



Chelmsford Amateur Radio Society

Foundation Course (7) EMC

Chelmsford Amateur Radio Society
Foundation Licence Course

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(7) EMC

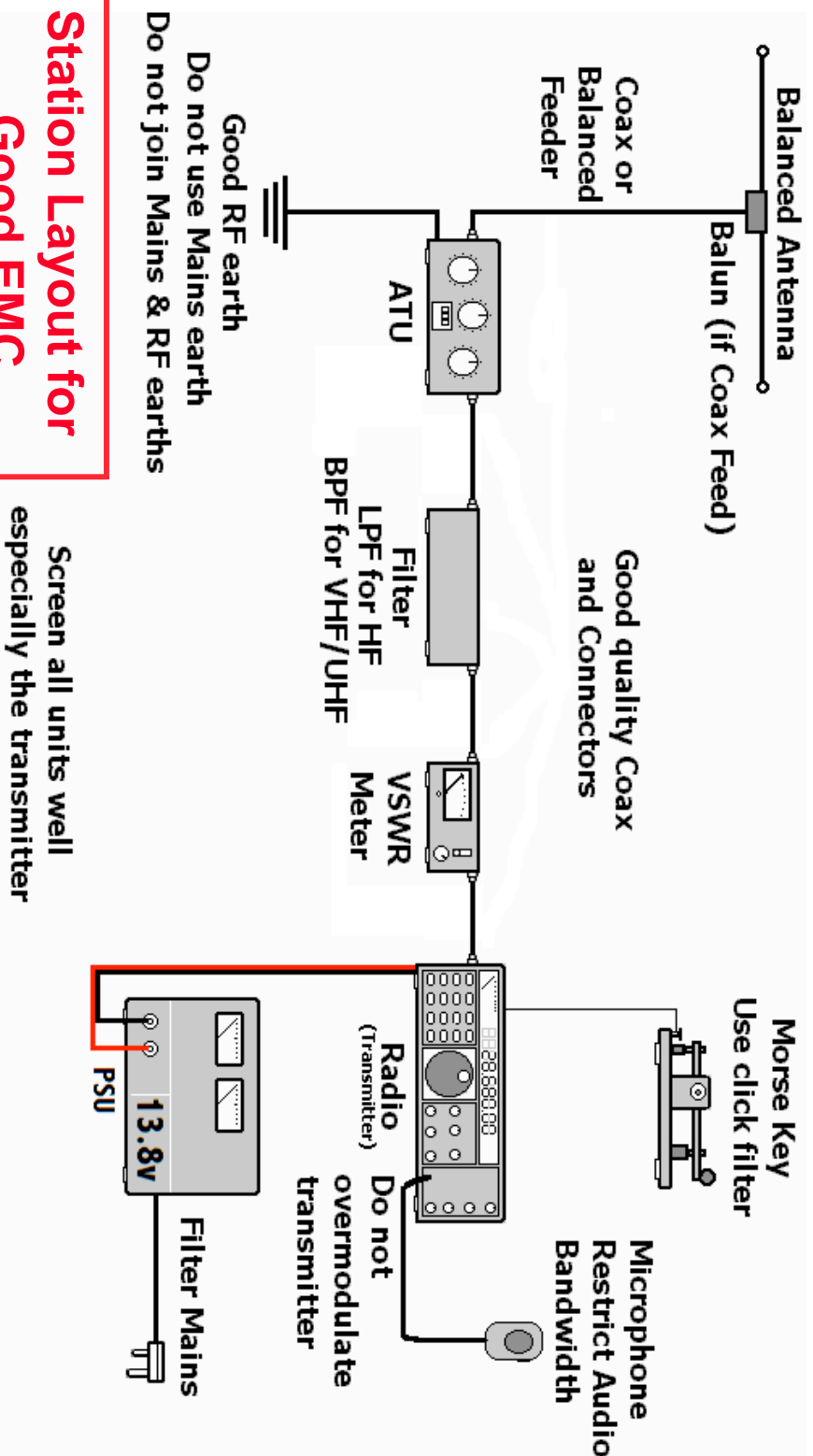


EMC - Introduction

- EMC - **E**lectro-**M**agnetic **C**ompatibility
- Consumer Appliances and Radios together in Perfect Harmony!
- EMC has two aspects:-
 - Avoidance of generating interference.
 - Immunity of own kit from being interfered with.
- The more power you run...
 - the greater the likelihood of causing interference
- The type of mode in use has a great affect on the interference



