



Emergency Response Guide

**LIFEGUARD**   
SRS

This **LifeGuard Technologies® Emergency Response Guide (ERG)** is just one component of a comprehensive education and training program offered on the LifeGuard SRS advanced occupant protection systems. This ERG is to be used as a familiarization and training manual for owners and operators of LifeGuard-equipped vehicles and first responders who may be required to deal with these vehicles under emergency circumstances.

Information in this manual pertains only to vehicles that are equipped with LifeGuard Technologies SRS, including the LifeGuard RollTek® side roll protection system and the LifeGuard 4Front® frontal airbag system. For an updated listing of vehicles available with these systems, please visit lifeguardtechnologies.com or call 1-866-765-5835.

The emergency responder information in this manual is based on methodology developed from best practices in vehicle rescue responses. Ron Moore, Battalion Chief in the McKinney (TX) Fire Department and author of the University of Extrication series in Firehouse magazine, wrote and edited this manual.

LifeGuard Technologies is a division of IMMI®.

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## Background

### Company background

The LifeGuard Technologies division of IMMI, based in Westfield, Ind., is making the job safer with seat belt systems and advanced occupant protection products tailored for highway vehicles and off-highway equipment. Utilizing a modern crash-test facility, sophisticated engineering and advanced manufacturing operations, LifeGuard develops and supplies innovative, proven restraint systems and airbag protection for customers worldwide.

IMMI understands that commercial vehicle occupants have different safety needs than occupants in passenger cars. Understanding those differences led IMMI to be the first to offer lap-shoulder belts, frontal protection and rollover protection to the commercial vehicles market.

- **LifeGuard RollTek**, the first-ever rollover protection system for heavy trucks, combines **side airbag protection** with advanced seat belt technology to reduce the potential for serious injuries or fatalities in a rollover.
- **LifeGuard 4Front** is a **frontal protection system** that uses a sensor, buckle pretensioner, seat pull-down system, steering wheel airbag and a passenger-side knee bolster airbag to protect occupants in the most common type of collision – one that hits the truck head-on.

By helping reduce the severity of personal injuries that occur in rollovers and frontal collisions, this advanced safety equipment can dramatically influence the human toll that accidents take on the people involved, as well as making a significant impact on the bottom line.

### Rollover statistics

Government safety agencies report that multiple safety devices can reduce the likelihood of death or serious injury to truck drivers and cab passengers. These safety devices include the new concept of front and side airbags for large-size, heavy-duty vehicles:

- Rollovers are the most deadly type of accident in commercial vehicles. According to the Federal Motor Carriers Safety Association (FMCSA), more than half of occupant fatalities in large trucks involve a rollover. But how common are rollovers in heavy trucks? In commercial motor vehicles, FMCSA says rollovers comprise 3 to 4 percent of all accidents. In cargo tankers, the percentage of rollover accidents increases dramatically – to 23 percent of all crashes. Even more alarming, the rate climbs to 75 percent when the accident occurs while the cargo tanker is negotiating a turn. Factors contributing to rollovers include difficult road conditions, hazardous weather, soft pavement, shifting cargo loads and driver error.

- According to a study by the University of Michigan Transportation Research Institute (UMTRI) Center for National Truck Statistics, when a rollover occurs, the likelihood of fatality increases 30 times.
- A survey of 42 participating companies, conducted by the National Ready Mix Concrete Association (NRMCA) and compiled in 2003, documented 136 concrete mixer rollovers occurring in 2000 and 2001. Of these rollover crashes, 52 percent resulted in bodily injury to the driver with 2 percent of the 136 incidents resulting in fatalities.
- According to the U.S. Fire Administration, motor vehicle accidents are the second leading cause of death for on-duty firefighters. Rollovers account for a significant number of these fatalities. The National Fire Protection Association reports that 20 percent of U.S. firefighter deaths in 2006 occurred while responding to or returning from emergency scenes. (NFPA Journal, July-August 2007)

### Cost of accidents

In recent years, manufacturers of heavy trucks have made tremendous strides in the improvement of cab crashworthiness, expanding the range of truck models for which frontal and side airbags can significantly reduce injuries and prevent fatalities. When occupants wear three-point seat belts and are provided with airbag equipment in these improved cabs, the potential for severe injuries or fatalities is reduced.

From a strictly monetary perspective, the average cost per fatal truck crash, according to FMCSA, is \$3.4 million, and the average cost per truck crash with injuries is \$166,000. FMCSA also reports that it is necessary for a motor carrier to generate an additional \$1,250,000 of revenue to pay for the cost of a \$25,000 accident, assuming an average profit of 2 percent. The amount of revenue required to pay for losses will vary with the profit margin.

