

SIEMENS



Datasheet

ACUSON X700 Ultrasound System

Release 1.0

The ACUSON X700 ultrasound system is not commercially available.
Due to regulatory reasons, its future availability cannot be guaranteed.

www.siemens.com/ultrasound

TABLE OF CONTENTS

GENERAL INFORMATION	4	FREEZE, CINE AND CINE	
System Architecture	4	POST-PROCESSING FUNCTIONS	10
User Interface	4	Cine Review	10
Control Panel	5	Post-Processing Features in	
System	5	Freeze Frame or Cine	11
Monitor	5	STUDY TYPES	11
TRANSDUCER TECHNOLOGY	5	EXAM-SPECIFIC MEASUREMENTS AND	
Specialty Transducers	6	REPORTS	11
Intracardiac Echocardiography Transducers	6	Abdomen	12
Transducer Ports	6	Obstetrics	12
Transducer Storage	6	Gynecology	12
Hard Drive	6	Cardiac	12
Physiological Interface	6	Cerebrovascular	12
OPERATING MODES	6	Peripheral Vascular	12
2D	6	Venous	12
Color Doppler	7	Thyroid	12
Spectral Doppler	7	Urology	13
M-mode	7	Testicle	13
DISPLAY MODES	7	Orthopedic	13
2D-mode Image Processing	7	TCD	13
MultiHertz Multiple Frequency Imaging	7	Emergency Medicine	13
Tissue Harmonic Imaging (THI)	7	DIGITAL PATIENT STUDY STORAGE AND	
Focusing	8	ARCHIVING	13
2D Image Display	8	Patient Study Management	13
2D Calipers – Generic Measurements and		Advanced Technologies and Features	14
Calculations	8	Dynamic TCE Technology	14
Color Doppler Velocity Imaging	8	Tissue Grayscale Optimization (TGO)	14
Power Doppler Imaging/Directional		SieClear Compounding	14
Power Doppler	8	Advanced SieClear Spatial Compounding	15
Color and Power Doppler Display	9	Spectral and Color Doppler Tissue	
Pulsed Wave Spectral Doppler	9	Imaging (DTI)	15
Steerable Continuous Wave (SCW) Doppler	9	DICOM 3.0 Connectivity	15
Continuous Wave Doppler	9	DICOM Modality Worklist	15
Spectral Doppler Display	9	DICOM MPPS – Modality Performed	
Spectral Doppler Calipers –		Procedure Step	15
Generic Measurements and Calculations	9	Integrated Gel Warmer (Option)	15
M-mode	10	External Battery (Option)	16
M-mode Image Display	10	Clarify Vascular Enhancement (VE)	
M-mode Calipers – Generic Measurements		Technology (Option)	16
and Calculations	10	SieScape Panoramic Imaging (Option)	16
QuickSet User-Programmable System		Cardiovascular (Option)	17
Parameters	10	Physio Module (Option)	17

TABLE OF CONTENTS

CartoSound Communication (Option)	17
<i>syngo</i> Auto OB Measurements (Option)	17
Auto Follicle Measurements (Option)	17
Stress Echo Imaging (Option)	17
<i>syngo fourSight</i> TEE View (Option)	18
<i>syngo</i> Mitral Valve Assessment (MVA) (Option)	18
<i>syngo</i> Arterial Health Package (AHP) (Option)	18
<i>syngo</i> Velocity Vector Imaging (VVI) Technology (Option)	18
<i>syngo</i> Auto Left Heart (Auto LH) Technology (Option)	19
Axius Edge Assisted Ejection Fraction (Option)	19
Intracardiac Echocardiography (ICE) Imaging Options	19
Cadence Contrast Agent Imaging* (Option)	20
Barcode Reader (Option)	20
DICOM Structured Reporting (Option)	21
DOCUMENTATION DEVICES	21
Optional On-Board Video Devices	21
SYSTEM INPUT/OUTPUT	22
Input/Output (I/O)	22
System Interface Connections	22
Acoustic Output Management	22
SYSTEM DIMENSIONS	22
ELECTRICAL/ENVIRONMENTAL SPECIFICATIONS	22
INTEGRATING THE HEALTHCARE ENTERPRISE (IHE)	22
STANDARDS COMPLIANCE	23
Quality Standards	23
Design Standards	23
Acoustic Output Standards	23
CE Declaration	23
EU Authorized Representative	23

ACUSON X700 Ultrasound System

The ACUSON X700™ ultrasound system brings a new level of performance to healthcare providers who are focused on patient care and high return on investment. Many Siemens premium class advanced technologies are standard on the ACUSON X700 platform, which enables clinicians to make confident diagnoses even in the most challenging cases.

GENERAL INFORMATION

System Architecture

All-digital signal processing and multi-beam formation technology provide best-in-class imaging in all modes and enable seamless integration of features and options to:

- New generation all-digital beamformer technology enables parallel Quad beam processing of the RF signal data in the time and amplitude domains
 - System imaging frequency: 1.0 MHz to 17.0 MHz
 - 2D-mode line density: Up to 512 lines
 - Processing channels: Up to 23,360 channels
 - Total system dynamic range: > 205 dB
- Native™ tissue harmonic imaging, DTO™ Dynamic Tissue Optimization technology, Dynamic TCE™ tissue contrast enhancement technology, SieScape™ panoramic imaging, Advanced SieClear™ spatial compounding, SieClear™ compounding and Clarify™ vascular enhancement (VE) technology are built into the ACUSON X700 system to provide excellent image quality.
- Enhance productivity through application-specific imaging presets, TGO™ tissue grayscale optimization technology, enhanced



measurement and report functionality, knowledge-based workflow tools including *syngo*® Auto OB measurements, Auto Follicle measurement, *syngo*® Mitral Valve Assessment (MVA), *syngo*® Auto Left Heart (Auto LH), *syngo*® Velocity Vector Imaging™ (VVI) technology, *Axius*™ edge assisted Ejection Fraction, *QuikStart* rapid boot and standardized imaging protocols.

- Streamline connectivity with solutions such as DICOM Print/Store, DICOM Modality Worklist, DICOM MPPS and DICOM structured reporting for OB/GYN, Vascular and Cardiac exams.
- Increase functionality with *fourSight*™ 4D transducer technology, Advanced *fourSight*™ technology, integrated stress echo, *syngo*® *fourSight*™ TEE View, *syngo*® Arterial Health Package (AHP)*, ACUSON *AcuNav*™ ultrasound catheters and *Cadence*™ contrast agent imaging technology**.