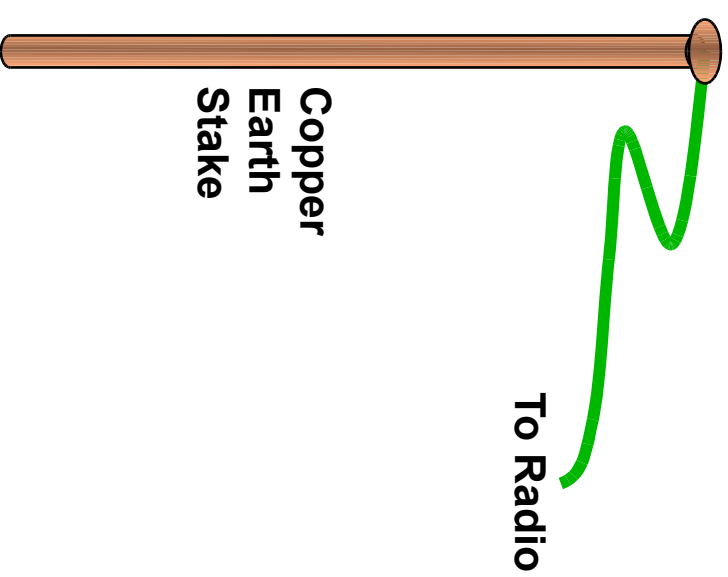
Station Design For EMC





RF Earth Connection

- Use a good RF earth connection in an HF transmitting station
- Provides a path to ground to minimise RF currents entering the mains earth system
- Minimises the possibility of interference to other electronic equipment
- Should consist of the shortest possible length of thick copper braid to an earth stake in the ground

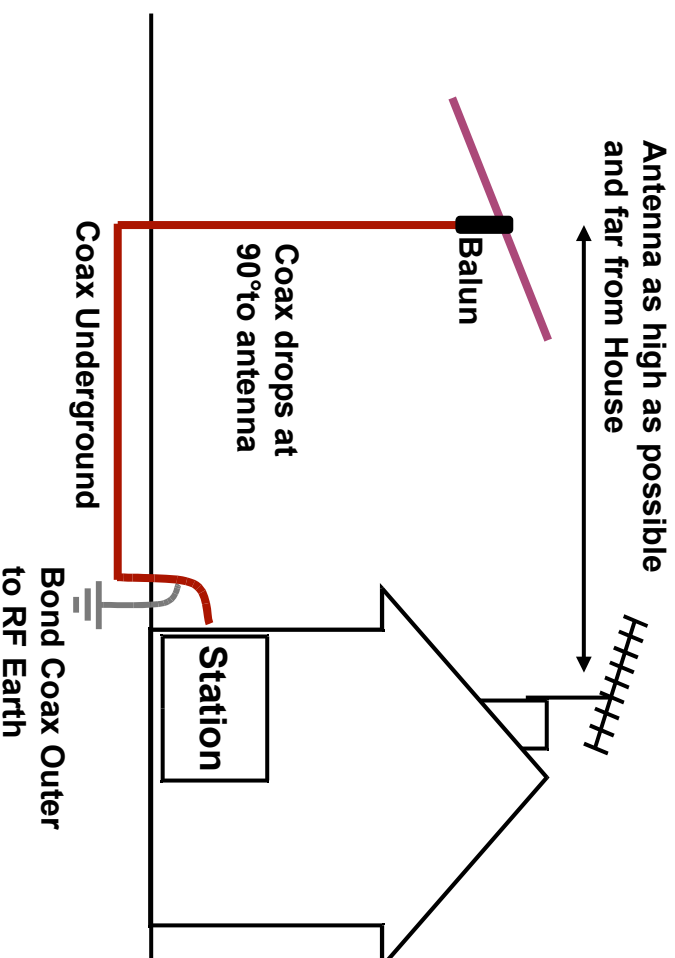




Choice of Antenna Type

Dipole / Balanced System

- **EMC Correct Antenna System**
- **Antenna sited as far away and as high as possible from TV antenna.**
- **Good quality coax run under ground where possible.**
- **Coax earthed at point of entry to house.**
- **Balun used.**
- **Balanced Antenna System.**

