

**BASIC VEHICLE  
RESCUE  
AWARENESS**

# Department of Health Basic Vehicle Rescue Curriculum

**BVR Awareness level - 16 hours**  
**BVR Operations level - 16 hours**  
**BVR Technician – 16 hours & DOH test**

---

---

## **Awareness Level**

Lesson 1 Overview (*BVR lesson 1*)

Lesson 2 Hazards (*BVR lesson 2*)

Lesson 3 Anatomy (*BVR lesson 3*)

Lesson 4 Stabilization (*BVR lesson 5*)

Practical evolutions stabilizing vehicles in wheels, on side, on roof and resting on another vehicle or object

## **Operations Level**

Lesson 5 Part 1 Tools – uses and hand tools (*BVR lesson 4*)

Lesson 6 Patient Access (*BVR lesson 6*)

Lesson 7 Patient Extrication (*BVR lesson 8*)

Lesson 8 Post Rescue (*BVR lesson 9*)

Review Anatomy, hazards, and stabilization.

Practical evolutions of hand tool usage, none destructive access, destructive access, patient packaging and tool maintenance.

## **Technician Level with DOH BVR Technician Written Test**

Lesson 5 Part 2 Tools – power tools (*BVR lesson 4 continued*)

Lesson 9 Disentanglement (*BVR lesson 7*)

Review Anatomy, Hazard mitigation, Stabilization, Access, Packaging, and Post rescue.

Practical evolutions of power tool usage and disentanglement scenarios

# **Course Description**

## **Course Purpose**

## **Administrative Policies and Procedures**

## **COURSE DESCRIPTION**

The Basic Vehicle Rescue Awareness Training Curriculum is part of a comprehensive rescue training program designed to be presented to those emergency service personnel responsible for patient rescue operations on highways of Pennsylvania. This Basic Vehicle Rescue Awareness module is designed as the first part of a three part rescue-training program, and as such, will help prepare the student for other special rescue modules by introducing a wide variety of tools, equipment, and techniques associated with highway rescue. This module introduces the student to a systematic approach to rescue, which includes hazard recognition and control, incident command, situational assessment, and personal protection in addition to the requisite tools, equipment, and techniques of vehicle rescue.

While this module is introduced as a part of a total rescue-training program, it is also constructed in such a manner so as to be a freestanding course of instruction. This module contains all materials necessary to meet the needs to the Awareness level of fire, rescue, and emergency medical services currently providing for vehicle rescue operations on the highways of Pennsylvania.

While not intended to replace the automobile extrication segments of our Emergency Medical Technician training programs, this module is designed in such a manner to augment the EMT rescue training programs. This unit of instruction does; however, meet all minimum requirements of existing Emergency Medical Technician training programs and will expand upon the rescue knowledge and skills taught in EMT courses and will serve to expand and enhance the delivery of rescue services in Pennsylvania.

While not teaching patient care, i.e., medical assessment and treatment, this instructional program should provide rescue personnel with a strong sense of patient oriented techniques and activities. It is a given, that must be understood by all rescuers, that we are performing “patient

rescue” of persons involved in vehicle accidents, NOT “rescuing vehicles” from the highways of Pennsylvania.

The Basic Vehicle Rescue Curriculum places emphasis upon the development of knowledge and skills to be used by rescue personnel to achieve a safe, efficient, and effective rescue operation.

The Basic Vehicle Rescue Awareness Level Curriculum mixes a combination of classroom lectures, discussions, and demonstrations with field situational demonstrations and practice sessions which provides each and every student with the opportunity to practice the skills taught under the guidance and supervision of qualified Vehicle Rescue Instructors.

## **PURPOSE OF THE COURSE**

The purpose of the Basic Vehicle Rescue Awareness Training Program is:

1. To develop the knowledge and skills necessary to assess a vehicle accident situation.
2. To develop the knowledge and skills necessary to recognize and control existing and potential hazards to vehicle rescue operations.
3. To develop the knowledge and skills necessary to assure the safety of the patient(s), bystanders, and rescuers involved in vehicle rescue operations.

## **TERMINAL OBJECTIVE**

Given a rescue team, not to exceed five (5) members, a simulated vehicle accident with patient(s) entrapped, and all minimum recommended tools and equipment, the student will be able to demonstrate his/her ability to perform the following:

1. Perform a situational assessment of the accident scene to determine what support services, if any, are needed and to determine the effective application of tools, equipment, and personnel.
2. Recognize existing and/or potential hazards and take appropriate steps to control the same.
3. Stabilize vehicle(s) involved in the incident.

Successful performance will require that the student perform the following:

1. Proper sequence of rescue tasks;
2. Creates no hazard(s) to threaten the patient(s) or rescuers;
3. No injury is incurred by the rescuer(s) or the patient(s) as a result of the rescue operation;
4. All equipment, tools, and personnel are accounted for and returned to an operational status following the simulated rescue operation.

## **STUDENT QUALIFICATIONS AND STUDENT SUPPLIED MATERIALS**

1. The student must be sixteen (16) years of age prior to the first day of the class.
2. The student must show that he/she is insured against accidental injury.
3. The student is responsible to provide his/her own personal protective clothes and equipment. The following minimum gear is required:
  - a. Helmet, fire type (or equivalent) with full impact suspension and liner.  
Note: If full hood is worn, then helmet liner is not needed.
  - b. Coat, fire type, with all liners in place. An extrication jumpsuit made of a fire resistant material may be used in place of the coat
  - c. Pants, fire type, with all liners in place. Not needed if student is wearing an extrication jumpsuit
  - d. Boots, fire type, rubber or leather. Boots must have steel toes and steel insole.
  - e. Eye protection, full goggles or wraparound safety glasses are required. Helmet shields alone are not acceptable as eye protection. Safety glasses should be secured with a strap.
  - f. Gloves of leather or Kevlar construction
  - g. Hearing protection, either ear plugs or full coverage ear protectors.
  - h. A flashlight
  - i. Notebook and writing implement for both the classroom and the field portions of the course.

## CLASS SIZE

In order to maximize student participation in class discussion, skill demonstrations, and practice sessions, the class size will be limited to a **minimum of ten (10) students**, or any other minimum number that may be set forth by the sponsoring agency (Regional EMS Council and/or Educational Training Agency), and a **maximum of thirty (30) students**. Any larger numbers of students would reduce the “hands-on” training time of each student.

It is recommended that students be divided into small groups, approximately five (5) per group, during the practice sessions to facilitate the direct supervision and evaluation of each student. It is furthermore recognized that small group activities will simulate real life rescue squad practices and permit for a greater degree of personal assistance from each instructor. At no time shall the **student:instructor ratio exceed 7:1** during any hands on activities and/or field practice portions of the Vehicle Rescue Awareness Class.

## **SCHEDULING**

The presentation of the Basic Vehicle Rescue Awareness Training Program, will require a minimum of sixteen (16) hours. The program is divided into two stages, the classroom portion and the field practice portion.

Field practice sessions may be extended to permit students to avail themselves of additional practice time. However, this permission shall not be misinterpreted as a requirement to exceed the minimum number of hours, beyond sixteen (16). If additional field practice time is scheduled, remember to predetermine this and include it as part of the original class schedule. Added field hours will increase resources required, i.e., more practice vehicles.

A variety of schedules are possible and the course schedule can be tailored to meet the needs of almost any group of people. The following are some sample schedules of hourly breakdowns which may be considered:

1. Four – four (4) hour class sessions..
2. Two – eight (8) hour class sessions.
3. Two – four (4) hour class sessions and one – eight (8) hour sessions.

While the scheduling of class sessions lends itself to a great deal of flexibility, it is strongly recommended that field practice sessions be scheduled for six (6) or eight (8) hour day. Full day practice sessions will reduce the time lost to class starts and stops and minimize the total time required for preparation, cleanup, and maintenance of tools and equipment, not to mention additional transportation time required of shorter class sessions.

In an effort to maximize the quality of the learning experience and provide for maximum safety, course coordinators and instructors are strongly discouraged from scheduling any class day in excess of eight (8) hours total time.

## **FACILITIES**

### **Classroom**

The classroom for the didactic portion of the class should be large enough to accommodate a minimum of thirty (30) students and one (1) instructor. The room should be large enough to provide for tool and equipment layout to permit discussion, visualization, demonstration, and practice, where applicable. The classroom should have the following equipment available to support class presentation:

1. Seating, with writing surface, for thirty (30) students
2. Teacher desk and chair
3. Audiovisual aid equipment table (cart)
4. Projection screen
5. 35mm slide projector
6. VCR, ½" VHS format
7. LCD Projector and Computer
8. Color monitor(s)
9. Chalkboard or dry erase board with chalk, dry erase markers and erasers as appropriate.
10. Window shades for slide/overhead presentations
11. Display table(s) for equipment

Student seating should be arranged so that the students have an unobstructed and comfortable view of the instructor's desk, chalkboard, and the projection screen.

### **Equipment Storage and Work Area**

It is recommended that an equipment storage and work area be provided on a permanent basis. This storage area should be large enough to store all training equipment on shelves or racks, with no equipment to be stored on the floor. The room should be large enough to provide for a cleaning and maintenance area. A workbench for servicing and repairing of equipment

should be present and should include adequate storage area for tools and supplies needed in the servicing and maintenance of all equipment. A double tub cleaning sink with drain boards should be provided along with hot and cold running water. There should be adequate drying racks and lines for equipment and sufficient storage space for all cleaning supplies. The floor should be constructed of concrete or tile to facilitate the cleanup of spilled substances during the cleaning, servicing, and repairing of equipment.

\* It is recognized that tools and equipment may be from a local rescue squad and may be stored on the apparatus. In a case where the tools and equipment owned by a active fire department/rescue squad and carried on a responding apparatus are used for the support of the vehicle rescue training class, such tools, equipment and apparatus must not be in an active response status. Emergency vehicles and tools and equipment must be dedicated to the scheduled training program and not lost to an emergency response.

