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ABSTRACT

Guidelines for organizing and administering the three-part Emergency Vehicle Operation (EVO) Course are provided. The first section of the guide describes the course structure and lists the unit objectives (by unit module) for each of the courses's three parts. Part I contains seven units, organized into twenty-one modules, to be taken by all trainees in a classroom setting. Topics include introduction, legal aspects of EV, selecting routes and reporting emergency operations, preparing to drive an EV, important physical forces and EV control, and handling unusual driving situations. Part II contains three units (six modules), one of which is to be taken by each trainee in a classroom setting: operation of law enforcement, operation of ambulances, and operation of fire apparatus. Part III provides in-vehicle practice exercises for the type of vehicle the trainee will drive. The second section of the guide discusses five areas of concern in planning and administering the course: instructor and trainee qualifications, class size, classroom training resources, and scheduling. The third section describes the special requirements for the range/practical exercises, including range characteristics, number and types of vehicles, necessary and desirable equipment, and administrative considerations. The final section provides guidelines for monitoring and evaluating the course. Titles and descriptions of audiovisual aids are provided in the appendix. (Available separately are instruction lesson plans, CE 020 286, and a trainee study guide, CE 020 287.) (JH)

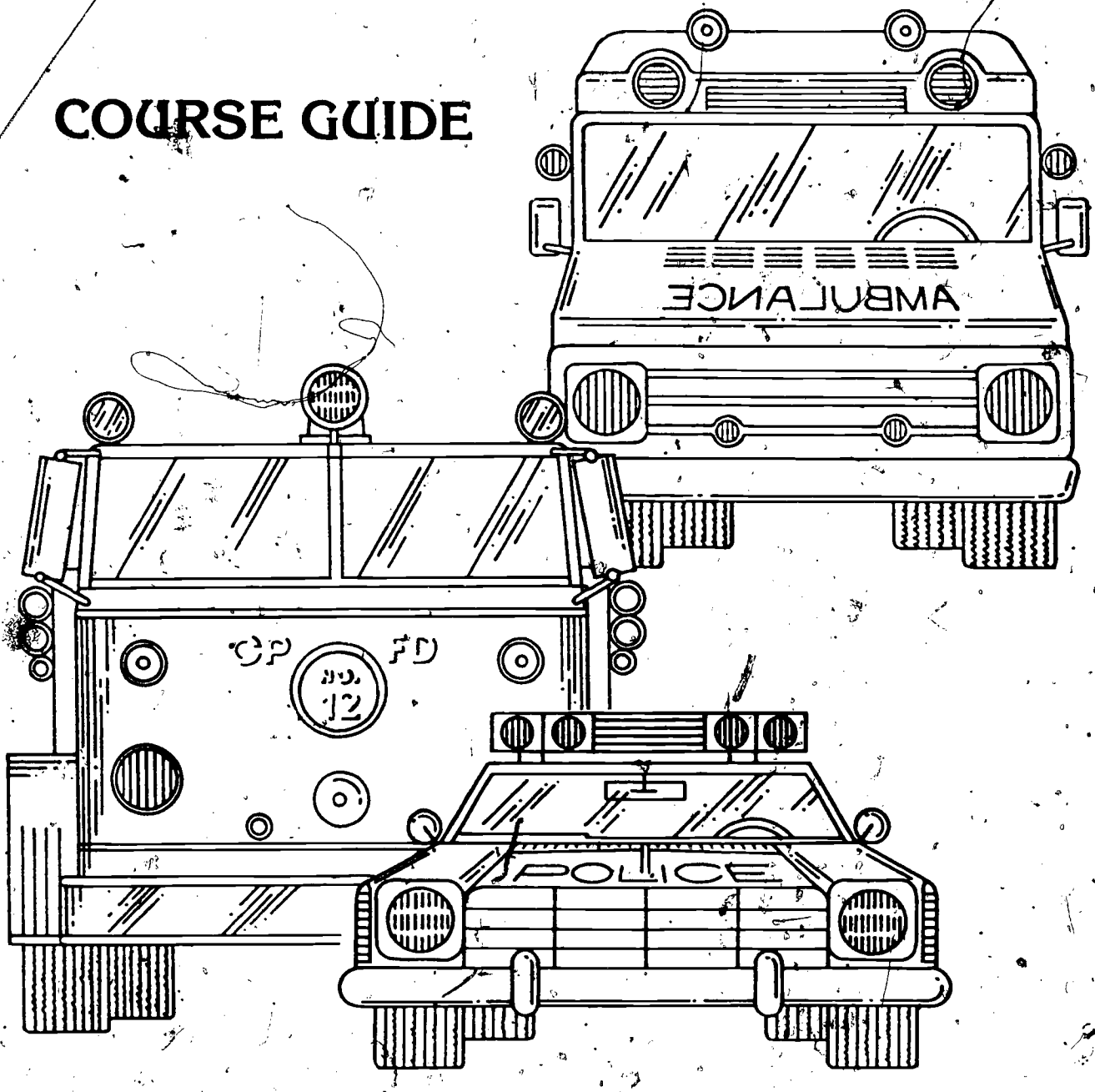
Training Program for Operation of Emergency Vehicles

COURSE GUIDE

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

Training Program for Operation of Emergency Vehicles

COURSE GUIDE



FOREWORD

This document is one of three in the Emergency Vehicle Operation (EVO) Curriculum; they are:

1. Course Guide--Training Program for Operation of Emergency Vehicles.

2. Instructor Lesson Plans--Training Program for Operation of Emergency Vehicles.

3. Trainee Study Guide--Training Program for Operation of Emergency Vehicles.

These documents were prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration (NHTSA) under contract no. DOT-HS-6-01336 by INNOVATRIX, Inc., Ingomar, PA.

The NHTSA Contract Technical Manager was Dr. C. Harding Veigel and, in the final months of the development effort, Mrs. Dorothy McKinney. Other NHTSA personnel who made significant contributions to the development of this curriculum were John Anderson, Richard Frederick, and Robert Motley. The assistance of all of these individuals is gratefully acknowledged.

Some of the others who contributed their time and expertise were: Dr. Aaron Adams, Cecil Arnold, and Dr. George Palmer of NHTSA; Norman Derwick, International Association of Chiefs of Police; Donald Flinn, International Association of Fire Chiefs; Richard Tippy and James Grisham of the National Safety Council; and Harold Rice, Pennsylvania State Police Academy. For those whom we have failed to mention: our appreciation and apologies.

And, our special thanks to the following people:

Chief Patrick McCabe, McCandless Township Police Department, who contributed his time and allowed the INNOVATRIX staff to interview and observe his officers while they operated their patrol and ambulance vehicles.

Fire Chief Kennelly, who assisted us in setting up observations and interviews with several stations of the City of Pittsburgh Fire Department.

Ron Kane, our primary Pilot Test classroom instructor. Ron helped develop the police materials, taught them at the Pilot Test, and presented the entire basic program very effectively.

Anthony Bizjak, who ably presented the fire service materials at the Pilot Test. Tony's knowledge of fire service vehicles and policies greatly assisted us in developing the fire service material.

John Kinzer, who presented the ambulance materials at the Pilot Test and loaned his company's vehicles for the range exercises.

Officer Mitchell, Spc. Ownby, and Spc. Butler, the Huntsville Police Academy driving instructors who pilot-tested the new program and provided excellent in-vehicle instruction. They guided our fire and ambulance range instructors and kept a fine sense of humor through the pressure of the Pilot Test (an accomplishment in Alabama in July).

Finally we would like to extend our special thanks and gratitude to:

The City of Huntsville--which may have some of the finest people in the world and certainly has the most cooperative administrators this staff has ever worked with.

Our Pilot Test trainees--who pitched in, learned a lot, and offered innumerable insights and suggestions which led to the improvement of the program.

Officer Danny Barnes, Director of the Huntsville Police Academy and head of the fine Evasive Driving Program at Huntsville, Alabama. Officer Barnes was the take-charge man who smoothed administrative matters so much that most of them were never noticed by the staff. He not only made the Pilot Test fun, but also became a true and lasting friend.

