

# BUILD THE SNOOPER STOPPER

***An easy-to-build filter rejects cable TV signals that interfere with your FM—and stops the infamous “bullet.”***

EDGAR WOLF

CABLE TV SERVICES HAVE COME A long way since they put antennas on hilltops to relay programs to customers hidden in radio “shadows.” People subscribed to what used to be called community TV because they had to, not because they wanted to. But now this has all changed: Cable TV offers scores of channels and special programs not available from commercial channels for a monthly fee. The latest estimates place the number of homes in the

U.S. with cable TV at 52 to 53 million, an astounding 61% of all homes.

However, CATV has become a victim of its own success. Many people want the programming but are unable or unwilling to foot the monthly bill. So many have turned to “pirating” the programs with unauthorized converters. Not surprisingly, the cable TV companies are striking back at unauthorized (nonpaying) users by charging them with “theft of service.” Ac-

ording to the National Cable Television Association (NCTA), U.S. cable companies lost \$3 billion in revenues because of pirating in 1991.

The cable companies have developed countermeasures to root out offenders. These include the infamous “bullet” (see **Radio-Electronics** January 1992.) and distinctive give-away identification signals. Both are sent out to customers over their cables.

The selective “bullet” will zap

only unauthorized TV converters or descramblers hooked up to the cable, and the identification signal, which sounds like a cuckoo at about 108 megahertz on the FM band, presents no threat to paying customers. The bleeping "cuckoo" signal leaks from unauthorized converters and can be detected by cable company personnel monitoring a suspected pirate's house with handheld receivers.

Unfortunately, both the "cuckoo" identification signal (if used) and routine command signals sent by the cable company over their cables to set up converters in customers' homes can cause interference with FM reception in those homes. To prevent the signals from interfering with your FM reception—and to ward off a "bullet"—you can build this passive filter called a Snooper Stopper.

### Addressability

Cable operators have the ability to control individual subscriber service from the head end in fully addressable systems. This permits prompt service changes and reduces tampering problems with converter computer control by identifying and "tagging" each channel so that specific programming can go to the authorized subscriber.

Each cable TV converter has its own unique identification code. When you change from one pay service to another, or request a pay-per-view program, that unique code identifies your converter. The code is first sent to access your converter to prepare it for data that is to follow. The data includes instructions that set up your converter for the programs you are authorized to receive.

### Data channel

With fully addressable systems, cable TV companies send setup data to your converter over the cable with an FM signal called a *data channel*. This is done by frequency modulating the data at 106.5 MHz. Cable companies use addressable converters because they are cost effective and convenient. When a customer calls for a change, or

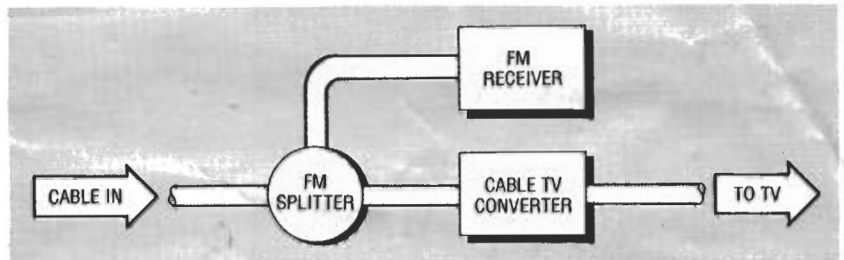


FIG. 1—TYPICAL INSTALLATION of a cable TV converter, FM receiver and an FM splitter.

orders a pay-per-view movie, these instructions can be carried out automatically by the cable company's computer. However, not all homes with cable TV have addressable converters yet.

Some cable companies have added the chirping cuckoo-like sound at 108 megahertz. The "cuckoo" signal rides along with the command signal at 106.5 MHz. Therefore, noise might show up at several spots on your FM dial. This is caused by what has been referred to as "channel splash" due to the high energy level of the signals being sent.

