RAY DOWNEY'S

THE RESCUE COMPANY

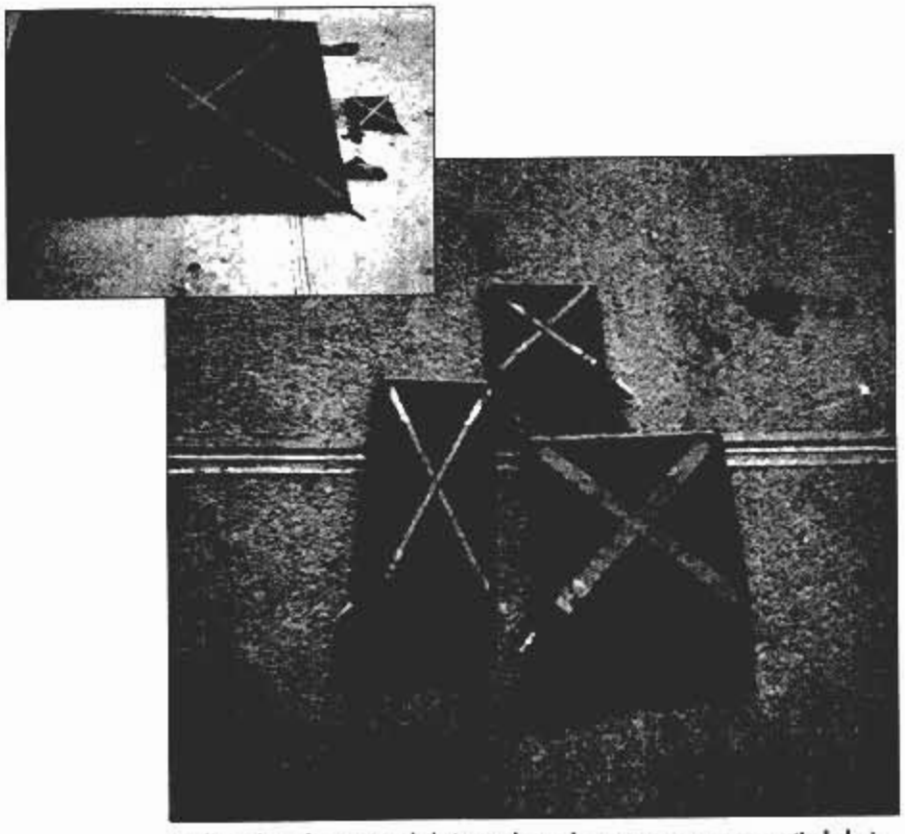
AIR BAGS PART 2

LAST MONTH'S article discussed the various types and sizes of air bags, air bag components, and the limitations and capabilities of the air bag system. Now let's look at some actual experiences in using these bags, operational guidelines, and maintenance of the system.

The newest components to the air bag system have been the smaller bags, designed for limited-access lifting and spreading. These bags are especially helpful when the size of an opening makes it impossible to use a larger bag. In two collapse operations that involved the freeing of a trapped victim, the six-by-six-inch bag was the last piece of equipment used to conclude a successful operation. (The 6"x6" bag weighs one pound and is capable of lifting 1.5 tons to a height of 3.4 inches using 0.14 cubic feet of air.)

In one operation, after two hours of tireless efforts by rescuers, the victim was still trapped. The lower part of one foot was securely wedged between sections of collapsed flooring. A rescue team member was able to dig out enough debris to make room for the 6"x6" bag, which was placed into the small opening. With one inflation, the last remaining obstacle was overcome and the victim freed. This experience helped in a similar situation, months later, when a victim's arm had to be freed for final removal operational procedures prior to his complete removal from under eight feet of fallen building floors, walls, and furniture.

These small bags (6"x6", 6"x12", 10"x10") have been used successfully on numerous occasions for freeing victims from industrial and agricultural machinery entrapments. How many



Small air bags have proved their worth on the emergency scene, particularly in small, confined areas typical of machinery accidents and building collapse. (Photos by author.)

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THE RESCUE COMPANY

AIR BAGS—PART 2

times have you read about the worker whose hand or arm was trapped in a press or conveyor? These small bags have certainly become a vital part of a rescue team's arsenal.

The other extreme is the largest high-pressure bag. Measuring 36 inches square, it can lift 73.4 tons to a height of 24 inches. The rescue of a bulldozer operator, trapped under his machine, required the use of two 36"x36" bags. Placed on each end of the bulldozer, the bags were inflated in unison, allowing sufficient clearance to remove the operator of the bulldozer.

In another incident involving a high-pressure bag, a doberman pinscher, chasing a neighborhood cat, became wedged under a large sanitation dumpster. A 17-ton bag was all that was needed to free the animal—but rescuers were more concerned with what the doberman was going to do when freed than with the operation itself. Fortunately, the owner of the dog arrived at the scene prior to the freeing of the "victim."

It often amazes me how people can get involved in elevator situations the way they do. On an early spring night tour, our rescue company was called to an apartment house for a report of a man with his arm caught in an elevator. While responding, you try and picture the situation you are about to enter based on the information you have. My first thoughts led me to picture a repairman who had accidently caught his arm while servicing an elevator.

Upon arrival at the scene, we found two people holding a man whose arm was stuck in the diamond-shaped viewing glass of the hallway elevator door, with his feet about two feet off the ground. The two good samaritans could do no more than provide support. The victim had broken the viewing panel glass with hopes of tripping the electrical connection to the elevator that had been stuck just above the door. As he put his arm through the opening, the elevator moved up, taking him with it. It had to be his lucky day, for as quickly as the elevator started up, it stopped again, leaving him hanging with his arm trapped between the elevator car and the shaft wall.

