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**Date:** June 10, 2020

**Attachment 22**

**To:** John Binaski, Chair  
Statewide Training and Education Advisory Committee  
c/o State Fire Training

**From:** Jim Eastman, Fire Service Training Specialist

**SUBJECT/AGENDA ACTION ITEM:**

Emergency Vehicle Technician 1, 2, and 3 (2020) - Curriculum and Certification Update

**Recommended Actions:**

Information/Discussion

**Background Information:**

This document is intended to provide information for all State Fire Training (SFT) stakeholders on the new Emergency Vehicle Technician (EVT) curriculum and certification requirements. Stakeholders are encouraged to study this information carefully and seek clarification from SFT if questions arise.

The Emergency Vehicle Technician (2020) curriculum and certification requirements will be phased in for the California Fire Service Training and Education System (CFSTES). A new Certification Training Standard (CTS) and five (5) Course Plans have been developed based on current National Fire Protection Association (NFPA) Standards which includes NFPA 1071, Standard for Emergency Vehicle Technician Professional Qualifications (2020). The CTS and Course Plans will be available on the SFT website.

The CFSTES was established to provide a single statewide focus for fire service training in California. CFSTES is a composite of all the elements that contribute to the development, delivery, and administration of training for the California Fire Service. The authority for the central coordination of this effort is vested in the State Fire Training (SFT) of the California State Fire Marshal's Office with oversight provided by the State Training Education Committee (STEAC) and State Board of Fire Services (SBFS).

*"The Department of Forestry and Fire Protection serves and safeguards the people and protects the property and resources of California."*

One of the most historical established stakeholders within CFSTES is the California Fire Mechanics Academy, Incorporated (CFMA). CFMA is the oldest and largest Emergency Vehicle Technician Training Academy in the United States (U.S.). Since 1970, CFMA has been providing the finest training opportunities for emergency apparatus repair and maintenance. CFMA workshops are very hands-on, giving participants not only the theory but the opportunity to work on emergency vehicles, take pumps apart, while getting their hands on the actual apparatus they will be encountering in the field.

Historically, CFMA has been using instructors from the industry such as fire apparatus manufacturers, pump manufacturers, transmission manufacturers and other manufacturers that provide apparatus and replacement components for emergency response equipment in California and throughout the United States. These manufactures have very specific guidelines and restrictions for who is qualified and allowed to make authorized manufacturer repairs to stay within guidelines of warranties and or maintaining manufacturers designed recommendations. These instructors are not registered as instructors with SFT. Historically, the quality assurance of these instructors has been maintained directly by CFMA.

A joint meeting was held with SFT Staff, CFMA representatives, and Chief Coleman on August 18, 2014. At this meeting, Chief Coleman presented a brief historical review of STEAC from the 1980's up to the current Blueprint 2020. Some discussion centered around the utilization of these instructors. Chief Coleman challenged the group of attendees by asking this question, "How do we redesign the future? By designing where you want to be."

At this meeting, it was identified to continue with the direction to update the curriculum to model and streamline with the standards developed and adopted by NFPA.

### **Development Cadre Members (NFPA 1071 - 2016)**

Lawrence Achen, Training Captain, Central Fire Protection District and Santa Cruz Vice President, California Fire Mechanics Academy, Inc.; John Borges, Burtons Fire Apparatus; Anthony Bulygo, Santa Clara County Fire Department (retired) and Northern/Southern California Liaison, California Fire Mechanics Association; Boyd Clegg, San Ramon Valley Fire Protection District (retired) and Instructor, California Fire Mechanics Academy, Inc.; Doug Link, San Miguel Fire Protection District (retired) and Treasurer, California Fire Mechanics Academy, Inc.; Mark McLean; Los Angeles City Fire; Rick Nogueira, Fleet Mechanic, San Ramon Valley Fire Protection District and President, Northern California Fire Mechanics Association; Marty Schmeltz, Emergency Vehicle Services Advisor and Valley Power Systems and Past-President, California Fire Mechanics Academy, Inc.; Validation: Shea Pursell, Fleet Manager, Sac Metro Fire District

### **Cadre Leadership**

Allison L. Shaw, Cadre Editor and California State University, Sacramento; Jim Eastman, Cadre Leader, Sacramento Metro Fire District (retired) and Training Specialist III, Office of the State Fire Marshal, State Fire Training.

## **Analysis/Summary of Issue:**

Following is an analysis of these new CFTES courses.

1. In 2018, there was a presentation to State Training Education Advisory Committee (STEAC) to adopt curriculum to the National Fire Protection Association (NFPA) Standard, NFPA 1071, Standard for Emergency Vehicle Technician Professional Qualifications (2016). This curriculum was approved and adopted by STEAC and State Board of Fire Services (SBFS).
2. During this transition and prior to implementation of the new curriculum, the NFPA Standard was again updated. NFPA 1071, Standard for Emergency Vehicle Technician Professional Qualifications (2020) was released. SFT along with CFMA decided to quickly adapt to this updated standard.
3. Additional Standards from NFPA will be utilized in the SFT curriculum and by instructors such as, but not limited to, NFPA 1911, Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Emergency Vehicle (current version).
4. SFT recognizes that many candidates are vested in the current Fire Mechanic (2014) Certification track and, therefore, the existing Fire Mechanic (2014) curriculum and certification requirements will be available for those candidates during this transition period. The new certification will accommodate both new and current candidates to transition to the Emergency Vehicle Technician Curriculum (2020).
5. EVT Candidates will be evaluated in their current level of certification as Fire Mechanics and guided through a cross walk moving from the Mechanic level to the new NFPA Emergency Vehicle Technician level. Example: A current valid Fire Mechanic 1 will cross over to Emergency Vehicle Technician 1 after completing any additional requirements that require completion as per the NFPA Standard.
6. New Curriculum Emergency Vehicle Technician 1 (2020) includes:
  - EVT 1A: Emergency Vehicle Systems: Chassis, Cab, Body, Tank and Accessories 36 Hours
  - EVT 1B: Electrical Systems A (2020) 36 Hours
  - EVT 1C: Pumps and Accessories (2020) 36 Hours
7. New Curriculum Emergency Vehicle Technician 2 (2020) includes:
  - EVT 2A: Electrical Systems B (2020) 36 Hours
8. New Curriculum Emergency Vehicle Technician 3 (2020) includes:
  - EVT 3A: Human Resource Management / Fleet Specifications and Records (2020) 28 Hours
9. The CFMA utilizes instructors recognized as manufacturer experts to deliver, train, approve and authorized repairs, direct maintenance and or modifications as authorized by the industry manufacturers within the guidelines of their design and operation. These instructors will be managed by a registered Instructor of Record in conformance with SFT regulations. The SFT Ethical Leadership for the Instructors course will be a requirement for manufacturer experts delivering SFT curriculum.
10. Recertification training is a recognized standard with SFT and CFMA. To align with the NFPA Standard, all certified EVT personnel will maintain 100 hours of approved recertification training every five years. This training will be monitored by CFMA and submitted to SFT during the recertification of the EVT applicants.

*NFPA 1.2.6.1 To obtain and maintain qualification as an emergency vehicle technician, persons shall furnish documentation showing that they have completed 20 hours of initial or continuing education on an annual basis.*

11. Effective August 1, 2020, the Fire Mechanic 1, Fire Mechanic 2, and Fire Mechanic 3 curriculum and certification will be retired December 31, 2021 and with which Emergency Vehicle Technician 1, 2, and 3 certifications will be fully implemented.

This staff report is being presented as initial information to initiate consideration and review for approval by STEAC at the next scheduled meeting.



# EMERGENCY VEHICLE TECHNICIAN (2020) Certification & Curriculum Implementation Plan

Issued: August 2020

## OVERVIEW

This document is intended to provide information for all State Fire Training (SFT) stakeholders on new Emergency Vehicle Technician (EVT) curriculum and certification requirements. Stakeholders are encouraged to study this information carefully and seek clarification from SFT if questions arise.

The Emergency Vehicle Technician (2020) curriculum and certification requirements will be phased in for the California Fire Service Training and Education System. A new Certification Training Standard (CTS) and five (5) Course Plans have been developed based on current National Fire Protection Association (NFPA) Standards which includes NFPA 1071, Standard for Emergency Vehicle Technician Professional Qualifications (2020). The CTS and Course Plans are now available on the SFT website.

## EMERGENCY VEHICLE TECHNICIAN 1, 2, AND 3 (2020) IMPLEMENTATION

SFT recognizes that many candidates are vested in the current Fire Mechanic (2014) Certification track and, therefore, the existing Fire Mechanic (2014) curriculum and certification requirements will be available for those candidates during the transition period. The new certification will accommodate both new and current candidates to transition to Emergency Vehicle Technician (2020).

New Curriculum Emergency Vehicle Technician 1	Hours
EVT 1A: Emergency Vehicle Systems: Chassis, Cab, Body, Tank and Accessories (2020)	36 Hours
EVT 1B: Electrical Systems A (2020)	36 Hours
EVT 1C: Pumps and Accessories (2020)	36 Hours

New Curriculum Emergency Vehicle Technician 2	Hours
EVT 2A: Electrical Systems B (2020)	36 Hours

New Curriculum Emergency Vehicle Technician 3	Hours
EVT 3A: Human Resource Management / Fleet Specifications and Records (2020)	28 Hours

**Emergency Vehicle Technician (2020) Curriculum and Certification..... Available August 1, 2020**  
Effective August 1, 2020, EVT 1, EVT 2, and EVT 3 curriculum and certifications will be available.

### Certification Task Books:

Implementation of the new Emergency Vehicle Technician (2020) certification levels require that candidates complete a certification task book. This requirement will apply to candidates moving to



# EMERGENCY VEHICLE TECHNICIAN (2020) Certification & Curriculum Implementation Plan

the next level of EVT certification. This task book covers all of the job performance requirements contained in the aforementioned professional qualification standards and CTS. Emergency Vehicle Technician certification applicant may initiate a task book and obtain verification signatures for job performance requirements (JPR) demonstrated during training.

For applicants employed by a California Fire Agency, the Fire Chief is the individual who reviews and confirms the completion of a candidate’s certification task book. For applicants employed by a public agency (non-fire agency) or private industry, the highest-ranking individual (i.e Fleet Manager) is the individual who reviews and confirms the completion of a candidate’s certification task book. All experience and employment used to meet the certification task book requirements must be completed within California.

## **FIRE MECHANIC 1, 2, 3 (2014) RETIREMENT**

SFT recognizes that many applicants are vested in the Fire Mechanic 1, 2, and 3 (2014) and, therefore, the existing curriculum and certification will be available for those applicants during the transition period. The new certification will accommodate both new and current candidates to transition to the Emergency Vehicle Technician Curriculum (2020).

EVT Candidates will be evaluated at their current level of certification and guided through a cross walk moving from the Mechanic level to the new NFPA EVT level. Example: A current valid Fire Mechanic certification will cross over to Emergency Vehicle Technician certification after completing any additional requirements.

**Fire Mechanic (2014) Curriculum and Certification Retirement ..... December 31, 2021**  
Effective January 1, 2022, the Fire Mechanic 1, Fire Mechanic 2, and Fire Mechanic 3 curriculum and certification will be retired.

## **INSTRUCTOR REQUIREMENTS**

**Instructor Registration ..... Available August 1, 2020**

### **Current Fire Mechanic Registered Instructors:**

Instructors for the new EVT courses must continue to meet the SFT requirements for Registered Instructor. In addition, the following transition period is available until the Fire Mechanic (2014) Curriculum and Certification retirement on December 31, 2021:

**EVT 1A: Emergency Vehicle Systems: Chassis, Cab, Body, Tank and Accessories (2020):** Current Registered Instructors of Fire Mechanic 1: Fire Pumps and Accessories, Fire Mechanic 3A: Ambulance Service and Maintenance, and/or Fire Mechanic 3B: Aerial Apparatus courses are authorized to deliver this course.



# EMERGENCY VEHICLE TECHNICIAN (2020) Certification & Curriculum Implementation Plan

**EVT 1B: Electrical Systems A (2020):** Current Registered Instructors of Fire Mechanic 2A: Fire Apparatus Electrical Systems course are authorized to deliver this course.

**EVT 1C: Pumps and Accessories (2020):** Current Registered Instructors of Fire Mechanic 1: Fire Pumps and Accessories course are authorized to deliver this course.

**EVT 2A: Electrical Systems B (2020):** Current Registered Instructors of Fire Mechanic 2A: Fire Apparatus Electrical Systems course are authorized to deliver this course.

**EVT 3A: Human Resource Management / Fleet Specifications and Records (2020):** Current Registered Instructors of Company Officer 2A: HR Management and has completed the Specifications Writing course (CFMA).

## **New Emergency Vehicle Technician Instructors:**

Instructor for the new EVT courses must meet the requirements for SFT Registered Instructor and will need to take the new course or apply through the PACE II process. The PACE II is a review of an applicant's qualifications, including appropriate education and practical experience relating to course content. This will include course completion and/or review of extensive experience and competency in directly related subject matter. In addition, a new instructor must meet the following requirements:

- Extensive experience directly related to the content of instruction that the candidate is seeking approval to deliver approved SFT Curriculum (See Instructor Task Book). Baseline experience established by the industry is 10,000 hours (5 years) in the direct field of the heavy automotive industry work. Of the five year experience, one year must be in a California fire department, California public agency, or California private industry as a truck mechanic with primary duties related to the maintenance of emergency response vehicles.
  - For new Instructors of the EVT 3A Course, consideration may be given to quantify instructors who perform the skills associated as an EVT 3, while not being a mechanic per say, topics in EVT 3 include Human Resources and Fleet Specifications and Records.
- The candidate shall complete an EVT Instructor Task Book which requires a minimum of 2 classes under the observation of a Vendor Expert (Industry Subject Matter Expert), Registered Instructor or Instructor of Record. These observations may be completed by the same Vendor Expert (Industry Subject Matter Expert), Registered Instructor or Instructor of Record. There is a separate EVT Instructor Task Book for each level (EVT 1, EVT2, EVT3).
  - The Task Book contains job performance requirements (JPRs) identified in the current version of NFPA 1071, Standard for Emergency Vehicle Technician Professional Qualifications (2020). These identified JPRs will correspond to respective course content of the curriculum.

