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Manufacture: GE Healthcare Model#

1 Discovery MR750w 3.0T

1 Discovery MR750w 3.0T 32-Channel GEM MR System

Patient expectations of MR have shifted in recent years, as patients have begun to demand a better, more comfortable scanning experience. Increasing the size of the bore is a good first step, but it's only the beginning. The right system should overcome traditional limitations of wide-bore MR, offering both excellent images and a user-friendly experience. Patients should be more comfortable during their scan, and clinicians more comfortable in making a diagnosis. All the while, organizations should expect their MR system to help them deliver solid financial returns, maintain a high standard of patient safety, and increase the quality of their care.

GE has advanced the capabilities of wide-bore MR by delivering both uncompromised image quality and high productivity, all with an expansive clinical field of view. With the Discovery MR750w 3.0T GE offers a range of new functionality, provides a more patient friendly environment and a clinical workhorse system for practices of all sizes and specialties.

To improve the patient experience and provide high image quality, no other component of an MRI system has greater impact than the magnet. Incorporating over 15 years of 3T magnet design experience, the Discovery MR750w system features a short, wide bore magnet that delivers a 50 x 50 x 50 cm FOV. The magnet geometry has been optimized to reduce patient anxiety by providing more space in the bore and more exams with the patient's head outside of the magnet. The 50cm field of view provides uniform image quality and can reduce exam times since fewer acquisitions may be necessary to cover large areas of anatomy. Complemented by GE's active shielding technology, the Discovery MR750w's flexible installations specifications provide easy siting. And with zero-boil-off magnet technology, helium refills are effectively eliminated, thus reducing operating costs and maximizing uptime.

Quiet Technology: GE has implemented Quiet Technology on critical components of the MR system to reduce acoustic noise and improve the patient environment. This technology enables full use of the eXtreme Gradient Platform for excellent image

quality, while maintaining a safe environment for the patient. The technology encompasses the gradient coil, RF body coil, and magnet mounting.

GE's M-Drive Transmit and OpTix RF Receive Chain: GE's innovative Optical RF receive technology improves signal detection while simultaneously reducing electrical noise. By locating the receiver electronics on the side of the magnet and close to the origin of the MR signal, interference from external noise sources is reduced thus improving image quality and SNR. The result is a 27% SNR improvement over previous generation, non-optical systems for volumetric scanning.

The use of optical signal transmission reduces the cabling footprint over conventional copper cable designs and enables high channel count configurations without requiring additional space. The OpTix technology can seamlessly route signals from any coil port to the receiver using a dynamic switching RF hub. To enable the simultaneous use of multiple coils, there are multiple high-density coil connections ports conveniently located where the detachable table docks to the scanner.

- Sampling Bandwidth 80MHz.
- Simultaneous Receive channels 32.

MultiDrive RF transmit technology combines independent RF amplitude and phase control with a 4-port drive large volume RF body coil to provide precise control over the

RF transmit field at 3.0T. For enhanced flexibility, MultiDrive allows the user to choose either factory preset modes for productivity or per patient optimized RF shimming. No matter which is chosen, the result is uniform images and enhanced image quality regardless of body size and shape.

GE Express Patient Table System: The GEM table is a mobile patient transport device that combines with the posterior array of the GEM coil suite to improve patient throughput while enhancing safety. The GEM table supports 500 lbs for both lift and transport. The table has a maximum longitudinal speed of 30 cm/s for rapid patient positioning and accommodates a total scannable range of 205 cm.

Volume Reconstruction Engine(VRE): The backbone of any high-channel count system is the reconstruction architecture.

The Discovery MR750w utilizes the latest quad-core Intel processing technology with the VRE recon architecture. With its 32 GB of memory, acquisition-to-disk technology, and 13,000 2D FFT/s frame rate, the VRE delivers the processing power to quickly reconstruct high-resolution 3D volumetric data.

Discovery MR750w Site Collector: Optimally designed for patient safety, patient comfort, and efficient workflow, the external features of the Discovery MR750w also provide an aesthetically pleasing look and feel that can reduce patient anxiety. The wide open flare of the covers increase the effective bore size and can reduce patient anxiety when entering the scan room or magnet bore. With patient-optimized lighting and air conditioning, the system can be ideally set for each individual, increasing their control of the environment.

Wide-Screen LCD Monitor: The Express Exam user interface and workflow features are easily viewed and operated with this flat-panel Liquid Crystal Display (LCD) monitor. The monitor delivers 1920 x 1200 dot resolution at a refresh rate of 85Hz and an excellent 1000:1 contrast ratio using a digital DVI interface.

Also included is the host computer, keyboard and mouse.

Discovery MR750w Controls: This hardware interface includes the ergonomically designed keyboard, two-way communication and voice command module between the host workspace and scanner, activation buttons for patient table control, acquisition interface to initiate the scanner, and emergency stop switch.

Dual control panels that interact with the In Room Operator Console allows patient set up from either the left or right side of the magnet. The control panels include backlighting for easy visualization in darkened rooms, automated button highlights that signal which button to press for simplified workflow and ease of use, and a trackball with mouse buttons for interaction with the Operator Console and patient setup screens.

Included is a single channel transmit receive head coil.

This package also includes the following applications:

- TRICKS

- eDWI
- SWAN
- READY Brain

TRICKS (Time Resolved Imaging of Contrast KineticS) provides high resolution multi-phase 3D volumes of any anatomy for fast accurate visualization of the vasculature. With segmented complex data recombination, TRICKS can accelerate 3D dynamic vascular imaging without compromising spatial detail. TRICKS also uses elliptic centric data collection for optimized contrast resolution and auto-subtraction for optimized background suppression. The result is time course imaging that does not require timing or triggering, provides high temporal and high spatial resolution, and enables the extraction of optimum phases of data. As a result, TRICKS enables reliable, high quality vascular imaging.

eDWI includes the acquisition sequence and post-processing tools. It is designed to provide high signal-to-noise-ratio diffusion images of the brain and liver with short-acquisition time. Its multi-B feature is designed to provide measurement of apparent diffusion coefficient (ADC) map with reduced effect of perfusion. In addition, "3 in 1" B value combining technique, applies diffusion weighting to all three gradients simultaneously, helping improve sensitivity. Built in tetrahedral feature applies four different diffusion weighing combinations of x, y, and z gradients simultaneously to acquire isotropic diffusion weighted images with high signal to noise ratio and shorter TE. Its smart NEX feature significantly reduces the acquisition time. Inversion recovery has been deployed to provide robust fat suppression.

SWAN is a volumetric 3D acquisition technique that is sensitive to differences in susceptibility between different tissues. This technique acquires multiple-echoes at different echo times to highlight regions with increased T2* (susceptibility-induced) decay. Utilizing multiple-echoes, SWAN generates images with higher SNR when compared with similar techniques that rely on a single echo.

READY Brain automates scan prescription for brain exams, improving precision, repeatability and workflow. The steps

involved are (A) Whole brain localizer with 3D slabs (B) Automatic detection of mid sagittal plane (C) 2D-registration of mid sagittal plane to high quality reference image (D) Computer transformations for standard axial, sagittal and coronal views and (E) Prescribe views to GRx and scan automatically.

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Discovery MR750w ScanTools 23.0

The Discovery MR450w Scantools Package contains the following:

- Express Exam Workflow.
- Advanced Applications Suite.
- Connect Pro.
- Performed Procedure Step.

The Express Exam and ScanTools of the Discovery MR750w include a comprehensive suite of workflow features, advanced applications, and parallel imaging capabilities to enable the user to harness the capabilities of the scanner efficiently and effectively. The patient and technologist workflow of Discovery MR750w automates many of the routine tasks that previously required user interaction, thus dramatically reducing the workload for the user and ensuring that consistent and repeatable images are presented for review. Prescription, acquisition, processing and networking steps can be automatically completed throughout the exam. These automated steps can be saved in the Protocol Library to ensure consistent exam workflow for each type of patient.

The automated workflow features of the Express Exam interface includes the Modality Worklist, Protocol Library, AutoStart, AutoScan, AutoVoice, Linking, and Inline Processing that complete much of the work for the user.

Modality Worklist: The Modality Worklist (MWL) provides an automated method of obtaining exam and protocol information for a patient directly from a DICOM Worklist server. For sites with full DICOM connectivity, once a patient has been selected from the MWL, a new session is opened on the host interface and the relevant exam details are highlighted for the user. Additional data fields for patient-sensitive information such as allergies, pre-medication, pregnancy status, and history are

provided for greater clarity. The Discovery MR750w MWL provides complete control of the exam protocol prescription. The protocol may be selected well in advance of the patient's arrival in the MR suite thereby simplifying exam preparation and reducing necessary work by the technologist during the time-critical procedure.

Protocol libraries and properties: The Discovery MR750w system provides the user with complete control of protocols for simple prescription, archiving, searching, and sharing. The protocols are organized into two main libraries, a GE optimized set that are included with the system and Site Authored. For quick search and selection, each protocol may be archived with independent properties based on patient demographics, anatomy, type of acquisition, or identification number. For commonly used protocols, a favorites flag may be used for quick selection from the Modality Worklist or for sharing across other libraries.

ProtoCopy: Standard on every Discovery MR750w system, the ProtoCopy feature enables a complete exam protocol to be shared with the click of a mouse. The exam protocol can originate from either a library or previously acquired exam. This enables routine archive of protocols for emergency backup and simple management of libraries across multiple systems.

Workflow Manager: Once a protocol has been selected for an exam, it is automatically loaded into the Workflow Manager. The Workflow Manager controls image prescription, acquisition, processing, visualization and networking and may fully automate these steps if requested.

AutoStart: With AutoStart, once the landmark position has been set and the technologist leaves the room the Workflow Manager will automatically start the first acquisition in the exam.

Linking: Linking automates the prescription of images for each series in an exam. Once the targeted anatomical region has been located the Linking feature combines information from a prescribed imaging series to all subsequent series in the Workflow Manager. All series that have been linked may automatically be prescribed (Rx) and no

further interaction will be needed by the technologist to initiate the scan. The user has control over which specific parameters can be linked together. Series can have common fields of view, obliquity, slice thickness, anatomical coverage, saturation bands, or shim volumes. Multiple series can be linked together and saved in the Protocol Library or edited in real time. Linking may be used with any anatomy and with any acquisition. Once the first volume is prescribed, all other subsequent series with the same planes, can be automatically prescribed and acquired.

AutoElement Location(GEM equipped systems only): Once the patient has been landmarked on the GEM Express Patient table with the appropriate components of the GEM Suite, the system will automatically determine the optimum subset of elements to enable for scanning. The optimization of the elements is based upon the prescribed FOV and will automatically adjust if either the FOV changes size or position over the anatomy.

AutoCalibration (GEM equipped system only): A calibration scan is necessary for any acquisition that uses either ASSET parallel imaging or PURE surface coil intensity correction. The system will automatically acquire calibration data based on the prescribed imaging volumes and actions by the technologist if necessary.

AutoScan: With AutoScan enabled, the Workflow Manager will sequentially go through the list of prescribed series without any user interaction.

AutoVoice: The AutoVoice feature ensures that consistent and repeatable instructions are presented to the patient for each and every exam. User selectable, pre-recorded instructions are presented at defined points in the acquisition. This helps ensure that the patient is in the right position and is fully aware of the next step in the acquisition process. AutoVoice is particularly helpful during breath hold exams. The AutoVoice feature includes instructions in over 14 languages and the user can create and include their own unique voice instructions for local needs.

Inline processing: To further automate an exam, the Inline processing feature can complete all tasks for a particular series.

For certain tasks, the user must accept the results, or complete additional steps prior to saving the image to the database. In these cases the data is automatically loaded into the appropriate tool, then the system will await further instruction by the user.

Inline viewing: Inline viewing allows the user to conveniently view, compare, and analyze images without having to switch to the Browser. Simply select the series to view from the Workflow Manager and the images are displayed along with standard image display tools. Image comparisons can be easily done by selecting multiple series at a time. The integrated viewer allows the user to seamlessly move between scanning and image viewing.

Image fusion: To better visualize tissue and contrast, multiple images from separate acquisitions can be overlaid on one another. High-resolution anatomical images can be automatically fused with functional data or parametric maps for improved visualization by the user. The data is registered using translation and rotation and distortion correction to ensure accurate fusion. High resolution 2D and 3D data sets can be fused with reformats, parametric maps, 2D and 3D spectroscopy maps, plus functional datasets and more.