* This feature should be utilized according to the ASE Consensus Statement "Use of Carotid Ultrasound to identify Subclinical Vascular Disease and Evaluate Cardiovascular Disease Risk: A Consensus Statement from the American Society of Echocardiography Carotid Intima-Media Thickness Task Force, Endorsed by the Society for Vascular Medicine."

** At the time of publication, the U.S Food and Drug Administration has cleared ultrasound contrast agents only for use in LVO. Check current regulations for the country in which you are using this system for contrast agent clearance.

User Interface

- On-screen text, control panel overlay and operating instructions are available in the following languages:
 - Chinese
 - English
 - French
 - Italian
 - German
 - Spanish
- Russian keyboard and operating instructions supported
- Operating instructions are available in 17 additional languages
- Thumbnail menu provides on-screen thumbnail images and dynamic clips during exams
- On-screen acoustic power indicator (AIUM/NEMA output display standard)

Control Panel

- Simple, intuitive user interface with Home Base design minimizes repetitive hand motions and enables motor-memory learning
- A floating control panel allows for a wide range of adjustment for operator comfort in standing and sitting positions
- Left/Right swivel articulation $\pm 90^\circ$
- Vertical adjustment: 10 cm
- Backlit key illumination
- Variable key brightness indicates active functions
- Multi-level task light: ON, 1, 2, 3, OFF
- Customizable soft keys for easy and immediate viewing of on-screen menus
- Full-size QWERTY keyboard supports text entry, function keys and system programming
- Wrist support to help reduce operator fatigue

System

- Height-adjustable and swivel control panel
- Control panel with lock lever

- Multi-directional articulating monitor arm to help improve ergonomics
 - Arm rotation: -90° to $+90^\circ$
 - FPD rotation: -80° to $+80^\circ$
 - Tilt: 15° to 90°
 - Up: 125 mm
 - Pull: 250 mm
- Integrated high performance audio speakers
- Wheels
 - Castor size: 125 mm
 - Front castor (2 ea): Bi-brake system (direction lock and total lock)
 - Rear castor (2 ea): Total lock

Monitor

- Flat Panel Display (LED/LCD), 20-inch widescreen, color, high resolution, and progressive scan (non-interlaced) with In Plane Switching (IPS) technology
- Resolution: 1600 x 900 pixels
- Total screen area: 1600 x 900 pixels
- Recordable image area clips: 1024 x 768 pixels
- Total screen capture: 1600 x 900 pixels
- Monitor tilt: 15° up, 90° down and swivel of $\pm 80^\circ$
- Digital on-screen display of brightness control
- Energy saving display power management
- (4) Illumination controls including menu, increase, decrease and light

TRANSDUCER TECHNOLOGY

Ultra-sensitive, wideband transducers, matched with user-selectable MultiHertz™ multiple frequency imaging, improve resolution and penetration. Up to seven 2D and THI frequencies and up to two color Doppler and spectral Doppler frequencies expand the clinical versatility of a single transducer, thereby maximizing transducer investment.

- Innovative ultra low-loss lens materials and microelectronic technologies for efficient performance and increased signal bandwidth
- microCase™ transducer miniaturization technology and SuppleFlex™ transducer cables
- SuppleFlex cables and integrated cable management provide protection during exams and transport
- Independent 2D and color frequencies for optimal resolution and penetration
- Frequency range: 1.3 – 11.4 MHz
- Hanafy lens acoustic technology
- Universal, stainless steel and disposable biopsy guides for specified linear and curved array transducers

Specialty Transducers

The ACUSON X700 system supports a range of transducers and capabilities, including TEE and Intracardiac Echocardiography transducers. For more detailed transducer information, please consult the Transducer Flyer.

Intracardiac Echocardiography Transducers

- ACUSON AcuNav™ 10F ultrasound catheter – Adult intracardiac echocardiography
- ACUSON AcuNav™ 8F ultrasound catheter – Adult intracardiac echocardiography
- CartoSound™ Communication – Adult intracardiac echocardiography with SoundStar™ 3D catheter[†]

[†] For purchase or inquires, contact Biosense Webster: USA (1-909-839-8500 and 1-800-729-9010), Belgium (+32-2-352-1411)

Note: See dedicated transducer flyer for more information.

Transducer Ports

- (3) Active transducer ports that support high density phased array, curved array and linear array transducers
- Electronic transducer selection (instantaneous

switching between transducers)

- Supports 612 micro-pinless (MP) and DL (260) type connectors
- Industrial design provides easy access to the transducer ports

Transducer Storage

- (6) Configurable transducer holders support all transducer designs and provide gel bottle storage
- Special transducer holder provides secure storage and easy access to endocavity transducer
- Transducer holders can be removed for cleaning

Hard Drive

- Internal 500 GB hard drive
- Allows storage of patient studies that include images, clips, reports and measurements
- Image storage capacity up to 300,000 images with compression
- For more detailed information, please consult the Digital Patient Study Storage and Archiving section on page 13.

Physiological Interface

- Standard 3-lead ECG interface
- Auxillary Input for ECG and other physiology signals from third party devices
- Continuous display in all real-time modes
- R-Wave single and dual trigger function
- Respiratory trace
- Heart rate display
- Adjustable gain and trace position on-screen
- Recovery Time: Less than 2 seconds

OPERATING MODES

2D

- Fundamental 2D
- Phased THI
- Filtered THI

- Alternating THI

Color Doppler

- Velocity-based color Doppler
- Power Doppler
- Directional power Doppler
- Color M-mode
- Color Doppler tissue imaging

Spectral Doppler

- Pulsed wave
- Steerable continuous wave (SCW)
- Continuous wave – pencil probe
- Spectral Doppler tissue imaging
- Duplex and Triplex modes

M-mode

- Color M-mode
- Anatomical M-mode
- ECG trace in all modes

DISPLAY MODES

- Selectable split screen display formats in 2D or 2D/color with M-mode and/or spectral Doppler mode: top-bottom or side-by-side in real-time and digital cine replay
- 4B-mode allowing simultaneous display of 4 static B-mode images
- Virtual Format
- Dual from freeze
- Split/Zoom

Flexible combination of imaging modes in side-by-side Dual and Dual Select in real-time, and digital cine replay.