**Safety technology can save money as well as lives.**

## Introduction to Manual

**Section One** of this manual serves as a familiarization and training manual for owners and operators of commercial vehicles equipped with LifeGuard SRS advanced occupant protection systems. **Section Two** is designed to assist first responders who may be required to deal with these vehicles under emergency circumstances. Emergency response personnel may utilize this document in their planning and training for vehicle rescue, firefighting, and medical tasks necessary at the scene of an incident where one or more vehicles involved are equipped with LifeGuard Technologies SRS.

For the purpose of this manual, emergency response personnel shall include firefighters, police officers, emergency medical personnel, DOT/Highway Dept. workers and tow/recovery operators. Vehicle rescue shall be defined as tasks including fire and hazard control, spill control, emergency medical care, rescue and extrication associated with any type of vehicle incident, including incidents that involve commercial vehicles.

This LifeGuard Technologies manual provides guidance, recommended operating practices and procedures for dealing with each of the LifeGuard SRS advanced occupant protection systems.

## SECTION ONE — Familiarization

Owners of commercial vehicles or emergency response apparatus equipped with LifeGuard SRS advanced occupant protection systems must properly maintain these systems so they are fully operational in the event of a rollover or frontal collision. After-market installations of accessory equipment, servicing and repairs performed on trucks equipped with RollTek or 4Front must be done so the operation of the system is not compromised at any time.

In addition, personnel operating vehicles equipped with LifeGuard systems must remain aware of their responsibilities for safety. First, the vehicle owner/operator must establish and enforce a standard operating policy whereby all personnel in the vehicle must be seated and properly belted at all times while the vehicle is in motion. For emergency responder agencies, this includes 'Code 3' responses as well as vehicles operating under normal driving conditions. Second, vehicle operators must be properly trained in vehicle operations and must adhere to safe driving and accident prevention practices at all times when operating a vehicle. This greatly minimizes the risks associated with vehicle operation.

Finally, if a vehicle equipped with LifeGuard SRS were involved in a crash, emergency response personnel may encounter an occupant protection system. Depending upon the type of collision, components of the LifeGuard SRS may be deployed or remain intact. Regardless of whether the system is deployed or intact, responders must be aware of the recommended emergency response guidelines for safely and effectively dealing with this equipment at an emergency scene.

## Components and Operation of RollTek and 4Front What do these systems include?

The LifeGuard Technologies advanced occupant protection system is designed and tested specifically for installation in large trucks and emergency response apparatus. The following components are included:

<b>RollTek</b>	<b>4Front</b>
<ul style="list-style-type: none"> <li>• Roll Sensor</li> </ul>	<ul style="list-style-type: none"> <li>• Frontal crash sensor</li> </ul>
<ul style="list-style-type: none"> <li>• Lap-Shoulder seat belt with integrated pretensioner system</li> </ul>	<ul style="list-style-type: none"> <li>• Lap-Shoulder seat belt with integrated pretensioner system</li> </ul>
<ul style="list-style-type: none"> <li>• Pull-down system for suspension seats</li> </ul>	<ul style="list-style-type: none"> <li>• Pull-down system for suspension seats</li> </ul>
<ul style="list-style-type: none"> <li>• Seat-mounted side airbags and/or pillar-mounted airbags</li> </ul>	<ul style="list-style-type: none"> <li>• Steering wheel-mounted driver frontal airbag</li> <li>• Front passenger dash-mounted knee bolster airbag</li> </ul>

**How do these systems work?**

To understand the components and operation of LifeGuard advanced occupant protection systems, one can easily compare this equipment to certain components of a typical automobile frontal and side-impact supplemental restraint airbag system. LifeGuard systems are unique, however, in that they incorporate additional devices, beyond sensors and airbags, to increase the survivability of occupants.

Two frontal airbags (4Front) activate in the event of a truck frontal collision, and another set of airbags (RollTek) is designed to deploy during a vehicle side rollover. (In some applications, it is possible for RollTek to deploy along with 4Front.) IMMI engineers incorporated seat belt pretensioners into the RollTek and 4Front systems for all occupants, along with seat pull-down systems for air suspension seats.

Here's how the RollTek system works: A sensor inside the cab continuously monitors the truck's stability, and if it detects an imminent rollover, it initiates up to three events per seating position. First, the system tightens every firefighter's seat belt to keep them securely in their seats. Second, it pulls down suspension seats to their lowest position to increase survivable space. And third, the system inflates side airbags in every outboard position to cushion head impact and reduce head and neck injuries during the rollover.

