Antennas
‘A Practical Approach’

Facts

- Antenna - Most important part of the station
- The most challenging aspect of station
  ie Space, Planning permission?
  Neighbours, XYL, etc
  Largest amount of effort, weather dependent
- Weigh up all factors and decide
- Put up the best you can within the constraints

Some Myths & Issues

- You do not need to buy a wire antenna.
  No magic solutions
- An ATU does not improve a poor antenna
- Most rigs have 50 ohm output.
  They need to see 50 ohms (low SWR) or they cut back the power.
- Hearing them does not mean you can work them on same antenna.

What's wrong with buying a wire antenna?

- Nothing, except
- Expensive for a bit of wire
- Not guaranteed to work as per the box
- Specs based on perfect surroundings
- Can be very heavy with potted traps, coils and baluns + wire
- Takes away the fun and purpose of Amateur Radio experimentation

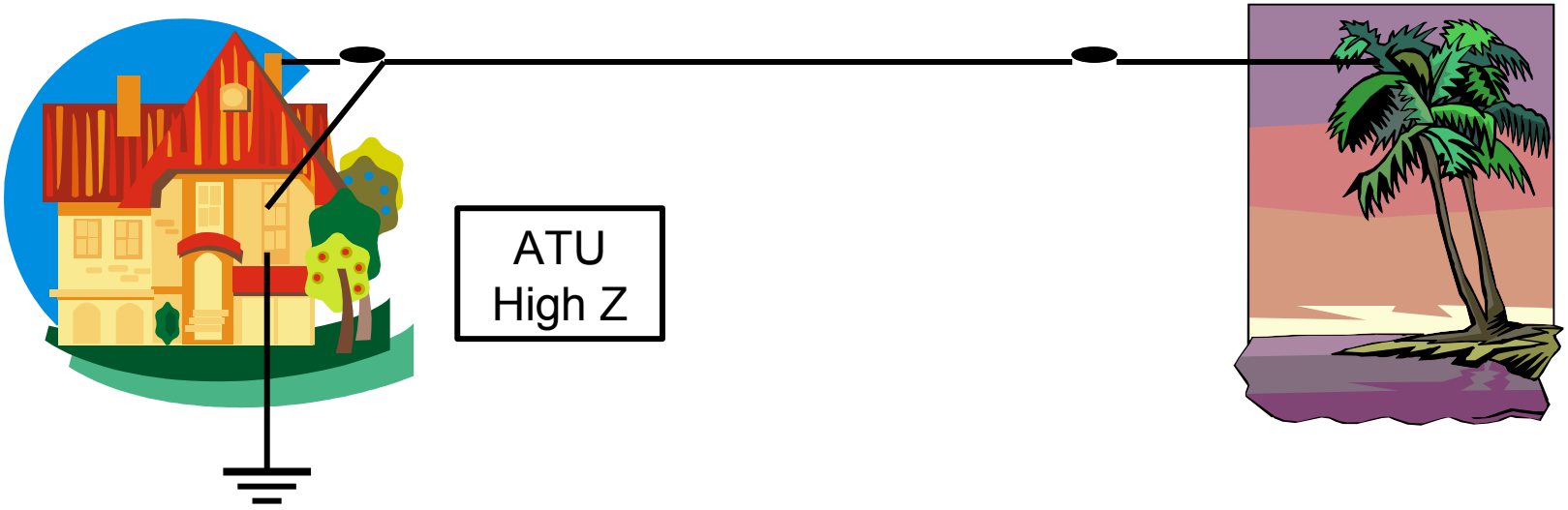
How do you know if its working?

- A piece of wet string will work! *Don't try it*.
- Cannot see if it's better
- Look for consistency of reports over time.
- Very subjective – depends on condx,
- Don't tell the other station you are testing new antenna as that adds 2 extra S points.
- Do not rip it down immediately after one poor report!

So what can you put up?

- Simplest solution End fed Wire
- But Beware!

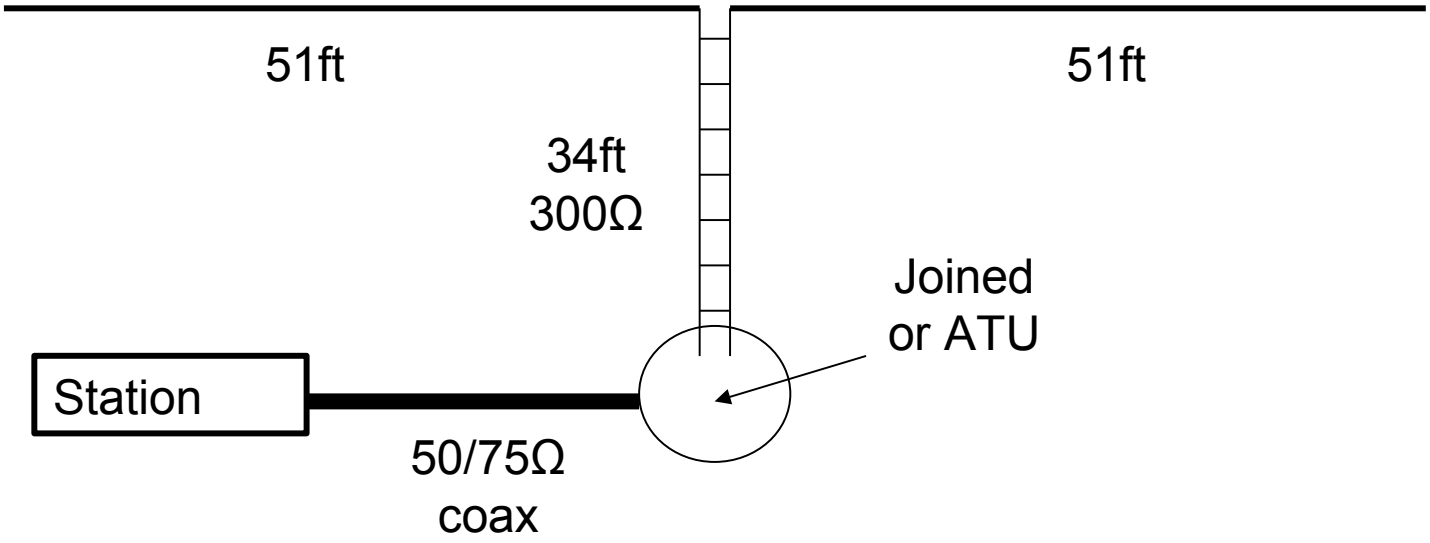
  High voltages, needs good earth, ATU, difficult upstairs, RF in shack, TVI & BCI,



