

Electromagnetic Compatibility

for the Radio Amateur

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- Common EMC Standards in use :
 - Commercial
 - EN 55022 Emission
 - EN 50082/1 Susceptibility
 - Military
 - MIL-STD-461
 - DEF STAN 59-41

- Amateur Radio Licence Terms, Provisions and Limitations Booklet BR68 (issued by Ofcom)
 - Conditions of use : The Licensee shall use the station for the purpose of self training in communication by radio communications including technical investigations
 - Inspection : The Licensee shall permit a person authorised by the Secretary of State to have access to the station, and view the licence and station log (if available)

- Myself :
 - Electronics degree BSc
 - MPhil 'Radio Interference from Car Ignition Systems' – My first exposure to EMC

- Phil Brown M5BTB

- Naval communications experience
- Systems Engineering in electronics and communications industry

- RSGB EMC Committee Member
 - Volunteer RSGB EMC Coordinator for West Sussex
 - RSGB has set up a group of enthusiasts to help members deal with EMC problems.
 - Ofcom may charge for investigating EMC complaints (Form RA179)
 - With the increasing plethora of sensitive susceptible, and possibly emanating, electronic goods in the home, there is an increasing risk of incompatibility between the radio amateur and the neighbours.

- Sample Questions from the Radio Amateur Examinations :
 - Q1 The radiation of harmonics from a transmitter can be reduced by :
 - » A) fitting a low pass filter
 - » B) using a different microphone
 - » C) changing from voice to morse operation
 - » D) changing to a different frequency band
 - Q2 The station can be closed down at any time by :
 - » A) a demand by an adjacent amateur
 - » B) a demand from a neighbour experiencing interference
 - » C) a demand from a person acting under authority of the licensing authority
 - » D) a taxi firm experiencing interference
 - » Answers at the end of presentation

- Measuring emanated RFI is relatively easy, compared to measuring susceptibility
- Commercial equipment is normally only tested for emission (e.g. EN55022)
- Susceptibility problems may only be apparent if the equipment interferes with itself. Difficult to test, and expensive
- ADSL was seen as a great danger to the amateur HF bands, but this is currently thought to be an exaggeration.
- Power Line Transmission is the next great danger. Its use will definitely increase background noise on HF. PLT is under limited usage in Germany.

EMC Case Studies, and Observations

- Case Study 1 – Knowing the Technology
 - Amateur running 100w into 10 element Yagi (2m), 40ft above ground
 - Neighbour complains of amateur's voice being heard on bedroom computer speakers
 - Similar complaint for 50w (6m), also through a yagi
 - Neighbour becomes aggressive, threat of damage to equipment, stalemate
 - Another neighbour complains of computer speakers 'bursting' into life'
 - An apologetic letter, copied to local constabulary, sent to aggressive neighbour giving possible cures. Letter includes words 'I am fully licensed by the Secretary of State to carry out transmissions as specified within my licence.....'
 - As far as I know the problem still exists.....

 - NB. Yagis can have of ~16dB, the effective radiated power of 4kw !
 - A similar fiasco was experienced by another amateur, again using a Yagi, at the transmitted power of 10w ! Also giving ~400w.
 - Note that 400w transmissions will commonly interfere with neighbours

- Case Study 2 – Ignorance is bliss
 - OAP couple asked by radio amateur if they had TV interference problems
 - No, but we seem to pick up aircraft a lot !

- Case Study 3 - Safety

- A military explosives expert was holding a detonator which was activated by a passing communications Landrover. One thumb was badly injured
- I have seen notices at petrol stations, warning customers not to fill up and use their mobile phone at the same time. Examples of resulting fires were cited

- Case Study 4 – Household Equipment
 - Radio amateur complains that the usual HF receiving bands are suffering interference, to such an extent they are unusable for DX.
 - Problem was traced to a neighbour who had fitted an electronic water descaler to his mains water pipe. This is wrapped around the mains water pipe and emits 16kHz square wave pulses. No CE marking on descaler
 - Supplier fits another descaler, same problem occurs
 - Solution WIP

- Case Study 5 – MiG Welding
 - Local interference wipes out HF bands on receive
 - Neighbour builds stockcars
 - Amateur contacting welding equipment manufacturer for recommended EMC filter, and other precautions

- Case Study 6 – Intruder Alarms
 - Amateur triggers neighbour's intruder alarm
 - As a result transmitting limited to when neighbour is at home
 - Sensor replaced and EMC filter added

- Case Study 7 – Vehicle Alarms

- Amateur transmitting on 2m triggers vehicle alarms
- Alarms annoy neighbours, and activation flattens car batteries
- AA van seen checking affected vehicles
- Antenna gain and power reduced

EMC

- The RSGB warns that if an amateur supplies filters to cure an EMC problem, they must be a loan rather than a gift. A gift may be seen as a legal acceptance of liability, rather than a gesture of goodwill
- The RSGB supplies booklets and many types of filters to help the Radio Amateur overcome EMC problems.
- Further information is given on the subject of EMC in the RSGB Yearbook.
- Plus the EMC Coordinator Service (of course !)
- The answer to Q1 is A.
- The answer to Q2 is C.