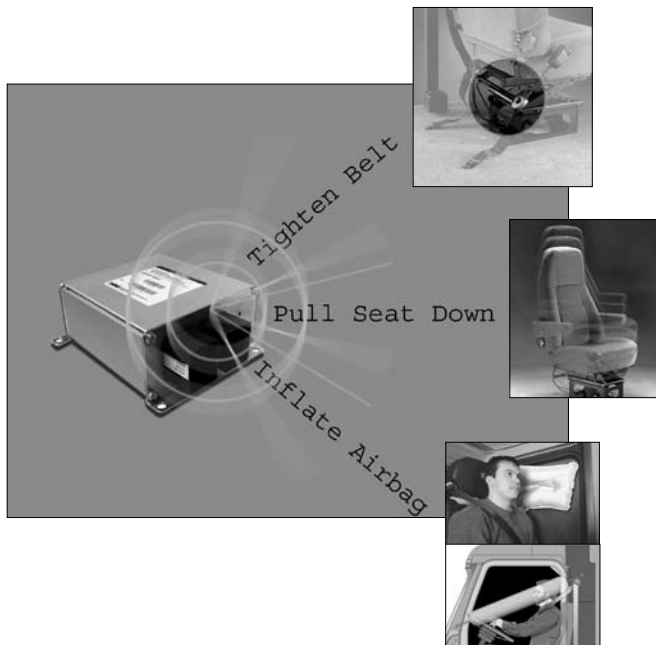
To provide protection to the driver and front seat occupant, LifeGuard Technologies offers the 4Front steering wheel-mounted driver frontal airbag and a unique knee bolster airbag for the front seat passenger.

Rather than utilizing an automotive airbag in the truck steering wheel, 4Front utilizes an airbag designed specifically for commercial vehicles. While passenger car airbags deploy primarily in a horizontal trajectory toward the driver, the 4Front airbag deploys outward and upward to protect the driver from the wheel rim. The 4Front inflatable knee bolster airbag, designed into several fire apparatus, is designed to cushion the impact of the knees with the bolster panel.

Here's how the 4Front system works: A sensor inside the cab monitors the trucks longitudinal accelerations. If the sensor detects a frontal crash of significant magnitude, it sends a signal to initiate three events that provide frontal protection for the driver and first officer. First, the system tightens seat belts around the driver and first officer to position them securely in their seats. Second, it pulls down suspension seats to their lowest position to increase survivable space. Third, the system inflates a steering wheel airbag to protect the head and neck of the driver, while inflating a knee bolster airbag to protect the first officer's knees. These subsystems work together to dramatically reduce the risk of fatality or severe injury in a frontal collision.

The RollTek system and the 4Front system are designed to work in conjunction with a 3-point seat belt. ALWAYS WEAR YOUR SEAT BELT.

**If occupants of a vehicle require emergency rescue and extrication after a frontal or side-impact crash, rescue personnel must exercise special caution because components may still be active and ready to deploy.**



## RollTek Component Systems

### Roll sensor

During normal operation, the roll sensor constantly sends out a pulsing signal to monitor the status of each component of the RollTek system. The roll sensor is about the size of a VHS tape and can be located in various locations in the cab, depending on the truck manufacturer. Placards are placed on the headliner directly opposite the sensor to notify personnel of the sensor's presence and to prevent unintentional damage from drilling, riveting or other equipment maintenance/installation activities.

If the roll sensor is removed or tampered with while under power and is still connected to the vehicle, it could unintentionally deploy all the safety devices. Two large yellow connector plugs distinguish this special sensor from the other electronic components that may be in close proximity. These yellow connectors will either point toward the front or rear of the vehicle, as the sensor must be in a specific alignment.

LifeGuard side airbags receive activation power from the roll sensor. An electrical power storage capacitor within the roll sensor assures that the airbag has power to operate during a vehicle crash and rollover in the event that vehicle power is lost.



1	2	<b>⚠ WARNING</b> • Do not remove • Do not service, salvage or reuse • Rapidly moving buckle could cause serious injury

### Seat pull-down system

During a rollover crash, standard air suspension seats can allow the occupant to move upward, out of his/her safe zone, which could result in serious injury or even death. Immediately after the pretensioner system deploys, the RollTek pull-down system pulls the truck's air suspension seat down to its lowest position.