Multiband Antennae

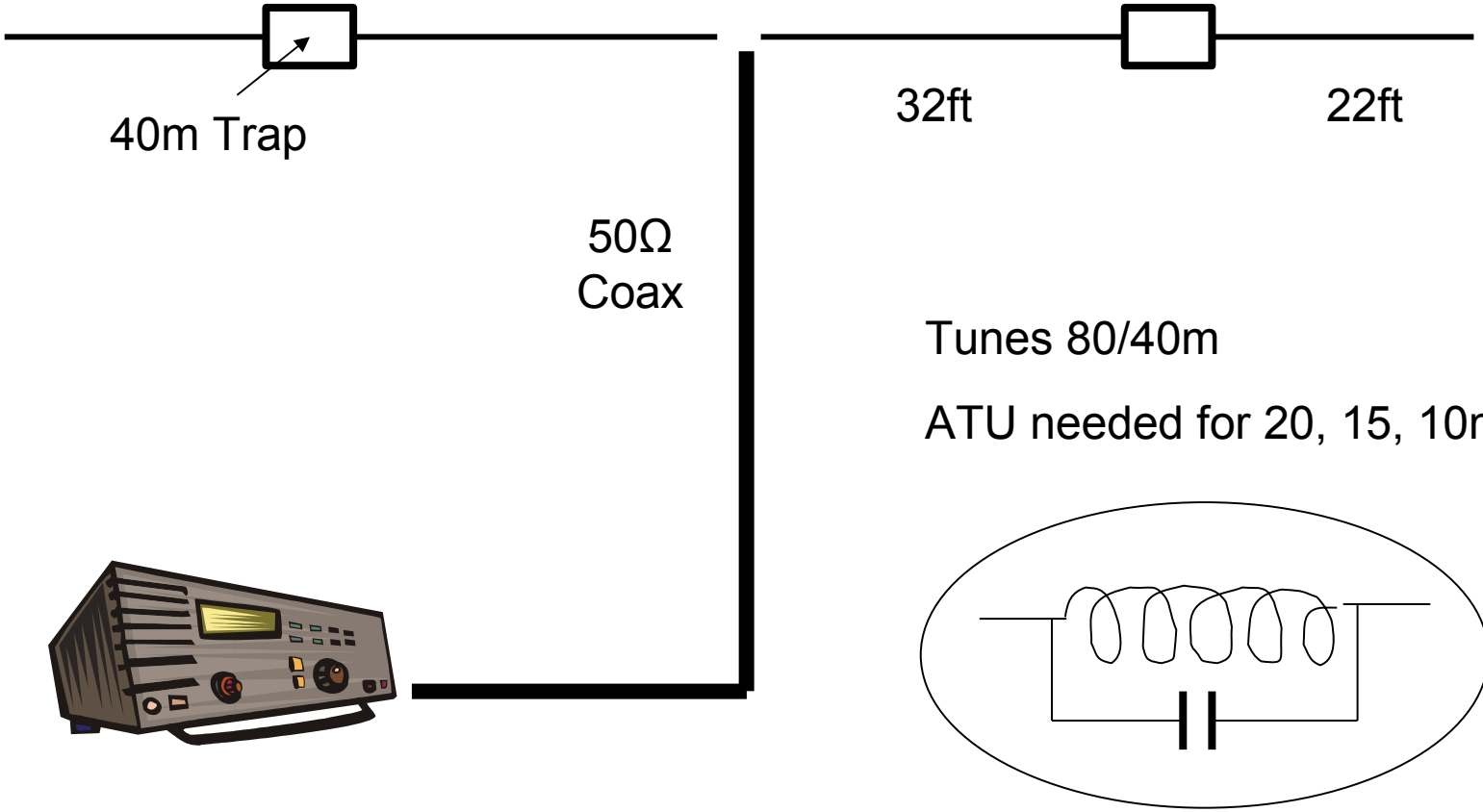
G5RV

- Full size, 80m – 10m,
- Half size, 40m +



Multiband Antennae

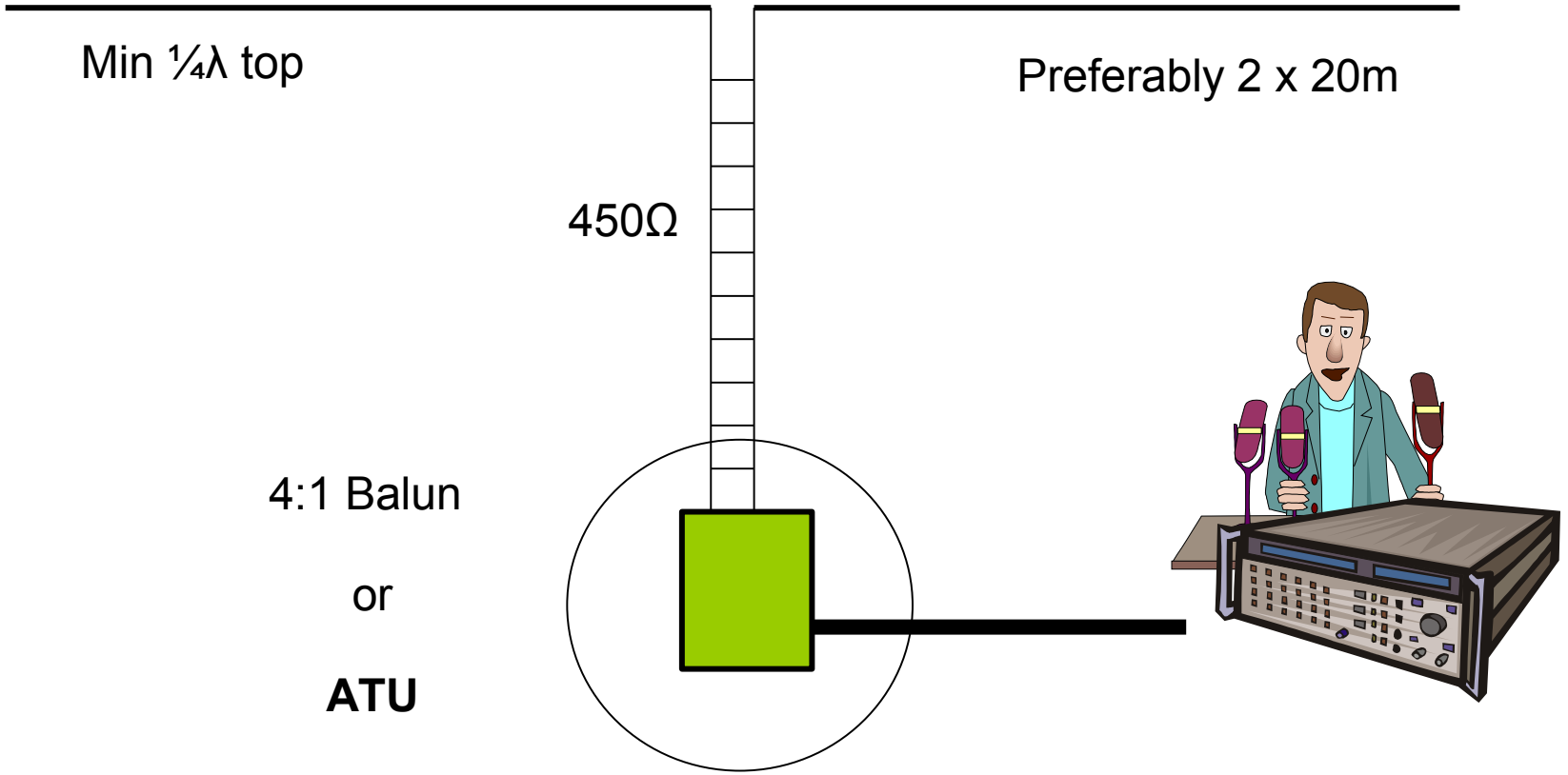
W3DZZ Trapped Dipole



Multiband Antennae

