

Teleprotection surprises

One of the ruder surprises you'll discover when you first start using a modem extensively is that anyone picking up an extension phone can blast you off the air. That can get especially frustrating and infuriating just before the end of a long and costly upload or download.

Radio Shack offers a product called their 43-107 *Teleprotector*. It costs eight bucks and its only tiny problem is that it may end up working too good for you.

Any unused telephone line has around 48 volts of direct current on it. When the first phone is picked up, the working voltage drops down into the 6- to 8-volt range. So, if you simply put a plain old voltmeter right across the red and green wires on your extension phone, you can quickly tell if the phone line is in use by another extension.

Figure 5 shows you the circuit for their teleprotector, along with some possible modifications. An extension phone normally uses only the red and green wires. The teleprotector breaks the green wire and inserts a full-wave diode bridge. The purpose of the bridge is to make the current in the use-sensing circuit always go in

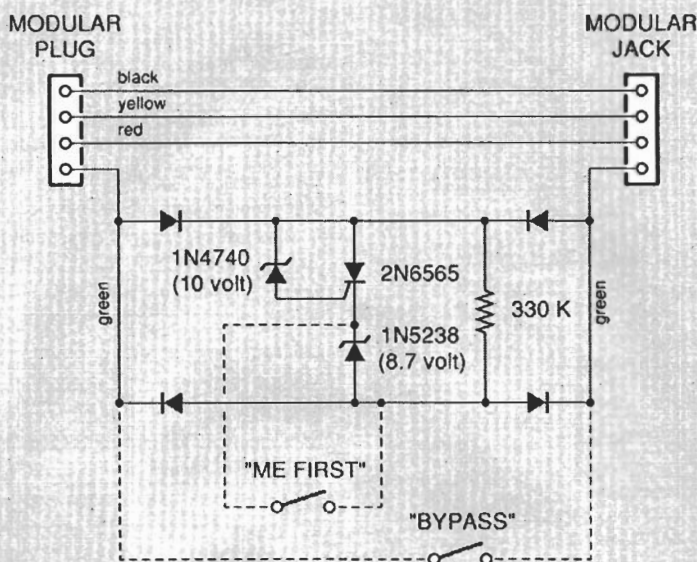


FIG. 5—CIRCUIT DIAGRAM for the Radio Shack 43-107 teleprotector, along with two possible modifications. Unmodified, the extension phone is allowed on the line only when no other phone or modem is in use. The bypass switch will defeat the teleprotector entirely; the me-first switch lets your extension remain active if another phone gets picked up during a call.

the same direction, even during the ringing or if the phone polarity somehow ends up backwards.

Initially, there is only a very high value 390K resistor inside the bridge. That is much too large a series value to let the phone work. When you pick up the phone, the full available line voltage initially appears across that resistor. Should you have at least 18.7 volts available (meaning that there is no other extension in use), the silicon controlled rectifier (SCR) turns on, stays on, and lets the extension operate. If another phone is being used, there will not be enough voltage to turn on the gate of the SCR, and the extension will remain off.

So far so good. Any SCR will stay on only so long as its main anode to cathode current drops to zero. This particular SCR can get turned off one of two ways. If you hang up your protected extension, the current in the green wire obviously drops to zero and resets you for the next call.

But there's also that mysterious 8.7-volt Zener diode *in series* with the SCR. Should some other phone get picked up, there won't be enough voltage left on the line to keep the Zener conducting, so the SCR turns off, as does the extension phone.

Thus, your protected extension phone will never turn on if another phone is off hook. Should you be using your protected extension phone and should another one get

picked up, you will get unceremoniously cut off the line!

All of which means that their teleprotector works *exactly* as they advertise. There is no way to eavesdrop with a teleprotected extension phone. There is also no way to let the teleprotected extension blast your modem off the air. Or a FAX machine for that matter.

Another trick is to hook up their teleprotector up to your answering machine. When you pick up your remote extension, your answering machine drops off the line, stopping the now unwanted message. Which also can be handy.

One key point: Your teleprotector does *not* go on the modem phone. It goes on the interfering extension.

Now for the big problems. Your teleprotected extension can *not* be used for any conferencing! You also cannot have a receptionist answer by picking up with their teleprotected extension and then listening in long enough to verify the correct person picked up the call.

Two possible circuit modifications are also shown in Fig. 5 that might be more suited to you should you need conferencing, but your main goal is to eliminate any modem blasting. The BYPASS switch completely defeats the teleprotecting. Whenever any two phone conversations are wanted, you slide that switch into its "bypass" position, shorting the works out. You

do, of course, have to remember to flip the switch back after any two-phone conversations.

Closing the ME FIRST switch lets the protected phone initiate or receive a call so long as it is the first phone picked up. It will stay active should additional phones be picked up, so two-phone conferencing can still be done. But the protected phone still can no longer break in on a modem or fax in progress.

If you really want to get hairy, you can even let your protected phone purposely break in on an ongoing voice conversation when in the "me first" position. Just shout at the other person to pick up their phone. Once

you are sure their phone is picked up, hang your phone up for half a second, and pick it up again. Both of you should now be in conference.

But my particular setup requires *three* phones, any-way conferencing, and no modem blasting. As a second contest for this month, let's have your thoughts on how to elegantly handle this problem.

The *Radio Shack* teleprotector unit is cheap enough that you probably would not want to build one up from scratch. But should you decide to experiment completely on your own, that oddball 2N6565 sensitive-gate SCR is a *Teccor* product available by way of *Mouser Electronics*.