### **Field Practice Facility**

Adequate space must be provided for the students to apply the theory and skills they have been taught in the classroom. This application phase of training should be in an open environment and under the direct supervision of the course instructors.

The practice facility must be large enough to accommodate a minimum of six (6) to ten (10) vehicles for students to practice the skills of stabilization, and access. The facility must be large enough to provide for a minimum of twelve (12) feet between each practice vehicle. When vehicles are placed in an unstable position for the purpose of stabilization demonstrations and practice and for advanced access, disentanglement and extrication practice, the distance between each vehicle must be increased to a minimum of twenty (20) feet so that any falling vehicles, debris or equipment will not endanger any other practicing students or instructors.

Ideally, the practice area should be as close to the classroom and equipment storage areas as possible to minimize the time lost in relocation from one site to another. However, priority

should be given to site characteristics, rather than relative nearness to other training facilities. Do not let a travel distance of one (1) or two (2) miles deter you from using an ideal site.

Consideration should be given to the surface of the practice grounds. It is strongly recommended that concrete or asphalt surfaces be provided for permanent sites. These surfaces increase the safety factors considerably for they present a constant surface for vehicle and equipment stabilization and do not provide the inherent hazards of dirt, sand or gravel. The latter three (3) surfaces tend to present a significant variable, at time quite excessive, to stabilization and safety of the operation. Temperature, rainfall, snow, ice, and other environmental effects tend to create a wide response from dirt, sand, gravel, and sod surfaces. These environmental changes also affect concrete and asphalt but to a lesser degree and the concrete and asphalt surfaces provide for easier mitigation of unfavorable environmental conditions and make it much easier for debris cleanup after the practice session. In addition, concrete and asphalt surfaces tend to significantly reduce equipment and personnel exposure to dirt, mud, and other foreign matter. This decreased exposure to foreign material will greatly reduce the cleanup time and equipment servicing and maintenance time.

In the event you require a night practice session, which is strongly recommended, you should provide for lighting of the practice area in such a manner as you would a real vehicle accident scene. The use of vehicle generators or portable generators to support portable lighting is part of the curriculum, and as such, requires practice by the student. The use of these devices during a night training exercise adds realism to the student's learning experience.

### **Classroom Equipment and Materials**

The following should be provided for proper presentation of the classroom portion of the training class:

1. Seating, with writing surface, for thirty (30) students
2. Teacher desk and chair, with lectern or podium
3. Audiovisual aid equipment table (cart)

4. Projection screen
5. 35mm slide projector
6. Overhead transparency projector
7. VCR, ½” VHS format
8. LCD Projector and Computer
9. Color monitor(s)
10. Chalkboard or dry erase board
11. Window shades for slide/overhead presentations
12. Display table(s) for equipment
13. Rescue Training Policies and Procedures Manual, 1 each
14. Instructor Lesson Plans and Guide, 1 each
15. Student Guides, 1 per each student

**Cleaning and Maintenance Supplies, Materials and Equipment**

1. Scrub bucket, 2 each
2. Detergent
3. Soap, liquid
4. Soap, hand
5. Hand cleaner, degreaser
6. Sponges
7. Cleaning and drying towels
8. Wire brush, 2 each
9. Scrub brush, 2 each
10. Steel Wool
11. Cleaning solvent, for metal surfaces
12. Oil, Air Tool
13. Oil, light to medium lubricating

14. Hand tools

**Vehicles**

The field practice portion of the training program will require damaged vehicles for student practice of theory and skills taught in the class. It is recommended that a minimum of six (6) to ten (10) vehicles be provided for each practice session. Prior removal of hazardous materials and waste prior to the training session limits environmental impact. One (1) of these vehicles should be set aside for use by the instructors in presenting demonstrations to the class prior to the student application of the skill. The remaining vehicles will be used by the students to practice stabilization techniques, access, disentanglement, and extrication.

If demonstrations and practice sessions are carefully supervised by the instructors, then the total of six (6) to ten (10) vehicles should be adequate for all practice sessions.

Stabilization demonstrations and practice will inflict little or no damage of significance to any of the vehicles and will permit all vehicles to be used in other sessions. With the student practicing in proper sequence of the rescue operation, access will not hinder later disentanglement sessions, and likewise, disentanglement should not damage the vehicles in such a manner that they may not be used for other practices.

Students should be assigned to a working “rescue squad” group of four (4) or five (5) students per crew. Each working crew of students must be assigned an instructor who is responsible for supervision, instruction, and the safety of each student in the group.

**TABLE A-1**

The following is the recommended amount of tools needed for a class of thirty (30) students

**HAND TOOLS**

Hammer, sledge, 8 lb long handle	3 each
Jack, "hi lift"	4 each
Strap, Ratcheting 20'	5 each

**TABLE A-2**

The following is the recommended amount of tools needed for a class of thirty (30) students

**POWERED TOOLS AND EQUIPMENT**

Generator, portable, 5kw minimum, gasoline/diesel	1 each
---	--------

**TABLE A-3**

The following is the recommended amount of tools needed for a class of thirty (30) students

**MISCELLANEOUS TOOLS AND SUPPORT EQUIPMENT**

Shovel, flat	4 each
Shovel, round	4 each
Broom, stiff bristle, push type	4 each
Broom, standard	4 each
Salvage cover, 8" x 12" minimum	8 each
Chain, rigging, minimum 3 ton rating, w/ hooks	
3 foot	4 each
6 foot	6 each
8 foot	4 each
20 foot	4 each
Cribbing, hard wood, 2" x 4" x 18"	60 each
Cribbing, hard wood, 4" x 4" x 18"	60 each
Cribbing, hard wood, 4" x 4" x 24"	60 each
Cribbing, hard wood, 4" x 4" x 72"	6 each
Cribbing, step chock, base 2" x 6" x 30"	4 each
Wedges, assorted	60 each
Plates, jacking, 10" x 10" minimum	12 each
Lantern, 6 volt, hand held	10 each
Flare, 30 minute, railroad type	1 case
Fire extinguisher, 20 lb., ABC	6 each
Blanket, wool or synthetic	8 each
Pneumatic shores	4 each
Power cable, 100 feet with reel	4 each
Portable electric lamps, 500 watt, minimum	6 each
Smoke ejector, (ventilation fan)	1 each
Webbing, tubular construction, nylon, 2" x 20'	12 each
Medical kit for real emergencies during training	1 each

**LESSON 1**

**AN INTRODUCTION AND OVERVIEW**

**OF THE**

**BASIC VEHICLE RESCUE TECHNICIAN COURSE**

## **Introduction**

### **A. Welcome & Personal Introductions**

1. Welcome the students
2. Introduce yourself as the lead instructor
3. Introduce assistant instructors
4. Have each student stand and introduce self
  - a. Name?
  - b. Emergency Service?

### **B. Registration**

1. Each student completes DOH Registration Form
2. Each student completes a nametag

### **C. Review Purpose of the Basic Vehicle Rescue Course**

1. To develop the knowledge and skills necessary to assess a vehicle accident situation
2. To develop the knowledge and skills necessary to recognize and control existing and potential hazards to vehicle rescue operations
3. To develop the knowledge and skills necessary to gain access to persons trapped in the wreckage of vehicles involved in highway accidents
4. To develop the knowledge of the requirements of 'patient oriented rescue' which addresses the need for medically trained and capable personnel to provide for patient assessment, medical treatment, packaging, and extrication concurrent with rescue operations
5. To develop the knowledge and skills required to accomplish patient disentanglement to facilitate patient care, packaging, and extrication

6. To develop the knowledge and skills required to accomplish patient removal (extrication) from the entrapment

7. To develop the knowledge and skills required to safely and properly employ the tools, equipment, and techniques associated with contemporary vehicle rescue operations
8. To develop the knowledge and skills necessary to assure the safety of the patient(s), bystanders, and rescuers who may be involved in vehicle rescue operations

D. Review Administrative Points

1 Attendance

a. a student may miss 3 hours of class, but is responsible for the material covered

b. Lead instructor will call roll prior to and after each class session

2. Breaks

a. Periodic class breaks will be given

b. Generally 10 minutes each hour

3. Tobacco product usage

a. Use of tobacco products will not be permitted in classroom or on the training ground (SMOKING or CHEWING)

b. Smoking and chewing will only be permitted during breaks and in designated areas. This includes field sites as well as the classroom.