## **Instructor of Record for Emergency Vehicle Technician:**

The Instructor of Record must be an approved SFT Registered Instructor and will need to apply for a PACE II review of their instructor qualifications. The Instructor of Record is accountable to ensure that courses are delivered in accordance with SFT regulations and procedures. The Instructor of Record does not directly deliver the course, but is responsible for course oversight. This includes, but



# EMERGENCY VEHICLE TECHNICIAN (2020) Certification & Curriculum Implementation Plan

is not limited to: being on-site of the host training facility where course(s) are delivered, maintains course oversight of Vendor Expert(s), monitors classroom with visits and observations, completes a written summary of the course being delivered, performs a test analysis, returns all required course documentation to SFT, and addresses all student interactions and concerns.

## **Vendor Expert (Industry Subject Matter Expert):**

SFT anticipates that non-traditional fire service instructors will often be used by delivery venues to meet the specific subject matter expertise needed for each course. The vendor expert is currently employed by a manufacturer (i.e., Pierce, Allison Pump) and is responsible to provide training to the end users. SFT does not register Vendor Experts, as they are approved by and under the supervision of the SFT Instructor of Record. Vendor Experts must successfully complete SFT's Ethical Leadership for the Instructor or Ethical Leadership in the Classroom. Vendor Experts are responsible for delivering SFT course content at the host site, and shall complete course closing procedures which includes, delivery of summative test(s), course evaluations, course survey, and submission of required items to the Instructor of Record.

## **POTENTIAL AGENCY IMPACTS**

Fire agencies desiring to utilize the Emergency Vehicle Technician (2020) Certification or curriculum as a requirement for their recruitment/promotion activities need to review the Emergency Vehicle Technician (2020) Curriculum and certification requirements to be sure that all agency training needs are being met. After review, Fire Agencies should update their job specifications and recruitment documentation to reflect these new courses and certification requirements.

Accredited Regional Training Programs (ARTP), Accredited Local Academies (ALA), community colleges and all other local delivery venues need to review the curriculum and seek approval from their curriculum committee / program sponsor, as appropriate. ARTPs should review the new Emergency Vehicle Technician (2020) curriculum and discuss potential impacts with their advisory committees.

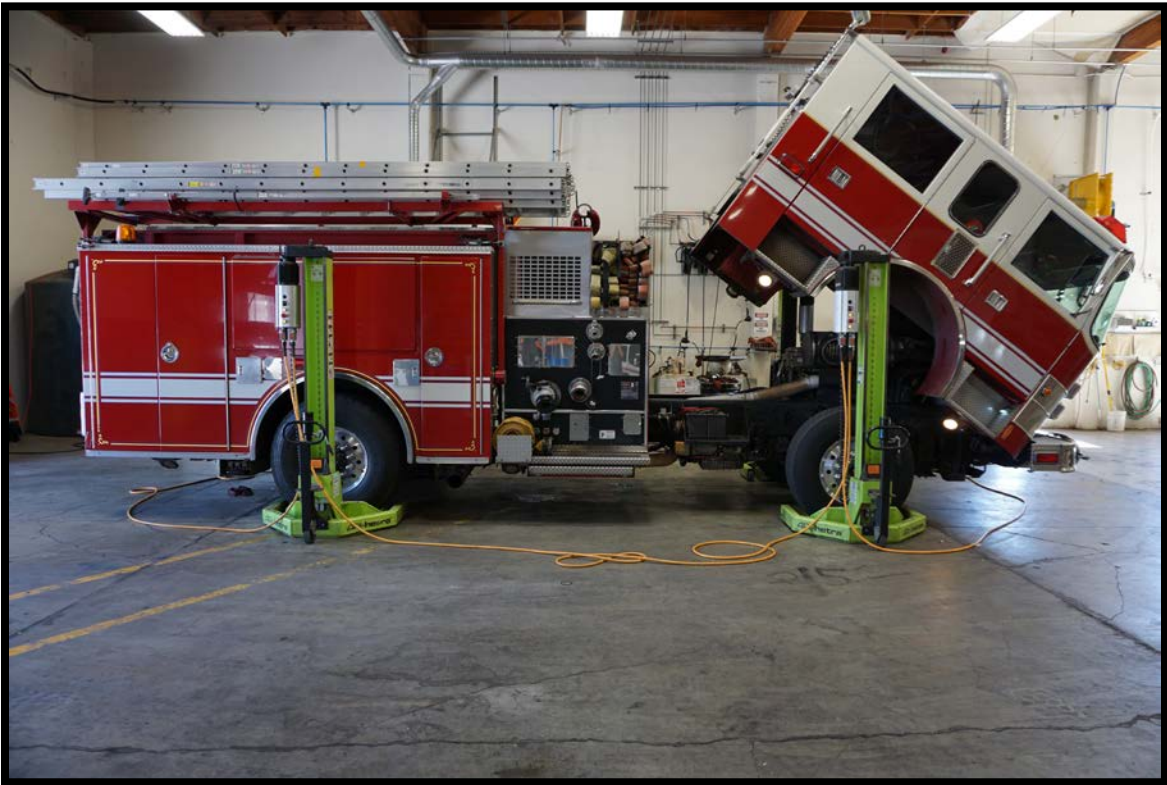
Fire Agencies should update their job specifications and recruitment documentation to reflect and maintain certification requirements and third party licensing requirements and continuing education.



# Emergency Vehicle Technician 1

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## Certification Training Standards Guide (2020)



California Department of Forestry and Fire  
Protection  
Office of the State Fire Marshal  
State Fire Training

# Emergency Vehicle Technician 1

## Certification Training Standards Guide (2020)

This CTS guide utilizes NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020) to provide the qualifications for State Fire Training's Emergency Vehicle Technician certification.

State Fire Training coordinated the development of this CTS guide. Before its publication, the Statewide Training and Education Advisory Committee (STEAC) and the State Board of Fire Services (SBFS) recommended this CTS guide for adoption by the Office of the State Fire Marshal (OSFM).

Published by State Fire Training.

Published August 2020

Cover photo courtesy of Lawrence Achen, Central Fire Protection District, Santa Cruz, CA

# Table of Contents

State Fire Training .....	1
Acknowledgments.....	2
How to Read a CTS Guide.....	4
Emergency Vehicle Technician I .....	6
Section 1: Definition of Duties .....	6
1-1: Definition of Duties for an Emergency Vehicle Technician I .....	6
Section 2: Chassis Systems .....	7
2-1: Inspecting Chassis Systems and Components .....	7
2-2: Maintaining Chassis System Components .....	9
2-3: Inspecting Chassis Systems and Components Unique to Emergency Response Vehicles .....	10
2-4: Maintaining Chassis System Components Unique to Emergency Response Vehicles...	11
2-5: Repairing Chassis Systems and Components.....	12
2-6: Completing Axle Weight Performance Testing .....	14
2-7: Completing Brake Performance Testing.....	15
2-8: Completing Parking Brake Testing .....	16
2-9: Completing Road Performance Testing .....	17
Section 3: Cab and Body Components.....	18
3-1: Inspecting Cab and Body Components.....	18
3-2: Maintaining Cab and Body Components .....	20
3-3: Repairing Cabs .....	21
3-4: Inspecting Equipment Mounting Systems .....	23
3-5: Maintaining Equipment Mounting Systems .....	24
3-6: Repairing Equipment Mounting Systems .....	25
3-7: Inspecting Cab Tilt Systems and Components.....	27
3-8: Repairing Cab Tilt Systems.....	28
3-9: Inspecting Body, Compartments, and Storage Areas .....	29
3-10: Maintaining Body, Compartments, and Storage Areas .....	30
3-11: Repairing Cab Bodies, Compartments, and Storage Areas.....	31

Section 4: Electrical and Electronic Systems .....	33
4-1: Inspecting Low-voltage Electrical Systems .....	33
4-2: Maintaining Low-voltage Electrical Systems.....	35
Section 5: Fire Pump, Auxiliary Pump, and Tank Systems .....	36
5-1: Inspecting Fire Pumps and Auxiliary Pumps.....	36
5-2: Maintaining Fire Pumps and Auxiliary Pumps.....	38
5-3: Repairing Fire Pumps or Auxiliary Pumps.....	39
5-4: Inspecting Water/Foam/Agent Tanks .....	40
5-5: Repairing Water/Foam/Agent Tanks.....	41
5-6: Testing Apparatus Fire Pumps and Components.....	42
Section 6: Aerial Systems .....	43
6-1: Inspecting the Ladder Sections of an Aerial Ladder .....	43
6-2: Inspecting Sections of Elevating Platforms or Water Towers .....	44
6-3: Maintaining Aerial Sections, Booms, Platforms, and Waterways.....	45
6-4: Inspecting Hydraulic System Components of an Aerial Device .....	46
6-5: Inspecting Mechanical Components of the Stabilization System.....	48
6-6: Maintaining Aerial Device Stabilization Systems.....	49
6-7: Inspecting Aerial Device Lifting, Rotating, and Extension Systems .....	50
6-8: Inspecting Aerial Device Electrical Systems.....	51
6-9: Inspecting Aerial Device Waterway Systems .....	52
Section 7: Specialized Systems.....	53
7-1: Inspecting Foam-proportioning Systems.....	53
7-2: Maintaining Foam-proportioning Systems .....	55
7-3: Repairing Foam-proportioning System Components .....	56
7-4: Testing Apparatus Foam Systems and Related Components.....	57
7-5: Inspecting a Compressed Air Foam System (CAFS) .....	58
7-6: Maintaining a Compressed Air Foam System (CAFS).....	60
7-7: Repairing a Compressed Air Foam Systems (CAFS) .....	61
7-8: Testing Compressed Air Foam Systems (CAFS) .....	62
7-9: Inspecting Electrical Line Voltage Generation Systems .....	63
7-10: Maintaining Electrical Line Voltage Generation Systems .....	65
7-11: Inspecting Breathing-air and Purification Systems .....	66

7-12: Maintaining Breathing-air and Purification Systems .....	68
7-13: Repairing Breathing-air and Breathing Apparatus Systems.....	69
7-14: Testing Breathing-air Compressor Systems .....	70
7-15: Inspecting Auxiliary Air Compressors .....	71
7-16: Maintaining Auxiliary Air Compressors .....	73
7-17: Repairing Auxiliary Air Systems .....	74
State Fire Training Content.....	75
Errata.....	81

## **State Fire Training**

### **Mission**

To enable the California Fire Service to safely protect life and property through education, training, and certification.

### **The California Fire Services Training and Education System**

The California Fire Service Training and Education System (CFSTES) was established to provide a single statewide focus for fire service training in California. CFSTES is a composite of all the elements that contribute to the development, delivery, and administration of training for the California fire service. The authority for the central coordination of this effort is vested in the Training Division of the California State Fire Marshal's Office with oversight provided by the State Board of Fire Services.

CFSTES facilitates, coordinates, and assists in the development and implementation of standards and certification for the California fire service. CFSTES:

1. Administers the California Fire Academy System
2. Provides accredited courses leading to certification and approved standardized training programs for local and regional delivery
3. Administers the national accreditation process in California
4. Publishes certification training standards, course plans, and a capstone task book for each certified level in the California fire service

CFSTES is a fire service system developed by the fire service, for the fire service. It is only as successful and effective as the people involved in it.

## **Acknowledgments**

State Fire Training appreciates the hard work and accomplishments of those who built the solid foundation on which this program continues to grow.

State Fire Training gratefully acknowledges the following individuals and organizations for their diligent efforts and contributions that made the development and publication of this document possible.

### **CAL FIRE**

- Thom Porter, Director
- Mike Richwine, Acting State Fire Marshal
- Andrew Henning, Chief of State Fire Training
- John Binaski, Chair, Statewide Training and Education Advisory Committee (STEAC)

### **Cadre Leadership**

- Jim Eastman, Cadre Lead, Training Specialist III, (RA), CAL FIRE, Deputy Chief (ret.), Sacramento Metro Fire District
- Allison L. Shaw, Editor, California State University, Sacramento

## Emergency Vehicle Technician I

### Acknowledgments

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#### **Cadre Members**

- Lawrence Achen, Training Captain, Central Fire Protection District, Santa Cruz, Vice President, California Fire Mechanics Academy, Inc.
- John Borges, *Operations Manager, Burtons Fire, Inc., Modesto*
- Anthony Bulygo, *Santa Clara County Fire Department (retired), Northern/Southern California Liaison, California Fire Mechanics Association*
- Boyd Clegg, *San Ramon Valley Fire Protection District (retired), Vacaville Fire Protection District (retired), Instructor, California Fire Mechanics Academy, Inc.*
- Doug Link, *San Miguel Fire Protection District (retired), Treasurer, California Fire Mechanics Academy, Inc.*
- Mark Mclean, *Fire Fighter, Los Angeles Fire Department*
- Rick Nogueira, *Fleet Mechanic, San Ramon Valley Fire Protection District, President, Northern California Fire Mechanics Association*
- Marty Schmeltz, Emergency Vehicle Services Advisor, Valley Power Systems, Board Member, California Fire Mechanics Academy, Inc.

#### **Partners**

State Fire Training also extends special acknowledgement and appreciation to the Conference and Training Services Unit with the College of Continuing Education at California State University, Sacramento, for its ongoing meeting logistics and curriculum development support, innovative ideas, and forward-thinking services. This collaboration is made possible through an interagency agreement between CAL FIRE and Sacramento State.



## **How to Read a CTS Guide**

State Fire Training develops a Certification Training Standards (CTS) Guide for a variety of job functions in the fire service such as firefighter, driver/operator, fire instructor, and company officer. The CTS guide lists the requisite knowledge and skills and the job performance requirements a person is expected to complete in order to become certified in a specific function. CTS guides are appropriate for fire service personnel and individuals in related occupations pursuing State Fire Training certification.

