INTERFERENCE FROM RADIO COMMUNICATIONS

Radio&Television Investigation Service

Fact Sheet 5

This Fact Sheet, produced by the Radio & Television Investigation Service (RTIS) describes how radio communications can cause interference to reception. It should be used in conjunction with the other Fact Sheets in this series.

WHAT THIS SHEET COVERS

Interference from radio amateurs or CB enthusiasts

Breakthrough
Who is responsible

Digital Communications interference ('TETRA' or 'Airwave')

Filters to prevent interference or breakthrough

TV/FM filters
Ferrite rings

INTERFERENCE FROM RADIO AMATEURS OR CB ENTHUSIASTS

If you have identified a radio amateur or CB enthusiast whose radio transmissions you think may be causing problems, please be aware of the following:

- The person responsible may well be unaware that they are causing a problem.
- Problems are very often caused by 'breakthrough' due to an undue sensitivity to unwanted signals in the affected TV or radio. It may not be a fault in the transmitter.
- Neighbours may well be suffering problems too – so do check this.

INTERFERENCE FROM RADIO AMATEURS OR CB ENTHUSIASTS

Breakthrough

Domestic electronic equipment such as TV, HiFi etc isn't designed to pick up transmissions such as radio communications. If there are no transmissions nearby, there is normally no problem. However, if there are nearby transmissions, and the equipment hasn't been designed with good immunity to these signals, it can misbehave. This is known as 'breakthrough'.

Breakthrough can manifest itself in a wide variety of ways. Typical examples are flashing and jumping of analogue TV pictures, break-up and freezing of digital TV, and 'voices' or rhythmic thumps and pops over AM or FM radio. It is sometimes possible to hear distorted speech through your TV loudspeaker or radio. In addition, breakthrough can be experienced on other equipment such as cordless phones, baby monitors, hi-fi equipment, computer speakers and even hearing aids.

Breakthrough is normally the result of a deficiency either in the installation or in the equipment rather than anything wrong at the transmitter.

Many amplifiers or boosters can be unduly susceptible to breakthrough from strong local radio communications. Moreover, poor connections in the aerial system or poorly screened interconnecting leads between pieces of equipment can allow breakthrough to occur. Regarding the equipment itself, unfortunately the householder can't easily tell if it has good immunity to breakthrough when buying it. Often the first he knows about it is when a radio transmitter begins to be used nearby. Nowadays equipment has to conform to regulations designed to protect against breakthrough in a typical domestic setting, but this was not always the case, and sometimes other steps must be taken to help overcome the problem.

Who is responsible?

It is important to appreciate that just because someone has begun using a transmitter in the near vicinity, and you are suffering disruption as a result, it is not necessarily their 'fault'. Provided they are operating within the terms of their licence—and the vast majority are—they are generally under no obligation to change or curtail what they do in order to avoid causing breakthrough to neighbours' equipment. Indeed, you may change a piece of equipment to a different brand and discover that although the previous model worked perfectly well, the new one suffers breakthrough. It would obviously be quite impractical to place the onus on the person transmitting, and wholly unjustified—yet such problems with equipment changes are not unknown.

What to do

Firstly, make sure your own installation is in good order. If reception is mediocre even when the 'interference' isn't present, you should attend to this before going any further.

Secondly, if the problem is affecting TV reception, try removing items of equipment from the system to see if the problem stops. If it does, try changing interconnecting leads to see if this helps. Cheap SCART leads are often unscreened and could lead to trouble, so use a properly screened one.

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What to do

Thirdly, keep a log of when the problem occurs, noting the date and time when it starts and stops, and which channels are affected. Ensure you keep it long enough to record a few instances of disruption. Licensed radio amateurs are legally required to keep a transmission log, making it straightforward to compare whether your problem coincides with their transmissions, should this be needed.

Having done this, the simplest way to diagnose whether the radio amateur or CB enthusiast is the cause of the problem is to approach them politely. Ask them to test to see if the problem only occurs when they are transmitting, and if so, which frequencies are most troublesome. If they are causing problems, most radio amateurs will normally be happy to co-operate in helping to find a solution. They have passed an examination in which they have to show understanding of interference issues and how they can be overcome. CB enthusiasts don't pass an examination but many are technically aware – in fact, CB interference is much rarer than from radio amateurs because legal CB enthusiasts use much lower transmitter powers.

As mentioned, most 'interference' is actually caused by breakthrough from strong transmitted signals into domestic equipment that isn't designed to receive them. If the installation itself is in good order, the best way of overcoming this is usually to install filtering on the cables going into receiving equipment. Many radio amateurs will keep some filters to suit the frequencies they are transmitting on. They will often be willing to fit these to your equipment, but the filters remain their property so, if you move away, don't forget to return them. Many radio amateurs are members of the Radio Society of Great Britain (RSGB) which provides them with advice on dealing with interference, and can supply made-up filters on request. This isn't normally something the householder would be expected to do. However, for those interested, more information on filters is given on the next page.

