THE IMAGING SOLUTIONS COMPANY

NATIONWIDE Imaging Services, Inc.
AN MXR IMAGING COMPANY

FUJIFILM
Value from Innovation

ECHELON Synergy

Specification Data

ECHELON Synergy

Key Components and Specifications

- 1.5T Superconducting Magnet with 70 cm Wide Bore
- Workflow and Comfort-focused Patient Management
- Dual Gantry Monitors with Hydro-AG+
- Gradient System - 33 mT/m and 130 T/m/s
- 32 Channel RF System
- FlexFit Neuro coil with integrated spine and blanket coils
- Vertex III Computer System and Celeris MRI Operating Software
- AutoExam one-touch scanning controls for maximum efficiency
- Synergy DLR-Deep Learning Reconstruction minimizes scan times and delivers increased SNR and high image quality


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Inspired By Your Patients

Magnet System

Echelon Synergy features a 70 cm wide bore for maximum patient accessibility and comfort, virtually ZERO Helium boil-off, high homogeneity, ultimate stability, and a full 50 cm FOV in all directions. Synergy also includes HOAST™ (Higher Order Active Shim Technology) applied per patient assuring exceptional magnetic field uniformity.

- Superconducting magnet
- 1.5 Tesla
- Horizontal field
- Homogeneity: <0.5 ppm @ 40 cm DSV (VRMS)
- Shimming:
  - Installation: Computer mapped passive shim
  - Patient: Linear and Higher order per patient active shim
- Active magnetic shielding
- 5G Fringe field
  - Axial: 4.0 m (13.1 ft)
  - Radial: 2.5 m (8.2 ft)
- Helium frequency: Once every six years with Fujifilm's Customer Support Program

Comfort-Focused Patient Management

Fujifilm's mastery of patient-focused MRI imaging is demonstrated in Echelon Synergy's attention to patient comfort. It begins with the 70 cm wide bore design, which accommodates the 62 cm wide table with a 550 lb weight capacity. It lowers to 45 cm allowing easy access even for wheelchair patients. A positive patient experience is enhanced with adjustable airflow, lighting, and two-way communication. Dual gantry-mounted monitors on either side of the table provide the operator with patient, coil, and gating information to further speed patient preparation.

- Patient aperture: 70 cm
- Table weight capacity: 550 lb (250 kg)
- Table width: 62 cm
- Longitudinal travel: >7 ft (230 cm)
- Vertical range: 45 cm-85 cm (17.7-33.5 in)
- Class II laser positioing
  - +/-1 mm accuracy
  - Automatic movement to isocenter

Table control

- Up/Down
- In/Out (Slow/Fast)
- Table position in mm
- Move to isocenter
- Return to zero position
- Stop
- Release
- Laser
- Clear

Scan control

- Start/Abort/Pause

Patient amenities

- Two-way intercom
- Technologist alert system
- Adjustable bore illumination
- Adjustable bore ventilation
- Patient pads and immobilization straps

Gradient System

High gradient performance is key to high performance imaging. Echelon Synergy includes a 33/130 capable gradient system. This high slew rate enables selection of low TR, TE, and IET in combination with small FOV and thin slices. This level of gradient capability positions Synergy to adapt to changing MRI technology and widening applications far into the future.

- Peak amplitude: 33 mT/m
- Peak slew rate: 130 T/m/s
- Active shielding
- Water cooling
- Gradient noise reduction: Mechanical gradient sound dampening

Radiofrequency System with WIT Receiver Coils

Echelon Synergy's FlexFit RF receiver system manages multiple coil connection points on the table. The integrated RF coil system provides coil arrays that can be used individually or in combination to give the operator maximum flexibility for positioning patients of all sizes. The FlexFit receive coil system includes the FlexFit Neuro coil, spine coil, and blanket coils that can be easily placed on the patient for imaging.

Virtually all of Synergy's array, surface, and volumetric coils are multiple element designs for high signal uniformity, high SNR, and compatibility with IP-RAPID and Synergy DLR (Deep Learning Reconstruction) for maximum clinical flexibility and image quality. Analog to Digital conversion in the scan room with optical digital transmission of MRI signal data prevents electrical noise pickup and ensures highest possible SNR.