4. Student supplied equipment and supplies

a. Classroom

1) Notebook

2) Pan and/or pencil

b. Field

1) Helmet with liner or hood

- 2) Coat (fire type) with all liners in place, or extrication jumpsuit made of a flame resistant material
- 3) Pants (fire type) with all liners in place, not needed if the student is wearing an extrication jumpsuit
- 4) Boots with steel toe and midsole
- 5) Eye protection (safety glasses or full goggles)
- 6) Gloves of leather or Kevlar construction
- 7) Flashlight
- 8) Ear protection (full coverage or plugs)
- 9) Strap for glasses, if worn

c. Miscellaneous

- 1) Inspection of gear – the lead instructor will inspect each student's protective gear to assure all is present and in satisfactory condition. The student will not be able to participate with unsatisfactory gear
- 2) If students will be required to drive themselves to the field site, the lead instructor should provide a map and explanation of the directions

E. Training Approach

1. Objective based
  - a. Each unit's objectives are presented at the beginning of the unit
  - b. The student will know what is expected of him/her at each stage of the program
2. Lecture-Discussion-Demonstration
  - a. The didactic portion of the training program will be presented in lecture or discussion methodology

- b. Students should be encouraged to ask questions and make comments throughout the program
  - c. Homework and reading assignments may be required. Note taking is a must
  - d. Skills will be demonstrated either in the classroom or in the field
3. Application of theory and skills
- a. Opportunities will be provided both in the classroom and at the field site for the practicing of the skills of vehicle rescue operations

4. Evaluation
  - a. There will be a written examination presented to evaluate knowledge gained through course participation
  - b. Students must successfully complete a skill evaluation conducted as a process evaluation by course instructors
  - c. Students must pass both the practical and written evaluations to be eligible for certification by the Pennsylvania Department of Health as a Basic Vehicle Rescue Technician
  
5. Course overview
  - a. Why train for vehicle rescue operations?
    - 1) Golden hour
  - b. Lesson 2 - Hazards
    - 1) Students will learn to assess (size-up) a vehicle rescue scenario and be able to:
      - a) Recognize existing and potential hazards
      - b) Control hazards
    - 2) Students will learn to function within an Incident Command System of vehicle rescue operations
    - 3) Students will learn and practice the concepts of staging and rapid deployment of tools, equipment, and personnel on the rescue grounds
  - c. Lesson 3 – Vehicle Anatomy
    - 1) The student will be able to identify the three body types
    - 2) The student will have an understanding of supplemental restraint systems and their locations
  - d. Lesson 4 - Tools and Equipment

- 1) Students will become familiar with the tools and equipment associated with vehicle rescue and will learn:
  - a) To identify and name tools and equipment
  - b) To assemble and operate tools and equipment
  - c) To clean, maintain, and store tools and equipment
  - d) To employ the tools and equipment of vehicle rescue operations efficiently, effectively, and safely to accomplish the following functions:
    - 1)) SEVERING
    - 2)) DISTORTING
    - 3)) DISPLACING
    - 4)) DISASSEMBLING
    - 5)) HAZARD CONTROL AND SAFETY

e. Lesson 5 – Stabilization

- 1) The student will be able to stabilize a vehicle in all positions

f. Lesson 6 - Access

- 1) Students will learn how to gain access to the patient(s) trapped within a vehicle

g. Lesson 7 - Disentanglement

- 1) Students will learn how to remove the wreckage from the patient(s) so as to permit for patient assessment, medical care, packaging, and extrication

h. Lesson 8 - Removal (Extrication)

- 1) Students will learn how to assist EMS with the removal of injured patients from the wreckage of a vehicle
- 2) Students will learn of the importance of coordinating all rescue operations to the needs of the patient(s)

- 3) Instructors will teach and demonstrate the theory and practice of concurrent patient care and rescue operations
- i. Lesson 9 - Post Rescue
    - 1) Students will learn how to perform a primary site cleanup to assure no further hazards to persons or property that exists
    - 2) Students will learn to clean, service, perform minor repairs, and inventory all tools and equipment
      - 3) Students will learn to return all tools and equipment to an operational status and how to perform an operational check of each
6. Explanation of course organization
    - a. Explain that while each vehicle rescue operation will be different from all others, there is a well established rescue operations priority which will seldom, IF EVER, vary
    - b. **PRIORITY OF RESCUE OPERATIONS**
      - 1) Preparation
      - 2) Dispatch and Response
      - 3) Situational Assessment and Incident Command
      - 4) Access
      - 5) Patient Assessment & Medical Care
      - 6) Disentanglement
      - 7) Patient Treatment & Packaging
      - 8) Patient Extrication and Transport
      - 9) Post Rescue



# **LESSON 2**

## **HAZARDS**

## LESSON 2

### HAZARDS

#### TERMINAL OBJECTIVE

Given a simulated vehicle rescue situation with all necessary tools, equipment, and manpower, the student will be able to establish incident command; assess the accident scene for real and potential hazards; assess the accident scene to establish the location and number of patients and the mechanism of entrapment; communicate rescue activities using common terminology; and determine what, if any, additional supporting units and/or personnel may be required to accomplish a safe, efficient, and effective rescue operation.

## LESSON 2

### HAZARDS

#### KNOWLEDGE OBJECTIVES

1. The student will be able to define incident command.
2. The student will be able to describe when, and by whom, command should be established.
3. The student will be able to discuss the importance of a command post and unified command
4. The student will be able to list a minimum of three (3) ways we can identify the incident commander.
5. The student will be able to list at least five (5) general functions of the incident commander.
6. The student will be able to explain the difference between strategy and tactics as they apply to vehicle rescue.
7. The student will be able to list potential hazards to vehicle rescue operations and he/she will be able to list what effects these hazards may have on the rescuers, bystanders, and patients.
8. The student will be able to list the minimum recommended personal protective clothing and equipment that is to be available for all vehicle rescue operations.
9. The student will be able to list the components of the primary assessment of the rescue scene.
10. The student will be able to list the components of the secondary assessment of the rescue scene.
11. The student will be able to list and describe the criteria that will determine if existing rescue resources can safely and expeditiously conduct the rescue operation.

12. The student will be able to identify, name, and describe at least eight (8) additional support services that may be needed to safely and effectively carry out the rescue operation.
13. The student will be able to list five (5) major sources of patient information available to the rescuer at the accident scene.
14. The student will be able to identify, name and describe a minimum of six (6) common hazards associated with vehicle accident scenes.
15. Given a DOT Guide Book the student will be able to identify a hazard and initiate the awareness level operations.

## LESSON 2

### HAZARDS

#### SKILL OBJECTIVES

1. Given the minimum recommended personal protective gear and equipment, the student will be able to demonstrate the proper wearing of the equipment. The minimum equipment will include the following:
  - a. Protective helmet with full suspension and liner
  - b. Eye protection
  - c. Coat or extrication jumpsuit
  - d. Pants
  - e. Boots
  - f. Inner gloves
  - g. Outer gloves
  - h. Hearing protection
2. Given the necessary hazard control equipment, the student will be able to demonstrate his/her ability to establish a work zone and a safety zone under the following conditions:
  - a. No complications
  - b. Downed electrical wires
  - c. Vehicle fire
3. Given a portable fire extinguisher, the student will be able to demonstrate his/her ability to activate the tools and extinguish a simulated vehicle fire.
4. Given a simulated accident scene, the student will be able to establish a 50' safety circle and a 20' working circle
5. Given a portable electric generator, power cable, and portable lights, the student will be able to demonstrate his/her ability to place and activate a lighting system.

6. Given a simulated accident victim, the student will be able to demonstrate his/her ability to properly protect the patient during rescue operations using the following:
- a. Blanket
  - b. Salvage cover
  - c. Short Spine Board
  - d. Helmet
  - e. Goggles

- A. Command and Control (Incident Command)
  - 1. Incident command must be established by first arrive units
    - a. Command and control of all activities is imperative
    - b. Command and control must begin immediately upon arrival
      - 1) It is impossible to operate a rescue operation by “committee consensus”
      - 2) It is next to impossible to reestablish control once it has been lost
    - c. Command should be established in a formal manner
      - 1) Clearly communicate who is in command
      - 2) Use radio to do so
    - d. DISCUSSION POINT
      - 1) Who is better suited to take command, medical personnel or rescue personnel?
  - 2. The incident commander must be readily identifiable and available to on scene personnel
    - a. Identification
      - 1) Need to establish command post
        - a) Good observation
        - b) Close but not too close
      - 2) Need to identify command post
        - a) Verbally – radio
        - b) Visually – “Green” rotating light
  - 3. Who is in charge? Who really is the IC?
    - a. This can be determined by law

- b. This may be determined by past practice
  - c. This may be determined by mutual aid agreements
  - d. Unified command with Police, Fire, EMS and other agencies
  - e. Regardless, it **MUST** be done before the call – **PREPLAN!**
4. IC Functions – Generalities
- a. Assess the situation
  - b. Identify problems
  - c. Identify rescue tasks
  - d. Assign personnel and equipment to solve problems and perform rescue tasks
  - e. Delegate authority as necessary
    - 1) An effective span of control is generally given to be about five (5) individuals
    - 2) The more critical the task or the more threatening (dangerous) the task, the shorter the span of control should be
  - f. Provide supervision
    - 1) The rescue incident commander must function as the director of the “BIG PICTURE”
    - 2) An incident commander who involves himself/herself with performing basic rescue tasks of operating tools and equipment has effectively removed themselves from the command structure
    - 3) **YOU CAN EITHER COMMAND THE RESCUE OR DO THE RESCUE BUT YOU CANNOT EFFECTIVELY DO BOTH!!!**

5. Incident Commander – Specific Functions
  - a. Initial size up
    - 1) Incident commander identified
    - 2) Command post established and identified
    - 3) Unified command
  - b. Develop the plan
    - 1) Strategy
      - a) Strategy is the basic goal or plan of action
      - b) Strategy is generally considered to be a command function
    - 2) Tactics
      - a) Tactics are what needs to be done and what methods we will use to accomplish the tasks
      - b) Tactics are generally considered to be a junior officer's or line officer's function
  - c. Establish and maintain communications
    - 1) Brief initial report
    - 2) Provide additional information as available
    - 3) Communicate problems and possible solutions
    - 4) Communicate the need for additional or support services
    - 5) Provide progress reports

B. Personal Protection and Safety

1. Potential hazards and the actual risks involved in rescue operations are usually greatly underestimated
2. WHY?
  - a. Casual attitude of the rescue personnel

- b. Common misconception that rescue operations are not as hazardous as fire fighting operations or just another Ambulance call.
  - c. Ignorance of the real and potential dangers inherent to rescue operations
3. What might be the results of the underestimation of the dangers of rescue operations?
- a. Rescuers do not wear the proper personal protective gear
  - b. Rescuers approach the rescue with inadequate mental preparation (POOR ATTITUDE TOWARDS SAFETY)
  - c. Rescuers will apply improper tactics and techniques during the rescue operation
  - d. Rescuers will improperly use the tools and equipment
  - e. Personal injury to the rescuer may (WILL?) occur, thereby creating additional burdens on other rescuers
  - f. The patients(s) may (WILL?) be threatened by the very people who have come to help
    - 1) Additional injury may result
4. Potential hazards to the rescue operation and rescue personnel
- a. Environment
    - 1) Rain
    - 2) Snow
    - 3) Heat
    - 4) Cold
    - 5) Ice
    - 6) Darkness