2D-mode Image Processing

- MultiHertz imaging: Up to 7 user-selectable transmit frequencies
- Res/Speed selection: 6 levels
- Persistence: 5 levels

- Edge enhancement: 4 levels
- Dynamic range selection: 30 – 90 dB in 3 or 5 dB increments, application dependent
- Gain: -30 to +30 dB in 1 dB increments
- DTO technology: 3 levels
- Dynamic TCE technology: 3 levels
- Depth/Gain Compensation: 8 controls
- User-selectable gain balance: 9 maps
- User-selectable 2D colorization: 16 maps
- Maximum Display Depth: 30 cm
- Minimum Display Depth: 1 cm

MultiHertz Multiple Frequency Imaging

Siemens' unique MultiHertz multiple frequency imaging is designed to combine the resolution and penetration of several transducers into one. At the push of a button, the user can independently change frequencies for 2D, THI, color and spectral Doppler to select the optimal combination for image resolution, penetration and sensitivity.

- Transmit frequencies: Up to 7 user-selectable frequencies
 - 2D and M-mode: Up to 3 fundamental frequencies
 - THI: Up to 4 frequencies
 - Color, power, or pulsed wave Doppler modes: Up to 2 frequencies
 - SCW Doppler mode: 1 frequency

Tissue Harmonic Imaging (THI)

Selectable harmonic frequencies increase success with difficult-to-image patients, improving diagnostic confidence, and dramatically improving contrast and spatial resolution by reducing noise and clutter in the image.

- MultiHertz imaging capability in THI
- Available on the 4C1, 6C2, EC9-4w, C7F2, EV9F4, 4V1c, VF10-5, VF12-4 and V5M transducers

Focusing

- Transmit focal zones: Up to 4 zones
- Digital dynamic receive focusing with dynamic apodization
- Multi-position, user-selectable position
- Can use multiple focal zones simultaneously

2D Image Display

- Full screen, Split, Quad and Dual Select screen formats as well as Dual, Dual seamless, Dual select and Dual from Freeze
- Curved Vector format
- L/R flip and U/D flip for all formats in real-time and digital cine replay
- Split/Zoom
- Image depth: 1 – 30 cm in 1.0 cm increments (transducer dependent)
- Virtual Format Imaging (transducer dependent)
 - Left/right steer
 - Trapezoid Imaging
- Digital read/write Zoom with image pan
 - Available on live and cine replay images
 - At least 2.5x and up to 10x zoom (transducer dependent)
- 4B-mode
- 90° image rotation (all linear transducers)

2D Calipers – Generic Measurements and Calculations

- Multiple cursor sets on frozen, live, dual screen and cine playback images
- Distance measurements: Up to 8 measurements per screen
 - Distance measurement
 - Depth measurement from skin line
 - Angle measurement
 - Area and circumference: ellipse, trace
- Compound Measurements
 - Volume: user-selectable preset by 1 distance, 2

distance, 3 distance, or 1 ellipse and 1 distance

- Flow volume: 1 velocity and 1 distance, or 1 velocity and 1 ellipse
- Stenosis: user-selectable preset calculated by 2 ellipse, or 2 distance measurements

Color Doppler Velocity Imaging

- Available on all imaging array transducers
- Multi-beam formation technology provides quad signal processing for color Doppler frame rates up to 177 fps (transducer dependent)
- Transmit frequencies: Up to 2 user-selectable frequencies per transducer
- Left/right steer on all linear transducers
- Color Doppler invert
- Advanced processing in color Doppler mode resulting in excellent spatial resolution and superior Flash suppression
- AutoColor flow state optimization with high, medium and low flow settings
- Color Doppler velocity maps: Up to 9 user-selectable maps (7 velocity and 2 velocity/ variance)
- Velocity scale range: $\pm 0.6 - \pm 244.4$ cm/sec
- PRF scale range: 100 – 19,500 Hz (transducer dependent)
- Gain: -20 – 20 dB in 1 dB increments
- Color Doppler line density: 6 selections
- Wall filter: 4 selections
- Color smoothing: 4 levels
- Tissue/color priority: 5 selections
- Color Doppler persistence: 5 levels
- Velocity tag
- Peak hold: Off, 1 sec, 2 sec and 3 sec
- DTI™ Doppler tissue imaging capability available on select transducers

Power Doppler Imaging/Directional Power Doppler

- Available on all imaging array transducers

- Multi-beam formation technology provides quad signal processing for power Doppler frame rates up to 195 fps (transducer dependent)
- Left/right steer on all linear array transducers
- Transmit frequencies: Up to 2 user-selectable frequencies per transducer
- Power Doppler maps: Up to 16 maps (8 directional and 8 non-directional)
- PRF scale range: 100 – 19,500 Hz (transducer dependent)
- Gain: -20 – 20 dB in 1 dB increments
- Power Doppler line density: 6 selections
- Wall filter: 4 selections
- Power Doppler smoothing: 4 levels
- Tissue/power Doppler priority: 5 selections
- Color persistence: 5 levels

Color and Power Doppler Display

- 2D/C mode, Split 2D-2D/C mode
- Dual real-time 2D/C mode
- 2D/C/D mode (simultaneous triplex), 2D/C/D mode (update)

Pulsed Wave Spectral Doppler

- Available on all imaging array transducers
- Transmit frequencies: Up to 2 user-selectable frequencies per transducer
- DTI capability available on select transducers
- Sweep speed: 8 selections
- Post-processing gray maps: 8 maps
- Doppler colorization maps: 12 user-selectable maps
- Gain: 0 – 90 dB in 1 dB increments
- PRF range: 100 – 19,500 Hz
- Velocity scale range: ± 1.5 – ± 350 cm/sec with 0° angle correction
- Angle correction: 0 – 89° in 1° increments
- Gate size: 0.2 – 20 mm
- Wall filter: 8 selections (transducer dependent)
- Baseline shift: 17 levels

- Spectral invert
- Autotrace function

Steerable Continuous Wave (SCW) Doppler

- Available on all phased array transducers when Advanced Cardiovascular option is purchased
- Transmit frequency: 1 frequency
- Sweep speed: 8 selections
- Post-processing gray maps: 8 maps
- Doppler colorization: 12 maps
- Gain: 0 – 90 dB in 1 dB increments
- PRF range: 1.56 – 34.7 kHz sample rate
- Velocity scale range: ± 30 – ± 650 cm/sec with 0° angle correction
- Wall filter: 8 selections (transducer dependent)
- Baseline shift: 17 levels
- Spectral invert
- Autotrace function is not supported in SCW mode