RF Transmit:

- 18 kw Power Amplifier

Digital Drive Dx Receiver:

- 32 channels
- 4 coil connection points
- Ultra low noise coil mounted preamplifiers
- A/D conversion on gantry with optical digital transmission to equipment room

Available Coil Set Includes:

- FlexFit Neuro Coil
- Spine Coil
- FlexFit Blanket Coil A
- FlexFit Blanket Coil B
- Flex M Coil
- Extremity Coil
- Hand/Wrist Coil
- Breast Coil
- Foot/Ankle Coil
- Shoulder Coil
- Micro Coil A
- Micro Coil B
- Flex S Coil
- QD T/R Body

Workflow & Efficiency

Vertex III Computer System with Celeris MRI Operating Software

From patient registration through scan planning, scanning, image processing, and image management, Echelon Synergy's Vertex III computer and Celeris MRI operating software deliver seamless workflow. The Celeris Clinical Study Library, Graphical User Interface (GUI), Intelligent Parameter Guidance, and real-time Image Quality Calculator make scan planning a breeze for even the most complex examinations.

Simultaneous scan, reconstruction, and multi-tasked image processing keep patient volume high, and Workflow Plus™ interoperability features ensure seamless HIS/RIS integration. With Synergy, your operational efficiency is assured.

VERTEX III Workstation

Fast GUI, simultaneous scan and reconstruction drive high workflow efficiency.

CPU:

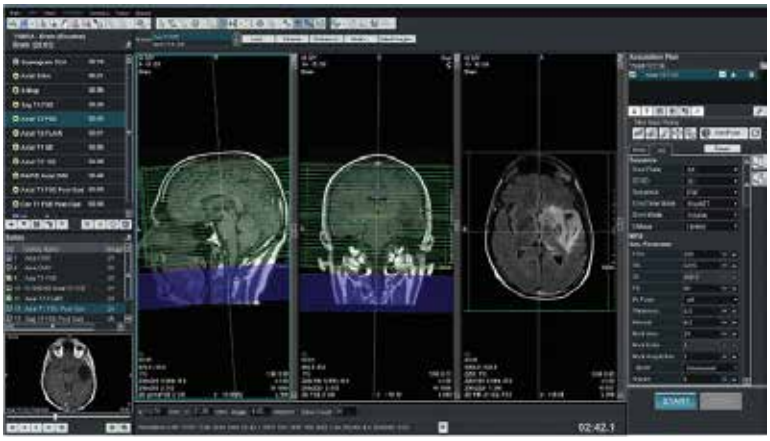
- Xeon 3.8 GHz
- 32 GB RAM
- Display
  - 24" LCD color monitor
  - Display matrix 1920x1200
- Solid State Drive:
  - 1 TB storage capacity
  - Stores up to 400,000 images (256x256)
- DVD archive
  - Media capacity: 4.7 GB
  - Stores up to 30,000 images (256x256)
  - CD/DVD writer with auto-launching PC viewer software*

Scan/Reconstruction Engine:

- Multiple processors
  - Pulse sequence control
  - Digital receive
  - Image reconstruction
  - Post- image reconstruction
  - Simultaneous scan and reconstruction

Celeris MRI Operating Software

- Log-on security features
  - Login with password
  - Normal and Audit user privileges
  - Timeout
  - Audit log
- Patient information management
  - Registration window
    - User-defined data fields
    - Automated study ID assignment
    - Rapid registration mode
  - Registration from HIS/RIS
  - Patient data correction feature
- Exam window
  - Multiple viewports for easy setup
  - 2-point and 3-point positioning
  - Multi-angle positioning
  - Image centering function
  - Interactive scan
  - Easy sequence selection and parameter adjustment
  - Basic and advanced parameter screens
  - Preview window for quick review of completed scans
  - Independent patient windows
- Patient directory
  - Directory management through drag and drop
  - Patient/study view
  - Modality Worklist Management
  - Search capability
- MRI software launcher
- Protocol library organized by anatomical groups
  - Fujifilm provided recommended protocols
  - User-defined custom protocols
- Graphical selection



The powerful Vertex III Workstation with Celeris MRI operating software easily manages multiple patients and tasks simultaneously.