- b. Traffic
  - c. Bystanders
  - d. Other emergency service personnel
  - e. Fire
  - f. Smoke and toxic gases
  - g. Sharp metal edges and broken glass
  - h. Dangerous chemicals
  - i. Unstable vehicles
  - j. Downed electrical wires
  - k. Broken gas pipes and meters
  - l. Exposure to bloodborne pathogens and other potentially infectious materials
5. How do we maximize personal safety?
- a. First, we must have a positive attitude
    - 1) Be aware of and have a respect of the potential dangers inherent in rescue operations
    - 2) Work within your personal limitations and the limitations of your rescue squad
      - a) Personal physical capabilities
      - b) Personal knowledge and skills of rescue operations
      - c) Manpower availability
      - d) Tool and equipment availability
  - b. Use the proper tool for the job and use it in the proper manner.  
This requires the following of the rescuer:

- 1) Knowledge of the functions of tools and equipment carried on the squad
  - 2) Knowledge of the proper application of tools and equipment
  - 3) Knowledge of the limitations of each tool and piece of equipment
  - 4) Knowledge of the potential risks involved with tool and equipment operation
  - 5) Knowledge of one's own personal limitations as to tool operation
    - a) Never used the tool before?
    - b) Unfamiliar with the tool?
  - 6) Possess the necessary mechanical aptitude and physical strength to apply the tools and equipment of rescue operations
6. Proper use of personal protective equipment
- a. Head protection
    - 1) Fire fighter's helmet or other approved impact helmet
    - 2) Must have full impact suspension
    - 3) Should have liner for thermal protection
    - 4) **YOU MUST WEAR IT FOR IT TO PROTECT YOU**
      - a) Why do we always remove the helmet just when we need it the MOST?
        - 1)) **INSIDE THE WRECKAGE**
        - b) (Count the helmets on the roof sometime)
  - b. Eye protection

- 1) Safety goggles or approved safety glasses, are necessary with all operations
  - 2) A face shield on a helmet by itself is inadequate protection and should never be relied upon
  - 3) The combination of a face shield over goggles is an excellent protection system
  - 4) Protect ourselves from exposure to body fluids of patients with which we may come in contact
    - a) It may be appropriate to wear goggles or rap-around safety glasses to protect ourselves from bloodborne pathogens and other potentially infectious materials.
- c. Turnout coat or extrication jump suit
- 1) Nornex or PBI will provide excellent protection
  - 2) You should leave all liners in place for the added protection they will provide
  - 3) CAUTION – the lightweight synthetic material “recognition” coats that some medical services are using do not provide adequate protection of the wearer
- d. Turnout pants
- 1) The wearing of a full protective ensemble (pants and coat) provides the optimum level of protection
- e. Boots
- 1) Boots should have steel midsole, steel toe, and cleated soles for maximum protection and mobility

2) Fire type rubber boots or leather boots will both be adequate

f. Gloves – outer protective work gloves

1) Outer gloves should be of leather or Kevlar construction

a) Cotton, wool or rubber material is unacceptable for outer gloves

2) Construction of the glove must meet a “happy medium”

a) Gloves must be thick enough for penetration and abrasion protection but thin enough to permit for a relatively high degree of dexterity required of rescue operations

g. Gloves – inner protective

1) Inner gloves should be worn to protect the rescuer from coming into contact with patient body fluids

2) These gloves should be of latex rubber material or non-latex material for personnel with a latex sensitivity.

These gloves should be worn under your work gloves

h. Flashlight

1) Every rescuer should carry a small flashlight

2) This allows for immediate lighting (even though very limited) to permit the operation to begin until better truck borne lighting can be put into service

C. Arrival at the Scene

1. Establish command

2. Position the rescue vehicle at the scene

- a. Ideally, the vehicle should be parked off the roadway to avoid involvement in any additional accidents
- b. Sometimes you may have to park on the roadway
  - 1) No other place to park the vehicle
  - 2) You may choose to use the vehicle's lights as a warning device to oncoming traffic
  - 3) Yellow rotating or flashing lights are better. Turn off headlights. Do not blind oncoming traffic
  - 4) You may wish to use the vehicle for traffic control
  - 5) Where do you park on the roadway?
    - a) Beyond the accident scene to protect from collision with vehicles in the same lane of traffic
    - b) Between oncoming traffic and the accident scene to offer some added degree of protection to the patients and rescuers
    - c) In the moving lane of traffic to bring it to a stop for control purposes
  - 6) Where you park usually depends upon what purpose the vehicle is to serve or is a result of established company procedures
- c. Considerations
  - 1) Work zone
    - a) Many hazards will prohibit parking the rescue vehicle close to the wreckage

- b) Generally speaking, we will establish an accident zone which consists of a circle around the scene with a radius of a minimum of 50 feet
  - 1)) A fifty (50) foot circle will become the safety area and a 20 foot circle will be the work area
- c) The rescue vehicle should be kept outside of this area
- d) Unneeded personnel, tools, and equipment should be kept out of this area as well
  - 1)) Establish a tool and equipment staging area just outside the work area
  - 2)) An easy way to mark the staging area is to put a specially colored (red, blue, green) salvage cover on the ground
  - 3)) Advance your tools and equipment to this spot and place them on the cover
  - 4)) Unassigned personnel should stand beyond the staging tarp so that the officer may observe tools and equipment on the cover and unassigned (available) personnel behind the staging tarp
  - 5)) When a tool is needed, advance it into the work area, use it and then return it to the tools and equipment staging area so

it does not interfere with activities in the work area

- 6)) Likewise, when people are needed, they may be assigned from the staging area to perform a task. Upon completion of the task, rescue personnel should report back to the staging area for further assignment.

2) Downed electrical wires

- a) A safety zone should be established that extends from the downed wires to the second standing pole on either side of the downed wires
- b) You should not park your vehicle within this safety zone

3) Vehicle fire

- a) Establish a safety zone a minimum of 100 feet

4) Hazardous materials cargo

- a) Uphill – Upwind
- b) Safety zone should be a minimum of 100 to 200 feet

- 1)) This distance may need to be greatly increased depending upon the size of the spill and the substance involved

- 2)) If fire exists in the presence of a hazardous materials release, increase the safety zone accordingly

- c) Take appropriate action based upon your department's level of hazardous materials training

D. Situational Assessment (Size Up)

1. Assessment or size up must begin with the dispatch of the rescue squad and continue throughout the rescue operation
2. While it is important that the size up be made relatively quickly, it is of much greater importance that it be made ACCURATELY AND COMPLETELY
  - a. All too often there is no real situational assessment performed and rescue personnel simply "jump" right into the situation
  - b. Another problem is that when an assessment is performed it is usually done in too much of a hurry
    - 1) All too many rescue people believe that speed is the most important aspect of the size up
3. It is far better to take a minute or two and properly assess the situation and base your rescue operation upon the ACCURACY AND COMPLETENESS of your assessment, not the speed
  - a. A little extra time spent on assessment may very well save hours during the rescue operation, not to mention the increased safety afforded to the rescuers and the patients
4. Primary assessment of the rescue scene
  - a. Multiple questions must be answered
    - 1) Are there persons injured?
    - 2) Are there persons trapped?
    - 3) What is the mechanism of entrapment?

- 4) Are people endangered?
    - a) Patients
    - b) Bystanders
    - c) Medical Personnel
    - d) Law Enforcement Officers
  - 5) Is property or the environment endangered?
- b. If the answer to one or more of these questions is YES, then the services of the rescue squad are needed
- 1) The incident commander must now develop a plan of action and implement the strategy and tactics required to bring the operation to a successful conclusion
5. Secondary Assessment of the Rescue Scene
- a. Are the resources that are on site capable of mitigating the situation?
    - 1) Do we have sufficient personnel?
    - 2) Are they properly trained to deal with this particular problem?
    - 3) Do we have the proper tools and equipment for the job?
    - 4) Do we have sufficient quantities of the required tools and equipment?
  - b. The following information will permit you to answer the first series of questions:
    - 1) What is the number and kinds of vehicles involved?
    - 2) What is the number and locations of injured persons needing care?
    - 3) What are the existing or potential hazards?