If you want to find out if your cable system is addressable and thus the source of superfluous noise, you can hook up your FM receiver to the cable TV system as shown in Fig. 1 (if it is not already connected). Next scan the FM band to pick up any beeping noise and record the dial setting at which it is strongest—most likely around 106.5 megahertz. However, noise could also occur around channels 59 and 60 on your cable converter. If you detect the beeping signal at any of those points, the Snooper Stopper will eliminate the noise and prevent you from being a target for surveillance. In addition, the Snooper Stopper is an electronic shield that will block the "bullet."

### Circuit description

The schematic of our Snooper Stopper is shown in Fig. 2. It is a low-cost passive band-rejection (notch) filter known as a bridge-T trap. The filter, offering a notch depth of 40 to 60 dB, has only one resonant circuit—C1, C2, L1, and L2—making it easy to tune. This bridge-T trap

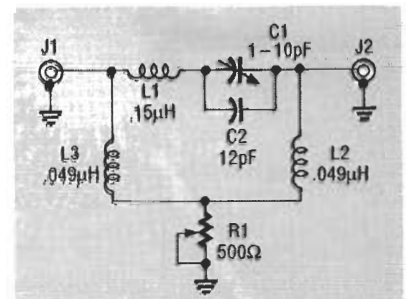


FIG. 2—SCHEMATIC OF THE SNOOPER stopper, actually a band-rejection filter known as a bridge-T trap.

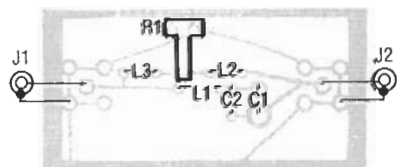


FIG. 3—PARTS-PLACEMENT DIAGRAM for the Snooper Stopper. Install all components as shown here.

uses a tapped inductor. Trimmer potentiometer R1 permits critical adjustment of notch depth. Although a bridge-T trap provides sufficient signal attenuation, its band (notch) width is not very precise.

Snooper Stopper's performance on systems with single interfering carriers is good, but with dual carriers, calibrating the notch frequency is critical. For this reason, trimmer capacitor C2 is included for tuning throughout the entire band, while R1 is used to adjust the notch depth.

### Building and adjusting

If you wish to make your own PC board, use the actual size foil pattern. Refer to the PC board layout shown in Fig. 3, and mount all components as shown. Be sure to install the F-

## PARTS LIST

### Resistors

R1—500-ohm potentiometer

### Capacitors

C1—1 to 10 pF, adjustable, Johanson type #8052 or equivalent.

C2—12 pF NPO

### Inductors

L1—0.15  $\mu$ H, fixed coil

L2, L3—0.049  $\mu$ H, fixed coil

### Other components

J1, J2—F-type RF jack connectors for circuit-board mounting with ring nuts

**Miscellaneous:** case (Radio Shack Cat. No. 270-231 or equivalent).

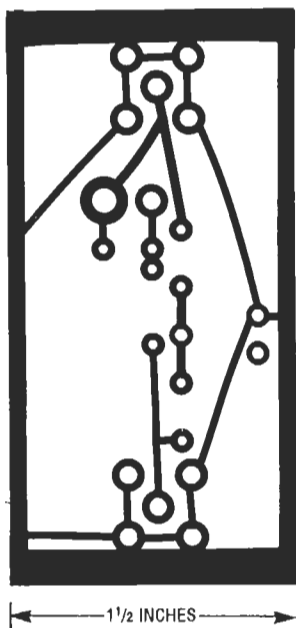
**Note:** The following items are available from Northeast Electronics Inc., P.O. Box 3310, N. Attleboro, MA 02761, (1-800-886-8699). Check, money order, Visa and Mastercard accepted. Massachusetts residents must add 5% sales tax.

- A kit of parts including an etched and drilled PC board, all components, and a plastic case with aluminum cover—\$19.95.

- An etched and drilled PC board—\$7.95.

- A kit of just the parts (no board or case)—\$15.95.

Please add \$4.50 S&H to any order.



SOLDER SIDE foil pattern for PC board shown actual size.

