

Immersion Heater

The heater and its associated wiring will give off high magnetic fields. Bedheads should be at least 1 metre away from the immersion heater cupboard wall. The pumps give off high fields close by - over 20 microtesla - which typically fall to around 0.5 microtesla at 50 cm. We recommend that chairs and beds are located at least 1.2 metres away.

Iron

Electric irons have low fields and are not a problem. Pregnant women should try to keep the iron at least 30 cm. from their body.

Jacuzzi

Some jacuzzis have pumps and motors built in to the base which will result in your being exposed to high EMF exposure. We do not believe that short-term use in a hotel is a problem, but if the jacuzzi is in your house, then we recommend that the pumps and motors are at least half a metre away from the bath.

Keyboard (Musical)

Musical instruments are usually earthed systems and are not an EMF hazard. The amplifiers contain a transformer which gives off low levels of EMFs. Take care in its placement if used in the home.

Lift

Lift motors give off high fields. If you have a lift in your home because of a disability, the motor will be in a separate housing at the bottom of the liftwell, at the top, underneath an integral chair, or underneath the lift floor if the lift is used specifically for wheelchairs. The closer the motor is to your body the higher the fields you will experience.

Stairlifts have motors mounted on the actual chair, so you are exposed to high magnetic fields when using it. This probably is not a problem as long as you only use it relatively few times each day.

In a multi-storey complex (e.g. flats), the lift motors are much larger and if you live in the top apartment then it is wise to find out where the motors are, and either keep at least 3 metres away, or measure the fields to see how far they extend.

Lighting

See article [Lighting and EMFs](#).

Loudspeaker

If the equipment the loudspeakers are attached to is earthed, they do not give off EMFs. They do contain very strong permanent magnets.

Microwave Ovens

See article on [Microwave cooking](#).

Mixer and Blender

The motors will give off high EMFs of up to $0.7\mu\text{T}$ (mixer) and $1\mu\text{T}$ (blender) at half a metre, which drop away quite rapidly. Short periods of use should be all right. If pregnant, it will be worth limiting time using electric appliances giving off this level of fields at work top height.

Mobile Phones

See articles entitled [Mobile Phones](#) and [Children and mobile phones](#).

Mobile Phone masts / base stations

See article [Mobile Phone Masts and Wireless Computing](#).

Music Centre

These can give off high magnetic fields, but the problem is usually high electric fields. Make sure the system has a decent electrical earth connection to the mains supply. This will remove most electric fields.

Nightlights

These should not be used unless absolutely necessary, because the pineal gland best produces melatonin, the body's natural anti-cancer hormone, in the dark. If necessary, have a low-wattage bulb, in a unit well away from the child's bed, keeping the wires away. Blue light affects melatonin production more than red light so if you feel a light is necessary, buy one that gives off light towards the red end of the spectrum.

Pagers / beepers

Old pagers are fine, they are only receivers, but no-one knows if you have received the message. We are not sure if the old style pagers are still supported.

We believe there may be newer GSM SMS based pagers but we have not seen one to test. They apparently answer back and confirm that the message has been received and sometimes even read. Of course they will regularly log on to their nearest base station and confirm that they are at that location - so they would best be kept in a bag or case or at least a loose jacket pocket as they would be similar to a GSM phone on standby.

It would probably be easier to keep the phone and just use SMS.

PDA's (Personal Digital Assistants)

PDA's are small handheld computers used for a wide variety of applications. PDA's have many methods of communication with other equipment (such as PCs, other PDA's and many other

devices), including Infra-red, Cable (usually USB), Bluetooth and WiFi (802.11a/b/g). Some even double as mobile phones.

In a study by Sage ([2007](#) see below) high levels of ELF MFs were measured from a PDA. The authors found that ELF-EMF emissions of 10 microtesla (microT) were recorded during normal office use over a 24 h test period. *"Email transmit and receive functions produce rapid, short-duration ELF-EMF spikes in the 2-10 microT range, each lasting several seconds to over a minute apparently depending on file download size. Some units produced spikes as high as 30-60 microT during email activities. Cell phone activity on PDAs produced continuously elevated ELF-EMF readings in the 0.5-1 microT range, as opposed to the rapid spiking pattern for email receipt and transmission. Switching the PDA unit from "OFF" to "ON" position resulted in single ELF-EMF pulses of over 90 microT on two units. Email downloads into the PDA can occur randomly throughout the day and night when the unit is "ON"; thus the user who wears the PDA may be receiving high-intensity ELF-EMF pulses throughout the day and night."*

We recommend using those with USB cables, because this is not wireless. Infra-red PDAs are not very common any more, and while safe as far as EMFs go, they have a much slower data transfer rate. Many PDAs come with both wireless capabilities and USB, but you can usually disable the wireless connectivity (which we also recommend; see the manufacturer's Instruction Manual for details / instructions). The power usage of PDAs is very low, so we do not see any problem with electromagnetic fields caused by the device's basic operation.

