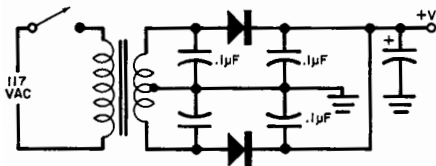


BUZZING DIODES

Q. *My stereo system includes a separate tuner and amplifier. I am experiencing heavy interference when the tuner is in the AM mode. There's an awful buzz clear across the band which only the strongest signals can overcome. Investigating the problem with a small transistor radio, I discovered that the amplifier is the source of the noise. Also, the noise signal is very strong near the tuner's ferrite rod antenna—whether the tuner is plugged into the ac outlet or not. Both components' chassis are grounded to a ground rod. What causes this, and what can be done to eliminate it? —David Shoulders, Eugene, OR.*

A. I suspect that the interference is being caused by transients in the amplifier's power supply. When an ac voltage is applied to a silicon diode, the diode



does not conduct exactly for one half-cycle and then shut off for the other half-cycle. Rather, a silicon diode will not begin to conduct until the barrier potential at the diode junction (about 0.6 volt) is overcome. Also, the diode is a very non-linear device, especially at the knee (the region in which it starts to conduct) of its characteristic curve.

As a result, turn-on and turn-off transients are generated near the 0° and 180° points in the sinusoidal cycle. These transients are rich in interference-causing harmonics of the line frequency. I suspect that they are being radiated by wiring in the amplifier and perhaps by the line cord. The reason the signals are stronger near your tuner's ferrite rod AM antenna is transformer action. Mutual coupling between the two ferrite antennas causes signals picked up by the tuner's coil to be passed to that in the transistor radio.

The diode transients can be dealt with by installing 0.1-µF disc ceramic capacitors on both sides of each diode as shown in the figure. Here, a full-wave center-tapped power supply is shown. If a dual polarity supply is used, repeat the procedure for the negative supply. If a

full-wave bridge rectifier is employed, install bypass capacitors at each corner of the bridge. The capacitive reactance of these components is too high to interfere with the rectifying action of the power supply.

All chassis in the system should be well grounded to a good earth ground. You mentioned that both components are grounded. That's good—but beware of hum-producing ground loops. If separate grounding wires are attached from each chassis to earth ground, no conductors should run from one chassis to the next. The shields of signal cables, if connected to a chassis at each end of the cable, will cause a loop to occur between the already grounded chassis. Such a ground loop can cause hum problems, but not the "buzz" you have described. Look to the amplifier's power supply for the source of that signal.

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.