- 4) What is the degree of the entrapment?
- c. If the rescue squad is not capable of handling the situation, then additional help must be obtained to properly and safely conduct the rescue operation
- 1) Additional resources that may be needed are:
    - a) Additional emergency medical personnel
    - b) Additional rescue personnel
    - c) Additional ambulances
    - d) Heavier rescue units
      - 1)) More personnel
      - 2)) Special training
      - 3)) More equipment, both in type and quantity
    - e) Fire apparatus
      - 1)) Engine
      - 2)) Additional lighting
      - 3)) Specialty vehicles, i.e., ladder, tanker
    - f) Wreckers
    - g) Utility companies
    - h) Helicopters for air evacuation
    - i) Construction equipment
      - 1)) Front end loaders
      - 2)) Backhoes
      - 3)) Cranes
    - j) Medical team from trauma center
    - k) Divers for underwater work

- l) Animal control personnel
  - m) Hazardous materials team
- 2) You must be aware of what resources might be needed and preplan where and how you can obtain these resources

E. Locating the Patients

1. You must be able to locate the patients before you can “rescue” them
2. Rescue implies that PEOPLE are involved and you must determine
  - a. How many are there?
  - b. Where are they located?
  - c. What is the mechanism and degree of entrapment?
3. Sources of this type of information include:
  - a. Occupants of the vehicles involved in the accident
  - b. Witnesses
  - c. Neighbors
  - d. The vehicles themselves
    - 1) Type of vehicle
    - 2) Contents of vehicle
4. You must search the vehicle completely for patients!!!
  - a. Passenger compartment
  - b. Cargo area (includes trunk)
  - c. Trailer or living quarters
  - d. Under the vehicle
5. When in doubt as to the full accounting of patients, you should search the surrounding area as well

- a. This is especially important if the vehicle or vehicles traveled a great distance while out of control or if they traveled well off the roadway
- b. Where to search?
  - 1) Along the path of travel
    - a) At least 25 feet on either side
  - 2) In ditches
  - 3) In ravines
  - 4) In tall grass and other vegetation
  - 5) Waterways
  - 6) Local buildings and vehicles

F. Hazard Recognition and Control

- 1. THE RECOGNITION AND CONTROL OF EXISTING AND POTENTIAL HAZARDS MUST BE COMPLETED BEFORE ANY FURTHER RESCUE OPERATIONS MAY PROGRESS
- 2. Types of hazards which might commonly be encountered:
  - a. Traffic
  - b. Downed electrical wires
  - c. Fire
  - d. Hazardous materials
  - e. Unstable vehicles
  - f. Bystanders
  - g. Debris and wreckage
- 3. The traffic hazard
  - a. This is usually the first hazard assessed
  - b. Most accidents will cause some sort of traffic hazard

- 1) Physical interrupting of traffic flow
- 2) The “rubber necker”
- c. Primary responsibility for controlling the traffic hazard rests with the police
- d. However, rescue personnel may have to assume this function in the absence of the police or if insufficient numbers of police officers are on scene
- e. You must warn oncoming traffic that danger exists ahead
- f. Warning devices:
  - 1) emergency vehicle’s warning lights
  - 2) Traffic cones or flags
  - 3) Barricades
  - 4) Flares
  - 5) Flashlights or lanterns
  - 6) Personal protective clothing
    - a) Bright colors
    - b) Reflective surfaces
  - 7) Traffic control personnel
- g. Methods of traffic control
  - 1) Lane control – channel moving traffic around the accident into an unaffected lane of traffic
  - 2) Detour – use alternate roads to divert traffic and the flow of traffic completely away from the accident scene
  - 3) Stop traffic flow – using vehicles, personnel, barricades or other devices to completely stop the flow of traffic

a) NOTE: While definitely eliminating the traffic hazard at the scene of the accident, this measure may not always be desirable

1)) With traffic stopped for a great distance, you may create potential dangers to oncoming motorists in that they will not have advanced warning of danger ahead

2)) With traffic stopped, the operators of the vehicles and their passengers may become spectators of the operation and hinder overall efficiency

3)) Impatient drivers may try to turn their vehicles around in the middle of the highway to return from where they came

a)) This, combined with the stopped traffic, may inhibit the response of additional units

h. REMEMBER: The responsibility of traffic control rests with the law enforcement officers. Ever effort must be made to free rescue personnel or at least minimize their participation in traffic control functions, so that they may perform their primary functions.

4. Downed electrical wires

a. You must first establish a hazard zone

- 1) This zone should extend from the area of the downed wires to the second fully standing, intact utility pole on either side of the accident scene
- 2) Other factors may cause this minimum distance to increase:
  - a) Pools of water
  - b) Wet ground
  - c) Wires known to be touching or suspected of touching conductors such as guard rails, fences, etc.
- b. With the hazard zone established, you must deny entry into the area until the hazard is controlled
  - 1) Rope barriers
  - 2) Rescue personnel guarding
- c. You **MUST** notify the utility company as quickly as possible
  - 1) Let the utility company handle the live wires
- d. Warn the occupants of the vehicle that electrical wires are down and that they should remain in their vehicles until the hazard is controlled
- e. The removal of downed electrical wires is a specialized skill requiring proper training, equipment, and practice
- f. If the patient condition is known to be only slightly or moderately injured, then rescue personnel should wait for the utility company to control the hazard

- g. If the patient condition is such that you cannot wait for the utility company, then you must deal with the problem according to your Department's Standard Policies and Procedures
  - 1) To become actively involved will require that you have the proper equipment and training to do so

5. Fire

a. Types

- 1) Engine compartment
- 2) Dashboard
- 3) Seat

b. Engine compartment

- 1) Usually gasoline or electrical
- 2) Use appropriate extinguisher
- 3) If the hood of the vehicle is opened as a result of the accident, then direct the application of the extinguishing agent into the compartment
  - a) Use short burst, don't overdo it. You may need more agent to control a rekindle caused by hot spots or sparks.
  - b) After the fire is under control, have someone stand by with another extinguisher until fire personnel can take over the task
- 4) If the hood of the vehicle is still closed, do not attempt to open it immediately
  - a) Direct the nozzle of the extinguisher into any opening that may exist in the hood area

- 1)) Wheel wells
      - 2)) Grill
      - 3)) Crash damaged opening
    - b) You should try to wait until fire personnel are on scene before opening the hood
  - c. Dash fires
    - 1) Usually electrical
    - 2) Disconnect the negative battery cable
    - 3) If it continues to burn, use appropriate extinguishing agent
  - d. Fire in the seats
    - 1) Very irritating smoke and gases
    - 2) Very close to patients
    - 3) You will probably need water to extinguish this fire
6. Hazardous Materials
- a. Hazardous materials training is required for all first responders under both Federal and State laws
  - b. Appropriate material is covered in the Hazardous Materials Recognition and Awareness four (4) hour training course
  - c. If students have not completed the program, this is where the four (4) hour Hazardous Materials Recognition and Awareness training course should be taught
7. Debris hazard
- 1) Many times the cargo of the vehicle(s) involved is spilled during the accident
    - a) Coal, dirt, grain, sand, etc.

- b) Debris may interfere with the rescue operation
- 2) In extremely high impact accidents, the pieces of the vehicles themselves may create additional hazards
  - a) Sharp metal edges
  - b) Broken glass
- 3) Trees may be down around the wreckage
- 4) The accident may have involved a vehicle striking a structure with resultant building collapse or partial collapse leaving much debris
- 5) Support equipment needed to deal with debris hazards include:
  - a) Shovels, round and square
  - b) Brooms
  - c) Poles
  - d) Axes
  - e) Saws

## 8. Summary

- 1) The existing and potential hazards must be recognized and controlled before rescue operations proceed
- 2) This assessment and control must be made very rapidly and accurately to insure the proper safety of the patients and rescuers
- 3) **REMEMBER:** You have not yet seen any patient and you are unaware of their medical condition

## G. Support Operations

### 1. Fire Protection

- a. The batter and electrical system
  - 1) Prior to taking action you must consider the following:
    - a) What is the potential fire hazard:
    - b) Will you have need of the vehicle's electrical system?
      - 1)) Power windows
      - 2)) Power locks
      - 3)) Power seats
  - 2) When you disable the battery do you cut the cable or remove the clamp from a post?
    - a) It is probably quicker to cut
    - b) BUT you should remove the terminals
      - 1)) Safer
      - 2)) Can reconnect if needed
      - 3)) Some modern vehicle have batteries that automatically disconnect through a small explosive charge.
  - 3) Which cable do you remove?
    - a) You should disconnect the negative terminal first
    - b) Both terminals need to be removed
- b. Spilled fuel
  - 1) If there is a small hole in the fuel tank, then you may be able to control it by using one of the following:
    - a) Clay

- b) Sealing compound, putty
  - c) Rubber or wooden plug
  - d) Emulsifying agents
- 2) If too large, then:
- a) Assign fire extinguisher personnel
    - 1)) Full personal protective gear
  - b) You must have charged hose lines placed into operations as quickly as possible
    - 1)) Serve to provide protection of the occupants and the rescuers
    - 2)) May use to cool exhaust system, which includes the catalytic converter
  - c) Hose lines placed into operation should NOT be a booster line or high pressure fog line
    - 1)) All protection lines should be a minimum of 1 ¾" lines, fully charged, ready for use
- 3) Do you need special fire suppression or protection support?
- a) In extremely hazardous situations, you may need special support from units capable of applying foam
  - b) A foam blanket may protect the occupants and the rescuers during the operation
  - c) There are some drawbacks to foam application:

- 1)) May take time to secure proper company
- 2)) Requires special equipment for application
- 3)) May require reapplication for extended operations
- 4)) May hinder operations if tools and equipment are dropped to the ground
  - a)) Foam will hide them

2. Lighting needs

- a. You must consider the lighting needs of the operation and what lighting equipment you have available
- b. Lighting equipment
  - 1) Personal flashlights
  - 2) Portable hand lanterns
  - 3) Vehicle head lights
  - 4) Vehicle spot lights
  - 5) Special vehicle mounted lights
    - a) Large output 500 watts +
    - b) Incandescent or quartz
  - 6) Electrical cords
  - 7) Electric generator
- c. Lighting of the rescue scene tends to be one of the little thought about functions at the scene of rescue operations
- d. We tend to be content to work IN THE DARK or in deep shadows created by inadequate or improperly placed lighting

- 1) This can and usually will create additional problems
- 2) Not only does it cause added problems but it may very well create additional hazards
  - a) You must be able to see what you are doing in order to efficiently, effectively, and safely conduct the rescue operations

e. Characteristics of proper lighting

- 1) Lights should adequately illuminate the work area
- 2) Lights should not shine directly into the rescuers' eyes
- 3) Lights should not shine into the eyes of drivers of oncoming vehicles
- 4) Lights should be placed in such a manner as to eliminate deep shadows
  - a) Shadows are usually a result of two things:
    - 1)) Inadequate numbers of lights
    - 2)) Inadequate placement of lights

f. Considerations to be made prior to placing lighting into operations:

- 1) How many lights will be needed?
- 2) The hazards on scene need to be considered before placing hot electric lights on the ground
- 3) How much power will these lights require?
- 4) What is the output of your electric generator?
- 5) What, if any, other electrical equipment must be powered?