Each CTS guide serves as a foundation for the certification programs recommended for adoption by the Office of the State Fire Marshal. Any certification program must be based on job-related knowledge and measurable performance standards. To master the knowledge and skills needed for specialized operations, individuals will require additional training to augment the performance standards included in the CTS guide.

Within the CTS guide, it is impossible to capture the different policies and procedures of each organization in the California fire service. Individuals aspiring to meet State Fire Training's certification training standards must do so in accordance with the codes, standards, regulations, policies, and standard operating procedures applicable within their own departments or jurisdictions.

### **Format**

Each certification training standard included in the CTS guide includes the following:

#### **Section Heading**

The section heading describes a general category for a group of training standards. For example, the Fire Marshal CTS includes the following sections: Administration, Risk Management, Community Relations, Professional Development, Regulatory Programs, Fire and Life Safety, and Investigation. Each section contains one or more individual training standards.

#### **Training Standard Title**

The training standard title provides a general description of the performance requirement contained within the standard.

#### **Authority**

The CTS guide references each standard with one or more paragraphs of the corresponding National Fire Protection Association (NFPA) Professional Qualifications. This ensures that each fire service function within California's certification system meets or exceeds NFPA standards.

## Emergency Vehicle Technician I

### How to Read a CTS Guide

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When California requirements exceed the NFPA standard, the CTS guide cites the Office of the State Fire Marshal as the authority and prints the corresponding information in *italics*.

#### **Given**

This section lists the objects, equipment, materials, or facilities an individual needs in order to acquire the requisite knowledge and skills or to accomplish the job performance requirement(s) within a training standard.

#### **Requisite Knowledge and Skills**

This section lists the knowledge and skills that an individual must acquire in order to accomplish the job performance requirement(s) within a training standard.

This section does not include NFPA requisite knowledge or skills that are too general to teach or that individuals should develop through life experiences. For example, a training standard would not list “communicate orally and in writing” or “ability to relate interpersonally” unless they specifically apply to a job performance requirement about acquiring communication skills or developing interpersonal relationships.

#### **Job Performance Requirements**

This section includes one or more written statements that describe a specific job-related task and define measurable or observable outcomes. After an individual completes all coursework and requisite requirements, the capstone task book process verifies completion of job performance requirements.

### **Content**

In addition to the individual certification training standards, the CTS guide also includes State Fire Training Revisions and Errata pages.

#### **State Fire Training Content**

Located at the back of the CTS guide, this table documents any significant revisions made by State Fire Training to the NFPA standards in the development of this CTS guide. This table is used to justify content additions and advise the course plan development team.

#### **Errata**

Located at the back of the CTS guide, this page documents any changes made to the CTS guide outside of the five-year NFPA revision cycle.

# **Emergency Vehicle Technician 1**

## **Section 1: Definition of Duties**

### **1-1: Definition of Duties for an Emergency Vehicle Technician 1**

#### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.1.1
- Paragraph 4.1.2
- Paragraph 4.2
- Paragraph 4.3
- Paragraph 4.4
- Paragraph 4.5
- Paragraph 4.6
- Paragraph 4.7 (Not addressed in the Revision 2020)
- Paragraph 4.8 (Not addressed in the Revision 2020)
- Paragraph 4.9 (Was the old 4.7 in the 2016 version)

#### **Given**

1. There are no givens identified for this training standard

#### **Requisite Knowledge and Skills**

1. Identify the general knowledge requirements associated with the roles of responsibilities of an EVT I
2. Identify the general skill requirements associated with the roles and responsibilities of an EVT I
3. Identify the inspection and preventative maintenance duties associated with chassis systems
4. Identify the inspection and maintenance duties associated with cabs (fixed and tilt) and vehicle bodies
5. Identify the operational checks duties associate with a vehicle's electronic and electrical systems (low voltage)
6. Identify the inspection, maintenance, and operational testing duties associated with at least one of the following systems: fire pump, auxiliary pump, and tank systems; aerial systems; or specialized (foam, line-voltage electrical, breathing air, auxiliary air) systems

#### **Job Performance Requirements**

There are no job performance requirements identified for this training standard.

## Section 2: Chassis Systems

### 2-1: Inspecting Chassis Systems and Components

#### Authority

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 4.2.1
2. *Office of the State Fire Marshal*

#### Given

1. An emergency response vehicle
2. An assignment
3. An inspection checklist
4. Manufacturer specifications
5. Standard operating procedures (SOPs)
6. Tools
7. *Test, calibration, and diagnostic* equipment

#### Requisite Knowledge and Skills

1. *Describe the* function, operation, and construction of chassis and vehicle systems
2. *Identify the principles of electricity and operational theory of electronics*
3. *List* types of defects, deficiencies, and potential problems associated with chassis systems
4. *Describe how to select test, calibration, and diagnostic equipment*
5. *Describe how to* use a checklist
6. *Identify* record-keeping requirements
7. *Describe the* inspection procedures of the manufacturer and the authority having jurisdiction
8. Recognize and identify symptoms and conditions of the chassis and vehicle systems
9. *Use test, calibration, and diagnostic equipment*
10. Determine defects, deficiencies, and potential problems
11. Perform operational checks
12. Complete checklist and inspection documentation

#### Job Performance Requirements

Inspect the chassis systems so that the structural integrity, the operation, and the condition of the auxiliary drive systems, axles, driveline, steering and suspension system, brake systems, wheels, and tires are verified to be within manufacturer specifications; the mounting security is verified; the chassis components are operational and within manufacturer specifications; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or

## **Emergency Vehicle Technician I**

### Section 2: Chassis Systems

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missing parts, are identified and reported; inspections and services are documented; and any deficiencies found during the inspection and diagnostic check process are documented.

## **2-2: Maintaining Chassis System Components**

### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.2.2

### **Given**

1. An emergency response vehicle
2. Manufacturer specifications
3. A maintenance schedule or an assignment
4. A maintenance checklist
5. SOPs
6. Test and calibration equipment
7. Tools

### **Requisite Knowledge and Skills**

1. *Identify* troubleshooting procedures
2. *Describe* adjustment methods and procedures
3. *Describe how to* select test, calibration, *and diagnostic* equipment
4. *Identify the* role of a maintenance schedule and a maintenance checklist
5. *Describe the* inspection and maintenance procedures of the manufacturer and the authority having jurisdiction
6. Perform operational checks
7. Evaluate reported conditions
8. Recognize and correct deficiencies
9. Use test, calibration, *and diagnostic* equipment
10. Perform all required maintenance, including all items on a maintenance checklist
11. Complete required documentation

### **Job Performance Requirements**

Perform maintenance on the chassis system so that deformed, broken, loose, worn, or missing parts are repaired or replaced; components are lubricated; fluid levels are maintained; calibrations and adjustments are performed; the system's operational condition is preserved or restored; activities are documented; and additional repair needs are reported.

## 2-3: Inspecting Chassis Systems and Components Unique to Emergency Response Vehicles

### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.2.3

### Given

1. An emergency response vehicle
2. SOPs
3. Manufacturer specifications
4. Tools
5. Test, calibration, *and diagnostic* equipment
6. An assignment
7. An inspection checklist

### Requisite Knowledge and Skills

1. *Describe the* function, operation, construction, and interface of frames, independent suspension systems, all-wheel steering systems, secondary braking systems, and auxiliary cooling systems
2. *Describe how to* select test, calibration, *and diagnostic* equipment
3. *List* types of defects, deficiencies, and potential problems associated with chassis systems and components
4. *Identify* record-keeping requirements
5. *Describe the* inspection procedures of the manufacturer and the authority having jurisdiction
6. Recognize and identify symptoms and conditions
7. Use test, calibration, *and diagnostic* equipment
8. Determine defects, deficiencies, and potential problems
9. Perform operational checks
10. Complete checklist and inspection documentation

### Job Performance Requirements

Inspect chassis systems and components unique to emergency response vehicles so that the structural integrity of the frame is verified; the operation and condition of independent suspension systems, all-wheel steering systems, brake systems, secondary braking systems, and auxiliary cooling systems are verified to be within manufacturer specifications; multiplexing, interface electronics, and load management systems are operationally checked for proper operation; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and operational checks are documented.

## 2-4: Maintaining Chassis System Components Unique to Emergency Response Vehicles

### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.2.4

### Given

1. An emergency response vehicle
2. Manufacturer specifications
3. A maintenance schedule or an assignment
4. A maintenance checklist
5. SOPs
6. Test and calibration equipment
7. Tools and diagnostic equipment

### Requisite Knowledge and Skills

1. *Describe how to* select test, calibration, and diagnostic equipment
2. *Identify* troubleshooting procedures
3. *Describe* adjustment methods and procedures
4. *Identify* record-keeping requirements
5. *Describe the* inspection and maintenance procedures of the manufacturer and the authority having jurisdiction
6. Perform operational checks
7. Evaluate reported conditions
8. Recognize and correct deficiencies
9. Use test, calibration, and diagnostic equipment
10. Perform all required maintenance, including all items on a maintenance checklist
11. Complete required documentation

### Job Performance Requirements

Perform maintenance on chassis systems and components unique to emergency response vehicles, so that deformed, broken, loose, worn, or missing parts are repaired or replaced; components are lubricated; fluid levels are maintained; calibrations and adjustments are performed; the system's operational condition is preserved or restored; activities are documented; and additional repair needs are reported.



## **2-5: Repairing Chassis Systems and Components**

### **Authority**

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 5.2.1
2. *Office of the State Fire Marshal*

### **Given**

1. An emergency response vehicle with an identified defective component(s)
2. Manufacturer specifications
3. Standard Operating Procedures (SOPs)
4. An assignment or inspection report detailing a deficiency or deformation
5. Test, calibration, and diagnostic checking equipment
6. Tools

### **Requisite Knowledge and Skills**

1. *Describe the* function, operation, and construction of chassis and vehicle systems
2. *Identify* types of defects, deficiencies, and potential problems
3. *Describe how to* select test, calibration, *and diagnostic* equipment
4. *Describe* repair and overhaul procedures
5. *Describe* theory of electricity and electronics
6. *Identify* types of cooling systems
7. *Identify* types of suspension and steering systems
8. *Describe* basic principles of suspension and steering geometry
9. *Identify* types of brake systems, including secondary braking systems
10. *Describe* principles of hydraulics
11. *Describe* operational, diagnostic checks, and performance tests
12. *Describe* adjustment and calibration procedures
13. *Describe* electrical troubleshooting procedures
14. *Identify* record-keeping requirements
15. *Describe the* diagnostic and repair procedures of the manufacturer and the authority having jurisdiction
16. Identify and evaluate conditions
17. Recognize deficiencies
18. Perform required repairs to resolve deficiencies
19. Conduct required testing
20. Use test, calibration, *and diagnostic* equipment
21. Complete required documentation

### **Job Performance Requirements**

Perform repairs on chassis systems and components so that the identified defective component is diagnosed; deformed, broken, loose, worn, or missing parts of a chassis system or its

## Emergency Vehicle Technician I

### Section 2: Chassis Systems

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components are repaired, rebuilt, or replaced to manufacturer specifications; applicable diagnostic checks are conducted and performance is verified; and the repairs are documented in accordance with the procedures of the *manufacturer and the authority having jurisdiction*.

## 2-6: Completing Axle Weight Performance Testing

### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 5.2.2

### Given

1. An emergency response vehicle
2. An applicable driving license (if required)
3. A commercial certified scale

### Requisite Knowledge and Skills

1. *Describe the* legal operation of fire apparatus
1. *Identify the* location of a certified scale
2. *Identify* record-keeping requirements of NFPA 1911 and the authority having jurisdiction
3. Operate fire apparatus
4. Complete required documentation

### Job Performance Requirements

Complete axle weight performance test on apparatus in accordance with NFPA 1911 so that the apparatus weight is determined to ensure that the weight on the vehicle does not exceed the gross axle weight rating (GAWR) and the gross vehicle weight rating (GVWR) or gross combination weight rating (GCWR) as shown on the rating plate on the fire apparatus; and all testing is documented in accordance with the requirements of NFPA standards and the authority having jurisdiction.

## **2-7: Completing Brake Performance Testing**

### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 5.2.3

### **Given**

1. An emergency response vehicle
2. An applicable driving license (if required)
3. A calibrated driving course

### **Requisite Knowledge and Skills**

1. *Describe the* legal operation of fire apparatus
2. *Demonstrate* familiarity with brake testing course
3. *Identify brake performance* requirements of NFPA 1911 *and* federal and state regulations
4. *Identify* record-keeping requirements of NFPA 1911 and the authority having jurisdiction
5. Operate fire apparatus
6. Recognize *the need for* and perform braking test
7. Complete required documentation

### **Job Performance Requirements**

Complete braking performance test on apparatus in accordance with NFPA 1911 so that the apparatus braking system performance is verified to ensure that the braking ability of the apparatus complies with the requirements of NFPA 1911 and federal and state regulations; and all testing is documented in accordance with the requirements of NFPA standards and the authority having jurisdiction.

## 2-8: Completing Parking Brake Testing

### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 5.2.4

### Given

1. An emergency response vehicle
2. An applicable driving license (if required)
3. An appropriate road grade

### Requisite Knowledge and Skills

1. *Describe the* legal operation of fire apparatus
2. *Demonstrate* familiarity with park brake testing course
3. *Identify parking brake performance* requirements of NFPA 1911 and federal and state regulations
4. *Identify* record-keeping requirements of NFPA 1911 and the authority having jurisdiction
5. Operate of fire apparatus
6. Recognize *the need for* and perform parking brake test
7. Complete required documentation

### Job Performance Requirements

Complete parking brake performance test on apparatus in accordance with NFPA 1911 so that the apparatus parking brake system performance is verified to ensure that the park braking ability of the apparatus complies with the requirements of NFPA 1911 and federal and state regulations; and all testing is documented in accordance with the procedures of NFPA standards and the authority having jurisdiction.

