Schematics and Circuits Index

DATE:2/2/2012

Index | Filters

Antenna Filters

↑ Top

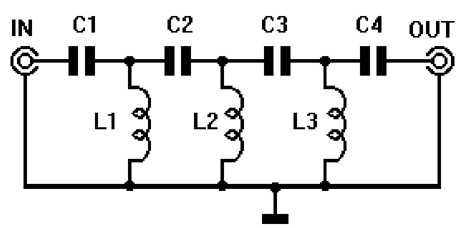
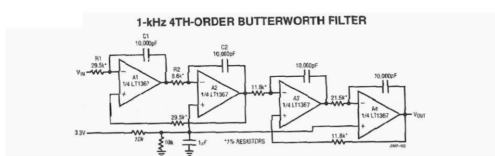


Figure 1165 :

Butterworth Filters

↑ Top



The filter is a simplified state variable architecture consisting of two cascaded 2nd-order sections. Each section uses the 360° phase shift around the two op-amp loop to create a negative summing junction at A1's positive input. The circuit has low sensitivities for center frequency and Q, which are set with the following equations:

$$\omega 0^2 = \frac{1}{(R_1 \times C_1 \times R_2 \times C_2)}$$

where,

$$R_1 = \frac{1}{(\omega 0 \times Q \times C_1)} \text{ and } R_2 = \frac{Q}{(\omega 0 \times C_2)}$$

The dc bias applied to A2 and A4, half supply, is not needed when split supplies are available. The circuit swings rail-to-rail in the passband making it an excellent anti-aliasing filter for A/Ds. The amplitude response is flat to 1 kHz then rolls off at 80 dB/decade.

Figure 859 : 1 kHz 4th Order Butterworth Filter

LOW FREQUENCY CONVERTER
SUPER-REGENERATIVE RECEIVER
100 KHZ CALIBRATION OSCILLATOR
VHF
ANTENNA AMPLIFIER UHF
LW/MW CONVERTER
TONE CONTROL
RANDOM LED SEQUENCE GENERATOR
LOW POWER TRANSMITTER
AM MODULATOR
SIGNAL TRACER INJECTOR
AM TUBE TRANSMITTER

By Bibliotaphe

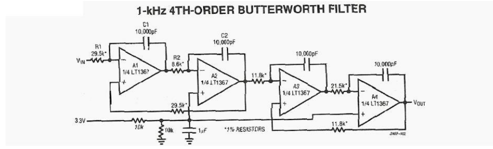
SAMS
TILTON, HOMER B.
BABANI, BERNARD B.
G.E. METER INSTRUMENT DEPT.
COWAN PUBLISHERS (CQ)
ROMNEY,ED
1947
GREENWOOD, HAROLD S.
R. CONOT
1898
GERNSBACK LIBRARY
ZANE GRAY
H. MILEAF
GOODMAN,ROBERT
ECG

By Logbook

ICELAND RADIO
11680
15205
9685
R.MALI
6280
CBS TAIPEI 2
R.PERLA DEL ACRE
7538
5068.6
11715
15185
2490
SRI LANKA
R.FREE EUROPE

Links

radioSPARKS BLOG
RSS Feed : Bibliotaphe
RSS Feed : Schematics



The filter is a simplified state variable architecture consisting of two cascaded 2nd-order sections. Each section uses the 360° phase shift around the two op-amp loop to create a negative summing junction at A1's positive input. The circuit has low sensitivities for center frequency and Q, which are set with the following equations:

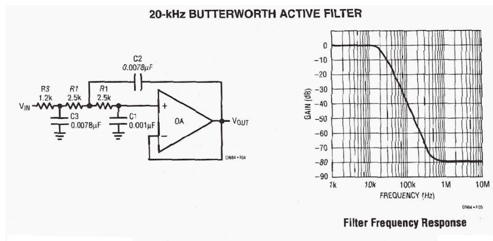
$$\omega 0^2 = \frac{1}{(R_1 \times C_1 \times R_2 \times C_2)}$$

where,

$$R_1 = \frac{1}{(\omega 0 \times Q \times C_1)} \text{ and } R_2 = \frac{Q}{(\omega 0 \times C_2)}$$

The dc bias applied to A2 and A4, *half supply*, is not needed when split supplies are available. The circuit swings rail-to-rail in the passband making it an excellent anti-aliasing filter for A/Ds. The amplitude response is flat to 1 kHz then rolls off at 80 dB/decade.

