Altaire®
It Gives You a Winning Combination

Over the last decade, Open MR has gained widespread acceptance in the medical community by combining patient comfort with high image quality.

Initially, this image quality had longer patient study times associated with it, leaving a mutually exclusive choice between patient comfort and speed.

Hitachi has now changed all that with Altaire; its high-field performance Open MR system. Altaire combines the comfort of Open MR with the image quality and patient throughput of conventional high-field systems.

Long recognized as the established leader in Open MR, Hitachi took the next logical step in its evolution by carefully evaluating and designing each sub-system to work in concert with each other to achieve high-field performance and to optimize overall system performance.

Hitachi has named this entire approach and philosophy of paying close attention to details Vertical-Field with Optimized Sub-System Integration (VOSI®) Technology.
Leadership in Open MR

Hitachi’s attention to every aspect of the MR image’s sub-systems led to advances in hardware development and clinical imaging performance comparable to conventional high-field systems. Altaire’s hardware platform includes:

- a state-of-the-art vertical field superconducting magnet delivering homogeneity never before available in open MR
- a powerful gradient system to support rapid, high-resolution imaging
- an advanced workstation architecture to enhance patient throughput
- a precision digital pulse sequence control processor that enables advanced applications
- a wide range of anatomically-specific coils for high signal sensitivity and uniformity
- Hitachi’s proven award-winning open gantry architecture

**Impressive results**
The culmination of the VOSI approach allows the Altaire system to:

- perform advanced clinical imaging techniques such as RF-fat saturation over a large field-of-view, EPI-based diffusion-weighted imaging, and advanced MR Angiography
- achieve high-resolution, small field-of-view imaging with very thin slices
- deliver high-field scan times through high slew rate gradients which offer short TEs and narrow inter-echo times for Fast Spin Echo and Echo-Planar Imaging
- provide flexibility in setting up acquisitions to optimize image quality

Highly Engineered Sub-Systems are the Secrets to Success

Our VOSI approach means all sub-systems are finely tuned to work together seamlessly to shatter old performance barriers.

**Spatial resolution**
Discrimination of small anatomical structures is achieved with Altaire’s high-performance gradient system. Specifically, Altaire’s gradient amplitude of 22mT/m is capable of:

- 512 x 512 image acquisition
- 5 centimeter field-of-view
- sub-millimeter slice thickness

Additionally, with a gradient slew rate of 551T/m/s, Altaire delivers:

- short acquisition times
- advanced imaging techniques

**Signal-to-Noise**
Hitachi’s choice of a 0.7T superconducting magnet with a vertical field design effectively supports:

- A wide variety of anatomically-specific solenoid coils for substantial signal-to-noise advantage over horizontal field with saddle-type coil configuration
- Narrow bandwidth operation with inherent benefits over high-field systems
- Advanced RF technology, including a flat quadrature MER transmit coil for high uniformity

The blend of vertical field technology, narrower bandwidth acquisition, and proprietary RF technology allows Altaire to achieve a high SNR.

**Contrast resolution**
Contrast resolution is greatly enhanced by the high homogeneity magnet at 0.35 ppm @ 35cm DSV (Vrms) and RF spectral fat saturation.

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**Bo (Tesla) vs Δf (Hz)**

<table>
<thead>
<tr>
<th>Bo (Tesla)</th>
<th>Δf (Hz)</th>
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<tbody>
<tr>
<td>0.70</td>
<td>104</td>
</tr>
<tr>
<td>1.50</td>
<td>224</td>
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*Frequency spread of Fat and Water as a function of field strength*

A meticulously engineered high homogeneity magnet and a high-precision pulse sequence controller allows for many advanced clinical imaging capabilities such as RF-fat saturation.
Fast Spin Echo
Rapid patient imaging times are made possible with an Echo Factor range of 2 to 256 and user-variable inter-echo time of 5.2 to 30 milliseconds. The Driven Equilibrium FSE feature allows optimized T2-weighted contrast with the shortest possible scan time.

FSE capabilities include Fast Inversion Recovery techniques such as Fast STIR for fat suppression and FastFLAIR for effective suppression of Cerebral Spinal Fluid (CSF).

