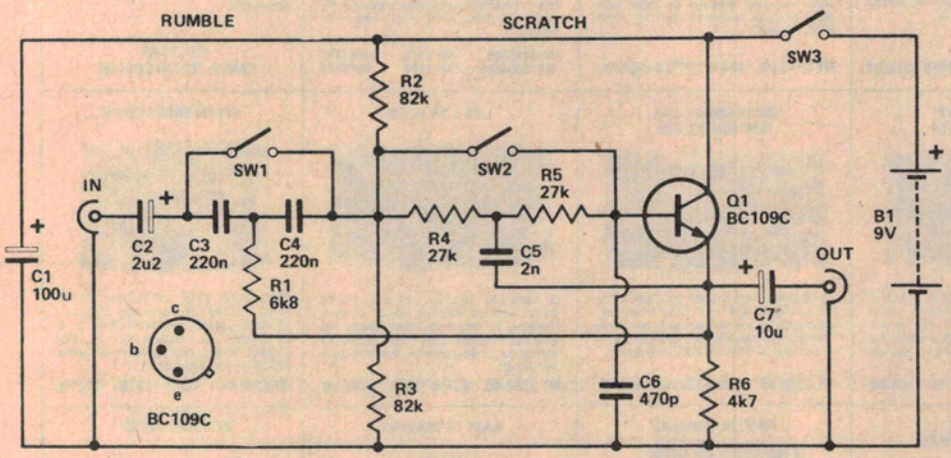
Scratch and rumble filter



Circuit of the Scratch and Rumble filter. This unit may be mounted on matrix board and mounted inside your amplifier — don't forget two will be needed for stereo. If you construct it as an out-board unit it should be mounted in a metal box and connected into your amplifier system with short lengths of shielded cable. It may be connected between the "preamp out" and "main in" sockets.

SCRATCH AND RUMBLE filtering is a valuable feature in a hi-fi amplifier but is one which is absent from many designs, or if this filtering is present it may well be in the form of a relatively ineffective 6 dB per octave type filter. This circuit is a 12 dB per octave add-on scratch and rumble filter which can be connected into the 'tape monitor' circuit or some similar facility of the amplifier.

This is a conventional second order filter circuit having passive high pass filter formed by the series capacitance C3 and C4, plus the parallel resistance of R2 and R3 (the latter also being used to bias emitter follower transistor Q1). A passive filter of this type gives only a very slow initial roll off and an ultimate attenuation rate of only 6 dB per octave. A bootstrapping resistor is therefore used to improve performance.

Above the cutoff frequency, where the gain of the circuit would otherwise fall off somewhat, R1 has the effect of reinforcing the input signal from the output of the buffer amplifier based on Q1. Well below the cutoff frequency, losses through C4 result in the signal level at Q1 emitter being well below that at the junction of C3 and C4. This results in some of the signal at the junction of C3 and C4 being tapped off through R1, with C3 and R1 effectively forming a second high pass filter network. This eliminates the slow initial roll off rate (in fact there is a small and insignificant peak of about 0.5 dB above the cutoff frequency) and speeds up the attenuation rate to a nominal 12 dB per octave.

The low pass filter works in much the same way as the high pass one, except of course the R and C filter elements have been transposed so as to give the correct filter action.

If only low pass filtering is required, SW1 can be used effectively to bypass the high pass filter components. C2 then maintains dc blocking at the input. SW2 can be used to bypass the low pass filter components when only high pass filtering is required.

With the specified component values the rumble filter response falls below unity at approximately 45 Hz, reaches the −6 dB point just above 30 Hz and then falls away at a nominal 12 db per octave. The scratch filter response crosses the unity gain point at about 6.5 kHz, reaches the −6 dB point at approximately 10 kHz, and then falls away at a nominal 12 dB per octave. The worst-case input impedance is around 30 k to 40 k with SW1 and SW2 closed.

A BC549 or similar transistor may also be used for Q1. The circuit should be housed in a shielded enclosure to avoid hum pickup. Use shielded input and output leads. A dual circuit, with two-pole switches for SW1 and SW2, is necessary for stereo operation. ●

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