Sage C et al 2007 – *Personal digital assistant (PDA) cell phone units produce elevated extremely-low frequency electromagnetic field emissions* Bioelectromagnetics 28(5):386-392

Pencil sharpeners

Electric ones have motors giving off high EMFs. They are not usually a hazard being used occasionally for short periods.

Personal alarms, as used in warden-controlled accommodation

As far as we know all battery-operated personal alarms are safe.

Personal radios and stereos

These do not pose an EMF problem when run on batteries.

Headphones attached by a lead to radios and stereos are fine as long as the equipment itself is earthed. If it is unearthed the headphones will give off high electric fields.

Remote cordless headphone systems have a microwave transmitter attached to the base unit. The receiver is in the headset worn by the person listening. Headsets are safe, but the transmitter gives off high fields. Sit a reasonable distance away from the transmitting unit.

Photocopiers

These can give off very high magnetic fields close to the motors. Stand back at least 50 cm. Photocopiers emit ozone, which is affected by the surrounding electric fields. Ensure good ventilation. Toner powder is toxic when inhaled and is attracted to static electricity.

Power tools

All electric power tools give off EMFs; those with motors close to your body (e.g. electric drills and hedgecutters) will expose you to high magnetic and electric fields while they are in use. Short term occasional exposure should not cause any EMF related problems. The motors of some tools are further away from your body when in use and so the fields your body is exposed to are lower. The evidence seems to show that exposure when you are moving about is less of a risk than prolonged exposure when you are stationary (i.e. in a chair or bed).

Printers

Laser printers give off ozone, which is affected by the surrounding electric fields. Ensure good ventilation. Toner powder is toxic when inhaled and is attracted to static electricity.

Inkjet and squirtjet printers are more economical and ecological.

Projectors

Film and **slide** projectors have motors which give off magnetic fields which fall away within half a metre. It is unlikely to be a problem, but keep your distance to avoid cumulative exposure.

Radar

There are a number of radar installations servicing the communication needs of airports, seaports or river ports. Workers' occupational exposure to radar has been associated with some patterns of ill-health and we believe that people with sensitised immune systems may well also have health problems in the vicinity of these installations. Most radars are swept through 360 degrees over several seconds, resulting in short bursts of radiation as the beam passes by where you are. The resulting 'pulse rates' are typically in the range 3 to 10 seconds. Radar sources typically operate at 2.6 GHz for weather radars and 8-10 GHz for airport radars.

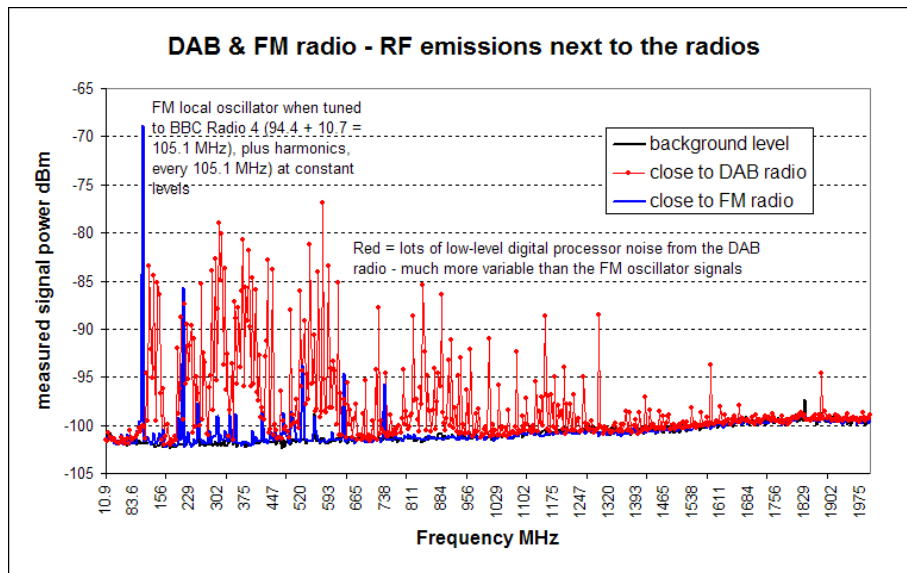
Radar gives off very high pulsed fields. These can extend to several miles away in the case of long distance military radar such as at Fylingdales in Yorkshire. Microwave radar levels can also be concerningly high within about half a mile of commercial airports.

Radios

Radios, by their nature, are not transmitting devices, merely receivers. However, mains operated radios give off EMFs from the cables when connected to the mains. Keep the radio at least a metre away when listening and unplug it or switch it off at the wall after use. Battery operated radios are fine.

We have been contacted by people concerned about emissions from the new Digital Audio Broadcasting (DAB) radios that have recently come onto the market.

