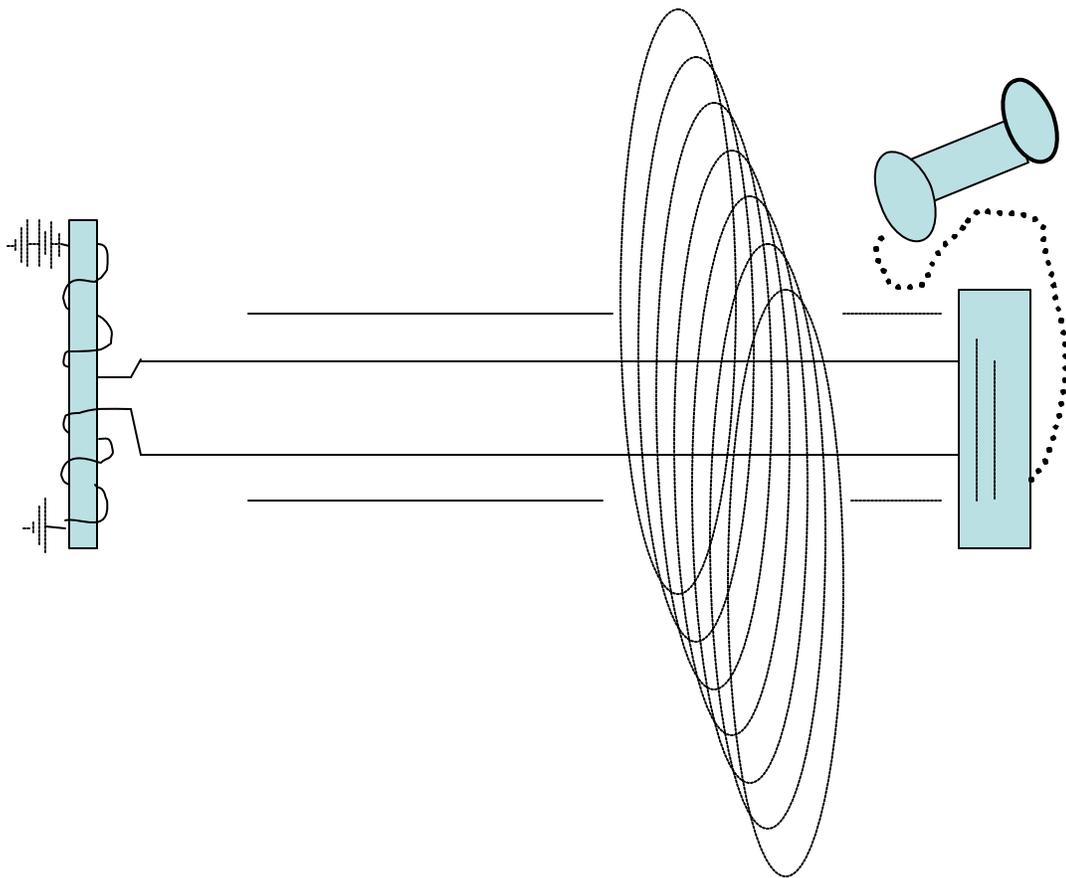


How to
troubleshoot
INDUCTIVE NOISE
in telephone plant

C. Keith Cheshire

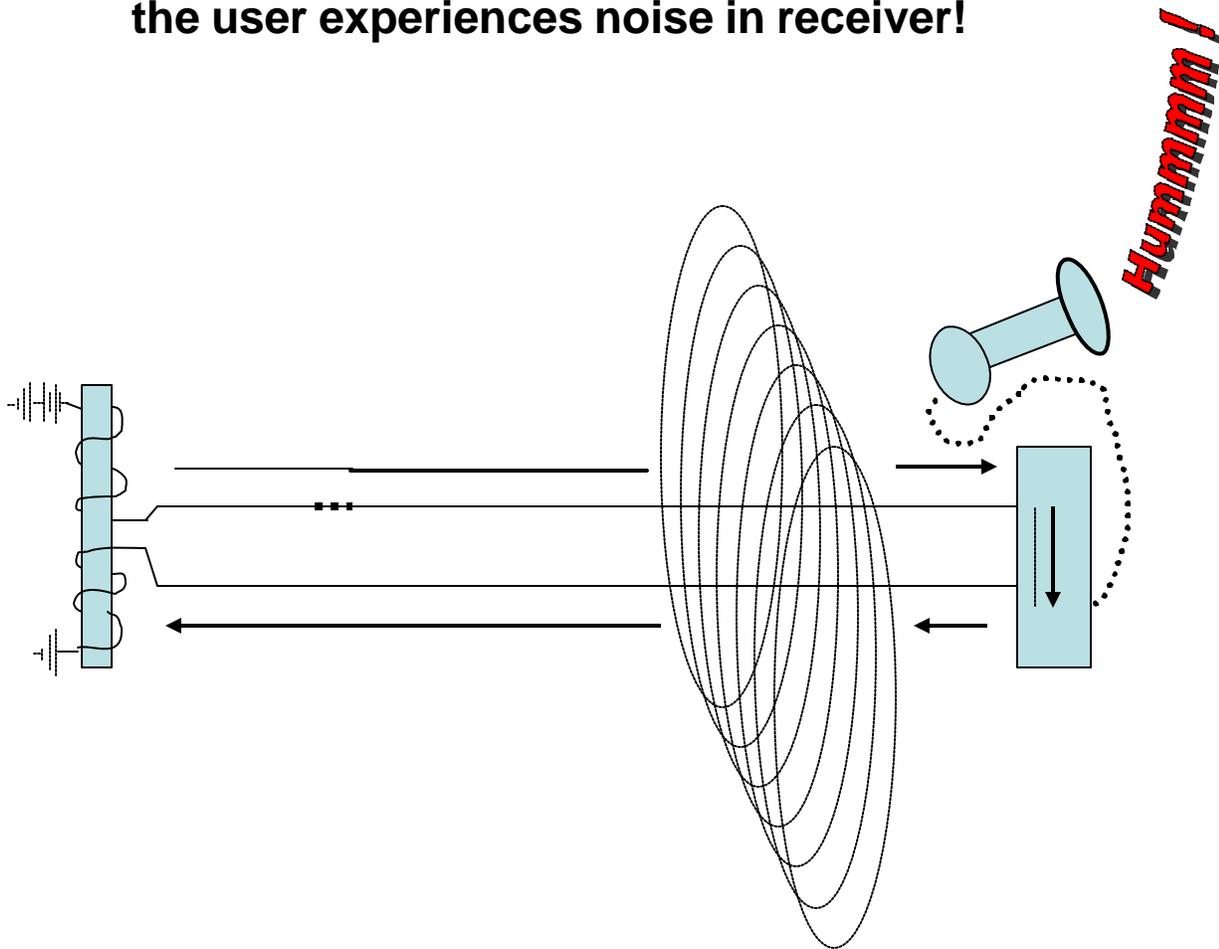
Inductive sources (ac powerlines, transformers etc)
induce ac currents in the cable/wire pair

In a properly balanced pair, currents flow equally in
