GUIDELINE TO REDUCE THE VISIBLE EFFECT OF MAGNETIC INTERFERENCE ON COMPUTER CRT DISPLAYS.

The image on a CRT is "painted" by electron beams as they are scanned over the inner surface of the CRT's faceplate. Magnetic fields in the CRT assembly steer the electron beams as they scan the faceplate, and the intensity of light emitted from the faceplate is controlled by video signals applied to the CRT electron gun.

Other electrical equipment or wiring in the vicinity of the display may generate magnetic fields that affect the electron beam paths. In the vast majority of cases, these fields have no perceivable effect on the image. On some occasions, alternating fields, such as those produced by AC operated equipment or wiring will cause the electron beams in the CRT to bend in time with the AC power. In some cases, this can result in perceivable flickering or wiggling of images on the screen, and in more extreme cases will result in apparent defocusing.

The procedure outlined below advises how to correct for most of these problems.

1. Turn off and unplug from the electrical power source all non-essential electrical appliances in the vicinity of the display. This includes any printers, scanners, modems, UPS and additional displays, leaving on only the computer and its display. It is also recommended that the computer and its display are connected to the same power circuit to minimize the influence of different ground paths in the event that this may be a factor.

2. If the magnetic interference symptoms have disappeared, then at least one of those appliances was the cause of that symptom. To determine which appliances were the cause, it is now necessary to plug in and turn on each appliance, one at a time, until the symptom reappears. Having identified which appliance causes the symptom, that appliance should be relocated or plugged into another power source circuit to cure the symptom. The process should then be continued until all the appliances are reconnected.

3. If the above procedure has not caused the symptom to disappear, then the display should be rotated horizontally to minimize the symptom. Moving the display to various positions around the original position, and then rotating it again to minimize the symptom may find further improvement. Following this procedure may allow the operator to find an orientation and location of the display that suitably minimizes the symptom.

4. If the above procedures have still not reduced the symptoms to an acceptable level, then testing with a small piece of sheet steel located along one of the sides of the display may be attempted. A two foot by one foot piece of 16 gauge sheet steel folded at 90 degrees mid way across its length would result in a one foot square vertical shield being supported by a one foot square horizontal shield that could be located under part of the display. By experimentation, the best location of the vertical shield can be established, but care must be taken to make sure that the natural ventilation of the monitor is unaffected, such as if the vertical shield part is placed more than two inches from the monitor. If required, further reduction can be obtained by purchasing a commercially available shielding product.

5. If all the above procedures have still not reduced the symptoms to an acceptable level, then it is advisable to program the graphics card to run at another refresh rate. If the graphics controller and the display are both specified to operate at the required conditions, then set the refresh rate to be as close to the power line frequency, or to twice the power line frequency, as possible (the power line frequency is 60 Hz in the U.S. and 50 Hz for most of the rest of the world). The operator is less likely to perceive flicker when operating at twice the power line frequency, and even if a hardware upgrade is required, this may be a more attractive solution than some of the others.

6. Item 3 above is effective for localized magnetic fields around nearby appliances, but for more uniform (less localized) magnetic fields, as generated by overhead power cables, or larger power sources, it may be necessary to modify the procedure of item 3. For the modified procedure it may be necessary to relocate the monitor much further away from it’s original position, such as to another room.

7. If none of the above procedures are adequate then it may be necessary to use an alternative display such as a flat panel display, since they are relatively immune to magnetic fields.