Sometimes the radio amateur can help by modifying his activities where tests have revealed it would help reduce problems. However, there is no *requirement* for them to do this unless specifically ordered to by Ofcom, the government regulator. In rare cases transmitting equipment may need additional filtering to reduce unwanted signals (called spurious signals). However, if these are the cause of the problem, the radio amateur's own TV or radio will pick them up so they will be as aware of it as you are, and should quickly take steps to overcome it.

If you are unable to make progress in solving the problem, either because the person in question isn't co-operating, or because their attempts to solve the problem have proved unsuccessful, you can contact the RTIS, giving a daytime telephone number so we can discuss the situation. If the radio amateur or CB enthusiast is willing to talk to us, please let us also have their number so we can discuss any measures already tried. This has proved helpful in the past.

It's important to remember that a courteous, non-accusatory approach will often achieve a solution without the need for any action by an external party such as Ofcom. Radio amateurs don't want to cause problems in the neighbourhood and are glad when they can be resolved without acrimony. However, you should not approach someone if you have reason to believe you are putting yourself or your neighbours at risk in any way. Instead, please speak to RTIS.

DIGITAL COMMUNICATIONS INTERFERENCE
'TETRA' or 'Airwave'

Occasionally problems occur when a new communications aerial or mast is switched on in areas where viewers are using TV masthead amplifiers. On analogue TV, horizontal bands or streaks can appear across the screen which may vary in intensity. Digital TV may suffer break-up. These problems are not affected by changes in the weather, will have started suddenly, and often affect neighbours. The problems are nearly always localised and are very often discovered by aerial installers who are suddenly called out to deal with several 'aerial problems' in a housing area.

The cause of the problem is that these strong transmissions, which are perfectly legal, enter along with the TV signals, and overload the masthead amplifier. The householder has no redress even if the source of the signals is known (they often belong to police and emergency services, for example). Therefore the solution needs to be sought by the viewer.

The solution is to fit a high pass or band pass filter to the input of the masthead amplifier, which will reduce or remove the unwanted signal but allow TV ones through as normal. Unfortunately, commonly available amplifiers often do not contain such filtering as standard, so it needs to be fitted afterwards. Fortunately a filter normally solves the problem entirely. Typically the aerial installer will fit the filter, having first confirmed that digital communications interference is the cause of the problem.

FILTERS TO PREVENT INTERFERENCE OR BREAKTHROUGH

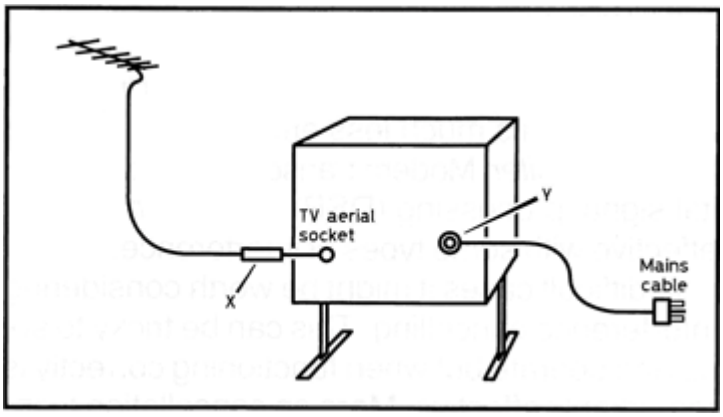
This information is for those wishing to know about different types of filters and how they are used. Unless competent to do so, we would not normally advise householders to specify and fit filters themselves unless the source of the problem has been established beyond doubt, and it is clear which filters are most suitable.

TV/FM filters

The idea of a filter is to prevent *unwanted* signals from reaching your equipment, whilst allowing the *wanted* ones to pass through unaffected. They come in several types for use in different situations:

1. Low pass filter
2 High pass filter
3. Bandpass filter
4. Braid-breaker
5. Ferrite rings

In most cases, filters are effective at preventing transmissions from radio amateurs and CB enthusiasts from causing problems to TV and radio reception. Since many amateur transmissions are lower in frequency than TV and FM signals, a **low pass filter** is fitted at the *transmitter* to prevent any unwanted spurious signals escaping. At the same time, **high pass filters** can be fitted to the *receiver* to prevent the low frequency amateur signals from reaching the receiver and causing problems. High pass filters are a common component in what are known as 'TVI' filters, sometimes also called 'TETRA' filters. In addition, a ferrite ring may need to be fitted to the mains lead if the filter alone is not enough (see next page). The diagram below shows where to fit the high pass filter (X) and the ferrite ring (Y). Note that filters must not be fitted *between* a masthead amplifier and its power supply (unless the filter specifically states it is suitable for this purpose).

