 20 Hz to 20 kHz. However, the more stages you have, the easier it is to boost or cut a particular frequency without affecting the response at adjacent frequencies. All the filter stages use the same R-C feedback-network configuration, to provide a maximum of about 15-dB of boost or cut at Fo, the center frequency. The only differences in each stage are in the values of C1 and C2, which set the values of Fo. Table 1 lists the values for R1, R3, C1 and C2 for many center frequencies in the audio spectrum. Note that C1 is ten times as large as C2 and that the values for R1 and R3 are both related to the value of R2 by about a factor of 10. The center frequencies have been adjusted so that C1 and C2 are standard, off-the-shelf, values. We recommend using linear slide potentiometers for R2.

The value of R6 depends on the number of filter stages used. It insures that the gain across the equalizer is unity when all controls (R2's) are in the FLAT or 0 dB position.

The value of R6 is 100K divided by N, where N is the number of stages used. Note that only one audio channel is shown in the circuit schematic. In order to build a Stereo version of the above Audio Graphic Equalizer you'll need two of those circuits.

Table 1. Component Values

R2=25k R1=2.4k R3=240k			R2=50k R1=5.1k R3=510k			R2=100k R1=10k R3=1meg		
f_O	C1	C2	f_O	C1	C2	f_O	C1	C2
23Hz	1µF	0.1µF	25Hz	0.47µF	0.047µF	12Hz	0.47µF	0.047µF
50Hz	0.47µF	0.047µF	36Hz	0.33µF	0.033µF	18Hz	0.33µF	0.033µF
72Hz	0.33µF	0.033µF	54Hz	0.22µF	0.022µF	27Hz	0.22µF	0.022µF
108Hz	0.22µF	0.022µF	79Hz	0.15µF	0.015µF	39Hz	0.15µF	0.015µF
158Hz	0.15µF	0.015µF	119Hz	0.1µF	0.01µF	59Hz	0.1µF	0.01µF
238Hz	0.1µF	0.01µF	145Hz	0.082µF	0.0082µF	72Hz	0.082µF	0.0082µF
290Hz	0.082µF	0.0082µF	175Hz	0.068µF	0.0068µF	87Hz	0.068µF	0.0068µF
350Hz	0.068µF	0.0068µF	212Hz	0.056µF	0.0056 µF	106Hz	0.056µF	0.0056µF
425Hz	0.056µF	0.0056µF	253Hz	0.047µF	0.0047µF	126Hz	0.047µF	0.0047µF
506Hz	0.047µF	0.0047µF	360Hz	0.033µF	0.0033µF	180Hz	0.033µF	0.0033µF
721Hz	0.033µF	0.0033µF	541Hz	0.022µF	0.0022µF	270Hz	0.022µF	0.0022µF
1082Hz	0.022µF	0.0022µF	794Hz	0.015µF	0.0015µF	397Hz	0.015µF	0.0015µF
1588Hz	0.015µF	0.0015µF	1191Hz	0.01µF	0.001µF	595Hz	0.01µF	0.001µF
2382Hz	0.01µF	0.001µF	1452Hz	0.0082µF	820pF	726Hz	0.0082µF	820pF
2904Hz	0.0082µF	820pF	1751Hz	0.0068µF	680pF	875Hz	0.0068µF	680pF
3502Hz	0.0068µF	680pF	2126Hz	0.0056µF	560pF	1063Hz	0.0056µF	560pF
4253Hz	0.0056µF	560pF	2534Hz	0.0047µF	470pF	1267Hz	0.0047µF	470pF
5068Hz	0.0047µF	470pF	3609Hz	0.0033µF	330pF	1804Hz	0.0033µF	330pF
7218Hz	0.0033µF	330pF	5413Hz	0.0022µF	220pF	2706Hz	0.0022µF	220pF
10827Hz	0.0022µF	220pF	7940Hz	0.0015µF	150pF	3970Hz	0.0015µF	150pF
15880Hz	0.0015µF	150pF	11910Hz	0.001µF	100pF	5955Hz	0.001µF	100pF
23820Hz	0.001µF	100pF	14524Hz	820pF	82pF	7262Hz	820pF	82pF
			17514Hz	680pF	68pF	8757Hz	680pF	68pF
			21267Hz	560pF	56pF	10633Hz	560pF	56pF
						12670Hz	470pF	47pF
						18045Hz	330pF	33pF