

# United States Army Advances Blood Information Program with Socket Cordless Bar Code Scanner

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*Tommy Morris, Chief Information Technology Officer, Telemedicine and Advanced Technology Research Center*



*Photo courtesy of the U.S. Department of Defense.*



For technicians who manage blood reserves for the United States Army, efficiently collecting, preserving, and distributing blood products can mean the difference between life and death for wounded soldiers. Army blood technicians closest to the battlefield can now manage inventories with 100% accuracy using a mobile blood management system that features the Socket Cordless Hand Scanner with *Bluetooth* Wireless Technology.

With the War on Terror in Iraq and Afghanistan, the Army needs more than 300,000 units of blood each year, quadruple the need at the beginning of the war. Because blood is so perishable, especially in the heat of the Middle East, inefficient management leads to expired and lost blood that could have gone to saving lives. The Army loses millions of dollars each year in expired and lost blood, which can cost as much as \$250 per unit to replace.

### **BLOOD INFORMATION PROGRAM**

The mobile system, known as the Blood Information Program (BIP) consists of a *Bluetooth*-enabled HP iPAQ hx4700 series Pocket PC, the Army's BIP software, and the Socket Cordless Hand Scanner with *Bluetooth* Wireless Technology. Medical and supply soldiers use the Socket Cordless Hand Scanner to scan bar codes on blood bags to quickly retrieve information including the unit number, blood type, expiration date, and product code. The data is sent

wirelessly via *Bluetooth* into the Pocket PC, where it automatically enters a database chip. A waterproof, crush-proof, and drop-proof box from Otterbox protects the Pocket PC from damage.

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BIP is an all-in-one suite of mobile applications that includes an inventory program, a report generator, and a transfusion/ disposition module. The solu-

tion was developed by the Army's Telemedicine and Advanced Technology Research Center (TATRC) in Fort Detrick, Maryland.

In the past, Army technicians inventoried and tracked blood by manually entering information into spreadsheets on a laptop computer, which was connected to a database server. Inventories were tedious, slow, and susceptible to typing errors. The solution was also too complicated for practical use in the field and restricted technicians to a workstation in a tent. Not originally designed for deployment, the system did not even support all the essential functions of blood teams in the field.

The new mobile system is first used when a cargo plane delivers palettes of blood to a field blood bank unit, surgical team, or combat support hospital. Lab technicians record the shipment's arrival by scanning bar codes with the Socket Cordless Hand Scanner into the application on the Pocket PC.



Because the entire system is portable, inventories can be performed right at the point of delivery, eliminating the time and effort needed to move blood to a workstation. Later, when a hospital calls for the blood, technicians scan the blood again before sending it out.

Bar code scanning makes recording data fast and virtually error-free, and using portable, cable-free devices enables nimble, efficient scanning.

BIP also simplifies the process of requesting blood shipments. "Using Blood Information Program, a soldier can tap out a blood request in 15 seconds, instead of the three to five minutes it once took using pen and paper," said Tommy Morris, Chief Information Technology Officer of TATRC and

inventor of BIP. With network access, requests can be instantly emailed, whereas paper forms required faxing, involving more time and effort.

When a hospital receives the blood, lab technicians use BIP to track the final disposition, after transfusing the

blood or destroying it because it's no longer safe to use. If the blood is transfused, technicians enter the patient's name, social security number, and diagnosis. This helps the Army control the spread of blood-borne diseases such as AIDS or hepatitis, by enabling technicians to trace all patients who received blood from a specific donor. Before BIP was implemented, the Army had never effectively monitored the final disposition of blood amongst its soldiers.

## HUMAN FACTORS OF DEPLOYMENT

While choosing a bar code scanner for BIP, Morris experimented with various devices. "Almost all scanners are fairly accurate when compared side by side. The biggest part is ergonomics, the human factors," he said. When Morris gave soldiers a Pocket PC with either a plug-in scanning card or a built-in bar code scanner, they complained of wrist pain due to the combined size and weight of the Pocket PC and bar code scanner.

"When you're talking about scanning a hundred bags, after so many, your wrist would get sore," Morris explained. "Partnering with Socket allowed us to leverage the research that was ongoing and

actually reduce the size of devices for the blood teams."