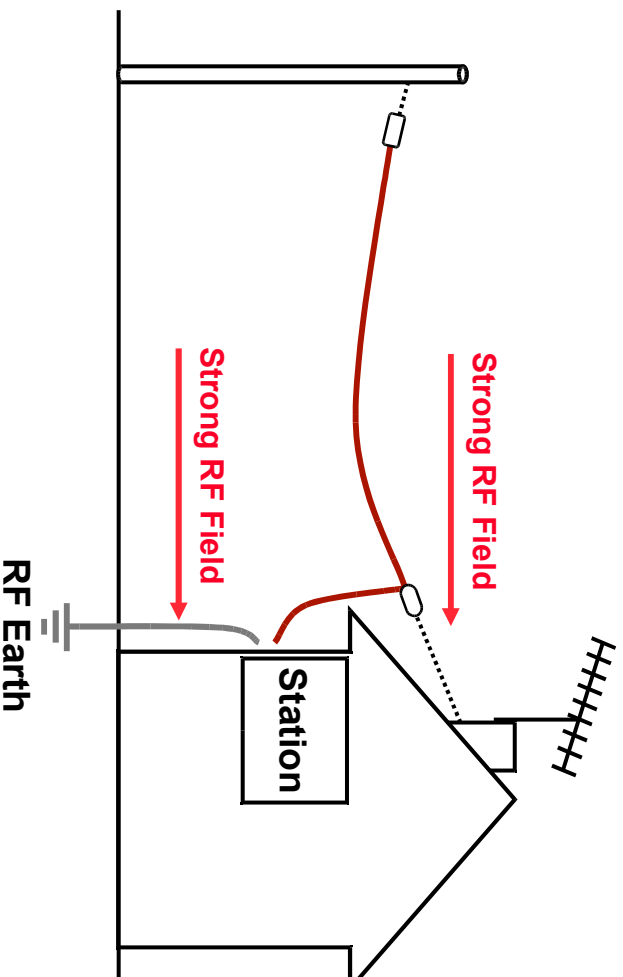




Choice of Antenna Type

Long Wire / End-Fed Wire System

- **Poor EMC Antenna System**
- **Unbalanced Antenna System**
- **End-Fed Wire**
- **Strong RF fields near the house**
- **Poor earth system**
- **Near TV antenna**
- **Most likely to cause interference**