The pull-down system is based upon a piston/cylinder device powered by a stored gas inflator similar to that used to deploy RollTek airbags. The unit (about the size of a shoe box) will always be mounted near, behind or below an air-suspension seat and will never be found on a standard static seat design. If the system is mounted behind the seat in a vertical orientation, original equipment manufacturers typically place a protective shroud over the device to keep foreign objects away from moving parts. The shroud will be labeled (see illustrations) to advise personnel of the presence of the equipment. When placed in the seat riser or pedestal, the seat pull-down device is generally not shrouded.



	<b>⚠ WARNING</b> PRESSURIZED GAS AND/OR PYROTECHNICS contained behind this panel or in cylinder. Release of gas can cause serious injury.
	• NEVER service, salvage or reuse. • NEVER weld, apply heat, grind, puncture or drill. • Contact manufacturer for disposal instructions.

1	2	<b>⚠ WARNING</b> • Do not remove • Do not service, salvage or reuse • Rapidly moving buckle could cause serious injury

### Side airbags

During a rollover, RollTek side airbags provide taut, yet cushioning support for the heads and necks of occupants in outboard positions, reducing injuries and saving lives. During a rollover, these airbags deploy across the window and side of the vehicle interior to protect the occupants' heads during impact. The seat belt pretensioner reduces movement and reduces the chance of head contact with the roof.

To activate a LifeGuard side roll airbag, an electrical signal must be received from the roll sensor, which is mounted elsewhere on the vehicle. This small electrical current



<b>⚠ WARNING</b> THIS ROLL SENSOR TRIGGERS AIRBAGS AND SEAT RESTRAINTS. Accidental deployment could cause serious injury and property damage.
• Service ROLL SENSOR ONLY if you are an authorized technician. • NEVER remove ROLL SENSOR. Removing ROLL SENSOR: • Turns OFF airbags and seat restraints • Can trigger deployment of airbags and seat restraints.
• BEFORE welding, read Operation Manual and disconnect ROLL SENSOR. • BEFORE disconnecting ROLL SENSOR, remove electric power.

### Lap-shoulder seat belt with integrated pretensioner system

The lap-shoulder seat belt is the primary occupant restraint system and is the foundation upon which any occupant protection system is designed and built. The seat belt integrated into the RollTek system includes a seat belt and a built-in seat belt pretensioner that functions as a safety device to retract the seat belt buckle and tighten the seat belt to keep the occupant securely in the seat.

Each pretensioner assembly typically includes the seat belt buckle, a steel cable connected to the buckle, several mechanical components and a self-contained micro gas generator. The tube-shaped generator contains an electric initiator, electrical wires and a small quantity of solid propellant. When the pretensioner system receives an electronic signal from the roll sensor, the pyrotechnic charge fires, pulls the cable and lowers the buckle, tightening the seat belt to keep the occupant securely in the seat.

flows to the stored gas inflators. The pressurized gases inside the inflator are warmed slightly as they escape. The gases flow directly into the airbag itself. As the pressurized and warmed gases fill the airbags, these airbags deploy across the side window area. If additional airbags are provided (up to six airbags in the case of fire apparatus), then those additional airbags will deploy during a rollover impact to also protect crew cab personnel riding in the outboard seat positions.

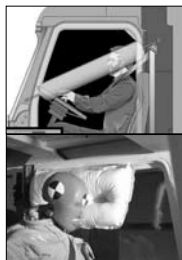
When the crash sensor sends a signal to the RollTek airbag, a pyrotechnic charge is used to activate these components, resulting in the residue smoke that issues from the airbag. The relatively cool surface of the airbag will not pose any risk to the occupant.


LifeGuard rollover airbags are installed at the time of vehicle manufacture. One design, called the ITS or Inflatable Tubular Structure airbag, resembles an elongated tube. It is constructed of proprietary materials that allow the rollover protection airbag to remain taut and inflated longer than conventional airbags, providing added protection in rollover truck crashes.

A second style of RollTek airbag is the Inflatable Head Curtain or IHC. It is pillow-shaped, and when deployed, covers a larger surface area than the tubular ITS airbag. ITS airbags are stored folded inside of the plastic trim, which is marked accordingly. IHC airbags are mounted vertically along a sidewall of the cab or on a roof pillar at the front and/or rear windows.

A third style of airbag is called "SRA." These airbags are installed within the outboard side of the seat back in the upright portion of the seat. All SRAs will be marked with an SRS emblem.

Regardless of which style of airbag is included in the RollTek system, the entire airbag deployment process from activation to the airbag being fully inflated takes less than a quarter of a second. The LifeGuard Technologies occupant protection systems deploy regardless of whether the occupants are wearing their seat belts.



