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THE REGULATORY ROUNDUP

Topic: Electromagnetic Compatibility (EMC)

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Electromagnetic Compatibility (EMC) is the term for certain kinds of interference. EMC covers situations where:

- Radio devices, such as your neighbour's TV, react to your transmissions
- Non-radio electronic devices, such as loudspeakers, react to your transmissions
- Your receiver reacts to nearby non-Amateur transmitters
- Your receiver reacts to nearby non-radio electronic devices such as switching power supplies

EMC has nothing to do with other kinds of interference we may experience – such as crowding on the Amateur bands – nor does it apply to situations where two Amateurs are competing for use of the same frequency.

Innovation, Science and Economic Development Canada (ISED) has a policy on EMC that provides guidance on who is responsible for resolving interference problems related to the operation of our transmitters. The policy is set out in Electromagnetic Compatibility Advisory Bulletin 2 (EMCAB-2), titled "Criteria for Resolution of Immunity Complaints Involving Fundamental Emissions of Radiocommunications Transmitters." It establishes criteria for interference resolution based on measured field strength at the location of the affected equipment and sets a standard for acceptable field strength levels (see Table 1)

The three broad types of equipment are:

- Broadcasting receivers including TVs, AM radios, FM radios, and any other receiver used to receive broadcasting
- Associated equipment including speakers, headphones, and audio amplifiers that are connected to and working with broadcasting receivers
- Radio-sensitive equipment including: computers and their associated monitors; speakers or other accessories; household appliances; lighting systems and garage door openers; and many others. Note that the field strength standard for radio-sensitive equipment is higher.

"If the level of the transmitted signal exceeds the applicable field strength value on the premises of the affected equipment, it will be deemed that the transmission is the cause of the problem. If the field strength is less than the applicable value, the affected equipment's lack of immunity will be judged the cause. These criteria are not applicable to incidents involving the transmissions of AM, FM or TV broadcasting transmitters. Those occurrences are subject to the provisions incorporated in the Broadcast Regulations and Procedures."

The policy recognizes that some radio equipment may have inadequate filtering to suppress out-of-band energy. It also recognizes that some equipment not intended for radio reception may be affected by nearby transmitters.

The policy provides a nuanced way of dealing with interference problems. If your transmitter is found to be the cause of the problem, you may be required to reduce power, pay for and install devices to suppress the interference, or take some other measure to reduce the interference.

It is also possible that the responsibility may lie with the owner of the affected equipment to take measures and pay for suppression.

Amateur Radio Question Bank

There are four possible questions in the Basic Question Bank on this policy.

The following are the questions, with the correct answers:

B-001-025-001

Q – Your neighbour's stereo system malfunctions when you are transmitting. What provision in Electromagnetic Compatibility Advisory Bulletin EMCAB-2 deems the stereo system's lack of immunity is the cause?

A – The field strength of your emissions, on your neighbour's premises, is below Innovation, Science and Economic Development Canada's specified immunity criteria

Table 1

Type of Equipment	Current	
	dbuv/m	V/m
Broadcasting Receivers	125	1.83
Associated Equipment	125	1.83
Radio-Sensitive Equipment	125	3.16

In the "Regulatory Roundup" column in each issue of *The Canadian Amateur* magazine, I will provide an overview of our regulatory priorities and also discuss some topics of interest.

B-001-025-002

Q – Your neighbour's television receiver malfunctions when you are transmitting. What provision in Electromagnetic Compatibility Advisory Bulletin EMCAB-2 deems your transmission is the cause?

A – The field strength of your emissions, on your neighbour's premises, is above Innovation, Science and Economic Development Canada's specified immunity criteria

B-001-025-003

Q – When determining the field strength criterion per Electromagnetic Compatibility Advisory Bulletin EMCAB-2, what type of equipment describes devices often used in home entertainment systems, but not strictly speaking radio apparatus?

A – Associated equipment

B-001-025-004

Q – Your neighbour complains that your transmissions interfere with their garage door opener. When determining the applicable field strength criterion in Electromagnetic Compatibility Advisory Bulletin EMCAB-2, what type of equipment is the garage door opener?

A – Radio-sensitive equipment

Anyone writing the Basic exam will get one of these four questions. The purpose of the questions is to ensure that all Amateurs understand they may have responsibilities to remedy EMC problems. The questions, however, do not provide insight on how to resolve situations.

What About EMC Solutions?

There are three sections of the Basic exam that test knowledge on technical measures to deal with EMC problems:

B-008-002 – Audio rectification, bypass capacitors, ferrites

B-008-004 – Harmonics, splatter, transmitter adjustments

B-008-005 – Use of filters, low-pass, high-pass, band-pass, band-reject

There are 11 questions in each of these sections for a total of 33 possible questions on resolving EMC problems.

Each person writing the Basic exam will get one question from each of these three sections on mitigating EMC problems.

Who vs How

All told there are four questions everyone trying the Basic exam will get on EMC matters:

- One question on who is responsible for fixing the problem
- Three questions on the technical means to resolve the problem

Most of the interference problems we experience are with our immediate neighbours. Television Interference (TVI) and pickup of RF in speaker leads are typical examples, but there are many, many more variations.

Technical + Diplomacy

The field strength measurements mentioned in EMCAB-2 are beyond the ability of most Amateurs to measure. These measurements would be made by ISED officers at the location where the interference happens.