* Not intended for use in diagnosis

- Processing tasks
  - Max/Min Intensity Projection (MIP/minIP)
  - Multi-Planar Reconstruction (MPR)
  - Vascular Volume Rendering
  - Signal Intensity Ratio Map (SIR Map)
  - Addition/subtraction
  - T1 and T2 calculated Images
  - T2 RelaxMap
  - T2* RelaxMap
  - Dynamic analysis
  - Perfusion analysis
  - Diffusion analysis
    - Single direction analysis
    - Multi direction analysis
      - ADC trace
      - DWI trace
  - Tensor/Kurtosis analysis
    - Mean Diffusivity (MD)
    - Fractional Anisotropy (FA)
    - DWI trace
  - Post-Reconstruction functions
    - Filtering
  - Spectroscopy analysis
    - Single voxel
    - Dual voxel
    - Multi-voxel (CSI)
    - Breast Spectroscopy
- Film, Archive, and Network Functions
  - Flexible filming options
  - Drag-and-Drop Archiving/Restoring
  - DICOM 3.0 Compliant
    - Print
    - Query/Retrieve
    - Storage
    - Storage Commitment
    - Modality Worklist Management
    - Modality Performed Procedure Step
  - IHE Profiles
    - SWF/PIR
    - CPI
    - KIN
    - Basic Security
- Image review tools
  - WW/WL
  - Magnify
  - Pan
  - ROI
  - Image Rotation
  - Measurement
  - Cine
  - Comment/Label
  - Statistics
- Sentinel™ Remote Customer Support
  - Remote system and cryogen monitoring
  - Remote desktop
  - Remote diagnostics
  - Remote image review

Clinical Capabilities

Imaging Suites

Powerful imaging architecture that delivers outstanding clinical benefits is achieved through Synergy's Imaging Suites. Scanning and processing features encompassing a broad range of acquisition sequences, sequence enhancements and processing tools are available to meet the clinical challenges in Neuro, Orthopedic, Body, Breast, Prostate, Vascular and Cardiac imaging. Synergy DLR (Deep Learning Reconstruction) provides users the ability to reduce exam times while maximizing SNR and optimizing image quality.

Pulse Sequences

General to advanced, the acquisition sequences you need to meet your clinical challenge.

- Spin Echo (SE)
  - Up to 4 echoes
- Inversion Recovery (IR)
  - FLAIR
  - STIR
  - Magnitude and Real (Real-IR) reconstruction
- 2D/3D Fast Spin Echo (FSE)
  - Echo Factors (ETL): 2–256
  - User defined inter-echo time
  - User defined echo allocation
    - Centric
    - ADA
    - Anti-centric
    - Sequential
  - Single Shot FSE—ultra fast high echo factor acquisition for MRCP, Urography, and Myelography
  - Driven Equilibrium—Increases SNR and contrast over conventional FSE without increasing TR
- opFSE—optimized image clarity, contrast and SNR
- primeFSE—user selectable receiver bandwidth
- isoFSE—3D isotropic acquisition (T1, T2, PD, IR)
- isoDIR-3D isotropic double-IR isoFSE
- Fast Inversion Recovery (FIR)
  - Echo Factors: 2–256
  - Inversion Time: 20–8,000
  - Driven Equilibrium
  - primeFIR
  - Double and Triple IR Black Blood acquisitions
- 2D/3D Gradient Echo (GE) and Multi-Echo Gradient Echo
- Micro TE—< 1ms TE acquisition
- ADAGE—combined echo imaging for high T2* contrast
- 3D GEIR—combined with an IR pulse for an isotropic acquisition
- FatSep Fat Separation (Dixon)
  - 2-point RSSG
  - 2 or 3-point FSE
- RADAR Motion Compensation
  - Spin Echo
  - FSE
  - FIR/FLAIR
  - BASG
  - GE
  - TOF
- RAPID Parallel Imaging Acceleration
  - Image Based
  - K-space Based
- RADAR-RAPID
- IP-RAPID
  - IP-Recon (2D)
  - IP-SCAN (3D)
- IterativeRAPID
- Synergy DLR (Deep Learning Reconstruction)
- T1Map (2D)
- 2D PSIR
- TIGRE™—3D volume gradient echo with RF fat saturation
- HIMAR Plus: Advanced Metal Artifact Reduction
- 2D/3D Steady-State Acquisition Rewound Gradient Echo (SARGE SG)
  - RF-Spoiled SG (RSSG)—provides T1 weighted imaging
  - Rephased SG—flow compensation for reduced artifacts
  - Balanced SG (BASG)—provides high SNR and bright fluids
  - Phase Balanced SG (PBSG)
  - Phase-cycled fat suppression cardiac imaging
  - Time Reversed SG (TRSG)—T2 weighted fluoro imaging
- Diffusion Weighted Imaging (DWI)
  - Single Shot SE EPI
    - Multi B-Factor: 0-2,000
    - RF fat saturation
    - IR pulse
- Diffusion Tensor/Kurtosis—up to 30 axes
- Perfusion
  - Dynamic Susceptibility Contrast (DSC)
  - ASL Perfusion (non-contrast)
- BSI (3D multi-shot gradient echo EPI)
  - Contrast from tissue susceptibility differences
- 2D/3D TOF
- fMRI (BOLD)
- BeamSat TOF and VASC-ASL—selective cylindrical beam saturation
- FLUTE™—fluoro triggered MRA
- TRAQ™—time resolved MRA
- Phase Contrast MRA (PC-MRA)
  - Velocity encode: 5–400 cm/sec, increment 1 cm/sec
- Non-Contrast MRA
  - VASC™—BASG with walking pre-sat
  - VASC-ASL—arterial spin labeling method
  - VASC-FSE—gated acquisition with image subtraction