	<b>WARNING</b>
	<p><b>PRESSURIZED GAS AND/OR PYROTECHNICS</b> contained behind this panel or in cylinder. Release of gas can cause serious injury.</p> <ul style="list-style-type: none"> <li>• NEVER service, salvage or reuse.</li> <li>• NEVER weld, apply heat, grind, puncture or drill.</li> <li>• Contact manufacturer for disposal instructions.</li> </ul> <p style="text-align: right; font-size: small;">15328</p>

## 4Front Component Systems

### Frontal crash roll sensor components

The frontal crash sensor (technically referred to as the airbag sensing unit) within the 4Front system is mounted to a solid metal structural area near the front of the vehicle. When it detects a sufficiently severe frontal impact, this small, metal box-like unit sends a signal to initiate three events: buckle pretensioning, seat pull-down, and deployment of the driver's steering wheel airbag and the passenger's knee bolster airbag.

**Note:** For information on the integrated pretensioner system and the seat pull-down system, please refer to pages 10-11.



### Frontal airbag and dash-mounted knee bolster airbag

When the 4Front frontal crash sensor sends a signal to the driver's airbag, a pyrotechnic charge is used to activate these components, resulting in the residue smoke that issues from the airbag vent holes. The relatively cool surface of the airbag will not pose any risk to the driver occupant.

4Front steering wheel airbags are designed to rapidly deflate in order to properly manage the energy imparted by the decelerating occupant. For this reason, the steering wheel bag is vented and will deflate in less than a quarter second. The knee bolster airbag may remain inflated for longer durations.

To ensure reliable operation, the 4Front airbag system is designed with a warning lamp, which will illuminate when it detects a fault in the system. To ensure that 4Front is fully operational, have your system serviced by a properly trained technician when the warning lamp is on.

The 4Front airbags can be paired with the RollTek side roll protection system within the same vehicle.

## SECTION TWO — Instructions for First Responders

### Introduction

Several important steps must be initiated by emergency response personnel upon arrival at any vehicle incident. Scene safety and traffic control, mitigation of hazards, caring for injured occupants, as well as fire suppression and extrication activities are examples of tasks that may be necessary. When a fire apparatus is involved in an incident, especially one resulting in personal injury, the call becomes a very personal and emotionally challenging emergency for responders.

With the introduction of LifeGuard RollTek and 4Front in commercial vehicles, there is now a possibility that an advanced occupant protection system will be present in the damaged vehicle. In addition to all the normal actions that are initiated at a vehicle crash, the presence of a LifeGuard SRS requires additional procedures be implemented to maintain the greatest degree of safety and efficiency of operations.

### Size-Up

#### Special size-up considerations

When a fire apparatus or large truck is involved in a vehicle accident, responders must complete standard procedures as they would with any vehicle incident response. Scene safety considerations are initiated, traffic and crowd control measures are put in place, and injured patients are accessed, treated and transported. When there is a fire apparatus or large commercial truck involved, however, a special size-up should be conducted on that vehicle specifically to determine factors such as the physical condition of the fire vehicle, extent of damage to its equipment, the contents of the truck, and condition of the occupant(s). Included in this assessment must now be efforts to search for the presence of a LifeGuard SRS. If present, there must be a plan to work with that system to assure safe operations for all involved.

### Vehicle position size-up

As is commonly done upon arrival at a crash that involves an automobile, first responders must approach the damaged fire apparatus or commercial vehicle to survey the physical damage. Begin first with a vehicle position size-up and then a vehicle condition size-up. As you walk around the incident scene, view as many sides of the truck as possible while considering;

- 1) the type of collision the vehicle has undergone (head-on, side impact, rear-end, rollover) and
- 2) the degree or amount of damage the truck has sustained.

A frontal collision will have deployed the 4Front components; the driver's frontal airbag and the front seat occupant's knee bolster airbag. If indications from your assessment of the vehicle's position are that the vehicle has remained upright during the entire collision sequence and has not experienced a rollover crash, you can expect that the RollTek airbags are still intact. If, however, there is evidence that the vehicle has rolled to a side-resting or roof-resting position or it exhibits signs of having rolled, then anticipate that the rollover safety systems have deployed, the seat belts pretensioners have fired, and that the driver's seat has lowered and locked into position.





### Vehicle condition size-up

After completing a large truck vehicle position size-up, emergency responders must then conduct a collision damage size-up. As you would do on the scene of an automobile crash, make a determination of the overall degree of damage by assigning a category, such as minor, moderate and major. Make note of apparent physical damage to the vehicle, while giving special attention to the cab structure. This is where the components of the LifeGuard SRS would be located if present. Note if the cab doors are operable, whether the windshield is intact and if side window glass is present. A severely damaged windshield or a cab with the windshield completely missing indicates that the cab, and particularly its roof structure, has undergone significant crash or impact damage. Anticipate the 4Front system has deployed.

