



By John McVeigh

Have a problem or question on circuitry, components, parts availability, etc? Send it to the Hobby Scene Editor, POPULAR ELECTRONICS, One Park Ave., New York, N.Y. 10016. Though all letters can't be answered individually, those with wide interest will be published.

MOTOR SPEED CONTROL

Q. Can I vary the speed of a single-speed ac motor by using a variable resistor?—George Crudington, Ellsinore, MD.

A. I once experimented with slowing down the speed (and noise) of an ac cooling fan motor by inserting various fixed resistors in series with one side of the ac line. I finally selected 450 ohms at 20 watts to obtain an optimum combination of quiet and air moving. Of course, I could have used a rheostat to find this value, and then replaced it with a fixed resistor.

Another way of varying the motor's speed is to use a conventional SCR or triac controller, such as that shown on p. 544 of the 1977 *Radio Amateur's Handbook*. This controller can be used with fixed speed drills to get the benefit of variable speed.

SCRATCH FILTER

Q. I need a scratch filter to attenuate the surface noise on my old 78-rpm records.—H.A. Dobson, Orangeburg, SC.

A. Try the circuit shown here. It is a continuously variable passive filter with op amp buffers at the input and output. The

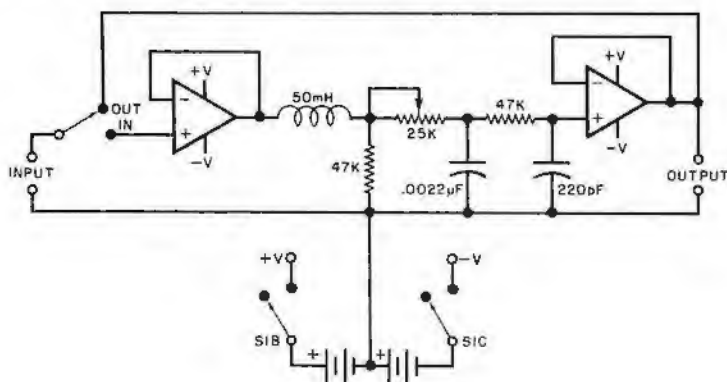
However, there is one caveat that must be mentioned. If you slow down the motor too much, you will damage it—unless it is impedance-protected. Unless the motor is turning fast enough, it won't develop a sufficient back emf. This will result in excessive current through the motor windings and reduced motor life.

12-VOLT POWER SUPPLIES

Q. Why do most "12-volt" power supplies and battery chargers actually have an output of 14 volts?—David W. Kraeuter, Washington, PA.

A. These line-powered dc supplies are generally rated at 13.8 volts output so that they can closely simulate the output of an alternator driven by an auto engine. The alternator output (nominally 13.8 volts) is somewhat higher than that of the battery (12 volts) so that the alternator can force current through the battery from positive to negative, thus charging it. If the alternator output were at the same potential as the battery output, no charging action would occur.

filter rolls off at 18 dB/octave and will provide cutoff frequencies between 6000 and 15,000 Hz. The setting of the 25,000-ohm potentiometer determines the exact cutoff frequency. A dual op amp such as a 747 can be used. Two 9-volt batteries can be used as a power source. You can insert the filter between the system's preamp and power amplifier or in the preamp's tape monitor loop.

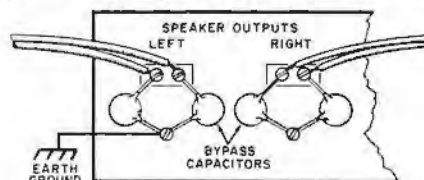


AUDIO RFI

Q. My stereo contains no tuner, but the ham who lives up the street comes in loud and clear. The signal is not affected by the volume control. How can I stop this?—David Sluiter, Grand Haven, MI.

A. You are experiencing audio rectification. That is, the r-f signal is being picked up by a wire (probably the speaker leads) and introduced to the circuitry somewhere past the volume control. It is then detected or demodulated into an audio signal by a diode, transistor junction, or possibly even a poor metal-to-metal connection. Once the signal is demodulated, it is amplified along with the program material you are listening to and delivered to the speakers.

The r-f signal can also enter via the power cable, path cords, or in severe



cases can be picked up directly by wiring within the amplifier or preamp if the components are not completely shielded. Signal leads can be consecutively unplugged to determine the r-f entry path.

In your case, I suspect the speaker leads. Disconnect them, but monitor the amplifier output through headphones. Wrap up the headphone cable to reduce its length. If the RFI has stopped, install 0.001-µF disc ceramic capacitors from each side of the speaker outputs to the chassis and ground the chassis as shown here. If the RFI persists, remove the line cord from the wall socket. If the RFI stops immediately, that's how it's getting in. You can prevent this by installing a 'brute force' line filter. If it fades away as the capacitors discharge, the r-f is entering via another route.

In cases where the volume control affects the interference, the signal is entering at an earlier stage. Remove one input patch cord at a time until the r-f stops to determine the r-f entry point. Shielding the patch cord with a grounded copper braid, or installing small bypass capacitors, ferrite beads, or r-f chokes at the appropriate input jacks.

By all means notify the ham that you are experiencing RFI. Although he is not obligated to help you, he often will cooperate by setting up a series of test transmissions and by giving you some technical advice.