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PURPOSE OF THIS COURSE GUIDE

The instructional curriculum described in this Course Guide prepares emergency vehicle operators to accomplish the major functions associated with driving an emergency vehicle. The four emergency vehicle operation functions of concern in this course are shown in Figure 1 on the following page.

This document provides guidance for those who will organize and administer the Emergency Vehicle Operation (EVO) Course. It contains a description of the objectives and scope of the course, covers course planning considerations, and details the special requirements for the in-vehicle range exercises. The final section of this Course Guide provides guidelines for monitoring and evaluating the course. This section is included because a major administrative responsibility is to implement quality control measures that ensure the effectiveness of the course.

In addition to this Course Guide, the EVO curriculum package contains a set of detailed Instructor Lesson Plans (ILP) and a text/workbook for the students, the Trainee Study Guide (TSG). The ILP presents the basic teaching methods required by the instructor in conducting the course. The lesson plans include a listing of course objectives, necessary instructor preparation activities, textual content for the instructor's presentation, practice exercises, and review questions for each of the units of the course. The ILP helps guide the instructor's presentation in ways which adhere to effective pedagogical principles (i.e., keep the trainees active, provide remedial assistance).

The student's document, the TSG, is a working book (containing necessary exhibits, exercises, etc.) that is used for several purposes. Trainees may use it in class for taking notes. It includes numerous practice and review exercises that the trainees can use to measure their learning progress. Finally, since it contains a great deal of information, the TSG also serves as a reference document for the trainees to use in their early weeks on the job.

FUNCTION A: SYSTEM SUPPORT

The procedures for supporting the efficient operation of emergency vehicles including: vehicle inspection, vehicle maintenance, and reporting activities.

FUNCTION B: COMMUNICATIONS

All communications activities including the mechanical operation of the communications equipment as well as routine and emergency communications procedures.

FUNCTION C: EMERGENCY VEHICLE OPERATION

The routine and emergency driving tasks associated with the operation of each specific type of emergency vehicle.

FUNCTION D: CONTINGENCIES

The performance of tasks associated with overcoming vehicle malfunctions or loss of vehicle control occurring during the performance of routine or emergency driving tasks.

Figure 1. Emergency Vehicle Operations Functions.

OBJECTIVES AND SCOPE OF THE COURSE

This EVO Course was developed to prepare individual drivers of emergency vehicles to operate their vehicles safely in the emergency and non-emergency mode. In developing the course, a large number of vehicle operators and their supervisors were interviewed. Additionally, the development team spent many hours observing drivers operating their emergency vehicles. It was determined from these interviews and observations and from a thorough analysis of the operating tasks that many of the skills and knowledges needed by all emergency vehicle operators are similar. The similarities apply regardless of the service the operators are with or the type of vehicle they will drive. That is, policemen, firemen, or emergency medical technician, when operating their emergency vehicles, perform many virtually identical tasks. Likewise, the skills and knowledge required for operating different types of emergency vehicles, whether they are sedans, vans, or large trucks, tend to be very similar for many tasks.

Based on the similarity of knowledge required for any kind of trainee, the course was divided into three parts, as shown in Figure 2.

OVERALL COURSE STRUCTURE

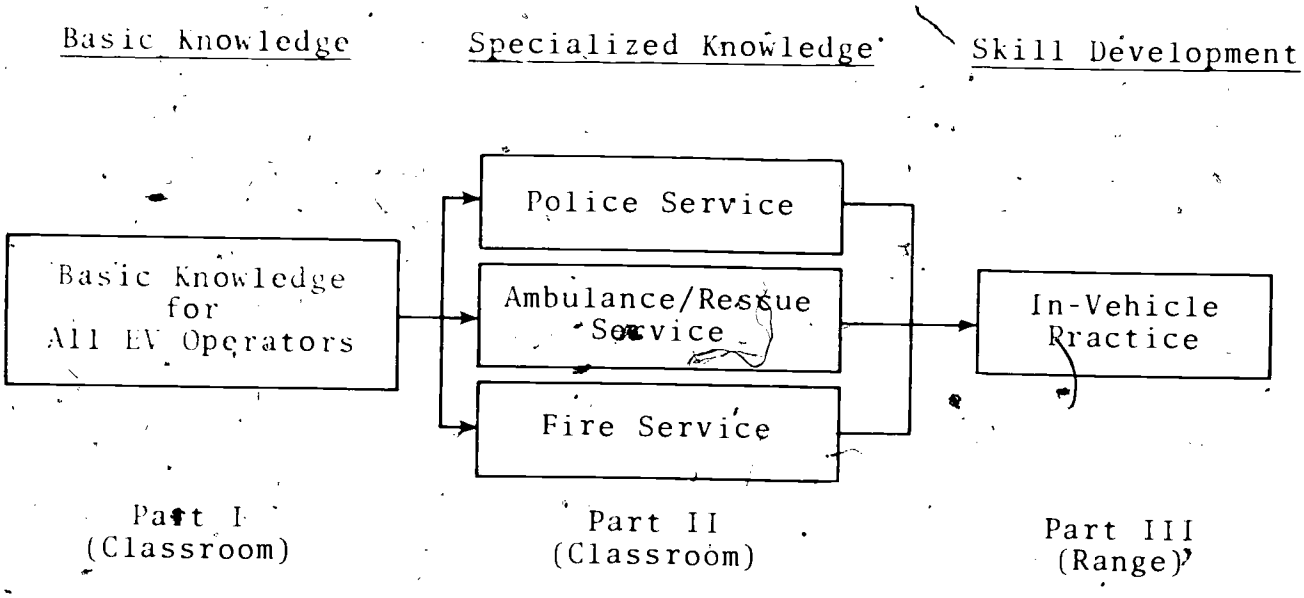


Figure 2. Overall Course Structure.

In Part I the trainees are presented with the Basic Knowledge required for the operation of any emergency vehicle. Trainees then receive one of three versions of Part II, Specialized Knowledge. The version received depends on the specific service employing the trainee. In Part III the trainees perform in-vehicle exercises on a driving range. The set of exercises they receive depends on the size and type of vehicle they will drive on the job.

This kind of structure is extremely versatile. For example, a trainee who will be driving a police wagon would receive Part I, and the Part II police materials. For Part III the trainee could receive practice in driving a van, even though most of the trainees receiving van training would probably be ambulance drivers.

The total course consists of seven Part I units to be taken by all trainees, three Part II units, one of which is taken by each trainee, and a version of the Part III unit structured for the type of vehicle the trainee will drive. Figure 3, below, lists the units of the EVO Course. Figures 4, 5, and 6, on the following pages, list the specific objectives for each unit of Part I, II, and III of the course.

Unit	Title
I-A	Introduction
I-B	Some Legal Aspects of Emergency Vehicle Operation
I-C	Selecting Routes and Reporting Emergency Operations
I-D	Before You Drive
I-E	Important Physical Forces and EV Control
I-F	Operation
I-G	Handling Unusual Situations
II-P	Operation of Law Enforcement Vehicles
II-A	Operation of Ambulances
II-F	Operation of Fire Apparatus
III	In-Vehicle Practice

Figure 3. Units of the EVO Course.

PART I BASIC UNITS	
UNIT/ MODULE	TITLE AND OBJECTIVES FOR UNIT
I A Module 1	Introduction No specific objectives.
I B Module 1	Some Legal Aspects of Emergency Vehicle Operation By the end of this module the trainees: 1. Given a [illegible] topical areas covered by state st[illegible], will be able to write a brief de[illegible]n of the statute as it relates to [illegible]ncy vehicle operation. 2. Given descriptions of several situations, will be able to identify those situations that represent a true emergency and explain why.
Module 2	By the end of this module, the trainees: Given descriptions of several situations, will be able to identify those situations that illustrate due regard for the safety of others and those that do not.
I-C Module 1	Selecting Routes and Reporting Emergency Vehicle Operations By the end of this module, the trainees: 1. Will be able to state two advantages of careful route preselection. 2. Will be able to list three examples of the kinds of facilities whose location could be essential to route planning.