both directions and cancel each other out



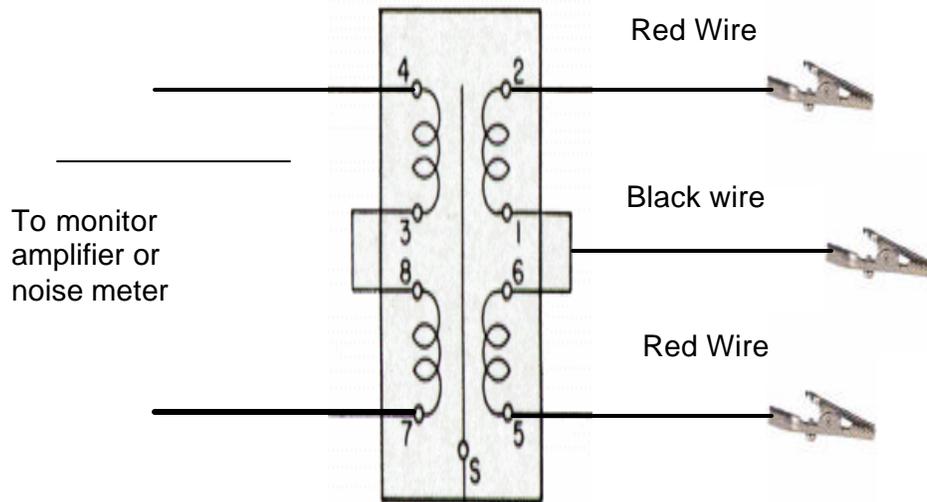
In an unbalanced pair, induced ac currents into the cable/wire pair flow unequally and DO NOT cancel each other out

Since the two directions of flow are not equal, the user experiences noise in receiver!