Ultra-Fast Imaging
With a high performance gradient system, Altair performs ultra-fast techniques found on conventional high-field systems, such as Spin Echo and Gradient Echo EPI in single or multi-shot sequences. Rapid imaging techniques like Echo Planar Imaging are useful when working with anxious patients.

Diffusion-Weighted Imaging
On the Altair system, diffusion-weighted imaging, beneficial in neurological assessment, is EPI-based.

Imaging through each disc space is greatly assisted with the use of multiple-slice/multiple-angle imaging. Image quality is further enhanced with the high resolution provided by the gradient system. Presaturation pulses and gradient refocusing techniques are available to negate the effects of pulsatile CSF and abdominal motion.

Multiple Array Technology
High uniform signal over a large field-of-view is possible with the use of multiple array technology. Multiple Array electronics, used in conjunction with the Cervical/Thoracic/Lumbar (CTL) coil, give Altair the ability to potentially reduce patient study times for total spine surveys by performing both the upper and lower spine study without the need to reposition the patient.
Vascular Imaging

Altair offers a variety of vascular imaging techniques including:
- 2D and 3D Time-of-Flight MR Angiography
- Contrast-Enhanced MR Angiography
- Phase Contrast MR Angiography

Altair also features high-resolution/high-definition reconstruction, multiple overlapping slabs, Magnification Transfer Contrast (MTC) for suppression of background tissue and Sloped Slab Profile (SSP™) to reduce in-plane saturation effects, resulting in vessel uniformity throughout the imaging volume and conspicuity of small vessel detail.

Advanced Reconstruction Techniques

The Ascent MIP capability offers user flexibility. The image trace tool provides elimination of undesirable surrounding background tissue to maximize vessel conspicuity.

Body Imaging

Body imaging is dramatically enhanced by RF-fat saturation and a 10kW transmitter for uniform signal and user-selectable echo allocation for contrast flexibility.

Altair is able to obtain rapid, high-quality breath-hold images. The motion effects of respiration are negated by Phase Encode Resonance for Reducing Motion (PEEPA).

This technology suppresses abdominal motion without heavily impacting scan time.

Altair's advanced PSE protocols allow for excellent MR Enterocolonopancreatic (MCPA) application imaging.
Upper Extremity Imaging

Altairé produces extremity imaging with high anatomical detail and RF-fat saturation for effective fat suppression.

Shoulder Imaging
The Multiple Array Shoulder coil provides high signal uniformity over the entire field-of-view. When coupled with RF fat saturation, it results in exceptional shoulder imaging.

Wrist Imaging
Altairé’s high gradient amplitude allows for 0.5mm slice thickness and the sub-millimeter resolution that is essential in wrist imaging. Combining this gradient technology with the multiple array wrist coil results in the highest quality images for the evaluation of small anatomical structures.

Lower Extremity Imaging

Altairé’s versatile Multi-planar Reconstruction (MPR) feature assists the radiologist in confirmation of suspected diagnosis through the use of orthogonal, oblique and curved imaging options. Reformatted images are commonly used to visualize obscured or abnormal anatomy.
Altaire’s Exceptional Patient Comfort
Opens a World of Opportunities

The unparalleled patient comfort provided by Altaire is something you would expect from the pioneer of Open MR. Altaire was designed and engineered with patient comfort in mind.

Being open on all four sides, Altaire minimizes feelings of anxiety and claustrophobia, potentially reducing the need for sedation or patient rescheduling. Altaire offers complete access to the patient at all times by both doctors and loved ones. Altaire also provides a call button and two-way intercom system that allow patients to be in constant communication with the technologist, reassuring even the most anxious patient. A six-direction, power-driven table makes positioning easy.

It starts with the award-winning gantry design featuring an asymmetric two-post architecture that creates a friendly environment. The patient gap of 47 cm high and 114 cm post to post further enhances the openness of the system while accommodating a wide variety of patient body types.

