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Simple Method for Optimizing Alignment of Device Sensitive to Magnetic Fields in an MRI Environment

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This invention is a simple way of optimally aligning the device's magnet sensitive motors and other components such that they are oriented to have the least amount of resistance to the magnetic field orientation (B0).

SPECIFICATION

Many devices, especially those with electric motors, are sensitive to the strong magnetic fields in an MRI scanner room. MRI systems utilize super conducting magnets that have very high magnetic fields. The polarity of these fields is specific to the installation of the magnet and the configuration of the room. The polarity and orientation of the magnetic field is known as B0. In closed MRI systems, B0 is parallel to the bore of the MRI tube, for example.

Devices that operate in a MRI scanner room will have to contend with the strong magnetic fields that are present. To the extent that motors or other magnet sensitive components are oriented opposite or at odd angles to the B0 field, the device will have to work harder to overcome the extra magnetic force exerted by the MRI system.

This invention is a simple way of optimally aligning the device's magnet sensitive motors and other components such that they are oriented to have the least amount of resistance to the magnetic field orientation (B0).

There are three components:

- A magnetic field sensor;
- An alignment indicator; and
- Instructions

There are two options for the magnetic field sensor:

- A compass-like device mounted on the device with a magnetically sensitive pointer that has the ability to rotate and point at B0; or
- An electric version of this where indicator lights help guide one to orient the device onto which it is mounted to point at B0 and there is a magnetic sensor, say a Hall effect sensor, which can detect magnetic field strength changes and change the indicator lights to direct the operator to re-orient the device.

The alignment indicator is a reference point that is physically placed on the device. This coincides with the optimal positioning of the device such that, when this reference point is aligned with the magnetic field sensor, the device is optimally positioned within the magnetic field. In other words, the magnetic field gives the least amount of resistance to the device when the pointer on the magnetic field sensor and the alignment indicator are aligned.

The instructions are verbal and visual indicators that teach the operator how to maneuver the device so that the alignment indicator and magnetic field sensor are in alignment.

Traditionally, such devices have not been provided with any kind of visual indication means with which to enable personnel to optimally position such devices in the magnetic field. It is not obvious to people that electro-mechanical devices will degrade over time in high magnetic fields. The invention disclosed here will improve the longevity of such devices, and possibly their reliability, in an MRI environment. It may allow such devices to be less costly due to reduced motor strengths and may improve reliability due to less stress in the MRI environment.