



## RESCUE EQUIPMENT

**B**elow, a firefighter of the Torrance (California) Fire Department is displaying a new generation of lightweight portable emergency rescue cutters for freeing accident victims from wreckage. Known as Life-



shear cutters, they incorporate NASA pyrotechnical separation technology and were developed under a cooperative agreement that teamed NASA and Hi-Shear Technology Corporation of Torrance.

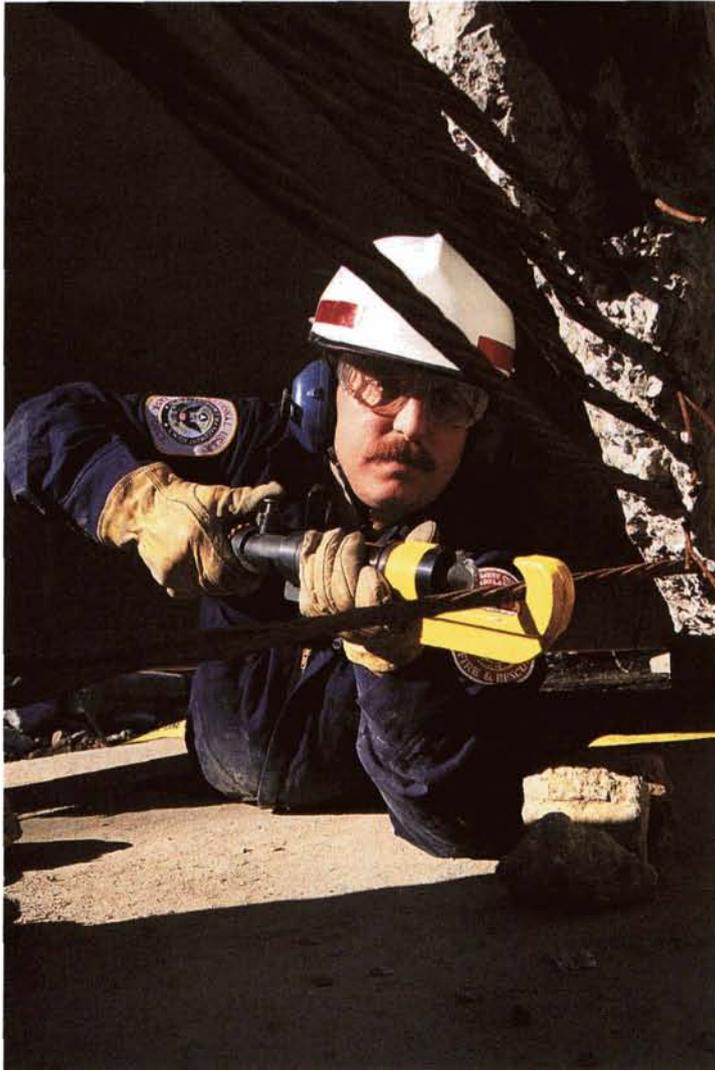
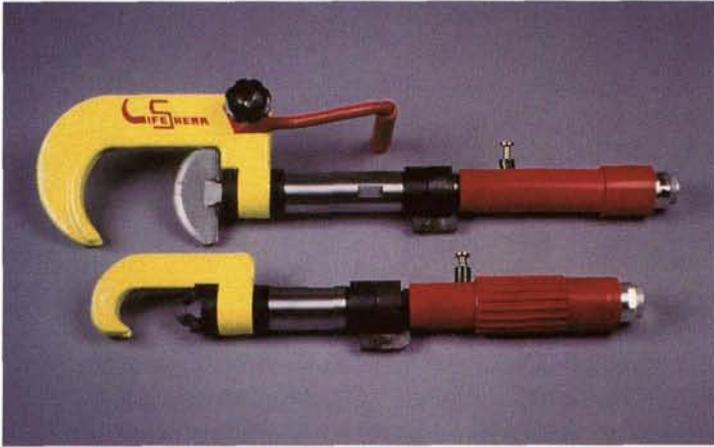
The cutters were developed under the Clinton Administration's Technology Reinvestment Program (TRP), an effort to transfer government-sponsored technology to the U.S. commercial marketplace. The development project was undertaken to meet the need of some 40,000 U.S. fire departments for modern, low-cost emergency cutting equipment.

Prior cutting equipment employed expensive gasoline powered hydraulic pumps, hoses and cutters for use in accident extrication. To eliminate much of this cumbersome equipment, the Lifeshear design team opted for pyrotechnically-actuated cutters, which made possible a 50 percent weight saving and a 70 percent reduction in cost. The key technology is a modified power cartridge, a miniature version of the cartridges that actuate pyrotechnical separation devices aboard the Space Shuttle and other NASA spacecraft. Hi-Shear Technology Corporation is an industry leader in the development and manufacture of pyrotechnically actuated thrusters, explosive

bolts, separation nuts, pin pullers and cutters and has supplied such equipment for a number of NASA deep space missions plus the Apollo/Saturn, Skylab and Space Shuttle programs. Although the company had broad experience in pyrotechnics, it lacked hands-on experience and training in vehicle rescue, therefore asked the City of Torrance Fire Department and Fire Chief Scott Adams to contribute their user experience to the development effort.

Hi-Shear offers the Lifeshear cutter in the two versions shown in **at right above**, the LS 100 (top unit) and the LS-200 (lower unit). The LS 100 has a 3½-inch "jaw" opening, is 26 inches long and weighs 11½ pounds. The LS 200 has a 1½-inch opening, is 22 inches long and weighs only 8½ pounds. The tools take only about 30 seconds to set up and they require no pumps or hoses; they can sever automotive clutch and brake pedals or cut quickly through roof posts and pillars to remove the roof of an automobile. They provide a bonus to firefighters and rescue personnel in that they reduce the probability of lower back injuries that occur with the use of hydraulically-powered equipment.

The accompanying photos illustrate two typical applications of the cutter. **At right, a**



firefighter is clearing an egress route by cutting through reinforcement cable and bars in a collapsed-structure situation. **Above right**, a firefighter is cutting off the roof of a car to provide access to a trapped victim.

Priced at less than \$2,000 per unit, the new equipment is cost-effective for the smallest fire departments and rescue squads and its easy transportability to remote areas makes it attractive for military/civil helicopter



search and rescue operations. Since the Lifeshear cutters were introduced in 1994, they have generated wide interest among other possible users, such as law enforcement agencies, private utility companies, mining interests, and elements of the Department of Defense.

Managed for NASA by Jet Propulsion Laboratory, the Lifeshear development effort was accomplished with funding of \$1.6 million, shared by NASA and Hi-Shear. The contract award, made in February 1994, was the first of the national TRP cooperative agreements. Hi-Shear was able to bring the cutters to production and commercial availability in only six months, and by mid-1995 the company was manufacturing 600 units a month. The Lifeshear program supports seven machine shops in the Los Angeles area and employs 40 people.