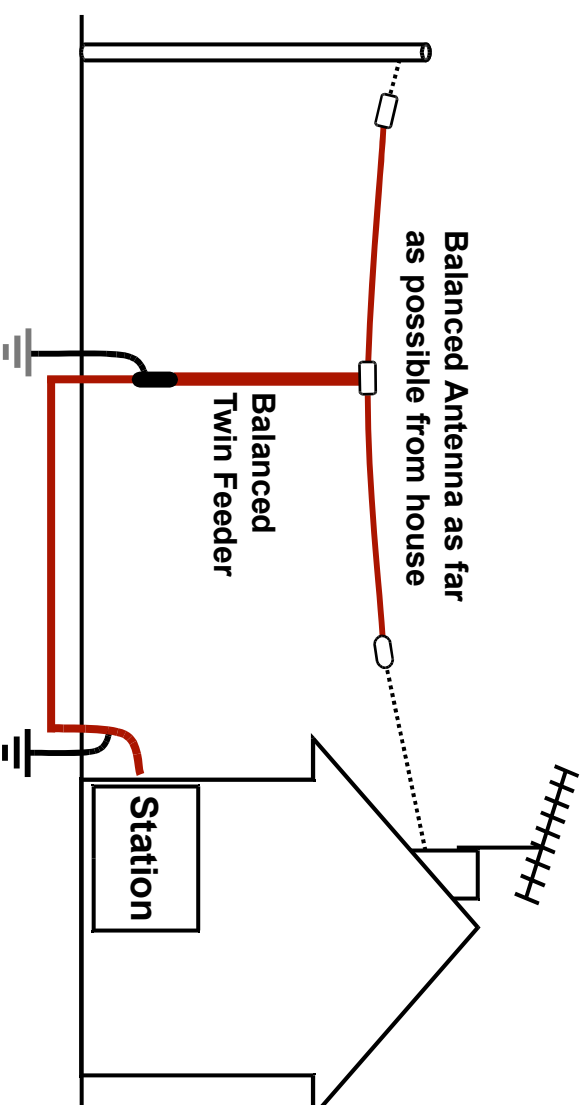




Choice of Antenna Type

Best EMC - Balanced System

- **Excellent EMC Antenna System**
- **Balanced Antenna**
- **Well Located**
- **Well Earthed**
- **Antenna Position - Spaced away from TV Antennas, Phone Lines**
- **Least likely to cause interference**





FM Transmission

- **Wavy, herringbone patterning on TV**
- **Possible loss of colour**
- **No effect on sound**
- **But on severe cases may cause distorted or loss of sound.**

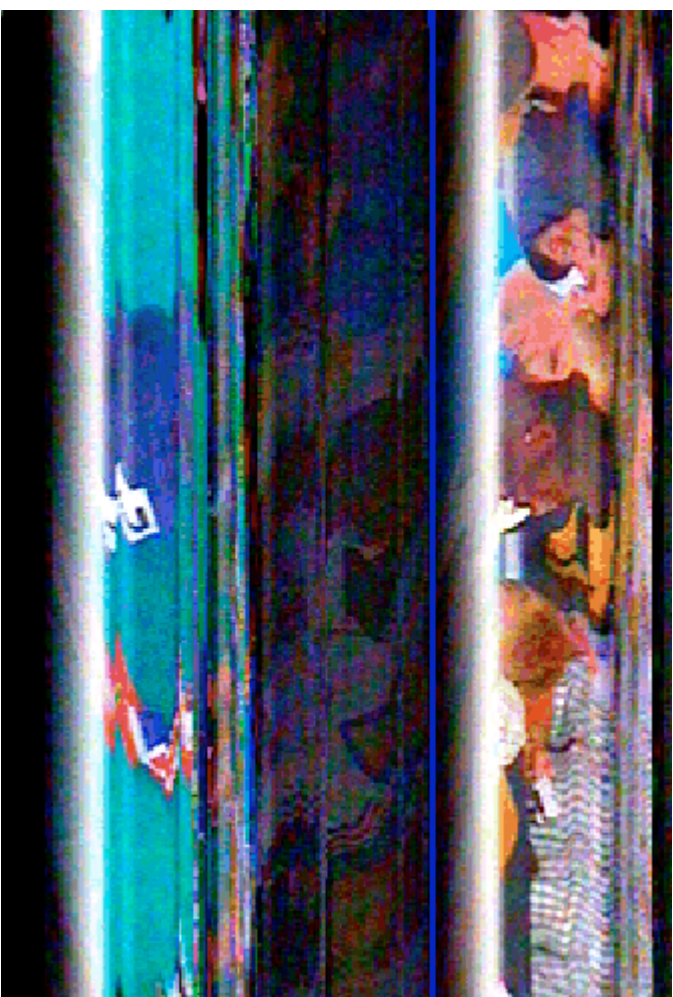


Herringbone patterning on TV



AM or SSB

- Similar patterning on screen,
- Possibly in time with speech,
- Distorted voice like sounds, can be intelligible.



AM / SSB Patterning on screen



CW - Morse code

- Possibility of flickering picture or wavy effects,
- Possibility of clicks or distortion on sound.
- The use of a key click filter on the Morse key will help.

