**Portable Ultrasound Probe System**

*Plug-and-play probe connects to any computer’s USB port for instant ultrasound use.*

The Ultrasound Probe System developed by Interson (Pleasanton, CA) delivers all the capabilities of a standard ultrasound probe but without the six-figure price tag. The device does not require the dedicated detection and display hardware that the expensive systems need. This means that the Interson device will allow ultrasound capabilities to get into more doctors’ offices, whether human or veterinary. An added bonus is that ultrasounds no longer need to be performed by specialist or require special visits to a different facility.

This device is the first complete ultrasound imaging system built right into a small and compact probe for B-mode imaging. The probe weighs a mere 7.5 ounces. This breakthrough allows a user to capture images in the probe before sending them to any standard personal computer or laptop, using Windows XP software, for processing. An ultrasonic image is generated and displayed on a monitor with the use of custom software provided with the probe. Further, image quality increases by eliminating the analog signal noise caused by traveling through a cable to be processed in the system. There are no additional devices required to connect between the probe and an existing computer.

This probe presently enables all veterinary practices to offer diagnostic imaging. The unit is an effective tool for diagnosing free abdominal or thoracic fluids in trauma cases, assisting with cystocentesis, intravenous or arterial catheters, and clinical judgments regarding cardiac contractility and chamber size. A similar probe based upon the same technology for use in doctors’ offices is currently pending FDA approval.

**The Design Challenge**

The most difficult challenge was in finding the motors with the designed-in efficiencies needed to run on the scant five volts trickling through the USB cables. Plus, Interson needed to have a variety of motor sizes available for the different probes. After a long research process, Interson decided to use Maxon Precision Motor products.

According to Roman Solek, President of Interson Corporation, “Maxon motors allow us to make all of this possible because of their low power consumption and their unique position encoder that is integrated into the motor itself.” The overall design of the ultrasound probe is proprietary. The motors used are Maxon’s A-max series, including the A-max 16 and A-max 22 with an integral MR rotary encoder.

**General Motor Specs**

Maxon’s A-max motors deliver the performance and lifetime of a moving coil motor. The real difference is that this performance is done at a reduced cost partly due to improved automated manufacturing processes. In addition, the patented rhombic moving coil design provides for longer life than competitive motors. Moving coil, or ironless, motors do not use a core of iron with copper wire wound around it as the basis for the rotor, but rather remove the iron core altogether and use a free standing copper coil. This design offers significant advantages as compared to conventional DC motors including low electrical noise, fast acceleration, and high efficiencies. Another important feature: an ironless rotor allows for zero cogging, which means simple, accurate control.

Eight versions of the A-max series are available, some with metal and some with graphite brushes. Single or double shaft units are available as well. Overall power ranges ran from 4 watts to 11 watts, while maximum continuous torque for the series comes in at up to 19.8 mNm (2.8 oz-in).
Dependent on the specific model and size of the motor unit weight and the length vary. Ambient temperature range is from \(-30\) to \(85\,^\circ\)C (\(-22\) to \(185\,^\circ\)F), and the maximum efficiency is up to \(85\%\) depending on the winding. Other options for the A-max series include the choice of ball bearings or sleeve bearings, and the choice of using terminals or leads for the interface. Several different windings are available to match desired speed with available voltage.

Due to their high performance and cost-effective price, Maxon’s A-max motors are particularly suitable for medical applications including infusion pumps, battery powered devices, surgical devices, printers/labelers, and measuring instruments.

Maxon not only designs and manufactures, but also markets a broad line of fractional horsepower moving coil DC motors and brushless motors ranging in size from 6 to 75 mm (0.2” to 3”) and from 0.5 to 500 watts. The company also has an extensive selection of gearheads, encoders, and control electronics to complement the motors.

**Ultrasound Probe System Operation**

The Interson Ultrasound Probe System is simple to use. A Doctor must first purchase the probe then download the software from the Interson website to an exam room computer. From there, the doctor plugs the hand-held unit into the computer’s USB (2.0) port. The USB line provides the 0.5 Amps necessary for the probe to operate. Now, the doctor can use the probe to perform any scanning job.

The probe is offered in 3.5 MHz, 5.0 MHz, 7.5 MHz and 12MHz versions for use in the most common ultrasound applications. Once approved by the FDA (expected date is the second quarter of 2007), the possibility for uses of the probe are endless, and include third world countries, ambulances, military operations, OBGYN, urology, dermatology, and many others. This ultrasound unit can go anywhere and for an easily affordable price. The total world market for diagnostic imaging equipment is estimated to be over \$16 billion in 2006 with the United States accounting for approximately 50% of the total market.

In conclusion, these highly reliable motors allow long and dependable operation of the probes, which is key in medical and veterinary applications. The probe itself is manufactured in the United States, and comes standard with a three-year warranty and 24-hour service. Roman said, “Our product was recently awarded recognition as one of the top 100 innovations in 2006 by Popular Science, and as one of the ten top inventions in the year 2006 by The International Academy of Science.”

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