Figure 864 : 120kHz 4th Order Butterworth Filter

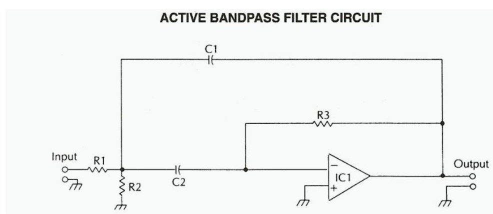


This filter will be useful for anti-aliasing or band limiting in an audio system. The op amp is a Linear Technology, LT1124, LT1355, or LT1169.

Figure 874 : 20 kHz Butterworth Active Filter

↑ Top

Band-pass Filters



In this circuit,

$$C_1 = C_2 = C$$

$$Q = \frac{f_o}{BW} \quad K = \textit{circuit gain},\ f_o = \textit{center frequency}$$

$$R_1 = \frac{Q}{2\pi f_o CK}$$

$$R_2 = \frac{2Q}{2\pi f_o C}$$

$$R_3 = \frac{Q}{2\pi f_o C(2Q - K)}$$

Figure 899 : Active Band-Pass Filter Circuit

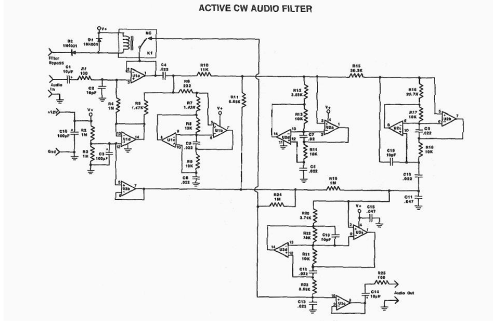
↑ Top

CW Audio Filters

RSS Feed : DX Ticker
RSS Feed : Media Schematics
radioSPARKS Google Wiki

NoTE:
Use FireFox!
IE has problems.

ACTIVE CW AUDIO FILTER



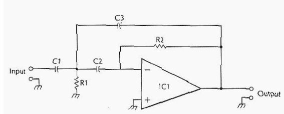
The audio filter shown has a bandpass of 200 Hz centered on 700 Hz. Resistors are 1% tolerance and capacitors should be 5% tolerance.

Figure 900 : Active CW Audio Filter

↑ Top

High-pass Filters

ACTIVE HIGH-PASS FILTER



In this circuit,

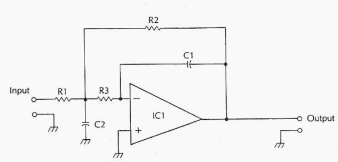
$$f_{CO} = \frac{1}{2\pi RC}$$

Figure 901 : Active High-Pass Filter

↑ Top

Low-pass Filters

ACTIVE LOW-PASS FILTER



In this circuit, $R_1 = 2$
$R_2 = R_4$
$R_3 = 2R_1$
$C_1 = C_2$
$f = \frac{1}{2\pi RC}$

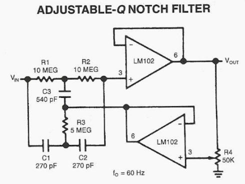
This circuit has a rolloff of 6 dB/Octave.

Figure 902 : Active Low-Pass Filter

↑ Top

Notch Q

ADJUSTABLE-*Q* NOTCH FILTER



This figure shows a circuit where the *Q* can be varied from 0.3 to 50. A fraction of the output is fed back to R3 and C3 by a second voltage follower, and the notch *Q* is dependent on the amount of signal fed back. A second follower is necessary to drive the twin "T" from a low-resistance source so that the notch frequency and depth will not change with the potentiometer setting.

Figure 903 : Adjustable Q Notch Filter

↑ Top

Band-pass Filters

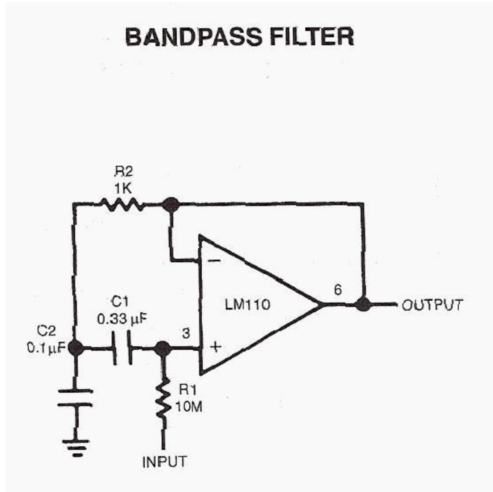
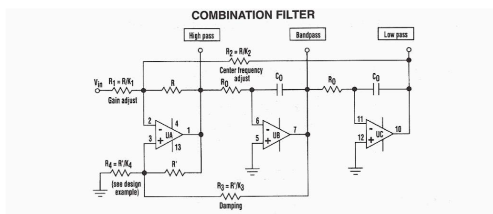


Figure 925 : Band-Pass Filter

↑ Top

Combination Filters



The classic "state variable" two-integrator filter is known for its insensitivity to component variations, and its ability to provide three separate simultaneous outputs—low pass, high pass, and bandpass.