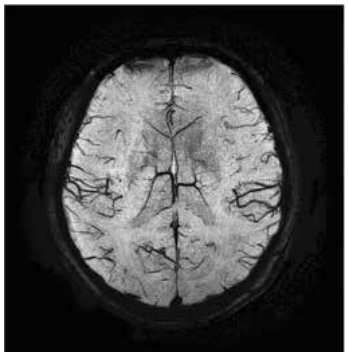
Acquisition Features and Protocol Enhancements

Scan fast and deliver excellent results using these pulse sequence enhancements and features designed to minimize artifacts and increase ease-of-use.

- Image plane selection
  - Transverse, Sagittal, and Coronal
  - Single and Double Oblique
  - Multi-slice, Multi-angle
  - Radial for simplified MRCP, Knee acquisition planning
  - Multi-plane for combined Sagittal, Coronal, Axial acquisition (SC, SCA, CA, or SA)
  - Interactive Scan Control (I-Scan) enables efficient plane selection and real-time image collection with slice position, scan parameter change and update for MRI Fluoro
  - AutoPose: Automatic slice planning for brain imaging
- Prescan
  - RF power adjustment
  - Center frequency
  - Volume shim adjust
- User defined regional shim
- Image Processing Algorithm
  - Adjustable image quality parameter
  - Increases image clarity and sharpness
- NATURAL™ image quality enhancement algorithm
- Coil mode search optimizes SNR for multiple coil usage
- Real-time image quality indicator (relative SNR, CNR)
- Real-time spatial resolution update shows impact of parameter changes prior to scanning
- Image centering—Places center of prescribed slab at magnet isocenter automatically for best image quality
- Auto voice
- AutoExam one-touch scanning operation
- Dynamic scan time table provides graphical review of dynamic scan procedure (steps and timing) for simplified study planning
- Motion compensation Fat suppression techniques
  - RADAR radial acquisition (FSE, FIR, FLAIR, DWI, SE, primeFSE, BASG, GE, TOF)
  - Gradient rephasing
  - Presaturation pulses-up to eight
  - Walking presaturation
  - Cardiac gating with arrhythmia rejection
  - Cardiac retrospective gating
  - Peripheral Pulse Gating with arrhythmia rejection
  - Respiratory gating
  - Diaphragm Navigation Echo
  - Intermittent presaturation
  - Beam Navi
- Fat suppression techniques
  - SINC RF fat saturation (conventional SINC pulse)
  - H-SINC RF fat saturation (Light mode for lipid only, Heavy mode for lipid and olefinic suppression)
  - FatSep
  - Water Excitation (Binomial technique)
  - STIR, Fast STIR (FIR)
  - In/out of phase GE
- User defined variable bandwidth
- Dual Slice acquisition
- Rectangular Field of View
- Anti-aliasing
- User defined inter-echo spacing
- Half Scan and 3/4 scan
- Half Echo
- Asymmetric Measurement Imaging (AMI)
- Quantitative Mapping
  - T2 RelaxMap—cartilage map
  - T2* RelaxMap—liver iron map
  - SIR Map—carotid plaque

