Scanning systems, ultrasonic, portable

Health problem addressed

These devices are used primarily for abdominal and OB/GYN scanning. Some systems include additional transducers to facilitate more specialized diagnostic procedures, such as cardiac, vascular, endovaginal, endorectal, or small-parts (e.g., thyroid, breast, scrotum, prostate) scanning.

Product description

These systems typically consist of a beamformer, a central processing unit, a user interface (e.g., keyboard, control panel, trackball), several probes (transducers or scanheads), one or more video displays, some type of recording device, and a power system. These systems produce two-dimensional (2-D) images; some may offer advanced scanning features such as harmonics, Doppler color flow mapping (CFM), and three-dimensional (3-D) imaging.

Principles of operation

To perform ultrasonic imaging, a probe is either placed on the skin (after an acoustic coupling gel is applied) or inserted into a body cavity. Ultrasonic probes contain one or more elements made of piezoelectric materials (materials that convert electrical energy into acoustic energy and vice versa). When the ultrasonic energy emitted from the probe is reflected from the tissue, the transducer receives some of these reflections (echoes) and reconverts them into electrical signals. These signals are processed and converted into an image (sonogram).

Operating steps

- Coupling gel is placed on a probe.
- A probe is placed on the skin or inserted into a body cavity.
- Images are viewed and evaluated on a display screen.

Reported problems

Ultrasound diagnostic imaging appears to be risk-free when used properly. Ultrasonic transducers should be handled carefully to avoid damage. Electromechanical problems, such as cracks in piezoelectric elements, can alter beam width and/or spatial pulse length, thereby affecting lateral and axial resolution. Errors in distance measurements can cause incorrect calculations.

Use and maintenance

User(s): Physician; ultrasound technologist
Maintenance: Biomedical engineering staff and/or service contract with the manufacturer or third-party organization
Training: Initial training by manufacturer; operator’s manuals; user’s guide

Environment of use

Settings of use: Hospitals; physician offices; radiology departments; cardiology departments; emergency departments; outpatient imaging centers
Requirements: Line power

Product specifications

Approx. dimensions (mm): 130 x 70 x 10 for handheld; 53 x 328 x 280 for laptop/tabletop (for mobile add cart, varies/user selected)
Approx. weight (kg): 0.3 for handheld; 5 for laptop/tabletop (for mobile add cart, varies/user selected)
Consumables: Coupling gel
Price range (USD): 5,000-10,000 (6,000 typical) for handheld; 25,000-70,000 (45,000 typical) for laptop/tabletop (for mobile add cost of user selected cart)
Typical product life time: 8 years
Shelf life (consumables): NA

Types and variations

- Handheld
- Laptop/tabletop
- Mobile (cart mounted)