Test apparatus for trouble shooting unbalanced phone lines due to longitudinal ac currents

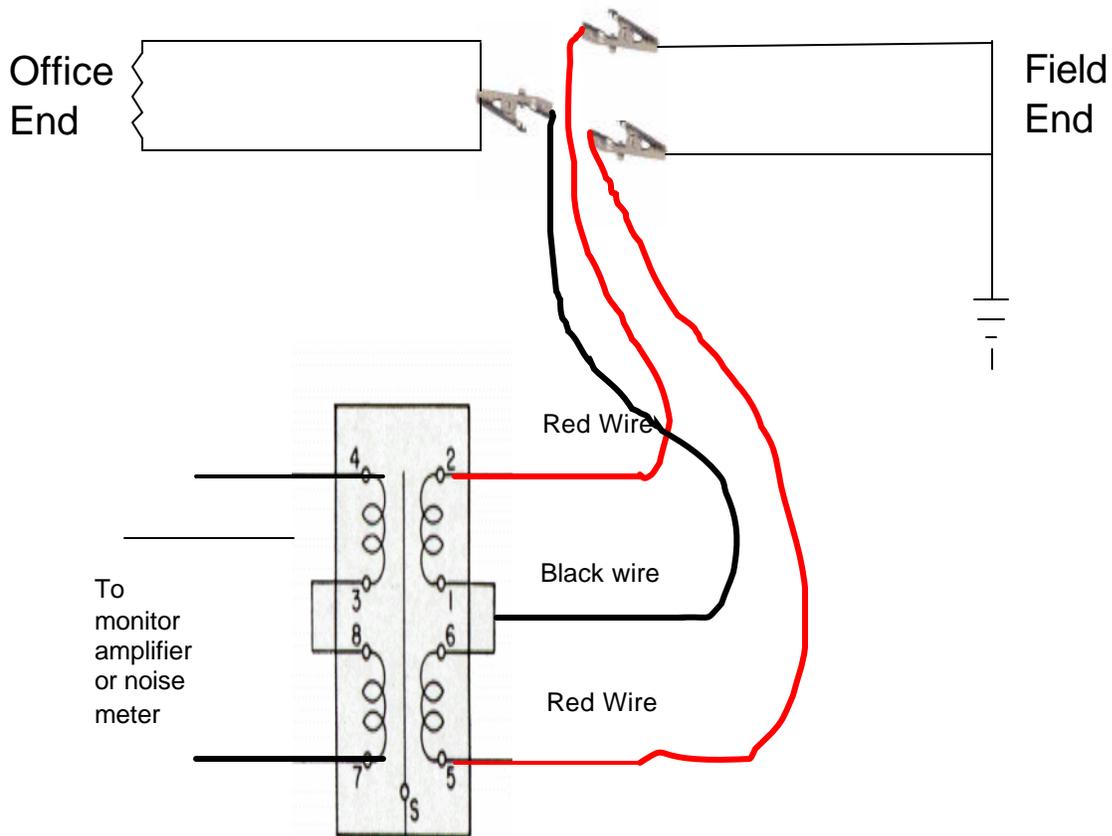
Western Electric 111,
119 or 120 repeat coil or
equivalent



**Terminate office end with 600/900ohm resistor,
Short and ground field end.**

**Open pair at midpoint and short one direction
and connect as shown**

(alternatively you can place the phone off hook and ground the tip and ring at
the central office)