The automated workflow features of the system can be used for any anatomy and for any sequence. When combining the technology of AutoStart, Linking, Inline Processing, AutoVoice, and the AutoScan features, an entire exam can be completed with just a few actions. Following is a list of the acquisition pulse sequences and parallel imaging capabilities for the Discovery MR750w. The list is divided into Fast Spin Echo, Gradient Echo, and Echo Planar imaging sequences.

The following sequences are Included for Fast Spin Echo based acquisitions.

Spin Echo: The single echo gold standard for generating T1, proton density and T2 images.

Fast Spin Echo (FSE), Fast Spin Echo-XL (FSE-XL): Uses a train of spin echoes to reduce total acquisition times and provide high

resolution datasets. The XRB gradient performance of the Discovery MR750w allows for very short echo spacing, thus maintaining image resolution and SNR even in long echo train acquisitions. The sequence provides great flexibility and a large range of imaging options to ensure that quality can be optimized for all anatomy and patient situations.

Fast Recovery Fast Spin Echo (FRFSE): is an extension of the Fast spin Echo sequence and incorporates an additional refocusing pulse and 90 degree excitation at the end of the echo train. This additional forced recovery of the long T1 and T2 spins increases T2 contrast with shorter acquisitions times. The sequence of choice for high-quality, high-speed, and high contrast T2-weighted imaging in neurological, body, orthopedic and pediatric applications.

Single Shot Fast Spin Echo (SSFSE): An ultra fast scanning technique that permits dataset acquisition within a single RF excitation period. That means it can acquire slices in less than one second, making it an excellent complement to T2-weighted brain and abdominal imaging, as well as MR cholangiopancreatography (MRCP) studies.

FLAIR: T1 and T2 Fluid Attenuated Inversion Recovery (FLAIR) pulse sequences have been designed expressly for neuro applications. FLAIR allows suppression of signal from cerebrospinal fluid (CSF). In addition to this capability, T1 and T2 FLAIR add extraordinary contrast between white and gray matter to T1- and T2-weighted brain and spine imaging.

Double/Triple IR: These pulse sequences are included to allow black-blood imaging for studies of cardiac morphology. Triple IR adds fat suppression to black-blood imaging.

3DFRFSE: A sequence for creating high resolution, three-dimensional T2-weighted images of all anatomies and is especially useful for MR cholangiopancreatography (MRCP) studies.

Single-Shot Fast-Spin Echo (SSFSE): An ultra fast technique that permits complete image acquisition following a single RF excitation. It can acquire slices in less than one second, making it an excellent complement to T2-weighted brain and abdominal imaging and MRCP studies.

The following two methods are available for reduction of Specific Absorption Rate in the fast spin echo family of sequences:

Variable Rate Selective Excitation (VERSE) is a revolutionary method to reduce SAR for FSE and FRFSE acquisitions. Through simultaneous variation in both the Gradient and RF transmit waveforms VERSE provides up to a 60% reduction in SAR when compared to conventional approaches, resulting in higher slice coverage and/or faster acquisition times with uncompromised quality.

Modulated Amplitude Refocusing Train (MART): An additional method to reduce SAR for 2D Fast Spin Echo based acquisitions at 3.0T. With MART, the amplitude of the transmitted RF refocusing pulses are modulated in intensity throughout the acquisition train to both reduce energy deposition and maintain signal intensity longer. This provides up to a 60% reduction in SAR when compared with conventional approaches. It also enhances image quality by reducing echo spacings to reduce blurring common in long echo train acquisitions.

The following sequences are Included in Gradient Echo based acquisitions:

GRE, FGRE, SPGR, FSPGR: This suite of gradient echo techniques uses short TR and TE times to generate Proton Density-, T1-, T2-, T2* tissue contrast, or a combination thereof, in far less time than conventional spin echo acquisitions. The ultra-short TR and TE times possible with these sequences also ensure the performance needed for state-of-the-art vascular and contrast-enhanced MRA studies.

2D and 3D Dual Echo Gradient Echo: A vital tool for abdominal imaging. This variation on conventional gradient echo provides a pair of images for which the signals from water and fat either are in-phase or out-of-phase. By design, all of the images acquired within a single breath-hold are in perfect registration.

2D and 3D Time of Flight (TOF), 2D-Gated TOF: TOF Imaging and Enhanced 3DTOF Imaging are all ideal for MR angiography. Based on conventional gradient echo scanning, time of flight imaging techniques rely primarily on flow-related

enhancements to distinguish moving from stationary spins.

2D Phase Contrast (2DPC), 3D Phase Contrast (3DPC): These techniques demonstrate flow velocities and directional properties in vessels and other moving fluids such as cerebral spinal fluid and aortic flow. These acquisitions provide the data for quantitative flow analysis.

2D MERGE: Multiple Echo Recombined Gradient Echo (MERGE) uses multiple echoes to generate high-resolution images of the C-spine with excellent gray-white matter differentiation. By combining early echoes with high SNR and late echoes with improved contrast, the result is improved cord contrast within the spinal column.

3D MERGE: The 3D MERGE (Multi-Echo Recombined Gradient Echo) sequence has been optimized to generate clear tissue contrast in the cervical spine. By acquiring and summing multiple gradient-echoes at various echo-times, MERGE improves gray-white matter contrast within the cord and provides excellent visualization of the neuroforaminal anals. The high in-plane resolution and thin slices enable excellent image reformats for better tissue visualization from all angles.

COSMIC (Coherent Oscillatory State acquisition for Manipulation of Image Contrast): COSMIC is a 3D imaging technique specifically tailored for cervical spine evaluation. The unique fluid-weighted contrast yields improved visualization of the cervical nerve roots and intervertebral disks. The high resolution images are easily reformatted for better tissue visualization from any orientation.

2D FIESTA (Fast Imaging Employing STEady-state Acquisition) is designed to produce high SNR images extremely rapidly. The technique features an extremely short TR and fully balanced gradients to rephase the transverse magnetization at the end of each TR interval. For very short TR sequences, the signal intensity depends strongly on the ratio $T2/T1$ and is largely independent of TR. As a result, this pulse sequence accentuates the contrast of spins with a high $T2/T1$ ratio, such as CSF, water and fat while suppressing the signal from tissues with low $T2/T1$ ratio, such as muscle. This property enables high contrast between the myocardium and blood

pool.

3D FIESTA is a technique that uses an extremely short repetition time (TR) between RF pulses such that high-resolution 3D volume images can be acquired rapidly. The 3D FIESTA technique is especially useful for the rapid acquisition of high spatial-resolution images of static structures such as cochlea, internal auditory canal, or joints.

3D FatSat FIESTA is advanced software designed for imaging of the coronary arteries. The software acquires 3D images using FIESTA. Fat suppression is applied to accentuate the coronary arteries. The use of VAST (Variable Sampling in Time) technology greatly shortens breath-holding requirements or allows for higher spatial resolution.

BRAVO-BRAin VOLUME Imaging: This IR-prepared 3D Gradient Echo imaging technique affords isotropic, whole-brain coverage with 1x1x1 mm resolution. Coupled with parallel imaging, this sequence produces superior gray white matter contrast in just 2 to 3 minutes.

Brain Volume imaging is a high-resolution 3D gradient echo imaging technique designed to produce heavily T1-weighted isotropic images of the brain in just two to three minutes. BRAVO uses an inversion pulse prior to a train of low flip angle gradient echo acquisitions to reduce scan time and optimize tissue visualization. Bravo is compatible with ARC parallel imaging to minimize scan time and provide whole brain coverage with 1mmx1mmx1mm isotropic resolution. SPECIAL: Spectral Inversion at Lipids (SPECIAL) is a spectral spatial inversion technique for fat saturation in 3D FGRE pulse sequences.

LAVA: LAVA is a three-dimensional (3D) spoiled gradient echo technique designed specifically to image the liver with unprecedented definition, coverage, and speed in a single breath hold. Excellent fat suppression, through a version of the SPECIAL technique customized for the liver, is one of the reasons for the high definition of anatomical structures. The coverage and speed of LAVA are the result of short TR, innovative use of partial k-space acquisition, and advanced parallel imaging.

For improved tissue contrast, LAVA is compatible with Flex imaging. The LAVA Flex acquisition will provide a water-only, fat-only, in-phase and out of phase data sets in a single acquisition and produce images with significantly reduced chemical shift and susceptibility artifacts.

FastCINE: This pulse sequence is included specifically for studies of cardiac function. Through the use of retrospective gating, it allows full R-R coverage with high multi-phase temporal resolution for excellent visualization of myocardial wall motion.

iDrive Pro: iDrive Pro brings real-time interactive imaging to the MR system, making it easier to generate detailed diagnostic information on just about any anatomy. This includes organs that are subject to motion artifacts, such as spine, heart, diaphragm and GI tract. The iDrive Pro technique allows the user to change scan parameters on the fly, during scanning, to evaluate the results immediately.

SmartPrep: SmartPrep uses a special tracking pulse sequence to monitor the MR signal through a user-prescribed volume to detect the arrival of an injected contrast bolus and to trigger the acquisition once the contrast agent has arrived in the target tissue. Use of SmartPrep provides optimum timing of contrast enhancement.

The following sequences are Included in Echo Planar based acquisitions.

An essential tool for any high throughput site employing advanced techniques, Echo Planar imaging is what enables the rapid imaging required for such studies as functional brain mapping. And both EchoPlanar and FLAIR Echo Planar techniques make it easier to generate neuro studies from patients who cannot or will not stay still long enough for conventional techniques.

Diffusion Echo Planar Imaging: This Diffusion Weighted Single Shot Echo Planar Imaging (EPI) technique is especially useful for detecting acute and hyper-acute stroke. Its functionality includes Single Shot EPI and FLAIR EPI, Multi-NEX capability, isotropic Diffusion-Weighting imaging and on-line image processing. Diffusion Echo Planar imaging is the basis for

diffusion tensor imaging, sold separately. To enhance body diffusion, Adiabatic SPectral Inversion Recovery (ASPIR) and STIR saturation techniques are supported.

Parallel Imaging Acceleration Approaches: Array Spatial Sensitivity Encoding Technique: ASSET imaging option is an image-based parallel imaging technique used to speed data acquisition. For temporally sensitive acquisitions, ASSET reduces image blurring and motion, enables greater anatomical coverage, and reduces SAR. Parallel imaging acceleration factors up to 3.0 are supported in one dimension depending on the coil selected.

Auto-Calibrating Reconstruction (ARC): Is a GE exclusive self calibrated parallel imaging technique that eliminates breath-hold mismatch errors by imbedding the calibration data within the scan data. In addition, this unique reconstruction permits small FOV imaging by minimizing focal parallel imaging artifacts from the exam. Supporting both 1D and 2D acceleration, ARC supports high acceleration factors for reduced scan time.

Parallel imaging is supported across all anatomies with acceleration factors that are dependent on the phased-array coils utilized.

Automated 3D Distortion Correction: The Discovery MR750w system includes automated 3D distortion correction software that corrects for spatial distortions induced by non linearities in the gradient field. The process is completely automated and is embedded with the MR data reconstruction process. It is compatible with 2D and 3D imaging acquisitions.

IVI: The Interactive Vascular Imaging (IVI) user interface allows operators to quickly remove background from MRA images in order to generate angiographic and maximum intensity (MIP) projections in multiple scan planes. The resulting dataset can be automatically saved as separate series within a patients exam number, for quick recall in the future.

Multi-Projection Volume Reconstruction (MPVR): MPVR provides quick and easy generation of reformations through any 3D MR data sets.

FuncTool Performance: This package enables advanced MR image post-processing using a wide range of sophisticated algorithms, including:

- eADC maps.
- Correlation coefficients for mapping of motor strip and visual/auditory stimuli.
- NEI (Negative Enhancement Integral).
- MTE (mean time to enhance).
- Positive Enhancement Integral.
- Signal Enhancement Ratio.
- Maximum Slope Increase.
- Maximum Difference Function.
- Difference Function.
- Diffusion Tensor Post-Processing.
- 3D CSI Post Processing.

MR Pasting: Combine images from separate acquisitions into a single series with MR Pasting. MR Pasting is an image analysis software package that facilitates the display and filming of multiple station MR data sets in the body applications (total spine, total body), as well as peripheral MR angiography data. MR Pasting will automatically register and combine multiple acquisition stations into a single image of covered anatomy.

BrainSTAT software for time course analysis: The BrainSTAT post-processing application automatically generates parametric maps for neuro Blood Flow, Blood Volume, Mean Transit Time, and Time to Peak signal intensity. A Gamma Variant fitting algorithm is used to automatically estimate the arterial input function, then calculate the quantitative values for the four parametric maps. The maps may be saved in DICOM format and fused with high-resolution anatomic datasets for improved visualization of tissue and anatomy.