3. Patient protection

- a. You must initiate patient protection measure as quickly as you can
  - 1) Before and after patient access
- b. You have already taken positive steps in this direction as a result of your assessment, hazard recognition, and hazard control operations
  - 1) Traffic control
  - 2) Fire protection
  - 3) Eliminating spilled fuel
  - 4) Charged hose lines
  - 5) Stabilizing the vehicle
  - 6) Calling other support services
- c. Additional protection is now needed
  - 1) From flying objects
  - 2) From toxic fumes
  - 3) From the environment
  - 4) From bystanders
  - 5) From the rescuers and the rescue operation itself!
- d. Methods and items of patient protection
  - 1) Cover the patient with a blanket
    - a) Wool blanket
    - b) Aluminized blanket
    - c) Explain to the patient why you are covering them up with a blanket
  - 2) Make use of a heavy salvage cover as a patient drape

- 3) It is really not a good idea to use a bunker coat to protect a patient, unless absolutely necessary
  - a) The use of a bunker coat means that one of the rescuers is without personal protection
  - b) If the coat is an extra, use it
  - c) Do not deprive your rescue personnel of protection
- 4) Provide your patient with helmet, eye protection and gloves, the same as you would any of your rescuer
- 5) Protect the patient with hard protection such as a short spine board when using tools close to the patient
- 6) You may need to build a temporary shelter from the weather when conditions are severe or rescue operations may be prolonged
  - a) Use salvage covers for top and side cover
- 7) You may need to provide for warming or cooling of the patient(s) during the operation
  - a) Blankets
  - b) Ventilation with fans
  - c) Portable heaters or make use of portable lights to generate heat
- 8) You may need to protect the patient(s) by removing or otherwise controlling bystanders
  - a) Establish a crowd control line
    - 1)) Ropes or marking tape

- b) Shield the patients from the observation of the bystanders
  - 1)) Salvage covers may be used to build a screen
- e. Protection of the scene
  - 1) You should provide protection from theft of materials from the scene
    - a) You want to protect any evidence that might be needed
    - b) You want to protect your tools and equipment
  - 2) You should always leave one man at your rescue unit
    - a) This person can serve as a communications link with the dispatch center and other personnel on scene
    - b) This person can have additional tools and equipment ready for use
    - c) Finally, this person will prevent the loss of tools and equipment due to theft
  - 3) You must secure the scene and permit no unauthorized persons into the area until law enforcement officers are present to assume this responsibility
- f. Evacuation of the area
  - 1) The spilling or release of hazardous materials may require the evacuation of the area
  - 2) You will need to activate support services to assist in the handling of this problem

- 3) There are three (3) considerations of evacuation of an area:
  - a) What area should be evacuated immediately?
  - b) What distance downwind should be evacuated?
  - c) How wide an area should be evacuated?
- 4) Depends upon the type of material and the size of the release
- 5) What are some general rules of evacuation?
  - a) General distances to be evacuated until definite identification of material is obtained and adequate personnel are on hand to effect the evacuation
    - 1)) Immediately evacuate the accident scene for a distance of 500 feet
    - 2)) Evacuate a 1,000 foot corridor for a distance of 2,000 feet downwind (downhill) of the spill
- 6) **REMEMBER:** This evacuation distance may be totally inadequate depending upon the material involved
  - a) This is just a recommended starting area until more information and specialized support personnel are available to assist
  - b) You must know the material, estimate the size of the spill, and consult with specialists to determine site management requirements

- c) Refer to the DOT Emergency Response  
Guidebook Table of Evacuation Distances  
(Green Pages)

# **LESSON 3**

## **VEHICLE ANATOMY**

## LESSON 3

### VEHICLE ANATOMY

#### TERMINAL OBJECTIVE

Given a simulated vehicle rescue situation with all necessary tools, equipment, and manpower, the student will be able to establish incident command; assess the accident scene for real and potential hazards; assess the accident scene to establish the location and number of patients and the mechanism of entrapment; communicate rescue activities using common terminology; and determine what, if any, additional supporting units and/or personnel may be required to accomplish a safe, efficient, and effective rescue operation.

## LESSON 3

### VEHICLE ANATOMY

#### KNOWLEDGE OBJECTIVES

1. The student will be able to describe the three (3) types of common frame designs.
1. Given a picture or real vehicle, the student will be able to identify, name, and describe the following components of the vehicle:
  - a. A-post
  - b. B-post
  - c. C-post
  - d. Sail panel
  - e. Roof
  - f. Roof rails
  - g. Honeycomb bumpers
  - h. Steering Wheel
  - i. Steering column
  - j. Supplemental restraint system (air bags)
  - k. Seat belts
  - l. Dash assembly
  - m. Batteries
  - n. Glass

## LESSON 3

### A. Vehicle Design Considerations

#### 1. Frames

##### a. Body on frame or full frame

- 1) This was the norm for older model cars
- 2) Newer models we will generally find full frames only on sport utility vehicles and light trucks
- 3) Frame rails extend front to rear
- 4) Body is mounted to the frame

##### b. Unit body design (Unibody)

- 1) Probably the most common design in the 80's and early 90's
- 2) No frame beneath the body
- 3) Unit body design used the floor, posts, doors, and roof as structural components
- 4) These components are reinforced through multiple layering of materials or creasing/folding/rolling of lighter metal components

##### c. Space frame design – Nascar and Cart racing cars

- 1) “Bird Cage” design
- 2) resembling a race car design where body parts are attached to the cage
- 3) Entire system interacts for structural stability

- 4) This type of design is well suited to lightweight body components of Bexloy panels, K type polyesters, plastics, fiberglass, & carbon composites

## 2. Components

### a. Posts

#### 1) Function

- a) Support the roof and sides of the car
- b) Support dash assembly
- c) Support seat belt assemblies
- d) Sometimes wiring is located within posts

#### 2) Composition

- a) Rolled sheet metal
- b) Hollow
- c) Rear posts ( C-post or sail panel) may consist of two (2) or three (3) layers of sheet metal with a truss core
- d) High Strength Low Alloy Steel (HSLA) to withstand a 5 g roll over

#### 3) Nomenclature

- a) "A-post"
  - 1)) Forward most post
  - 2)) Supports dash assembly and windshield
- b) "B-post"
  - 1)) Next post to the rear of the car
  - 2)) Roof support
  - 3)) Wiring?

- 4)) Seat belt supports
- 5)) Pretensioners
- c) “C-post”
  - 1)) For most passenger cars this is the last post
  - 2)) Support roof and rear window
  - 3)) Sometimes called the “sail panel”
- d) Other
  - 1)) If other posts are present they may be identified in alphabetic order from the front of the vehicle
  - 2)) a-b-c-d-e-f-g-h-, etc.
  - 3)) Examples:
    - a)) Station wagons
    - b)) Vans
    - c)) Buses

b. Roof

- 1) Hollow
- 2) Rolled sheet metal
- 3) HSLA Steel to with stand a 5g roll over test
- 4) Usually heavier material than body skin
- 5) Roof rails
  - a) These are the four (4) sides of the roof
  - b) Provides roll over protection
- 6) May have additional reinforcing ribs
- 7) Material may be plastic

- 8) Design safety says roof must support the weight of the vehicle
- c. Bumpers
- 1) Piston type systems may present a problem to the rescuers
  - 2) Probably the quickest and easiest way to deal with a potentially “loaded” bumper is to stay away from it
  - 3) Modern vehicle have a honey comb bumper – no pistons
- d. Fuel systems
- 1) May be found just about anywhere
  - 2) Newer vehicles have non-vented tanks
  - 3) Fuel tank may be made of plastic in newer cars
  - 4) May be two (2) fuel lines
    - a) Delivery and return
    - b) May be copper, steel, or even plastic
  - 5) Alternative fuels
    - a) CNG, LPG, Methanol, Electric
- e. Steering wheel and column
- 1) Today the column is usually a hollow tube surrounded by plastic
    - a) Designed to collapse upon impact
  - 2) Tilt column
    - a) Column may fail at tilt joint during a displacement procedure
  - 3) Front wheel drive
    - a) May be prone to failure if column pulled

- b) May cause additional harm to driver
- e. Supplemental restraint systems (air bags)
  - 1) General
    - a) Located in up to 14 different locations in the vehicle.
      - 1)) Steering wheel
      - 2)) passenger side dash
      - 3)) Front doors
      - 4)) Side of front seats
      - 5)) Rear Doors
      - 6)) Knee bags
      - 7)) Head Liner
      - 8)) Peddles
      - 9)) Head rest of the front seat
    - b) It is imperative that all rescuers become familiar with the marking of SRS systems
    - c) Only the airbag(s) in the direction of the accident will deploy (if a side impact, front airbags will not deploy)
    - d) Air bag itself is nylon like material
    - e) Nitrogen, Argon, & CO<sub>2</sub> can be the expansion agent
    - f) Triggered by a dual sensor system
    - g) Steering wheel bags and some side airbags use sodium azide as the active chemical to produce Nitrogen gas

- 2) Sequence of events
  - a) Deceleration triggers sensors
    - 1)) One to arm
    - 2)) second sensor activates to deploy airbag
  - b) Activation
    - 1)) Sodium azide ignites or Gas is expelled out of pressure canister
  - c) Expansion
    - 1)) Gas fills the bag
  - d) Deployment
    - 1)) Bag inflates
    - 2)) Extremely rapid
  - e) Deflation
    - 1)) Begins immediately
    - 2)) The bag is an open system
- 3) NOTE: IT IS STRONGLY RECOMMENDED THAT EACH INSTRUCTOR SHOW THE VIDEO TAPE  
The Dayton Air bag Incident
- 4) It is imperative that the student learns how to recognize the identification labels for the air bag systems within a vehicle and communicate this information with the rescue team
- 5) Some of the head liner bag systems use a 3000 psi pressurized container located in the C post, with sensors in the B post, to activate the system