## 2-9: Completing Road Performance Testing

### Authority

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 5.2.5
2. *Office of the State Fire Marshal*

### Given

1. An emergency response vehicle
2. An applicable driving license (if required)
3. An approved driving course

### Requisite Knowledge and Skills

1. *Identify the difference between a road test and a performance test*
2. *Describe the legal operation of fire apparatus*
3. *Demonstrate familiarity with apparatus drivability*
4. *Identify road performance requirements of NFPA 1911 and federal and state regulations*
5. *Identify record-keeping requirements of NFPA 1911 and the authority having jurisdiction*
6. Operate fire apparatus
7. Recognize *the need for* and perform road test
8. Complete required documentation

### Job Performance Requirements

Complete road performance test on apparatus in accordance with NFPA 1911 so that apparatus system performance is verified to ensure that the drivability of the apparatus complies with requirements of NFPA 1911 and federal and state regulations; and all testing is documented in accordance with the requirements of NFPA standards and the authority having jurisdiction.

## Section 3: Cab and Body Components

### 3-1: Inspecting Cab and Body Components

#### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.3.1

#### Given

1. An emergency response vehicle
2. Standard operating procedures (SOPs)
3. Manufacturer specifications
4. Tools
5. Test, *calibration, and diagnostic* equipment
6. An assignment
7. An inspection checklist

#### Requisite Knowledge and Skills

1. *Describe the* function, construction, and operation of doors and latches, seats, *storage areas*, self-contained breathing apparatus (SCBA) mounting, safety restraints, instrumentation, window glass and mirrors, steps, handrails, and skid-resistant walking surfaces
2. *Describe how to select test, calibration, and diagnostic equipment*
3. *Identify* types of defects, deficiencies, and potential problems associated with cabs
4. *Identify* types of lubricants
5. *Identify* failures of finishes, signs, labels, and paint
6. *Identify* record-keeping requirements
7. *Describe the* inspection procedures of the manufacturer and the authority having jurisdiction
8. Perform operational checks
9. Recognize and identify symptoms and conditions
10. *Use test, calibration, and diagnostic equipment*
11. Determine defects, deficiencies, and potential problems
12. Complete checklist and inspection documentation

#### Job Performance Requirements

Inspect the cab so that the operation of the cab and components is verified; the condition of finishes, signs, labels, and paint is determined; the operation and condition of the doors, latches, trays, glass, and associated hardware are verified to be within manufacturer specifications; climate control systems are tested for proper operation; all checklist items are

**Emergency Vehicle Technician I**  
Section 3: Cab and Body Components

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inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented.



## **3-2: Maintaining Cab and Body Components**

### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.3.2

### **Given**

1. An emergency response vehicle
2. Manufacturer specifications
3. A maintenance schedule or an assignment
4. A maintenance checklist
5. SOPs
6. Tools and test equipment

### **Requisite Knowledge and Skills**

1. *Describe* troubleshooting procedures
2. *Describe* adjustment methods and procedures
3. *Describe the* inspection and maintenance procedures of the manufacturer and the authority having jurisdiction
4. Perform operational checks
5. Evaluate reported conditions
6. Perform all required maintenance, including all items on a maintenance checklist
7. Complete required documentation

### **Job Performance Requirements**

Perform maintenance on the cab so that the operational condition is preserved or restored; deformed, broken, loose, worn, or missing parts are repaired or replaced; components are lubricated; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; activities are documented; and additional repair needs are reported.

### **3-3: Repairing Cabs**

#### **Authority**

8. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 5.3.4
9. *Office of the State Fire Marshal*

#### **Given**

10. An emergency response vehicle
11. Manufacturer specifications
12. An assignment or inspection report detailing a deficiency or deformation
13. SOPs
14. Test, calibration, *and diagnostic* equipment
15. Tools

#### **Requisite Knowledge and Skills**

16. *Describe the* function, construction, and operation of doors and latches, seats, self-contained breathing apparatus (SCBA) mounting and safety restraints, instrumentation, window glass and mirrors, steps, handrails, and skid-resistant walking surfaces
17. *Identify materials used in cabs*
18. *Identify personnel safety restraint systems that may present hazards during cab repair*
19. *Identify* types of lubricants
20. *Identify* failures and restoration of finishes, signs, labels, and paint
21. *Describe* welding and fabrication procedures
22. *Describe how to* select test, calibration, *and diagnostic* equipment
23. *Describe* adjustment and alignment procedures
24. *Describe* troubleshooting procedures
25. *Identify* record-keeping requirements
26. *Describe the* repair and diagnostic procedures of the manufacturer and the authority having jurisdiction
27. Recognize, evaluate, and identify reported conditions
28. Use test, calibration, *and diagnostic* equipment
29. *Mitigate personnel safety restraint system hazards*
30. Apply paint and finish materials
31. Perform welding and fabrication
32. Perform required repairs to resolve deficiencies
33. Perform diagnostic checks
34. Complete required documentation

#### **Job Performance Requirements**

Perform repairs on a cab so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of a cab are repaired, replaced, or rebuilt to manufacturer

## **Emergency Vehicle Technician I**

### **Section 3: Cab and Body Components**

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specifications; diagnostic checks are conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

### **3-4: Inspecting Equipment Mounting Systems**

#### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.3.3

#### **Given**

1. An emergency response vehicle and its assigned equipment
2. SOPs
3. Manufacturer specifications
4. Tools
5. Test, *calibration, and diagnostic* equipment
6. An assignment
7. An inspection checklist

#### **Requisite Knowledge and Skills**

1. *Describe the* function, operation, and construction of equipment mounting systems, warning systems, and mounting racks, brackets, and latches
2. *Identify* types of defects, deficiencies, and potential problems associated with equipment mounting systems, warning systems, and mounting racks, brackets, and latches
3. *Describe how to* select test, calibration, *and diagnostic* equipment
4. *Describe the* inspection procedures of the manufacturer and the authority having jurisdiction
5. Recognize and identify symptoms and conditions of equipment mounting systems and mounting racks, brackets, and *latches*
6. Use test, calibration, *and diagnostic* equipment
7. Perform operational checks
8. Determine defects, deficiencies, and potential problems
9. Complete checklist and inspection documentation

#### **Job Performance Requirements**

Inspect equipment mounting systems and mounting racks, brackets, and latches so that the operation and condition of the mounting system and mounting racks are verified to be within manufacturer specifications; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and operational checks are documented.

### **3-5: Maintaining Equipment Mounting Systems**

#### **Authority**

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 4.3.4
2. *Office of the State Fire Marshal*

#### **Given**

1. An emergency response vehicle
2. Manufacturer specifications
3. A maintenance schedule or an assignment
4. A maintenance checklist
5. SOPs
6. Tools
7. Test, calibration, and diagnostic equipment

#### **Requisite Knowledge and Skills**

1. *Identify* common requirements of maintenance
2. *Describe* adjustment methods and procedures
3. *Describe* types of fluids and lubricants
4. *Identify leak classifications and methods to stop them*
5. *Describe* adjustment and calibration procedures
6. *Identify* electrical connection theory and maintenance
7. *Describe* troubleshooting procedures
8. *Describe the* inspection and maintenance procedures of the manufacturer and the authority having jurisdiction
9. Perform operational checks
10. Evaluate reported conditions
11. Perform all required maintenance, including all items on a maintenance checklist
12. Correct deficiencies
13. Complete required documentation

#### **Job Performance Requirements**

Perform maintenance on equipment mounting systems and mounting racks, brackets, and latches so that warning system components function; all hoses are tight; leaks are stopped; latches are aligned and adjusted to operational condition; fluids are checked and filled; lubricants are applied; any electrical connections are clean and tight; worn pads are replaced; deformed, broken, loose, worn, or missing parts are repaired or replaced; operational condition is preserved or restored; activities are documented; and additional repair needs are reported.

### **3-6: Repairing Equipment Mounting Systems**

#### **Authority**

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 5.3.1
2. *Office of the State Fire Marshal*

#### **Given**

1. An emergency response vehicle
2. An assignment or inspection report detailing a deficiency or deformation
3. Manufacturer specifications
4. Standard operating procedures (SOPs)
5. Test, calibration, *and diagnostic* equipment
6. Tools

#### **Requisite Knowledge and Skills**

1. *Describe* the function, construction, and operation of equipment-mounting systems, mounting racks, brackets, and locks
2. *Describe how to* select test, calibration, *and diagnostic* equipment
3. *Identify materials used in cabs and equipment-mounting systems, racks, brackets, and locks*
4. *Describe* principles of welding and fabrication
5. *Describe* principles of pneumatic, hydraulic, and electric operation
6. *Describe* troubleshooting procedures
7. *Describe* repairing, rebuilding, and replacement procedures
8. *Identify* required diagnostic checks
9. *Identify* types of fluids
10. *Identify* record-keeping requirements
11. *Describe* repair and diagnostic procedures of the manufacturer and the authority having jurisdiction
12. Recognize, evaluate, and identify reported conditions
13. Use test, calibration, *and diagnostic* equipment
14. Measure voltage, amperage, and resistance
15. Perform welding and fabrication
16. Perform required repairs to resolve deficiencies
17. Perform diagnostic checks
18. Complete required documentation

#### **Job Performance Requirements**

Perform repairs on equipment-mounting systems and racks so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an equipment-mounting system or rack are repaired, rebuilt, or replaced to manufacturer specifications; diagnostic checks are

conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

### **3-7: Inspecting Cab Tilt Systems and Components**

#### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.3.5

#### **Given**

1. An emergency response vehicle with a cab tilt system
2. SOPs
3. Manufacturer's specifications
4. Tools
5. Test, *calibration, and diagnostic* equipment
6. An assignment
7. An inspection checklist

#### **Requisite Knowledge and Skills**

1. *Describe the* function, operation, and construction of the cab tilt system, safety and latch systems, and warning systems
2. *Identify* types of defects, deficiencies, and potential problems associated with cab tilt systems
3. *Identify* record-keeping requirements
4. *Describe the* inspection procedures of the manufacturer and the authority having jurisdiction
5. Perform operational checks
6. Recognize and identify symptoms and conditions of the cab tilt systems
7. Determine defects, deficiencies, and potential problems
8. Complete checklist and inspection documentation

#### **Job Performance Requirements**

Inspect the operation of the cab tilt system and components so that the tilt mechanism is readied safe; the structural integrity is assessed; the operation and condition of all cab tilt components and warning systems are verified to be within manufacturer's specifications; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspections and checks are documented.



### **3-8: Repairing Cab Tilt Systems**

#### **Authority**

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 5.3.2
2. *Office of the State Fire Marshal*

#### **Given**

1. An emergency response vehicle with a cab tilt system
2. Manufacturer specifications
3. An assignment or inspection report detailing a deficiency or deformation
4. SOPs
5. Diagnostic checks, calibration, *and diagnostic* equipment
6. Tools

#### **Requisite Knowledge and Skills**

1. *Describe the* function, construction, and operation of cab tilt systems and safety locks
2. *Describe how to* select test, calibration, *and diagnostic* equipment
3. *Identify materials used in cab tilt systems*
4. *Describe* principles of welding and fabrication
5. *Describe* principles of pneumatic, hydraulic, and electric operation
6. *Describe* troubleshooting procedures
7. *Describe* repairing, rebuilding, and replacement procedures
8. *Describe* verification testing
9. *Identify* types of fluids
10. *Identify* record-keeping requirements
11. *Describe the* repair and diagnostic procedures of the manufacturer and the authority having jurisdiction
12. Recognize, evaluate, and identify reported conditions
13. Use testing, calibration, *and diagnostic* equipment
14. Measure voltage, amperage, and resistance
15. Perform welding and fabrication
16. Perform required repairs to resolve deficiencies
17. Perform diagnostic checks
18. Complete required documentation

#### **Job Performance Requirements**

Perform repairs on cab tilt systems so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of a cab tilt system are repaired, replaced, or rebuilt to manufacturer specifications; diagnostic checks are conducted and performance is verified; hazards are avoided; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

### **3-9: Inspecting Body, Compartments, and Storage Areas**

#### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.3.6

#### **Given**

1. An emergency response vehicle
2. SOPs
3. Manufacturer specifications
4. Tools
5. Test, *calibration, and diagnostic* equipment
6. An assignment
7. An inspection checklist

#### **Requisite Knowledge and Skills**

1. *Describe the* function, construction, and operation of body, compartments, shelves and dividers, steps, ladders, platforms, handrails, and skid-resistant walking surfaces
2. *Describe the* operation of doors, latches, trays, and associated hardware
3. *Identify* types of defects, deficiencies, and potential problems associated with the body, compartments, shelves and dividers, steps, ladders, platforms, handrails, and skid-resistant walking surfaces
4. *List* common problems and failures of finishes and paint, signs, and labels
5. *Identify* record-keeping requirements
6. *Describe the* inspection procedures of the manufacturer and the authority having jurisdiction
7. Perform operational checks
8. Recognize and identify symptoms and conditions
9. Determine defects, deficiencies, and potential problems
10. Complete checklist and inspection documentation

#### **Job Performance Requirements**

Inspect body, compartments, and storage areas so that the operation and condition of the body, compartments, doors, latches, trays, and associated hardware are verified to be within manufacturer specifications; the condition of finishes, signs, labels, and paint is determined and documented; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

### **3-10: Maintaining Body, Compartments, and Storage Areas**

#### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.3.7

#### **Given**

1. An emergency response vehicle
2. Manufacturer specifications
3. A maintenance schedule or an assignment
4. A maintenance checklist
5. SOPs
6. Tools
7. Test, *calibration*, and *diagnostic* equipment

#### **Requisite Knowledge and Skills**

1. *Describe* troubleshooting procedures
2. *Describe* adjustment methods and procedures
3. *Describe* types of lubricants
4. Perform operational checks
5. Evaluate reported conditions
6. Perform all required maintenance, including all items on a maintenance checklist
7. Correct deficiencies
8. Complete required documentation

#### **Job Performance Requirements**

Perform maintenance on body, compartments, and storage areas so that operational condition is preserved or restored; deformed, broken, loose, worn, or missing parts are repaired or replaced; components are lubricated; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; activities are documented; and additional repair needs are reported.