Continuous Wave Doppler

- Supported on the CW2 and CW5 transducers

Spectral Doppler Display

- Full screen Doppler trace, 2D/Doppler mode, triplex or update 2D/C/Doppler
- Imaging display: 4 formats
 - Top-bottom: 1/3-2/3, 1/2-1/2, 2/3-1/3
 - Side-by-side: 40-60

Spectral Doppler Calipers – Generic Measurements and Calculations

- Multiple cursor sets on frozen and cine playback images
- Velocity/Frequency/Pressure Gradient
- Heart rate/Heart cycle/Time
- Autotrace measurements in real-time and freeze including calculations for PS, ED, TAMx, TAMn, PI, RI and S/D
- Resistive Index (RI)

- Pulsatility Index (PI), including Peak-to-Peak method
- Time Average Velocity max (TAV)
- Systolic/diastolic ratio (S/D)
- Velocity Time Integral (VTI)
- Acceleration/Deceleration
- Flow volume using combined velocity and distance, or velocity and ellipse measurements
- Doppler angle correction after measurement

M-mode

- Available on all imaging array transducers
- Anatomical M-mode – live, cineloop and DIMAQ image review
- Frequencies: Up to 5 user-selectable frequencies, including fundamental and harmonics
- Edge enhancement: 4 selections
- Display dynamic range: 30 – 70 dB in 5 dB increments
- Gain: -30 – 30 dB in 1 dB increments
- Gray maps: 9 maps
- M-mode colorization maps: 16 maps
- Sweep speed: 8 selections

M-mode Image Display

- Full screen M-mode, 2D/M-mode
- Imaging display: 4 formats
 - Top-bottom: 1/3-2/3, 1/2-1/2, 2/3-1/3
 - Side-by-side: 40-60

M-mode Calipers – Generic Measurements and Calculations

- Multiple cursor sets on frozen and cine playback images
 - Distance
 - Time
 - Slope
 - Heart rate



QuickSet User-Programmable System Parameters

All imaging modes and parameters are customizable and programmable using QuickSet™ user-programmable system parameters.

- Up to 32 QuickSet parameters supported
- QuickSet parameters combine all preferred imaging mode parameters, annotation, text and measurements into a single user preset

FREEZE, CINE AND CINE POST-PROCESSING FUNCTIONS

Cine Review

The cine feature is standard and offers the ability to review real-time acquired data. All real-time, post-acquisition optimization functions are available in cine review.

- Frame-by-frame cineloop review and continuous cine motion review, including control of playback rate
- Independent cine review in mixed modes (2D/M, 2D/Doppler, 2D/C/Doppler)
- Independent cine review in 2D Dual Select mode

- with image align playback feature
- Standard cine memory: Up to 2729 frames
- Acoustic clip capture from cine review
- Anatomical M-mode available

Post-Processing Features in Freeze Frame or Cine

- 2D-mode
 - Zoom/pan
 - Gray map
 - Colorization map
 - Measurements/reports/annotations/pictograms
- Color Doppler
 - Zoom/pan
 - Color map
 - Color invert
 - Measurements/reports/annotations/pictograms
- Spectral Doppler
 - Gray map
 - Doppler colorization map
 - Angle correct
 - Measurements/reports/annotations/pictograms
- M-mode
 - Gray map
 - M-mode colorization map
 - Measurements/reports/annotations/pictograms
- Abdominal
- Renal
- Obstetrics
- Gynecology
- Early Obstetrics
- Adult Cardiac (Transthoracic)
- TEE Adult
- Intracardiac Echo (ICE)
- Vascular (C-Vas, P-Vas, Venous)
- Small Parts (Breast, Testicle, Thyroid)
- Orthopedics
- Musculoskeletal
- Urology (Prostate)
- Cranial (TCI & TCD)
- Emergency Medicine (EM)

STUDY TYPES

The ACUSON X700 system is designed to support many multi-specialty imaging applications. Factory-supplied exam and transducer dependent imaging presets have been carefully optimized for each application to provide consistency, reliability and increased productivity. All applications include body markers, text and annotation labels. Selected applications support customized worksheets and reports. The following study types are supported:

EXAM-SPECIFIC MEASUREMENTS AND REPORTS

All measurement and report packages are available for use with all exam types.

All exam specific measurement and reports support:

- All general measurements and calculations
- Comprehensive, customizable, patient reports and worksheets
- Customizable Anatomy Descriptions
- Physician summary utility – supports on-system report generation including customizable letterhead, patient data, results, graphs, images, comments, recommendations and a customizable signature line.

The following Measurements and Reports packages are available on the ACUSON X700 system:

Abdomen

Obstetrics

- Early Obstetrics Gestational Age (GA) measurements are MSD, CRL, and Yolk Sac
- Gestational Age parameter labels are MSD, CRL, BPD, OFD, HC, AC, ATD, ASD, FL, HL, UL, TL, FT, FTA and BN
- 20 user-defined measurement labels
- Calculations include: EFW from the selected reference, HC/AC, TCD/AC, LVW/HW, CorBPD, FL/AC, FL/BPD, CI, AFI, AXT
- Comprehensive Fetal Heart measurements and calculations
- Facial Angle
 - Nuchal Translucency and Nuchal Fold measurements
- Calculations for both Gestational Age (GA) and Estimated Date of Confinement (EDC)
- Early OB and Standard OB patient reports include worksheets for viewing the progress of the report and editing during the exam process
- Multiple fetus reporting capabilities
 - Maximum of 4
- Growth Analysis Graphs with exam file linking
- Detailed Fetal Heart report page

Gynecology

- Micturated and residual volume calculation
- Uterus, Right and Left Ovary, Right and Left Follicle, CRL, MSD, GS and Yolk Sac measurements
- Follicle Measurement supports up to 15 follicles
- Follicles measurement methods supported
 - Distance
 - 2Dist + Avg

- 3Dist + Avg
- 2Dist Avg
- 3Dist Avg
- Area
- Volume
- Circumference

Cardiac

- Adult standard measurements
- Volume formulas for Left Ventricular function assessment in 2D-mode and M-mode
- 2D-mode, M-mode and Doppler calculations
- M-mode Slope, Heart Rate, Time and Distance measurements
- Spectral Doppler Acceleration, Trace, Heart Rate, Time and Velocity measurements
- Cardiac patient report and worksheet for 2D-mode, M-mode and spectral Doppler