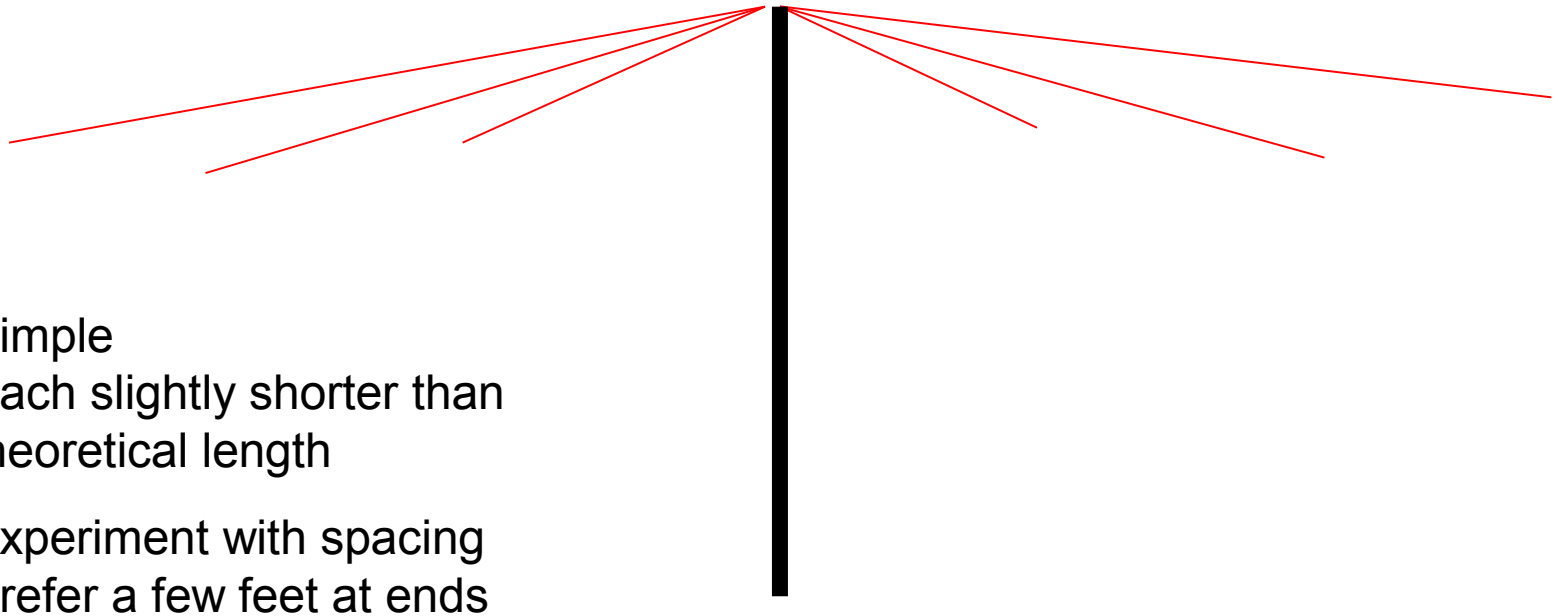
Doublet

- Simplest Multiband antenna



Multiband Antennae

Parallel Dipoles



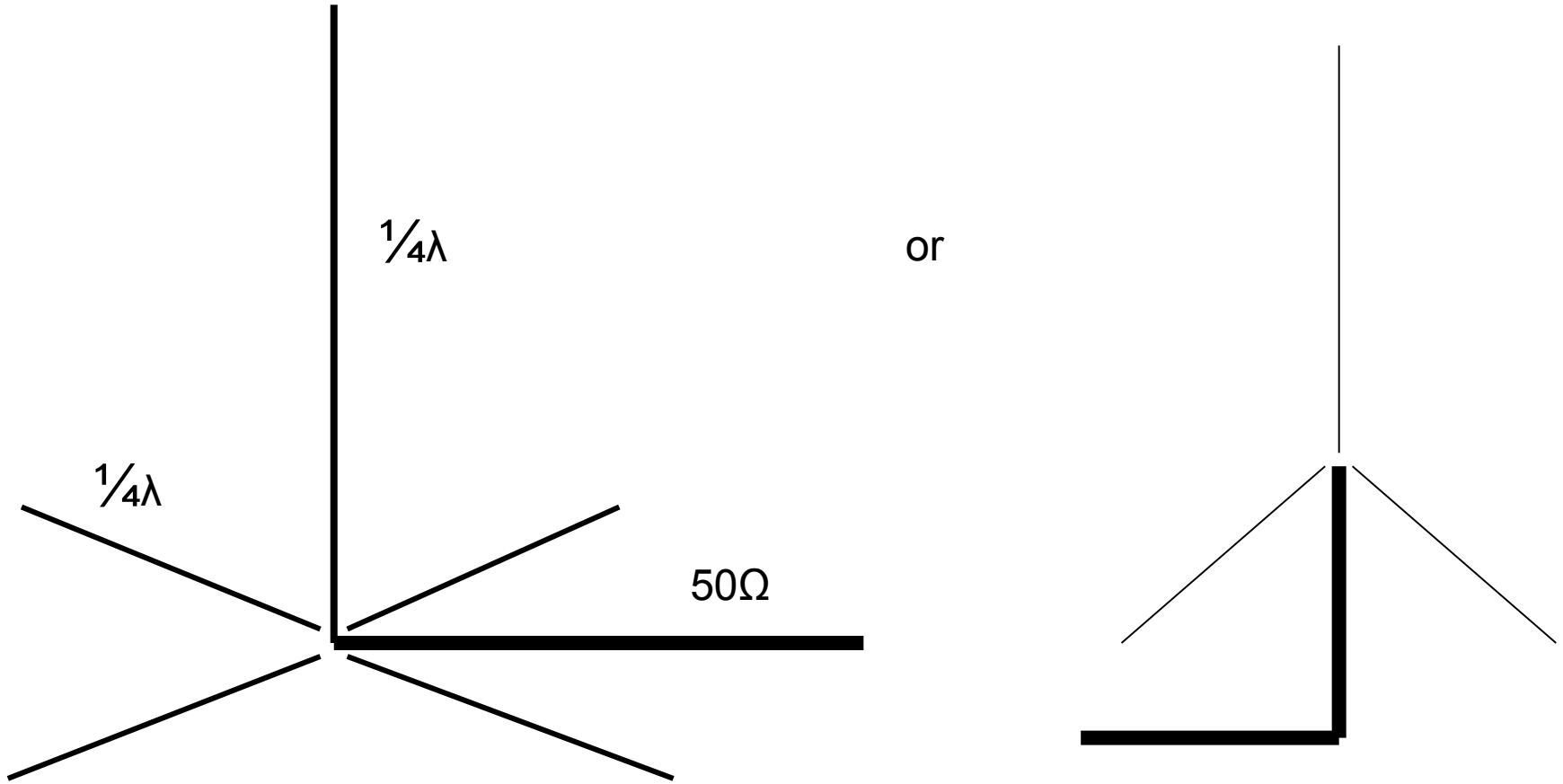
Simple
Each slightly shorter than theoretical length