After setting up a chair for him to stand on, we set a game plan into operation. First we shut down the electrical power to the elevator and left a member at the power source so it could not be accidently turned on while members worked on the elevator. We gained access into the elevator shaft via the hallway door on the floor above. Entering the shaft, we were better able to operate from the top of the elevator car itself. We were then able to use a 12-ton bag between the elevator car and the wall. We needed only inches to completely free the man's arm from entrapment and allow him to step down from the car. The man's "lucky stars" were still with him—after being freed, his arm showed only scrapes and bruises; he suffered no broken bones or open lacerations.

The air bag system has been put to very effective use in incidents involving trains, subway cars, or railcars, be they derailments, crashes, and victim entrapments. Twelve-ton and 17-ton bags are ideal for lifting train wheel assemblies, axle assemblies, or a car from the wheel assembly. Actual operational procedures can vary, depending on how the train was manufactured.

Prior to setting up a departmental standard operating procedure for these types of incidents, a training session for rescue teams and the agencies involved is a must. Understanding the system will give the rescue team an opportunity to incorporate safety guidelines into their SOP. This is extremely important, especially when electrified systems are involved.

Air bags are often used in accidents involving automobiles, trucks, and heavy equipment. As is the case with all rescue tools and equipment, the training and specialization of the rescue firefighter plays an important part in maximizing the overall effectiveness of the air bag system. Safety is an important part of every operation, and members should be dressed in protective gear to prevent injury.

AIR BAGS—PART 2

OPERATIONAL GUIDELINES

Setting up the system: Using an SCBA cylinder, connect the regulator to the cylinder, making sure that the connection is tight, and open the air source slowly. The high-pressure gauge will indicate the cylinder pressure. The low-pressure gauge is then set to the operating pressure. (This will depend on the manufacturer's specifications.) During operations, the high-pressure gauge must be checked to ensure that sufficient air is available. In extended operations, additional air should be readied.

All valves and controls should be in the closed position to prevent accidental discharge of air. After the regulator is attached, connect the supply hose from the regulator to the controller, making sure that the locking couplings are secure. Opening the outlet valve on the regulator will provide air flow to the controller.

Once the connections on the controller are secure, a supply hose attached to an air bag can be connected to the outlet of the controller. After a check that all connections are secure, the bag can be positioned under the load, with the air inlet nipple pointing outward. Whenever possible, the hose should be attached to the air bag prior to placing the bag under the load. This provides an additional safety factor by keeping the rescuer away from the load, limiting exposure time.

The operator now uses the control lever, button, or toggle switch on the controller to inflate the bag. Bags should be inflated slowly to prevent shifting of the load and should be inflated only as much as needed, which will depend on the incident itself. Overinflation of the bag is prevented by the safety relief valve of the controller.

Centering the bag under the load is extremely important. Centering provides a stable lift and prevents the bag from "popping out" from under the load. A bag popping out can be very dangerous; the load loses its support, possibly injuring victim or rescuer.

When using two bags, always place the larger bag on the bottom and center the smaller bag on top. Use two hoses of different colors to prevent accidental inflation of the wrong bag, and always inflate the bottom bag first. If two bags of the same size are used, center both under the load. Inflate the bottom bag to its maximum capacity and then the top bag to the height required. Never use more than two bags on top of each other.

Set all bags and cribbing, then connect in-line safety relief shut-offs at the nipples and connect hoses to the controller. Next, install air regulator and supply hose to the controller. After assuring that all connections are tight and valves shut, open air supply.

To obtain the maximum capabilities of air bags, use the largest bag when possible, use cribbing or shoring when available, and use two bags to gain additional height. Cribbing and shoring are used to gain height, support the bags, and protect the bag from objects or surfaces that could damage it; they should also be used to support the load that has been lifted to prevent shifting or to complete support. The safety of the rescuers should always be the number-one consideration.

Accessories that increase the capabilities of the systems are available. An in-line safety relief and shut-off attached to the air bag nipple allows for disconnecting the air supply hose from the air bag after inflation. This allows for multibag operation using the same supply line. Components are available that can convert or adapt alternate air sources to supply the system. Truck air-brake systems, low-pressure (90 to 125 psi) compressor systems, or other air-tool supply systems can be easily converted using adaptors. Because the air bag system is versatile and because components are readily available, rescuers can adapt these systems to handle almost any situation.

CARE AND MAINTENANCE

All components of the system should be kept clean, which, in the long run, will help ensure dependable service. Use a stiff brush and mild soap and water to clean the surface of the bags. Checking for leaks can be done by inflating the bags to 30 psi and using the soap and water to check for bubbles. The nipples of the bag should be checked for damage. Storing the bags with nipples pointed upward and covered with protective caps will help keep them in working condition. Hoses should be checked for damage to couplings and connections; locking couplings should be kept free from dirt and grime. Hoses should also be checked for cuts, cracks, nicks, etc. Store the hose in the coil position to prevent kinking. Check the regulator and controller for cleanliness. Make certain that couplings are free of damage, fittings are tight and not leaking, valve and control knobs are undamaged and in proper working order, gauge coverings are intact, screws are tight, and gauges and safety relief valves are in working order.

Regardless of the amount the system is used, a regularly scheduled maintenance check of the entire system—all components—must be incorporated into your tool and equipment maintenance schedule. This means the connecting of all hoses, regulators, controller, and bags.

Remember, the scene of operation is not the place or time to be checking tools or equipment. Regardless of how talented or specially trained the operator of the system is, the system can only perform to its maximum when it is in proper working order. ■