Figure 4. Course Objectives.

UNIT/ MODULE	TITLE AND OBJECTIVES FOR UNIT
Module 2	By the end of this module, the trainees: 1. Given a list of several statements relating to communications techniques and procedures, will be able to identify which are correct. 2. Will be able to state the three items of information that must be obtained from the dispatcher before responding to an emergency call.
I-D	Before You Drive
Module 1	By the end of this module, the trainees: 1. Given a list of several statements relating to vehicle inspection and maintenance, will be able to identify those statements that are correct. 2. Given a list of vehicle components, will be able to list two indicators (symptoms) of problem/malfunction for each.
Module 2	By the end of this module, the trainees: Will know the criteria for proper adjustment of: a. Seat position. b. Head restraint. c. Lap belt. d. Shoulder harness. e. All mirrors.
Module 3	By the end of this module, the trainees: 1. Given a copy of the Inspection Checklist, will be able to perform a thorough inspection of a motor vehicle, and correctly identify any symptoms of malfunctions or items requiring repair. 2. Will be able to perform any minor maintenance required.

Figure 4. (Continued)

UNIT/ MODULE	TITLE AND OBJECTIVES FOR UNIT
	3. Will be able to demonstrate proper adjustment of: a. Seat position. b. Head restraint. c. Lap belt. d. Shoulder harness. e. All mirrors.
I-E Module 1	Important Physical Forces and EV Control By the end of this module, the trainees: 1. Will be able to write a brief description of the following terms: a. Velocity. b. Centrifugal force. c. Inertia. d. Friction. 2. Will be able to indicate on a drawing the effects of acceleration, deceleration, and turning on a vehicle's weight distribution. 3. Will be able to state the primary cause of brake fade.
I-F Module 1	Operation By the end of this module, the trainees: 1. Will be able to state the purpose of emergency signaling equipment. 2. Given a list of statements relating to use of emergency signaling equipment, will be able to identify those statements that are correct.
Module 2	By the end of this module, the trainees: 1. Will be able to state the correct wheel position for a vehicle that is parked on a slope.

Figure 4. (Continued)

UNIT/ MODULE	TITLE AND OBJECTIVES FOR UNIT
	2. Given a description of a backing mishap, will be able to describe actions that might have been taken to avoid the accident.
Module 3	By the end of this module, the trainees:
	1. Will be able to describe the provisions of their state's statute that deals with motorists' responsibilities for clearing a path for emergency vehicles.
	2. Will be able to select the appropriate siren-use technique for negotiating through heavy or blocked traffic.
Module 4	By the end of this module, the trainees:
	1. Will be able to dientify the correct percentage of emergency vehicle accidents that occur at intersections.
	2. Will be able to select the appropriate method for checking traffic before attempting to cross an intersection.
	3. Will be able to state the kind of turn (left or right) which requires a larger gap in cross-traffic and explain why.
Module 5	By the end of this module, the trainees:
	1. Will be able to name the safest type of turnabout.
	2. Given three illustrations, will be able to illustrate the correct path for a vehicle making a U-turn.
	3. Given an illustration of each, will be able to illustrate the correct path for a vehicle making a left and a right sideroad turnabout.
Module 6	By the end of this module, the trainees:
	1. Will be able to describe two methods of estimating following distance.

Figure 4. (Continued)

UNIT/ MODULE	TITLE AND OBJECTIVES FOR UNIT
	2. Given a list of several conditions, will be able to select those that indicate following distance should be increased. 3. Given a list of several statements relating to following distance, will be able to identify those that are correct.
Module 7	By the end of this module, the trainees: 1. Will be able to state two types of road configuration that indicate it is unsafe to pass. 2. Given a list of several conditions, will be able to select those that would indicate it is unsafe to pass.
Module 8	By the end of this module, the trainees: 1. Will be able to give an accurate explanation of what a "Yield" sign means. 2. Will be able to select the correct siren-use technique for entering/exiting expressways.
Module 9	By the end of this module, the trainees: 1. Given two drawings, will be able to select the one that illustrates a properly banked road. 2. Given a listing of several incomplete sentences relating to driving curved roads, will be able to insert the word that best completes the sentences. 3. Given an illustration of two vehicles' path of travel through a curve, will be able to select the vehicle that has chosen the safest path.

Figure 4. (Continued)

UNIT/ MODULE	TITLE AND OBJECTIVES FOR UNIT
I-G	Handling Unusual Situations
Module 1	By the end of this module, the trainees: Given a list of statements relating to driving under adverse conditions, will be able to identify those that are correct.
Module 2	By the end of this module, the trainees: 1. Given a list of several items, will be able to determine which of the items are impact-absorbing (if struck with a moving vehicle) and which are not. 2. Will be able to state the three primary steps that should be taken in controlling any type of skid. 3. Given several statements relating to off-road recovery, will be able to distinguish those that are correct from those that are not. 4. Given a list of vehicle malfunctions, will be able to describe the appropriate driver response(s) for handling the malfunction.
Module 3	By the end of this module, the trainees: 1. Given a list of several emergency vehicle light arrangements that could be used to warn other motorists, will be able to rate them in order of effectiveness. 2. Given two drawings of a disabled vehicle (off-road and on-road), will be able to indicate proper placement of warning devices (e.g., flares, reflectors).

Figure 4. (Continued)

	PART II SPECIALIZED UNIT
UNIT/ MODULE	TITLE AND OBJECTIVES FOR UNIT
II-P Module 1	Operation of Law Enforcement Vehicles By the end of this module, the trainees: 1. Will be able to list three items of identifying data that should be transmitted to the dispatcher whenever a suspect or violator is spotted. 2. Will be able to write a brief description of the effects of "tunnel vision" and "adrenalin kick." 3. Given a listing of several types of offenders, will be able to identify which fall into the hazardous violator group. 4. Will be able to state two reasons why a pursuit might be abandoned.
Module 2	By the end of this module, the trainees: 1. Given a list of several statements about pursuit driving, will be able to select those which are correct. 2. Given a drawing illustrating several police vehicles and a violator's vehicle, will be able to select the police vehicle that is in the correct position for making a routine traffic stop. 3. Will be able to state whether or not emergency escort of another vehicle is permitted in the department in which he will be working. If escort is permitted, the trainee will state under what circumstances it is permitted.

Figure 5. Course Objectives.

UNIT/ MODULE	TITLE AND OBJECTIVES FOR UNIT
	4. Given a description of two situations, will be able to indicate whether or not it would be appropriate to provide escort, and explain the rationale.
II-A Module 1	Operation of Ambulances By the end of this module, the trainees: 1. Given a list of statements relating to driving to a patient, will be able to identify those that are correct. 2. Will be able to list two reasons why it is not advisable to drive in the emergency mode with a patient aboard. 3. Will be able to name two medical conditions that indicate especially smooth, low-speed transport is required. 4. Will be able to name two conditions that indicate emergency mode transport is required.
II-F Module 1	Operation of Fire Apparatus By the end of this module, the trainees: 1. Will be able to demonstrate, on a large fire apparatus, the daily inspection procedure. 2. Will be able to identify on a large fire apparatus, certain inspection items that do not meet manufacturers recommended specifications.
Module 2	By the end of this module, the trainees: 1. Will be able to state two guidelines which should be followed when more than one vehicle is dispatched from the same direction. 2. Will be able to name the two basic categories of engines found on large fire apparatus.