Experiment with spacing
Prefer a few feet at ends

Vertical Antenna

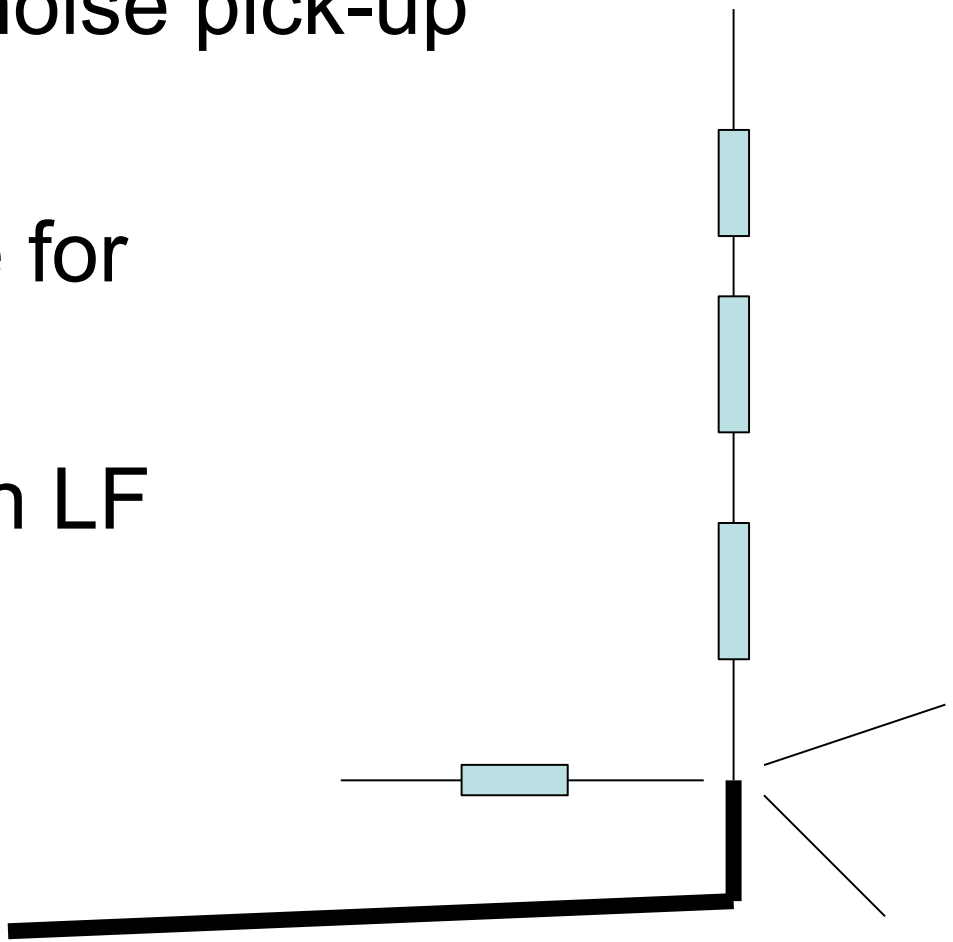
Vertical or Ground Plane

Despite claims, they work best with radials



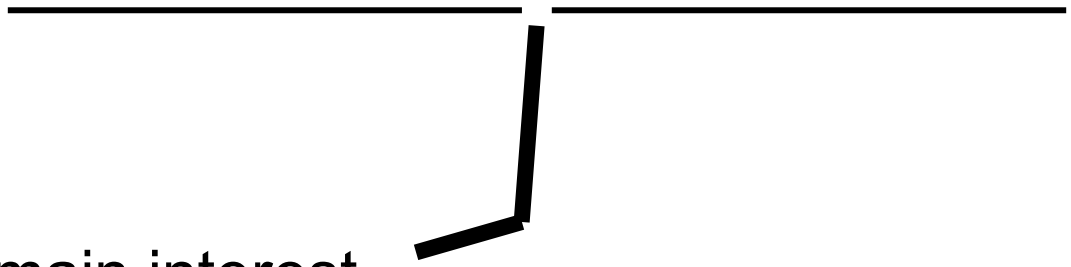
Verticals

- Compact
- Multiband trapped vertical, (commercial)
- Potential TVI, RFI, noise pick-up
- Work ok
- Can be tricky to tune for each band
- Narrow bandwidth on LF



Resonant ¼ λ Dipole

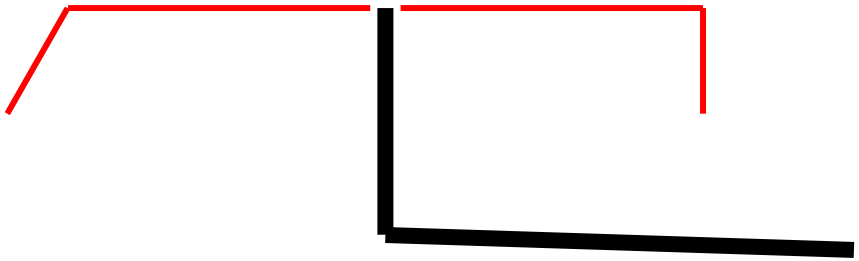
- Simple



- Choose band of main interest
- Calculate lengths using standard formulae

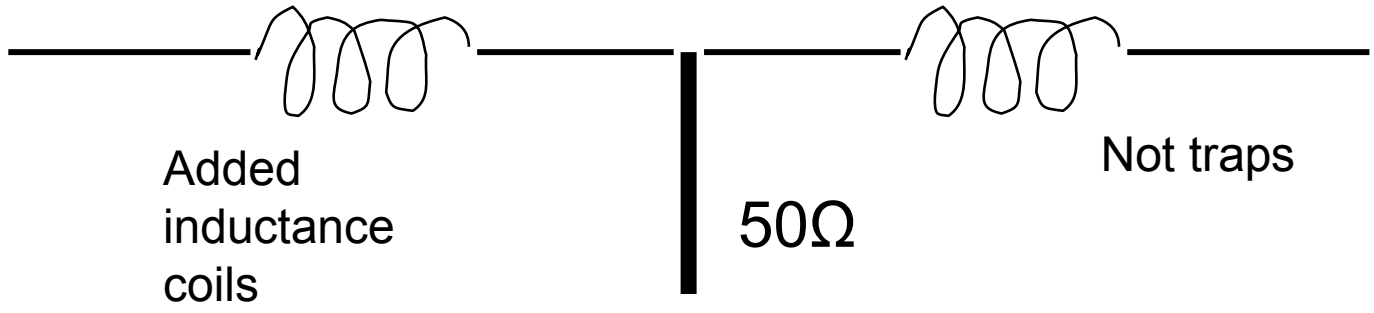
  Theoretical 492/f in ft or 150/f in metres

  In practice 468/f = ft or 143/f = m
- Horiz or inverted V shape, can drop ends/bend.
- ½λ High, or high as poss
- 50-75 Ω
- No ATU needed if resonant



Loaded Dipole

- For restricted space can use loaded dipole



- Coils reduce the overall length
- Wide spaced windings
- ⅛λ + between coils, Final tuning of ends

Construction issues

- Tune for band sector of interest
- Shorten by twisting back ends, not cutting
- Use good materials and construction methods waterproofing, support feeder
- If no analyser check SWR at each end and middle of band then lengthen or shorten.

  ie if resonating at low end of band shorten **slightly**.

  Only a few inches,

  same at both ends.

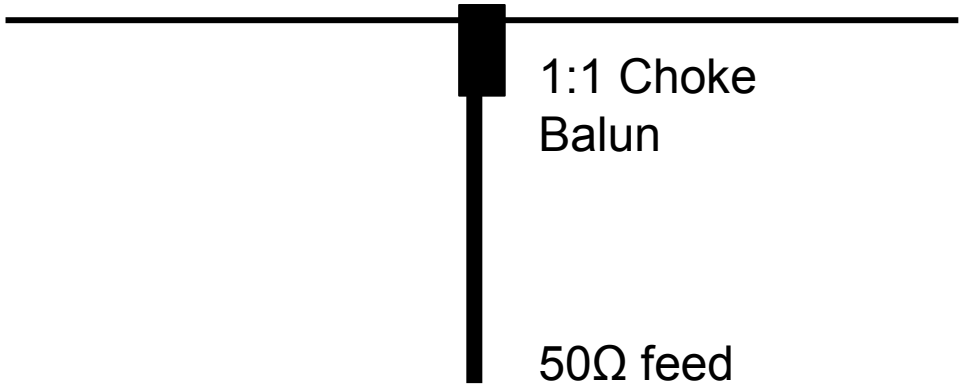
Feeders

- Coaxial, Open Wire/line, Ladder Line

- Coax 50Ω, easiest to handle into shack
  RG58 LF – ok to 30m (10MHz)
  RG213 HF – VHF/UHF, Westflex U/VHF
- Ribbon slotted 75Ω
- Open Wire 300Ω Ribbon, slotted
- 450Ω slotted, stiff, Highly visible, can break
- 600Ω Open Wire line, spreaders – home made

Balun

- **Bal**anced to Unbalanced
- Using a 1:1 Balun at the feeder/antenna joint of a dipole reduces currents flowing on the coax screen affecting radiation pattern, TVI, RFI. *(textbook)*
- In practice does not seem to make much difference.