Cerebrovascular

- CCA prox, CCA mid, CCA dist, ICA prox, ICA mid, ICA dist, ECA and VA measurements
- Area Percent Stenosis and Diameter Percent Stenosis measurements

Peripheral Vascular

- CIA, EIA, CFA, PFA, SFA prox, SFA mid, SFA dist, POP A, TRUNK ATA, PTA, PER A and DPA measurements
- Right and left extremity measurements

Venous

- Right and left extremity measurements

Thyroid

- Rt. Lobe, Lt. Lobe Isthmus and nodule measurements
- Supports measurement of up to 15 separate nodules
- Measurements can display all 3 measurements plus volume calculation

Urology

- Pre- and post-void volume, Prostate volume, PSAD and micturated volume calculations
- Includes both Prostate and Urology report packages

Testicle

- Volume 1–5

Orthopedic

- Right and left hip angle measurement
- Classification and Graf Sonometer
- Hip angle patient report

TCD

- MCA, ICA-Siphon, ACA-A1, ACA-A2, ACoA, PCA-P1, PCA-P2, PCoA, PCA, Basilar A and Vert A measurement

Emergency Medicine

- FAST – Focused Assessment with Sonography for Trauma reporting
- Aorta – Essential aorta measurements and reporting to support emergency medicine
- OB – Subset of essential OB measurements and reporting

The ACUSON X700 system supports customizable labeled measurements (20 B-mode, 5 Doppler and 5 M-mode) for the following exam types: Abdomen, Musculoskeletal, Breast, Thyroid, Testicle, Venous, Renal, Superficial Musculoskeletal, Digital and Small Parts. Additionally, all reporting packages support user-defined descriptors (up to 39).

DIGITAL PATIENT STUDY STORAGE AND ARCHIVING

The DIMAQ-IP integrated workstation allows for digital acquisition, storage and review of complete ultrasound studies, including static images, dynamic



clips, measurements, calculations and reports.

Studies can be reviewed and quantified on-board, stored on the system hard drive and transferred to the built-in DVD multi-drive (DVD-R/RW & CD-R/RW) or USB Flash drive for cost-effective archival.

Patient Study Management

Playback of digitally stored images in a selectable 1-up, 4-up, 9-up, 16-up or 25-up screen format. The patient study screen allows search, selection and deleting of studies or export to DVD multi-drive (DVD-R/RW and CD-R/RW).

- 300 GB (of the 500 GB internal hard drive) internal hard drive reserved for patient data management
 - Patient database sorting by Name, ID and Study Date
- Hard drive capacity:
 - Approximately 300,000 B/W and color images
- Storage and retrieval of static images
- Storage and retrieval of cine clips
 - Retrospective clip capture during real-time

imaging with a selectable duration of 1, 2, or 4 seconds or a selectable duration of 1, 2, 3 or 4 beat capture; ECG triggerable

- Prospective clip capture during real-time imaging with a selectable duration of 1 to 120 seconds or a selectable duration of 1 to 120 beat capture; ECG-triggerable
- Export of patient studies from hard drive
- Storage and retrieval of reports
- Supports measurements and calculations on archived study and on saved and retrieved images
- Acoustic clip capture from cine review
- M-mode still frame scroll and store
- PW spectral Doppler still frame scroll and store
- Export of patient studies from hard drive to DVD-R/RW and CD-R/RW drive. Studies can be individually selected or batched copied
- Images are exported in PC-compatible TIFF format, AVI format or DICOM format
- Compatible with removable 650 MB, 700 MB and 790 MB CD-R and 650 MB or 700 MB CD-RW
- Removable 4.7 GB single layer DVD and 8.5 GB single side double layer DVD
- Supports export to USB Flash Drive

ADVANCED TECHNOLOGIES AND FEATURES

Dynamic TCE Technology

- Dynamic TCE technology is a proprietary, advanced post-processing method for speckle reduction
- Compatible with other advanced imaging modes including Advanced SieClear compounding, THI and TGO technology
- Supports all primary and secondary exam types
- Three levels available: Low, Medium and High

Tissue Grayscale Optimization (TGO)

TGO tissue grayscale optimization technology provides one-button image optimization. It automatically adjusts image brightness to the tissue type being imaged and equalizes the overall image gain. The user-definable threshold accommodates different user preferences for gain settings and various room lighting conditions. TGO technology improves the consistency and quality of the ultrasound images to enhance productivity by removing time-consuming and operator dependent manual adjustments. TGO technology can be used with every transducer, for every exam type and at every imaging frequency, including THI.

SieClear Compounding

The SieClear compounding option uses multiple lines of sight to increase contrast resolution and improve tissue differentiation of low contrast lesions by reducing image speckle. Tissue boundaries and interfaces appear sharper and more continuous. SieClear compounding is accessible in THI and is compatible with other advanced imaging options including SieScape imaging, TGO ultrasound technology and Clarify vascular enhancement technology.

Advanced SieClear Spatial Compounding

This feature combines two distinct technologies to create exceptional image quality: Advanced SieClear spatial compounding and SieClear compounding. This combination of technologies provides exceptional improvements in border definition.

- Up to seven steering angles available on linear transducer, five available on curved array transducers
- Supports all primary and secondary exam types

Spectral and Color Doppler Tissue Imaging (DTI)

- Supports both color DTI and spectral DTI functionality and includes a quantification package
- Enables assessment of LV diastolic function on the ACUSON X700 system
 - Spectral Doppler DTI capability utilizes real-time Doppler shift information from moving tissue to better visualize and quantify myocardial diastolic function
 - The spectral Doppler DTI calculation package provides guided velocity and acceleration measurements and includes a measurement report package
 - Color DTI capability can be used for qualitative evaluation of wall motion and displays the relative change of velocities
 - Color DTI M-mode
 - DTE (Doppler Tissue Energy)

DICOM 3.0 Connectivity

Enables digital data transfer via a DICOM network for both printing and storage. The ACUSON X700 system acts as a DICOM Storage Class User and DICOM Print Class User.