Figure 5. (Continued)

UNIT/ MODULE	TITLE AND OBJECTIVES FOR UNIT
	3. Will be able to name the two types of transmissions found on large fire apparatus. 4. Will be able to state the primary difference between synchromesh and nonsynchromesh transmissions. 5. Will be able to state the normal operating pressure for air brakes. 6. Will be able to state the normal hydrovac gauge reading. 7. Will be able to state the two basic rules which relate to safe speeds for fire apparatus.
Module 3	By the end of this module, the trainees: 1. Given several statements relating to braking techniques, will be able to identify those that are correct. 2. Given a listing of several different types of emergency vehicles, will be able to rank them according to the priorities at a working fire. 3. Will be able to list three techniques that can minimize the possibility of intersection collisions.

Figure 5. (Continued)

PART III IN-VEHICLE PRACTICE	
UNIT/ MODULE	TITLE AND OBJECTIVES FOR UNIT
III	At the conclusion of Part III, given either a sedan, van, or large truck representative of the type to be used in their emergency service, the trainees will demonstrate proficiency in small area, range, and skid pad maneuvers. Proficiency will be assessed on the basis of: 1. Correctness of the procedure. 2. Smoothness of the maneuver (instructor rating). 3. Whether the maneuver was completed without knocking over any cones. 4. Speed in MPH for completing the maneuver (range exercises only). Specific maneuvers to be demonstrated are: a. <u>Small Area</u> -Dutton's Weave (sedan and van only) -Turnabouts (including side-road and "Y") -Stall Parking (van only) b. <u>Range Exercises</u> -Evasive Maneuver -Serpentine -Baird's Judgment -Lane Change -Controlled Braking -Decreasing-Width Track (large truck only) c. <u>Skid Pad Exercise</u> (sedan only)

Figure 6. Course Objectives.

COURSE PLANNING CONSIDERATIONS

This course has been prepared to be administered by any emergency or public service agency. Listed below are the major topics of concern to administrators in planning for and establishing an EVO Course. Topics covered are:

Instructor Qualifications.

Trainee (student) Qualifications.

Class Size.

Classroom Training Resources.

Scheduling Considerations.

Preparing for the practical (in-vehicle) range exercises described in Part III of the ILP involves numerous special considerations. These are outlined in the next section of this Course Guide.

Instructor Qualifications

For Parts I and II of the course an instructor/trainee ratio 1:15 is acceptable. For Part III, however, a ratio of 1:3 is required. Thus, depending on the class size, several instructors will be needed with the qualifications to teach Part III. Following is a brief description of desirable instructor qualifications for each of the three parts of the course.

Part I

The basic materials for this course (Part I) have been designed so they can be delivered by a single instructor. The capabilities and background of this instructor will depend to some extent on the trainees who are taking the course. For example, if the majority of the trainees are policemen, the trainees would benefit most if the instructor also had a law enforcement background. On the other hand, an instructor with a background in any of the major services could adequately provide the training in the Part I materials.

To some extent, the Part I materials are similar to those provided in an advanced driver education curriculum. For this reason an instructor with some driver education background

would be a suitable candidate for conducting the Part I portion of the course. Certainly, experience and competence as an instructor would be highly desirable.

Whatever his or her experience, before teaching, the instructor must be exposed to the materials of this course; either by taking the course itself or by attending an Instructor Training Institute for this course. Also, prior to teaching the course, the instructor must become familiar with the trainees' post training job environment. This familiarity is absolutely necessary if the instructor is to present a creditable image to the trainees. Familiarity with the trainees' work requirements will enable the instructor to tailor the materials of his or her presentation to the specific job needs of the trainees.

Part II

The instructor for the specialized (Part II) materials must have a background in the service which he or she will be instructing. The two main reasons for this requirement are: (1) The materials focus on the specific service-related needs of the trainees and (2) the content of the Part II materials is fairly broad, leaving room for the instructor to expand the presentation in ways suited to the trainees' needs. Thus, an instructor with a fire-service background may be unable to present effectively the Part II police materials and vice versa. Again, an individual with some prior teaching experience would be desirable. If the class is comprised primarily of trainees from one service, the instructor for Part I and for Part II could be the same individual, provided the instructor meets the requirements for Part II.

Part III

The classroom instructor(s) from Parts I and II may or may not be one of the range (Part III) instructors. By temperament, classroom instuctors might not be suited to providing range instruction and vice versa. In any case, several range instructors will be required to maintain the desired ratio of one in-vehicle instructor for every three trainees.

A great deal of thought and consideration should go into the selection of the range instructors. Both physical abilities and psychological considerations are particularly important.

a. Physical abilities: The range instructors should be in good physical condition, have perfect vision, and quick reflexes.

b. Psychological: The range instructors need to learn all phases of the program. They must be able to deliver difficult concepts in the sometimes stressful range environment. They will have to analyze trainee deficiencies, present the problems in a non-threatening way, and then develop and encourage the trainees in a remedial skill-development program. They must be patient and understand that range instruction is physically tiring and repetitious. Finally, as they work with the program they may need to suggest changes in layout or content.

Even individuals who have the appropriate temperament and abilities must learn how to teach the range exercises. If a range facility, equipment, and vehicles are locally available, the potential instructor could teach themself to administer the practical exercises outlined in Part III of the Instructor Lesson Plans. Inevitably, however, self-taught instructors develop misconceptions and inefficient teaching techniques. It is far better if new range instructors receive guidance and training from experienced instructors before they teach the program themselves.

Several academies and driving schools are qualified to certify instructors for training the practical portion of this course. By requesting information from such schools, an agency can then decide on the appropriate place to send their selected instructors for training. Training agencies are located in Huntsville, Alabama (Police Department); Los Angeles, California (State Trooper, EVOC); and several other areas.

Another approach is through the auspices of the National Highway Traffic Safety Administration. NHTSA typically provides Instructor Training Institutes. These institutes provide each state with at least one qualified teacher of instructors. Arrangements for training a specific set of instructors for a local area should be made through the Governor's Highway Safety Representative's Office.

Student Qualifications

Any individual from an authorized emergency service who possesses a valid drivers license for the class of vehicle to be operated (i.e., sedan or van or truck) is qualified to be a trainee in the course. It is strongly recommended, however, that each trainee be in satisfactory physical condition, since operation of emergency vehicles imposes additional stress and skill requirements on the driver. It is a particularly good idea to ensure that minimal visual requirements are satisfied by all potential trainees. Students should have completed the National Safety Council Defensive Driver Training Course.

Class Size

The Emergency Vehicle Operation Course has been designed for administration to a class not exceeding 15 trainees. The course structure encourages trainees to ask questions and to interact with the instructor and each other during the presentation. Even at the recommended maximum size of 15, such interaction tends to become difficult or dominated by a few of the more vocal trainees.

To a great extent, the availability and particular configuration of range facilities and vehicles will dictate the maximum number of trainees. It is recommended that there be one range instructor for every three trainees and that no more than two vehicles be in operation on the range at the same time (large range areas can set up duplicate versions of the course and accomodate a larger number of trainees at one time). Therefore, with three instructors a maximum of nine trainees can be effectively taught on the range at one time. Even at this ratio, one third of the trainees are always helping by setting up cones, etc., during the range exercises rather than actually receiving in-vehicle practice.

Classroom Training Resources

Range and vehicle facilities are discussed in more detail in the next section of this Course Guide. The following discussion is limited to the facilities, equipment, and materials required for the Part I and Part II classroom presentation.

Facilities

The recommended facility for this training is a large conference room or small lecture hall. Most school classrooms are very well suited to this course. The room should be well lighted to permit the trainees to read their study guides and to take notes. The room should have adequate heating and ventilation or air conditioning to ensure the comfort of the trainees and instructor. The room should be well enough sound isolated to prevent distracting noises.

Each trainee should have a chair and table surface or desk arm at which he or she can take notes. Seating arrangements should be as flexible as possible.