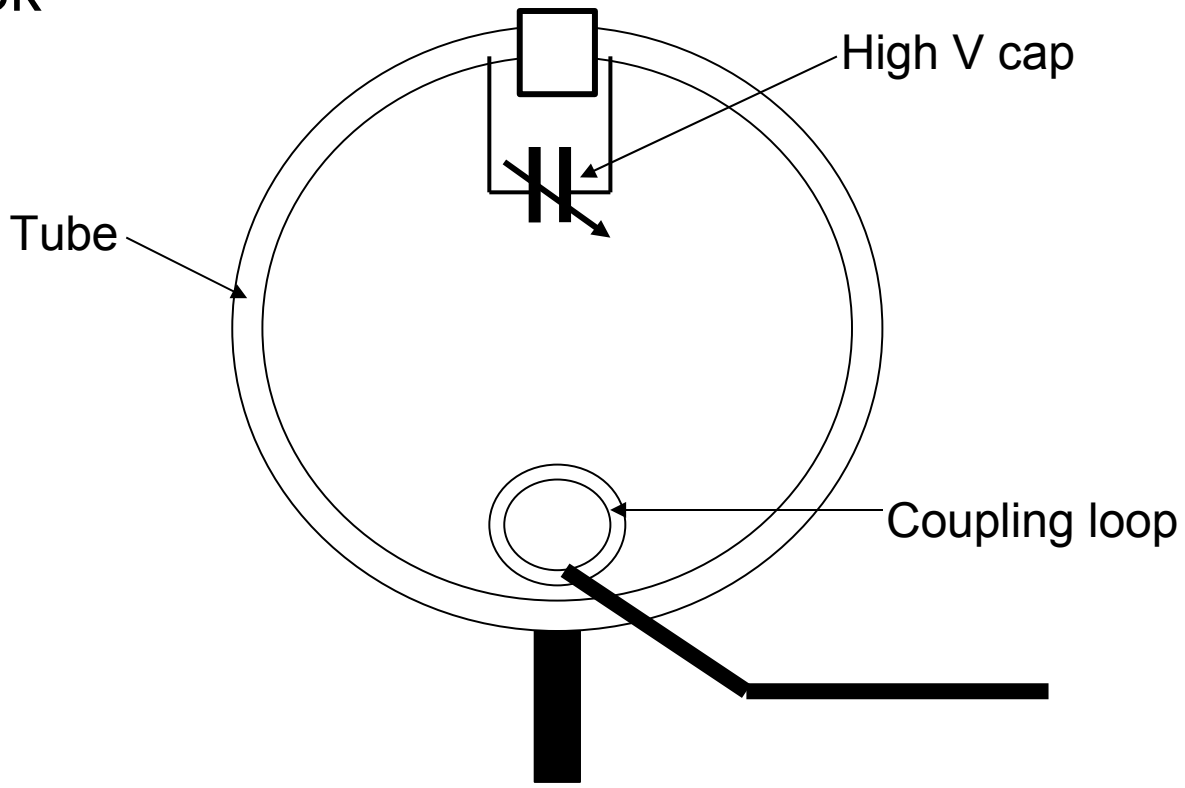
Other Antenna types

- Magnetic Loop

  Small ie 1m diameter or less

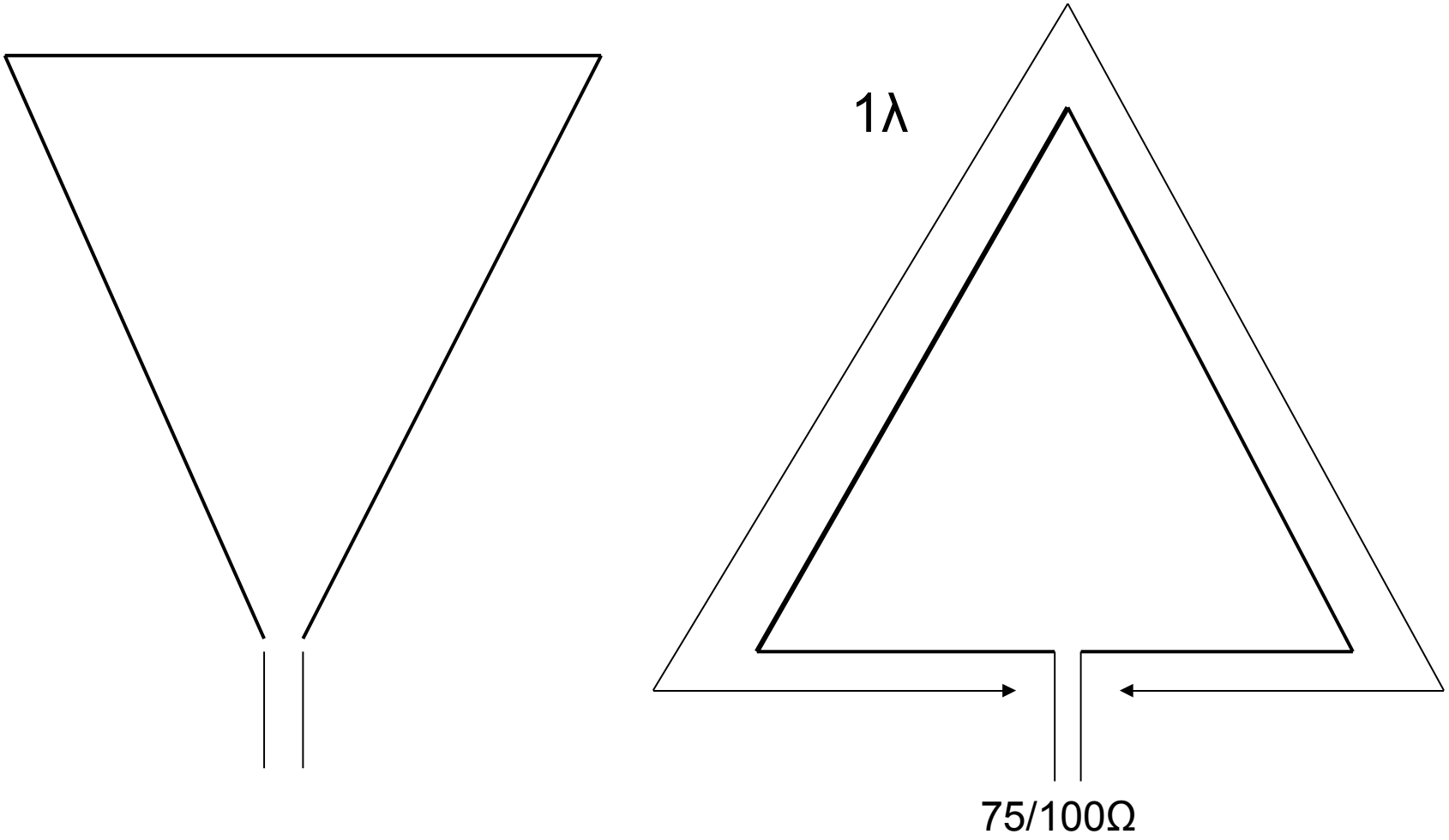
  Involved construction, critical tuning with narrow b/w