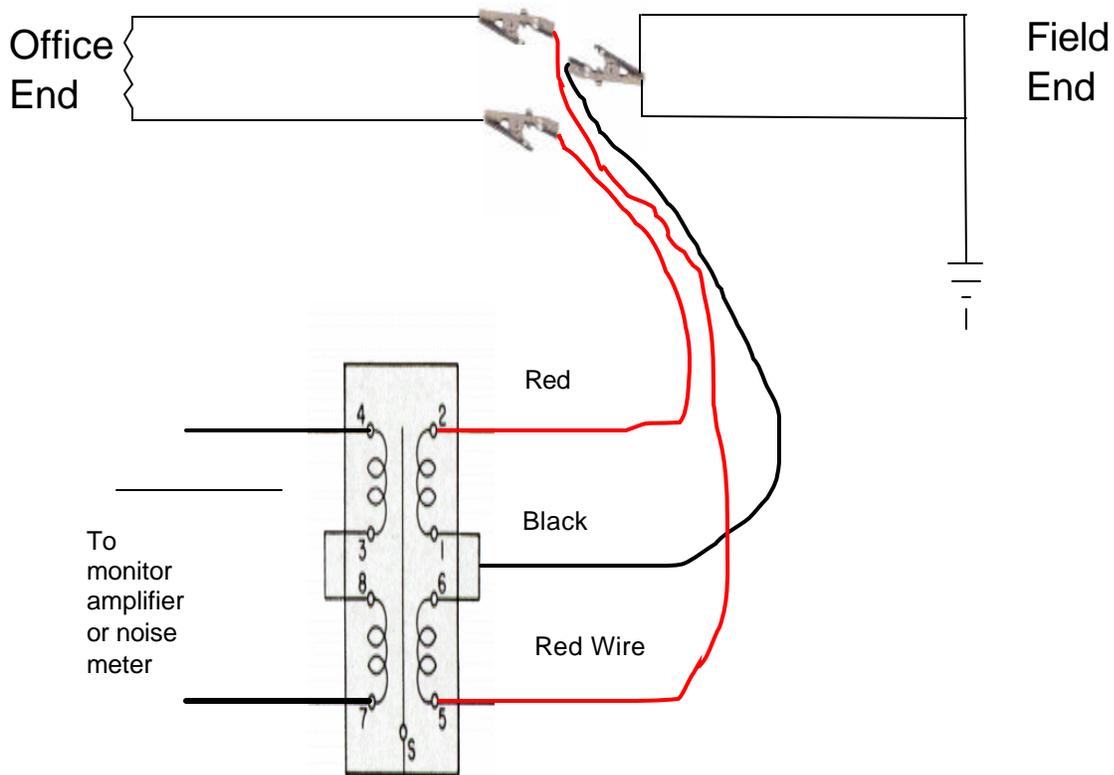


**Terminate office end with 600/900ohm resistor,
Short and ground field end**

**Open pair at midpoint and short other direction
and connect as shown**

**One direction should have higher noise reading or louder noise level in
monitor**

**The connection setup that experiences the higher level indicates the
unbalance is in the direction of the pair connected to the two red wires**



General trouble shooting techniques

- Before you start the Cut and Test Procedures;
 - Examine the subscriber premise to be sure that the protector is clean and wired correctly
 - Look for (if still used) dirty carbons in protector or defective gas tube protection
 - If you isolate the pair from the house wiring at the residence and noise is not apparent in test set, the trouble is in the inside wiring or telephone set
 - Side cross to second pair in block or RJ 11 jack
 - Grounded ringer in telephone
 - Wire hookswitch to isolate ringer when phone is off hook (private line only)
 - Install gas tube isolator on grounded ringer (can be done at protector)
 - Bugs in phone or phone jack (don't be surprised about this one!)
 - Perform similar inspection at Central Office end of loop
 - OW to cable terminal
 - MDF protector (carbons again)
 - Examine IDF line block for wire snips, solder splash or trash

Trouble shooting techniques on Open Wire

- Open wire can be a real pain because of the difficulty of cutting and re-splicing so the recommended technique for Open Wire is to test at each end of the Open Wire to determine if the fault is NOT in the Open Wire
- If the fault is in the OW, it can usually be isolated by visual examination before trying to cut and re-splice the OW pairs
- Fault causes can be
 - Bad splice (look for splices in open wire where circuits may have been cut or repaired after damage)
 - Bridge tap still in place on pair (remove)
 - Foreign object (tree limb, moss, vines etc) growing into or on wire
 - Wire slipped out of insulator or broken insulator on one wire

Trouble shooting techniques in Cable

- Once you have eliminated the Open Wire, your thoughts move to the cable
- Visual is usually out for cable (except for superman) so some logic must be employed.
- You can take “liberties” with the half the distance each time you test by going to the nearest access pedestal
- Be sure to restore pair with good splice when you move to next test point!
- Fault causes can be
 - Bad splice (look for splices in open wire where circuits may have been cut or repaired after damage)
 - Bridge tap still in place on pair (remove)
 - Foreign object (plants, BUGS or vines etc) growing into pedestal
 - Splice exposed to elements will suffer UV damage to PIC insulation and could have wires contacting foreign conductor
 - Defective load coil (short in one side)