### **3-11: Repairing Cab Bodies, Compartments, and Storage Areas**

#### **Authority**

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 5.3.3
2. *Office of the State Fire Marshal*

#### **Given**

1. An emergency response vehicle
2. Manufacturer specifications
3. Assignment or inspection report detailing a deficiency or deformation
4. SOPs
5. Test, calibration, *and diagnostic* equipment
6. Tools

#### **Requisite Knowledge and Skills**

1. *Describe the* function, construction, and operation of doors, compartment shelves, trays, and dividers, steps, ladders, platforms, handrails, skid-resistant walking surfaces, and storage areas
2. *Identify materials used in cab bodies, compartments, and storage areas*
3. *Identify* types of lubricants
4. *Identify* failures and restoration of finishes, signs, labels, and paint
5. *Describe* welding and fabrication procedures
6. *Describe how to* select test, calibration, *and diagnostic* equipment
7. *Describe* adjustment and alignment procedures
8. *Describe* troubleshooting procedures
9. *Identify* record-keeping requirements
10. *Describe* repair and diagnostic procedures of the manufacturer and the authority having jurisdiction
11. Recognize, evaluate, and identify reported conditions
12. Use test, calibration, *and diagnostic* equipment
13. Apply paint and finish materials
14. Perform welding and fabrication
15. Perform required repairs to resolve deficiencies
16. Perform diagnostic checks
17. Complete required documentation

#### **Job Performance Requirements**

Perform repairs on body, compartments, and storage areas so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of a body, compartment, or storage area are repaired, replaced, or rebuilt to manufacturer specifications; components are fabricated, adjusted, aligned, and lubricated; hazardous conditions are resolved; diagnostic

## **Emergency Vehicle Technician I**

### **Section 3: Cab and Body Components**

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checks are conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## Section 4: Electrical and Electronic Systems

### 4-1: Inspecting Low-voltage Electrical Systems

#### Authority

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 4.4.1
2. *Office of the State Fire Marshal*

#### Given

1. An emergency response vehicle
2. Standard operating procedures (SOPs)
3. Manufacturer specifications
4. Tools
5. Test, *calibration, and diagnostic* equipment, including a belt tension gauge and a *digital* multimeter (*DVOM*)
6. *Schematics*
7. An assignment
8. An inspection checklist

#### Requisite Knowledge and Skills

1. *Describe the* function, construction, operation, and requirements of starting and charging systems, chassis lighting and electrical components, emergency lighting, and accessory lighting
2. *Describe how to* select test, calibration, and diagnostic equipment
3. *Describe the* principles of electricity (Ohm's law and Kirchhoff's law), magnetism, and voltage drop
4. *Describe how to* read and interpret schematics
5. *List* types of defects, deficiencies, and potential problems associated with low-voltage electrical systems
6. *Identify* mounting and adjustment requirements
7. *Identify* record-keeping requirements
8. *Describe the* inspection procedures of the manufacturer and the authority having jurisdiction
9. Recognize and identify symptoms and conditions of low-voltage electrical systems
10. *Read and interpret* schematics
11. Determine defects and deficiencies
12. Use test, calibration, and diagnostic equipment
13. Perform operational checks
14. Complete checklist and inspection documentation

**Job Performance Requirements**

Inspect the low-voltage electrical system so that the mounting security is verified; operation and condition of the low-voltage electrical system is verified to be within manufacturer specifications; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## **4-2: Maintaining Low-voltage Electrical Systems**

### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.4.2

### **Given**

1. An emergency response vehicle
2. Manufacturer specifications
3. A maintenance schedule or an assignment
4. A maintenance checklist
5. SOPs
6. Test, calibration, *and diagnostic* equipment
7. Tools

### **Requisite Knowledge and Skills**

1. *Describe* troubleshooting procedures
2. *Identify* adjustment methods and procedures
3. Evaluate reported conditions
4. Perform operational checks
5. Perform all required maintenance, including all items on a maintenance checklist
6. Correct deficiencies
7. Use test, calibration, *and diagnostic* equipment
8. Complete required documentation

### **Job Performance Requirements**

Perform maintenance on the low-voltage electrical system so that deformed, broken, loose, worn, or missing parts are repaired or replaced; the operational condition is preserved or restored; calibration and adjustments are performed; activities are documented; and additional repair needs are reported.



## Section 5: Fire Pump, Auxiliary Pump, and Tank Systems

### 5-1: Inspecting Fire Pumps and Auxiliary Pumps

#### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.5.1

#### Given

1. An emergency response vehicle with a fire pump or an auxiliary pump
2. Standard Operating Procedures (SOPs)
3. Manufacturer specifications
4. Tools
5. Test, *calibration, and diagnostic* equipment
6. An assignment
7. An inspection checklist

#### Requisite Knowledge and Skills

1. *Describe the* function, construction, and operation of fire pumps, auxiliary pumps, primer pumps, and related components
2. *Identify* pressure control devices
3. *Identify* plumbing and valves
4. *Identify* packing and seals
5. *Identify* types, grades, and viscosity of lubricating oils
6. *Describe* pump packing adjustment methods and procedures
7. *Describe* pump operational procedures
8. *Identify* types of defects, deficiencies, and potential problems associated with fire pumps, auxiliary pumps, primer pumps, and related components
9. *Identify* record-keeping requirements
10. *Describe the* inspection procedures of the manufacturer and the authority having jurisdiction
11. Recognize and identify symptoms and conditions of pumps and components
12. Determine defects and deficiencies
13. Recognize characteristics of fluid contamination
14. Perform operational checks
15. Complete checklist and inspection documentation

#### Job Performance Requirements

Inspect fire pumps or auxiliary pumps and related components so that the security of the mounting of all system components (e.g., primer pump, plumbing and valves, pressure control

## **Emergency Vehicle Technician I**

### **Section 5: Fire Pump, Auxiliary Pump, and Tank Systems**

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devices, gauges) is verified; operation and condition of the system components, warning system, and interlocks are verified to be within manufacturer specifications; adjustments are made where required; recommended fluid levels are verified; leaks and fluid contamination are identified and reported; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## **5-2: Maintaining Fire Pumps and Auxiliary Pumps**

### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.5.3

### **Given**

1. An emergency response vehicle with a fire pump or an auxiliary pump
2. Manufacturer specifications
3. A maintenance schedule or an assignment
4. A maintenance checklist
5. SOPs
6. Test, calibration, *and diagnostic* equipment
7. Tools

### **Requisite Knowledge and Skills**

1. *Describe* packing and seal adjustment procedures
2. *Identify* instrumentation and controls
3. *Describe* sacrificial anode replacement procedure and schedules
4. *Describe* troubleshooting procedures
5. Evaluate reported conditions
6. Perform operational tests
7. Perform all required maintenance, including all items on a maintenance checklist
8. Use test, calibration, *and diagnostic* equipment
9. Correct deficiencies
10. Complete required documentation

### **Job Performance Requirements**

Perform maintenance on a fire pump or auxiliary pump and related components so that deformed, broken, loose, worn, or missing parts are repaired or replaced; all packing and seals are adjusted to specification; hoses, valves, and fittings are in good condition and are leak free; fluids are at recommended levels; recommended lubricants are applied; indicator lights are operational and electrical connections are clean and tight; instrumentation is operational; controls are adjusted, lubricated, and operational; the system's operational condition is preserved or restored; activities are documented; and additional repair needs are reported.

### **5-3: Repairing Fire Pumps or Auxiliary Pumps**

#### **Authority**

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 5.5.1
2. *Office of the State Fire Marshal*

#### **Given**

1. An emergency response vehicle with a fire pump or auxiliary pump
2. Manufacturer specifications
3. An assignment or inspection report detailing a deficiency or deformation
4. Standard operating procedures (SOPs)
5. Test, calibration, *and diagnostic* equipment
6. Tools

#### **Requisite Knowledge and Skills**

1. *Describe the* function, construction, and operation of a pump and its related components
2. *Describe* overhaul procedures
3. *Describe* principles of pressure control devices
4. *Describe* packing and seal replacement and adjustment procedures
5. *Describe* diagnostic checks and performance testing procedure and requirements
6. *Describe how to* select test, calibration, *and diagnostic* equipment
7. *Describe* safety procedures
8. *Describe* troubleshooting procedures
9. *Identify* record-keeping requirements
10. *Describe the* diagnostic and repair procedures of the manufacturer and the authority having jurisdiction
11. Recognize, evaluate, and identify reported conditions
12. Use test, calibration, *and diagnostic* equipment
13. Identify defects and deficiencies
14. Complete required diagnostic checks and performance test systems
15. Perform required repairs to resolve deficiencies
16. Perform *hydraulic* flow calculations
17. Complete required documentation

#### **Job Performance Requirements**

Perform repairs on fire pumps or auxiliary pumps, wildland pump, ultra-high-pressure, or industrial pump, and related components so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts on a fire pump, auxiliary pumps, or related components are repaired, replaced, or rebuilt to manufacturer specifications; diagnostic checks and service tests are conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## **5-4: Inspecting Water/Foam/Agent Tanks**

### **Authority**

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 4.5.2
2. *Office of the State Fire Marshal*

### **Given**

1. An emergency response vehicle with a water, foam, *or agent* tank
2. SOPs
3. Manufacturer specifications
4. Tools
5. Test, *calibration, and diagnostic* equipment
6. An assignment
7. An inspection checklist

### **Requisite Knowledge and Skills**

1. *Describe the* function, operation, construction, *and mounting* of water/foam/agent tanks and related components
2. *Describe specialized pressure systems*
3. *Identify* flushing procedures
4. *Describe* sacrificial anode replacement procedures and schedules
5. *Identify* types of defects, deficiencies, and potential problems associated with water/foam /agent tanks
6. *Identify* record-keeping requirements
7. *Describe the* inspection procedures of the manufacturer and the authority having jurisdiction
8. Recognize and identify the effects of corrosion by different types of water and foam agents on selected tank materials
9. Determine defects and deficiencies
10. Perform operational checks,
11. Complete checklist and inspection documentation

### **Job Performance Requirements**

Inspect water/foam/agent tanks so that the mounting and condition of the water/foam/agent tank is verified; all coated and non-coated surfaces are free of corrosion; sacrificial anodes are evaluated for life-cycle condition and replaced if necessary; the tank is flushed; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspections and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## **5-5: Repairing Water/Foam/Agent Tanks**

### **Authority**

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 5.5.2
2. *Office of the State Fire Marshal*

### **Given**

1. An emergency response vehicle with a water, foam, *or agent* tank
2. Manufacturer specifications
3. An assignment or inspection report detailing a deficiency or deformation
4. SOPs
5. *Test, calibration, and diagnostic equipment*
6. Tools

### **Requisite Knowledge and Skills**

1. *Describe the* function, construction, and operation of water/*foam/agent* tanks
2. *Identify* flow requirements
3. *Describe* cleaning and coating procedures
4. *Describe* principles of welding and fabrication
5. *Describe types of* materials used in water/*foam/agent* tanks
6. *Describe how to* select test, calibration, and diagnostic equipment
7. *Describe* performance testing procedures
8. *Describe* troubleshooting procedures
9. *Identify* record-keeping requirements
10. *Describe the* diagnostic and repair procedures of the manufacturer and the authority having jurisdiction
11. Recognize, evaluate, and identify reported conditions
12. Perform welding and fabrication
13. Perform required repairs to resolve deficiencies
14. Use test, calibration, and diagnostic equipment
15. Perform service flow tests
16. Complete required documentation

### **Job Performance Requirements**

Perform repairs on water/foam/agent tanks so that leaks are repaired; interior and exterior surfaces are free of corrosion; coatings are renewed; deformed, broken, loose, worn, or missing parts are repaired, replaced, or rebuilt to manufacturer specifications; service flow test of the tank(s) is conducted; and the repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## **5-6: Testing Apparatus Fire Pumps and Components**

### **Authority**

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 5.5.3
2. *Office of the State Fire Marshal*

### **Given**

1. An emergency response vehicle with a fire pump
2. Manufacturer specifications
3. SOPs
4. Test, calibration, *and diagnostic* equipment
5. Facilities and tools

### **Requisite Knowledge and Skills**

1. *Describe the* function, construction, and operation of a pump and its related components
2. *Describe the* principles of pressure control devices
3. *Describe* operational and performance testing procedures and requirements
4. *Describe how to* select test, calibration, *and diagnostic* equipment
5. *Describe* safety procedures
6. *Describe* diagnostic checking and performance testing procedures
7. *Describe hydraulic* flow calculations
8. *Identify* record-keeping requirements
9. Conduct fire pump performance tests
10. Use test, calibration, *and diagnostic* equipment
11. Identify defects and deficiencies
12. Perform *hydraulic* flow calculations
13. Complete required documentation

### **Job Performance Requirements**

Complete performance testing on apparatus fire pumps and related components in accordance with NFPA 1911 so that the pumping systems or combinations, wildland pump, ultra-high-pressure, or industrial pump is capable of meeting the performance requirements without exceeding 110 percent of the original certification test rpm; and all testing is documented in accordance with the procedures of NFPA standards and the authority having jurisdiction.

## Section 6: Aerial Systems

### 6-1: Inspecting the Ladder Sections of an Aerial Ladder

#### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.6.1

#### Given

1. An emergency response vehicle with an aerial ladder
2. Standard operating procedures (SOPs)
3. Manufacturer specifications
4. Tools
5. Test, *calibration*, and *diagnostic* equipment
6. An assignment
7. An inspection checklist

#### Requisite Knowledge and Skills

1. *Describe the* function, operation, construction, and inspection practices of aerial ladders
2. *List* types of defects, deficiencies, and potential problems associated with aerial ladders
3. *Identify* record-keeping requirements
4. *Describe the* inspection procedures of the manufacturer and the authority having jurisdiction
5. Recognize and identify physical and operational conditions of ladder sections, components, and systems
6. Determine defects and deficiencies
7. Perform operational checks
8. Complete checklist and inspection documentation

#### Job Performance Requirements

Inspect the ladder sections of an aerial ladder so that the operation and condition of the ladder sections and extension systems are verified to be within manufacturer specification; the mounting security is verified; the alignment of the sections is checked for twists and bows; rails and rungs are checked for corrosion and dents; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.