If the collision is minor, the cab doors may open normally. The doors as well as the entire cab structure may even appear undamaged. The roofline more than likely has not suffered crush damage, so for occupants in the large truck, the collision may be a minor impact. LifeGuard SRS components in this vehicle will most likely remain intact. With severe frontal damage or significant cab crush damage, suspect that the frontal airbags have deployed. Jammed doors, a crushed front wall of the cab and windshield glass missing are all indications of a frontal collision.

Even if you find the vehicle in an upright position, evidence of scrape marks across the sides and top of the vehicle, or gouges and depressions in the roadway or ground near the apparatus, can indicate a rollover event. In a rollover, the side airbags, seat belt pretensioners and pull-down seat will have activated during the rollover crash.



### Hazard Controls

#### Electrical system

After the completion of the position and condition size-ups, the on-scene responder's attention must be turned to hazard control, specific to the large truck. Electrical system shutdown is a critical assignment for a crew to accomplish. The battery switches in the cab may be accessible. If so, turn the 'Master' to the 'Off' position as an initial first step in shutting down the electrical system. If the vehicle operates on an ignition key system, turn the key to the 'Off' position. Then remove the key and place it on the dashboard or hand it to a fire officer.

The assigned crew must continue their efforts as they locate the bank of batteries and physically disconnect or cut all battery cables. Disconnect or cut the ground or negative cable(s) first, then disconnect or cut the positive cables as well. The batteries must be completely disconnected from the electrical system of the fire vehicle in order for the electrical shutdown task to be considered completed.

#### Vehicle stabilization

If access to the cab area permits, in addition to making sure the vehicle's engine is shut off and the electrical system has been shut down, assure that the vehicle's transmission is in 'Park' if it is an automatic transmission.

If the crash-damaged vehicle is on its wheels, assign crews to chock or block the wheels and crib as necessary to assure a stable vehicle.

#### Fluids

First responders arriving at the scene of a large vehicle accident may encounter leaking fluids from a number of sources. For example, water from an onboard water tank on a fire apparatus may have spilled. Other leaking fluids can include vehicle fuel, battery acid, transmission fluid, oil and/or antifreeze. If the vehicle is a cargo tanker, fluid, such as a bulk quantity of gasoline, may have spilled from the storage tank as a result of the accident. Deployment of a standby handline and/or portable fire extinguishers should be implemented by emergency responders as a safety measure at a large truck incident scene.

#### Determining presence or absence of LifeGuard SRS

Relatively early upon arrival at a large vehicle crash, first responders must assess whether a LifeGuard SRS is present. Several key indicators can signal the presence of an SRS and its status. If there is a LifeGuard SRS, it will either be deployed or it will be undeployed.

To determine if a LifeGuard SRS is installed on the truck involved in a collision, responders have several options. Upon arrival at a crash involving a truck, first responders can identify the presence of a LifeGuard SRS advanced occupant protection system by looking for a decal on the exterior that indicates its presence.

If the vehicle is equipped with the LifeGuard SRS, a decal may indicate the presence of the system. This decal could be in several locations — near the front cab door, on the driver's sun visor, on the driver's window or on the roof of the cab above the sun visor.

The interior of the vehicle must be visually scanned to determine the presence of a RollTek or 4Front system. If the airbag has not deployed, but there is evidence of a system being installed in the vehicle, this confirms that the LifeGuard SRS is still intact. Pressurized gas still remains in the stored gas inflator unit for any roof, seat or dash-mounted airbag that has not deployed. The pyrotechnic charge also still remains within the seat belt pretensioner.

All RollTek and 4Front components including the pull-down seat system will still have potential energy after a frontal crash. Care should be taken while working around these devices. The unit should NEVER be used as a prying or levering surface during a rescue situation. Likewise, all components of the RollTek system should not be cut, drilled or sawed. Before extrication, always unplug or cut the 2-lead wire harness to the RollTek component device. This will reduce the possibility of stray voltage activating the components.

If the LifeGuard RollTek system is present and has deployed, the rollover airbags on the low side will be visible across the front door window area of the driver or passenger side or along the sides of the crew cab area. Even with a door closed, a deployed LifeGuard airbag will be visible from inside or outside the vehicle.

If the 4Front airbag system is present and the truck has experienced a frontal collision of significant force, the driver's steering wheel-mounted airbag and the knee bolster airbag in front of the passenger's seat will have deployed.