  Work ok



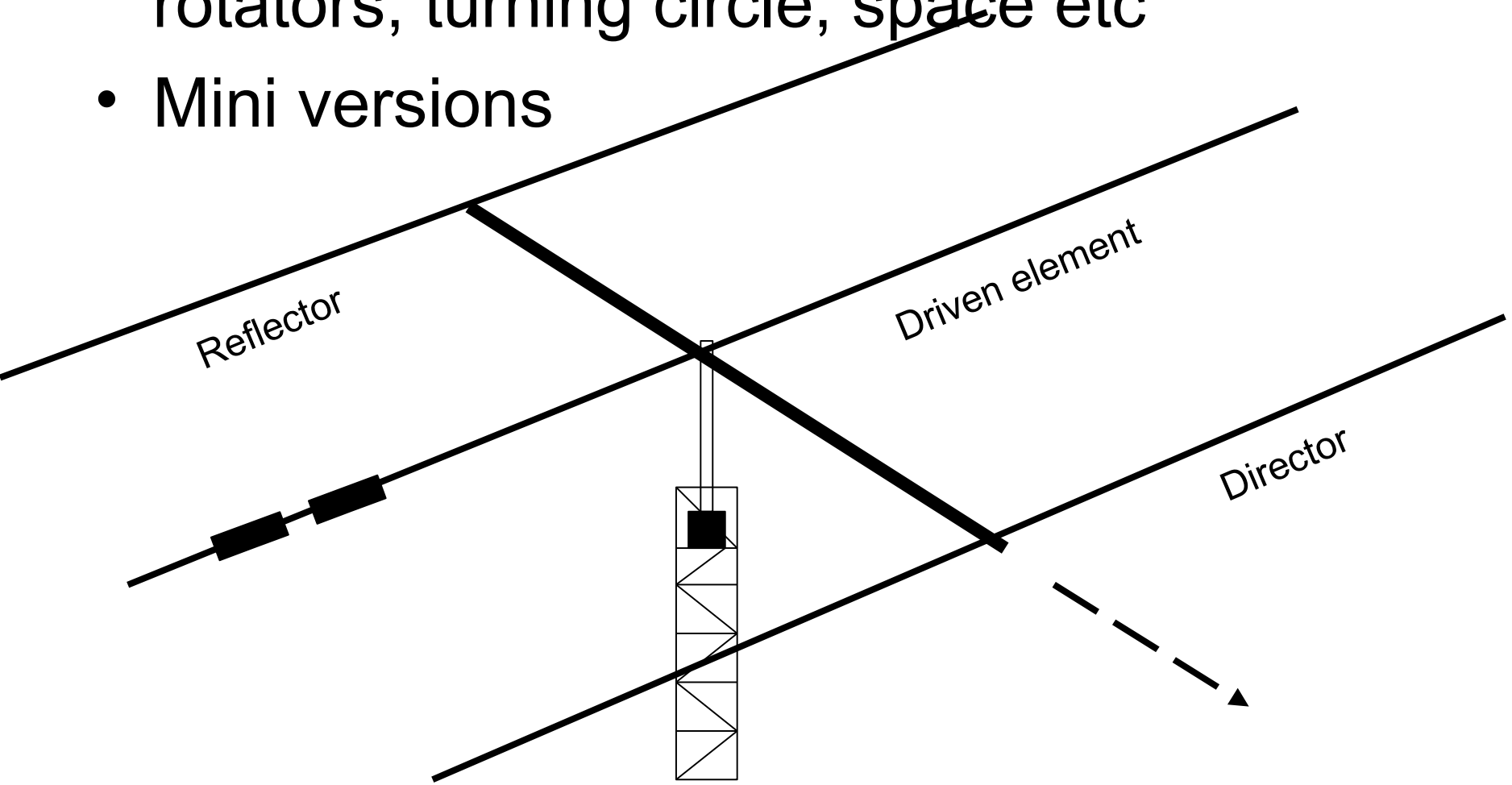
Others you may have heard of

- Delta Loop (quad loop)



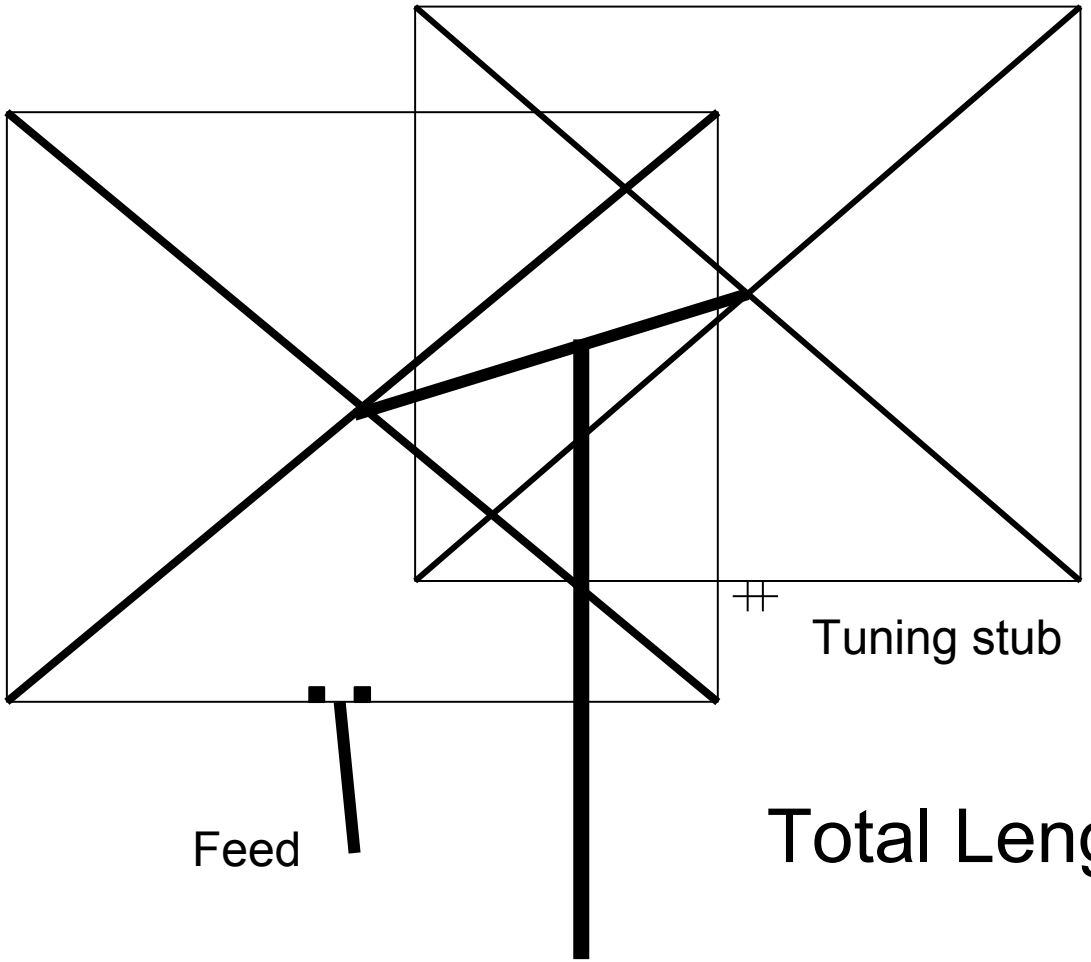
Yagi (after Japanese prof Yagi)

- Directional, with gain and front/back ratio
- Involves Planning permission, towers, rotators, turning circle, space etc
- Mini versions