The Socket Cordless Hand Scanner meets the ergonomic requirements of the blood technicians, not only because of its petite size, minimal weight, and unique shape, but also because of *Bluetooth* Wireless Technology, which enables technicians to scan data into a Pocket PC without having to hold the Pocket PC in their hand.

Size and weight are crucial to any technology deployed to field soldiers because they may already be carrying more than 100 pounds of equipment. Medics for special operations forces, for example, each carry a 65-pound backpack, 45-pound aid bag, food, water, weapons, ammunition, and 20-pound medical reference books.

"If you're looking at giving them something bigger than an iPAQ, they're typically not going to take it with them, because it weighs too much, because they have to carry it." Morris explained.

"When we're designing these systems, we have to take into account the human factor, which is the user, and it has to fit into their business process. It can't be cumbersome, it can't be heavy, it has to be user-friendly," he said.

Field testing produced extraordinary results. "With the studies that we conducted in Korea at three combat support hospitals, we were able to track 100% of the inventory 100% of the time," Morris said. "With all of the Socket scanners that we currently have in use, we have not had any reported failures," he added.

## WORLDWIDE IMPLEMENTATION

After deploying BIP to Iraq and Afghanistan, the Army plans to implement it worldwide. "The device is filling a formerly complicated and sometimes unfilled gap in military blood-tracking proce-

*The Socket scanner meets the soldiers' ergonomic needs with its small size and weight, unique shape, and Bluetooth, which enables them to scan data into a PDA without having to hold the PDA in their hand.*





#### Customer at a glance

- Organization: Telemedicine and Advanced Technology Research Center
- Founded: 1977
- Headquarters: U.S. Army Medical Research & Materiel Command, Fort Detrick, Maryland
- URL: [www.tatrc.org](http://www.tatrc.org)
- Primary business: Military organization

dures,” said Kevin Belanger, commander of the Army’s 440th Blood Support Detachment unit and a consultant for the BIP program. “The vision is to have this device placed with every forward medical unit in the military that transfuses blood and blood products.”

The Air Force and Navy have also expressed interest. “They were excited because it’s inexpensive and easy to set up,” Belanger said. Because the software was created within the military, the main expenses involved are for the Pocket PC and Socket Cordless Hand Scanner, which together cost about \$1,000 per system, much less than the price of buying a server or laptop with blood software.

While the previous solution was so complicated that it took a week to learn, BIP is so easy to use that it requires only one hour of training.

Even more remarkable than the cost of deployment is the cost of development. “The total development cost for the

BIP was actually about \$58K, which is incredible considering some of the other programs are costing millions and millions a year,” Morris said. The software architecture supports rapid development, lowering costs.

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Morris sees extensive usage for BIP, in both military and civilian sectors. “We’re working with the logis-

tics program so it goes further than just a blood tool. It will be the architecture for the medical logistics programs at the point of care,” he said.

“It can be used by all levels of military and civilian health care providers, as well as public health, insurance companies and emergency responders.”

BIP won one of the Army’s “Greatest Invention” awards, which recognizes the Army’s best new technologies impacting soldiers. It was also a finalist in *U.S. Medicine Magazine’s* Frank Brown Berry Prize in Federal Healthcare and a nominee for *Wired Magazine’s* Rave Award for medical science.

### CHALLENGE

Quickly and accurately manage blood inventories in the field

### SOLUTION

- Socket Cordless Hand Scanner with *Bluetooth* Wireless Technology
- HP iPAQ hx4700 series Pocket PC with built-in *Bluetooth* radio
- Otterbox protective case
- Blood Information Program software from TATRC



### RESULTS

- Increased speed and 100% accuracy of blood inventory counts, saving soldiers’ lives as well as the cost of lost and expired blood
- Decreased costs in hardware and training, enabling easy deployment worldwide
- Ability to track the final disposition of blood, helping to prevent the spread of blood-borne diseases



#### Corporate Headquarters:

Socket Communications, Inc.  
 37400 Central Court  
 Newark, CA 94560 USA  
 Phone: 510-744-2700  
 Domestic Toll-Free: 800-552-3300  
 Online: [www.socketcom.com/contact](http://www.socketcom.com/contact)