Functionality supported:

- Connectivity to PACS system for storage of all digital images and dynamic clips with patient demographic data
- In-Progress Store during the exam
- Image printing to DICOM color and grayscale printers
- DICOM Storage Commitment
- DICOM Exchange Media export to DVD-R/RW and CD-R/RW
- DICOM Region Calibration
- DICOM interchange media viewer software SHOWCASE®
- Interchange media database that identifies the CD to which the patient study has been burned

DICOM Modality Worklist

Enables query and direct download of the patient worklist schedule from the Hospital/Radiology Information System (HIS/RIS) to the ACUSON X700 system, automatically populating the "New Patient" screen with patient demographic information.

DICOM MPPS – Modality Performed Procedure Step

Enables automatic exchange of Modality Performed Procedure Step information with the Hospital/Radiology Information System (HIS/RIS).

Integrated Gel Warmer (Option)

- Temperature control precision: $\pm 1^\circ$
 - Low: 31°C
 - Medium: 34°C
 - High: 37°C
- Easy-to-use Power on/off control switch

- LED color for status indicator
 - Standby mode: Off
 - Operating mode: Orange
- Safety protection for electrical overload
- Weight: ~480 g
- Size: 83 mm x 123 mm x 103 mm

QuikStart (Option)

QuikStart reduces time required for power-up and power-down events by allowing the system to enter a specialized suspend mode.

- Standby mode power-down in 3 sec; complete boot-up in less than 12 sec
- Standby time: > 40 min
- Full recharge: < 180 min

External Battery (Option)

- Size 28.3 cm (w) x 15.0 cm (h) x 30.0 cm (d)
- Weight: 17 kg (37.4 lbs)
- Live scanning time: Up to 1 hr 10 min
- Standby time: Up to 1 hr 50 min
- Warning alarm at 85% discharge
- Time for complete charge from complete discharge: 7 hr

Clarify Vascular Enhancement (VE) Technology (Option)

Clarify VE technology is a real-time, adaptive, pixel-by-pixel analysis implemented through a simple, time-saving user interface that provides multiple levels of clarification to optimize tissue contrast resolution and definition of both tissue and vessel walls according to user preference. Clarify VE technology is available on all curved and linear transducers.

SieScape Panoramic Imaging (Option)

Grayscale panoramic imaging allows acquisition and display of images up to 60 cm in length to a maximum curvature of 360°.

- Available on all curved and linear transducers
- Can be displayed in full field acquisition or zoomed for detail viewing
- Measurements available

3D/4D (Options)

- 3-Scape™ real-time 3D imaging
 - Provides a freehand acquisition technique
 - Supported on the 4C1 and 6C2 transducers
- *fourSight* 4D Transducer Technology
 - Provides real-time 3D images
 - Utilizes mechanical acquisition
 - Up to 30 vol/sec
 - C7F2 and the EV9F4 4D transducers supported
 - Offers an easy-to-use interface for rapid acquisition and volume rendering Curved Top VOI
 - 4D cine
 - MPR Measurements
- Advanced *fourSight* Technology
 - Offers enhanced 3D/4D acquisition, data rendering and post-processing functionality
 - MultiSlice format allows the user to select range, slice spacing and format for viewing each slice. The MultiSlice format supports up to 36 slices at once.
 - Thick Slice Imaging (TSI) enables definition of a view plane and creates a thick slice around the region of interest. TSI delivers improved contrast resolution and provides more information in a single image.
 - Curved MPR enables real-time multiplanar reformatting of images into any linear or curved plane. This permits the user to set points along a curved object in order to bring all objects along this line into the same plane for viewing, such as the fetal spine.

Cardiovascular (Option)

Contains the prerequisites to perform cardiac and certain vascular exams:

- Physiological interface
 - Standard 3-lead ECG interface
 - Aux ECG interface
 - R-Wave single and dual trigger function
 - Heart rate display
 - Adjustable gain and trace position on screen
 - Selection for external ECG input
 - Respiratory function
- Steerable Continuous Wave Doppler module
- Auxiliary Continuous Wave Doppler module

Physio Module (Option)

- Provides the ability to configure ECG capabilities for specialty applications that do not require Continuous Wave Doppler capabilities
- AUX ECG and Respiratory functions are supported in addition to conventional Physio Module

CartoSound Communication (Option)

This license enables Ethernet communication between the ACUSON X700 system and the Biosense Webster CartoSound™ system.

syngo Auto OB Measurements (Option)

The *syngo* Auto OB measurements option contains an innovative algorithm which provides the ability to automatically measure the most common fetal structures required for fetal biometry: BPD, HC, AC, FL and HL. This technology reduces user variance, providing consistency between operators and reduces keystrokes. All measurement results are saved to the OB report.

Auto Follicle Measurements (Option)

The Auto Follicle Measurements option contains an innovative algorithm which provides the ability to semi-automatically measure the 2D dimensions of the follicle on B-mode scan. This technology reduces user variance, providing consistency between operators and reduces keystrokes. All measurement results are saved to the patient report.

Stress Echo Imaging (Option)

The stress echo package provides tools for ECG-triggered acquisition, display, selection comparison, evaluation and archiving of multiple cardiac loops during various stages of a stress echo examination.

- Standard acquisition protocols for treadmill, ergometric and pharmacological stress including:
 - Multiple factory default stress echo protocols
 - Customizable stress echo protocols
 - Flexible combination of imaging modes while in stress echo package
 - Ability for customized studies through Protocol Editor, with up to 12 stages, 6 views per stage, 20 loops per view or 120 sec prospective clip capture
 - Full screen or ROI (region of interest) acquisition
- Complete R-R capture with clip editing
- Easy workflow throughout the exam protocol
- Stage Timer
- Prospective continuous capture (up to 120 seconds) or Retrospective labeled capture
- Reference image display during acquisition
- Immediate review of acquired loops
- Flexibility to skip views or stages
- Flexibility to re-acquire and overwrite already acquired images
- Indication of current view, acquired views and skipped views in the workflow diagram

- Wall Motion Scoring, 16/17 segment model with graphical display and report printing
- LV Volume Measurements with report printing

syngo fourSight TEE View (Option)

An integrated method which provides acquisition, review, manipulation and dynamic display capabilities of gated 3D datasets using the V5M transesophageal transducer.

- 3D surface (volume) rendering for detailed anatomical display
- D'Art is an intuitive navigation tool with adjustable indicator for line of sight direction
- Utilizes two cut planes positioned perpendicular to the selected line of sight
- Dynamic MultiPlanar reconstruction
- Viewing presentation enhanced by zoom, pan and rotate functions
- Easy to use, rapid acquisition, enhanced workflow

syngo Mitral Valve Assessment (MVA) (Option)

An integrated method which, in conjunction with *syngo fourSight* TEE view, enables a detailed assessment of mitral valve morphology from 3D images for a more accurate and complete diagnosis of pathology location and size. Performs measurements for:

- Angle
- Size
- Distance
- Area

syngo Arterial Health Package (AHP) (Option)*

syngo Arterial Health Package provides the clinician with the capability to measure Carotid Intima-Media Thickness (CIMT) and the option to reference normative tables that have been validated

and published in peer-reviewed studies.¹ The information is intended to provide a straightforward tool for communicating with patients the relative state of their cardiovascular system.

This feature should be utilized according to the ASE Consensus Statement, "Use of Carotid Ultrasound to Identify Subclinical Vascular Disease and Evaluate Cardiovascular Disease Risk: A Consensus Statement from the American Association of Echocardiography; Carotid Intima-Media Thickness Task Force, Endorsed by the Society for Vascular Medicine."

syngo Velocity Vector Imaging (VVI) Technology (Option)

syngo VVI technology visualizes, measures and displays global and regional myocardial motion and mechanics from a 2D image and sophisticated tracking algorithm. Using individual vectors to display direction and relative velocity (based on length of the vectors) of frame-to-frame tissue movement, *syngo* VVI technology delivers motion measurement at any point in the cardiac cycle. *syngo* VVI technology provides a unique graphical presentation of the mechanics of myocardial function.

- Algorithm processes ultrasound clips obtained in all views of the heart, as well as generic moving tissue (e.g. vessel wall)
- Not limited by Doppler angle dependencies, frame rate or mean velocities
- ECG signal is not required, allowing use with fetal echo
- Tracking algorithm incorporates multiple sources of information, including speckle tracking

¹ ARIC- G Howard, et al: "Carotid artery intimal-media thickness distribution in general populations as evaluated by B-mode ultrasound, ARIC Investigation": *Stroke* 1993;24;1297-1304.

- Displays include:
 - Visual assessment of wall motion and vector dynamics
 - Time curves of the selected velocity vector components
 - 3D representations of parametric color M-mode
 - Selected components of tissue velocity (tissue strain and tissue strain rate)
 - Time curves of global and segmental LV volumes and Ejection Fraction
 - Synchrony analysis including time-to-peak
- Compatible with standard acquisition frame rate clips and acoustic clip capture (e.g. isovolumetric contraction and relaxation events)

syngo Auto Left Heart (Auto LH) Technology (Option)

- Calculated Confidence
 - Uses pattern recognition technology based on a comprehensive database representing typical adult transthoracic exams
 - Provides robust performance and expert-like consistency in every exam
 - Excels in technically difficult studies as learning is largely independent of image quality
- Automated Workflow
 - Bypasses the cumbersome “mark-and-trace” method to calculate EF, end diastole volume and end systole volume
 - Automatically identifies ED and ES frames and tracks endocardial borders frame to frame
 - Promotes smooth, efficient workflow with manual edit options
 - Reduces observer variability to yield more consistent, standardized measurements

- Consistent, Reliable and Convenient
 - Extends calculation accuracy to broaden clinical confidence
 - Presents EF measurement in complete perspective – with image frames for ED and ES with numerical and graphical data
 - Available off the system with *syngo*[®] US Workplace
 - Operates on DICOM clips from select Siemens and non-Siemens ultrasound systems

Axius Edge Assisted Ejection Fraction (Option)

Axius ejection fraction calculates left ventricle volumes and ejection fractions quickly and reliably.

- Enhances workflow by allowing the user to indicate three boundary points for measurement instead of a manual trace of the ventricle
- Utilizes the Simpson method for LV volume calculations based on LV endocardial border trace

Intracardiac Echocardiography (ICE) Imaging Options

Adult and pediatric intracardiac echocardiography (ICE) using the ACUSON AcuNav ultrasound catheter family.

- Disposable ACUSON AcuNav 8F ultrasound catheter
 - 8 French catheter (cross-sectional diameter 3.3 mm), 90 cm insertable length
- Disposable ACUSON AcuNav 10F ultrasound catheter
 - 10 French catheter (cross-sectional diameter 2.7 mm), 90 cm insertable length
- Ultrasound catheters must be purchased separately
- Reusable SwiftLink catheter connector (MP type) (additional SwiftLink connectors are optional)
- 10 sterile covers

- Complete echocardiography exam capabilities during intracardiac minimally invasive procedures, such as atrial fibrillation ablation, transcatheter septal closure device placement, pacemaker lead placement, transseptal catheterization and balloon valvuloplasty or septostomy
- Visualization of cardiac anatomy and regional myocardial tissue motion, great vessels and vascular anatomy, blood flow direction, blood flow velocity and other devices located within the heart
- Sterile, steerable, single-use catheter
- High resolution, high frame rate imaging in multiple modes, including: 2D, M-mode, PW spectral Doppler, CW spectral Doppler, color Doppler velocity and Doppler tissue imaging (optional)
- Digital phased array technology
- Imaging penetration up to 15 cm allows for visualization of left-sided cardiac anatomy from within the right atrium or right ventricle
- Two planes of bi-directional steering of the catheter tip (160° in each direction: anterior-posterior/left right) for maneuverability, rapid anatomic orientation and micro-positioning
- Longitudinal side-fire imaging provides standard echocardiographic views, similar to TEE, for easier orientation
- QuikSet user-programmable system parameters provide instant image optimization
- Tension control knob for holding the desired catheter curvature
- 64-element digital phased array with simultaneous processing for the highest imaging resolution in all modes
- Access to advanced imaging modes provides full echocardiography capabilities, including:

- 2D imaging
- M-mode
- Pulsed Wave (PW) spectral Doppler
- Continuous Wave (CW) spectral Doppler
- Color Doppler velocity capability
- DTI Doppler Tissue Imaging capability
- Comprehensive measurements and calculation, including volume, function and hemodynamics
- MultiHertz imaging
- Zoom capabilities

Cadence Contrast Agent Imaging (Option)**

Provides excellent detection of the responses from contrast agent microbubbles, coupled with a high resolution display. The ability to simultaneously detect both the signals returning from the contrast agent and the signals arising from tissue allows the user to switch between a contrast-only display and a tissue-only display for instantaneous confirmation of contrast presence and position, providing real-time flexibility and enhanced diagnostic confidence.