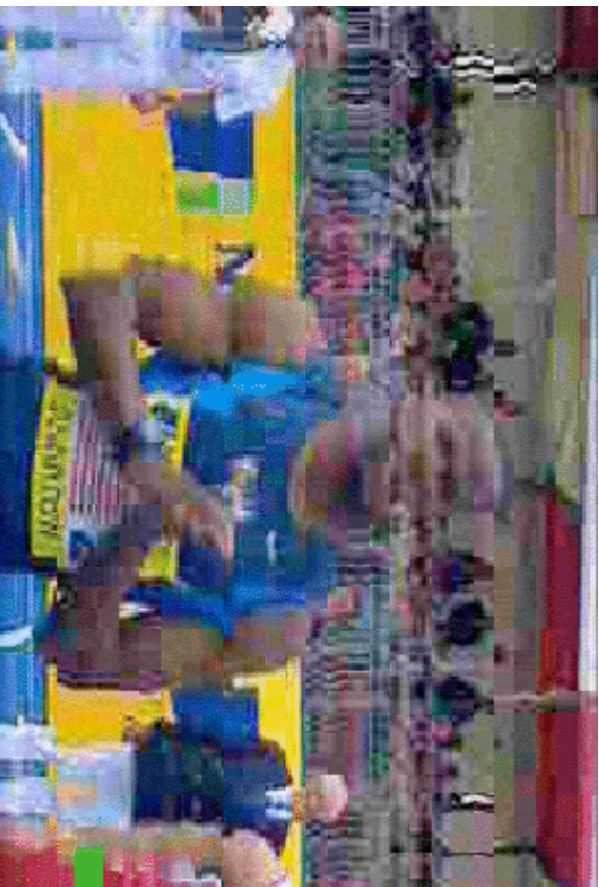


Morse code - possibility of clicks or distortion on sound



Digital TV

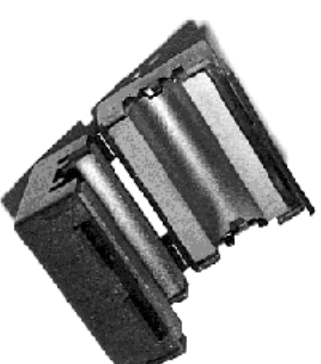
- Digital TV is affected quite differently.
- There is no visual evidence of what is happening other than the picture becoming jerky, forming blocks as if it is a jig-saw,
- Freezing or disappearing.
- These effects are the same as if there is a weak signal.
- The neighbour is more likely to call the service engineer believing a fault on the TV.





EMC Precautions

- Suppress problems at their source !
- Use Lowpass/Band Pass Filters to suppress Harmonics for TVI at the transmitter end.
- Use Dedicated RF Earths - **NOT** Safety Mains Earths
- RF Traps / Baluns on antenna feeders
 - *Improves the Source*
- Inline Filters, Ferrite Rings may be needed
 - *Helps the Victims - TV, HiFi, PC, Home Theatre etc*
- Fit filters as close as possible to affected equipment.





Social Issues

- **EMC has the potential for causing Neighbour Disputes**
 - Commonly Television Interference - TVI
 - Sometimes on HiFi, Telephone Lines
 - Even a few Watts is enough to overpower a TV preamp
 - Keep a log book – it will help you
 - Get them to keep a log book – it may not be you!
- **Advice is available from the RSGB EMC Committee**
- **Local Ofcom officers will also help in dealing with cases of interference.**



Re-Cap

- **EMC - Electro-Magnetic Compatibility**
- **Station Design For EMC**
- **RF Earth Connection**
- **Choice of Antenna Type**
 - *Dipole / Balanced System (Best for no TV interference)*
 - *Long Wire / End-Fed Wires System (Worst for TV interference)*
- **Choice of transmission Mode**
 - *FM Best for no TV interference*
 - *SSB/AM Worst for TV interference*
 - *CW may cause TV interference*
 - *PSK31 should be benign*
- **Fit Filters where needed**
 - Transmitter- (Low pass)
 - Receivers - TV Radio (High pass)
 - HiFi / PC Speakers – Ferrite rings
- **Mobile Installations Issues**
- **Social Issues**
 - Diplomacy at all times
 - Log book
 - RSGB EMC committee may help
 - Ofcom's assistance (£50+)
- **Your local radio club**
 - Ask and someone may have the answer – as they may have had it all before