Equipment and Materials

The materials and equipment mentioned below are important to the effective presentation of this course. The course administrator should arrange to procure these items in sufficient quantity to accommodate the anticipated class size. The list includes:

1. Chalkboard with eraser and sufficient chalk or flipchart with grease pencils or felt tip markers.

2. A complete set of transparencies made from the masters at the end of the Instructor Lesson Plans for this course.

3. An overhead projector and screen for showing the transparencies to the class.

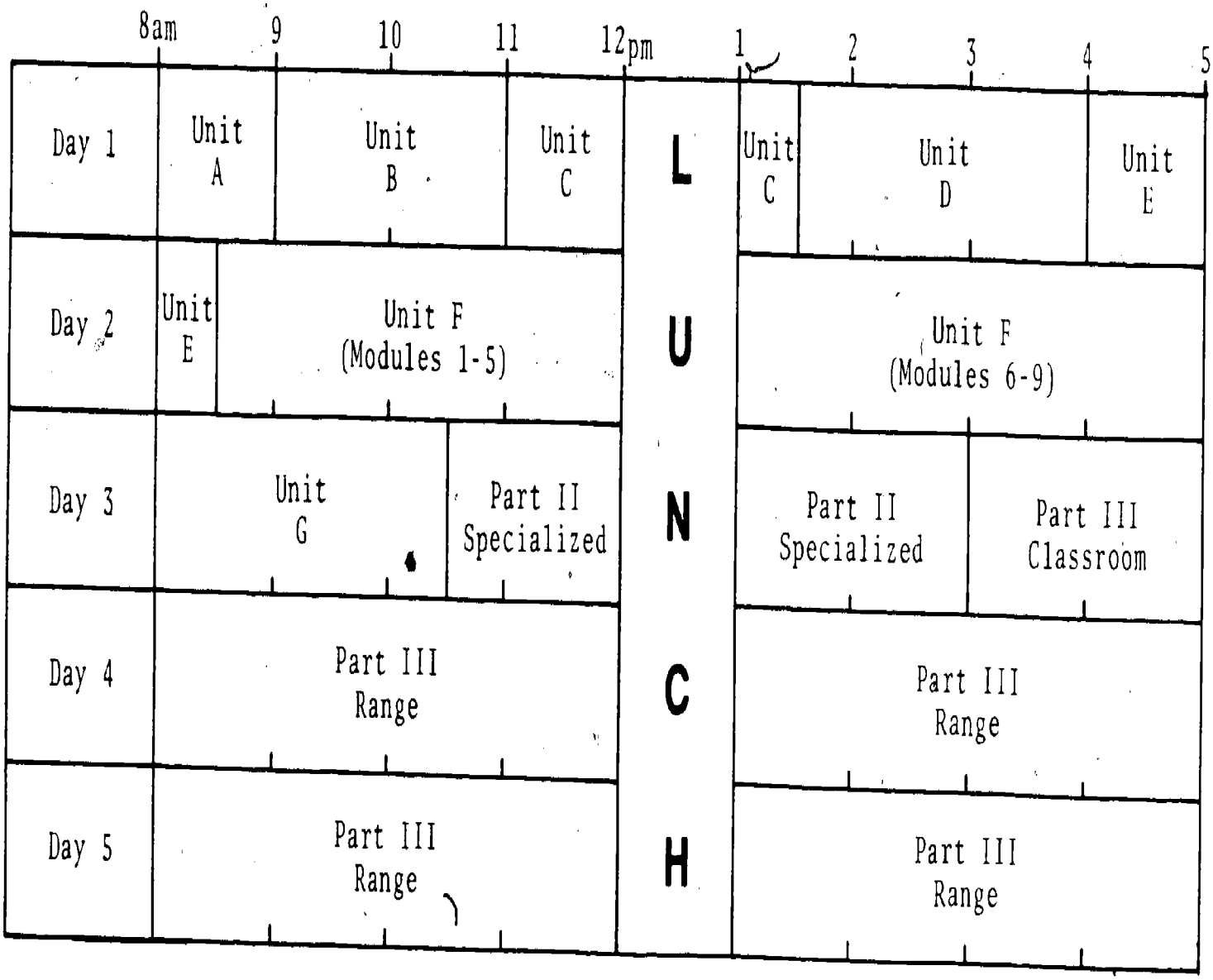
4. A 16mm projector and screen for showing any of the films listed at the end of this course guide. These films have been reviewed and are considered satisfactory for showing during the classroom portion of the EVO Course. Time restraints preclude showing more than about two of the listed films. If the films are provided to the instructor, the administrator should have the instructor determine an optimal place in the schedule for showing the films.

5. Miscellaneous forms, state statutes, etc. In the Instructor Lesson Plans the specific requirements for additional materials are listed in each unit. Generally, the instructor can procure these materials, but the course administrator should review the Instructor Lesson Plans to ensure that all such required materials are available to the instructor.

Scheduling Consideration

The three parts of the Emergency Vehicle Operation Course have been designed to permit maximum flexibility in the scheduling. Figure 7 shows a typical schedule for presenting the course in a 5 day period. The example schedule is a reasonable one, but several points are worthy of note. First, two days of range time is required if the trainees are to develop sufficient driving skill. During the two day range period each trainee will receive about five hours of actual behind the wheel practice. Even five hours is minimal for skill development.

Example Schedule for Emergency Vehicle Operation Training



NOTE: Times shown for each unit are estimates.

Figure 7. Example Schedule for EVO Training.

Thus, in order to provide sufficient behind-the-wheel time, it is necessary that Unit I-F be completed by the end of the second day of training. This allows Unit I-G and Part II to be accomplished before the end of the third day. This way, the instructor will have time at the conclusion of day three, to present the transparencies of the range exercises. The purpose of this presentation would be to provide the trainees with a classroom overview of the Part III portion of the course.

Although the materials for the classroom portion of the course have been carefully selected to be generally useful for training emergency vehicle operators, instructors may elect to take out certain of the units (or modules within the units) in order to shorten the course. It would be possible, on this basis, to reduce the classroom instruction to two days. This reduction would allow the course to be completed in four days or allow three days of range training.

If possible, the EVO Course should be conducted on consecutive days. If the trainee travel requirements are not great, however, the classroom and range training portions could be conducted in different weeks.

SPECIAL REQUIREMENTS FOR THE RANGE/PRACTICAL EXERCISES

Introduction

This section of the Course Guide describes the special requirements for the range area, skid pad area, and the vehicles to be used on the range and skid pad. To assist the reader's review and location of information within the text, the material is presented in "detailed outline" form. Specifically, it covers Range Characteristics, Number and Type of Vehicles, Other Necessary Equipment, and Desirable Equipment. The last portion of the outline, Running the Practical Program, provides some suggestions about administrative matters.

Range Characteristics

A. Size and surface for practical exercises:

1. When selecting a site for the practical exercises, possible areas include:

   a. Commercial or public parking lot, approximately 600' x 600'. An area of this size will allow several exercises to be set up at one time.*

   b. Any 1/2 mile or greater stretch of generally straight four-lane roadway that can be closed off to outside traffic.

   c. Inside areas of raceway ovals or drag strips that are not in use.

   d. Airport runways or sections of airport runways that are not in use.

2. Surface should have the following characteristics:

   a. Grade capable of water runoff, but no more than one (1) percent.

*NOTE: A smaller area can be used, but is less practical. The smaller the area, the fewer the number of exercises that can be set up at one time.

b. Surface that corresponds to actual road surfaces in the general area (e.g., asphalt, concrete).

c. Free of potholes, curbs, construction, and shoulder dropoff.

B. Size and surface of skid pad:

1. Select an area with the following characteristics:

a. Approximately 36' wide and 300' long.

b. Located in an area free of buildings, poles, or any constructions.

c. The area (whether paved or earth) surrounding the skid pad should be free of holes, trenches, bumps, debris, etc., to allow for lost-control recovery.

2. Surface should have the following characteristics:

a. Pad should be graded with center drain to retain water (no runoff).

b. Skid area should be free of curbs, dropoffs, potholes, etc.

c. Relatively smooth asphalt (blacktop) surface. Rougher asphalt can be used, but skid conditions will be more difficult to create.