- Optimized for 4C1 transducer for abdominal applications
- MultiHertz imaging provides improved fine-tuning for low-MI contrast investigations
- Integrated burst/reflow control for destruction, reperfusion investigations
- On-screen stopwatch feature
- Frame rate triggering with extended clip capture times of up to 20 minutes
- Burst (bubble destruction) mode

Barcode Reader (Option)

- Allows fast and accurate patient information data input
- Easy attachment to USB port

** At the time of publication, the U.S Food and Drug Administration has cleared ultrasound contrast agents only for use in LVO. Check current regulations for the country in which you are using this system for contrast agent clearance.

- Supports 2D and 1D patient barcode
- Can scan up to 3 individual barcodes: patient, physician and sonographer
- Inputs the following patient identifying data:
 - Patient Name (First and Last)
 - Patient ID
 - Physician ID
 - Sonographer

DICOM Structured Reporting (Option)

DICOM Structured Reporting (SR) provides a standardized report architecture to allow for easy transfer of measurements to offline PCs, workstations and archiving systems. DICOM Structured Reporting will automatically populate measurements to their respective fields in an external software package. This option is available for the following applications:

- OB/GYN
- Vascular
- Cardiac

Wireless Data Transfer (Option)***

Utilizes USB dongle to enable wireless connectivity between the ultrasound system and the facility's LAN to provide functionality equivalent to a wired network.

The Wireless Option supports connectivity with:

- DICOM services - Modality worklist, print, storage commitment and store
- Siemens Remote Service – Remote update handling for storage distribution and NetViewer for remote application support and remote troubleshooting

*** Not commercially available.

Technical Specification

- Standards : IEEE 802.11n, 802.11g, 802.11b, 802.11a
- Security features: WEP, WPA, WPA2 personal, WPA and WPA2 Enterprise

ASUS – Supported in all countries

Ultrasound System Security – Virus Protection (Option)

Embedded virus protection solution that protects the system against advanced persistent threats, viruses, malware and other executing software by detecting and preventing any unwanted change to improve IT compliance and security.

DOCUMENTATION DEVICES

Optional On-Board Video Devices

- Up to 2 documentation devices (B/W printer and color printer/DVR recorder) can be integrated into the system cart and controlled from the system control panel
- Supported devices:
 - Mitsubishi USB P95DW B/W Printer
 - Sony UP-D897 B/W Printer
 - Mitsubishi USB CP30DW Color Printer
 - Sony UP-D25MD Color Printer
 - TEAC DVR UR-50BDS

SYSTEM INPUT/OUTPUT

Input/Output (I/O)

- (4) USB ports
- VGA out and DVI out
- DVI in/out
- External audio out

System Interface Connections

- Network
 - (1) Ethernet connector, type RJ45 (10/100 BaseT)
- Peripherals
 - (6) USB 2.0 ports (2 USB ports in front, 4 USB ports in the rear)
 - DVI in/out
 - (2) AC Main Outlet

Acoustic Output Management

- On-screen acoustic power indicator (AIUM/NEMA output display standard)

SYSTEM DIMENSIONS

- Height: 138.6 – 166 .3 cm (54.6 – 65.5 in)
- Width: 55.6 cm (21.9 in)
- Depth: 90.5 cm (35.6 in) without rear handle, 97.9 cm (38.5 in) with rear handle
- Weight: 102 kg (225 lbs)
 - 98 kg (216 lbs) without OEM's

ELECTRICAL/ENVIRONMENTAL SPECIFICATIONS

The ACUSON X700 system is available in one mainframe configuration, suitable for use in 100/115V and 230V environments.

- Power connections: 100-120/200-240 VAC, 50/60 Hz
- Built-in AC isolation transformer
- Power consumption: maximum 600 VA with OEM's
- Atmospheric pressure range: 700 – 1060 hPa (525 – 795 mm Hg) or up to 3000 m (9,483 ft)
- Ambient temperature range (without OEM's): 10 – 40° C (50 – 104° F)
- Humidity: 30 – 80%, non-condensing, during operation
- Maximum heat output: 2150 BTU/hr
- Average noise level output: 46 – 47 dB

INTEGRATING THE HEALTHCARE ENTERPRISE (IHE)

Having all relevant information at one's fingertips is a prerequisite for optimal and efficient patient care. Seamless integration of the hospital's IT and Imaging Systems and their capabilities to exchange information without restriction are key success factors for facilitating daily work. This is why Siemens has been instrumental in launching and advancing the IHE (Integrating the Healthcare Enterprise) Initiative. Our commitment and dedication enable us to provide clinicians with the ACUSON X700 system one of many innovative products embedded with the building blocks necessary in supporting clinicians' need for seamless health information exchange.

For more information on the ACUSON X700 system and the Siemens commitment to the IHE initiative, please visit www.siemens.com/IHE.

STANDARDS COMPLIANCE

The ACUSON X700 system is in compliance with the following standards, including all applicable amendments at the time of product release.

Quality Standards

- FDA QSR 21 CFR Part 820
- ISO 9001
- ISO 13485

Design Standards

- UL 60601-1
- CSA C22.2 No. 601-1
- EN 60601-1 and IEC 60601-1
- EN 60601-1-1 and IEC 60601-1-1
- EN 60601-1-2 and IEC 60601-1-2 (Class B)
- EN 60601-2-18 and IEC 60601-2-18
- EN 60601-2-37 and IEC 60601-2-37
- EN 60601-2-25 and IEC 60601-2-25
- EN 60601-1-4 and IEC 60601-1-4
- EN 60601-1-6 and IEC 60601-1-6
- ISO 14971
- EN 62304 and IEC 62304

Acoustic Output Standards

- IEC 61157 (Declaration of Acoustic Power)
- IEC 62359 ed. 2 (Test Methods for the Determination of TI and MI)
- AIUM/NEMA UD-2, Acoustic Output Measurement Standard for Diagnostic Ultrasound
- AIUM/NEMA UD-3, Standard for Real-time Display of Thermal and Mechanical Acoustic Output Indices on Diagnostic Ultrasound Equipment

CE Declaration

This product is provided with a CE marking in accordance with the regulations stated in Council Directive 93/42/EEC of June 14, 1993 concerning Medical Devices. The CE marking only applies to medical devices that have been put on the market according to the above referenced Council Directive. Unauthorized changes to this product are not covered by the CE marking and the related Declaration of Conformity.



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