R2* Tool: Generate quantitative relaxation maps with the R2 Star (R2*) analysis tools in Functool. With the Express Exam workflow, this feature can automatically generate R2* maps (in units of Hz) and T2* maps (in units of milliseconds) after the multi-echo data has been acquired. The user can have

complete control of analysis and may use either the default values to initiate the calculation, or specify specific starting parameter to generate the parametric maps. Input variables for edit include, but are not limited to: number of initial images/echoes to be skipped, lower and upper threshold levels, use of a two-parameter or three-parameter fitting model, confidence level.

The parametric maps may be saved in DICOM format and may overlay high resolution 3D images with Functool Fusion for better tissue visualization. No separate option is necessary to acquire the data; it is included in Express Exam ScanTools.

ConnectPro enables the DICOM worklist server class for the operators' console, making it easy to query your HIS/RIS by name, or scheduled date, and to download patient demographics directly to the scanner. The data is automatically loaded into the Express Exam Modality Worklist for simple filtering, editing and prescription of protocols for exam preparation.

ConnectPro may require separate gateway hardware to connect non-DICOM compatible HIS/RIS systems to the MR scanner.

Performed Procedure Step (PPS) is an important automated connectivity capability, and a key component in film-less and paperless environments. Used in conjunction with the GE PACS broker, it automatically notifies the HIS/RIS and PACS systems of procedure status, in effect, closing the loop on the information gathered from patient arrival through billing.

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Discovery MR750w Magnet Collector

The MR750w is equipped with GE's most-advanced 3.0T magnet design, high-performance 44 mT/m and 200 T/m/s slew rate gradients, a spacious 70cm patient bore with bright inner-bore lighting, and MultiDrive RF transmit technology delivering performance, productivity and exceptional image quality.

GE's Wide-Bore Magnet Design: With GE's active shielding technology and space-age composite design, the lightweight 3.0T magnet minimizes weight while preserving homogeneity and minimizing fringe fields. The result is a 3.0T magnet that

does not compromise performance yet can be installed almost anywhere. The magnet's high-homogeneity delivers excellent fat-saturation away from iso-center and ensures image quality over a full 50 cm field-of-view. Coupled with its zero-boil off technology and remote magnet monitoring technology, the MR750w 3.0T magnet is designed to provide years of worry-free, reliable, low-cost operation.

In-Room Console (iROC): By consolidating all controls into one place, the In-Room Console (iROC) provides real-time feedback to the operator to improve exam room efficiency. With a high-resolution, color LCD display located just above the MR750w gantry, coil-connection, patient set-up, cardiac and respiratory waveforms make exam preparation a breeze. The iROC provides feedback on:

- Display of patient name, ID, and study description.
- Display and entry of patient weight.
- Display and entry of patient orientation / position.
- AutoStart - initiates automatic scan start.
- Cardiac & Respiratory waveform display.
- IntelliTouch landmarking information, table position, and scan time.
- Coil connection status.

High Performance Whole-Body Gradients: The MR750w incorporates the latest in MR gradient technology with the wide eXtreme Resonance Module (XRMw). XRMw gradients deliver 44 mT/m peak amplitude and 200 T/m/s maximum slew-rate on each axis with unmatched fidelity, accuracy, and reproducibility. The gradients are water-cooled and equipped with integrated thermo-electric cooling panels to provide excellent stability and duty-cycle for gradient intensive applications. The XRMw gradients have been designed with excellent linearity across the 50cm FOV. Utilizing a unique acoustic barrier material, acoustic noise levels are reduced for enhanced patient comfort without compromising imaging performance.

MR750w MultiDrive RF Whole-Body RF Coil: The Discovery MR750w system comes with GE's MultiDrive RF transmit technology as a standard system feature. This system features

a high efficiency 4-port drive RF body coil and independent RF amplitude and phase control to improve RF signal homogeneity across the field of view. The system features a fully automated optimization to adjust the RF settings for each patient to deliver optimal image quality regardless of patient size or shape.

1 Discovery MR750w Scan Room Electronics

The MR750w scan room electronics collector includes all of the following:

- MultiDrive RF components (cabling and electronics).
- Mechanical and electrical docking architecture that interfaces the GE Express patient tables, both GEM and non-GEM tables, to the Discovery MR750w magnet.
- RF signal switching hardware and cabling that routes the MR signals received to the respective OpTix receivers.

1 MR450/MR750 Preinstallation Collector

The Preinstallation Collector delivers to the site in advance of the magnet and main electronic components. This facilitates the later delivery and installation of supporting electronics. The following are the main components in the Preinstallation collector:

- Heat exchange cabinet for distribution of chilled water.
- Primary Penetration wall panel for support of the penetration cabinet.
- Secondary Penetration wall panel for support of gradient filters, helium cables, and chilled air and water.
- Helium cryocooler hose kit.

1 MR450/MR750 Main Disconnect Panel

The Main Disconnect Panel safeguards the MR system's critical electrical components, by providing complete power distribution and emergency-off control.

1 Discovery MR750w Fixed Cables Collector (A) (Short SR/ Short ER)

To accommodate various electronic and scan room configurations and sizes, the Discovery MR750w has preset lengths of cables and connector kits to speed system

installation. This configuration is for sites with a relatively short distance of 7 meters between the penetration wall and the rear of the MR scanner room (SR), and approximately 9 meters between the penetration wall and cabinets in the electronics room (ER). Refer to the pre installation manual for exact cable lengths and configurations. This cable collector is compatible with fixed and modular or relocatable building configurations.

1 MR450w/MR750w Gradient Cable Collector - A

1 Vibroacoustic Damping Kit

Material in the Vibroacoustic Damping Kit can significantly attenuate the transmission of gradient-generated acoustic noise through the building structure to nearby areas, including adjacent rooms and floors above or below the MR suite. If this kit is applied during the installation of a new magnet, no additional service charges are necessary. However, installation of the Vibroacoustic Damping kit under an existing magnet requires special steps. The steps to prepare the site and steps to install, such as modifications to the RF screen room, and other magnet rigging, modifications to the RF screen room, and other finishing work, are not covered in the pricing.

1 Cabinet Dollies

Provided to install the System Cabinets. Dollies remain the property of GE to be returned after cabinets are in place at customer site.

1 MR750w Calibration Phantom Kit

This 3.0T calibration kit contains a large volume shim phantom, a daily quality assurance phantom, an echo-planar calibration phantom, and associated loader shells.

1 Label Collector Kit - English

1 English Keyboard

Required for our operator console. This keyboard is ergonomically designed to keep your staff comfortable even through the longest shifts. The scan control keyboard assembly has an intercom speaker, microphone, volume controls and

emergency stop switch.

1 Discovery MR750w 23.1 Software and Technical Publications

1 Cable Concealment Kit - MR450w GEM, MR750w, MR750w GEM

The Cable Concealment Kit option accommodates a wide-range of scan room ceiling heights and is designed to provide a clean-look installation by concealing the overhead cabling from view.

1 MR Spectroscopy Phantom

The MR Spectroscopy Phantom is a Spherical Phantom Used for Calibration and Functional Checks of PROBE/SVQ and Phosphorus Spectroscopy. The MR Spectroscopy Phantom Contains a Solution of Metabolites Characteristic of a Human Brain Spectrum. These Metabolites are Present in Concentrations Approximately Equal to Those Found in the Human Brain and Include: N-Acetyl Aspartate, Glutamate, Creatine, Choline, Myo-Inositol, and Inorganic Phosphate. The Phantom Also Contains Sodium Azide to Inhibit Bacterial and Fungal Growth and Contains Lactate in Concentrations Higher Than Typically Found in Vivo. The Phantom is Dielectrically Adjustable to Load the Head Coil and is Chemically Adjusted to Match the T2 of Human Tissue.

1 Calibration Kit Phantom Holder Cart

1 Operator's Console Table

Wide table designed specifically for the color LCD monitor and keyboard.

1 MAVRIC SL + Flex Coil Suite for MR750w GEM

MAVRIC SL is a new advanced magnetic resonance imaging technique for imaging soft tissue and bone near MR conditional metallic devices. MAVRIC SL is designed to greatly reduce susceptibility artifacts, compared to conventional fast spin echo techniques, and is suitable for use on all patients cleared for MR exams.

The 3.0T Flex Suite by Neocoil is a versatile set of high density 16-channel coils designed to give high quality images in a wide

range of applications. The high degree of flexibility is particularly advantageous when imaging patients that do not fit the constraints of rigid coils, improving the patient and technologist experience, and enabling most exams to be completed with the same level of image quality expected from dedicated coils.

This standard set provides the two most commonly used flex coils, Medium and Large, and a knee stabilization fixture that is designed for compatibility with the standard curved table. With these two coils and the included accessories, this suite covers a broad range of muscular skeletal applications, including hand, wrist, elbow, shoulder, hip (unilateral and bilateral), knee, ankle, and foot. In addition, the coils versatility has been shown in a range of general purpose applications that include head, neck, and spine exams.

This suite of flex coils is compatible with the GEM Express Patient Table.

Includes:

- 3.0T GEM Flex Coils - Medium and Large.
- 3.0T GEM Flex Interface Module 16-ch Fixed, P-Connector.
- Flex Knee Stabilization fixture for curved table.
- Flex GP Strap and Interface Module Cover.
- Flex Cable Take-up Pad and General Purpose Stabilization Pad.

1

Discovery Advanced Imaging Pak

The Advanced Imaging Pak includes the following:

- IDEAL and Flex
- PROPELLER 3.0
- Inhance 2.0 Suite
- Cube 2.0

IDEAL

Generate consistent tissue contrast and reduce the number of series in an exam with IDEAL. The IDEAL acquisition and reconstruction methods can generate a water-only, fat-only, in-phase and out-of-phase data sets for clear tissue differentiation in a single series. In addition susceptibility

artifacts common to MR imaging such as incomplete or inaccurate fat saturation, and chemical shift can be eliminated as well. The IDEAL application acquires multiple echoes and uses unique reconstruction routines to generate the four image contrasts and correct for errors due to tissue susceptibility. IDEAL is ideally suited for imaging anatomical regions such as the brachial plexus, neck, spine, chest, foot, ankle, and axilla where inhomogeneous magnetic fields may yield failures with traditional fat saturation techniques. IDEAL is compatible with Fast Spin Echo, 3D Gradient Echo and parallel imaging.

For fast T1w multi-phase imaging of the abdomen and pelvis, LAVA Flex acquisition uses 2D ARC parallel imaging to reduce artifacts from breath hold misregistration and incorrect FOV placement while providing up to four types of T1w-based tissue contrasts: water-only, fat-only, in-phase and out-of-phase. LAVA Flex requires LAVA which is included in the Express Exam ScanTools and is standard with the MR750, MR450, and MR450w system.

For fast T1w multi-phase imaging of the breast, VIBRANT Flex acquisition uses 2D ARC parallel imaging to enable higher acceleration factors over ASSET parallel imaging, and reduce artifacts from breath hold misregistration and eliminates artifacts due to incorrect FOV placement, while providing up to four types of T1w-based tissue contrasts: water-only, fat-only, in-phase and out-of-phase. VIBRANT Flex requires VIBRANT, which must be purchased separately.

The IDEAL method is compatible with ASSET and ARC parallel imaging and is optimized based on the anatomy of interest.

PROPELLER 3.0

PROPELLER 3.0 uses an innovative k space filling technique and post processing algorithms to help reduce and correct for motion and minimize magnetic susceptibility artifacts. Radial k space filling pattern causes oversampling of the k space center, generating more SNR and providing excellent tissue contrast. Radial k space filling is inherently less sensitive to motion compared to the Cartesian method. In addition, a sophisticated motion correction post-processing algorithm is deployed to

reduce effects of motion originating from CSF flow, breathing, patient tremor or voluntary movements. PROPELLER 3.0 has been enabled for all anatomies, and T1 FLAIR, T2, T2 FLAIR, DWI as well as PD contrasts in all planes.

Inhance (Inherent Enhancement) Suite Non-Contrast MRA

The Inhance application suite consists of several sequences designed to provide high-resolution images of the vasculature with short-acquisition times and excellent vessel detail. These sequences include:

Inhance Inflow IR: Inhance Inflow IR is a new angiographic method, which has been developed to image renal arteries with ability to suppress static background tissue and venous flow. This sequence is based on 3D FIESTA, which improves SNR, as well as produce bright blood images. A selective inversion pulse is applied over the region of interest, which inverts arterial, venous, and static tissue. At the null point of the venous blood, an excitation pulse is applied to generate signal. The net result is an angiographic image with excellent background suppression and without venous contamination. Uniform fat suppression is achieved using a spectrally selective chemical saturation (SPECIAL) technique to provide uniform fat suppression, while respiratory gating compatibility reduces respiratory motion artifacts during free-breathing renal exams.

