

# **Interference Frequently Asked Questions** **(FAQ)**

## **Contents:**

### **Interference Definitions**

It may seem somewhat academic at this point to define interference, but the best understanding starts with a strong foundation in fundamentals.

Webster defines interference as: "... radio. a. A jumbling of radio signals, caused by the reception of undesired ones. b. The signals or devices producing the incoherence."

Meanwhile the Federal Communications Commission (FCC) and IC Industry Canada defines harmful interference as interference which endangers the functioning of a radio navigation service or other safety services or seriously degrades, obstructs or repeatedly interrupts a radio communication service operating in accordance with the Radio Regulations.

From the amateur's standpoint, this means you cannot communicate. However, remember that the amateur service is not a safety or essential service. Some moderation must be considered (e.g. hearing a distant co-channel repeater when your local repeater is not active), While being annoying, is not "interference". Hearing adjacent channel splatter while carrying on a conversation on simplex or your local repeater, while affecting the quality of the conversation, is not truly interference. If it makes communication completely impossible, then it should be considered interference, although it still may not be harmful or necessarily willful. Take note at this point that many of the noise sources to be defined below do not affect FM/PM type radio operation except to cause desensing of the radio, possibly masking the desired signal.

Taking Webster quite literally, we first examine types of interference.

### **Types of Interference:**

#### **Natural:**

- Lightning: Crashing type momentary interference
- Static electricity: Crashing, ripping, tearing sounds
- Thermal shot: Momentary Impulse, raises noise floor of receiver
- Solar radiation: raises noise floor of receiver

There isn't much that can be done about these sources.

## **Manmade:**

### *Non-Radio:*

- Electric power sources (60 Hz) leakage, arcing
- Neon signs (continual arc)
- Fluorescent light fixtures (more arcing)
- Computer clocks (disc drive controllers etc...(lovely 144 MHz sources)

### *Radio sources:*

- Co-channel : same frequency various power levels - strongest signal captures receiver.
- Adjacent Channel: close in frequency with significant power can cause desensing of receiver, pulling of AFC, even capture.
- Inter-modulation: unrelated frequency mixes with another signal generating a signal on or close to the receive frequency desensing, capturing etc.
- Equipment malfunction: Cable connectors loose, corrode causing rectification which in turn creates new signals. Amplifiers driven into non-linearities causing spurs. Parasitic oscillation in amplifiers.

As you can readily see, there are a multitude of problems waiting for solutions. Each, with few exceptions, is solvable. It takes patience, perseverance and the cooperation of others.

The natural phenomena as defined above are not within our capability to solve. It is the manmade signals that by and large can be attenuated or controlled.

## **Manmade "Non-Radio" Remedies:**

1. Electric Power sources: these mostly emanate from leaky insulators or cables belonging to the power company, and with sufficient coaxing they will repair them. It may take considerable convincing on your part, but once convinced they will repair them.
2. Neon signs: These are more difficult to control because of their design. Most sign companies will not be cooperative. However, the saving thing here is these typically do not interfere with FM/PM unless you are in the immediate proximity.
3. Florescent Light fixtures: These, when working properly, are not a problem. However, when they fail they can become annoying. If they fail, the alternatives are repair or replacement. In that same vein are the mercury vapor and sodium vapor lights used for outdoor lighting. These utilize an arcing mechanism for startup, and when they fail this becomes a great noise annoyance.
4. Computer clocks, etc.: This is a problem that is very pervasive with the increased appearance of faster and faster computers. Here, the best defense is Tempest shielded machines however these are not available for everyone,

especially your neighbor. An alternative is to start with shielded/filtered power cords. On plastic cabinet computers, the use of RFI sprays on the interior of the case with conductive fingers to the metal chassis has been proven effective.. Monitors, because of the harmonic-rich signals that float around inside, require special attention, including RFI sprays, conductive fingers, and filtered/shielded cables.

The most important thing to grasp is don't let these problems beat you. They can be solved. If you need help, there are other amateurs out there that are ready, willing and able to help. Just ask.

Sometimes they also could use a hand. It's called sharing the load.

Those are most of the manmade problems. Now for the difficult ones: Interference from other amateurs and commercial sources.

## **Manmade "Radio (Amateur & Commercial)" Remedies:**

*There are two basic types:*

1. Unintentional or accidental (e.g. keying up on the repeater before turning up the volume control, or sitting on the microphone). This has happened to many of us, and those of you that haven't done it yet will sooner or later.
2. The other type is the harmful, willful or mischievous interference. This is intentionally tying up a repeater or frequency to prevent its use by other persons. Typical examples are the touch tone bandit, the purveyor of objectionable language, and the false cry for help. Many of these incidents are frequently reported in QST, CQ, and 73 magazines. The false cries for help not only cost the taxpayer in terms of manpower sent needlessly but they cost credibility to every one with a legitimate need for help. It's the classic case of the "boy who cried wolf" enough times, and no response will come.

The FCC nor IC is usually not interested in solving unintentional or accidental interference. However they do occasionally assist in rectifying harmful interference. Sometimes they use the term, "malicious." to justify their involvement. It is rare that they will get involved in an amateur radio interference complaint unless the offended amateur radio community has already done a lot of the work themselves. Some of the things to do are:

1. Document call signs on paper and with audio recordings.
2. Keep a log of when the interference occurred, what was said, who said it (if known), and what the circumstances were.
3. Form your own transmitter hunt. If possible, buy direction-finding equipment. Many clubs own direction-finding equipment for fox hunts and interference solving.
4. Try to solve the interference yourself before contacting others for help.

5. Remember that WNYSORC has no enforcement powers, but your coordinator may be able to help you by supplying telephone numbers and addresses of individuals. The coordinator may also be able to help you in other ways.
6. Remember that the repeater which has the older coordination date rightfully has the upper hand in an interference complaint which involves repeaters and repeater users.
7. Remember that the offender in most repeater complaints is the user, not the repeater. The offender may have transmitted from a mountaintop to his home repeater and keyed up your repeater. This is NOT the type of interference that is the fault of the repeater. The user must learn that there are some locations which are not suited for working repeaters, particularly on two meters. He must learn that this is a major reason that the IC/FCC Rules and Regulations state that we must use power levels which are necessary only to establish reliable communications, and nothing more. High power levels on a mountaintop are inviting complaints.
8. Many interference problems in the future will be solved ONLY by using CTCSS tone encoding and decoding on repeaters. All new repeater coordinations are required to use sub-audible or other types of encoding for access in order to subdue interference problems.

## **Conclusion**

The time is already here that when two repeaters on the same pair are heard in the same area (overlapping coverage in fringe areas), the user can eliminate most of the nuisance noise by using tone decode. This, of course, is only possible if the repeater which he desires to hear has tone encoding. Many repeaters now have tone encoding, even though they may not have tone decoding, because they know that many of their users will encounter these problems of overlapping coverage and that they will be able to monitor only that machine by using tone decoding on the user's radio.

On the other hand, if the repeater itself experiences increasing incidences of distant users of other machines keying it up, tone decoding may be necessary. Many repeater owners have hesitated to install tone-decoding options on their repeaters. However, it may be necessary to insure that some of the man-made and natural interference does not constantly key up the repeater. Because of this, the time is coming that every ham using repeaters will have to have tone encoding capabilities on their radios. All radios presently being marketed in the United States now include tone encoding as a standard feature. Many radios also now have tone decoding as a standard feature, particularly hand helds. This feature is available as an option on virtually all radios on the market today. In addition, there are several amateur accessory manufacturers who sell tone decoder boards.