ISED document GL-01 provides "Guidelines for the Measurement of Radio Frequency Fields at Frequencies From 3 kHz to 300 GHz". This will only happen if an interference complaint goes official.

Going official means that relations between you and your neighbour have already broken down.

The best solutions to EMC problems require not just technical knowledge, but also good manners. Most of the time, you and your neighbour can resolve an interference complaint with good humour and good will.

If we must get into ISED making precise field-strength measurements, that may indicate that relationships have already broken down and that you and your neighbour are now playing the blame game. This represents a failure of diplomacy: sometimes neighbours are unreasonable, sometimes it's the Radio Amateur who is being unreasonable, and sometimes there may be an unrelated grudge between neighbours. In these cases, the interference problem becomes a metaphorical stick with which one rival beats the other.

Do your best to be diplomatic and accommodating with your neighbour, even if you have grounds to believe their equipment is more vulnerable to your RF than it should be. As an Amateur you will likely have greater knowledge and support from experienced fellow Amateurs than your neighbour.

Other EMC-related policy

ISED has nine publications on "Interference-Causing Equipment Standards" (ICES). Here is the list:

- CES-001: Industrial, Scientific and Medical (ISM) Equipment
- ICES-002: Vehicles, Boats and Other Devices Equipped with Internal Combustion Engines, Traction Batteries or Both
- ICES-003: Information Technology Equipment (including Digital Apparatus)
- ICES-004: Alternating Current High Voltage Power Systems
- ICES-005: Lighting Equipment
- ICES-006: AC Wire Carrier Current Devices (Unintentional Radiators)
- ICES-008: Cable Distribution Networks
- ICES-Gen: General Requirements for Compliance of Interference-Causing Equipment

You can find the list online at:

https://ised-isde.canada.ca/site/spectrum-management-telecommunications/en/devices-and-equipment/interference-causing-equipment-standards-ices

These set the standards for radio emissions from these non-radio devices.

A Case of Interference

A few months ago, a Radio Amateur in Ontario contacted me for advice on an interference problem he was having. After extensive research and Direction-Finding, he identified the source of a persistent broadband noise he heard at his Amateur station. This noise interfered with this reception on all bands from 7 MHz to 144 MHz. The source of the problem was a large, illuminated sign for a fast food restaurant. The sign was 1.2 kilometres from his home!

This is clearly beyond the capacity of an Amateur to resolve. Fixing noise from a large commercial sign will take qualified and insured electricians and service people with access to the malfunctioning device. The insurance implications alone would inhibit even the most confident Amateur from shinnying up a commercial light standard and working on that commercial equipment.

I suggested he contact the owners of the restaurant to make them aware of the problem and remind them that there are rules their equipment must meet as outlined in ISED's policies ICES-GEN and ICES-005.

I also suggested he offer to demonstrate the problem by using a portable broadcasting receiver.

Another approach is to try to get the owner to see that it is in their best interest to fix the problem. In this case it could be done by making the owners aware that the noise caused by their lighting was a malfunction which was wasting energy and adding to the costs of their electricity bills without improving the visibility of the business.

If the owner is unresponsive or unwilling to cooperate then the Amateur should contact ISED by email and inform them that he has identified equipment violating the ISED standards in ICES-GEN and ICES-005.

If broadcast reception is impeded, he should emphasise this while also providing information about the impact on reception in the Amateur bands.

He should also document his attempts to deal with the owner of the equipment. ISED will want to know if the owner is aware and what action the owner is willing to take.

Note: *You should only write to ISED if engaging the owner fails.*

Any complainant should be prepared to wait patiently for a response from ISED. We never know what priorities or staffing challenges the local ISED office may have.

RAC EMC Committee

You are not alone. There are many resources on EMC issues including several publications specifically oriented to Amateur Radio. Sometimes finding the right solution requires context. While books are great, you can't ask a book a question but you can ask RAC.

As I indicated in my last column, Radio Amateurs of Canada has revived its EMC committee. We have four dedicated Amateurs with personal and professional experience in resolving EMC problems.

The members of this committee are:

- Jason Pasetka, VA5JEP, of Regina
- Ed Richardson, VE4VT, of Winnipeg
- Norm Rashleigh, VE3LC, of Ottawa
- Glenn MacDonell, VE3XRA, of Ottawa

Jason, VA5JEP, is a civilian employee with the Royal Canadian Mounted Police "F" Division (Saskatchewan) in the Protective Technical Services Section (PTSS) of the Electronic Security Unit.

For many years, Ed, VE4VT, was a microwave design engineer and he is now employed as the Communication Systems Engineer for the City of Winnipeg. He is also RAC's Midwest Director.

Norm, VE3LC, worked with the Royal Canadian Mounted Police for 30 years where he designed and implemented public safety mobile radio systems. He is an Accredited Examiner.

Glenn, VE3XRA, worked with Industry Canada for 18 years serving as a Director in areas such as Environmental Industries, Energy Industries and Aerospace. He is a former RAC President and Director and continues to serve Canadian Amateurs as RAC's representative on the Radio Advisory Board of Canada (RABC), where he chairs the EMC committee.

The committee's goal is to "deliver accessible, knowledgeable assistance to diagnose, pinpoint and resolve interference problems, fostering a stronger, quieter radio environment where every operator can thrive."

The committee members can be reached by email at emc@rac.ca.

With time, your questions and experiences will provide the stock for a library of best practices for resolving EMC problems. We hope to make these available on the RAC website.

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