## 6-2: Inspecting Sections of Elevating Platforms or Water Towers

### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.6.2

### Given

1. An emergency response vehicle with an elevating platform or water tower
2. SOPs
3. Manufacturer specifications
4. Tools
5. Test, *calibration*, and *diagnostic* equipment
6. An assignment
7. An inspection checklist

### Requisite Knowledge and Skills

1. *Describe the* function, operation, and construction of elevating platforms or water towers
2. *List* types of defects, deficiencies, and potential problems associated with elevating platforms
3. *Identify* record-keeping requirements
4. *Describe the* inspection procedures of the manufacturer and the authority having jurisdiction
5. Recognize and identify physical and operational conditions of elevating platforms or water towers and components
6. Perform operational checks
7. Determine defects and deficiencies
8. Complete checklist and inspection documentation

### Job Performance Requirements

Inspect the sections of an elevating platform or water tower so that the operation and condition of the boom sections are verified to be within manufacturer specifications; the mounting security of all components is verified; the alignment of the booms is checked for twists and bows; booms are checked for corrosion, dents, wear, and discontinuities; extension, elevation, and leveling systems are checked for damage; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

### 6-3: Maintaining Aerial Sections, Booms, Platforms, and Waterways

#### Authority

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 4.6.3
2. *Office of the State Fire Marshal*

#### Given

1. An emergency response vehicle with an aerial device and waterway
2. Manufacturer specifications
3. *NFPA 1911 (current edition)*
4. A maintenance schedule or an assignment
5. A maintenance checklist
6. SOPs
7. Test, calibration, *and diagnostic* equipment
8. Tools

#### Requisite Knowledge and Skills

1. *Describe the* function, construction, operation, *and performance* of aerial device, components, and systems
2. *Identify* fluid types and lubricants
3. *List* types of defects or deficiencies associated with aerial devices
4. *Describe* troubleshooting procedures
5. *Describe* adjustment methods and procedures
6. *Identify* record-keeping requirements
7. *Describe the* apparatus inspection and maintenance procedures of the manufacturer and the authority having jurisdiction
8. Evaluate reported conditions
9. Perform operational *and performance* checks
10. Perform all required maintenance, including all items on a maintenance checklist
11. Use test, calibration, *and diagnostic* equipment
12. Correct deficiencies
13. Complete required documentation

#### Job Performance Requirements

Perform maintenance on aerial sections, booms, platforms and waterways so that the aerial sections, booms, platforms, and waterways are maintained in accordance with specifications, and are cleaned, lubricated, and adjusted; deformed, broken, loose, worn, or missing parts are repaired or replaced; the operational condition is preserved or restored; the aerial device is tested for proper operation *and NFPA performance standards*; activities are documented; and additional repair needs are reported.

## 6-4: Inspecting Hydraulic System Components of an Aerial Device

### Authority

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 4.6.4
2. *Office of the State Fire Marshal*

### Given

1. An emergency response vehicle with an aerial device
2. SOPs
3. Manufacturer specifications
4. Tools
5. Test, *calibration, and diagnostic* equipment
6. An assignment
7. An inspection checklist
8. *Schematics*

### Requisite Knowledge and Skills

1. *Describe the* function, construction, operation, and inspection procedures of stabilizers, rotation motors, extension cylinders, elevation cylinders, leveling cylinders, gauges, and parts of an aerial device hydraulic system
2. *Describe* normal operating condition
3. *Identify* fluid requirements
4. *List* types of defects, deficiencies, and potential problems associated with hydraulic systems
5. *Identify* sources of contamination
6. *Describe how to read and interpret schematics*
7. *Identify* record-keeping requirements
8. *Describe the* inspection procedures of the manufacturer and the authority having jurisdiction
9. Recognize and identify the condition of the aerial device hydraulic system
10. Recognize and identify recommended fluid levels and sources of contamination
11. Determine defects and deficiencies
12. Read and interpret gauges
13. *Read and interpret schematics*
14. Perform operational checks
15. Complete checklist and inspection documentation

### Job Performance Requirements

Inspect the hydraulic system components of an aerial device so that the operation and condition of the hydraulic system components, warning systems, and gauges are verified to be within manufacturer specifications; the security of the mounting of components is verified; recommended fluid levels are verified; visible leakage or contamination is identified; all

## **Emergency Vehicle Technician I**

### **Section 6: Aerial Systems**

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checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## 6-5: Inspecting Mechanical Components of the Stabilization System

### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.6.5

### Given

1. An emergency response vehicle with an aerial device stabilization system
2. SOPs
3. Manufacturer specifications
4. Tools
5. Test, *calibration, and diagnostic* equipment
6. An assignment
7. An inspection checklist

### Requisite Knowledge and Skills

1. *Describe the* function, construction, and operation of an aerial device stabilization system, including wheels, tires, axles, frame, torque box, turntable, and related components
2. *Describe* normal operating condition
3. *List* types of defects, deficiencies, and potential problems associated with stabilization systems
4. *Identify* record-keeping requirements
5. *Describe the* inspection procedures of the manufacturer and the authority having jurisdiction
6. Recognize and identify the condition of an aerial device stabilization system
7. Determine defects and deficiencies
8. Perform operational checks
9. Complete checklist and inspection documentation

### Job Performance Requirements

Inspect all mechanical components of the stabilization system so that the security of the mounting is verified; operation and condition of the mechanical components of the stabilization system are verified to be within manufacturer specifications; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## 6-6: Maintaining Aerial Device Stabilization Systems

### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.6.6

### Given

1. An emergency response vehicle with an aerial device stabilization system
2. A maintenance schedule or an assignment
3. Manufacturer specifications
4. A maintenance checklist
5. SOPs
6. Test, calibration, *and diagnostic* equipment
7. Tools

### Requisite Knowledge and Skills

1. *Describe* troubleshooting procedures
2. *Identify* adjustment methods and procedures
3. *Identify* record-keeping requirements
4. *Describe how to* select test, calibration, *and diagnostic* equipment
5. *Describe the* inspection and maintenance procedures of the manufacturer and the authority having jurisdiction
6. Evaluate reported conditions
7. Perform operational tests
8. Perform all required maintenance, including all items on a maintenance checklist
9. Use test, calibration, *and diagnostic* equipment
10. Correct deficiencies
11. Complete required documentation

### Job Performance Requirements

Perform maintenance on the aerial device stabilization system so that deformed, broken, loose, worn, or missing parts are repaired or replaced; the stabilization system is maintained in accordance with manufacturer specifications; the operational condition is preserved or restored; the stabilization system is tested for proper operation; activities are documented; and additional repair needs are reported.

## 6-7: Inspecting Aerial Device Lifting, Rotating, and Extension Systems

### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.6.7

### Given

1. Emergency response vehicle with an aerial device
2. SOPs
3. Manufacturer specifications
4. Tools
5. Test, *calibration, and diagnostic* equipment
6. An assignment
7. An inspection checklist

### Requisite Knowledge and Skills

1. *Describe the* function, construction, and operation of components of lifting, rotating, and extension systems of an aerial device
2. *Describe* normal *operating* condition
3. *List* types of defects, deficiencies, and potential problems associated with aerial device lifting, rotating, and extension systems
4. *Identify* record-keeping requirements
5. *Describe the* inspection procedures of the manufacturer and the authority having jurisdiction
6. Recognize and identify conditions of components of lifting, rotating, and extension systems of an aerial device
7. Determine defects and deficiencies
8. Perform operational checks
9. Complete checklist and inspection documentation

### Job Performance Requirements

Inspect all components of aerial device lifting, rotating, and extension systems so that the operation and condition of the aerial device lifting, rotating, and extension systems, including the rotation motor and cables, and warning systems are verified to be within manufacturer specifications; the security of mounting of the components is verified; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## 6-8: Inspecting Aerial Device Electrical Systems

### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.6.8

### Given

1. An emergency response vehicle with an aerial device
2. SOPs
3. Manufacturer specifications
4. Tools
5. Test, *calibration, and diagnostic* equipment
6. An assignment
7. An inspection checklist

### Requisite Knowledge and Skills

1. *Describe the* function, construction, operation, and inspection of components of the aerial device electrical and warning systems
2. *Describe* normal *operating* condition
3. *List* types of defects, deficiencies, and potential problems of aerial device electrical systems
4. *Describe how to* select test gauges and meters
5. *Identify* record-keeping requirements
6. *Describe the* inspection procedures of the manufacturer and the authority having jurisdiction
7. Recognize and identify conditions of components of aerial device electrical systems
8. Read and interpret test gauges and meters
9. Perform operational checks
10. Complete checklist and inspection documentation

### Job Performance Requirements

Inspect the components of the aerial device electrical system so that the security of mounting is verified; operation and condition of the electrical system, interlocks, and warning systems are verified to be within manufacturer specifications; the operation and the legibility of the gauges are verified; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.



## 6-9: Inspecting Aerial Device Waterway Systems

### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.6.9

### Given

1. An emergency response vehicle with an aerial device and waterway system
2. SOPs
3. Manufacturer specifications
4. Tools
5. Test, *calibration*, and *diagnostic* equipment
6. An assignment
7. An inspection checklist

### Requisite Knowledge and Skills

1. *Describe the* function, construction, and operation of components of the waterway system
2. *Describe how to* select test, calibration, and diagnostic equipment
3. *Identify* lubrication requirements
4. *List* types of defects, deficiencies, and potential problems associated with aerial device waterway systems
5. *Describe* record-keeping requirements
6. *Describe the* inspection procedures of the manufacturer and the authority having jurisdiction
7. Recognize and identify symptoms and the condition of components of aerial device waterway systems
8. Use test, calibration, and diagnostic equipment
9. Read and interpret test gauges and flowmeters
10. Perform operational checks
11. Complete checklist and inspection documentation

### Job Performance Requirements

Inspect all components of an aerial device waterway system so that the security of mounting is verified; the operation and condition of the aerial device waterway system are verified to be within manufacturer specifications; the operation and the legibility of the gauges are verified; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## Section 7: Specialized Systems

### 7-1: Inspecting Foam-proportioning Systems

#### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.9.1

#### Given

1. An *apparatus* with a foam-proportioning system
2. Standard Operating Procedures (SOPs)
3. Manufacturer specifications
4. Tools
5. Test, calibration, *and diagnostic* equipment
6. An assignment
7. An inspection checklist

#### Requisite Knowledge and Skills

1. *Describe the* function, construction, and operation of foam-proportioning systems, including construction and operation of eduction, injection, and venturi proportioning systems and related components
2. *Describe* characteristics of system design, including foam concentrate agents
3. *Describe* characteristics of water flow and pressure
4. *Identify* flushing procedures
5. *Describe* backflow prevention
6. *Describe how to* use filters and strainers
7. *Describe* basic principles of operating controls, metering devices, and indicators
8. *Describe how to* select test, calibration, *and diagnostic* equipment
9. *List* types of defects, deficiencies, and potential problems associated with foam-proportioning systems
10. *Identify* record-keeping requirements
11. *Describe the* inspection procedures of the manufacturer and the authority having jurisdiction
12. Identify and operate proportioning systems
13. Recognize symptoms and conditions
14. Determine defects and deficiencies
15. Use test, calibration, *and diagnostic* equipment
16. Perform operational checks
17. Complete checklist and inspection documentation

**Job Performance Requirements**

Inspect the foam-proportioning system so that the mounting security and structural integrity are verified; operation and condition of the system are verified to be within manufacturer specifications; recommended fluid levels are verified; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## 7-2: Maintaining Foam-proportioning Systems

### Authority

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 4.9.2
2. *Office of the State Fire Marshal*

### Given

1. An *apparatus* with a foam-proportioning system
2. A maintenance schedule or an assignment
3. A maintenance checklist
4. Manufacturer specifications
5. SOPs
6. Test, calibration, *and diagnostic* equipment
7. Tools

### Requisite Knowledge and Skills

1. *Describe* troubleshooting procedures
2. *Describe how to use test, calibration, and diagnostic equipment*
3. *Describe* adjustment methods and procedures
4. *Identify* record-keeping requirements
5. *Describe the* inspection and maintenance procedures of the manufacturer and the authority having jurisdiction
6. Evaluate reported conditions
7. Perform all required maintenance, including all items on a maintenance checklist
8. Use test, calibration, *and diagnostic* equipment
9. Correct deficiencies
10. Perform operational checks
11. Complete required documentation

### Job Performance Requirements

Perform maintenance on a foam-proportioning system so that deformed, broken, loose, worn, or missing parts are repaired or replaced; the system operates within manufacturer guidelines; fluid levels are maintained; activities are documented; and additional repair needs are reported.

### 7-3: Repairing Foam-proportioning System Components

#### Authority

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 5.7.1
2. *Office of the State Fire Marshal*

#### Given

1. An *apparatus* with a foam-proportioning system
2. An assignment or inspection report detailing a deficiency or deformation
3. Manufacturer specifications
4. Standard operating procedures (SOPs)
5. Test, calibration, *and diagnostic* equipment
6. Tools

#### Requisite Knowledge and Skills

1. *Describe the* function, construction, and operation of foam-proportioning systems, including foam types, drive systems, foam concentrate pumps, flowmeters, proportioners, valves, eductors, and nozzles
2. *Describe how to* select testing, calibration, *and diagnostic* equipment
3. *Describe testing* methods and procedures
4. *Identify* record-keeping requirements
5. *Describe the* repair and diagnostic procedures of the manufacturer and the authority having jurisdiction
6. Identify and evaluate reported conditions
7. Interpret manufacturer specifications
8. Use required test, calibration, *and diagnostic* equipment
9. Perform diagnostic procedures
10. Perform required repairs to resolve deficiencies
11. Perform diagnostically checked
12. Complete required documentation of the manufacturer and the authority having jurisdiction.