Cubical Quad

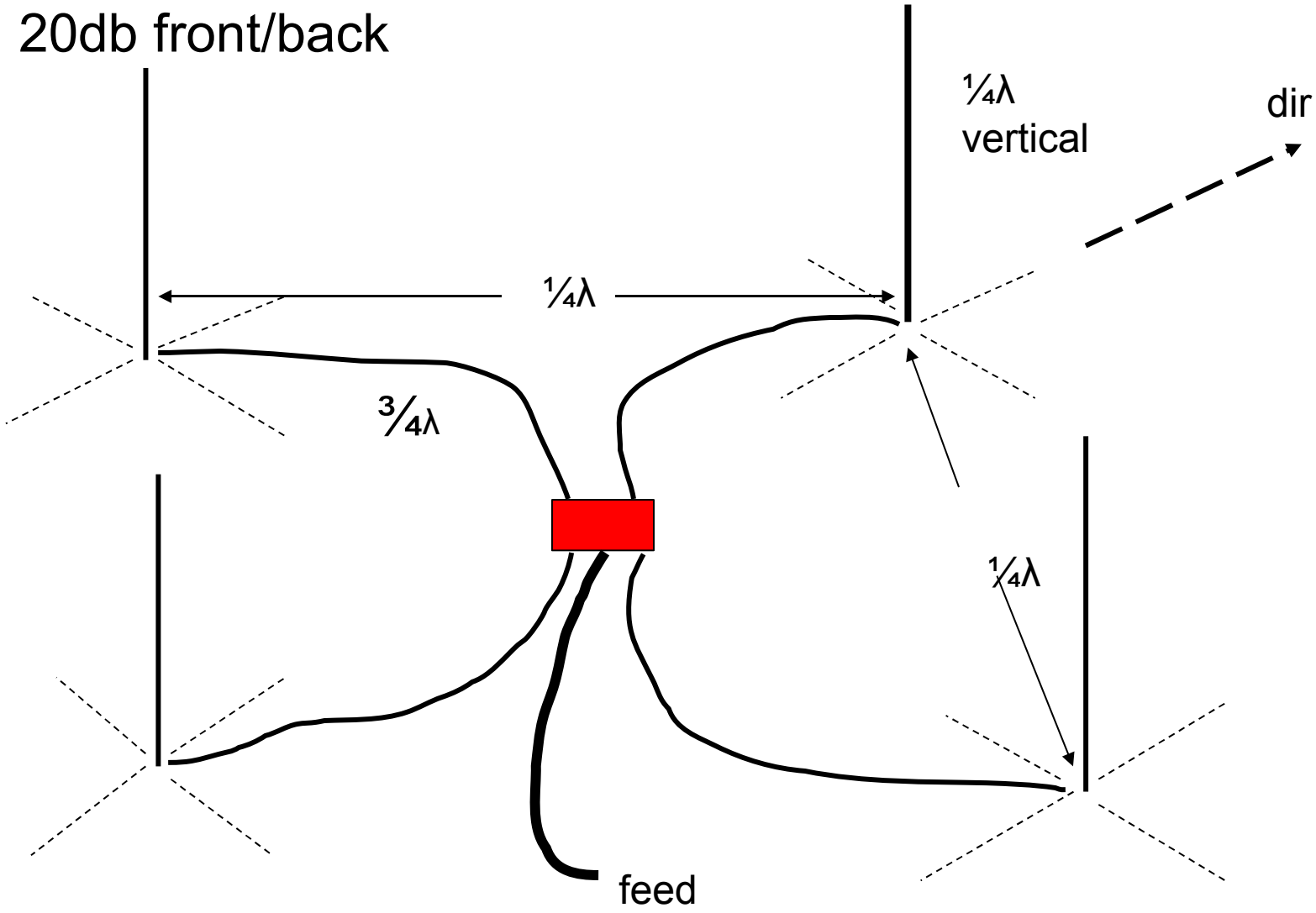
- Quad loops, Large, very effective, low angle radiation