C. Special considerations for vans and large trucks:

1. The sizes of areas mentioned above should be sufficient for larger vehicles. The layout (dimensions) of the exercises, however, will need to be expanded according to specific vehicle size. Additionally, speed may need to be adjusted somewhat.

2. Skid pad: It is not practical (for safety reasons) to expose larger equipment to skid pad exercises. Trainees who will operate larger equipment on the job should go through the exercises in the smaller skid vehicle.

Number and Types of Vehicles

A. Number of vehicles is dependent upon the number of qualified instructors who will be available to instruct. Ideally:

1. There will be one instructor for every three trainees. (And, consequently, one vehicle for every three trainees.*)

2. One "extra" vehicle available (in case of mechanical difficulty) to avoid down-time.

B. General characteristics:

1. All vehicles should be representative of their type, in good mechanical condition:

2. Sedans:

   a. Standard, four-door, representative of the type used on the job.

   b. A high-displacement engine is recommended for obtaining proper speeds in short distances. It should not be forgotten, however, that it is best to train with equipment as equal as possible to that used on the job.

   c. A heavy-duty suspension or "special police package" is recommended. (Heavy-duty or police-package equipped vehicles generally require less maintenance.)

   d. It is advisable to require that each of the range exercise units be equipped with visa-bars with lights and siren, for safety purposes.** These features allow a more realistic "field" situation and permit the vehicles to be seen more easily.

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*NOTE: Given a range of the larger dimensions specified, only two vehicles can be safely run at one time. Instructors can, however, devote time to briefing and de-briefing trainees, inspection, and maintenance activities when not on the driving range.

**NOTE: This equipment is not required for the skid-pad unit.

e. Transmission:

1) For the practical exercises; a three-speed automatic transmission (rear-axle with a ratio of 3.42 to 1) is most practical for maximum power and acceleration.

2) For the skid-pad: Standard, three-speed transmission is sufficient.

f. Tires:

1) Regular, four-ply tires are recommended. Expense is a big consideration; a set of tires may be worn out in several hours of heavy use on a rough-surface range. Good quality recaps are often the best choice.

2) Radial tires are NOT recommended unless they are standard on vehicles to be used on the job. Radials have better holding capability and may require that the practical maneuvers be run at higher speeds than would be necessary with four-plys. Also, under certain conditions, radials wear faster than regular four-ply tires.

g. Power steering is recommended for all vehicles.

h. Interior:

1) The use of roll bars on practical exercise vehicles is strongly recommended. The use of roll bars on the skid pad vehicle is MANDATORY.

2) A fire extinguisher (suitable for types A, B, and C fires) is MANDATORY equipment for each vehicle. It should be well secured in the vehicle, within reach of trainee and instructor. (One practical place is the drive shaft hump in the front floor board.)

3) Lap belts and shoulder harnesses are MANDATORY equipment for all vehicles. Heavy-duty belts, such as those used in air craft are preferred, but standard belts are satisfactory.

4) Two-way radios in each unit are advisable for safety reasons, and for total coordination of the range operation.

5) Air conditioner and heater provide for a better learning/teaching environment in extreme weather.

3. Special considerations for larger vehicles: It is understood that it may be difficult to alter the standard equipment furnished by the manufacturer. Safety is important, however, and the characteristics relating to safety should be implemented whenever possible.

Other Necessary Equipment

A. Range:

1. A first-aid kit equipped for minor injuries.

2. Traffic cones:

   a. Approximately 125 to 140 12" to 14" cones, safety orange in color. This is sufficient for obstacles and replacement cones.

   b. Approximately 20 to 25 16" to 22" cones, safety orange in color for use as key and obstacle point cones.*

3. A roller tape or a regular 100' tape measure will be needed for marking off and setting up the obstacles.. (the roller tape is more practical and faster.)

4. Several different colors of spray paint are useful for marking the configuration of each exercise and the location of cones for easy construction of the exercises.

5. A safety helmet for every occupant of every vehicle is MANDATORY equipment.

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*NOTE: If more than one course will be set up (for different types of vehicles, etc.) the quantity of cones will need to be increased proportionately.

6. Extra fire extinguishers for the supply vehicle and the command post are recommended.

7. Extra tires, wheels, and jacks will be needed and should be available.

8. Perimeter markers and "Restricted Area" signs are recommended for securing the area. If permanent perimeter markers are erected, they should be well clear of the driving and recovery areas.

9. A water supply is necessary for wetting-down the skid pad. This can be done with a water supply pipe located near the skid pad, or by use of a tank truck.

B. Special consideration for larger vehicles: All items listed should apply without major modification.

Desirable Equipment*

A. A course support vehicle, in the form of a golf cart or cycle vehicle can be a great time saver. With one person manning the vehicle it can be used to set up cones knocked over in the course of the exercises, and to pick up needed equipment from the utility vehicle or base station (e.g., jacks, wheels, oil). This vehicle does not require a permanently installed radio, but a walkie talkie or hand-held two-way radio linking it to the course vehicles would be most valuable.

A utility supply vehicle for setting up the exercises (carrying the cones) and for carrying maintenance equipment is a valuable aide. This vehicle should be large enough to contain and carry all equipment needed for setting up the exercises, maintenance equipment, and safety equipment. If the storage facilities are close enough to the training area, the size of the vehicle can be smaller because of the relatively easy access to equipment.

C. An observation tower (command post) for observation and co-ordination of range activities should be located so as to allow a control officer full view of the entire training area. If possible, radios in the vehicles can be tied into the observation tower for coordination of activities.

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*NOTE: In the satisfactory operation of any program, some items of equipment, although not required, contribute to the easy flow of the operation. The items listed under "Desirable Equipment" are of this type.

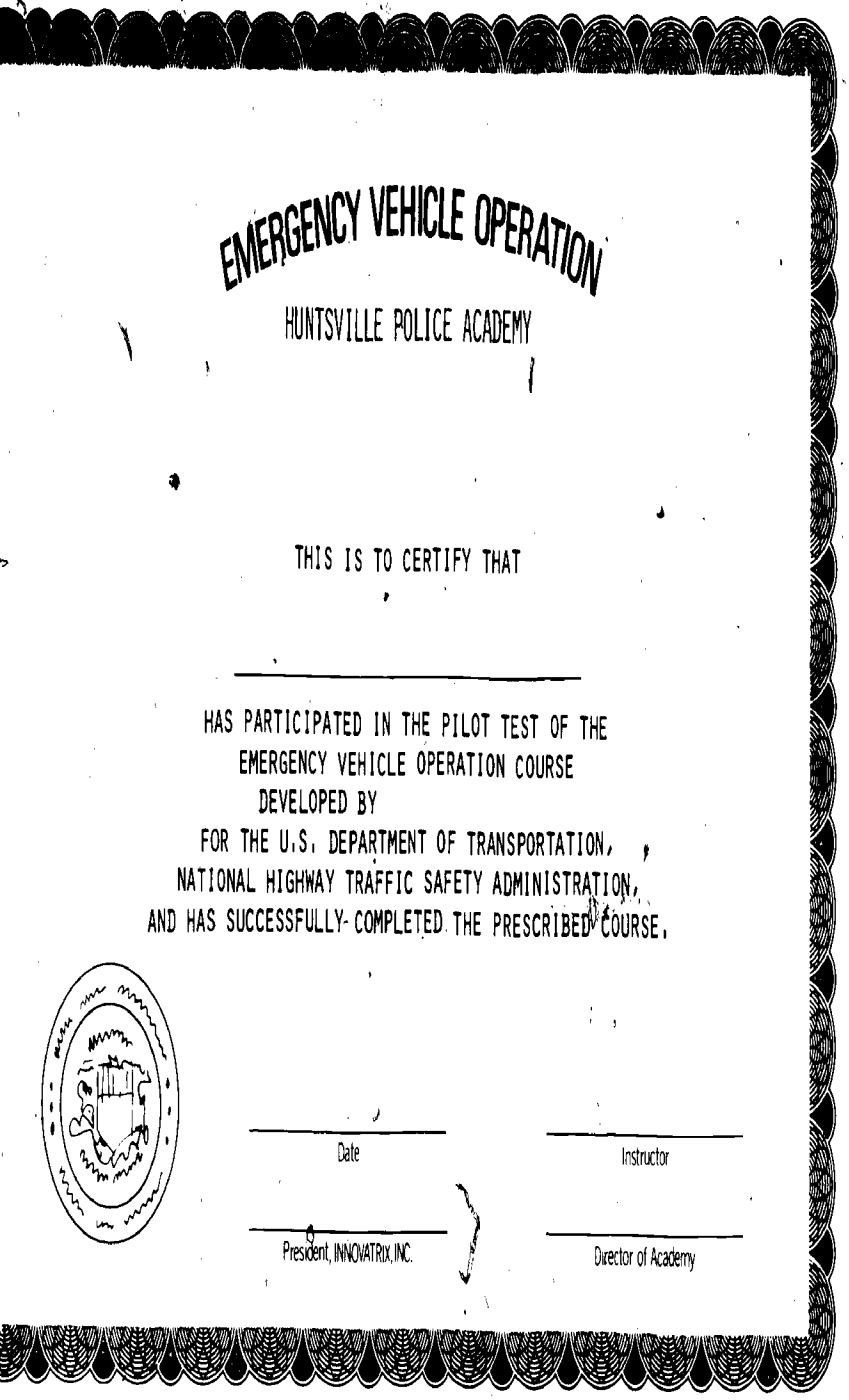
C. If the observation tower is constructed, or if a mobile observation tower is used, it should be located to conform to the safety requirements.

