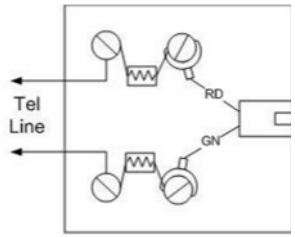
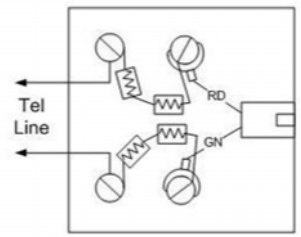




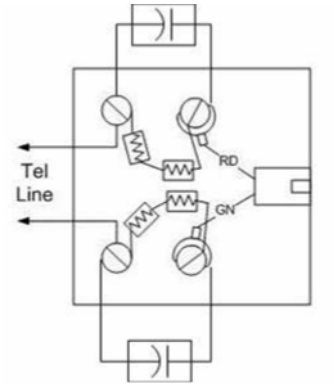
The first jack is 200 Ohms, the second one is 400 Ohms.

I have made the assumption you will attach the jack to the wall and feed it with a wire that goes directly to the telephone line of your home.

You have an option, if your old telephone has a line cord with spade tips on the end, you can attach it to the terminals that would go to the telephone line, and then use a mod cord from the jack to the wall.

The object is to add resistance in series with the old telephone so that the other modern telephones on the line see it as a "regular modern" telephone.

What else should I do? If you get too much audio loss (low volume) you can get 2 each 1.5 or 2.2 MFD capacitors, 250 Volts non polarized and connect one across each set of resistors. This will not fit in the jack, and you can either put this in the phone or build it into a small box.



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Colin T. Chambers

oldphoneguy.net

High Line Current

This circuit should be used with all old telephones

Think of the telephone line as a power source.

The telephone line has current (it has voltage too but for this discussion we are going to talk about current) and a certain amount is available. It is dependent on how far from you are from the Central Office (CO) as to how much current you get.

There are two factors here (a) how far you are from the Central Office and (b) the phone you are using. The closer you are to the Central Office the more current you get, the greater the distance you are the less current you get. This has been true since the start of common battery (where the power is provided by the Central Office) service. Here is a simple comparison:

Across the Street from the CO	60 Milliamps or more
Average Distance from the CO	30 Milliamps or so
A Far Distance from the CO	25 Milliamps or less

Why is this important? The closer you are to the CO, the less the audio loss and the higher the volume in your ear and the greater the talk volume you generate. (On an old style phone) In the olden days, if you were close to the CO your transmitted a very strong "voice". There was no consistency in the volume levels.

How is this problem solved? Over the years, starting in the mid 1950's, telephone sets were improved and automatic self compensations circuits were put in them. This way the volume on both transmit and receive was equalized. It did not matter if you were across the street from the CO or miles away, it all sounded the same. Two varistors in the telephone network compensated for the line current, shunting or wasting some of the current if you were close to the CO so volume levels were constant regardless of distance.

What happened? America got accustomed to the evenness in volume and expected it. In other parts of the world, similar events took place. Now the public expects to hear everyone at the same volume. This is also critical on long distance calls, in the olden days we rarely made them, now the world seems to be smaller and we call all over.

Now what? Antique telephones do not have this means of automatic compensation and have no means of manual compensation. Connecting an old telephone brings back the early days. On short distances (or in telephone terms "short loops") the volume is higher and often to the point that people say, "Don't Shout"!

What about additional issues? When an old phone and new phone go off hook at the same time, the old phone "sucks out" the available power on the telephone line and the new phone cannot be heard. Again, no automatic self compensation in the old set is the issue.

What can be done? It is doubtful you will want to replace the old telephone with a new one or put the new parts in the old telephone. The only other option is to put in "manual compensation" if you have higher then normal line current, or short loop.

What is the solution? Reduce the line current to the old telephone set, by adding manual compensation. The old telephone set will now work similar to a new telephone set with automatic self compensation. Well not really, but it will be close.

What is manual compensation? Add a resistor in series with the telephone. This is like a mile or so of extra wire, if you are across the street from the CO, you now look like you are a mile away. Even without knowing your line current, of if you have high line current, this is still a good idea. Your old telephone, like a Western Electric 302 or earlier or similar telephone will no longer "suck out" the line current and if you go off hook at the same time with a modern telephone, both will work, equally well.

How simple is it? Obtain four each 100 Ohm resistors rated at ½ watt (Brown Black Brown Gold). This will give you the option of adding 100 to 400 Ohms in series with the old telephone. You can try each of the combinations and see if it works for you. One mile of cable has about 400 Ohms resistance.

Are there "commercial" applications for this? Yes, some PBXs are known to furnish high line current, One manufacturer suggests adding a 180 Ohm resistor (a total of 360 Ohms) in series with tip and ring if there is a problem. Also line current reduction modules are available as a plug in device for a few $$. (about $40 from sandman.com) Your resistors should cost you about 10 cents each or less..

How do you know for sure if you have high line current? Using your handy dandy digital meter that you can buy for about $10, measure the line current. Set the meter to 100 MA (or the scale closest to this). Connect it across tip and ring at the telephone jack. This will place a temporary short circuit on the telephone line, not harmful, and read the value of the current. Compare it to the values at the top of this document. Meters are available at All Electronics or MPJA.

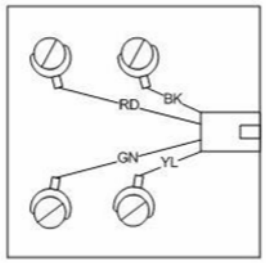
What if the value is in the normal or low range? Add at least one resistor in series with your old phone, it will help when you go off hook with the old phone and a new phone. Two resistors would be the preferred value. You can try it and if you do not like it, go back to the way it was.

Will there be any audio loss? Yes, some, probably not too noticeable.

What if there is too much audio loss? While this is not common, but it can happen. Perhaps you have a weak transmitter or a weak receiver. You can add a capacitor across the resistor(s).

Doing It

How do I add the resistors? First take a look at the inside of a low cost modular jack. The picture shows 4 wires from the jack. You are only going to use two of them, the red and the green. Remove the yellow and black lead from the screw terminals and put a small piece of tape over the spade tip on the black and the yellow wires, just let them hang loose.



Next decide if you are going to use 2 or 4 resistors, that would be 2 each 100 Ohm resistors for a total of 200 Ohms or 4 each 100 Ohm resistors for a total of 400 Ohms. I would suggest starting with 200 Ohms. Wire the jack as shown with the two resistors. You will have a jack looking like one of these illustrations: