

Performance Criteria and Recommended Specifications for ITW Field Ultrasound System				
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CATEGORY	FEATURE	MINIMUM CRITERIA	RECOMMENDED SPECIFICATION	COMMENTS
Imaging	Auto Features	presets for each study and s, m, l patients	automatic gain and TGC	adaptive automatic gain control is preferred because it will reduce the need for user interaction but it may cost more to implement
	Penetration	body sector > 16 cm small parts > 5cm	body sector > 20 cm small parts linear > 9cm	use 0.5dB/cm/MHz phantom CIRS 040GSE or equivalent for these tests
	Axial Resolution	body sector < 1mm small parts < 0.8mm	body sector < 0.5mm small parts < 0.3mm	
	Contrast Resolution			reserved for possible future use--no current specification
	Receive Focusing	dynamic	dynamic	
	Transmit Focal Zones	≥ 1	≥ 4	
	Minimum Frame Rate	10 Hz	15 Hz	these are for normal (non cardiac) applications
	Grayscale Maps	1- linear	2	Linear is required. Mild sigmoid, mild positive gamma boost maps are options
	video loop storage	yes--64 frames	yes - 200 frames	6 sec to 20 sec at 10fps is the goal
	user definable imaging presets	no	yes	custom presets are recommended so that the field training team can make final adjustments to presets at the field site.
preinstalled imaging presets	yes	yes	these cannot be changed by user	
on board image storage	5GB (approx 10 studies)	50GB	10-100 study on board storage so that scanning can continue when gateway is down	
harmonic imaging	no	yes	it is OK to have this feature--especially if it improves image quality	
spatial compounding	no	yes	it is OK to have this feature--especially if it improves image quality--but < 4 frame averaging is recommended to avoid slow composite frame rates and motion blurring	
Controls	TGC	no (automatic only)	auto plus manual TGC controls OK	slider controls every 2-3 cm or near, far and gain slope controls are acceptable
	Gain	single knob or button without calibration marks	knob or button	display of gain on knob or screen is optional but it is expected that most systems will include this
	Output	knob or button	knob or button	display of output by knob marks or on screen is required
	Focal Depth			optional & soft keys allowed
	Focal Zone Number	1	multiple are OK	soft keys allowed
	Image Depth	control by preset	preset and manual control	soft keys allowed
	Print	button	button	soft keys allowed
	Gray Scale Map	button or toggle	button or toggle	soft keys allowed
	Setup	button	button	soft keys allowed
	Transducer Select	optional if only one port	optional if only one port	optional if only one port
Freeze	button	button		
Tracball or otherscroll control for video loops	any-see comments	any-see comments	ability to select for play or save a segment of a video loop is required, other controls are not required	
Transducers	Body Transducer-Angular Coverage	55	90	minimum config is two transducers: one body sector and one small parts, each transducer may be a curved array, phased array, or a mechanical sector transducer (with or without standoff)
	Body Transducer - Center Frequency	3MHz	3.5MHz	
	Small Parts - Length	38mm at skin	40mm	mechanical sector scan is allowed with standoff
	Small Parts - Center Frequency	5MHz	7.5MHz	
	Cable length	1.5m	2m	
Display	type	LCD, OLED	LCD, OLED	preferred resolution depends on dimensions of screen. 8 in diagonal screen size is preferred but smaller screens may be acceptable.
	spatial resolution	320x240	1024x768	
	pixel depth	16 bit color	24 bit color	
	touch screen	no	OK	

CATEGORY	FEATURE	MINIMUM CRITERIA	RECOMMENDED SPECIFICATION	COMMENTS
	power saving, off control	yes, yes	yes, yes	
Imaging Modes	B	yes	yes	
	m	no	yes	
	Color Doppler	no	OK	desirable--especially for later in project
	Power Doppler	no	no	
	harmonics	no	OK	harmonics OK especially if image quality is improved
Communications	Video output	no	yes	NTSC Composite preferred
	USB output	no--see comment	yes	As a minimum requirement, USB or some alternative digital output format <u>strongly</u> recommended as a backup for wireless (10baseT or 100baseT also acceptable) (avi files for video, tiff or jpeg for stills)
	multiframe dicom	yes	yes	lossless compressed
	single frame dicom	yes	yes	lossless compressed
	802.11 wireless	b, g capable	built in b,g, n	
	background image transmission	optional	yes	this is highly desirable
Power	External supply vs built in	either	either	use cheapest option...external may be easier to replace and may lower maintenance costs
	voltage input	100-240 V 50-60Hz	100-240 V 50-60Hz	
	battery power	external or internal, NiMH or Li-ion	external or internal, NiMH or Li-ion	battery is optional, type optional
	Battery life	30 min scan time	60 min scan time	to allow finishing one or two cases in a power failure situation --- may also opt for an external battery or UPS
	separate battery charger	optional	optional	depends on configuration of battery
	battery charge while system on AC	yes	yes	if there is a battery
	battery hot swap	no	no	
	Power consumption total while scanning and transmitting	<200	<75	a system consuming <50Watts would be highly desirable
	car charger	yes	yes	
Ruggedness, Physical Characteristics, Certification	water resistance	none	resistant	recommend IEC and NEMA standards
	dust & dirt	under development	under development	recommend IEC and NEMA standards
	operating temp range	5-40C -see comments	5-40C	external cooling device may be provided to meet this requirement--recommend using classification 3K4 (weather protected stationary equipment) in "Environmental Requirements or Electromechanical and electronic equipment" (1999, Tricker and Tricker, ISBN 07506-3902 4)
	humidity	5-95% - see comments	5-95%	class 3K4 as above
	weight	<40lbs	<15lbs	
	size	see comment	see comment	full scanner plus transducers and power supply should fit into airline carry on
	Certification/Approval	FDA or EU	FDA & EU	many developing countries will not allow non approved devices to be used