Imaging Parameters

- Slice thickness
  - 2D: 0.5–100mm
  - 3D: 0.05–10mm
- FOV: 3–50cm
- TR: 0.9–20,000ms
- TE: 0.25–7,680ms
- TI: 20–8,000ms
- Inter-echo time (IET)
  - FSE: 4.0–15ms
  - EPI: 0.4–7ms
- Flip angle (FA)
  - SE: 3–120
  - GE: 3–90
- Signals averaged: 1–99
- 3D multi-slab: 32
- Maximum number of 2D slices
  - 256 (512x512)
- Maximum number of 3D slices
  - 512 (512 × 512)
  - Acquisition matrices
  - Up to 1024 × 1024
- Reconstruction matrices
  - Up to 2048 × 2048
  - Flexible Recon Matrix



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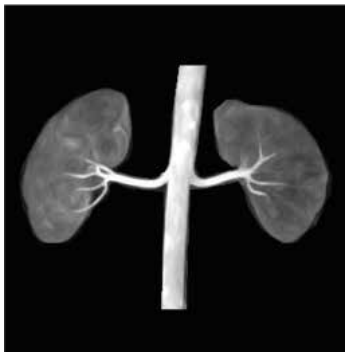


VASC ASL

Low Cost of Ownership

Echelon Synergy continues the Fujifilm tradition of advancing MRI systems beyond the technology you expect with cost-effective siting and operation with it's remarkable design attributes, making it accommodating to existing facilities and easily planned into new construction. As an acknowledged leader in imaging placements, Fujifilm offers a wealth of site planning experience and a proven system for efficient siting, installation, and start-up.

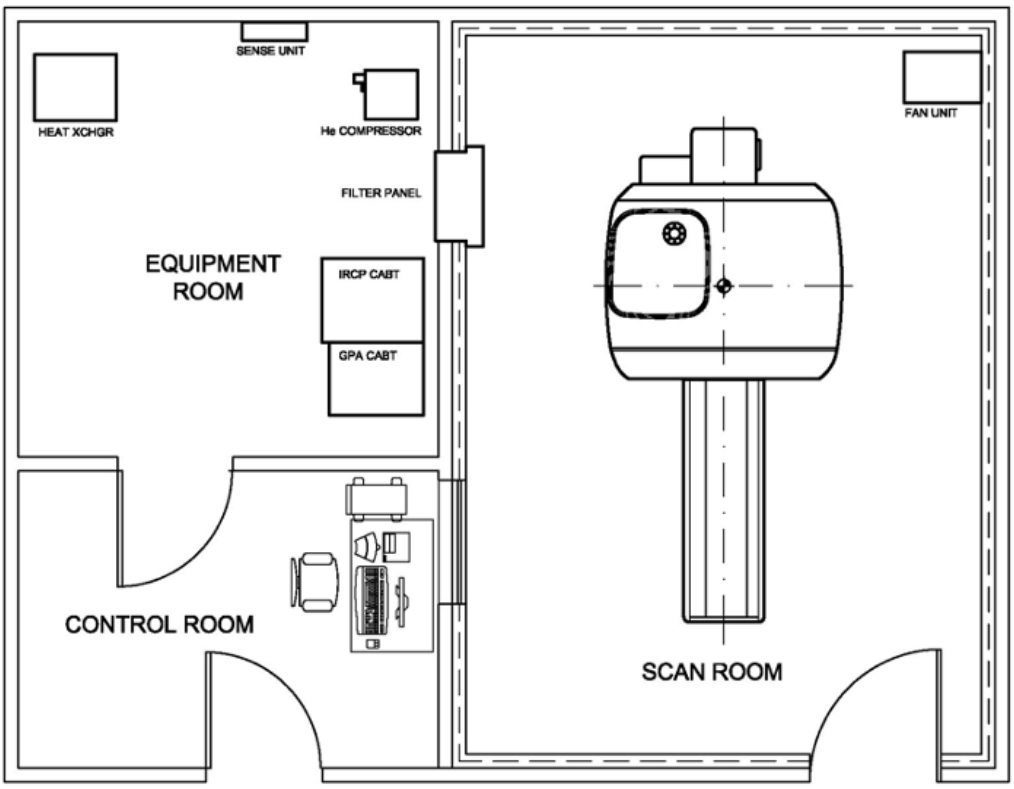
Siting Considerations:

- Typical room size
  - Scan room
    - 19' × 16.4' (5.8 m × 5 m)
    - Min. ceiling height: 8.2' (2.5 m)
  - Equipment room
    - 11.5' × 6.6' (3.5 m × 2 m)
    - Min. ceiling height: 7.9' (2.4 m)
  - Control room
    - 7.9' × 7.9' (2.4 m × 2.4 m)
    - Min. ceiling height: 7.2' (2.2 m)
  - 5 gauss line magnetic leakage flux
    - Axial: 13.1' (4.0 m)
    - Radial: 8.2' (2.5 m)
- RF-shielding scan room
  - RF noise <0dB μV/m from 10-80 MHz
- AC power
  - Voltage: 3 phase AC 460V, 480V (60Hz)
  - Frequency 50/60 Hz +/-1% or less
  - Capacity 100 kVA
- Air conditioning
  - Scan room
    - Ambient operating temp: 68–75°F (20–24°C)
  - Equipment room
    - Ambient operating temp: 64–75°F (18–24°C)
  - Control room
    - Ambient operating temp: 64–79°F (18–26°C)

Site Planning

Component Dimensions

- Gantry (with covers)
  - Length: 70.9 in (180 cm)
  - Width: 86.6 in (220 cm)
  - Height: 90.6 in (230 cm)
  - Weight: 12,787 lbs (5,800 kg) (70% helium level)
- Bore
  - Wide bore design: 70 cm
  - Length: <63 in (160 cm)
- Computer
  - QWERTY keyboard
  - 2-button mouse with scroll
- Patient table
  - Length: 88 in (223.5 cm)
  - Width: 29.5 in (75 cm)
  - Tabletop width: 24.4 in (62.1 cm)
  - Height
    - Max: 33.7 in (85.7 cm)
    - Min: 17.7 in (45 cm)
- LCD monitor
  - 24 in LCD monitor
- RF Coil Cabinet
  - Length: 84 in (213.4 cm)
  - Width: 28 in (71.1 cm)
  - Height: 58.25 in (148 cm)
- Switch/Microphone
  - Scan control
  - Patient intercom
  - ECG/Auto voice volume
- IRCP unit
  - Width: 32.3 in (82 cm)
  - Depth: 39.4 in (100 cm)
  - Height: 74 in (188 cm)
- GPA unit
  - Width: 26.2 in (66.5 cm)
  - Depth: 37.2 in (94.5 cm)
  - Height: 76 in (193 cm)
- Helium compressor
  - Width: 17.7 in (45 cm)
  - Depth: 19.1 in (48.5 cm)
  - Height: 23.3 in (59.1 cm)
- Magnet Supervisory Unit
  - Width: 30 in (76 cm)
  - Depth: 28 in (71 cm)
  - Height: 34 in (86 cm)
- Heat Exchanger
  - Width: 19.2 in (48.8 cm)
  - Depth: 12 in (30.6 cm)
  - Height: 2.8 in (7 cm)
- Sense unit
  - Width: 23.8 in (60.4 cm)
  - Depth: 6.7 in (17.1 cm)
  - Height: 45.4 in (115.2 cm)



Echelon Synergy Site Plan (450sq.ft.)

4909 Murphy Canyon Road, Suite 120
San Diego, CA 92123
Phone: 888-278-9933
www.mxrimaging.com