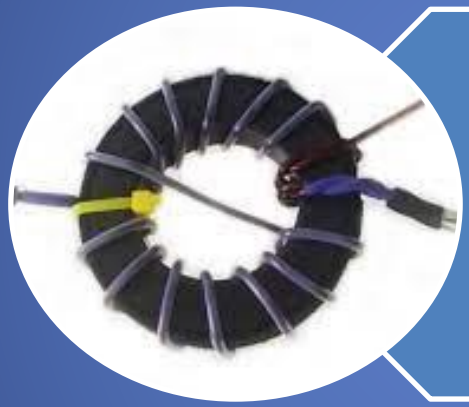
End Fed Antennas - some notes



de VE6KK

Peter

SASTAR talk April 18, 2022

End Fed Antennas – notes and comments

1. **Background and origin**
   -original was the end fed Zepp on hydrogen balloons
   - used open wire feed line and LC tuned TX
2. **EFHW vs. EFNR <(End Fed non-resonant)**
   - true end fed half wave is resonant on the band of operation
   - EFHW end Z is very high perhaps 1000-3000 Ohms but not infinite
   - EFNR is often called end fed random length - the old random wire!
   - the "random" length avoids ¼ and ½ W.L. and so avoids very high Z
3. **Matching the antenna**
   - open wire and balanced tuner – the best? – e.g. Emtech ZM-2 qrp
   - direct to a radio with wide range tuner (e.g. KX3?)
   - using coax feed and matching transformer
4. **Transformers**
   - EFNR typically uses a 9:1 i.e. 450 to 50 Ohm trifilar (3 wire)
     This is a true transmission line transformer – high efficiency possible
   - EFHW uses 49:1 or 64:1 autotransformer for 2450 to 3200 Ohms
     These are less efficient and need large cores for high power

End Fed notes- continued

5. **Wire lengths**
   - EFHW length is ½ W.L. on lowest band – be careful of multiples
   - EFNR- many lengths possible – which are best? - experiment
6. **Construction**
   - waterproof box not strictly necessary
   - core taping not necessary – ferrite is high resistance
   - insulated wire not strictly necessary – see Waters and Stanton
   - provide mechanical protection to core
   - capacitor (100-150 pF) across feed improves matching on 10m EFHW
7. **Core choice**
   - iron core e.g. type 2 poor on lower bands – mu is too low
   - ferrite mix 43 most common, mix 31 for high power stacked cores
   - small ½ inch size fine for QRP, 140-43 size for 100W EFHW
   - watch out for higher power or duty cycles, use 240 size
   - for EFNR the 140 size is ok to 300 W or so
8. **Winding**
   - twisted primary for EFHW xfmr not proven necessary
   - 9:1 TLT should properly use 150 Ohm line (hookup wire ok?)

Q&A

How do I hang the antenna?

- from rig and up, no feedline…. may need counterpoise
- coax to ground mounted transformer – up and out
- longer coax to tree or roof mounted transformer

Do I need a counterpoise?

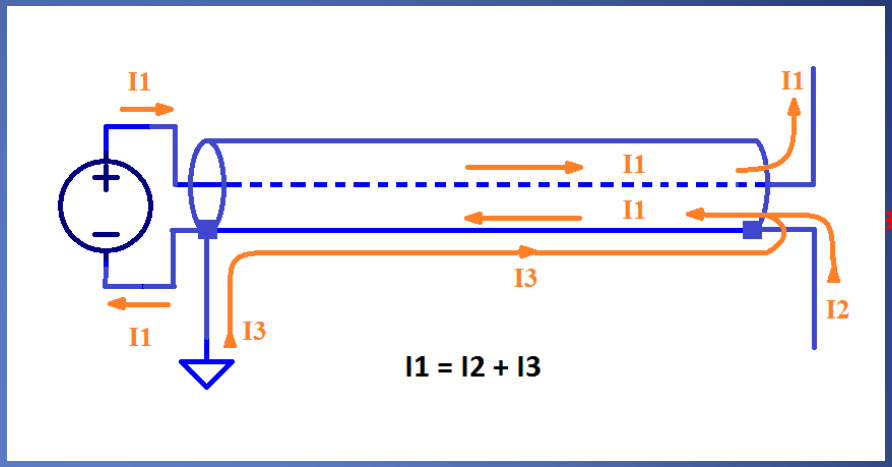
- a true EFHW needs a 0.05 W.L. counterpoise (Moxon)
- all end feds need or will create a counterpoise (W8JI)
- use a feedline choke to delineate counterpoise section of feedline

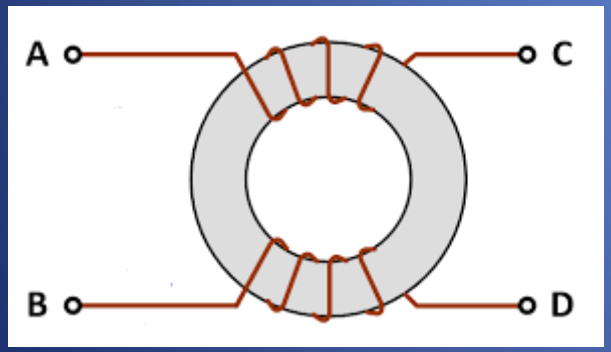
Is an end-fed antenna noisy?