A 80 cm wide table provides additional comfort and positioning flexibility to accommodate larger-than-average patients. Both of these patient table features in combination with Altaire’s open architecture allow for more accurate, easy positioning of the region of interest at magnet isocenter.
Altaire’s Workstation is Designed for Easy Operation and Efficiency

To prepare study protocols ahead of time and modify protocols on demand, even while scanning is in progress. Flags signal invalid parameter selection and direct the user to possible parameter adjustments.

Altaire’s image display capabilities allow the user to view images individually or in multi-format for quick review and processing. There is a wide array of display tools to assist the technologist in image manipulation processes such as windowing/leveling, magnification, annotation, image framing and the inclusion of a reference image.

In image management, Altaire features processing such as edge enhancements, adaptive image processing, elimination of background, image addition and subtraction, Multi-Planar Reconstruction (MPR) and Maximum Intensity Projection (MIP). Film, archive and network tools are also available for autofilming, autoarchiving and DICOM 3.0. The DICOM 3.0 interface feature offers ease of use in such tasks as printing, querying and retrieving images from the database and more.

Altaire’s Dual XP workstation features a multi-processor computer architecture, enabling comprehensive multi-tasking for efficiency in acquisition, display and image management...all keys to better throughput. The system features an intuitive Graphical User Interface (GUI) which is easy to learn and use. Highlighted by a large color monitor, the Altaire workstation offers high storage capacity and promotes operator efficiency.

Image acquisition, scan selection and parameter control are managed through scan “cards.” These scan cards are organized in a logical sequence that allows the technologist to efficiently
Siting is Simple and Economical with Altaire

Self-shielded design
The self-shielded design of Altaire, which limits the area of the magnet's fringe field, provides a variety of sitting advantages.

The most significant of these advantages is the reduction of the overall cost of site construction by eliminating or reducing the need for magnetic shielding as well as decreasing total site preparation time. The ability to incorporate scan room windows and skylights adds to the friendly, open environment.

Modular approach
Altaire continues the Hitachi tradition of MR systems with compact equipment cabinets and minimal space requirements. The modular workstation consists of just three components—a large LCD flat panel monitor, computer center and mouse keyboard—offering additional sitting flexibility.

Electrical requirements
Altaire uses three-phase 208V power, which is readily available and less expensive than the power required by many other systems using superconducting magnets.

When the chiller is located outside, the equipment room requires no special air handling equipment, potentially reducing overall operating costs.
Unparalleled Customer Support

Since Hitachi has been a leader in the development of Open MR from the beginning, our understanding of this field is second to none. We share this depth of knowledge with you every step of the way.

Siting
It starts with the siting process. We'll give guidance on the room size, optimize the placement of the magnet and thoroughly test for environmental concerns. Hitachi's self-shielded design reduces installation time and usually the overall cost of siting.

Once a site has been selected, we'll work with you through completion and beyond. Installation is done by Hitachi-trained engineers who ensure your

MR system is optimized for your site. Upon completion, service engineers not only document and test that your system meets all our exacting specifications, but use an ACR testing phantom to verify this optimization.

Applications
Hitachi understands that the technical features of its equipment can only provide the highest levels of image quality and user satisfaction when your technologists and physicians have comprehensive training and continuous support.

- On-site start-up support
- Applications helpline
- HITS training for MR Technologists
- On-site follow-up support
- Customer workshops
- System enhancement training

Service
Hitachi has a large number of service engineers strategically placed across the country. There will be one near you.

Hitachi's service contracts give you much more than just service. They provide for free operating software upgrades, special discount options and a 99% uptime guarantee.

99% Uptime

Marketing
We will provide you a complete marketing planner to help promote your facility to the fullest. Its enclosed guide can help you develop your own unique marketing program. There is also a collection of brochures, ads, press releases, letters, videotapes and a CD-ROM of digital images that will help you communicate effectively with patients, referring physicians and the local community.
Altaire gives you the best combination of high-field performance and the patient comfort of Open MR. All of Altaire's sub-systems—magnet, gradients, RF and computer—have been specifically optimized to work in concert, a blend of features called VOSI® technology. This seamless blending is something you'd expect from Hitachi, the world leader in the advancement of Open MR technology.