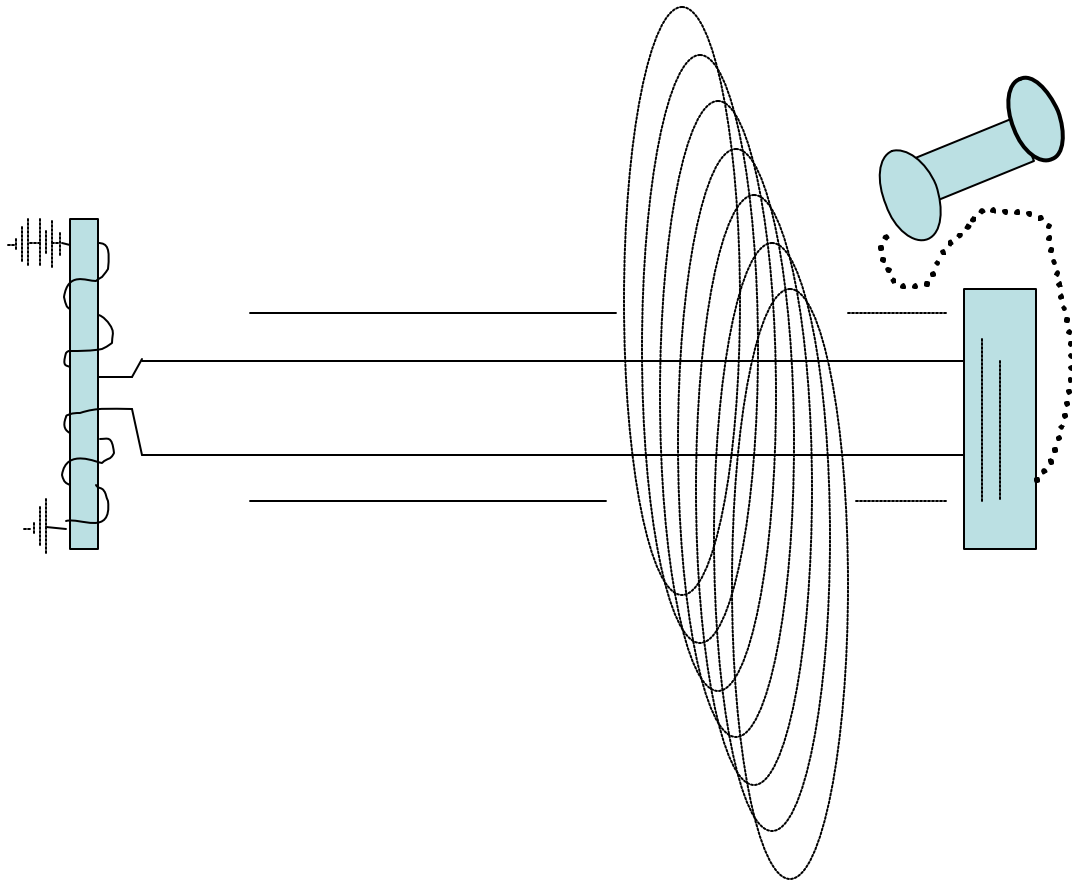


# How to troubleshoot *INDUCTIVE NOISE* in telephone plant

C. Keith Cheshire

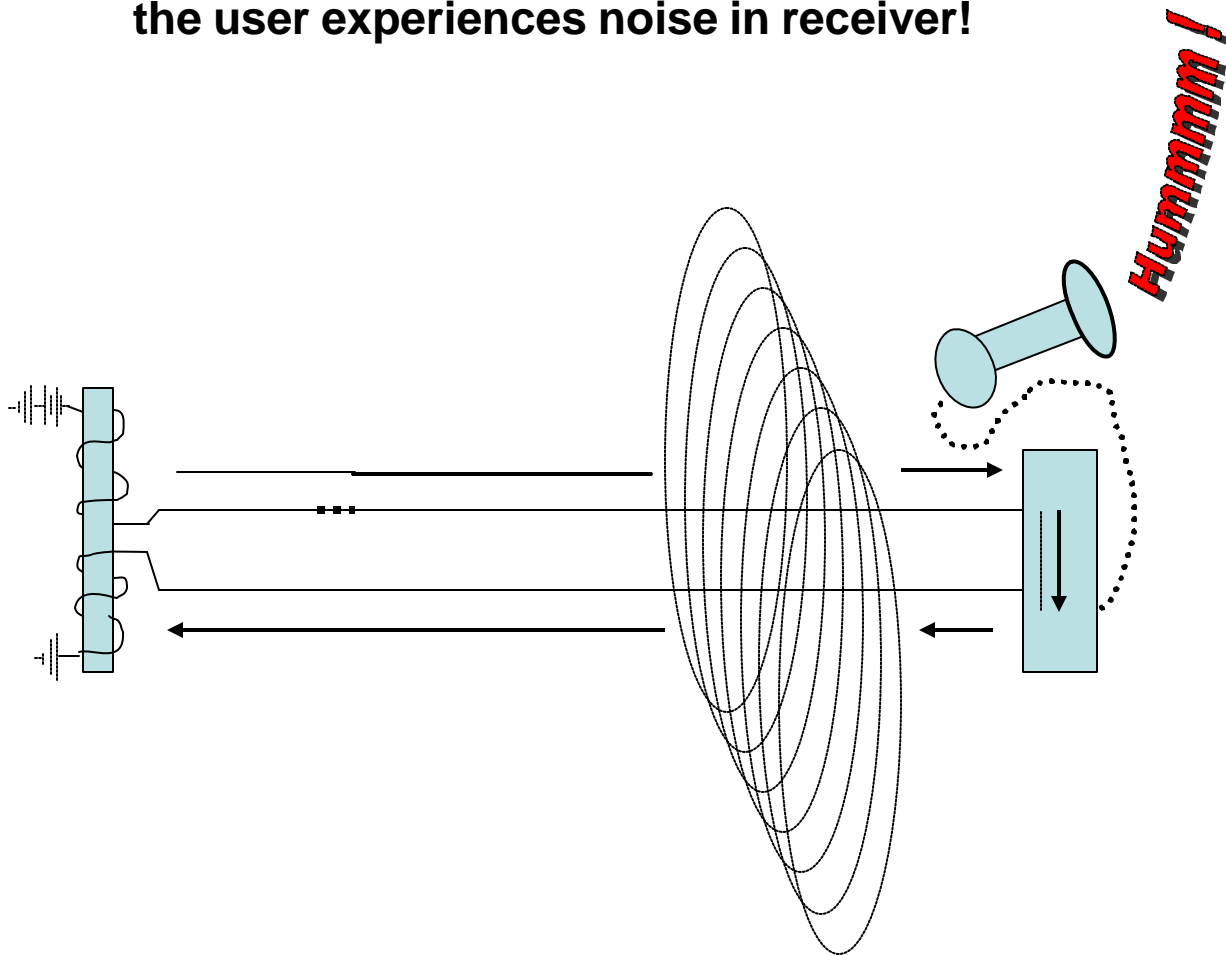
Inductive sources (ac powerlines, transformers etc)  
induce ac currents in the cable/wire pair