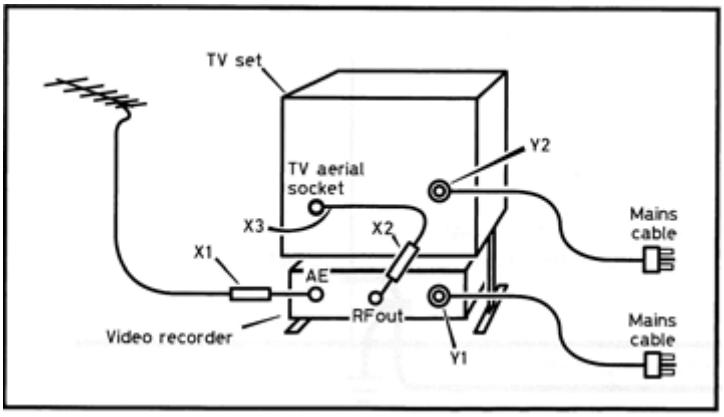


Fitting filters to a TV set

Band pass filters are usually fitted where the amateur is using frequencies close to FM or TV ones. The filter is normally fitted to the receiver, and allows only the range of required frequencies through, rejecting all others. Band pass filters must be specified for the correct use – to use a TV band pass filter on an FM tuner will prevent reception of FM signals – and vice versa. Band pass filters are often fitted to TV masthead amplifiers, as unfiltered ones are known to be easily upset by strong local transmissions of all kinds – not just radio amateurs. A different kind of band pass filter can be used on the transmitter, again to ensure no spurious signals can escape.

FILTERS TO PREVENT INTERFERENCE OR BREAKTHROUGH

Braid-breakers work by preventing low frequency signals from reaching TV or FM equipment down the outside of the co-axial cable. They can be made in various ways, sometimes using components or a transformer, but the easiest way is often to wind several turns of co-axial cable around a suitable ferrite ring. In practice, many commercial braid-breakers often incorporate a high-pass filter in the same box, to provide a 'belt and braces' approach to interference suppression. As with the simple high-pass filter, this is used in position X in the previous diagram. If you have a VCR or DVD connected to your TV, you may need to fit filters to the inputs to both units, and possibly ferrite rings to both mains leads as shown in the next diagram. Just what is needed is best determined by experiment.



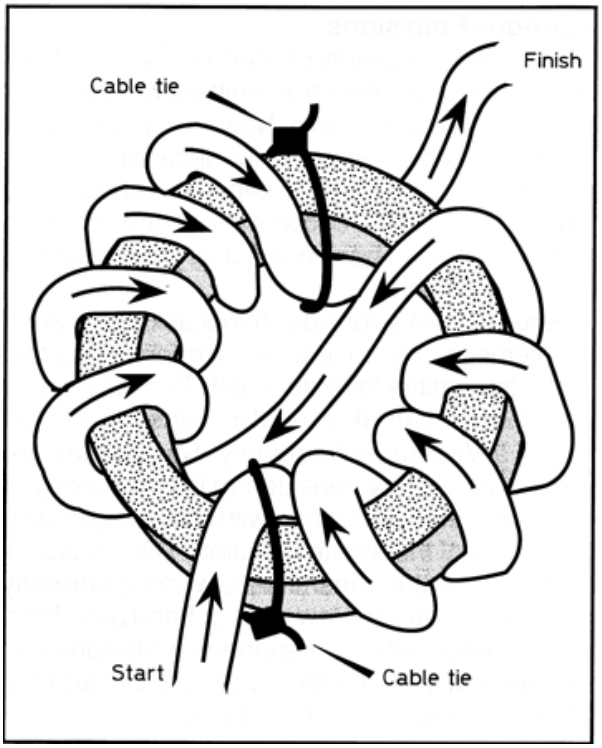
Fitting filters to a TV set and VCR

Ferrite rings

Sometimes strong amateur signals can get into audio equipment as well as TV or radio. This usually happens because the loudspeaker wires or mains cables act as 'aerials' and conduct the signals inside the case. Once inside, it is difficult to overcome problems without modifying the circuitry – a method of last resort! An easier solution can often be to wind a short section of the cable in question around a ferrite ring using a number of turns, and to do so as near to the HiFi/TV/radio as possible. The diagram below shows how to do this.

Ferrite rings work by providing a high impedance to radio-frequency signals, with little effect on mains or audio frequencies.

A range of filters and ferrite rings can be supplied by the Radio Society of Great Britain (www.rsgb.org) or from other outlets.



Diagrams reproduced by courtesy of the Radio Society of Great Britain.
More detailed information on the use and design of filters is available from www.rsgb.org