Inhance 3D Velocity: Inhance 3D Velocity is designed to acquire angiography images in brain and renal arteries with excellent background suppression in a short scan time. By combining a volumetric 3D phase contrast acquisition with parallel imaging, efficient k-space traversal, and pulse sequence optimization, Inhance 3D Velocity is faster than previous generations and is capable of obtaining complete neurovascular imaging in 5-6 minutes. Furthermore, background suppression is improved by the optimized pulse sequence design, resulting in better visualization of small branches. Respiratory trigger is also compatible with 3D Velocity to enable abdominal angiography, especially renal arteries. The result is the Inhance 3D Velocity technique offers improved productivity and image quality.

Inhance 3D DeltaFlow is a 3D non-contrast enhanced MRA application for peripheral arterial imaging. Inhance 3D

DeltaFlow is based on the 3D Fast Spin Echo technique and it utilizes the systolic and diastolic flow differences to help generate arterial signal contrast. A subtraction of the systolic phase from the diastolic phase images results in arterial only images, with good venous and background suppression. Interleaved acquisition and parallel imaging (ASSET) with optimized k-space trajectory helps reduce motion misregistration and improve vessel visualization respectively. In addition, with the use of partial-Fourier and coronal plane acquisition, the scan time is considerably reduced. Inhance 3D DeltaFlow is a robust 3D NCE MRA technique that provides excellent, high SNR visualization of peripheral arteries.

Inhance 2D Inflow: The Inhance 2D Inflow pulse sequence is designed to acquire angiography images of arteries, which follow almost a straight path, i.e. femoral, popliteal, carotid arteries, etc. Arterial blood flow is faster during systolic phase and slows down during diastolic phase. Inhance 2D Inflow is designed to acquire data during systolic phase and offers the following:

- Optimized spatial saturation gap to improve fat suppression and background suppression. With this saturation gap optimization, higher views per segment (vps up to 48) could be used, resulting in significant scan time reduction.
- Peripheral Gating that minimizes the pulsatile artifacts.
- Optimized View Ordering to improve arterial signal.
- ASSET acceleration compatibility to reduce scan time.

Cube 2.0

The Cube technology can eliminate multiple independent two-dimensional datasets with a single three-dimensional volume (or cube) of high resolution data to provide better image quality in shorter exam times. Compared to traditional 3D fast spin echo acquisitions, Cube uses a combination of optimized echo train pulses and ARC parallel imaging to reduce SAR, extend the duration of the acquisition echo train, and reduce the echo spacing. The system automatically adjusts the echo train flip angle amplitudes to provide optimized tissue contrast based on the specific tissue T1 and T2 characteristics and

prescription parameters. To further reduce exam time and improve image

quality, Cube is compatible with ARC self-calibrating parallel imaging.

Isotropic Cube datasets may be automatically reformatted from a single acquisition into any plane, without gaps, and with the same resolution as the original plane for improved anatomical review and tissue visualization. The maximum parallel imaging acceleration is dependent upon the surface coil in use.

High resolution Cube data can be acquired with T1, T2, T2 FLAIR, or Proton density weighted tissue contrasts for neuro, abdominal, pelvic, and musculoskeletal imaging.

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Discovery MR750w Advance Body Pak

The Advance Body Pak includes the following:

- IDEAL IQ
- StarMap Acquisition
- MR-Touch

IDEAL IQ is an acquisition and reconstruction software package that generates water and fat images, relative fat concentration, and $R2^*$ relaxation maps. This technique builds upon GE's IDEAL (Iterative Decomposition of water and fat with Echo Asymmetry and Least-squares estimation) technology by incorporating a fast, volumetric multi-echo imaging sequence and an enhanced reconstruction algorithm to improve the visualization of regional fat deposits in-vivo.

The IDEAL IQ reconstruction generates $R2^*$ corrected fat and water maps as well as an $R2^*$ map depicting the signal decay at each voxel in the image. Water and fat images produce the fat fraction map, a relative measure of the quantity of fat to total signal (water and fat signal combined) at each voxel in the image. The fat fraction image is scaled such that a full-scale value represents a voxel containing only fat while a value of zero represents no fat in that voxel.

The StarMap Acquisition package enables the acquisition of multiple gradient echo images at each 2D slice at a range of

echo-times. The resultant images can be processed using FuncTool to provide T2* maps within the anatomy of interest.

MR-Touch is a non-invasive method to measure relative tissue stiffness with MR, that combines hardware and acquisition and reconstruction algorithms to produce Elastograms, color-coded anatomical images showing varying degrees of elasticity or stiffness. The image contrast is related to relative stiffness of soft tissue and is generated from the real-time data acquisition during tissue palpation with low amplitude and low frequency sound waves. The hardware component is comprised of an active sound wave generator and a passive transducer that produces small vibrations in the area of the patient to be scanned. The MR-Touch acquisition software incorporates a spin-echo EPI phase contrast sequence making it less sensitive to susceptibility-induced signal loss. The acquisition software also triggers the sound wave generator to produce synchronized vibrations on the surface of the patient during the data acquisition. The reconstruction algorithms generate images that show the propagation of sound waves through the tissue (phase images) and also the corresponding strain wave and relative stiffness images. Parallel imaging is used to accelerate image acquisition and provide for whole liver coverage in a few breath holds.

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Discovery/Optima Cardiac Pak

The Cardiac Pak includes the following:

- MR Echo
- Tagging
- 3D Heart with Cini IR, 3D MDE and Navigator

MR Echo

MR Echo is a dedicated Cardiac MR interface that eases cardiac workflow and combines leading edge pulse sequences used specifically in cardiac imaging. It includes:

2D FIESTA imaging for cardiac wall motion visualization both in classic gated mode and with a real-time ability that needs no gating nor patient breath-holding. The real time imaging combines the resolution of MRI with the ease of use of Echocardiography and hence the product name MR Echo. The

real time and gated versions of the wall motion pulse sequence use a FIESTA sequence for superb bright blood pool images which contrast against a dark myocardium for maximum contrast to noise ratio. FIESTA combined with parallel imaging permits acquisition times of approximately 50ms, which results in 20 frames/second in the real time mode.

Time Course imaging is performed with MR Echo and includes two new pulse sequences to visualize the myocardial tissue at a single phase over a period of time. The first of these is an FGRE pulse sequence which uses the GE exclusive notched saturation pulse to maximize contrast to noise ratio. The second is a FIESTA base time course technique, which permits time course imaging in multiple planes simultaneously. Both techniques use ASSET parallel imaging speed up techniques. 'Lock coverage' is a feature within MR Echo that automatically adjusts the slice gap and R-R intervals to match the desired acquisition rate. This is particularly useful in stress imaging where there is a change in heart rate and a desire to maintain (or lock) the coverage of the time course dataset.

Myocardial Evaluation is also within the MR Echo interface to allow scar tissue assessment of the heart.

Autovoice can be combined with all pulse sequences within MR Echo allowing automated voice commands in over seven differing languages.

Cardiac Tagging

With Cardiac Tagging, an even distribution of spatial saturation lines are applied across the myocardium in the FastCINE Gradient Echo pulse sequence to enable cardiac wall motion assessment. Cardiac Tagging allows the application of 1D diagonal stripes or 2D grid saturation pulses once per R-R interval immediately following the R-wave trigger. Resulting images demonstrate motion (or lack of motion) effects.

3D Heart

3D Heart is a 3D Fat Sat FIESTA sequence (Optimized for 1.5T) or 3D IRPrep FGRE sequence (Optimized for 3T) that provides whole-heart coverage for coronary artery imaging or cardiac chamber imaging. It employs a T2 preparation pulse at 1.5T to

provide myocardial suppression for better coronary visualization. A multi-slab localizer allows easy whole-heart prescription, and increase inflow effect for high vessel conspicuity. A navigator echo pulse that detects motion of the diaphragm is utilized to enable free breathing acquisition. The navigator has been optimized to improve robustness, and employs prospective real-time motion correction to improve motion suppression and increase scan efficiency. The multi-slab acquisition minimizes the effect of respiratory drift and heart rate variability on image quality. An optimized phase ordering and steady state preparation has also been used to improve CNR and SNR.

As this sequence supports 3D IRPrep FGRE acquisition mode on both 1.5T & 3T, it can also be used for 3D MDE acquisition. With the

purchase of 3D Heart, 3 additional options (3D MDE, Cine IR and Cardiac Navigator) would be included.

Cine IR is a conventional ECG-gated, gradient recalled echo FASTCARD or FASTCINE acquisition sequence with an inversion recovery (IR) preparation. A single adiabatic inversion pulse is generated upon detection of the cardiac R-wave to trigger the multi-phase readout. Each image (i.e., cardiac phase) is at a progressively longer TI time; up to 30 TI times can be captured. Cine IR can be used to approximate the myocardial null point for a subsequent delayed enhancement (MDE) study for myocardial viability.

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Discovery/Optima Advanced Breast Package

The Advanced Breast Package contains the following:

- VIBRANT
- BREASE

NOTE: This package requires the 8-ch GE Breast Coil as a pre-requisite.

VIBRANT: VIBRANT (Volume Imaged BReast Assessment) is a fast, high resolution T1 weighted imaging sequence and application optimized for evaluation of breast tissue. VIBRANT uses GE exclusive technology and parallel imaging acceleration to quickly acquire multi-phase data without compromising

spatial resolution. This 3D gradient echo technique, optimized for sagittal or axial acquisitions, uses an optimized inversion pulse and dual-shimming technology that yields enhanced image contrast and robust, uniform, bilateral fat suppression. Auto subtraction of the first dataset is available to further suppress background. For enhanced speed, VIBRANT is compatible with both ASSET and ARC parallel imaging with acceleration factors up to four. As a result, VIBRANT enables reliable, high quality breast imaging.

For improved tissue contrast, VIBRANT is compatible with Flex imaging. The VIBRANT Flex acquisition will provide a water-only, fat-only, in-phase and out of phase data sets in a single acquisition and produce images with significantly reduced chemical shift and susceptibility artifacts. This is critical for evaluation of the axilla and chest wall. The Flex acquisition is a separately purchased option compatible with VIBRANT.

BREASE Breast Spectroscopy: BREASE is a single-voxel TE-averaged PRESS sequence that is optimized for mapping the bio-chemical information of breast tissue. The TE averaging reduces unwanted information from side-bands to ensure clean and simple spectra and streamlined interpretation. Optimized prescan and reconstruction algorithms are employed to accurately characterize tissue, especially in areas normally dominated by lipid signal.

1

MR750w 3.0T GEM Suite - Core Components

The Geometry Embracing Method (GEM) Suite of surface coils and accessories improves image quality and patient comfort while simplifying workflow for the operator. The GEM design ensures that the geometry of the surface coil matches the geometry of the patient. By matching size and shape of the coil with the size and shape of the patient, the GEM Suite embraces the natural shape of the anatomy thus improving image quality and patient comfort. In addition, the GEM Suite is fully integrated into the Express Patient Table and provides a simple method for the operator to prepare each patient with minimal effort and maximum productivity.

The core components of the GEM Suite include the fully integrated Posterior Array, the Head and Neck Unit, and the

Large Anterior Array. Each component of the GEM Suite may be used individually or combined together to increase anatomical coverage. The GEM Suite of surface coils is used with the fully detachable GEM Express Patient Table. This combination of technologies can dramatically simplify technologist and radiographer workflow and enables the patient to be positioned head-first or feet-first for all exams.

GEM Posterior Array: The GEM Posterior Array (PA) is designed to provide optimum element geometry for each targeted anatomy. Unlike matrix arrays that use the exact same coil element size and shape for all anatomy, the GEM PA uses different element geometries for the cervical-to-thoracic spine transition, thoracic and lumbar spine, and body and cardiac anatomy. This approach maximizes signal-to-noise by matching the size and shape of the coil elements to the size and shape of the targeted anatomy. Four different sizes and shapes of elements are used throughout the design, and parallel imaging is supported in all three planes.

The GEM PA is symmetrically positioned within the patient cradle and is fixed in location. This design enables all components of the GEM Suite to support either head-first or feet-first patient orientation to support either patient preference.

The GEM PA is invisible to additional surface coils when they are placed directly on top of the surface. Unique electronic decoupling circuits ensures there is no electrical interference between surface coils. This feature is critically important for patient and operator workflow and enables the PA to be stationary for all exams, including breast and musculoskeletal exams where dedicated coils are typically used for these anatomies.