We have measured one radio using new DAB technology, and compared it with an analogue FM radio of the type that has been used for many decades. We placed them, one at a time, into an EMF shielded container, and measured frequencies emitted from them over a wide frequency (0 Hz to 2.0 GHz) a very short distance away (5 cm).



As can be clearly seen on the graph, the DAB radio emits far more noise over a wide range, although the FM radio peaks at a higher level.

The reason for this is because of the more complex nature of the electronics in the DAB radio. The digital microchips cause a lot more to be emitted, while the simpler nature of the FM radio's electronics means that it has generally lower levels.

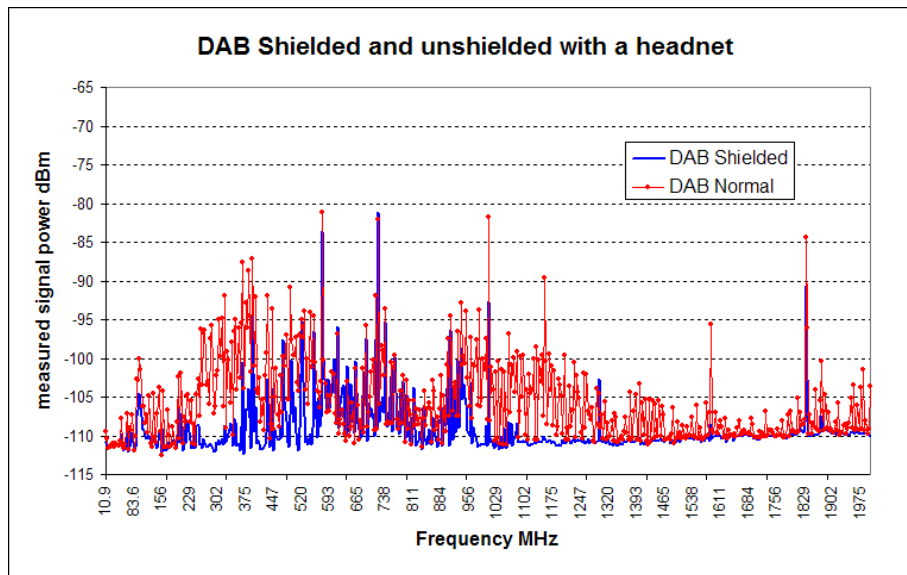
The reason for the FM radio's big spike is that it has an oscillator to focus it upon the incoming signal. This will move around as you tune to different stations.

While the differences in emissions are considerable relative to one another, the actual levels given off are very low, and not unusual to come from a modern electronic device. The low levels recorded here were at very close proximity, and in normal use you would not be exposed to levels this high, unless you held the radio to your head.

Potentially, the DAB radio could affect somebody who is EHS more because of the larger quantity of noise, but it could also potentially affect them less due to a lower peak signal.

For non-EHS people, there is no reason to regard a DAB radio any differently to other modern electronic devices.

We also tested the reduction in emissions when we shielded the device (excluding the aerial) with a headnet made of screening material. These are available from EMFields (<http://www.emfields.org>).



As can be seen, the levels from the device are significantly reduced, but still present.

The scale is logarithmic, so lowering the signal by 3 dBm roughly halves its power, and lowering by 10 dBm reduces the power by a factor of 10; 20 dBm by a factor of 100, etc.

The remaining signals will be travelling up the aerial, which cannot be shielded for the device to continue to properly function.

Also worth noting is how different the basic measurement is in comparison to the first graph; the signal strengths/frequencies vary significantly, depending upon where you measure the device.

Radio transmitters

Radiofrequency and microwave signals will increase over the next few years with the replacement of analogue transmissions with digital ones.

Stanislav Szmigielski (1996) monitored the Polish military personnel for over 15 years and found that those occupationally exposed to RF and microwave radiation were 14 times more likely to develop chronic leukaemia in their old age, 9 times more likely to develop acute leukaemia and 6 times more likely to develop Non-Hodgkin's Lymphoma (NHL). NHL incidence is rising steadily in Western countries for no known reason. The estimated average exposure levels of the people in Szmigielski's study were only about 5 microwatts per square centimetre, a level which can be found near powerful cellular phone base-stations and main TV and radio transmitter masts.

A major investigation was undertaken in the UK following a report by a Birmingham GP that there were high numbers of cancers close to the Sutton Coldfield transmitting mast. The cancer rates in the areas around eleven masts were looked at, and the only one with significantly more cancers than usual was the one at Sutton Coldfield. The reason for this is still unknown, but it may well have been a combination of microwave radiation and possible cancer-causing chemicals in the air. The researchers concluded that living near TV transmitting masts could not generally be considered an increased cancer risk.

Szmigielski S 1996 - *Cancer morbidity in subjects occupationally exposed to high frequency (radiofrequency and microwave) electromagnetic radiation* Sci Total Environ 180(1): 9-17