

Telephone Line Troubleshooting Kit:

These Testers Allow **Quick** Troubleshooting of Telephone Company Related Problems:

• **Deluxe Loop Current Tester** **\$69.95**

- Modular K-Plug & 66M Block Adapter that can also be used with other testers
- Cloth Cords with Bed-of-Nails Clips that can be used with other testers
- Case that will also hold other testers

Phone Companies no longer build new Central Offices as the population increases. They install SLCs (pronounced "slick" - pair gain equipment) or Remote Central Offices, which feed dial tone to the nearby population. SLCs are usually placed at the edges of shopping center or office plaza parking lots, in small huts or buried vaults. This equipment is setup to provide a lot of loop current, so the phone company can serve subscribers as far away from the SLCs as possible.

The minimum loop current that the Phone Company is supposed to provide is 23ma. Many SLCs and Remote COs put out 40, 50, 60 or even 80ma of loop current. For subscribers close to the SLIC, there isn't a lot of loss so they get a whole lot of loop current - often enough to damage CO Line cards and cause erratic operation of phone equipment. Since these SLCs are being dropped into lots of neighborhoods, it's very likely that a subscriber's lines are fed from a SLC or Remote CO, *and* that they are very close to the SLC.

Generally speaking, loop current should be in the range of 23 to 27ma. In practice, few problems occur until the loop current goes above 32ma, or below 20ma. Anything over 40ma will probably shorten the life of any phone equipment connected to the lines. Even single line electronic feature phones can be effected. On popular 2 or 3 line Panasonic feature phones, the line key switches usually burn out within a year in the face of high loop current.

Why does the phone company put out so much current, even though they know it will damage equipment? They don't care. All they are mandated to do is get dial tone to subscribers using a standard 2500 set, which are generally not effected by high loop current (they are not electronic). What's the Phone Company's high limit on Loop Current? Around 110ma, at which point you'll probably see smoke pouring from anything other than a 2500 set!

• **2 Line Loop Current Regulator** **\$49.95** • Reduces High Current *Automatically*

Both 1 and 2 Line FCC Registered Regulators are available, which automatically reduce loop current to 25ma. They have no effect on current below 25ma. They can be installed using modular plugs, or punched down on a block. One is included in this kit for troubleshooting purposes. If the Loop Current is over 27ma and you are having strange or intermittent problems, install a Regulator to see if the problem goes away. Unfortunately, the symptoms of high loop current are quite varied, so trying the Regulator at the customer site is usually the quickest way of diagnosing and repairing the problem.

• **CPC Tester - Calling Party Disconnect** **\$45.95**

The Phone Company normally sends out a CPC (Calling Party Disconnect) signal when the outside caller hangs up. Since the advent of electronic Central Offices, this has been a 500ms (1/2 second) open, sent within a few seconds of the outside party's hanging up. CPC is used to signal an answering machine or voice mail to hang up, and is also used to drop a call off hold if the outside party has hung up.

For a number of reasons, many phone companies are either no longer providing CPC (you can sometimes request it for a customer's lines), or they've reduced the open loop time down to as little as 60ms. Using this tool, you will know whether the Phone Company is actually sending the CPC signal, and the duration of it so you can set the phone system to see the CPC. If the phone system is set for a 500ms CPC, and the Phone Company is sending 300ms, the phone system will ignore the CPC and not drop the line because the open wasn't long enough to meet the programmed parameter.

• **Circuit Loss Tester** **\$99.95**

- For "Can't Hear" Complaints
- Receives Telco's 1KC 0db Tone

• **1KC Tone Generator** **\$49.95**

- Transmits 0db Tone to Circuit Loss Tester

When a subscriber is on the far end of a loop from a CO or SLC, there are often complaints of "can't hear," especially on long distance calls. The circuit loss, or "volume" (AC audio) of a phone line is determined by sending out a one thousand cycle tone at 0db from the CO, and measuring the level when it reaches the subscriber.

The maximum circuit loss allowed on a line is -8.5db. Anything lower than that, and the Phone Company is supposed to bring it up to at least -8.5. In practice, it becomes hard to hear on long distance calls when the circuit loss on a line is below around -7.5db. So what do you do to increase it if it's within the Phone Company's specs? You ask the Phone Company to change the lines to trunks (sometimes called something else like "Assured Service"). They can be either loop start or ground start trunks, but the Phone Company is required to condition the trunks so that the maximum loss is -5.5db. At that level, there will be no problem hearing on any type of call. The Phone Company usually charges a few dollars more per month per trunk, and your customer will have to pay an additional installation charge for changing the lines to trunks.

These tools allow you to determine the circuit loss on the line by dialing the Phone Company's automatic 1KC tone number for the CO the subscriber's lines are coming from (if you can get it from the Phone Company), or to connect the 1KC Tone Generator to each line the customer has, and determine the circuit loss by checking each line with a "Loop Around Test" (instructions included).

• **Triplett Digital VOM (Multimeter) with Case** **\$52.95**

What else should you check, that might cause strange problems? If you take a minute to take these measurements at the time of installation, you can see anything that doesn't look right and save yourself service calls later!

Check the DC line voltage and AC ring voltage on the line. Line voltage should be around 50VDC on-hook, and 6 to 16VDC off-hook. Ring voltage should be around 90VAC on a true RMS meter, or around 75VAC on a cheaper non-RMS meter like the Triplett (as with all testers, use them in your office before using them at a customer's site so you'll know what you're looking for!). Also check the AC voltage between the **tip and ring**, **tip and ground**, and **ring and ground**. You should see less than .5VAC (half a volt) on all three measurements. Higher readings indicate AC voltage being induced from power lines, which should be reduced (call **SNC Manufacturing**, at **920-231-7370**).

The phone company adds transformers called "Load Coils" to copper phone lines, to make the lines sound louder if they are a long way from the CO. These should be no closer than 2,000 feet from the subscriber's premise. If they're closer they can cause assorted problems, like DTMF not being recognized by voice mail systems. Load Coils also tend to slow data. If you're not going to use the lines for voice, you can request non-loaded lines from the phone company. We sell a Load Coil Detector (\$89.95) that will tell you how many Load Coils are on the line (up to 4), but not how far they are from the subscriber. For that, you'd need a TDR (Time Domain Reflectometer), which will graph out everything that's connected to the line, and tell you how far they are from the premise. It will also help you detect illegal wire taps on a line. You can rent a TDR (or buy one for around \$5,000) from **McGrath Rentelco** at **972-234-2422**.

Reg. Kit Price: \$368.70
10% Kit Discount: - 36.87
Total Kit Price: \$331.83



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