PA Coil Specifications:

- S/I Coverage: 100cm.
- Head or Feet-first imaging.
- Elements: 40.

The GEM PA Array is designed to be used in conjunction with the GEM Head and Neck Unit, the Large Anterior Array, the Small Anterior Array (purchased separately) and the GEM

Peripheral Vascular Array (purchased separately). In addition, the PA may co-reside with a suite of flexible coils or dedicated anatomy-specific coils (each purchased separately). Additional GE PA coils may be purchased for use in additional patient tables.

GEM Head and Neck Unit and Comfort Tilt: The GEM Head and Neck Unit (HNU) is a standard component of the GEM Suite. The HNU consists of four imaging components, a HNU Base Plate and three anatomy-optimized anterior components. The inclusion of separate anterior components ensure that the geometry of the surface coil matches the geometry of the patient to improve both image quality and patient comfort. The three anterior components are the Neuro Vascular Array, a dedicated Cervical Array, and the Open Face Adapter.

The HNU Base Plate supports the patient's head and includes three rows of elements separated in both the superior/inferior and right/left dimensions. Any of the three separate anterior arrays may be connected to the Base Plate.

The Comfort Tilt is a variable-degree ramp that may be positioned under the HNU. The Comfort Tilt can elevate the superior end of the coil to match the curvature of the patient's head and thoracic spine angulations. The operator may easily adjust the angle of tilt with a single motion.

The HNU Base Plate, Comfort Tilt, and any of the anterior components may be positioned at either end of the GEM Express Patient Table to support head-first or feet-first imaging. The HNU Base plate may remain in place for all body, vascular, spine, and the majority of musculoskeletal exams for either patient orientation.

GEM Head and Neck Unit Coil Specifications:

- Length: 49.5 cm (19.5 in).
- Width: 38.8 cm (15.3 in).
- Height: 36.8 cm (14.5 in).
- Height: 33.6cm (13.2in) with Cervical Array.
- Height: 25.7cm (10.1in) with Open Face Adapter.
- Weight: 8.8kg (19.4 lb).
- S/I Coverage: 42 cm.

- R/L Coverage: 50 cm.
- Head or feet-first imaging.
- Elements: up to 28 elements in the Field of View.

GEM Anterior Array: The GEM Anterior Array (AA) is a standard component of the GEM Suite that facilitates chest, abdomen, pelvis, and cardiac imaging. The GEM AA is lightweight, flexible, thin, and pre formed to conform to the patient's size and shape. With 54 cm of S/I coverage, the coil permits upper abdominal and pelvic imaging without repositioning the patient.

GEM Anterior Array Specifications:

- Length: 56.2 cm (22.1 in).
- Width: 69.8 cm (27.5 in).
- Height: 4.4 cm (1.7 in).
- Weight: 2.4 kg (5.3 lb) resting on patient.
- Weight: 3.6 kg (7.9 lb) with cable.
- S/I Coverage: 54 cm.
- Head or feet-first imaging.
- Elements: up to 36 elements in the field of view when used with the GEM Posterior Array.

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MR750w 3.0T GEM Small Anterior Array

The GEM Small Anterior Array is a receive-only, high-density RF coil designed to produce images with optimal signal to noise ratio and uniform coverage for cardiovascular, pulmonary, renal, and abdominal imaging. The light-weight coil design contains 16 channels, with parallel imaging capability in all three dimensions to speed up high-resolution, breath-held, and free breathing cardiovascular exams.

The small dimension of the coil and coil elements provide optimal specifications:

- Length: 45 cm (17.7 in).
- Width: 40.5 cm (15.9 in).
- Height: 4.5 cm (1.8 in).
- Weight: 2.94 kg (6.5 lbs).
- S/I Coverage: 27 cm (10.6 in).
- R/L Coverage: 35 cm (13.8 in).

- Head-first or feet-first imaging.
- Up to 33 elements in the FOV, when combined with the GEM PA.

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3.0T MSK Coil 4-Pak for MR750w GEM

The MSK Coil 4-Pak for MR750w GEM includes the following:

- 3-channel Shoulder Array
- 8-channel GEM T/R Knee Array
- 8-channel Foot and Ankle Array
- 8-channel GEM Wrist Array

The 3-channel Shoulder Array offers the increased signal-to-noise characteristic of phased-array technology, along with a unique sleeve design that delivers exceptional joint-imaging capabilities. The coil provides clear definition of the shoulder joint, specifically the head of the humerus, clavicle, acromion, supraspinatus muscle and ligaments.

The GEM Transmit and Receive Knee Array is designed for high definition imaging of the knee. This array uses unique hybrid technology where separate birdcage coils are used for RF transmission and excitation, and independent receive elements.

Designed uniquely for GE. The array is compatible with PURE for uniform signal intensity, and ASSET and ARC parallel imaging method for accelerated acquisition speed.

The foot/ankle coil produces high-resolution images of the foot and ankle by incorporating an 8-channel phased array design in a unique "ski" boot design. The unique coil design has excellent distal coverage and supports multiple foot positions for optimizing studies. Parallel imaging is supported to reduce acquisition times.

The 8-Channel GEM Wrist Array generates high definition images of the hand and wrist. The one-piece, ovoid, hinged design is optimal for small-FOV imaging and provides 12-cm S/I coverage. The coil can be positioned overhead or at the patient's side in either a vertical or horizontal orientation.

The array is compatible with PURE processing for uniform signal intensity, and ASSET and ARC parallel imaging methods for accelerated acquisition speed.

1 MR750w 3.0T GEM 8-Channel Breast Array with Biopsy Grids

The Breast Array generates high-definition MR breast images on Discovery MR750w 3.0T systems. Optimized for use with ASSET and VIBRANT for up to 3X acceleration, this 8-element phased-array coil helps ensure excellent temporal and spatial resolution, patient after patient. The array is also compatible with Fast Spin Echo, Fast Gradient Echo, and Diffusion Imaging sequences. It provides uncompromised lateral and medial access. This catalog contains a set of MR MR compatible biopsy grids that are compatible with this coil.

This coil has a flat base-plate making it compatible with the flat-table GEM coil system available on Discovery MR750w systems.

1 Discovery MR750w 3.0T GEM Lower Extremity Coil

The combined transmit and receive design of the Extremity Coil helps ensure optimal results in studies of the knee, ankle and foot. Its unique anterior extension increases the imaging volume for thorough evaluations in dorsi-flexed foot and ankle studies, covering fields of view up to 30 cm for the foot and ankle, and up to 20 cm for the knee.

This coil is designed for GE and is only compatible with the Discovery MR750w with GEM system and GEM Express Patient Table.

1 GE Discovery MR450 and Discovery MR750 Heat Exchangers - 70kW (30 Tons)

Cooling for your GE Healthcare MR system has never been so easy. GE Healthcare has partnered with the Glen Dimplex Group, a world leader in cooling systems, to offer heat exchangers designed to meet the needs of your Discovery MR System. Now you can look to GE Healthcare for your entire MR purchase and support.

This heat exchanger is highly reliable and the only unit verified to perform with the new platform of GE Healthcare MR systems. As part of your integrated GE Healthcare solution, you'll work with a single contact throughout the whole installation. A Project Manager of Installation will help with building layout,

room designs, delivery and installation - every step until your system is ready to scan. Our team will work seamlessly with architects, contractors and your internal team to help ensure timely, cost-effective completion.

Once your cooling system is running, you'll get fast, highly-skilled service support managed through GE Healthcare - with the same quality and response time you expect from your MR system.

FEATURES AND BENEFITS

- Designed to provide stable fully dedicated cooling for your MR system's needs
- Water/glycol outdoor-air-cooled heat exchangers to support your highest exam volumes and your full range of diagnostic procedures
- Redundant fluid pumps with automatic switchover let you keep operating with no loss of cooling even if one pump goes down
- Quad compressor, dual tandem refrigeration circuit design saves on energy while your system smoothly transitions through the 10% to 100% heat load capacity cycles of patient scanning and idling
- Quiet operation between patient exams and overnight - ideal for facilities in residential areas
- Comes with installation support, installation visits, preventative maintenance visit and 1 full year of parts and labor warranty
- Installation support includes: support through GE's Project Manager of Install, GE's Design Center, technical support from the Glen Dimplex company, two (2) installation visits
- Comprehensive and quality service rapidly delivered through our CARES service solution
- 65 gallons of 100% glycol concentrate for complete system filling and diluting
- Wall mounted remote display panel provides the ability to monitor the system's operation and indicates possible system errors
- Filter kit with flow meter helps to ensure purity of water

prior to entry to the MR system

- Highly recommended that Vibration Isolation Spring Kit (E8911CJ) be added for systems that will be rooftop mounted

SPECIFICATIONS

- Net Cooling Capacity: 70 kW / 30 Ton
- Maximum Coolant Flow: 35 gpm (132 l/m)
- Coolant Outlet Temperature: 48 F (8.9 C)
- Coolant Temp Stability: E 1.8 F (E1.0 C)
- Max Coolant Pressure : 70 Psi (4.8 Bar)
- Refrigerant: R407C
- Ambient Temp Range: -20 to 120 F (-30 to 50 C)
- Condenser Air Flow (Approx): 18,000 Cfm
- Tank Capacity: 100 gal (378 l)
- Flow Meter Range: 4-40 gpm
- Filters: 50 micron cartridge filters
- Supply Voltage: 460v / 3 phase / 60 Hz
- Coolant Connections: 2" NPTF
- Overall Size (L x W x H) 44" x 136" x 84.5"

COMPATIBILITY:

- GE Discovery MR450 1.5T MR system
- GE Discovery MR750 3.0T MR system

NOTES:

- Item is NON-RETURNABLE and NON-REFUNDABLE

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Medrad Spectris Solaris EP MR Injection System

Medrad Spectris Solaris EP MR injector for use use in all MR scanner field strengths up to and including 3.0T. Optimized touch-screen for fewer keystrokes, KVO (keep vein open) allows patient to be prepared before beginning the scan. Larger 115 ml saline syringe for longer KVO or multiple flushes. Includes cables and starter kit...E

NOTE: GE is responsible for unpacking, assembly, and installation of equipment. Medrad will be available for technical

assistance by phone at (412)767-2400. An additional charge will apply for on-site installation assistance. Medrad will be responsible for operational checkout, final calibration, in-service of the equipment, and initial applications training. Please contact the local Medrad office two weeks in advance of installation.

1 Magnacoustics Genesis ULTRA Communication & Music System

The Magnacoustics Genesis ULTRA is the only MRI Communication & Music System to interface directly with GE's MRI hardware and software. This allows software driven Auto Voice Commands from GE's computer to be delivered directly into the patient's ears for breath-hold sequences. This same interface allows the Technologist to talk directly to the patient through the console Mic even while the scan is in progress. The Genesis ULTRA also features an exclusive Patient Ready Signal. By simply depressing a small button on the handheld control an audible and visual signal is transmitted to the Technologist indicating the patient's readiness for the scan to begin. This simple step streamlines the breath-hold exam which amounts to approximately 30% of all exams. Patient Handheld Volume and Media Selection Controls with Voice Feedback interface with an FM/AM stereo, CD player, and iPod interface. This distracts even the most apprehensive of your patients by allowing them to be in control of their own environment. Additionally, the Auto Gain feature automatically raises and lowers the volume level for the patient based on the Sound Pressure Level of the MRI. Magnacoustics also provides the only patented 8-driver transducer that provides the highest sound directly to the patients ears with the MagnaLink Headset System. This patented system includes a stethoscope-style headset with the MagnaPlug (replaceable earplug) that provides 29dB of attenuation and complies with GE Healthcare MR Safety Guide Operator Manual.

The Genesis ULTRA's See-In-the-Dark GUI Electroluminescent Backlit Technologist Control Unit enhances operation in the normally low-lit MRI environment allowing the Technologist to operate the entire system with the touch of a button.

The Genesis ULTRA includes an integral interface for fMRI with

built-in input for audio stimulation and output for responses...E

1

700 VA Partial System UPS - MR

Tested with all MR system computers, the 700VA Partial System UPS provides reliable, clean, consistent power for the data processing portion of the MR imaging system. The use of the double conversion UPS enables the MR system data processing portion electronics to operate when there is a power anomaly or total power loss. Valuable data and the system operating software are protected, if there is an extended outage the UPS allows for an orderly shutdown of the system.

