TECHNICAL SPECIFICATION

Version 3.0

ALPINION MEDICAL SYSTEMS

15 Nov 2013

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01 SYSTEM INTRODUCTION

PHYSICAL DIMENSIONS

- Weight: 57kg
- Height: 1355 (short) / 1425 (tall) mm (minimum-monitor folded: 1070mm(S), 1140mm (T))
- Width: 509mm
- Depth: 670mm

MONITOR

- 18.5” Wide LED
- Brightness, contrast adjustment (OSD button)
- IPS (In plane switching) technology
- Monitor tilt (Monitor ARM)
  > 15 degree up, 90 degree down
  > ±135 degree swivel
- Integrated stereo speakers
- Display size: 1366 X 768
- Recording area: 880 X 660

Monitor ARM

- Adjustable Tilt/Swivel
- Safety space for protecting of hands during monitor folding operation
TRANSUCER CONNECTOR

- 3 active Transducer ports (Optional High density array port: 3rd port)

CONTROL PANEL

- Back-lit Alphanumeric keyboard
- Alphanumeric QWERTY keyboard
- 8 steps TGC (Time Gain Compensation) keys
- 5 Soft keys
- 2 User define keys
- 14 Power preset keys
- On/Off task light and back-lit illumination of control panel

CONSOLE DESIGN AND USER INTERFACE

- 3 active Transducer ports
- Integrated HDD (Capacity: over 500GB)
- Integrated DVD-R/W Drive
- On-board Storage for Peripherals
  - B/W Printer, Color Printer or DVD recorder
- Control panel Fixed Type
- 3 Transducer holders, detachable for cleaning and washing
- Air Filters
- Front Handle
- Wheel-lock Mechanism
  - Front-wheel & Back-wheel: Total Lock
- 6 USB ports: Front side (2 ea), Back side (4 ea)
- Thumbnail images on-screen
- On-line Help key

HARD DISK DRIVE

- Internal 385 GB hard disk drive for patient database management

ELECTRICAL POWER

- Voltage: 100 - 120V, 220 - 240V
- Frequency: 50/60Hz
- Power: Max. 600 VA with Built-in and On-Board Peripherals

SYSTEM ON/OFF AND RESPONSE TIME

- Boot up time: 120 sec
- Shutdown time: 30 sec
- Response time: 0.5 sec (B-mode --> Duplex mode), 1.0 sec (B-mode --> Triplex mode)

LANGUAGE SUPPORT

- English
- German
- French
- Spanish
- Italian
- Russian
02 SYSTEM OVERVIEW

APPLICATIONS

- Abdominal
- Obstetrical
- Gynecological
- Cardiac
- Vascular
- Urological
- Small Parts and Superficial
- Pediatric and Neonatal
- Transcranial
- Emergency Medicine

OPERATING MODES

- B-mode
- M-mode
- Pulsed Wave (PW) Doppler mode
- Continuous Wave (CW) Doppler mode
- Color Flow (CF) mode
- Power Doppler (CF) mode
- Anatomical M-mode
- THI (Tissue Harmonic Imaging, PI/FTHI)
- Beam Steering
- Directional Power Doppler mode
- SRI (Speckle Reduction Imaging)
- FSRI (Full Speckle Reduction Imaging)
- Spatial compounding
- Frequency compounding
- Auto IMT
- Auto traces PW
- Panoramic B/CF
- Xpeed on 2D / CF/PW
- 3D/4D Volume mode

DISPLAY MODES

- Duplex mode
  > PW Doppler mode (B/PW)
  > CW Doppler mode (B/PW)
  > Color Flow mode (B/CFM)
  > Power Doppler mode (B/PDI)
  > Motion mode (B/M)
  > Directional Power Doppler mode
- Real Time Triplex mode (B/CFM/PW, B/CFM/CW, B/PDI/PW, B/PDI/CW)
- Zoom: Write/Read/Pan (Write zoom up to 8x)
- Colorized Image (B, M, PW, CW)
- Virtual Convex
  > Left/Right steer
Trapezoid Imaging
• Full Screen
• Quad Screen Display
• Time Line Display
  • Independent Dual B/PW Display
  • Display Formats
    • Vertical: 1/2, 1/3, 2/3
    • Horizontal: 1/2, 1/3, 2/3
  • Full: Time Line Only (PW / M)
• Maximum Depth: 30cm

DISPLAY ANNOTATION
• Institution/Hospital Name: 25 Characters
• Date: 3 types selectable
  • YYYY/MM/DD, MM/DD/YYYY, DD/MM/YYYY
• Time: 2 types selectable
  • 24 hours, 12 hours
• Operator Identification
• Patient Name: First, last, middle name
• Patient Identification: 64 Characters
• Gestational Age form
  • LMP/EDC/GA
• Acoustic power output
  • MI (Mechanical Index)
  • TIS (Thermal Index Soft Tissue)
  • TIC (Thermal Index Cranial (Bone))
  • TIB (Thermal Index Bone)
• System Status (real-time or frozen)
• Transducer Directional Marker
• Image Preview: Thumbnails
• Gray/Color Bar
• Cine Gauge
• Measurement Summary Window
• Measurement Results Window: pre-settable display location
• Transducer Type
• Application Name
• Imaging Parameters by mode (current mode highlighted)
  • B mode
    • Imaging Frequency
    • Dynamic Range
    • Rejection
    • Virtual
    • Angle Steer
    • Gray Map
    • Colorize
    • Up/Down
    • Power Output
    • SRI
    • FSRI
    • Persist
    • Spatial Compounding
- Line Density
- Frequency Compounding

> M mode
- Anatomical M-mode
- Dynamic Range
- Rejection
- AMM Angle
- Sweep Speed
- Gray Map
- Colorize
- Full Screen M mode
- Power Output

> Color Flow mode
- Doppler Frequency
- PRF
- Angle Steer
- Baseline
- Invert
- Wall Filter
- Persist
- Color Map
- Threshold
- Power Output
- Ensemble
- Line Density
- Smooth

> Power Doppler mode
- Doppler Frequency
- PRF
- Angle Steer
- Wall Filter
- Persist
- Color Map
- Threshold
- Power Output
- Ensemble
- Line Density
- Smooth

> PW mode
- Sample Volume Width
- PRF
- Angle Steer
- Base Line
- Invert
- Doppler Frequency
- Wall Filter
- Angle Correct
- Sweep Speed
- Full Screen PW mode
- Power Output
- Rejection
- Dynamic Range
- Gray Map
- Colorize
- Time Resolution
- Update
- Auto Calculation
- Method
- Direction
- Sensitivity

> CW mode
  - PRF
  - Baseline
  - Inverse
  - Doppler Frequency
  - Wall Filter
  - Angle Correct
  - Sweep Speed
  - Full Screen CW mode
  - Power Output
  - Rejection
  - Dynamic Range
  - Gray Map
  - Colorize
  - Time Resolution
  - Auto Calculation
  - Method
  - Direction
  - Sensitivity

• TGC Curve: On/Off
• Body Pattern: 164 types
• B Scale Markers
• M Scale Markers
  > Time/Depth
• Caps Lock: On/Off
• System Message Display
• Trackball Functionality Status Display
• Heart Rate
• Biopsy Guide Line and Zone
• Focal Zone mark

ANNOTATION PACKAGE

• Arrow
  > Arrow size: S, M, L, XL
  > Rotate Arrow
• Body pattern
• Text
  > Font Color: Green, Yellow, White, Orange
  > Text size: S, M, L
IMAGE PROCESSING

B MODE

- Gain: 0-90 dB (1 dB increment)
- Imaging Frequency: 3 Selectable Imaging frequencies
- Dynamic Range: Up to 192 dB
- Rejection: 10 steps
- Virtual: ON/OFF
- Angle Steer: 6 steps
- Gray Map: 14 steps (0-13)
- Colorize: 21 steps (0-20)
- Up/Down: ON/OFF
- Power Output: 1-100% (2% increment)
- SRI: ON/OFF
- FSRI: 5 steps
- Persist: 4 steps
- Spatial Compounding: 3 steps
- Line Density: 5 steps
- Frequency Compounding: ON/OFF
- Transmit Focus position: 30 position types
- Multi Focus: Max 8

M MODE

- Anatomical M-mode: On/Off
- Dynamic Range: 30-150 dB
- Rejection: 10 steps
- Sweep Speed: 5 steps
- Gray Map: 14 steps (0-13)
- Colorize: 19 steps (0-18)
- Full Screen M mode: ON/OFF
- Power Output: 1-100% (2% increment)

PW MODE

- SV Gate Width: 13 steps (0.7, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 15)
- PRF: 300Hz – 20100Hz (Transducer dependent)
- Angle Steer: 6 steps
- Base Line: 16 steps
- Invert: ON/OFF
- Doppler Frequency: 3 selectable frequencies
- Wall Filter: 9 steps
- Maximum/Minimum Velocity Scales
  > Max: 52m/sec (Angle/Transducer dependent)
  > Min: 10cm/sec
- Angle Correct: ±89°, (1° step)
- Sweep Speed: 5 steps
- Full Screen PW mode: ON/OFF
- Power Output: 1-100% (2% increments)
- Rejection: 10 steps
- Dynamic Range: 30-120dB
- Gray Map: 14 steps (0-13)
- Colorize: 19 steps (0-18)
• Time Resolution: 1-7
• Update: Frozen, Live, 2,3,4,8,16s
• Auto Calculation: ON/OFF
• Method: Mean, Max, Both
• Direction: Below, Above, Both
• Sensitivity: 20 steps

**CW MODE**

• PRF: 500Hz – 78100Hz (Transducer dependent)
• Baseline: 16 steps
• Inverse: ON/OFF
• Doppler Frequency: 2 selectable frequencies
• Wall Filter: 9 steps
• Maximum/Minimum Velocity Scales
  > Max: 270m/sec (Angle/Transducer dependent)
  > Min: 10cm/sec
• Angle Correct: ±89°
• Sweep Speed: 5 steps
• Full Screen CW mode: ON/OFF
• Power Output: 0~100%
• Rejection: 10 steps
• Dynamic Range: 30-120dB
• Gray Map: 14 steps (0-13)
• Colorize: 19 steps (0-18)
• Time Resolution: 1-7
• Auto Calculation: ON/OFF
• Method: Mean, Max, Both
• Direction: Below, Above, Both
• Sensitivity: 20 steps

**COLOR FLOW MODE**

• Doppler Frequency: 3 selectable frequencies
• PRF: 300Hz-20,100Hz (Transducer dependent)
• Angle Steer: 6 steps
• Baseline: 40 steps
• Invert: ON/OFF
• Wall Filter: 7 steps
• Persist: 10 steps
• Color Map: 10 steps (0-9)
• Threshold: 0-100%
• Power Output: 1-100%
• Ensemble: 6-16
• Line Density: 2 steps
• Smooth: 10 steps

**POWER DOPPLER MODE**

• Doppler Frequency: 3 selectable frequencies
• PRF: 300Hz-20,100Hz (Transducer dependent)
• Angle Steer: 6 steps
• Wall Filter: 7 steps
• Persist: 10 steps
• Color Map: 10 steps (0-9)
• Threshold: 0-100%
• Power Output: 1-100%
• Ensemble: 6-16
• Line Density: 2 steps
• Smooth: 10 steps

VOLUME MODE

• Rendering mode
  > Surface (Gradient/Texture)
  > Light
  > MIN IP (Intensity Projection)
  > MAX IP (Intensity Projection)
  > X-Ray
• Viewing volume data
  > 3D/4D (Live and Review)
• MPR + VR
• CUBE CT
• Slices
  > Multi slice
• Editing volume
  > Inside & Outside Contour/Box
• Annotating volume data
  > Comment
  > Arrow
• Navigation
• Cine
  > 3D Rotation
  > 4D Cine Loop

CINELOOP REVIEW

• 3,000 frames CINE memory
• Cine replay speed: 200%, 100%, 50%, 25% (4 types)
• Cine gauge and cine image number display
• Cine review: Frame by frame, Loop
• Start and End Frame Selections for Loop Playback
• Measurement and calculation capability

IMAGE ARCHIVE/CONNECTIVITY

• Preview: displays thumbnail images of the acquired data for the current exam
• E-View: An enlarged preview of the image
• Recalling Images from the Preview
• Image Management
  > Select All/Unselect All
  > Permanent Store
• Hard disk drive Image Storage: Min 300GB
• Ethernet Network Connection
• Archiving Format:
  > Standard DICOM (US/MF)
Secondary Capture
- 6 USB ports
- DVD/CD writes and read capabilities
- Export Image Format
  - Bitmap
  - JPEG
  - DICOM
  - WMV
  - AVI (Volume Cine)
- DICOM 3.0 Connectivity
  - DICOM Structured Report
  - DICOM Verification
  - DICOM Storage
  - DICOM Storage Commitment
  - Modality Worklist
  - MPPS
  - Print
- Network Storage

03 MEASUREMENTS/CALCULATIONS

BASIC MEASUREMENTS/CALCULATIONS

B MODE
- Distance
- Ellipse
- Trace
- % Stenosis
- Volume
- Ratio
- Angle
- Histogram

PW MODE
- Velocity
- PI (Pulsatility Index)
- RI (Resistance Index)
- S/D Ratio (Systole/Diastole Ratio)
- A/B Ratio
- PG Mean (Pressure Gradient Mean)
- PG Max (Pressure Gradient Max.)
- Acceleration
- HR (Heart Rate)
- Time (Velocity Time)

M MODE
- Distance
- HR (Heart Rate)
- Slope
- % Stenosis
- Time
- Ratio (% Distance)
B/PW MODE

- Auto & Manual Trace
  - PS (Peak Systole)
  - ED (End Diastole)
  - MD (Minimum Diastole)
  - PS/ED (Peak Systole/End Diastole)
  - ED/PS (End Diastole/Peak Systole)
  - PI (Pulsatility Index)
  - RI (Resistance Index)
  - TAmx (Time avg. max. Velocity)
  - TAmn (Time avg. mean. Velocity)
  - VTI (Velocity Time Integral)
  - HR (Heart Rate)

LABELED MEASUREMENTS/CALCULATIONS

CARDIOLOGY MEASUREMENTS/CALCULATIONS

B mode

- AV/LA (Aortic Valve/Left Atrium): RV, LA & Ao Dm
- PA (Pulmonary artery): PA Dm
- Vena Cava: IVC & SVC Dm
- RV (Right Ventricle): RV Diameter, RV length
- Simpson BP (Simpson Bi-plane): EDV & ESV
- Simpson SP (Simpson Single-plane): EDV&ESV
- Modified Simpson
- Area Length: LVLd, LVLs, LVAd, LVAs
- Teichholz (Left Ventricular Dimensions by Teichholz method): RAVd, RVd, Diastole, Systole
- LV Mass (Left Ventricle Mass): Truncated Ellipse & Area-Length method
- LA Vol A-L (Left Atrium Volume by Area-Length method)
- LA Vol /Simp BP (Left Atrium Volume by Simpson method /Biplane)
- RA Vol /A-L (Right Atrium Volume by Area-Length method)
- RA Vol /Simp (Right Atrium Volume by Simpson method /Single)
- MV (Mitral Valve): EPSS, LVOt Dm, MV Area, MV Dm
- AV (Aortic Valve): LVOt Dm, AVA Area
- MR (Mitral Valve - Regurgitant Flow): MR VC Dm, Jet Area
- AR (Aortic Valve - Regurgitant Flow): AR VC Dm, Jet Area
- TR (Tricuspid Valve - Regurgitant Flow): TR VC Dm, RAP
- PV (Pulmonary Valve): PV Dm
- PVe (Pulmonary Vein): Pved Dm, PVes Dm
- PISA AR (Proximal Isovelocity Surface Area of Aortic Regurgitation): Radius, Aliasing Vel
- PISA MR (Proximal Isovelocity Surface Area of Mitral Regurgitation): Radius, Aliasing Vel

M mode

- Teichholz (Left Ventricular Dimensions by Teichholz method): RAVd, RVd, Diastole, Systole, LVET, HR
- AV/LA (Aortic Valve/Left Atrium): RV, LA & Ao Dm LVET, LVPEP
- MV (Mitral Valve): CA/CE amp, DE amp/slope, EPSS, EF slope,
- RV (Right Ventricle): RV Dm, RVOT Dm
- PVe (Pulmonary Vein): PVe Dm
**Doppler mode**
- MV (Mitral Valve): E Dur, A Dur, IVRT, MV E pt, MV A pt, MVA (PHT, VTI, Area), CO, LVIMP, HR
- AV (Aortic Valve): AV VTI, LVOT VTI, AVA (Vmax, Area)
- PV (Pulmonary Valve): PV Vmax, CO
- TV (Tricuspid Valve): TV VT, TV Vmax, TV E pt, TV A pt, RVIMP
- PVe (Pulmonary Vein): PVs, PVd, PVa
- AR (Aortic Valve - Regurgitant Flow): AI Decel slope, AI PHT, AR VTI
- TR (Tricuspid Valve - Regurgitant Flow): TR VT, TR VC Dm, RAP
- PR (Pulmonary Valve - Regurgitant Flow): PR VT, PR V ed
- MR (Mitral Valve - Regurgitant Flow): MR Vmax, dp/dt, MR VC Dm
- PISA AR (Proximal Isovelocity Surface Area of Aortic Regurgitation): AR VT, Aliasing Vel
- PISA MR (Proximal Isovelocity Surface Area of Mitral Regurgitation): MR VT, Aliasing Vel
- TDI (Tissue Doppler Imaging): MV E pt, Ea, Aa, Sa

**OBSTETRICS MEASUREMENTS/CALCULATIONS**
- Abdominal Circumference (AC)
- Anterior Posterior Thoracic Diameter (APTD)
- Binocular Distance (BOD)
- Biparietal Diameter (BPD)
- Clavicle (CLAV)
- Crown Rump Length (CRL)
- Estimated Fetal Weight (EFW)
- Fibula (FIB)
- Femur Length (FL)
- Fetal Trunk Area (FTA)
- Gestational Sac (GS)
- Head Circumference (HC)
- Humerus
- Middle Abdomen Diameter (MAD)
- Occipital Frontal Diameter (OFD)
- Radius
- Spinal Length (SL)
- Transverse Abdominal Diameter (TAD)
- Transverse Cerebella Diameter (TCD)
- Tibia
- Transverse Thoracic Diameter (TTD)
- Ulna Length (ULNA)
- Multi-Gestational Calculation
  - Up to 4 fetuses comparison of multiple fetuses data on a graph and a worksheet
- OB Worksheet
- Patient Information
  - Fetus Number
  - CUA/AUA Selection
  - Fetus Position
- Measurement Information
REPORT PACKAGE

- Abdomen
- Obstetrics
- Gynecology
- Cardiology
- Vascular
- Urology
- Pediatrics
- Small Parts
- Breast
- MSK
- EM (Emergency Medicine)
TRANSDUCER SPECIFICATION

SC1-6*
- Applications: Abdomen, Renal, OB, Fetal Echo, GYN, Emergency Medicine
- Transducer Type: Convex array (Premium*)
- Frequency Bandwidth: 1.0 - 6.0 MHz
- Convex Radius (mm): 60 mm
- FOV: 60°
- Number of element: 128
- Biopsy kit: Available
*Note: Premium means single crystal as piezoelectric material.

C1-6
- Applications: Abdomen, Renal, OB, Fetal Echo, GYN, Emergency Medicine
- Transducer Type: Convex array
- Frequency Bandwidth: 1.0 - 6.0 MHz
- Convex Radius (mm): 60 mm
- FOV: 60°
- Number of element: 128
- Biopsy kit: Available

C5-8
- Applications: Abdomen, Cardiac, Emergency Medicine
- Transducer Type: Micro Convex array
- Frequency Bandwidth: 5.0 - 8.0 MHz
- Convex Radius (mm): 14 mm
- FOV: 92°
- Number of element: 128
- Biopsy kit: N/A

L3-12H*
- Applications: Carotid, Peripheral Vascular, Thyroid, Testicle, MSK, Superficial, Breast, Emergency Medicine
- Transducer Type: Linear array
- Frequency Bandwidth: 3.0 - 12.0 MHz
- Foot Print: 45 mm
- Biopsy kit: Available
- Number of element: 192
*Note: H* means high density transducer.

L3-12HWD*
- Applications: Carotid, Peripheral Vascular, Thyroid, Testicle, MSK, Superficial, Breast, Emergency Medicine
- Transducer Type: Linear array
- Frequency Bandwidth: 3.0 - 12.0 MHz
- Aperture length (mm): 64 mm
- Number of element: 192
- Biopsy kit: N/A
*Note: H* means high density transducer.
*Note: WD* means wide foot print transducer.
L3-12
- Applications: Carotid, Peripheral Vascular, Thyroid, Testicle, MSK, Superficial, Breast, Emergency Medicine
- Transducer Type: Linear array
- Frequency Bandwidth: 3.0 - 12.0 MHz
- Foot Print: 45 mm
- Number of element: 128
- Biopsy kit: Available

L3-8
- Applications: Carotid, Peripheral Vascular, Thyroid, Testicle, MSK, Superficial, Breast, Emergency Medicine
- Transducer Type: Linear array
- Frequency Bandwidth: 3.0 - 8.0 MHz
- Foot Print: 45 mm
- Number of element: 128
- Biopsy kit: Available

L8-17
- Applications: Carotid, Peripheral Vascular, Thyroid, Testicle, MSK, Superficial, Breast, Emergency Medicine
- Transducer Type: Linear array
- Frequency Bandwidth: 8.0 - 17.0 MHz
- Foot Print: 32 mm
- Number of element: 128
- Biopsy kit: Available

SP1-5
- Applications: Abdomen, Renal, Cardiac, Emergency Medicine, TCD
- Transducer Type: Phased array (Premium*)
- Frequency Bandwidth: 1.0 - 5.0 MHz
- FOV: 90°
- Number of element: 64
- Biopsy kit: N/A
* Note: Premium means single crystal as piezoelectric material.

SP3-8
- Applications: Abdomen, Renal, Cardiac, Emergency Medicine, TCD
- Transducer Type: Phased array (Premium*)
- Frequency Bandwidth: 3.0 – 8.0 MHz
- FOV: 90°
- Number of element: 64
- Biopsy kit: N/A

VC1-6
- Applications: Abdomen, Renal, OB, Fetal Echo, GYN, Emergency Medicine
- Transducer Type: Volume Convex array
- Frequency Bandwidth: 1.0 - 6.0 MHz
- Convex Radius (mm): 40 mm
- FOV: 79°
- Number of element: 128
- Biopsy kit: N/A
EN3-10

- Applications: OB, Fetal Echo, GYN, Urology, Emergency Medicine
- Transducer Type: Endovaginal/Endocavity
- Frequency Bandwidth: 3.0 - 10.0 MHz
- Convex Radius (mm): 10 mm
- FOV: 145°
- Number of element: 128
- Biopsy kit: Available

E3-10

- Applications: OB, Fetal Echo, GYN, Urology, Emergency Medicine
- Transducer Type: Endovaginal/Endocavity
- Frequency Bandwidth: 3.0 - 10.0 MHz
- Convex Radius (mm): 10 mm
- FOV: 145°
- Number of element: 128
- Biopsy kit: Available

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