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Test Report
Magnetic Flux Density Measurements on the DBO Patient Chair

Now in production
by Kirton Healthcare Group

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Introduction

Earlier development work comprised the design of the holding magnet fixtures to be used in the DBO patient chair and test measurements of the DC magnetic flux density surrounding these holding magnet fixtures. The DBO patient chair is now in production. To fully satisfy any doubts about the stray magnetic flux density levels that a person sitting in the char may be subjected to it was decided to do further measurements on a finished production model.

Test procedure

Measurements of DC magnetic flux density were carried out on a production chair, shown in Fig 1, using a calibrated Bell 9640 Hall-effect gaussmeter connected to a 3-axis Hall probe. The probe contained three Hall elements arranged at right angles to each other to enable measurements to be carried out in the X, Y and Z directions. The measurements were taken at positions that would cover possible areas of concern as quoted in the ICNIRP standard.

Figure 1 Production Chair.

Test Procedure.

The measurements were taken at the following positions: -

1. Centre of the head position. This was to cover exposure to brain tissue.
2. Centre of the neck. This was to cover exposure to major nerve and blood transport networks.
3. Centre of the chest. This was to cover the heart and any possible electronic implants.
4. Centre of the seat. This was to cover any hip implants.
5. Centre of the seat edge. This was to cover any knee implants (This was done for both left and right knee positions)

To enable correct positioning of the probe a person, 1.68 m in height was photographed sitting in the chair; this is shown in Fig 2. From the photograph an estimate of the test positions given above was made.

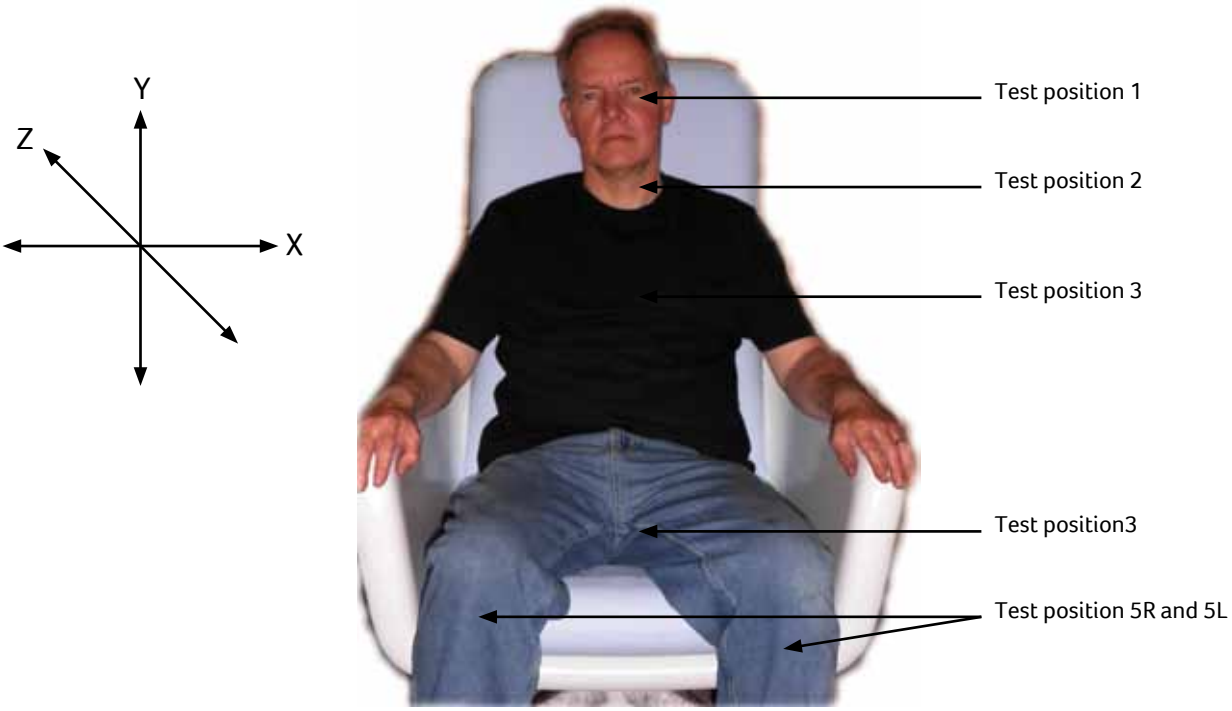

Figure 2 Person sitting in the production chair with the test positions marked

The probe was mounted on a none magnetic stand and at each test point the probe was oriented such that the Y direction corresponded to the vertical plane. The X direction corresponded to the horizontal plane across the face of the chair and the Z direction corresponded to the horizontal plane front to back of the chair. An estimate was also made of the distance the probe was to be placed away from the cushion surface to correspond to the central portion of the body part in question.

A further two tests were carried out at positions 1 and 2 to determine the magnetic flux density with the Hall probe touching the surface of the cushion.

The results of the tests are given in Table 1.

Results.

Table 1 Test Results.

Test Position	Distance from Surface of Cushion to Probe Tip (cm)	Magnetic Flux Density Value X direction (Gs)	Magnetic Flux Density Value Y direction (Gs)	Magnetic Flux Density Value Z direction (Gs)
1	10	0.15	0.55	0.00
1	0	0.17	0.47	0.20
2	10	0.14	0.49	0.03
2	0	0.06	0.36	0.20
3	12	0.14	0.48	0.03
4	10	0.05	0.60	0.02
5R	5	0.15	0.34	0.08
5L	5	0.13	0.30	0.05

Conclusion

It can be seen from the results shown in Table 1 that none of the magnetic flux density readings exceeds the recommended level of 3 Gs quoted in the ICNIRP standard. I believe that the stray DC magnetic fields associated with the holding magnets used in the cushions of the chair should not cause any problems with implants or electronic devises such as pacemakers.