FEATURES/BENEFITS

- True double-conversion, online technology provides reliable operation and uninterrupted glitch free power
- Automatic frequency selection eases startup, i.e., 50 or 60 Hz compatible
- Integral Electronic Static Bypass switch means zero transfer time
- Improves user productivity, system reliability, reduces service costs and increases system uptime
- Advanced Battery Management (ABM) software monitors / indicates battery health and improves battery service life

SPECIFICATIONS

- Dimensions (H x W x D): 9.09" x 6.3" x 13.9"
- Weight: 26 lbs.
- Input Voltage Range: Single Phase 80-138 V
- Input Frequency Range: 47-70 Hz
- Rating: 700 VA / 630 W

COMPATIBILITY

- MR Systems

NOTES

- This is a partial system UPS - it covers only the computer, not the entire MR imaging system. After a power event portions of the system will have to be reset before operation can resume

- Customer is responsible for rigging and arranging for installation with a certified electrician
- ITEM IS NON-RETURNABLE AND NON-REFUNDABLE

1 Physician's Chair with Padded Arms

Physician's chair has padded arms for comfort and comes in a charcoal gray color that blends with any environment. Chair adjusts from 16.75 in. to 21 in. (42.5 cm x 53.3cm) and is only for use in the MR Control Room. Weighs 45 lbs.

1 MR Dielectric Pad Set-Includes 1 Neck Pad and 1 Abdomen Pad

These soft and flexible dielectric pads are used to suppress shading artifacts that can sometimes be encountered at higher 3.0T field strengths, and especially when imaging in the cervical spine and abdomen and pelvis. Covered with a patient friendly outer cover, the neck pad is placed inside the coil, and under the patient's neck, while the abdomen pad is placed over the patient's abdomen or pelvis and under the front portion of the torso array coil.

1 Advanced Cardiac MR Training - 3 Days

This 3-day MR Advanced Cardiac Training is valid for one year from system installation date.

The Advanced Cardiac MR Training program is intended to prepare experienced MR technologists to perform a comprehensive cardiac MRI exam. The training program is designed to be conducted at your MRI site during a period of three days. It consists of a combination of didactic instruction and practical hands-on training delivered by an Applications Specialist who has specialized expertise and experience in cardiac MRI.

1 TiP Discovery and Optima Family Training 10 Days Onsite Plus 10 Hrs TVA

The TiP Training Choices program is designed for CURRENT GE customers WITHOUT HDx experience who purchase a Discovery or Optima system. Training is delivered onsite at the customer's facility and instructs students in start-up operation of the system and introduces participants to the system design,

workflow, new options and clinical applications included.
Extended TVA support ensures learners maintain performance over the long term.

This training program must be scheduled and completed within 36 months after the date of product delivery.

Configuration List Price:

Configuration Discount:

1

NonProducts

1

Rigging the new system into the site at

Configuration List Price:

Configuration Discount:

Quote Summary:

Total List Price:

Total Discount:

HDxt 1.5t

Total Quote Net Selling Price

Customer: Department of Veterans Affairs

Customer Facility: Ann Arbor VA Medical Center
2215 Fuller Road
Ann Arbor, Michigan 48105

Site Preparation for:

3.0T MR System - Room C304B

The site preparation work ("work") is limited to the construction, labor, materials, equipment, and related services set forth in the specifications contained in this Scope of Work to prepare the site for the installation of the above-referenced MR system. The work will conform to the general configuration (floor plan) represented in the "work drawings" consisting of the following drawing(s) which are incorporated herein by reference.

1.

Any directional references in this Scope of Work rely on north or plan north being located at the top of the work drawings, unless indicated otherwise on the work drawings.

The work will comply with (i) the applicable specifications and dimensions set forth in the work drawings, and (ii) the applicable requirements set forth in technical publication titled "Discovery* MR750w, Preinstallation Manual," publication number 5670003, revision 4.0. If the above-referenced work drawings are not the final site-specific equipment installation drawings, the final site-specific equipment installation drawings, when issued, will be known as the "work drawings" thereafter.

The "site" where the work will be performed consists of the Magnet, Control (partial), Equipment, and Staff Toilet rooms (totaling approximately 1,240 sq. ft.) that are shown on the work drawings and are located at the Customer's facility identified above.

For the purposes of this Scope of Work, (i) the term "furnish" means supply the specified item(s) as an integral part of the work, delivered to the location within the site where it (they) will be installed and/or used, (ii) the term "install" means place the specified item(s) into final position, including the necessary fastening, cutting, mechanical/electrical connections, and adjustments, and (iii) the term "standard work hours" means the hours of 7:00 A.M. through 5:00 P.M., Monday through Friday, excluding observed holidays.

Work-Related Services

1. Furnish the applicable architectural design and engineering (such as, structural, mechanical, plumbing, and electrical) services, including signed and sealed construction drawings for the work, if and to the extent needed for production of the work. Those services will be furnished by architects and engineers licensed in the jurisdiction where the work will be performed.
2. Furnish a structural analysis by a licensed structural engineer of the existing concrete floor slab in the Magnet room to determine if that slab will support the new MR system's magnet located in that room. That analysis will be based solely on the structural drawings and engineering calculations for that area furnished by Customer.
3. Furnish floor loading calculations along the removal/delivery route of the MR system's magnet to determine the extent of the temporary shoring needed for the removal of the existing magnet and the delivery of the new magnet. Those calculations will be prepared by a licensed structural engineer and will be based on the drawings and engineering calculations for the delivery route furnished by Customer. A copy of those determinations will be furnished to Customer.

4. Furnish a site vibration measurement survey to determine if, during the period of such survey, vibration levels exist at the site that exceed the recommended maximum vibration levels set forth in applicable pre-installation manual. These services include conducting a cursory on-site investigation to determine the potential source(s) of vibration levels exceeding those recommended maximum vibration levels. A copy of the written survey report indicating the findings of such measurements and investigations will be furnished to Customer.
5. Retain a set of site-specific equipment installation drawings at the site, and red line those drawings to indicate any deviations made from the requirements indicated in those drawings during the production of the work.
6. Furnish miscellaneous shop drawings if and to the extent necessary for production of the work.
7. Furnish record drawings showing material changes in the work made during construction based on markup drawings and other data produced by the work contractors during their performance of the work. Those record drawings include one AutoCAD and one PDF record drawing file of floor plans only of each discipline showing those changes on a CD-ROM or DVD.
8. Furnish a survey of the existing supply and return static pressures, temperatures, and air flows, and, if applicable, exhaust air flows in Magnet, Control (partial), and Equipment rooms, and record and report on the static pressure, temperature, and air flow readings taken. A copy of that survey will be furnished to Customer.
9. The design for the work will incorporate applicable State of Michigan building codes, rules, and regulations.

Division 1 - General Requirements

1. Coordinate and attend a preliminary meeting at the site to review the work content, design for the work, drawing approval process, if any, and finalize the schedule for the design and production of the work.
2. Coordinate and attend a pre-construction meeting and periodic progress meetings. Compile and distribute the minutes of those meetings and an updated construction schedule following each of those meetings.
3. Project management and full time on-site construction supervision services.
4. Seal off applicable site supply and return air diffusers and grills to minimize dust contamination of ductwork and the surrounding areas.
5. Furnish and install (i) temporary dust barriers between the site and the adjoining areas, and (ii) temporary walk-off mats at the entrance(s) to the site.
6. Furnish and install a temporary negative air unit for the site with HEPA filtration for general dust control purposes.
7. Maintain a reasonably clean and safe job site in compliance with OSHA regulations.
8. Comply with the reasonable written fire prevention measures and other written general construction-related rules furnished by Customer and that are in effect at the site.
9. The work will be produced during standard work hours, except for the following:
 - a. The demolition, wall framing, drywall installation, radio frequency and magnetic shielding installation, and HVAC work which will be performed between 6:00 P.M. and 2:30 A.M., Monday through Friday.
 - b. The rigging services which will be performed between 7:00 A.M. and 5:00 P.M. on mutually agreed upon Saturdays.
10. Power and other utilities shut downs will occur during standard work hours and will be coordinated with a representative of Customer.

11. Clean the site (broom clean) at the completion of the work.
12. Furnish a dumpster for work rubbish and debris near the site in an area designated by Customer.
13. If areas adjoining the site are occupied during the production of the work, coordinate the work so that Customer's use and occupancy of those areas will not be unreasonably impaired for extended periods of time.
14. Coordinate the delivery and storage of the work materials with Customer.
15. The work will comply with applicable State of Michigan building codes, rules, and regulations.
16. The wage and benefit rates for the work contractors and their subcontractors on-site workers at any tier shall be equal to the amount of the applicable Davis-Bacon Act wages and benefits in effect for the location of the site.

Division 2 - Site Work/Selective Demolition

The site work/selective demolition work includes the following services and work elements. The removed items include the disposal of those items, unless otherwise specified. These site work/selective demolition work elements will be performed only to the extent necessary for the production of the work.

1. Furnish the rigging, equipment, and labor necessary (i) to move the existing MR system's magnet from the Magnet room to the transporting common carrier located near the site, and (ii) to move the new MR system's magnet from the transporting common carrier located near the site to the magnet installation location in the Magnet room.
2. Furnish the rigging, equipment, and labor necessary to move the new MR system's water chiller from the transporting common carrier to the installation location of that chiller.
3. Core drill the concrete floor and deck above the site to accommodate the installation of a new riser HVAC duct, electrical conduit and duct, plumbing, and medical gas piping to the interstitial spaces above and below the site.
4. Remove the existing MR system's slab-embedded floor anchors from the Magnet room after the removal of that system by others.
5. Remove the existing countertop from the Control room (partial).
6. Remove the existing cabinetry from the Magnet room.
7. Remove the existing 4'-0" x 7'-0" door and frame from the Equipment room.
8. Remove the existing viewing window frame from the Magnet room.
9. Remove existing window panels (approximately 150 sq. ft.) from the exterior wall of the adjacent Corridor plan east of the Magnet room to the extent necessary for the removal of the existing MR system's magnet and the delivery of the new MR system's magnet, including, if applicable, furnishing and installing temporary supports. Store the storefront components for reinstallation. The opening created by the removal of the window panels will be temporarily infilled and weatherproof sealed during construction.
10. Remove portions of the existing walls from the Control and Equipment rooms to the extent necessary to allow for the installation of, where applicable, conduits, and wall blocking.
11. Remove approximately 25 linear feet of existing non-load bearing wall from the Magnet and Equipment rooms.
12. Remove the existing interior drywall and studs covering the existing radio frequency shielding in the walls of the Magnet room.

13. Remove the existing radio frequency shielding (walls, floor, ceiling, glass window and frame, door and door frame, electrical filters, and waveguides) from the Magnet room.
14. Remove portions of the existing wall (approximately 81 sq. ft.) and guardrail from the adjacent Corridor to the extent necessary for the removal of the existing MR system's magnet and the delivery of the new MR system's magnet. Store the guardrail for reinstallation.
15. Remove the existing non-asbestos flooring and adhesive and base materials the Magnet, Control (partial), Staff Toilet, and Equipment rooms.
16. Remove the existing access flooring panels and supports from the Magnet room.
17. Remove the existing ceiling panels and grid from the Magnet, Control (partial), and Equipment rooms and the existing space that will become the new Staff Toilet room.
18. Remove the existing fire sprinkler system components from the Magnet, Control (partial), and Equipment rooms and the existing space that will become the new Staff Toilet room.
19. Remove the existing medical gas system components from the Magnet room. Temporarily cap the remaining gas piping.
20. Remove the existing ceiling diffusers, grills, HVAC ductwork, and light fixtures from the Magnet, Control (partial), and Equipment rooms, and the existing space that will become the new Staff Toilet room.
21. Remove the existing MR system's main disconnect switch from the Equipment room.
22. Remove the existing MR system's power feeder (wire, conduit, and fittings) from the existing MR system's disconnect to the existing electrical distribution panel in the Equipment room.
23. Remove the existing fire alarm components throughout the site. Store for reinstallation.
24. Remove existing nurse call and code blue station components from the Control room (partial). Store for reinstallation.
25. Remove the abandoned in-floor electrical cable ducting and surface-mounted or exposed electrical conduits, cable ducting, junction boxes, and panels from the site that hinder the production of the work and are not required for the work.

Division 3 - Concrete

1. At the core drilled locations, fill the voids around new duct, conduit, and pipe installations with high early strength concrete that has a fire rating consistent with the fire rating of the penetrated building component.
2. Furnish and install fast curing high strength concrete patching material to fill the existing floor depressions and the openings where the existing table anchors have been removed in the Magnet room.
3. Furnish and install a self-leveling cementitious underlayment (Ardex K15 or equal) to the extent necessary to level the existing floor in the Control and Staff Toilet where the existing walls were removed.
4. Shot blast the floor to remove adhesive residue and furnish and furnish and install a self-leveling cementitious underlayment (Ardex K15 or equal) to the extent necessary to level the existing floor in the Magnet room in the area below the MR system's magnet so it complies with that system's pre-installation specifications.