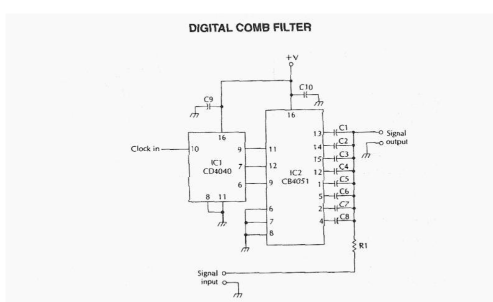
Typically, a quad op amp is used to implement the state-variable filter. The classic configuration uses two integrating amplifiers, a filter input amplifier, and a filter feedback amplifier.

The design described here combines both input and feedback amplifiers into one adder/subtractor amplifier, achieving a three op-amp filter design (see the figure).

Figure 934 : Combination Filter

↑ Top

Comb Filters



This circuit uses an eight-step switching sequence, so n=8. This makes the center frequency equal to:

$$F_c = \frac{1}{(2nRC)} = \frac{1}{(2 \times 8)RC} = \frac{1}{16RC}$$

Using the component values suggested in the parts list, the circuit has a main center frequency of:

$$F_c = \frac{1}{(16 \times 1000 \times 0.00000001)} = \frac{1}{0.00016} = 6250 \text{ Hz}$$

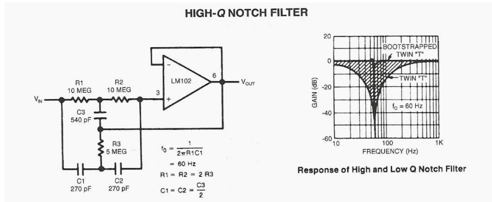
Suggested parts list for the digital comb filter

IC1	CD4040 BCD-ripple counter
IC2	CD4051 BCD-to-decimal decoder (SP8T rotary bilateral switch)
C1–C8	0.01 µF close tolerance capacitor
C9, C10	0.1 µF capacitor
R1	1K ¼ W 5% resistor

Figure 950 : Digital Comb Filter

↑ Top

Notch Q



This shows a twin "T" network connected to an LM102 to form a high Q, 60-Hz notch filter. The junction of R3 and C3, which is normally connected to ground, is bootstrapped to the output of the follower. Because the output of the follower is a very low impedance, neither the depth nor the frequency of the notch change; however, the Q is raised in proportion to the amount of signal fed back to R3 and C3.

Figure 976 : High Q Notch Filter

↑ Top

High-pass Filters

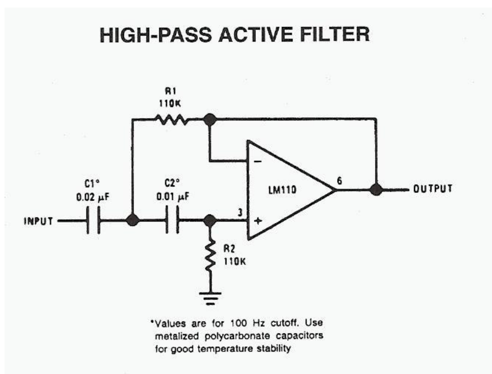


Figure 975 : High-Pass Active Filter

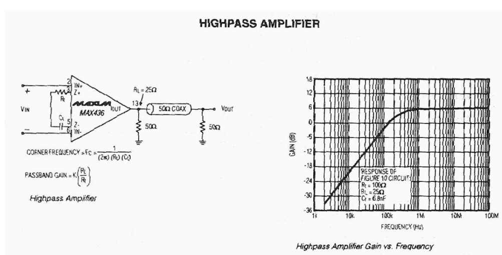
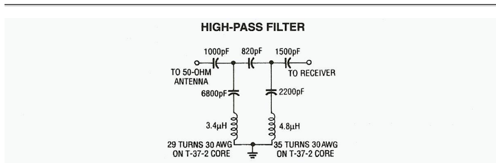


Figure 979 : High-Pass Amplifier



This high-pass filter will attenuate AM stations by 40 dB. Its low-frequency cutoff is about 2.2 MHz. This filter is useful for SW listening in areas of high AM radio signal strength.