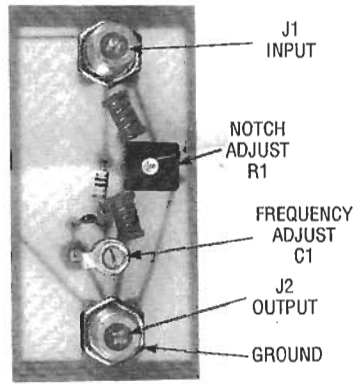


FIG. 4—THE AUTHOR'S PROTOTYPE removed from the case and without the cover plate.

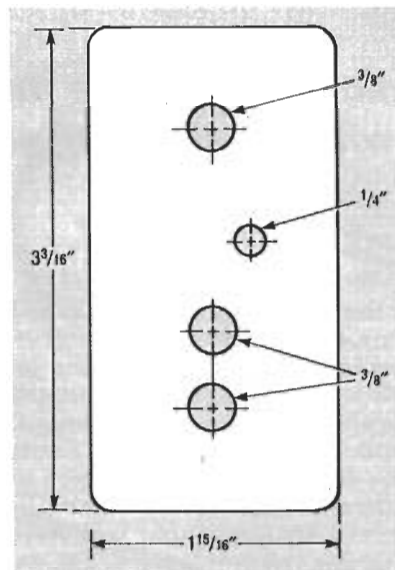


FIG. 5—HOLE-DRILLING TEMPLATE for aluminum cover of recommended plastic case.

type RF coaxial jack connectors and trimmer potentiometer R1 so they face up on the PC board as shown in Fig. 4. When the components have been positioned and soldered, check your work carefully, looking for solder bridges and open traces. Next, use the template (Fig. 5) as a guide for drilling the four holes in the aluminum cover of the recommended case. The same template can be used for drilling the holes in an alternate case cover by centering it on the cover. Be sure that the alternate case has sufficient volume to contain all of the circuitry without interference.

Install the completed Snooper Stopper as shown in Fig. 6 and tune it for the nuisance noise. Adjust C2 (frequency) and R1 (notch depth) until the interfering noise is blocked from your FM receiver.

Do not use the Snooper Stopper to circumvent the cable company's right to de-authorize your converter. Along with blocking a destructive "bullet," the filter will also prevent all programming instructions from reaching your cable box. If you install the Snooper Stopper ahead of the cable company's converter and change services, you will have to remove it so the converter can receive new instructions. Some new converters shut down if data is missing for long periods of time. R-E

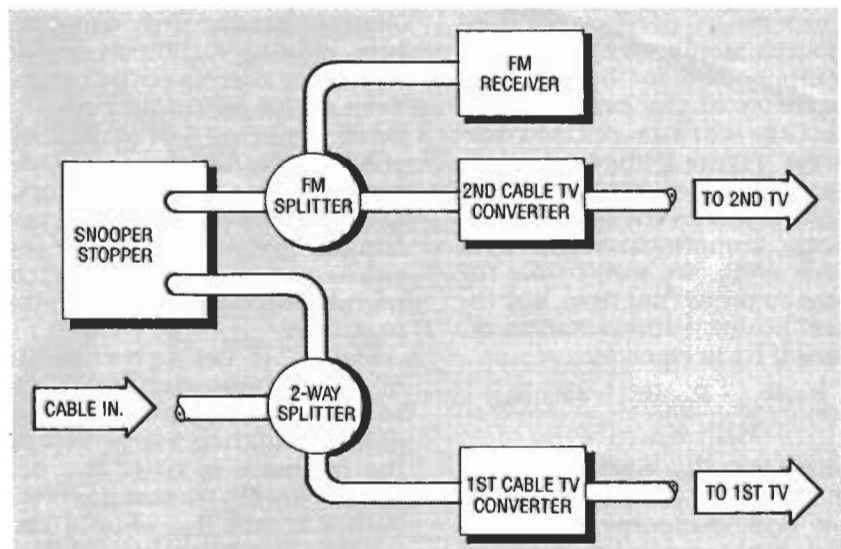


FIG. 6—INSTALLATION OF THE SNOOPER STOPPER ahead of the FM receiver and a second cable TV converter.