Division 4 - Masonry (Not Applicable)

Division 5 - Metals

1. Furnish and install a metal support frame consisting of steel plates and beams below the roof, not to exceed a total of one ton, attached to the existing roof structural members to provide support of the MR system's water chiller cabinet and new air conditioning equipment.
2. Furnish and install overhead supports (Unistrut or equal) attached to the existing overhead facility structure above the Magnet room to accommodate the installation of the radio frequency shielding ceiling and items attached to that ceiling.
3. Furnish and install supplemental structural steel floor support beams attached to the existing steel beams and columns in the interstitial space below the floor along the magnet removal/delivery route to support the existing and new MR system's magnets. *Note: This work does not include any permanent or temporary relocation of existing ductwork, piping, and electrical conduits, ducts, or other items that may need to be relocated to accommodate the installation of these new steel beams.*
4. Furnish and install metal support materials in the walls to attach, where applicable, the MR system's cabinets to the walls.

Division 6 - Wood and Plastics

1. Furnish and install one-hour fire-rated wood blocking in the walls to attach, where applicable, the casework to the walls.
2. Furnish and install 5'-9" long base and upper cabinets (with sloped top) with plastic laminate exterior and melamine interior surfaces in the Magnet room. The base cabinets include solid surface countertop with a 4" back splash. Drawers will have full extension heavy-duty slides. Handles will be consistent with the existing facility hardware standards. Interior shelving will be adjustable.
3. Furnish and install a 24" deep x 15'-0" long solid surface countertop with a 4" back splash in the Control room (partial). This countertop will be installed at a height designated by Customer. The countertop includes two 3" hole(s) with grommet(s) for cable access.
4. Furnish and install a new 30" deep x 7'-0" high x 5'-0" long plastic laminate over plywood MR coil storage cabinet (with sloped top) in the Magnet room.
5. Casework and countertops with a plastic laminate finish will be fabricated and installed in accordance with the specifications and standards of the American Woodwork Institute for "custom grade." Sample laminate materials will be furnished to Customer for their selection of the laminate pattern/color.
6. The solid surface countertops will be Corian® (or equivalent) fabricated and installed in accordance with the manufacturer's specifications. Sample countertop materials will be furnished to Customer for their selection of the countertop material pattern/color.

Division 7 - Thermal and Moisture Protection

1. Furnish and install caulking and, where applicable, fire rated sealant compounds at the work penetrations. The fire rated materials will be consistent with the fire rating of the penetrated building component.
2. Furnish and install caulking at countertops, back splashes, cabinets, and new door and window frames.
3. Furnish and install masonry caulk at the storefront exterior window panels.
4. Furnish and install waterproofing of the work penetrations through the building shell.

5. Cut and patch the existing roofing to the extent necessary to produce the roof penetrations required for the work. Furnish and install roof curbs for the MR system's water chiller (supplied by others) and air conditioning equipment that is furnished as part of the work.
6. Furnish and install 1/2" thick Armaflex insulation wrapped on the cryogen vent piping, from the connection at the magnet to the point exiting the building.
7. Furnish and install 3" thick sound attenuation batt insulation in the new walls of the Magnet room.
8. Furnish and install 3" thick sound attenuation batt insulation above the ceiling of the Magnet room.

Division 8 - Doors and Windows

See Division 13 for other specialty door and window work elements.

1. Furnish and install a new 3'-0" x 7'-0" solid core birch veneer wood door, metal frame, and hardware in the Staff Toilet room. The door finish and hardware will be consistent with the existing facility standards for those items.
2. Furnish and install a new 4'-0" x 7'-0" solid core birch veneer wood door, metal frame, and hardware in the Equipment room. The door finish and hardware including door closer will be consistent with the existing facility standards for those items
3. Furnish and install a 48" high stainless steel plate that spans the door width on the push side of the new doors into the Equipment and Staff Toilet rooms.
4. Furnish and install a set of two new 3'-0" x 7'-0" wood louvered doors in a new 6'-0" x 7'-0" wood frame and hardware in the penetration panel closet in the Magnet room. The door finish and hardware will be consistent with the existing facility standards for those items.
5. Reinstall the existing exterior storefront wall components removed to allow for the removal/delivery of the MR system's magnet in their original location. This work includes the furnishing and installing of supplemental storefront components and glazing to replace those components damaged during their removal.

Division 9 - Walls and Finishes

Walls:

See Division 13 for other specialty wall work.

1. Furnish and install approximately 40 linear feet of new walls in the Control and Staff Toilet rooms constructed from 5/8" drywall (both sides) on 3-5/8", 20 gauge metal studs, 16" on center to a height of 9'-6" above the finished floor.
2. Furnish and install approximately 96 linear feet of new walls in the Magnet room constructed from 5/8" drywall (one side only) on 3-5/8", 20 gauge metal studs, 16" on center to a height of 10'-0" above the finished floor.
3. Furnish and install the infilling of the wall opening in the adjacent Corridor using 5/8" drywall, one side only, on 3-5/8" 20 gauge metal studs, 16" on center to a height of 9'-0" above the finished floor.
4. Furnish and install a maximum of seven 3'-0" x 10'-0" wood grain stained wood laminate panels integrated into the Magnet room wall.
5. Patch, include priming if applicable, the areas of the existing walls in the Control and Equipment rooms damaged by the production of the work.
6. Furnish and install double 20 gauge (minimum) metal studs at each side of the new door frames. These double studs will be extended and attached to the facility structure above. Furnish and install diagonal kickers (using

20 gauge studs) attached to each of those double studs immediately above the finished ceiling at each side of the new door frames and extend and attach to the facility structure above.

Floors:

1. Furnish and install approximately 695 sq. ft. of Armstrong Excelon™ vinyl composition floor tile in the Control (partial), Equipment, and Staff Toilet rooms. The vinyl composition floor tile material will be similar to the existing floor tiles and samples will be furnished to Customer for their selection of the vinyl composition floor tile color/pattern.
2. Furnish and install approximately 545 sq. ft. of sheet vinyl flooring in the Magnet room. Furnish and install sheet vinyl flooring as a flash cove base in that room. Sheet vinyl flooring seams will be heat welded and the flooring materials will be similar to the existing sheet vinyl flooring in nearby areas. Samples will be furnished to Customer for their selection of the sheet vinyl flooring color/pattern.
3. Furnish and install 4" Roppe® rubber base in the Control (partial), Equipment, and Staff Toilet rooms. Base material samples will be furnished to Customer for their selection of the base color.

Ceilings:

1. Furnish and install approximately 1,240 sq. ft. of suspended acoustical ceiling panels (2' x 2') in a new pre-finished white steel grid system at a minimum height of 8'-0" above the finished floor in the Control (partial), Equipment, and Staff Toilet rooms and a new nonferrous grid system at a height of 9'-0" above the finished floor in the Magnet room. The ceiling panel and grid materials will be similar to the existing ceiling panels and grid in nearby areas. Ceiling panel and grid samples will be furnished to Customer for their selection of the ceiling panel and grid color/pattern.

Painting and Other Finishes:

1. The finish on the new radio frequency view window and door frames will remain as is, unchanged.
2. Prime the new walls in the Magnet, Control (partial), Equipment, and Staff Toilet rooms and new door frames in the Equipment and Staff Toilet rooms.
3. Paint the existing and new walls in the Magnet, Control (partial), Equipment, and Staff Toilet rooms and the existing and new door and frames in the Equipment and Staff Toilet rooms with 2 coats of latex paint.
4. Paint the wall (approximately 100 sq. ft.) in the adjacent Corridor wall where the magnet access opening was infilled with 2 coats of latex paint.
5. Paint the existing and new electrical cable ducting and conduit in the Control and Equipment rooms with 2 coats of latex paint similar to the paint color on the adjacent walls.
6. Prepare, stain, and varnish the new wood doors in the Magnet, Equipment, and Staff Toilet rooms. Stain sample chips will be furnished to Customer for their selection of the stain color.
7. Paint finish will be similar to the existing paint finish in nearby areas. Sample paint chips will be furnished to Customer for their selection of the paint color/finish.

Division 10 - Specialties

1. Furnish and install a metal framed 36" high x 24" wide mirror in the Staff Toilet room.
2. Furnish and install toilet room accessories consisting of grab bars, paper towel dispenser, and toilet paper dispenser in the Staff Toilet room.
3. Reinstall removed high impact vinyl guard rail in the adjacent Corridor after the magnet access opening has been infilled.

4. Furnish and install a total of 4 linear feet of stainless steel corner guard material at the outside corner of the Magnet room.
5. Furnish and install one new hand-held five-pound CO2 aluminum cylinder wall-mounted fire extinguisher in a semi-recessed cabinet in the Control room (partial).

Division 11 - Equipment (Not Applicable)

Division 12 - Furniture (Not Applicable)

Division 13 - Special Construction

Radio Frequency Shielding:

1. Furnish a test of the new radio frequency shielding in the Magnet room after the completion of the radio frequency shielding installation and the temporary sealing of the magnet delivery access panel opening prior to the delivery of the MR system's magnet. Furnish a copy of those test results to Customer.
2. Furnish a test of the new radio frequency shielding in the Magnet room following the delivery of the MR system's magnet and the installation and sealing of magnet delivery access panel. Furnish a copy of those test results to Customer.
3. Furnish and install a new radio frequency shield in the Magnet room. The radio frequency shield will be designed and constructed in accordance with requirements set forth in applicable MR system's pre-installation specifications. In addition to the support structure and shielding panels, the radio frequency shield includes the following components:
 - a. One 4'-0" x 7'-0" non-rated birch veneer wood door with frame, standard hardware, and stained to match the new wood grain panels installed on the walls in the Magnet room.
 - b. One 3'-6" high x 4'-0" wide observation view window.
 - c. One 6'-0" high x 2'-6" wide view window.
 - d. One door switch.
 - e. A maximum of 6 radio frequency interference electrical line filters.
 - f. One return and two supply wave-guides with sizes determined by representative.
 - g. One magnet access wall panel.
 - h. Two blank penetration panels.
 - i. One 8" diameter (maximum) cryogen vent wave-guide.
 - j. One wave-guide for the new exhaust system.
 - k. One each medical gas wave-guide for oxygen, vacuum, nitrous oxide, and medical air piping.
 - l. One each wave-guide for fire sprinkler piping.
 - m. One 2'-0" x 2'-0" pressure equalization waveguide vent in the radio frequency shielding ceiling.
 - n. Threaded rod hangers and brackets attached to the radio frequency shielding ceiling support members and the new overhead electrical cable tray above the Magnet room finished ceiling.

Miscellaneous Special Construction:

1. Furnish and install the MR system's table anchor bolt in the floor of the Magnet room.
2. Install only the new MR system's magnet ceiling interface kit in the Magnet room. The magnet ceiling interface kit is furnished by with the MR system.

Magnetic Shielding:

1. Furnish and install a magnetic shield consisting of approximately 1 ton of M36 silicon steel shielding plates that are 1/8" thick and are attached to the new radio frequency shielding in the Magnet room. The shield will be constructed in strict accordance with the specifications set forth in Shield Design for its project number 20130013, dated March 28, 2013, incorporated herein by reference.
2. Furnish the rigging and equipment necessary to move the magnetic shield materials from the delivering common carrier to the shield installation location.

Division 14 - Conveying Systems (Not Applicable)

Division 15 - Mechanical

Plumbing:

1. Furnish and install a wall-mounted vitreous china water closet and a wall-mounted vitreous china lavatory with faucet and wrist handles in the Staff Toilet room.
2. Furnish and install the domestic water, sanitary drain, and vent piping and connections for the new plumbing fixtures. That piping will be connected to the existing facility services piping within the interstitial space below the Staff Toilet room.
3. Furnish and install a condensate drain for the new air conditioning fan coil unit. That drain piping will be connected to the existing sanitary drain in the Equipment room.
4. Furnish and install a new manual domestic water bypass in the Equipment room connected to the existing domestic water lines in the interstitial space below the Equipment room and to the new MR system's heat exchanger cabinet. This work includes the applicable valves, piping, back flow preventer, and filters for that manual bypass.

Fire Protection Work:

1. Furnish and install a new fire sprinkler system in the Magnet, Control (partial), Equipment, and Staff Toilet rooms, including connecting to the existing fire sprinkler system in the adjacent Corridor. The new fire sprinkler system components (i) will be designed to accommodate the floor plan and use/occupancy for the site, (ii) will have components and piping that is consistent with the existing facility fire sprinkler component standards, and (iii) will, where applicable, include new piping, heads, fittings, valves, and piping identification labels. Piping in the Magnet room will be copper.