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



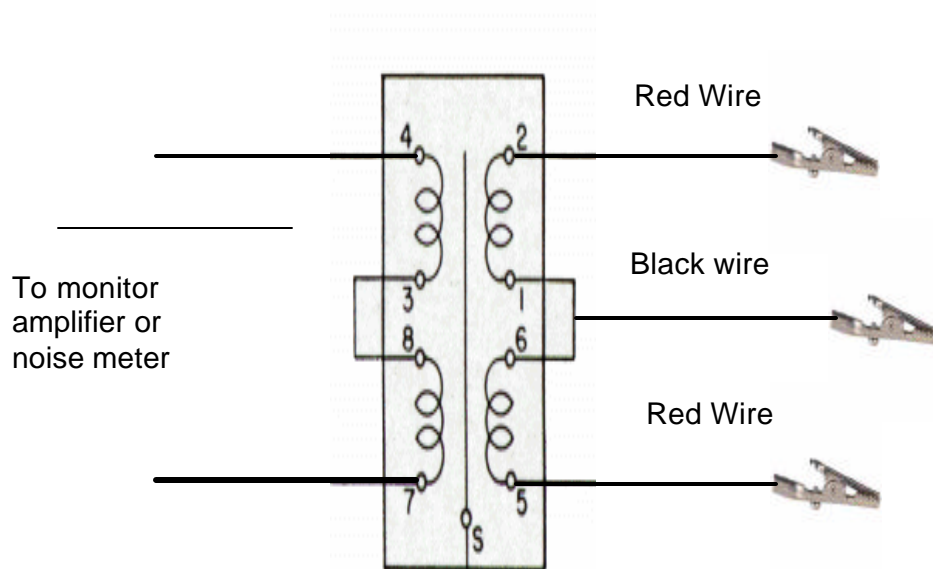
**In an unbalanced pair, induced ac currents into the cable/wire pair flow unequally and DO NOT cancel each other out**