#### Job Performance Requirements

Repair foam-proportioning system components so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of a foam-proportioning system, including component mounts, drive systems, pumps, plumbing, and valves, are repaired, replaced, or rebuilt to manufacturer specifications; the foam system is diagnostically checked for proper operation and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## 7-4: Testing Apparatus Foam Systems and Related Components

### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 5.7.2

### Given

1. An apparatus with a foam system
2. Manufacturer specifications
3. SOPs
4. Test, calibration, *and diagnostic* equipment
5. Facilities and tools

### Requisite Knowledge and Skills

1. *Describe the* function, construction, and operation of a foam system and its related components
2. *Describe* principles of foam proportioning
3. *Describe* diagnostic checks and performance testing procedure and requirements
4. *Describe how to* select test, calibration, *and diagnostic* equipment
5. *Describe* safety procedures
6. *Describe* diagnostic procedures
7. *Identify state and local foam flow requirements and restrictions*
8. *Identify* foam flow calculations
9. *Identify* record-keeping requirements
10. Conduct foam system performance tests *in accordance with state and local requirements and restrictions*
11. Use test, calibration, *and diagnostic* equipment
12. Identify defects and deficiencies
13. Perform foam flow calculations
14. Complete required documentation

### Job Performance Requirements

Complete performance testing on apparatus foam system and related components in accordance with NFPA 1911 so that the foam system is capable of meeting the performance testing requirements of the original certification test; and all testing is documented in accordance with the requirements of NFPA standards and the authority having jurisdiction.

## 7-5: Inspecting a Compressed Air Foam System (CAFS)

### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 5.7.3

### Given

1. An *apparatus* with a CAFS
2. SOPs
3. Manufacturer specifications
4. Tools
5. Test, *calibration, and diagnostic* equipment
6. An assignment
7. An inspection checklist

### Requisite Knowledge and Skills

1. Describe the function, construction, and operation of CAFS, including foam types, drive systems, flow-meters, proportioners, valves, eductors, and nozzles
2. *Identify* warning and interlock systems
3. *Identify* common failure symptoms associated with component interfaces of related equipment
4. *List* types of defects, deficiencies, and potential problems associated with CAFS
5. *Describe how to use test, calibration, and diagnostic equipment*
6. *Describe* pressure-control devices
7. *Describe* packing and seals
8. *Identify* types, grades, and viscosity of lubricants
9. *Identify* record-keeping requirements
10. *Describe* operational testing requirements
11. *Describe the* inspection procedures of the manufacturer and the authority having jurisdiction
12. Recognize and identify normal operating conditions of CAFS
13. Identify components that are damaged, worn, or missing
14. Determine defects and deficiencies
15. Use test, calibration, *and diagnostic* equipment
16. Perform diagnostic checks
17. Complete checklists and inspection documentation

### Job Performance Requirements

Inspect the compressed air foam system (CAFS) and associated components so that the security of mounting of the system is verified; the operation and condition of the system and its associated components, including air tank, hoses, valves and fittings, warning and interlock systems, linkage, and drive shafts, are verified to be within manufacturer specifications;

## **Emergency Vehicle Technician I**

### Section 7: Specialized Systems

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recommended fluid levels are verified; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and diagnostically checked are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.



## 7-6: Maintaining a Compressed Air Foam System (CAFS)

### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 5.7.4

### Given

1. An *apparatus* with a compressed air foam system
2. Manufacturer specifications
3. A maintenance schedule or an assignment
4. A maintenance checklist
5. SOPs
6. Tools
7. Test, *calibration*, and *diagnostic* equipment

### Requisite Knowledge and Skills

1. *Describe* troubleshooting procedures
2. *Describe* adjustment methods and procedures
3. *Identify* record-keeping requirements
4. *Describe the* inspection and maintenance procedures of the manufacturer and the authority having jurisdiction
5. Evaluate reported conditions
6. Perform all required maintenance, including all items on a maintenance checklist
7. Recognize and correct deficiencies
8. Interpret and follow operational diagnostic checks and test procedures
9. Use test, *calibration*, and *diagnostic* equipment
10. Complete required documentation

### Job Performance Requirements

Perform maintenance on a CAFS and its components so that the operational condition of the CAFS is preserved or restored; CAFS compressor and system components function to the recommended specifications; all hoses are tight; adjustments are made to stop all fluid leaks; lubricants are applied; all electrical connections are clean and tight; system operation is verified; deformed, broken, loose, worn, or missing parts, including component mounts, drive system, pump, plumbing, and valves, are repaired or replaced; activities are documented; and additional repair needs are reported; and testing requirements and performance testing is documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## 7-7: Repairing a Compressed Air Foam Systems (CAFS)

### Authority

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 5.7.3
2. *Office of the State Fire Marshal*

### Given

1. An *apparatus* with a CAFS
2. An assignment or inspection report detailing a deficiency or deformation
3. Manufacturer specifications
4. Department SOPs
5. Test, calibration, *and diagnostic* equipment
6. Tools

### Requisite Knowledge and Skills

1. *Describe the* function, construction, and operation of CAFS, including foam types, drive systems, air compressors, flowmeters, proportioners, valves, eductors, and nozzles
2. *Describe how to* select test, calibration, *and diagnostic* equipment;
3. *Describe* adjustment methods and procedures
4. *Identify state and local foam flow requirements and restrictions*
5. *Identify* lubrication and fluid types
6. *Identify* record-keeping requirements
7. *Describe the* repair and diagnostic procedures of the manufacturer and the authority having jurisdiction
8. Recognize, evaluate, and analyze reported conditions
9. Interpret manufacturer specifications
10. Use test, calibration, *and diagnostic* equipment
11. *Perform required repairs to resolve deficiencies*
12. Perform diagnostic checks and operational tests *in accordance with state and local requirements and restrictions*
13. Complete required documentation of the manufacturer and the authority having jurisdiction

### Job Performance Requirements

Repair compressed air foam system (CAFS) so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of a CAFS, including component mounts, drive systems, pumps, plumbing, and valves, are repaired, replaced, or rebuilt to manufacturer specifications; fluid levels are restored; the CAFS is tested for proper operation and its performance is verified; and diagnostic checks and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## 7-8: Testing Compressed Air Foam Systems (CAFS)

### Authority

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 5.7.4
2. *Office of the State Fire Marshal*

### Given

1. An *apparatus* with a CAFS
2. Manufacturer specifications
3. SOPs
4. Test, calibration, *and diagnostic* equipment
5. Facilities and tools

### Requisite Knowledge and Skills

1. *Describe the* function, construction, and operation of a CAFS and its related components
2. *Describe the* principles of compressed air systems
3. *Describe* foam-proportioning systems
4. *Describe* operational and performance testing procedure and requirements
5. *Describe how to* select test, calibration, *and diagnostic* equipment
6. *Describe* safety procedures
7. *Describe* diagnostic checks and test procedures
8. *Identify state and local foam flow requirements and restrictions*
9. *Identify* foam and compressed air flow calculations
10. *Identify* record-keeping requirements
11. Conduct CAFS performance tests *in accordance with state and local requirements and restrictions*
12. Use test, calibration, *and diagnostic* equipment
13. Identify defects and deficiencies
14. Perform foam and compressed air flow calculations
15. Complete required documentation

### Job Performance Requirements

Complete performance testing on apparatus compressed air foam system (CAFS) and related components in accordance with NFPA 1911 so that the CAFS is capable of meeting the performance requirements of the original certification test; and all testing requirements and performance testing is documented in accordance with the requirements of NFPA standards and the authority having jurisdiction.

## 7-9: Inspecting Electrical Line Voltage Generation Systems

### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.9.5

### Given

1. An *apparatus* with a line voltage electrical system
2. SOPs
3. Manufacturer specifications
4. Tools
5. Test, *calibration*, and *diagnostic* equipment
6. An assignment
7. An inspection checklist

### Requisite Knowledge and Skills

1. *Describe* electricity safety and inspection procedures
2. *Demonstrate* knowledge of local, state, and federal regulation regarding inspection of line voltage installations
3. *Describe the* function, construction, operation, and inspection of components of electrical line voltage *generators*, controls, instrumentation, and *drive units*
4. *List* types of defects, deficiencies, and potential problems associated with electrical line voltage generation systems
5. *Identify* required labels, plates, and signs
6. *Identify* record-keeping requirements
7. *Describe the* inspection procedures of the manufacturer and the authority having jurisdiction
8. Recognize and identify the symptoms and conditions of components of electrical line voltage generation, including controls and instrumentation
9. Determine defects and deficiencies
10. Perform operational checks
11. Complete checklist and inspection documentation

### Job Performance Requirements

Inspect all components and accessories of the electrical line voltage generation system, controls, and instrumentation so that the security of mounting is verified; the operation and condition of the system and drive units, cord reels, lighting, accessories and equipment, safety and protection devices, and instrumentation are verified to be within manufacturer specifications; the condition and correct placement of information and warning signs and labels are verified; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.



## 7-10: Maintaining Electrical Line Voltage Generation Systems

### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2002)

- Paragraph 4.9.6

### Given

1. An apparatus with a line voltage electrical system
2. Manufacturer specifications
3. A maintenance schedule or an assignment
4. A maintenance checklist
5. SOPs
6. Test, calibration, *and diagnostic* equipment
7. Tools

### Requisite Knowledge and Skills

1. *Demonstrate* knowledge of local, state, and federal regulation regarding maintenance of line voltage installations
2. *Identify* lubrication requirements and types
3. *Describe* troubleshooting procedures
4. *Describe* adjustment methods and procedures
5. *Identify* record-keeping requirements
6. *Describe the* inspection and maintenance procedures of the manufacturer and the authority having jurisdiction
7. Evaluate reported conditions
8. Perform operational checks
9. Perform all required maintenance, including all items on a maintenance checklist
10. Use test, calibration, *and diagnostic* equipment
11. Correct deficiencies
12. Complete required documentation

### Job Performance Requirements

Perform maintenance on electrical line voltage generation system, controls, and instrumentation so that the operational condition of generators, system components, instrumentation, controls, safety and load protection devices, and the drive unit is preserved or restored; lubrication and fluid levels are checked; deformed, broken, loose, worn, or missing parts are repaired or replaced; activities are documented; and additional repair needs are reported.

## 7-11: Inspecting Breathing-air and Purification Systems

### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.9.7

### Given

1. An *apparatus* with a breathing-air and purification system
2. SOPs
3. Manufacturer specifications
4. Tools
5. Test, *calibration*, and *diagnostic* equipment
6. Quality sample kits
7. An assignment
8. An inspection checklist

### Requisite Knowledge and Skills

1. *Describe the* function, construction, and operation of a breathing-air purification system
2. *Demonstrate* understanding of cascading operations, high-pressure air regulation, and purification testing
3. *List* types of defects, deficiencies, and potential problems associated with breathing-air and purification systems
4. *Identify* record-keeping requirements
5. *Describe the* inspection and maintenance procedures of the manufacturer and the authority having jurisdiction
6. *Describe how to* select test, calibration, and diagnostic equipment
7. *Describe* test methods and troubleshooting procedures
8. Evaluate reported conditions
9. Recognize symptoms and conditions
10. Determine defects and deficiencies
11. Perform operational checks
12. Use test, calibration, and diagnostic equipment
13. Complete checklist and inspection documentation

### Job Performance Requirements

Inspect all components of a breathing-air and purification system so that the security of mounting is verified; operation and condition of the breathing-air and purification system, including the drive unit and compressors, electrical protection devices, safety devices, interlocks, and instrumentation, are verified to be within manufacturer specifications; the condition of the separator filters is verified; recommended fluid levels of drive units and compressors are verified; the condition and adjustment of drive belts are verified to be within manufacturer specifications; all checklist items are inspected; defects and deficiencies,

## **Emergency Vehicle Technician I**

### Section 7: Specialized Systems

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including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.



## 7-12: Maintaining Breathing-air and Purification Systems

### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.9.8

### Given

1. An *apparatus* with a breathing-air and purification system
2. Manufacturer specifications
3. A maintenance schedule or an assignment
4. A maintenance checklist
5. SOPs
6. Test, calibration, *and diagnostic* equipment
7. Tools

### Requisite Knowledge and Skills

1. *Identify* lubricants and lubrication systems
2. *List* types of defects or deficiencies associated with breathing-air and purification systems
3. *Describe* troubleshooting procedures
4. *Describe* adjustment methods and procedures
5. *Identify* inspection, repair, or replacement of system components
6. *Identify* record-keeping requirements
7. *Describe the* inspection and maintenance procedures of the manufacturer and the authority having jurisdiction
8. Evaluate reported conditions ~~of the compressor and drive unit~~
9. Perform all required maintenance, including all items on a maintenance checklist
10. Recognize and correct deficiencies
11. Interpret and follow that the system is operationally checked operational test methods and procedures
12. Use test, calibration, *and diagnostic* equipment
13. Complete required documentation

### Job Performance Requirements

Perform maintenance on a breathing-air and purification system so that drive units and compressors are maintained; breathing air is within purification standards; deformed, broken, loose, worn, or missing parts are repaired or replaced; the operational condition is preserved or restored; the system is tested for proper operation checking methods; activities are documented; and additional repair needs are reported.