Figure 978 : High-Pass Filter

↑ Top

Low-pass Filters

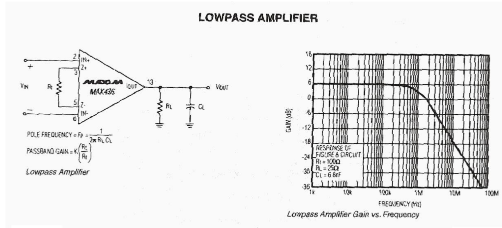
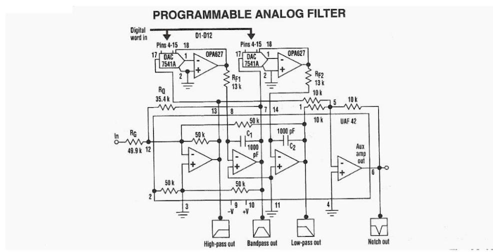


Figure 988 : Low-Pass Amplifier

↑ Top

Programmable Filters



The circuit in the figure shows how an analog, digitally programmable filter can be built using a UAF42. This monolithic, state-variable active filter chip provides a two-pole filter building block with low sensitivity to external component variations. It eliminates aliasing errors and clock feed though noise common to switched-capacitor filters. Low-pass, high-pass, bandpass, and notch (band-reject) outputs are available.

Figure 1022 : Programmable Analog Filter

↑ Top

Notch RC

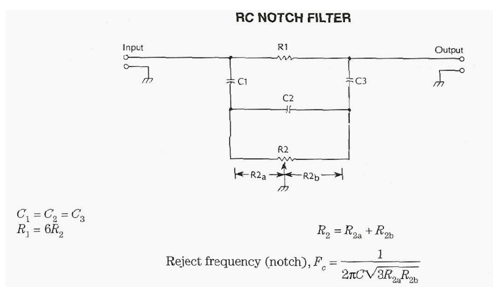


Figure 1034 : RC Notch Filter

↑ Top

Low-pass Filters

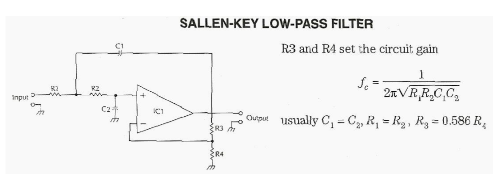
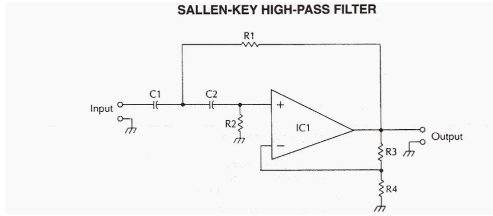


Figure 1053 : Sallen KEY Low-Pass Filter

↑ Top

High-pass Filters



R3 and R4 set the circuit gain

$$f_c = \frac{1}{2\pi\sqrt{R_1 R_2 C_1 C_2}}$$

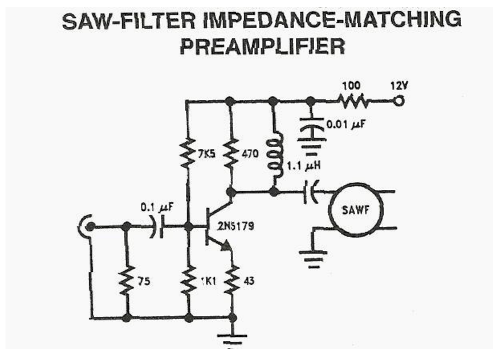
usually $C_1 = C_2$, $R_1 = R_2$

$$R_3 = 0.586\, R_4$$

Figure 1054 : Sallen-KEY High-Pass Filter

↑ Top

SAW Filters

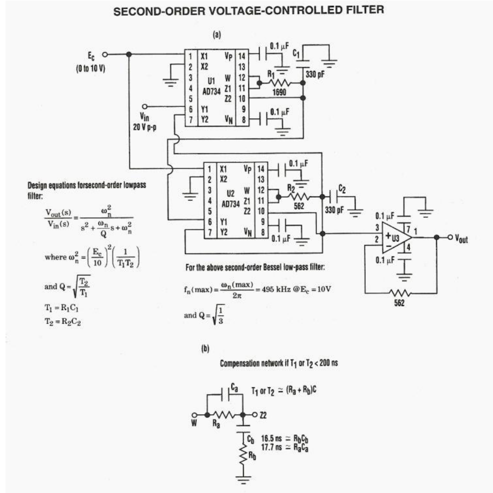


This circuit matches a saw filter to an *IF* amplifier.