- 6) Side airbag system maybe very hard to see when a patient is in the vehicle – look at the opposite door if possible to locate side air bag systems.
  - 7) Disconnecting the battery will de-power the airbag system after the capacitor in the air bag control device de-energized 30 seconds to 20 minutes
  - 8) Control devises are located in the passenger compartment – under the passenger seat, in the passenger foot well, and under the center console
  - 9) There is no standard color of wiring for an air bag system
  - 10) Follow the air bag safety zones
    - a) 5 inches for a side air bag
    - b) 10 inches for a drivers side bag
    - c) 15 inches for a passenger side bag
  - 11) REMEMBER: do not place yourself or tools between the patient and an airbag
- f. Doors
- 1) HSLA steel side impact bar in all passenger cars
  - 2) Bar can be dislodged and prevent normal opening of car door
- g. Dash assembly
- 1) HSLA steel across dash to provide side impact support
  - 2) In some cars the center of the dash assembly extends downward to the drive shaft hump or center console area

- a) This is probably an entertainment center or convenience grouping designed to hold beverage containers
- 3) Significance
  - a) This unit will be attached to the floor of the vehicle and in some cases will severely interfere with rescue tasks you may wish to undertake
  - b) If you need to perform a dash assembly displacement toward the front, you may find that the attachment points of the dash assembly to the floor will serve as structural components
  - c) You will need to defeat this attachment to successfully displace the dash assembly

#### h. Batteries

- 1) Locations
  - a) Under hood
  - b) Under rear seat
  - c) In trunk
  - d) In front wheel well
- 2) Some modern vehicles have multiple positive leads coming off the battery
- 3) Batteries located in the rear of the vehicle have their positive wires running along side the gas and brake lines
- 4) Disconnect battery terminals if possible. Disconnecting is preferred over cutting. Disconnecting allows you to repower an electric component if needed

i. Seatbelts

1) 3 point restraints

- a) Front seat occupants
- b) Rear seat occupants

2) Adjustable height

- a) Adjustable plates in the B post for different sized drivers and passengers
- b) Creates a large hardened metal plate in the top of the B post

3) Pretensioner systems

- a) This system works with the Supplemental restraint system (air bags). It triggers a spring loaded or gas propelled take up of the seatbelt
- b) This system pulls you back into the seat and the proper distance away from the SRS
- c) These compressed 1400 psi gas canisters can be located in the B post

4) Child seat anchors

- a) All year 2000 vehicle are coming out with child seat tethers located in the rear seat. This will eliminate the need to use the seatbelt for securing a child seat into the vehicle

5) Seats

- a) Integral seat belt in the seat – securely hold passenger into the seat. Seat, Seatbelt and patient become one unit
- b) Some seats will read the weight of the patient and determine if the air bag should deploy or not

j. Glass

1) Types

- a) Laminated

- b) Tempered
- c) Polycarbonate

2) Laminated safety glass

- 1)) This is the type of glass used in windshields
- 2)) May be three layers – glass/plastic/glass
- 3)) May be four layers – glass/plastic/glass/plastic
- 4)) Windshields may be replaced by three methods
- 5)) Types of windshield mounting
  - a)) Channel mounted glass  
The glass is set into a rubber channel molding
  - b)) This type of mounting is a “Rescue Bonus,” for it is the easiest of all mountings for total removal of the windshield in one piece
  - c)) A “Rescue Bonus” can be found mostly in older cars, pre –1970
- 6)) Adhesive mounted glass (Mastic)
  - a)) Most 1970 – 1990 vehicles have adhesive mounted windshields
- 7)) Ceramic mounting/Glued in

a)) Found in 1990 cars

This style of windshield mounting causes the glass to become a structural component of the car

You will not be able to remove this windshield in one piece as we could with the previous two mountings

3) Tempered glass

1)) This type of glass is used in most other areas, except the windshield

2)) Tempered glass is very strong but when broken breaks into little pieces

4) Polycarbonate

1)) Lexan by Dupont – non-breakable glazing

2)) Found in non-movable windows

k. Mini Vans, Pickup trucks, and VW bugs

1) Mini vans

a) Multiple patients, up to 8 seat belted

b) Jammed sliding doors

c) Uni-body or space frame with plastic or metal body

d) This one vehicle can push the available resources to the limit

2) Pickup Trucks

- a) Full Frame
  - b) Bed has very little strength
  - c) Cab can break free from cab mounts
- 3) VW Bug (new)
- a) Uni-body
  - b) Plastic body components
  - c) Top hinge is in the mirror

# **LESSON 4**

## **STABILIZATION**

## LESSON 4

### STABILIZATION

#### TERMINAL OBJECTIVE

Given a simulated vehicle rescue situation with all necessary tools, equipment, and manpower, the student will be able to establish incident command; assess the accident scene for real and potential hazards; assess the accident scene to establish the location and number of patients and the mechanism of entrapment; communicate rescue activities using common terminology; and determine what, if any, additional supporting units and/or personnel may be required to accomplish a safe, efficient, and effective rescue operation.

## LESSON 4

### STABILIZATION

#### KNOWLEDGE OBJECTIVES

1. The student will be able to list the three (3) general rules of controlling an unstable vehicle hazard.
2. The student will be able to explain the main objectives of vehicles stabilization.
3. The student will be able to identify, name and describe at least six (6) stabilizing devices available for vehicle stabilization.
4. The student will be able the identify the 3 basic types of accidents

LESSON 4  
STABILIZATION  
SKILL OBJECTIVES

1. Given all necessary cribbing, wedges, boards, plates, and support tools and equipment, the student will be able to demonstrate his/her ability to stabilize a vehicle found in the following positions:
  - a. On all four (4) wheels
  - b. On its roof
  - c. On its side
  - d. On another vehicle or object, such as a guard rail
  - e. On an incline
2. The student will be able to make use of step chocks, box cribs, rail cribs, buttress cribbing and slant cribs to stabilize a vehicle.
3. Given a damaged vehicle, the student will be able to demonstrate the use of temporary stabilization techniques.

## Lesson 4: Stabilization

### 1. Types of accidents

- a. Head-on
- b. T-Bone
- c. Rear-end
- d. Roll-over
- e. On side
- f. Under an object
- g. Object on the vehicle

### 2. Unstable vehicles

#### a. Positions in which we find unstable vehicles:

- 1) On all four (4) wheels
- 2) On side
- 3) On roof
- 4) One vehicle on top of another
- 5) On embankments or steep cliffs
- 6) Teetering on a bridge
- 7) In the rubble of a structure

### 3. General rules as regarding unstable vehicles

- 1) The vehicle must be stabilized before any rescue efforts begin – this is a hazard
- 2) The vehicle must not be moved or righted until all patients are removed from the vehicle
  - a) NEVER MOVE A VEHICLE WHILE THERE ARE STILL PEOPLE IN IT

- 3) Never push, rock or otherwise move a vehicle to determine if it is unstable
4. Objectives of stabilization
    - 1) Increase the number of contact points that the vehicle has with the ground or other firm surface
    - 2) Spread the contact points over as wide an area as possible
5. Stabilizing devices
    - 1) Wooden cribbing and wedges
    - 2) Jacks, hydraulic and high lift
    - 3) Air bags
    - 4) Winches, both vehicle and hand operated
    - 5) Chains
    - 6) Pneumatic struts
    - 7) Ropes
6. Makeshift (temporary) stabilization devices
    - 1) Bumper jack
    - 2) Spare tire
7. Wooden cribbing and wedges discussion
    - 1) Material should be wood such as pine or Douglas Fir
    - 2) Sizes vary but most common sizes are:
      - a) 2" x 4"
      - b) 4" x 4"
      - c) 6" x 6"
    - 3) Length varies but it is recommended that 24" to 72" sections be provided

- 4) Do not paint cribbing and wedges
  - a) It can make it difficult to determine damage to the lumber
- 5) A rope handle may be nice as this makes it easier to carry, place, and remove the cribbing
- 6) A wedge should vary in thickness and length
- 7) The purpose of a wedge is to completely fill any voids left by the larger sections of cribbing
- 8) Recommendation: You might also consider carrying some 2" x 6", 2" x 8" or 2" x 10" lumber to use as base units, jack plates, and to increase the degree of ground contact when working on soft surfaces
- 9) Step chocks are recommended for a rapid into use tool to assist in the stabilization of a vehicle
  - a) 2" x 6" x 30" base section
  - b) Secure a 2" x 6" x 24" section on top
  - c) Next attach a 2" x 6" x 18" section
  - d) Next attach a 2" x 6" x 12" section
  - e) Finally, attach a 2" x 6" x 6" section
- 10) Recommendation: You might also consider carrying full size "jack plates" for support of cribbing and tools and equipment when used in critical applications or upon soft ground

#### 8. Stabilizing a vehicle on its wheels

- 1) You need to stabilize this vehicle to limit the degree of patient movement

- 2) Chock all four (4) wheels
- 3) Build 4 box cribs – 2 behind the front tires and 2 in front of the rear tires. There is very little stable material in the crush zones
- 4) Make use of step chocks
  - a) Insert step chocks behind front wheels and in front of rear wheels under the rocker panels
  - b) Deflate the tires and permit the vehicle to settle gently on the step chocks
    - 1)) Do not damage the tire to deflate, rather push in the valve step pin or unscrew the valve with the proper tool. Deflating the tires takes the suspension out of the stabilization system allowing for better stabilization and continued stabilization as pieces of the vehicle are removed
    - 2)) When the wrecker arrives to tow the vehicle, all you have to do is refill the tire and drive away

9. Stabilizing a vehicle resting on its side

- 1) Temporary but very quick
  - a) Rope
  - b) Chains
- 2) Good stabilization with cribbing and wedges
  - a) Build a box crib under the A-post and the C-post of the car

- b) Build a small crib under each wheel and wedges to complete
- c) Long cribbing with baseplates or pneumatic struts can also be used to make a buttress cribbing.
- d) The use of buttress cribbing widens the stance of the vehicle greatly and is probably the best form of stabilization for a vehicle on the side
- e) NOTE: Ropes may be used for initial protection of the rescuer while he/she is setting the cribs and wedges

#### 10. Stabilizing a vehicle resting on its roof

- 1) Build a box crib to support each side of the trunk and hood
  - a) You should use four (4) box cribs, two (2) for the trunk and two (2) for the hood, to provide for balance
- 2) Cribbing the roof alone is only a temporary measure
- 3) Pneumatic struts can also be used un the trunk area for stabilization

#### 11. Car on a car or other object

- 1) Fill voids with cribbing
- 2) Use ratchet strap to hold the vehicle in the position.  
Strap the two cars together or strap the car to the object
- 3) The same thing can be done when the car has a object on it.