D. It is a good idea to test each trainee, prior to track exercises, for any visual deficiency he may not be aware of and that should be corrected. Consequently, a visual acuity testing machine, or minimally, a Snellen eye chart is desirable.

E. Audio-visuals are valuable training aids. Transparancies of the exercises can be a valuable tool for the instructor. Additionally, any films illustrating the principles demonstrated in the range exercises are helpful additions to the training (see list of films at the end of this Course Guide).

F. The use of state recognized Certificates of Completion acts as a reward for the trainees, for satisfactory completion of the course. Additionally, if training is conducted on a local or departmental level, copies can be entered into personnel files. There are some legal situations (liability suits) in which the departmental certificate along with a file of the trainee's performance records or grades might be valuable. (See Figure 8.)

G. Special considerations for larger vehicles: If more than one set of range exercises are to be set up, it may be desirable to have a larger utility supply vehicle.



EMERGENCY VEHICLE OPERATION

HUNTSVILLE POLICE ACADEMY

THIS IS TO CERTIFY THAT

_____

HAS PARTICIPATED IN THE PILOT TEST OF THE
EMERGENCY VEHICLE OPERATION COURSE
DEVELOPED BY
FOR THE U.S. DEPARTMENT OF TRANSPORTATION,
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION,
AND HAS SUCCESSFULLY COMPLETED THE PRESCRIBED COURSE.

Date

Instructor

President, INNOVATRIX, INC.

Director of Academy

Figure 8. Certificate of Completion used in Pilot Test of EVO Course

A. Legal matters--under proper operation of the program, there is little possibility of any major accident or incident taking place. As a precautionary measure, however, the legal aspects should not be overlooked. For instance, if commercial parking lots will be used, the agency may want to provide the business or company with a release if injury does occur, or it may guarantee compensation if private property is damaged. The city attorney can provide legal advice.

B. Procuring equipment--many avenues are available for procuring needed equipment for the practical program.

1. The training area (range) itself can usually be found in the private sector (if the department does not have it's own facilities or if it cannot make appropriate arrangements with other public agencies). In many cases, company officials or private businessmen are more than willing to assist by letting their company's parking area be used for this program.

2. In most cases, department vehicles that are still in service (or vehicles that are to be phased out) can be used. Obviously, these vehicles should be in good mechanical order, or repaired to meet specifications before they are used. Automobile dealers or manufacturers are often willing to assign several vehicles for use in a program of this type. Generally, the only stipulation is that records be kept on the vehicles' mechanical and other performances.

3. Tires may need to be purchased through the appropriate agency budget, although some manufacturers will furnish tires for experimental purposes.

4. Perimeter poles and restricted-area signs may be available from other city or local departments.

5. Most of the other items such as code equipment, helmets, cones, etc., will have to be purchased.

MONITORING/EVALUATING THE COURSE*

An important function in the administration of this course is quality control. Training personnel should have as their primary goal producing graduate emergency vehicle operators who can successfully accomplish their emergency vehicle operation functions. Everything they do should be directed toward this goal. Even under good conditions, however, the course may not be presented as originally conceived and planned. Therefore, training personnel should be informed that the Emergency Vehicle Operation Curriculum will be evaluated to detect and correct situations which detract from achievement of the primary goal. All of these individuals should be fully aware that evaluation is a positive process; that it is the only way of providing needed feedback to ensure the continuing high quality of course graduates.

For purposes of this course, two general types of evaluation are appropriate. The first of these, internal evaluation, is also called "course review." This form of evaluation focuses only on the characteristics of the course itself. An internal evaluation will identify some of the problems with the components of the course or its administration, and suggest where improvements should be made. Field evaluation completes the picture. Field evaluation determines what the graduate license examiner does in his field assignment and how well he is performing as an emergency vehicle operator. The results of both forms of evaluation are used to determine better ways for achieving the primary goal of preparing well trained operators.

The following discussion of internal and field evaluation is a general-level presentation of an optimal process for improving the quality of instruction. Given real-world constraints of time and resources, it may be impractical to accomplish all aspects of the process. Nevertheless, it is desirable to strive to achieve as much of the process as possible. The better the quality control program, the more efficient and effective emergency vehicle operation will be.

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*NOTE: Many passages in this section of the Course Guide are paraphrased from Volume V of:

Schumacher, S.P., & Glasgow, Z.A. Handbook for designers of instructional systems (5 volumes). Valenia, Pa.: Applied Science Associates, Inc., March 1974. Also published by U.S. Department of the Air Force. AFP 50-58, January 1974.

Internal Evaluation

Internal evaluation will help to identify specific causes of instructional failure, i.e., the reasons why trainees fail to achieve satisfactory performance during the course. Some possible causes of such failure include:

1. The instructor activities don't conform to the lesson plans.

2. Resources, facilities, or materials are inadequate.

3. The trainees do not satisfy the student selection requirements specified in this Course Guide.

4. Locally developed practice exercises are not sufficiently comprehensive or representative.

5. Student/instructor ratio is too high.

6. Instructor is not well qualified to teach this course.

7. Course objectives were too difficult to achieve in the time allotted.

The purposes of the internal evaluation are to isolate the causes of instructional problems and to gather sufficient data to decide how to alleviate the problem. The internal evaluation process for gathering sufficient data and isolating the problem starts with an analysis of the course planning and control documents (course guide, schedule, lesson plans, etc.). Then each component and procedure authorized and/or required by these documents is studied to see that it conforms to the control document specification. Discrepancies between the planned course and what occurs during the actual training program might be found.

1. Resources. This Course Guide and the Instructor Lesson Plans indicate the requirement for specific training facilities, equipment, tools, and supplies in order for the course to accomplish the stated objectives. The internal evaluation will determine whether such facilities and services are adequate. When deficiencies are found, corrective action should be recommended.

2. Classroom Facilities and Conditions. Control documents and a specification of existing resources may not provide sufficient information for the internal evaluation. Classroom visits of sufficient length and frequency to ensure representative sampling are useful. Specified trainers, media, and aids should be checked for condition, operation, and appropriateness. Also the instructional supporting documents, including the lesson plans and study guides, should be checked for availability and quality.

3. Range Facilities. Records of trainee performance in the range and reaction of the range instructors to the facilities and range resources should be solicited. Missing or inadequate resources must be provided or replenished quickly or morale problems may develop. Likewise, if the number of range instructors or the range itself is inadequate for the number of trainees, corrective steps should be quickly implemented.