Medical Gas Work:

1. Furnish and install a total of three new medical gas outlets, one each oxygen, medical air, and vacuum services. They will be installed on the wall of the Magnet room and connected to the new medical gas zone valve in the adjacent Corridor. Furnish and install a slide holder adjacent to the vacuum outlet.
2. Furnish and install a new medical gas zone valve and alarm in the wall in the adjacent Corridor. The new zone valve and alarm will be connected to an existing medical gas zone valve approximately 100 linear feet from the perimeter of the site.
3. The new medical gas work will comply with the applicable NFPA standards. Upon completion of the medical gas work, it will be inspected back to the existing zone valve upstream from the Magnet room. That work will be certified in writing by an independent testing agency. This inspection includes the outlets that are located downstream from that zone valve.

HVAC:

1. The existing HVAC system(s) for the Magnet, Control (partial), and Staff Toilet site will remain as is, unchanged, except for furnishing and installing new supply and return louvered aluminum diffusers. That work includes furnishing and installing supplemental ductwork within the site, if and to the extent necessary to accommodate the location of the diffusers. New duct in the magnet room will be aluminum.
2. Furnish and install a new 5-ton split system computer room air conditioning unit for the Equipment room. That unit includes the supply and return ductwork, insulation, connections, diffusers, and controls. The unit's condenser will be located on a roof curb on the roof of the building adjacent to the site within approximately 100 linear feet of the perimeter of the site.
3. Install only the new water chiller for the MR system and furnish and install the associated copper piping, insulation, valves, filters, heat tape, and gauges. The water chiller will be connected to the MR system's heat exchanger cabinet. The water chiller is air cooled and will be located on a roof curb on the roof of the building adjacent to the site within approximately 100 linear feet of the perimeter of the site. The water chiller is furnished by others.
4. Furnish and install an inline 1,200 cfm exhaust fan, ductwork, and controls for the Magnet room located in the interstitial space above the Magnet room and route to the exterior through the building wall approximately 15 linear feet from the perimeter of the site and terminate with a weatherproof enclosure and insect screen.
5. Furnish and install a new cryogen vent, totaling approximately 25 linear feet, from MR system's magnet to the radio frequency shield wave-guide and from that wave-guide route to the exterior through the wall and terminate with a (new) weatherproof outlet and insect screen.
6. Perform final air balancing in the Magnet, Control (partial), Equipment, and Staff Toilet rooms using an independent certified air test and balancing company, including furnishing a written final air balancing report to Customer.

Division 16 - Electrical

Power:

1. Furnish and install a new 5-wire, 3-phase electrical feeder (conduit, wire, and fittings) rated for 150 amps at 480 volts for the new MR system. The feeder will extend from a new (included) 150 amp breaker installed in the existing electrical distribution panel located in the Equipment room to the new main disconnect panel located in the Equipment room.
2. Furnish and install new appropriately sized electrical feeders (conduit, wire, and fittings) for the new split system computer room air conditioning coil unit for the Equipment room and its remote condenser. The feeder will extend from new (included) appropriately sized breaker installed in the existing electrical distribution panel located in the Equipment room to (i) the new split system computer air conditioning unit located in the Equipment room, and from that unit to (ii) the remote condenser located on a roof curb on the roof of the building adjacent to the site, and both will be terminated in manual disconnects (included, exterior disconnects will be weatherproof).
3. Furnish and install a new 4-wire, 3-phase electrical feeder (conduit, wire, and fittings) rated for 100 amps at 480 volts for the new MR system's water chiller. The feeder will extend from a new (included) 100 amp breaker installed in the existing electrical distribution panel located in the Equipment room to the new water chiller located on the roof of the adjacent building and will be terminated in a manual disconnect (included, exterior disconnects will be weatherproof).

4. Furnish and install the electrical feeder (conduit, wire, and fittings) and two on/off switches, (one in the Magnet room and one in the Control room (partial)) to the new exhaust fan connected to an existing circuit within or near the site.
5. Furnish and install a total of 7 new 120 volt duplex outlets and 3 quadraplex outlets at various locations throughout the site, connected to existing circuits within or near the site.
6. The balance of the existing 120 volt duplex outlets throughout the site will remain as is, unchanged.

Lighting:

1. Furnish and install a total of 24 new 2' x 2' LED light fixtures, 6 DC light fixtures in the Magnet room, 5 light fixtures in the Control room (partial), 1 light fixture in the Staff Toilet room, and 12 light fixtures in the Equipment room. Connect to existing circuits located within or near the site.
2. Furnish and install a total of 18 new LED can light fixtures with dimmers, 14 DC can light fixtures in the Magnet room and 4 can light fixtures in the Control room (partial). Connect to existing circuits located within or near the site.
3. Furnish and install a maximum of seven flush-mounted 3'-0" X 9'-0" illuminated wall boxes with translucent panels in the Magnet room. Connect to existing circuits within the site.
4. Furnish and install one 4'-0" x 4'-0" illuminated LED visual therapy ceiling panel (Medical Power Systems or equal) in the Magnet room. Connect to existing 120 volt circuit within the site. The translucent artwork light lenses shall be selected by _____ Customer from standard images available from the mural manufacturer.

Diagnostic Imaging System:

1. The existing electrical cable ducting, junction boxes, conduit, and fittings throughout the site will be used for the new MR equipment. They will be supplemented with new electrical cable ducting, dividers and junction boxes, conduit, and fittings that are similar to the existing, if and to the extent necessary for the installation of the MR system.
2. Furnish and install a new overhead nonferrous electrical cable tray above the ceiling of the Magnet room and a new overhead steel electrical cable tray above the ceiling of the Equipment room for the MR system's cabling.
3. Install only one new _____ main disconnect panel in the Equipment room and the associated system emergency off button in the Control room (partial), both furnished by others.
4. Furnish and install one new DC lighting controller with auto transformer in the Equipment room and the associated light fixture switches in the Control room (partial) to control the new DC light fixtures in the Magnet room.
5. Furnish and install the electrical connections (wire, conduit, and fittings) between the new MR system's heat exchanger cabinet, power gradient cabinet, and new main disconnect panel.

Miscellaneous Electrical:

1. Furnish and install the rough-in of vertical drops and junction boxes for three new telephone/computer/data outlets, two in the Control room (partial) and one in the Equipment room.
2. The existing security and paging systems will remain as is, unchanged.
3. Reinstall the removed existing fire alarm system components within the site. Furnish and install supplemental fire alarm system components if and to the extent necessary to comply with governing codes and regulations.

These components will be connected to existing contact points in the existing facility fire alarm system located within approximately 50 linear feet of the perimeter of the site. Programming or reprogramming of the existing fire alarm control system is by others.

4. Reinstall the removed local nurse call and code blue stations in the Control room (partial). The reinstalled stations will be connected to existing contact points within the Control room (partial).

Work Clarifications:

1. Customer is responsible for ensuring that the existing building structural system will support the loads imposed by the new radio frequency shielding and its ceiling supports, the new electrical cable trays, their support hardware and brackets, the MR system's cables installed in those electrical cable trays, and the below-roof metal support framing included in Division 5 of this Scope of Work and the chiller and air conditioning equipment mounted on the roof above that support framing.
2. Except for the structural analysis of the concrete floor slab in the Magnet room included in the Work-Related Services section of this Scope of Work, Customer is responsible for ensuring the existing floor structures and building structural system will support the loads imposed by the work itself, the occupancy and use of the site, and the new MR system's components.
3. Except for (i) the floor loading calculations along the magnet removal/delivery route included in the Work-Related Services section of this Scope of Work, and (ii) the supplemental structural steel floor support beams included in Division 5 of this Scope of Work, Customer is responsible for ensuring the existing floor structures and building structural system will support the loads imposed by the work itself, the occupancy and use of the site, and the new MR system's components.
4. Customer is responsible for completing all removal and/or abatement of asbestos or other hazardous or toxic materials (including but not limited to biohazards and mold) at the site and other areas where the work will be conducted prior to the commencement of on-site work. Such removal and/or abatement shall be conducted in strict compliance with applicable laws, rules, and regulations.
5. Except for the new computer room air conditioning unit included in the work, Customer is responsible for ensuring the existing heating, ventilating, and air conditioning systems for the site are adequate to support the operation of the new MR system, the work, and the occupancy/use indicated in the work drawings.
6. Customer is responsible for ensuring the existing power for the new MR system at the source electrical distribution panel connection point in the Equipment room complies _____ power specifications for that system.

Exclusions:

The following items are not included in the work:

1. Any work that is not specifically included in other portions of this Scope of Work.
2. Structural design and/or facility modifications that may be necessary for reinforcement of the existing facility structural system beyond (i) the structural analysis and floor loading calculations included in the Work-Related Services section of this Scope of Work, and (ii) the below-roof support frame and supplemental structural steel floor support beams specified in Division 5 of this Scope of Work.
3. State and local building permits and associated fees.
4. Performance and payment bonds.
5. Americans with Disabilities Act (ADA) compliance upgrades to existing facility or other upgrades to the existing facility that may be required by existing or new governmental codes or regulations.

6. Asbestos or other hazardous material testing, abatement, encapsulation, or removal or disposal work or services, or any work in bio-hazardous (including mold), toxic, radioactive, asbestos, and other high-risk environments.
7. Removal of existing equipment, furniture, and supplies from the site.
8. Interior design services, furnishings, artwork, or other similar services or items.
9. Except for the rigging services specified in Division 2 of this Scope of Work, any new or existing MR equipment removal, delivery, rigging, or transportation.
10. Final site sterilization.
11. The testing of the strength of magnetic fields in or about the site.
12. Site vibration measurements beyond those specified in the Work-Related Services section of this Scope of Work, or investigations or vibration abatement engineered design or engineering services, or any work related to the abatement of site vibration levels.
13. Modifications or additions to or the relocation of the existing utility and other facility services.
14. Except for the new computer room air conditioning unit included in the work, any new heating, ventilating, and air conditioning systems or equipment, or modifications or repairs to the existing heating, ventilating, and air conditioning systems or equipment, including any humidification or filtration systems or components.
15. Power conditioning or UPS systems, components, or related services.
16. Security or paging systems' components or related services.

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Customer: Ann Arbor VA Medical Center
2215 Fuller Road
Ann Arbor, Michigan 48105

Performance Statement for Magnetic Shield Design

This magnetic shield design ("Shield Design") is provided solely for use with a 3.0T magnetic resonance system ("System").

1. The magnetic shield when configured as shown in Illustration 1 with the System's magnet located in the Magnet Room as shown in work drawings identified in _____ Scope of Work for its project number _____, dated March 28, 2013, and constructed in strict accordance with _____ final magnetic shield design specifications will meet the following design objectives ("Design Objectives"):
 - a. Contain the MRI-generated magnetic induction of 5 gauss within the outside wall located 15'-8" plan east of the magnet's isocenter.
2. The Design Objectives are subject to and conditioned upon the following:
 - a. The magnetic field strength measurements are conducted using techniques which account for the effects of the earth's magnetic field, and
 - b. The magnetic field strength measurements are conducted using techniques which account for magnetic field distortions caused by magnetic materials in the vicinity of the measurement, and
 - c. Customer demonstrates to _____ that (i) the System has not been and is not being subjected to improper or extraordinary use, (ii) the System has not been and is not being subjected to improper maintenance, and (iii) Customer has complied with all applicable instructions or recommendations of _____ related to the System and magnetic shield; and
 - d. _____ Customer operates the System at or below its specified field strength.
3. The magnetic field gradients resulting from the magnetic shield's effect on the System's magnet will allow the System's magnet to meet published homogeneity specifications upon completion of required installation procedures.
4. The isogauss contours represented in this Shield Design indicate the magnetic fringe field containment which corresponds to the predicted interaction between the System and the Shield Design. _____ creates these isogauss contour plots only to predict if the Shield Design meets the Design Objectives. All other effects such as the superposition of the earth's magnetic field, residual magnetism, and localized field concentration effects, due to ferromagnetic structural elements, are not considered or indicated. The exact location of a particular isogauss contour may differ from that shown due to the above stated reasons and the resolution limits of the mathematical modeling techniques used to derive these results.

Note: For actively shielded Systems, fault conditions may exist where the isogauss contours expand temporarily (refer to your System's Pre-Installation Manual for exact information regarding fault expansions).

5. The Customer is responsible for the effect of the fringe fields produced by the System's magnet, and is responsible for the coordination of the magnetic shield into existing or planned facilities, such as foundations/footings and other building components.