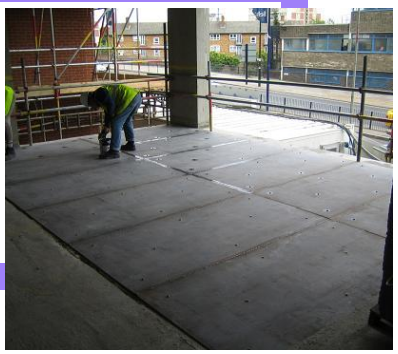
LOW FREQUENCY MAGNETIC SHIELDING

EMF Steel screening installed on the floor to prevent interference from electrical substation below the floor



EMF Screening installed on floor to prevent interference from new IT centre.

The effects of Low frequency magnetic fields on VDU's and human health

The effects of electro-magnetic interference on equipment and human health are a much-discussed topic. We are all continuously exposed to low frequency electro-magnetic fields (EMF), the most common manifestation of these are flickering computer screens or VDU's. With the rapid growth in the use of IT equipment in the office, it is no longer possible or acceptable to just move the computer to another part of the building that is unaffected.

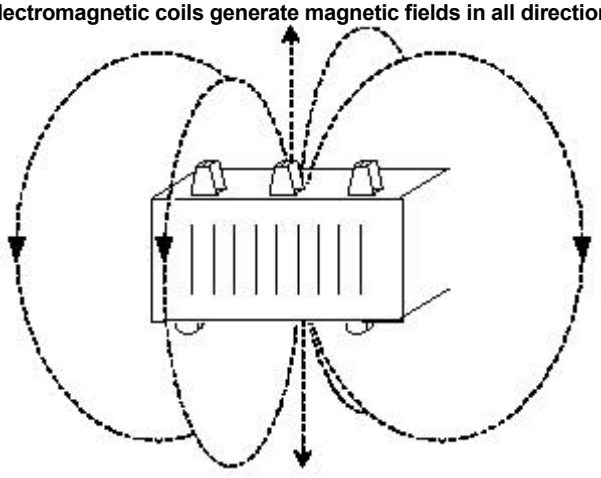
How does EMF affect VDU's? TTTss

The most commonly used VDU's are Cathode Ray Tube (CRT) displays. The CRT is an evacuated glass tube with a phosphorous coating on the screen and an electron gun that generates an electron beam. The beam is accelerated toward the screen by a high voltage electric field. The beam is scanned horizontally and vertically by controlled magnetic fields generated by deflection coils outside of the CRT around the electron gun. The horizontal scanning frequencies range from 15 kHz to 90 kHz, the vertical scanning frequencies from 50 Hz to 90 Hz. External 50 Hz magnetic fields generated by other electrical power equipment will, if high enough, modulate the magnetic field generated by the deflecting coils. For example if a VDU with a vertical scan rate of 60 Hz is affected by a 50 Hz field the resultant modulation will give rise to two new frequencies, 10 Hz (60 – 50) and 120 Hz (60 + 50). The human eye will detect the 10 Hz flicker. The horizontal scan will be similarly affected, but as this will be of a far high frequency, it is not normally noticeable.

EMF Screening

The consideration of physical screening may become the most practical of remedial actions, involving placing a physical barrier of shielding material between the source of interference and the affected area. The most commonly used materials are steel and high permeability Mu-metal. EMF shielding works by diverting and deflecting the magnetic field away from the affected area. The design of a shield must take into account that a magnetic field will 'flow' around a partial shield, but as these fields decay rapidly with distance, the extent of the shield needs to be large enough to take this into consideration. The most critical criteria when designing a shield is the level of attenuation required. Although different sizes and types of IT equipment and VDU's are affected by different levels of interference, experience shows magnetic fields in excess of 0.5 ìT (Micro Tesla) can cause VDU flickering, and if the fields rise above 1 ìT most screens will be affected. Test levels for IT equipment as detailed in the EU EMC Directive *(EN 55024, Immunity of IT equipment)* is 1.25 ìT. From the results of an EMF survey, compared to an acceptable level, the required attenuation can be determined using the formula A = 20log(R/M), where A is the attenuation required in dB, R is the actual EMF level and M is the maximum EMF level acceptable. For example, a monitor susceptible to 0.8 ìT located in an actual field of 10 ìT will require 22 dB of attenuation. Once this has been determined the type, thickness and extent of shielding material can be calculated. Particular consideration needs to be taken at floor / wall junctions as a poorly designed shield may solve a problem in one area, but result in concentration of the magnetic field in a different area.

All electromagnetic coils generate magnetic fields in all directions



For an effective EMF screen, the magnetic fields in all directions must be considered

European EMC Products Limited

Unit 8 : Saffron Business Centre : Elizabeth Way : Saffron Walden : Essex : CB10 2NL
Tel: +44 1799 523073 Fax: +44 1799 521191 Email: info@euro-emc.co.uk Web: **http://www.euro-emc.co.uk**