Total Length = 1λ

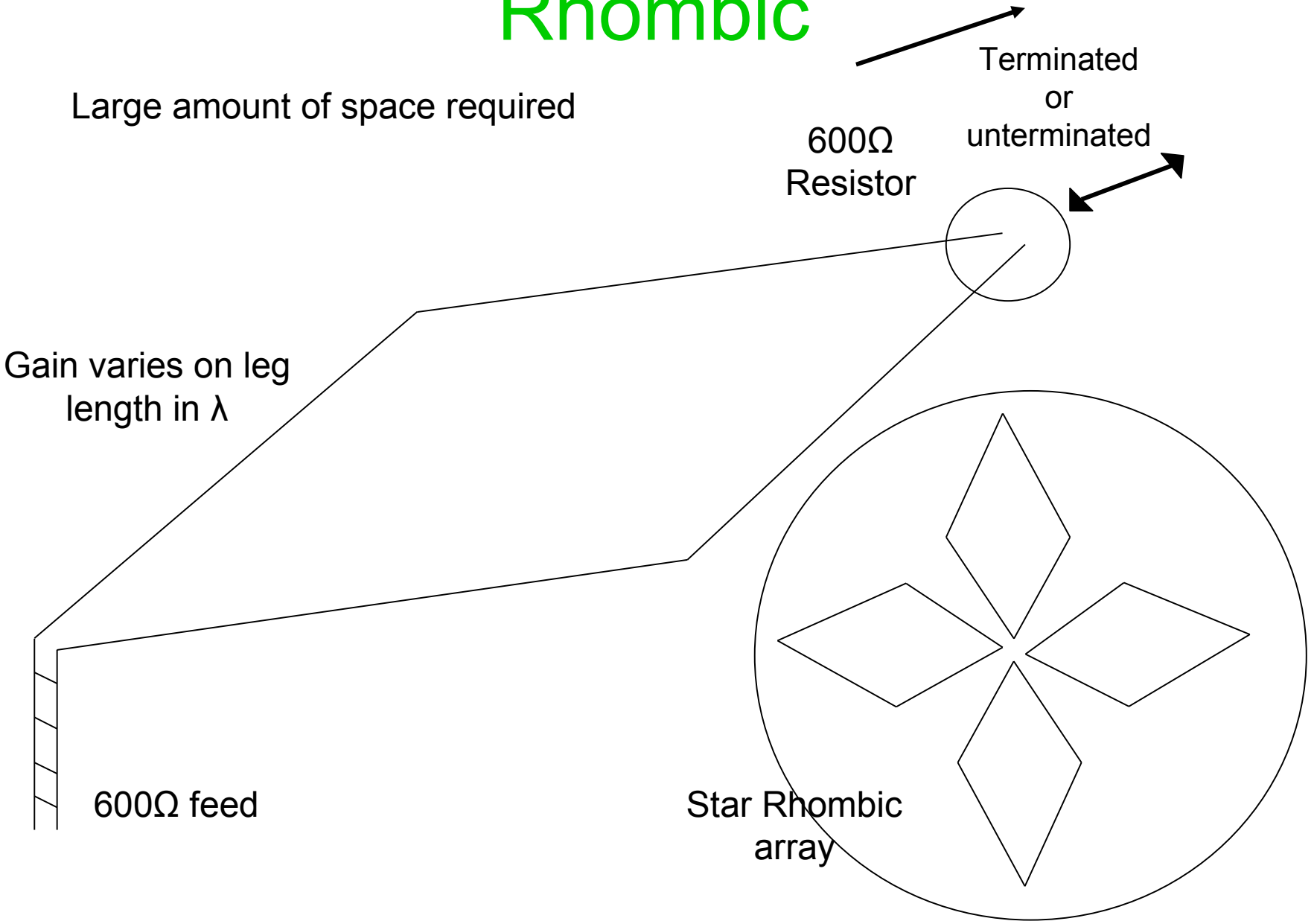
For serious DXing on LF

- Four Square, 5db gain over single element



Rhombic

Large amount of space required

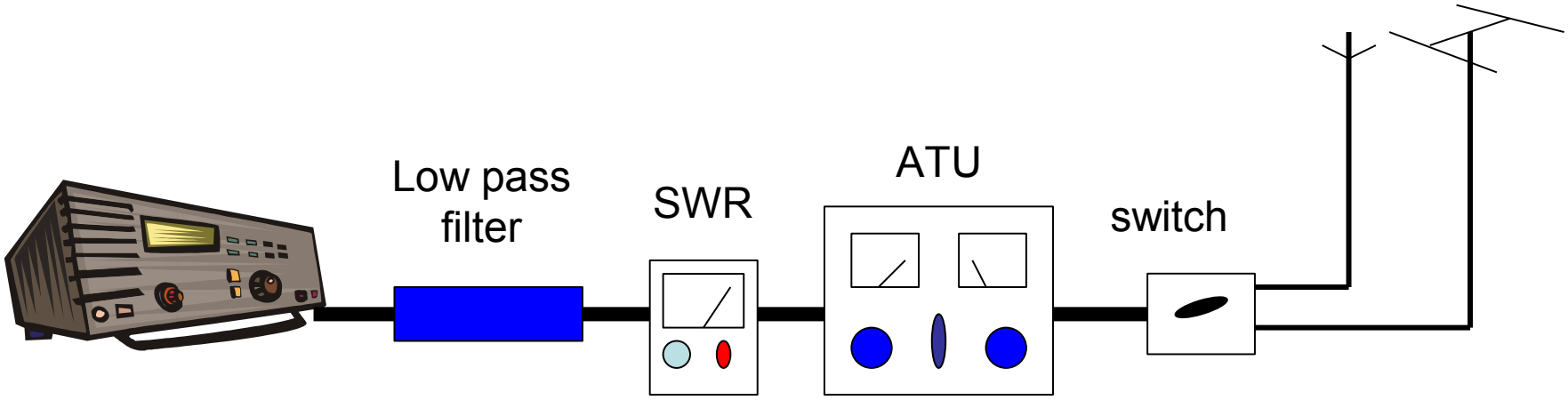


Too many types to detail

- V BEAM
- Windom, OCFD (Off Centre fed dipole)
- Log Periodic Yagi - wide freq range
- ¼λ Sloper
- Inverted L
- Marconi T
- Beverage - long, low receiving antenna for LF, low noise, at least 1λ long

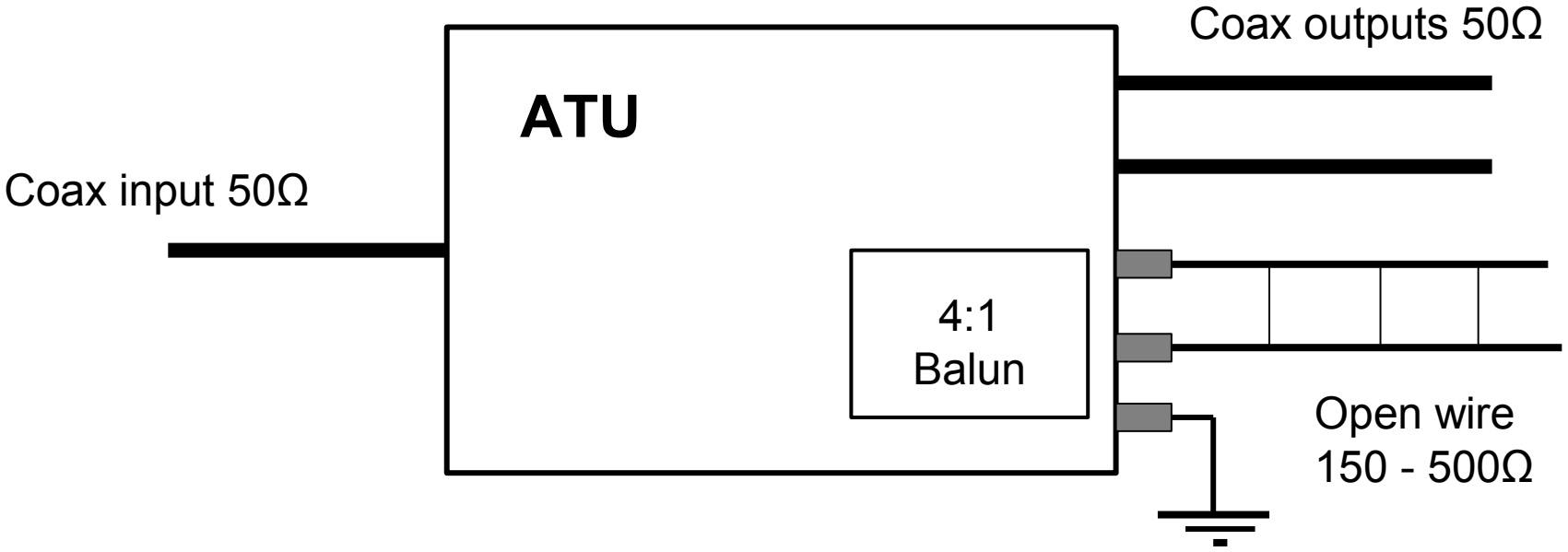
Connecting to the Antenna

- Most rigs have an in-built SWR/power meter and ATU
- Don’t lose power through in-line devices unless you have an RFI/TVI problem.



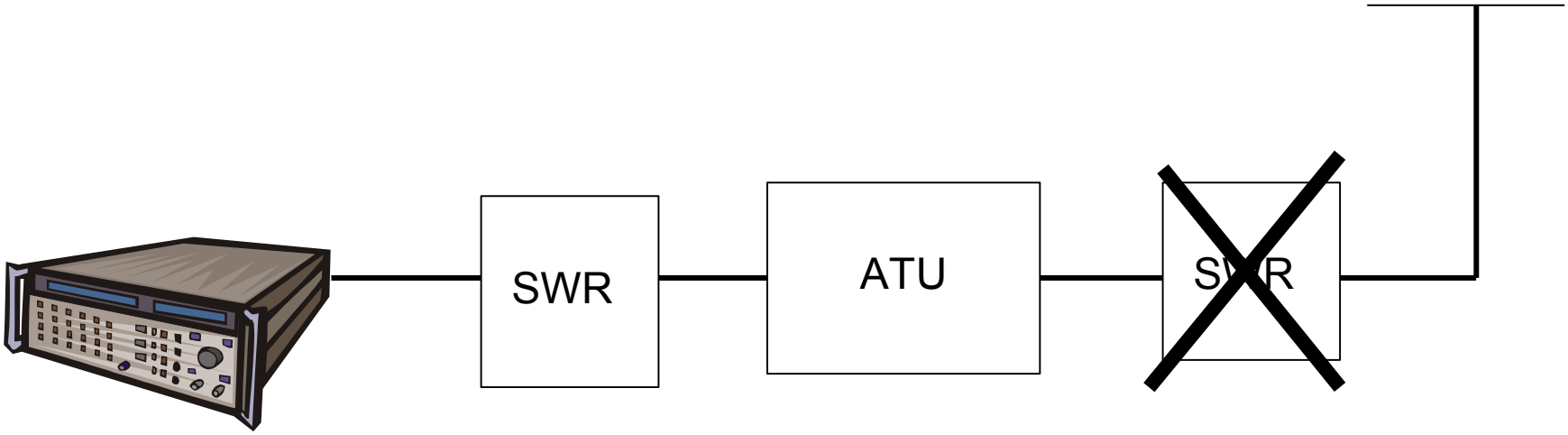
ATU's

- Rig inbuilt ATU's are 50Ω,
- Many add-on ATU's are also 50Ω in/out
- If you want to connect to an Open Wire feeder system a high impedance output is needed



SWR

- Don’t waste time worrying about an SWR reading over 2:1



SteppIR Yagi

- Why is it different?
- Each element has a motor which controls copper tape in fibre glass tubes
- Adjusts to appropriate length for each band with a controller.
- Works like a mono bander on all bands 14 -28 Mhz incl WARC bands.
- Can be tuned for max gain or front/back ratio
- Controller can switch it to ‘reverse’ to work off the back in 3 secs


The "Monster" Lives!