If an airbag is not visible, this does not necessarily mean that there is no LifeGuard SRS in the vehicle. A visual scan of the interior of the vehicle cab may reveal the presence of a LifeGuard Technologies safety decal or the LifeGuard SRS System Locator. The 4Front or LifeGuard SRS decal should be on the backside of the driver's sun visor or on the roof liner just above. This is a location currently used by automakers for posting airbag safety notices as required by current motor vehicle safety standards. Information posted in this location allows first responders, law enforcement and EMS personnel to quickly learn about important safety information without opening the hood or removing license plates. Another safety decal is provided on the inside lower portion of both front doors of the cab.

When a truck with LifeGuard SRS advanced occupant protection systems is involved in a rollover accident, it is possible for the LifeGuard safety decal to be destroyed or become detached from the vehicle. A more aggressive approach to discover the presence or absence of a LifeGuard SRS involves searching for actual components mounted directly to the roof edge of the cab. Inspect the area above the headliner of the cab over either front door by physically moving or removing the headliner material

in this area. This inspection will reveal either that there is no airbag system, or it may reveal the stowed airbag or the actual stored gas inflator module itself.

## Working with a Deployed LifeGuard SRS

If a LifeGuard SRS advanced occupant protection system is present and it has deployed, several recommendations for additional actions are provided to assure safety for responders and victims during medical, fire safety and extrication activities.

If a LifeGuard airbag has deployed due to a rollover, then the front seat occupant's seat belt system has also automatically tensioned, and the air suspension seats have lowered. All necessary medical care, fire safety actions and extrication can proceed normally.

The deployed side airbag will interfere with patient care due to its post-crash position. The airbag itself can be cut to remove it from the work area, or the nylon tether strap at either or both ends of the airbag can be cut. If an airbag is cut, slight residual gases inside the bag, under approximately 2 psi pressure, will be released. No rupture or violent failure of the airbag will occur as it is cut. The gases that escape from the cut airbag are a mixture of argon and nitrogen. These are inert, non-toxic gases.

Consider the scenario where a rollover has occurred and the truck is equipped with the rollover airbag system. If occupants are trapped inside, rescuers may decide to cut open the roof of the vehicle or cut it off. With the RollTek ITS airbag system, the stored gas inflator cylinders for the airbags are mounted onto the structure of the vehicle's cab and will be no longer pressurized since the airbags have been deployed.



A deployed steering wheel airbag and the companion knee bolster airbag can also be moved or physically cut and removed if they in any way interfere with patient care or vehicle rescue operations.

An activated seat belt pretensioner system is rendered harmless simply by its initial activation and deployment. The small pyrotechnic charge within the pretensioner device has expended itself, and the receiver buckle of the seat belt system will be collapsed several inches. The buckle lowers automatically to remove slack from the seat belt positioned around the occupant. After activation, the buckle will release normally.

If the vehicle has sustained a rollover or frontal crash, the pull-down air suspension seats will also have activated into the crash position. The pedestal-type air suspension seats can be moved or removed during an extrication operation without any special regard for the presence of the seat pull-down system. After deployment, the S4 system is still highly pressurized and should not be cut or pried upon.

## Working with an Undeployed LifeGuard SRS Undeployed airbags

If a large truck or fire and emergency response vehicle undergoes a crash incident and the vehicle is equipped with a LifeGuard SRS advanced occupant protection system, components of the system may or may not have deployed. Specific safety-oriented actions are recommended to be taken by responders in the case that the system has not been deployed. An undeployed airbag system can deploy unintentionally for several reasons, including exposure to heat, electrical shorting of the sensor control module, stray static electric charges during work in and near the inflator module, or the cutting of the airbag electrical wiring.

To quickly gain control of an undeployed airbag system, the vehicle's electrical system must be shut down to allow the airbag system's electrical capacitor to "drain." The typical drain time for the LifeGuard safety system capacitor is at least two (2) minutes from when the vehicle's electrical system is shut down.

### Undeployed S4 seat pull-down system

An undeployed S4 pull-down seat has a stored gas inflator unit within its operating system. This pressurized inflator must not be cut, crushed or damaged during completion of extrication tasks. The seat can be moved or completely removed so long as the stored gas inflator is not compromised. The back of the seat itself can be cut to provide increased access to the trapped patient.

## Undeployed seat belt pretensioner system

To assure that the patient is not affected by the accidental deployment of a seat belt pretensioner while EMS personnel are rendering care, the seat belt should be unbuckled as soon as it is practical. If the buckle cannot be released or if the belt is interfering in any way with patient care or extrication, it should be cut.

