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From waves to the beach



Remote-controlled vehicle with
explosives attached

Tomorrow's reality in defense electronics

From space-based satellite communications systems to rifles equipped with laser and thermal imaging sights, electronics has integrated itself as a core ingredient of contemporary warfare. During the next quarter-century, **Forecast International** believes that the fields of communications, intelligence, computers, avionics, radars, lasers, electro-optical systems, and sensors will leap forward so dramatically that today's most advanced systems will seem prehistoric by comparison.

Only a few decades ago, the high level of sophistication of today's defense-electronics systems existed only in the realm of science fiction. In 1959, Robert Heinlein wrote the novel *Starship Troopers* that described infantry soldiers outfitted with computers, communications, optics, and sensor systems that gave them superiority over the enemy in battle by providing them with information while on the move. This story has practically become the blueprint for the future, as several major systems are currently under development worldwide that will offer these features: the Dutch Dismounted Soldier System (D²S²) for the Netherlands, the Fantassin à Equipements et Liaisons Intégrés (FELIN) for France, the Future Integrated Soldier Technology (FIST) system for the UK, the 21st Century Land Warrior for the U.S., the Future Infantryman for Germany, the Integrated Protective and Clothing Ensemble (IPCE) for Canada, and the Soldier Combat System (LAND 125) for Australia.

Soldier systems are expected to be used by troops engaged in intimate combat against the enemy. These systems are now boasting a dazzling array of features, including sophisticated command, control and reconnaissance capabilities; advanced information capabilities; enhanced visual capabilities; nuclear/biological/chemical warfare alarms; Identification Friend or Foe (IFF) capability; safe and precise individual weapons systems; state-of-the-art individual protection

equipment; and interoperable combat information systems. "Starship Troopers" are no longer merely the stuff of science fiction.

As brilliant as these technological advances appear, each next-generation piece of equipment can be expected to be even more incredible than the last. Demands for capabilities only grow as technology evolves. In other words, once expectations are met at one level, the response tends to be a call for an even higher level of refinement. So what comes after soldiers are already equipped head-to-toe with electronics devices? Look for the cybernetic warrior, troopers with a direct neural interface between their brain and military hardware that renders a virtual "plug and play" capability.

Unfortunately, getting such technology from the drawing board onto the field takes years. There are always many technical issues to be resolved regarding matters such as size and power supply. Among current efforts, nanotechnology is making great strides in shrinking down equipment size. Another emerging field is Biotronics, which is exploring the creation of "wetware"—electronics directly implanted into the body to enhance soldier performance.

The future of defense electronics will be as limitless as the ability to imagine. Of course, it will always take time for bursts of creativity to translate into practical advances in technology. The makers of the "must-have" systems of the time will always be in good standing to profit. Yet, the real winners in the military electronics business will be the anonymous components manufacturers, those unsung heroes of the common-core parts such as circuit boards, semiconductors, chips, transistors, and so forth. It is here at ground zero of electronics-systems production that profits will be reaped. No matter what systems are hot at the moment, they will all need and share these basic hardware elements. **OHE**