



CUTTING THROUGH... RADIO INTERFERENCE

94.7 FM
STEREO
MEM1

1020 AM
MONO
MEM6

96.5 FM
STEREO
MEM2

1140 AM
MONO
MEM3

Aussi disponible en français.

32-EN-95539W-01

© Minister of Supply and Services Canada 1996

CUTTING THROUGH... RADIO INTERFERENCE

THE COMMUNICATIONS AGE

In recent years, the proliferation of transmitters, receivers and communication devices in homes, cars and offices around the world has been phenomenal.

This explosion in radio communications has stressed the radio frequency spectrum and increased the risk of disruption in reception and the number of problems encountered when using electronic equipment.

Industry Canada, through its Spectrum Management Division, has developed a set of tools to help you:

- locate the sources of interference;
- resolve certain problems yourself;
- determine where a repair technician may be needed.

These tools consist of a series of brochures, a videocassette and a CD-ROM. The Industry Canada Internet site <http://strategis.ic.gc.ca>, under the heading *Marketplace Services* includes useful information and advice for solving interference problems.

■ Who is at fault?

Despite a substantial increase in the number and type of communication and broadcast systems that are potential sources of interference, almost half of signal reception problems are due primarily to faults or defects in the radios, televisions or other equipment we use. Antennas and antenna lead wires can also cause reception problems.

When equipment is affected by radio interference, the problem is often assumed to be attributed to the production of unwanted signals by a transmitter. In fact, the equipment itself is often the source of the problem: it cannot screen out unwanted signals as well as it should.

All equipment must be able to pick up and amplify audio or video signals and screen out undesirable signals and noise.

If interference cannot be eliminated using the methods described in this documentation, the services of a technician may be required. The enclosed questionnaire may be helpful to the technician.



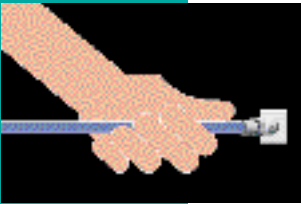
WARNING! To avoid the risk of electric shock, fire or violation of the manufacturer's warranty, do not make any internal changes to equipment. Only a qualified technician should perform this type of work.

BASIC CHECKS

■ To go straight to the point

To track down the cause of the problem, here is what you should do:

1. Check all connections



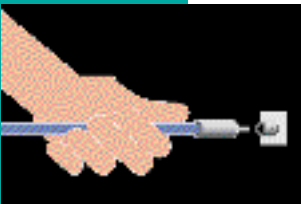
Check the condition of all the cabling from your antenna or cable television input, through any switches or VCR, to your television set or radio. This check cannot be done on most AM radios, since AM antennas are generally built in.

In the case of an outdoor antenna, make sure it is properly installed and in good working order.

Whatever the type of equipment, make sure connections comply with the manufacturer's recommendations.

IF THE PROBLEM PERSISTS...

2. Disconnect all auxiliary equipment



This is how you will determine if one of your pieces of equipment is the source of the problem. If this is the case, it will have to be changed, repaired or equipped with the required filters or shielding.

Examples:

- a VCR or antenna signal booster for a television;
- a telephone answering machine; or
- a CD player or tape deck for an audio system.

IF THE PROBLEM PERSISTS...

3. Conduct the equipment substitution test

This test determines whether the equipment is faulty, by replacing it with similar equipment, in the same room, with the same antenna.

If the interference does not affect this substitute equipment, then the original equipment is not in good working order and needs to be repaired or replaced or is more susceptible to interference and will require additional filtering, shielding or grounding.



IF THE PROBLEM PERSISTS...

4. Talk to your neighbours

If the interference problem persists after these basic checks have been done, talk to your neighbours. If they are experiencing the same problems, this clue may make it easier to find the source of the interference.

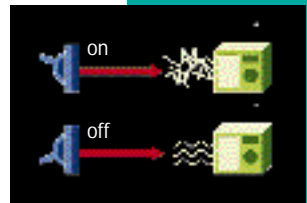
If you subscribe to cable television or direct-to-home satellite service, contact your supplier after you have made sure that your installation complies with the standards.



THE BREAKER TEST

Depending on the type of equipment and the nature of the interference, you will be advised in the other brochures in this series to conduct the breaker test to determine the source. Here is how to proceed.

This is a very simple method for determining the source of interference inside the home. It is best to ask someone to help you.



First, ensure that the interference is active by using equipment affected by the problem. A portable AM radio may be used if it is also affected by interference in the form of buzzing and crackling. A good approach is to tune your AM radio between two stations so the interference will be more pronounced.

One person then goes to the electrical panel to turn off circuit breakers one by one, or remove fuses one by one. The second person

checks each time to see whether the interference disappears from the reference equipment. If you are alone, you can use a portable radio placed near the electrical panel. The interference will stop when you switch off the circuit powering the defective equipment.

If you are using a television set as a reference, connect the television to another circuit, while checking its regular circuit.



Be very careful and do not touch anything except the circuit breakers or fuses.

If the interference disappears when you turn off one of the breakers or remove one of the fuses, you have likely found the electrical circuit that supplies the piece of equipment causing the interference.

In devices such as heating pads, fish tank heaters, etc., where power goes on and off intermittently, disconnecting the power to the source may delay the interference cycle.

HOW DO YOU FIND THE DEFECTIVE EQUIPMENT?