**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

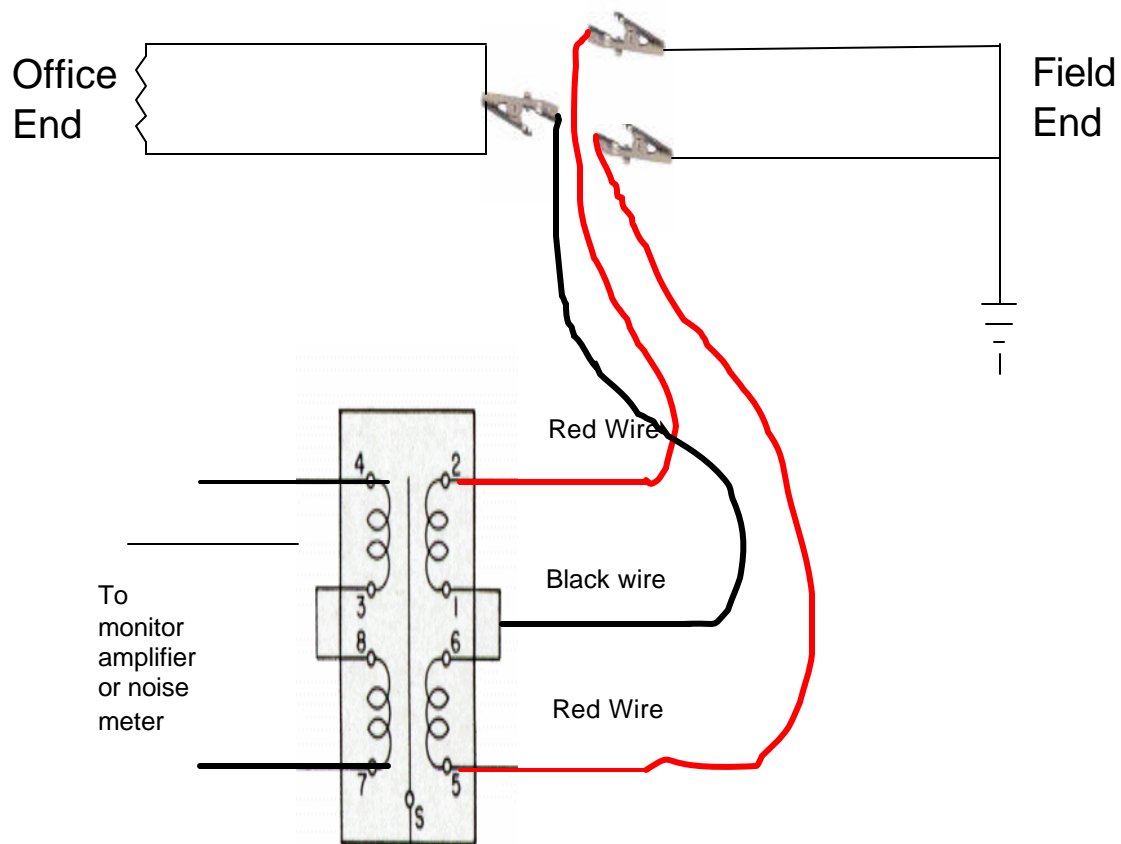
Western Electric 111,  
119 or 120 repeat coil or  
equivalent



**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)

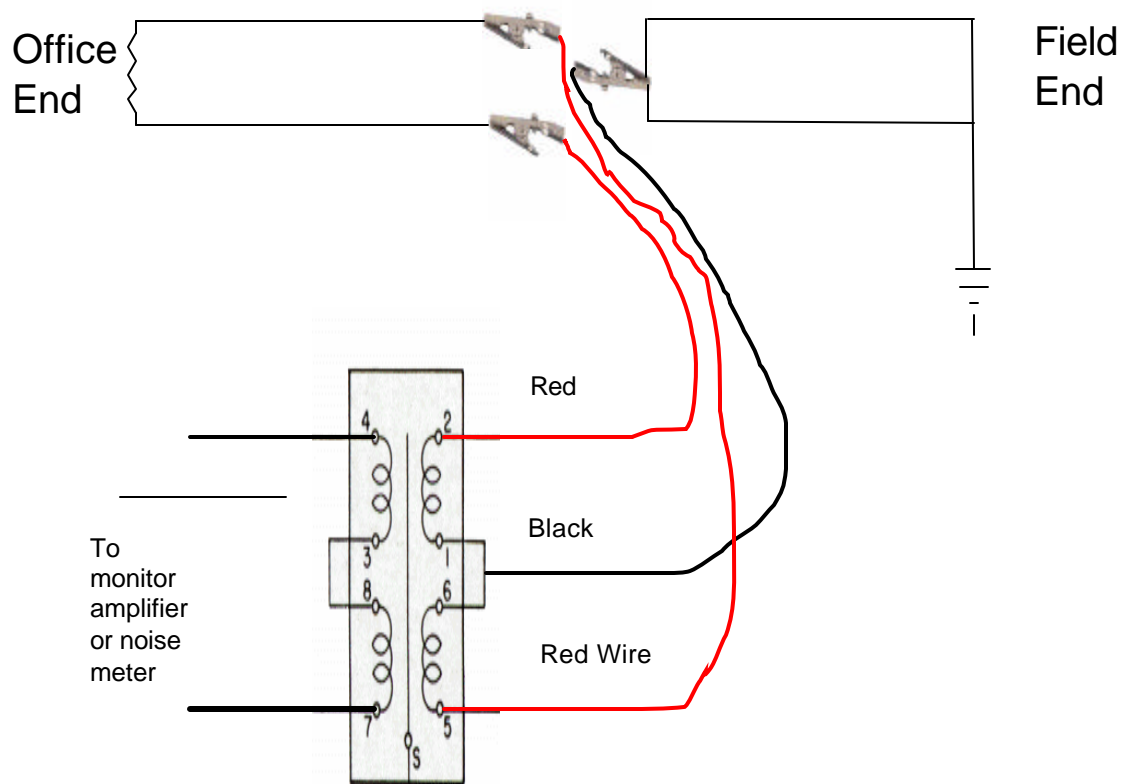


**Terminate office end with 600/900ohm resistor,  
Short and ground field end**

**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)