An undeployed seat belt pretensioner system contains a small pyrotechnic charge at one end of the cylinder-shaped unit. The pretensioner should not be cut or crushed as extrication tasks are completed. If it is possible to gain access to the wiring that supplies power to the pretensioner, the electrical circuit can be disconnected at the plug. This further minimizes the chance of the pretensioner deploying unintentionally.

## Special Considerations

### Extrication safety

Caution must be taken when rescue and extrication equipment are used in or near the cab of the large truck. Undeployed stored gas inflator units for the side airbags must never be cut, punctured or crushed during extrication activities. Removing portions of the interior cab headliner or roof pillar trim material will reveal the actual location of the stowed airbags and the metal inflator cylinder. Crews must work around these systems as extrication tasks are accomplished. For example, when cutting the roofline, crews should be able to expose and see the safety system and the airbag inflators, so cuts can be made in the cab structure below or behind the unit. These cuts can allow an entire section of the vehicle's roof as well as the undeployed airbag system to be moved or removed intact.



Cut above or below stowed airbags & inflator cylinder

### Disconnecting the stored gas inflator

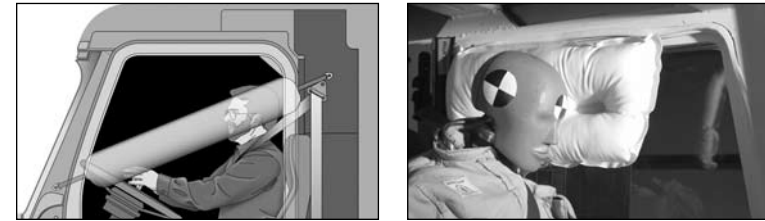
It may be possible to expose the paired electrical wiring that attaches to the end of the LifeGuard airbag's cylinder-shaped stored gas inflator unit. This is the wiring that delivers the electrical signal to the inflator unit to deploy a stored gas inflator airbag during a crash. Wiring for the ITS roof-mounted inflator units is the easiest to locate by stripping away the trim. With the headliner or pillar trim pieces removed and this wiring exposed, rescuers can gently unplug the yellow wires at the snap clip. This minimizes the chance of accidental deployment of that airbag during extrication and patient care activities.



### Cutting the airbag

While in its stowed position, an undeployed roof-mounted airbag can safely be cut during extrication. Inflators for the newer seat-mounted and dash-mounted airbags are integrated into the airbag unit itself and are not readily accessible. **Any fully charged and undeployed stored gas inflator must never be cut or crushed during extrication under any circumstances.** If it were necessary to cut into a stowed airbag during rescue work and then later, an unintentional airbag deployment were to occur, the stored gas would still blast out of the now severed end of the tubing from the inflator unit. Avoid placing personnel or patients near this inflation area.

Just as responders avoid working within the inflation zone of an undeployed airbag at an automobile crash, it is important that responders also avoid the inflation zone of LifeGuard airbags while working on a damaged fire apparatus or large truck. The airbag deployment zone of the LifeGuard airbag extends from the roofline down to the inside of the windows along both the driver and passenger sides of the vehicle. The knee bolster airbag deploys outward a distance of four inches from its mounting location on the dashboard. The steering wheel airbag inflates upward, then expands about three inches past the steering wheel rim. At rescue scenes, do not place rescuers, patients or equipment within these airbag inflation zones.



### Moving a damaged vehicle (for wrecker drivers)

It is advised that the electrical system be shut down prior to any recovery or tow operation. During recovery of a vehicle that has rolled over, chains or straps should not be placed on the roofline or in contact with an undeployed LifeGuard SRS advanced system.

**Please note:** All LifeGuard components must be deployed before disposal of a wrecked vehicle, in accordance with EPA procedures and regulations. If you require further assistance, contact LifeGuard Technologies at 866-765-5835.

### If the vehicle is on fire

If the fire apparatus or large commercial truck has a LifeGuard SRS advanced occupant protection system installed and the cab of the vehicle is involved in a fire or exposed to significant heat, the stored gas inflator units will auto-deploy when they reach an internal temperature of above 302° F. The chemical inflator unit of the 4Front driver airbag system will auto-ignite at approximately 250° F. At these temperatures, airbags will deploy in a similar fashion as if the vehicle were involved in a rollover crash or frontal collision.

The seat belt pretensioner system and the S4 air suspension seat will be destroyed when involved in a significant vehicle fire. The stored gas inflator within the pull-down seat system will auto-ignite at temperatures above 302° F (150° C). No unusual actions or reactions will occur when the seat belt pretensioner is involved in a fire situation.

## **Installation Assistance**

For additional information, call technical support at **866.765.5835**.



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