4. Instructors. It is also important to determine that instructors' activities conform to those specified in the lesson plans. Instructors must show acceptable application of sound instructional techniques. They must be able to detect student problems, and react to student needs. Required instructor records must be current.

5. The Measurement (Testing) Program. The most important element of the internal evaluation is an examination of student performance on the the end-of-unit tests (both classroom and range). A satisfactory measurement program should:

   a. Provide students and instructors with goals.

   b. Inform each student of his progress in meeting program objectives.

   c. Establish a permanent record of each student's achievement, and make it available to the student.

   d. Identify any need for a remedial program.

e. Identify the course objectives not met by individual students.

f. Provide feedback to establish a constant quality-control check on the entire program.

Field Evaluation

It is possible for a training program to satisfy the internal evaluation criteria while failing to achieve its primary objective of training emergency vehicle operators to perform their driving activities satisfactorily. Reasons include:

1. "Customizing" of the materials was undertaken but not handled adequately; e.g., training units or modules necessary to establish good job performance were deleted during the customizing process.

2. The job requirements changed after the course was developed, or were incorrectly identified in the first place.

3. The graduates are not sufficiently motivated by the job itself to perform it satisfactorily. That is, their performance on the job might stay at the same level, or degrade over time, rather than improve.

Field evaluation is absolutely essential even when the internal evaluation and end-of-unit test performance are satisfactory. It is still necessary to ascertain that the job requirements are being adequately accomplished by the course graduates. Supervisors' and graduates' opinions of how well the training program prepares students to operate their emergency vehicles should also be determined. Their suggestions for improvements are often invaluable.

The four primary methods of collecting field evaluation data are: Questionnaires, observing the graduate on the job, interviewing the graduate, and interviewing the graduate's supervisor.

1. Questionnaires. The use of questionnaries is the least expensive procedure for field evaluation. They may yield a large amount of data from large samples of graduates. However, the data obtained

by mail questionnaries tends to reflect how it was prepared and distributed. Questionnaires must be carefully prepared, properly distributed, objectively executed, and critically analyzed. When properly handled, evaluation by questionnaries can provide constructive information on:

a. The ability of recent graduates to operate their emergency vehicles proficiently.

b. The specific nature of instructional deficiencies, as seen by the graduates.

c. Details of the jobs actually being performed by the graduates.

d. Instruction not needed by the graduates in their jobs.

2. Observing the Graduate. Watching graduates perform can provide some indication of their proficiency. However, observers should be technically qualified to evaluate the emergency vehicle operation. Notes should be made detailing which tasks are performed, unusual situations, and problems encountered. The graduate's attitude should be noted if it appears attitude might have an impact on job performance. Clearly, observation should not disrupt the emergency service.

3. Interviewing the Graduates. Whether or not graduates are observed on the job, a representative sample should be interviewed three to six months after they are assigned to the service. If necessary, telephone interviews may be used. Examiners should be interviewed to obtain background information and to get their ideas of how well the training prepared them for their present assignments as operators of emergency vehicles. A preplanned list of questions designed to get honest, pertinent answers should be used.

4. Interviewing the Supervisor. The operators' supervisors should also be contacted. They have the opportunity to observe or hear of the graduates' performance over a long period of time. Their appraisal is significant and valuable. The focus of the interview with the individual supervisors should be on determining the examiner's proficiency as an operator. A list of questions should be prepared and used as a guide when conducting the interviews.

Summary

Analysis of the internal and field evaluation data should bring out strengths and weaknesses in the Emergency Vehicle Operation Curriculum. All training programs have weaknesses. The aim of quality-control measures is not to create a perfect training system. Rather, it should focus the decision maker's attention on those problems which directly compromise the goal of preparing operators to be more effective as drivers of emergency vehicles. Good evaluation will assure a steady flow of timely, pertinent data for maintaining both quality and cost-effectiveness of the emergency vehicle operators in each of the emergency services.

APPENDIX

Audio Visual Directory

AUDIOVISUAL DIRECTORY

	Title/Time Distributor	Description
A.	A Matter of Judgment (20 minutes) Highway Safety Films, Inc. PO Box 3563 890 Hollywood Lane Mansfield, OH 44907	Demonstrates six skid-school exercises and techniques for maintaining control of car. Charts show stopping distance required under various weather, tire tread, and speed conditions. Stresses driver responsibility as to: -Use of turn signals and seatbelts. -Knowing the destination. -Checking tread and pressure of tires. -Awareness of driving environment. -Social responsibilities to other drivers and pedestrians.
B.	Ambulance Driver Course (100+ slide program) Mr. Charles Eisele Motor Vehicle Safety Division Department of the Navy Naval Safety Center Norfolk, VA 23511	Slides accompany training document. Covers driving situations in which a high frequency of ambulance accidents occur, such as backing and negotiating intersections.
C.	Ambulance Run (25 minutes) Film Communicators 11136 Weddington Street North Hollywood, CA 91601	Points out the most common vehicle operation errors committed by ambulance drivers, using dramatic scenario.

	Title/Time Distributor	Description
D.	Defensive Driving I, Normal Speeds (AC-33) (20 minutes) Motorola Teleprograms, Inc. 4825 N. Scott St. Suite 23 Schiller Park, IL 60176	Uses dramatic incidents to illustrate defensive driving techniques useful for police officers.
E.	Defensive Driving II, Routine (AC-57) (20 minutes) Motorola Teleprograms, Inc. Same as above.	Illustrates advanced defensive driving techniques; emphasizes evaluating urgency of emergency versus driving risk.
F.	Defensive Driving III, Code 3 (AC-59) (20 minutes) Motorola Teleprograms, Inc. Same as above.	Illustrates effective emergency response driving; discusses legal liability and physical principles affecting high-speed vehicle.
G.	Defensive Driving IV, Pursuit Driving (AC-70) (20 minutes) Motorola Teleprograms, Inc. Same as above.	Discusses distinction between rational high-speed driving and tactics which are dangerous and destructive of the vehicle; emphasizes making judgments.
H.	Emergency Vehicle Operations Course (25 minutes) Aims Instructional Media Services, Inc. 626 Justin Avenue Glendale, CA 91201	Illustrates high-speed automobile control techniques being practiced by California Highway Patrolmen at their driving range. Makes brief reference to physical principles of momentum and coefficient of friction.
I.	Fire--Code 3 (15 minutes) Film Communicators 11136 Weddington Street North Hollywood, CA 91601	Illustrates techniques useful in the operation of large emergency vehicles.

Title/Time Distributor	Description
J. Freeway Driving Tactics (15 minutes) Aims Instructional Media Services, Inc. 626 Justin Avenue Glendale, CA 91201	Depicts freeway driving techniques to ensure safety, including: -Route planning. -Entering and exiting. -Changing lanes. -Leaving traffic flow and vehicle malfunction. -Speed/following distance/stopping distance.
K. It's Your Decision (30 minutes) Liberty Mutual U.S. Steel Building 600 Grant Street Pittsburgh, PA 15219	Demonstrates the five steps involved in decision driving including: -Look ahead. -Evaluate. -Signal. -Plan escape route. -Take decisive action.
L. Night Driving (15 minutes) Aims Instructional Media Services, Inc. 626 Justin Avenue Glendale, CA 91201	Discusses aspects of night driving that impact on safety, including: -Drowsiness. -Hypnosis. -Use of high and low beams. -Adjusting speed to visibility and weather conditions.
M. Police Pursuit (15 minutes) Film Communicators 11136 Weddington St. North Hollywood, CA 91601	Illustrates training of policemen in pursuit driving.

Title/Time Distributor	Description
N. Six Deadly Skids (30 minutes) Liberty Mutual U.S. Steel Building 600 Grant Street Pittsburgh, PA 15219	Illustrates techniques for recovering from the six basic skids; discusses defensive driving.

* U.S. GOVERNMENT PRINTING OFFICE : 1978 O - 276-230/6510