



Radio Transmitters and Home Security Systems



Purpose of this leaflet

This information sheet is intended for owners and installers of intruder alarm systems and security lighting.

False alarms.

Most false alarms in intruder alarm systems are caused by user error, incorrect installation or inadequate maintenance. In some alarm systems however, false alarms can occur when a radio transmitter is being operated nearby. This is called an **RFI** (Radio Frequency Interference) problem and it is not the fault of the radio transmitter or its operator.

Radio transmitters.

The use of radio transmitters in the UK is strictly regulated and requires a licence issued by Ofcom except for some approved low power types, such as cellular telephones or car remote control keys.

Intruder alarms should be able to operate correctly in the environment in which they are used. This environment includes radio signals from many types of authorised radio transmitter which may be operated nearby. For example, a portable cellular telephone could be in use in the house next door, there could be a police officer or security guard with a hand-held transmitter nearby or a licensed radio amateur may be using a transmitter in a neighbouring house. Some alarm systems with poor immunity to RFI can be set off by transmitters in passing vehicles such those used by emergency services, taxis, public utilities, CB operators and many others.

Passive Infra-Red sensors.

Passive Infra-Red (PIR) sensors, are the "eyes" of an alarm system and can detect the body heat of a moving person at a distance of up to 30 feet or more. This requires some highly sensitive electronics which must be designed carefully to make sure that it is not disturbed by such things as nearby radio signals. Most manufacturers of PIRs are well aware of this and have tackled the problem effectively but some types still have inadequate immunity to RFI in some situations.

Approved alarm installers

NACOSS, the National Approval Council for Security Systems is part of the Loss Prevention Council (LPC). NACOSS maintains a list of approved installers of intruder alarm systems in the UK and can carry out inspections of installations against the appropriate British Standard and NACOSS Codes of Practice.

Another organisation, the Security Systems and Alarms Inspection Board (SSAIB) was set up by the security installation industry and maintains a list of registered installers.

Standards for alarm systems

Most professionally installed intruder alarm systems are installed in accordance with British Standard BS4737. Part 1 of the 1986 edition of BS4737 covers installation requirements for intruder alarm systems. Section 3.2.3 refers to various "environmental" conditions.

BS4737 Part 3 : 1988 applies to components used in alarm systems and defines various environmental conditions. Section 3.6 states, "No alarm conditions shall occur during exposure to the specified environmental conditions". Section 3.6(g) specifies electromagnetic field strengths of 10 volts per metre (V/m) from 0.1 MHz - 150 MHz and 5 V/m from 150 MHz - 1000 MHz.

Nearly all electronic equipment sold in the European Union after 1 Jan 1996 must meet relevant European EMC (Electromagnetic Compatibility) Standards and must carry a 'CE' mark. The EMC standards require electronic equipment to have certain levels of immunity to signals from nearby radio transmitters. They also control the amount of interference which electronic equipment can cause to radio receivers.

Alarm components such as PIR sensors that were manufactured before 1st January 2001 may have been 'CE' marked by testing to a standard that is substantially lower than the RF field levels specified in BS4737 Part 3 : 1988.

Dealing with an alarm RFI problem

If a radio transmitter is being operated within the terms of the licence issued by Ofcom and causes a false alarm in a nearby alarm system, the owner of the alarm should not expect the transmitter to be switched off permanently. Further false alarms can be avoided by switching off the alarm system temporarily until the problem is solved. If the person who operates the transmitter is prepared to stop using it for a temporary period, this is purely a gesture of good will and is not a permanent solution.

A PIR has a red "walk test" indicator light which flashes when the PIR detects something moving. If it flashes when a radio transmitter is being used nearby but nothing is moving within the range of the PIR, this indicates an RFI problem. In some models, the indicator operates all the time, while in others, it has to be switched on by setting a link inside the PIR or by selecting "walk test" on the control panel.

Wireless alarms

Wireless alarm systems have a small radio transmitter in each sensor and a receiver in the control panel. They operate on a special radio frequency which is allocated for this purpose. Many types sound the alarm if they detect a signal which could indicate that someone is trying to "jam" the radio link. Some wireless alarm receivers can produce a false "jamming" alarm due to signals from authorised transmitters which are not on the wireless alarm frequency. There is normally a way of switching off the "jamming" detection in such cases.

Security lighting

PIR sensors which control outdoor security lights are generally much less immune to false triggering than alarm PIRs. Security lights which carry the "CE" mark have to be tested for immunity against false triggering but many non "CE" marked types light up whenever a nearby transmitter is used or when there is electrical interference on the mains supply. This is a problem with the design of the PIR, and is not the fault of the operator of the radio transmitter. In most cases, it can only be solved by replacing the light with one which is less prone to false triggering.

Information for alarm installers

RF triggered PIRs

If a PIR sensor has inadequate immunity to RFI in a particular situation, the use of screened cable or filters is unlikely to give much improvement. The PIRs normally need to be replaced with a more immune type. The RSGB EMC Committee has received reports of RF triggering of certain models of the following types in some situations.

Wickes PIR, an early model sold in 1991/92.

A1 Security and Electrical "Petite 101", early types with circuit boards marked 530.130.0 or 530.130.1.

Glazertron G-Tron 40NL. Now discontinued.

Texecom "Medusa", early non-CE marked model with 6 pins to select the pulse count. The later type with 3 pins to select the pulse count is much better.

Pyronix - some 'Colt', 'Magnum', 'Enforcer' models.

Intellisense MPC-4040-T. This model appears to claim higher levels of RFI than are achieved in practice.

Various low cost PIRs having very poor RF immunity have been imported in the past.

RFI immune PIR sensors.

In the UK, PIR sensors on the LPC approved list must have immunity to at least 10 V/m (volts per metre) over the frequency range 1-1000 MHz. This is higher than the minimum European immunity standards for PIRs. Many PIRs claim immunity to 20 or 30 V/m but this may only be over a limited frequency range such as 26-1000 MHz which is specified in the older IEC 801-3 (BS 6667 Pt3) standard. This range does not test immunity on various amateur radio bands from 1.8 - 24MHz. Another important factor is that the immunity may be lower when the sensor is in an actual installation and connected to long cables. PIRs which are known to have good RF immunity in practice include the following:

The **Texecom 'Reflex'**. This model claims RFI immunity to 30 V/m from 0.15-1000 MHz and has been found to have good RF immunity in practice.

Another PIR sensor that has been found to have good RF immunity is the **Rokonet 'Cosmos PQ'**. The 'PQ' model has a 'Quad' type infra-red detector and is widely available from UK trade suppliers.

'**Dual technology**' sensors have both infra-red and microwave sensors in the same unit. These generally have good RFI immunity but are an expensive solution if used purely to solve an RF immunity problem. A suitable type of 'quad' PIR detector as mentioned above will generally solve the problem at lower cost.

Alarm control panel RFI

The cables leading from an alarm control panel to the PIR sensors, switches, etc. can act as aerials, picking up radio signals and feeding them into the panel. This can trigger the panel if it is not sufficiently immune to RFI. This effect can also work the other way round with signals from the electronics in some alarm control panels escaping via the cables and causing interference on sensitive radio receivers nearby. Although both effects may sometimes be reduced by fitting suitable filters, it is often necessary to change the control panel for an adequate cure.

Addresses and telephone numbers

The National Approval Council for Security Systems (NACOSS), is an approvals organisation for alarm installers. Tel. 01628 637512, <http://www.nacoss.org>

The Security Systems and Alarms Inspection Board (SSAIB) maintains a list of registered installers. Tel 0191 296 3242/296 2667. <http://www.ssaib.co.uk>

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