Figure 1055 : SAW Filter Impedance Matching Preamplifier

↑ Top

Second-Order Voltage-Controlled



Desirable second-order voltage-controlled low-pass filter response can be achieved with this voltage-controlled filter (A). By using low-distortion, wide-bandwidth multipliers, it achieves higher cutoff frequencies than switched-capacitor filters. If the circuit's RC network has a time constant less than 200 ns, it should be replaced by a lag compensator network (B).

Figure 1057 : Second-Order Voltage-Controlled Filter

↑ Top

State Variable Filters

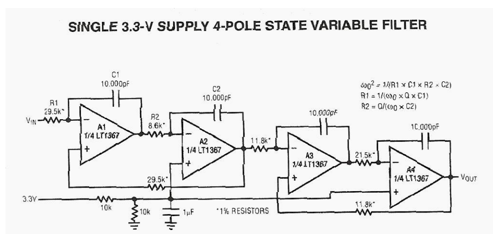
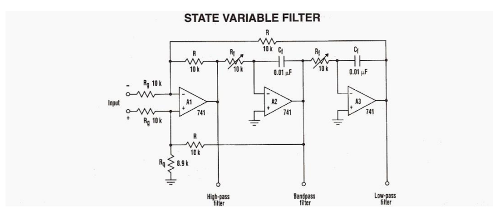


Figure 1066 : Single 3.3V Supply 4 Pole State Variable Filter

---

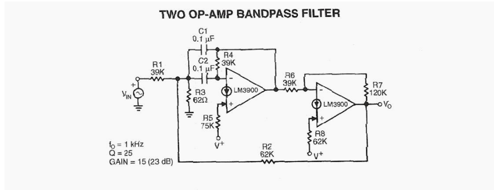


The state variable filter shown consists of only three op amps and a few passive components. It provides several key features. These include the ability to simultaneously provide low-pass, high-pass, and bandpass filter functions, and adjust bandwidth in a wide range by changing the values of C_f and R_f. The device also is easy to tune and simple to construct, while the quality factor (Q) of each filter is independent of each other.

Figure 1067 : State Variable Filter

↑ Top

Band-pass Filters

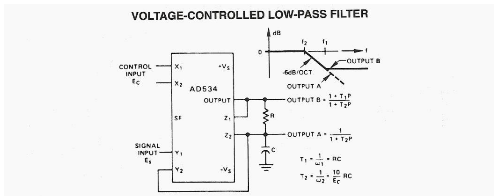


This circuit uses only two capacitors. The amplifier on the right supplies a controlled amount of positive feedback for improved response characteristics. Resistors R5 and R8 are used to bias the outvoltage of the amplifiers at V+/2.

Figure 1080 : Two OP-AMP Band-Pass Filter

↑ Top

Low-pass Filters

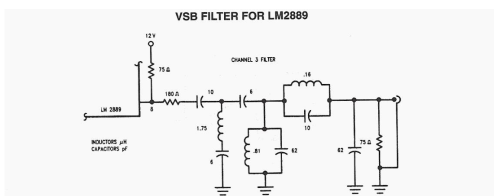


The voltage at Output A, which should be unloaded by a follower, responds as though E_s were directed to the RC filter, but the filter's break frequency were proportional to E_c [i.e., $= E_c/(20\pi RC)$]. The frequency response has a break at f_2 and the 6-dB/octave rolloff. The voltage at Output B has the same response, up to $[f_1\ (f_1 = 1/(2\pi RC)]$, then levels off at a constant attenuation of $f_2/f_1 = E_c/10$. For example, if $R = 8\ k\Omega$, C = 0.002 µF, Output A has a pole at 100 Hz to 10 kHz and can be loaded. The circuit can be converted to high-pass by interchanging C and R.

Figure 1105 : Voltage Coltrolled Low-Pass Filter

↑ Top

VSB



This filter is for CH3, in order to get a vestigial sideband TV signal. It is designed for 75-Ω impedance levels.

Figure 1106 : VSB Filter for Lm2889

---

posted by Ralph (VE3XRM) | 1:30:27 PM