## 12. Special considerations when using cribbing and wedges

- 1) You may need a Halligan bar or other such tool to help you with the insertion of single pieces of lumber
- 2) NEVER BEAT ON CRIBBING – BEATING ON CRIBBING MOVES THE PATIENT. Cribbing should be placed so it is tight.
- 3) You should never permit your body to be on more than one knee at a time while cribbing
  - a) You must be capable of rapidly evacuating the area in case the vehicle falls prior to stabilization
- 4) Cribbing and wedges are probably the best stabilization material available to us
  - a) Low cost and readily accessible
  - b) Wide variety of applications
  - c) Can be built to fit any situation
  - d) Tends not to slip under load as might happen with metal to metal contacts
  - e) The use of cribbing and wedges does not tie up another piece of equipment which might later be needed in the rescue operation

## 13. Special considerations when using other stabilization devices

- 1) Hydraulic jacks
  - a) Small base demands the use of extra supportive equipment
    - 1)) Jack plates
    - 2)) Wood planks or boards

- b) Small surface area of ram face requires support equipment to spread the surface contact
- c) Be careful not to lift the vehicle
  - 1)) They will serve to reduce, rather than increase, the surface area in contact with the ground
- 2) Hi lift jack
  - a) Ratcheting jacks
  - b) Exert the same cautions and considerations as with the hydraulic jacks
  - c) Excellent tools for stabilizing a vehicle on its side
- 3) Air bags
  - a) A good, quick stabilization device once assembled
  - b) Fits many places
  - c) Again, be careful not to lift, only stabilize
  - d) Be extra cautious when using a double bag lift
- 4) Winches
  - a) Hand winch (come-a-long) or a vehicle winch may be used
  - b) Need support equipment – chains or straps
  - c) Be careful that you do not develop too much force and move the vehicle rather than merely stabilize it

- d) You may need two (2) winches pulling in opposite directions
  - e) If you are using a vehicle winch, you have committed the vehicle to that position for the duration of the operation
  - f) To properly employ winches, you must approach and work around the unstable vehicles to rig chains or straps
- 5) Temporary stabilization
- a) Use ropes
    - 1)) Ropes should be used only for a rapid, temporary stabilization to permit the time for a more secure stabilization placement
    - 2)) Once you use a rope to stabilize a vehicle, it should be retired from service

## BIBLIOGRAPHY

- American Academy of Orthopedic Surgeons, Emergency Care of the Sick and Injured 7<sup>th</sup> Edition, Jones & Bartlett Publishers, Sudbury MA: American Academy of Orthopedic Surgeons, 1998
- American National Red Cross, Red Cross First Aid Module: Emergency Extrication, American National Red Cross, 1981.
- Autoliv Inc (Air bag manufacturer) – [www.autoliv.com](http://www.autoliv.com) 1998
- Brunacini, Alan V., Fire Command, Quincy, MA: National Fire Protection Association, 1985.
- Civil Defense Preparedness Agency, Rescue Skills and Techniques, S.M. 14.2, 1972.
- Downey, Ray, The Rescue Company, Saddle Brook, NJ: Fire Engineering Books & Videos, 1992.
- Erven, Lawrence W., Emergency Rescue, Encino, CA: Glencoe Publishing Co., Inc., 1980.
- Fire Protection Publications, Incident Command System, Fire Protection Publications, Oklahoma State University, 1983.
- Grant, Harvey D & James Gargan., Vehicle Rescue: A System of Operations 2<sup>nd</sup> edition, Bowie, MD: Robert J. Brady Company, 1997.
- Grant, Harvey D., Robert H. Murray, Jr., and J. David Bergeron, Emergency Care, 5th ed., Englewood Cliffs, NJ: Brady, A Prentice Hall Division, 1990.
- Holmatro, New Vehicle Safety Systems for the Rescuer, Holmatro Inc, 505 McCormick Dr Glen Burnie, MD 21061 1999
- Insurance Institute for Highway Safety – [www.hwysafety.org](http://www.hwysafety.org) 1999
- International Fire Service Training Association, Fire Service Rescue Practices, 7th ed., Fire Protection Publications, Oklahoma State University, 1992.
- International Fire Service Training Association, Principles of Extrication, 1st ed., Fire Protection Publications, Oklahoma State University, 1990.
- Kidd, J. Steven and John D. Czajkowski, A Training Manual: Vehicle Extrication, Saddle Brook, NJ: Fire Engineering, Penwell Publishing Company, 1991.
- Kidd, J. Steven and John D. Czajkowski, Study Guide. A Training Manual: Vehicle Extrication, Saddle Brook, NJ: Fire Engineering, Penwell Publishing Company, 1991.
- Moore, Ronald E., Vehicle Rescue and Extrication, St. Louis, MO: Mosby Year Book, 1991.
- National Association of Emergency Medical Technicians & the Committee on Trauma, American College of Surgeons, PHTLS 4<sup>th</sup> Edition. Mosby Year Book ,1999

- National Emergency Training Center, The Incident Command System, Student Manual, Emmitsburg, Maryland: Federal Emergency Management Agency, 1989.
- National Highway Traffic Safety Administration – [www.nhtsa.dot.gov/](http://www.nhtsa.dot.gov/) 1998
- Nethercutt, Dawson, The International Manual of Basic Rescue Methods, Greenville, NC: Morgan Printers, Inc., 1975.
- Ohio State University, Fire Service Training, Columbus, OH: Instructional Materials Laboratory, The Ohio State University, 1986.
- Ohio Trade and Industrial Education Service, Emergency Victim Care: A Textbook for Emergency Medical Personnel, Columbus, OH: The Ohio State Trade and Industrial Education Service, 1971.
- Ohio Trade and Industrial Education Service, Victim Rescue, Columbus, OH: The Ohio State Trade and Industrial Education Service, 1976.
- Simkins, Mary Lou, Crash Victim Extrication Training Program for Emergency Medical Technician, Valencia, PA: Applied Science Associates, Inc., 1977.
- Shaw, Ron Extrication .Com - [www.extrication.com](http://www.extrication.com) 1999
- Transportation Emergency Rescue Committee IAFC, [www.TERC.org](http://www.TERC.org) 1998
- Watson, L.M., Advanced Vehicle Entrapment Rescue for Power Tool Operators, Printwize, Essex England, 1994
- U.S. Department of Transportation, National Highway Traffic Safety Administration, Crash Victim Extrication, Washington, D.C.: U.S. Government Printing Office, Revised, April, 1979.

## Instructor Resources

Video – New Vehicle Safety Systems for the Rescuer, Holmatro Inc, 505 McCormick Dr  
Glen Burnie, MD 21061 (410) 768-9662, [Info@holmatro-usa.com](mailto:Info@holmatro-usa.com)

Video – Traffic Injury The Medicine-Engineering Link, Association for the  
Advancement of Automotive Medicine, 5/13/92

Video – The Car Busters Series, Mosby Lifeline

Video – Crash-Rescue, Public Broadcasting Service, NOVA 1998

Video – Crash Test / Kinetics of Injury, Discovery Channel, 1998

Video – Dayton Air Bag Incident, American Heat, Extrication.Com

Video – NHTSA Air Bag Guidelines, NHTSA

Web Page – Transportation Emergency Rescue Committee IAFC, [www.TERC.org](http://www.TERC.org)

Web Forum – Search and Rescue Society of British Columbia – Vehicle Extrication  
Forum. [www.sarbc.org](http://www.sarbc.org)

Web Page and Forum– Ron Shaw, Extrication .Com - [www.extrication.com](http://www.extrication.com)

Web Page and Forum – Ron Moore, Firehouse .com – [www.firehouse.com](http://www.firehouse.com)

Web Page – Exatec Limited (Polycarbonate glazing)- [www.exatec.llc.com](http://www.exatec.llc.com)

Web Page – Autoliv Inc (Air bag manufacturer) – [www.autoliv.com](http://www.autoliv.com)

Web Page – Wreck Technology Inc – [www.wrecktech.org](http://www.wrecktech.org)

Web Page – Insurance Institute for Highway Safety – [www.hwysafety.org](http://www.hwysafety.org)

Web Page – Rescue training resources and guide – [www.techrescue.org](http://www.techrescue.org)

Web Page – National Highway Traffic Safety Administration – [www.nhtsa.dot.gov/](http://www.nhtsa.dot.gov/)

Web Page – International Centre Extrication Techniques – [www.icet.nl](http://www.icet.nl)

Web Page – Automotive Learning Online – [www.innerauto.com](http://www.innerauto.com)

Web Page – Simula Inc (air bag manufacturer) – [www.simula.com](http://www.simula.com)