Restore power, check that the interference returns, then turn off or disconnect all devices that may be plugged into this circuit, **one at a time**. When the interference stops, you've likely found the culprit! The faulty equipment will then have to be replaced or repaired.



NOTE: The faulty equipment may not be readily apparent. A doorbell transformer or a television signal booster installed in the attic, for example, is often a source of interference that is difficult to locate.

A portable AM radio is a very effective detector. As you move around the house, the crackling or buzzing noises will grow louder as you move closer to the faulty equipment.

GLOSSARY

Audio rectification: Interference caused to electronic audio equipment by external radio signals carrying voice, Morse code, data, etc.

Band-pass filter: Electronic device that allows only a desired band of signals or channels to pass, while rejecting all other signals.

Breaker: Device, on an electrical panel, that automatically opens a circuit when the current exceeds its rated value. Can also be operated manually.

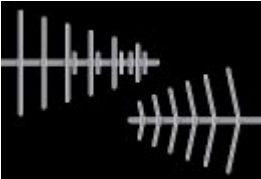
CD-ROM: Compact Disc-Read Only Memory. Data storage disk, whose information (text, sounds, pictures, video) is retrievable with a computer.

Coaxial cable: Round cable in which one wire is centred inside and insulated from a metallic jacket. RG-59/U is widely used for television antennas and cable television distribution. Its impedance is 75 ohms.

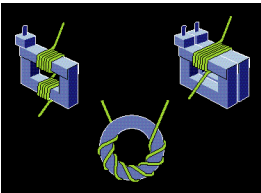


Dimmer: Electronic control for varying the intensity of a light fixture.

Directional antenna: Antenna that receives radio waves more effectively in one direction.



Ferrite core: A ring-shaped device, made of a magnetic material, used with windings of wire, to block radio frequency signals.



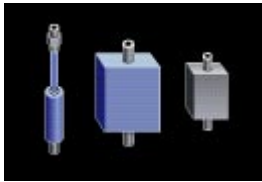
Frequency spectrum: The entire span of electromagnetic frequencies, including all of the frequencies used in radio communications. Typical applications include cellular telephones, General Radio Service (GRS also known as CB), two-way radio dispatch, broadcasting, shortwave radio and satellite communications.

Gain: Increase in signal level, provided by a directional antenna or amplifier.

Grounding: Connection to the earth by means of a low-resistance conductor.

Harmonic: Undesired multiple of a given frequency. For example, the second harmonic of 27 MHz is 54 MHz.

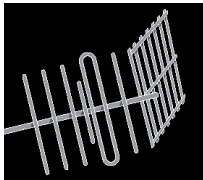
High-pass filter: Electronic device that allows only frequencies above a particular frequency limit to pass.



Impedance: An electrical characteristic of devices such as cables, filters and antennas. The unit of measure for impedance is the ohm.

Notch filter: Electronic device that rejects or blocks a particular band of undesired signals.

Rear-screen antenna: Particular type of directional antenna, whose characteristics reduce reception from the back.



Shielding: Method of suppressing the reception or transmission of undesired signals, normally by means of metallic braid or plate.

Signal: An electromagnetic field, used to carry information such as voice, pictures or music.

Signal booster: An electronic amplifier used to increase the level of a radio signal.

Spectrum management: The Spectrum Management branch of Industry Canada manages the radio frequency spectrum to allow access to the greatest number of users, while minimizing the occurrences of interference.

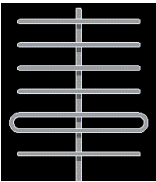
Tuning: Adjusting the controls of a receiver or filter to obtain optimum performance at a selected frequency.

Twin lead wire: Flat cable made of two parallel wires contained in an insulating material. For television antennas and receivers, the cable's impedance is 300 ohms.



Velocity factor: Numerical ratio describing the velocity of radio waves in a cable as compared to free space. Velocity factor is used in calculating the length of tuned stub filters.

Yagi antenna: A common type of directional antenna consisting of parallel elements.





QUESTIONNAIRE

DESCRIPTION OF INTERFERENCE PROBLEM

If you seek help from the manufacturer or supplier of your equipment, the following information will give a better understanding of the problem.

1. Your name, address and telephone number:

Name: _____

Address: _____

Telephone (res.): _____ (bus.): _____

2. Equipment affected by the interference:

Television, VHF channels (indicate which channels) _____

Television, UHF channels (indicate which channels): _____

AM radio FM radio

Telephone (owned) (rented equipment) (cordless)

Answering machine

Other (specify)

3. Do you use:

An indoor antenna (rabbit ears) Outdoor antenna

Satellite dish Cable television services Signal booster

4. At what time does the interference occur?

5. Have you followed the instructions contained in these brochures?

Yes No Please provide details:

6. Describe the problem:

7. Have you used the services of a technician? Yes No

If you have, please indicate his or her name, address and telephone number:

Describe the tests conducted by the technician:

8. If the interference is caused by a radio transmitter, indicate the name, address and telephone number of the operator:

Has the operator been contacted? Yes No

If yes, what was the result?

9. Are some of your neighbours experiencing the same type of interference?

Yes No

Have you given your neighbours the information contained in these brochures?

Yes No

If you have, describe the tests that were carried out:

10. Provide any other information likely to facilitate analysis of your problem:



Recycled paper

Canada