- no antenna is “noisy” – some are more prone to noise pickup
- where are the noise sources? Avoid close proximity to line equipment
- an antenna high and in the clear will be the quietest
- end feds are VERY prone to feedline radiation AND reception <noise?
- this is also called **common mode** transfer to the coax shield
- use a feed choke in all permanent installs

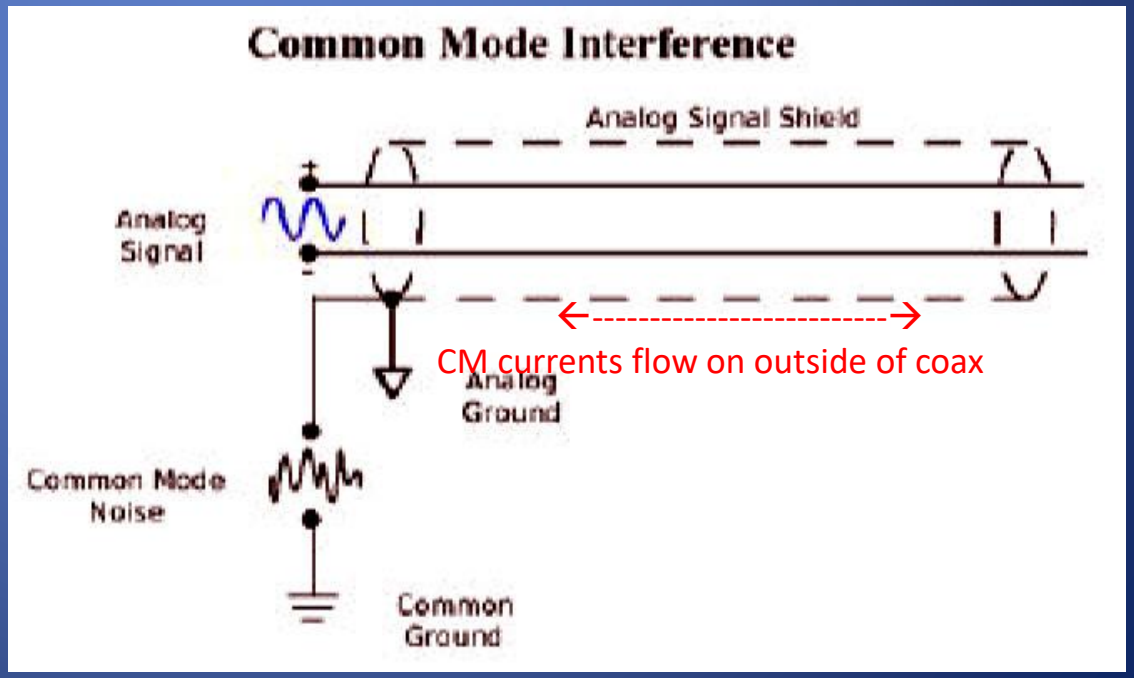
Common mode currents

common mode choke
(unbalanced line)





common mode choke
(balanced line)



References:

1. **Steve Ellington EFHW presentation**
   https://www.youtube.com/watch?v=N_o0jneBEh0
   - a bit snoozy and long but great info
   - see his other videos about building and testing
   - search "EFHW antenna Ellington" on YouTube
   - he explains counterpoise, compensation coil, capacitor, power
2. **K1 RF's presentation on End Fed Half Wave antennas**
   http://gnarc.org/k1rfs-presentation-on-end-fed-half-wave-antennas/
3. **HyEndFed Antennas**
   https://www.hyendcompany.nl/
   - considered among the best in prebuilt EFHWs
   - save money by just purchasing the transformer?
4. **Emtech ZM-2 15 w manual tuner – balanced line or coax**
   https://steadynet.com/emtech/
5. **Ferrite cores** https://palomar-engineers.com/ferrite-products/
   https://www.kitsandparts.com/toroids.php great company too.
6. Waters and Stanton
   https://www.youtube.com/watch?v=qv8Jmyu8q7Q&t=66s
   https://www.youtube.com/watch?v=4PHygzYrOBM&t=537s

References – a bit more technical:

1. **Steve Yates AA5TB on EFHW**
   https://www.aa5tb.com/efha.html
   - solid theory as per that of Les Moxon
   - shows Z vs. counterpoise length, LC coupling to antenna

2. **Tom W8JI – a top notch engineer**
   – do read this artricle
   https://www.w8ji.com/long_wire_antenna.htm/