## 7-13: Repairing Breathing-air and Breathing Apparatus Systems

### Authority

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 5.7.8
2. *Office of the State Fire Marshal*

### Given

1. An *apparatus* with a breathing-air and air purification system
2. An assignment or inspection report detailing a deficiency or deformation
3. Manufacturer specifications
4. SOPs
5. Test, calibration, *and diagnostic* equipment
6. Tools

### Requisite Knowledge and Skills

1. *Describe the* function, construction, and operation of the complete breathing-air system and high-pressure air regulation
2. *Describe* purification testing
3. *Identify* record-keeping requirements
4. *Describe the* system diagnostic and repair procedures of the manufacturer and the authority having jurisdiction
5. *Describe how to* select test, calibration, *and diagnostic* equipment
6. *Describe* troubleshooting procedures
7. *Describe* test procedures
8. Identify and evaluate reported conditions
9. Use test, calibration, *and diagnostic* equipment
10. Complete performance procedures
11. Perform required repairs to resolve deficiencies
12. Calibrate equipment
13. Perform diagnostic checks
14. Complete required documentation

### Job Performance Requirements

Repair a breathing-air and air purification system so that all defective components are diagnosed; deformed, broken, loose, worn, or missing parts of a breathing-air and air purification system, including mounts, drive systems, pumps, piping, valves, fittings, tanks, and other components, are repaired, replaced, or rebuilt to manufacturer specifications; the system is diagnostic checked for proper operation and performance is verified; and the repairs and test results are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## 7-14: Testing Breathing-air Compressor Systems

### Authority

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 5.7.9
2. *Office of the State Fire Marshal*

### Given

1. An *apparatus* with a breathing-air compressor system
2. Manufacturer specifications
3. SOPs
4. *Test, calibration, and diagnostic equipment*
5. *Tools*

### Requisite Knowledge and Skills

1. *Describe the* function, construction, and operation of a breathing-air compressor system and its related components
2. *Identify* compressor manufacturer or manufacturer representative
3. *Identify* compressed breathing-air quality standards and air quality testing agencies
4. *Identify* record-keeping requirements
5. Schedule and verify completion of breathing-air compressor testing
6. Schedule and verify compressed breathing-air quality testing
7. Complete required documentation

### Job Performance Requirements

Complete performance testing on breathing-air compressor system and related components in accordance with NFPA 1911 and NFPA 1989 so that the breathing-air compressor system is tested to ensure that the compressor performs to the compressor manufacturer original requirements; compressed breathing air is tested to ensure breathing-air quality standards are met; and all results are documented in accordance with the requirements of NFPA standards, the compressor manufacturer, and the authority having jurisdiction.

## 7-15: Inspecting Auxiliary Air Compressors

### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 5.7.10

### Given

1. An *apparatus* with an auxiliary air compressor
2. SOPs
3. Manufacturer specifications
4. Tools
5. Test, *calibration*, and *diagnostic* equipment
6. An assignment
7. An inspection checklist

### Requisite Knowledge and Skills

1. *Describe the* function, construction, and operation of auxiliary air compressors, drive units, and related components
2. *Identify* warning and interlock systems
3. *Describe* common failure symptoms associated with component interfaces of related equipment
4. *List* types of defects, deficiencies, and potential problems associated with auxiliary air compressors, drive units, and related components
5. *Identify* types of instrumentation
6. *Describe how to* select test, calibration, and *diagnostic* equipment
7. *Identify* pressure control and safety devices, packing, and seals
8. *Identify* types, grades, and viscosity of lubricants
9. *Identify* record-keeping requirements
10. *Describe the* inspection and operational testing requirements and procedures of the manufacturer and the authority having jurisdiction
11. Recognize and identify symptoms and conditions of compressors, drive units, and related components
12. Determine defects and deficiencies
13. Use test, calibration, and *diagnostic* equipment
14. Perform diagnostic checks
15. Complete checklists and inspection documentation

### Job Performance Requirements

Inspect an auxiliary air compressor so that the operation and condition of the auxiliary air compressor, warning systems, instrumentation, and interlock systems are verified to be within manufacturer specifications; the security of mounting of the system and its associated components is verified; linkage and drive shafts are inspected for wear and alignment; the

## **Emergency Vehicle Technician I**

### **Section 7: Specialized Systems**

---

condition of air tank, dryer, reels, hoses, piping, valves, and fittings is assessed; recommended fluid levels are verified and fluids are inspected for any visible contamination; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and diagnostic checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## 7-16: Maintaining Auxiliary Air Compressors

### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 5.7.10

### Given

16. An *apparatus* with an auxiliary air compressor
17. Manufacturer specifications
18. A maintenance schedule or an assignment
19. A maintenance checklist
20. SOPs
21. Tools
22. Test, *calibration*, and *diagnostic* equipment

### Requisite Knowledge and Skills

1. *Identify* lubricants and lubrication systems
2. *Describe* troubleshooting procedures
3. *Describe* adjustment methods and procedures
4. *Identify* inspection, repair, or replacement of system components
5. *Identify* record-keeping requirements
6. *Describe the* inspection and maintenance procedures of the manufacturer and the authority having jurisdiction
7. Evaluate the reported conditions
8. Perform diagnostic checks
9. Perform all required maintenance, including all items on a maintenance checklist
10. Determine and correct defects and deficiencies
11. Use test, *calibration*, and *diagnostic* equipment
12. Complete checklists and required documentation

### Job Performance Requirements

Perform maintenance on auxiliary air compressors, drive units, and related components so that the compressor, drive unit, and related components are operational and functioning within the manufacturer specifications; filters are replaced; any leaks in hoses, piping, valves, and fittings are repaired; lubricants are applied; all electrical connections are clean and tight; deformed, broken, loose, worn, or missing parts are repaired or replaced; system operations and diagnostic checks are verified; activities are documented; and additional repair needs are reported.

## 7-17: Repairing Auxiliary Air Systems

### Authority

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 5.7.10
2. *Office of the State Fire Marshal*

### Given

1. An *apparatus* with an auxiliary air system
2. An assignment or an inspection report detailing a deficiency or deformation
3. Manufacturer specifications
4. SOPs
5. Test, calibration, *and diagnostic* equipment
6. Tools

### Requisite Knowledge and Skills

1. *Describe the* function, construction, and operation of the auxiliary air system, low-pressure regulation, valves, and controls
  2. *Describe* testing procedures
  3. *Describe how to* select test, calibration, *and diagnostic* equipment
  4. *Describe* adjustment and calibration methods and procedures
  5. *Identify* record-keeping requirements
  6. *Describe the* repair and diagnostic procedures of the manufacturer and the authority having jurisdiction
  7. Identify and evaluate reported conditions
  8. Use test, calibration, *and diagnostic* equipment
  9. Perform diagnostic procedures
  10. Perform tests and calibrations
- Perform required repairs to resolve deficiencies
11. Perform diagnostic checks
  12. Complete required documentation

### Job Performance Requirements

Repair an auxiliary air system and its components so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an auxiliary air system, including mounts, drive systems, pumps, piping, valves, fittings, and tanks, and other components, are repaired, replaced, or rebuilt to manufacturer specifications; the auxiliary air system is diagnostically checked for proper operation and its performance is verified; and the repair and test results are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## State Fire Training Content

### Code Key

**Blocks**

- G = Given
- RKS = Requisite Knowledge and Skills
- JPR = Job Performance Requirements
- NCTS = New certification training standard

### Certification: Emergency Vehicle Technician

CTS	Block	Addition	Justification	Source / Reference
2-1	RKS #2	Added "Describe how to select test, calibration, and diagnostic equipment".	An EVT has to use be able to select and use the appropriate test, calibration, and diagnostic equipment as part of the inspection process.	
2-1	RKS #9	Added "Use test, calibration, and diagnostic equipment".	An EVT has to use be able to select and use the appropriate test, calibration, and diagnostic equipment as part of the inspection process.	
2-1	JPR	Added "brake systems" to the list of chassis system components "...auxiliary drive systems, axles, driveline, steering and suspension system, <i>brake systems</i> , wheels, and tires...".	NFPA 1071 does not address brakes as a separate vehicle system or component. This addition ensures that California EVTs receive adequate brake training.	
2-1	RKS #2	Added "Identify the principles of electricity and operational theory of electronics".	This originally appeared in CTS 2-3 as part of 4.2.3 but cadre requested relocation to CTS 2-1 because it applies to all chassis systems, not just those in emergency vehicles.	
2-3	JPR	Added "brake systems" to the list of chassis system	NFPA 1071 does not address brakes as a separate vehicle	



## Emergency Vehicle Technician I

### State Fire Training Content

CTS	Block	Addition	Justification	Source / Reference
		components "...independent suspension systems, all-wheel steering systems, <i>brake systems</i> , secondary braking systems, and interface electronics, and load management systems...".	system or component. This addition ensures that California EVT's receive adequate brake training.	
2-5	JPR	Added "manufacturer and the authority having" to the last segment which now reads "and the repairs are documented in accordance with the procedures of the <i>manufacturer and the authority having jurisdiction</i> ".	NFPA oversight. All repairs are done to manufacturer standards and procedures first.	
2-9	RKS #1	Added "Identify the difference between a road test and a performance test"	Not all performance tests are road tests. Cadre wanted a distinction.	
3-1	RKS #2	Added "Describe how to select test, calibration, and diagnostic equipment".	An EVT has to use be able to select and use the appropriate test, calibration, and diagnostic equipment as part of the inspection process.	
3-1	RKS #10	Added "Use test, calibration, and diagnostic equipment".	An EVT has to use be able to select and use the appropriate test, calibration, and diagnostic equipment as part of the inspection process.	
3-3	RKS #2	Changed "Recognize metals" to "Identify metals used in cabs"	Cadre didn't feel "metals" was broad enough category of the types of materials encountered in this task.	
3-3	RKS #3	Added "Identify personnel safety restraint systems that may present hazards during cab repair".	Cadre wanted attention placed on air bag safety considerations.	

## Emergency Vehicle Technician I

### State Fire Training Content

CTS	Block	Addition	Justification	Source / Reference
3-3	RKS #14	Added "Mitigate personnel safety restraint system hazards".	Cadre wanted attention placed on air bag safety considerations.	
3-5	RKS #4	Added "Identify leak classifications and methods to stop them".	Original language didn't include classification.	
3-6	RKS #9	Changed "Recognize metals" to "Identify materials used in cabs and equipment-mounting systems, racks, brackets, and locks"	Cadre didn't feel "metals" was broad enough category of the types of materials encountered in this task.	
3-8	RKS #3	Changed "Recognize metals" to "Identify materials used in cab tilt systems"	Cadre didn't feel "metals" was broad enough category of the types of materials encountered in this task.	
3-11	RKS #8	Changed "Recognize metals" to "Identify materials used in cab bodies, compartments, and storage areas"	Cadre didn't feel "metals" was broad enough category of the types of materials encountered in this task.	
4-1	G #6	Added "Schematics".	Cadre felt the JPR couldn't be performed without them but NFPA did not include.	
4-1	G #5	Added "digital" to "including a belt tension gauge and a multimeter".	Cadre requested clarification to ensure correct equipment.	
4-1	RKS #3	Added "Kirchhoff's law" to "Ohm's law".	Almost everything in vehicles now runs on electronic systems.	
4-1	RKS #4	Added "Describe how to read and interpret schematics".	NFPA omission. This is a necessary skill to complete the JPR.	
4-1	RKS #10	Added "Read and interpret schematics".	NFPA omission. This is a necessary skill to complete the JPR.	
5-3	RKS #16	Replaced "fire flow calculations" with "hydraulic flow calculations"	Fire flow is not accurate.	
5-4	G #1	Added "or agent" to types of tanks listed.	Curriculum should cover tanks with contents other than water and foam.	

## Emergency Vehicle Technician I

### State Fire Training Content

CTS	Block	Addition	Justification	Source / Reference
5-4	RKS #1	Added "and mounting" to "function, operation, construction of water/foam tanks".	This is a critical element of this part of the vehicle. The JPR lists it, but the RKS doesn't address it.	
5-4	RKS #1, #5	Combined "agent" with "water/foam" to address all three types of tanks.	NFPA writing read as if water/foam modified agent and it doesn't. Agent is also a noun: water/foam/agent.	
5-4	RKS #2	Added "Describe specialized pressure systems".	This is a very unique system that is becoming more popular but is not yet included in the NFPA standard.	
5-5	G #1	Expanded "water or foam" tank to "water, foam, or agent" tank	California has three tank types and students need to be able to repair all three types.	
5-5	G #5	Added: "Test, calibration, and diagnostic equipment"	NFPA oversight. Selecting and using the equipment was listed in the RKS.	
5-5	RKS #1, #5	Expanded "water" tanks to include "water/foam/agent" tanks.	California has three tank types and students need to be able to repair all three types.	
5-5	JPR	Expanded "water/foam" tanks to include "water/foam/agent" tanks.	California has three tank types and students need to be able to repair all three types.	
5-6	RKS #7, #12	Replaced "fire flow calculations" with "hydraulic flow calculations".	Fire flow is not accurate.	
6-3	JPR	Added "and NFPA performance standards" to "the aerial device is tested for proper operation".	Just because it's operational does not mean it meets minimal requirements. Cadre requested more specificity.	
6-3	RKS #1	Added "and performance" to "Describe the function, construction, and operation of an aerial device".	Just because it's operational does not mean it meets minimal requirements. Cadre requested more specificity.	
6-3	RKS #9	Added "and performance" to "Perform operational tests".	Just because it performs does not mean it meets minimal requirements. Cadre requested more specificity.	
6-3	G #3	Added "NFPA 1911 (current edition)".	Corresponds to addition in JPR.	

**Emergency Vehicle Technician I**

## State Fire Training Content

<b>CTS</b>	<b>Block</b>	<b>Addition</b>	<b>Justification</b>	<b>Source / Reference</b>
6-4	RKS #6	Added "Describe how to read and interpret schematics".	This is a critical skill not covered by NFPA.	
6-4	RKS #13	Added "Read and interpret schematics".	This is a critical skill not covered by NFPA.	
6-4	G #8	Added "Schematics".	Corresponds to addition in RKS.	
7-2	RKS #2	Added "Describe how to use test, calibration, and diagnostic equipment".	NFPA listed the skill component, but not the knowledge component. Added for consistency and because it's necessary.	
7-3	G #1	Replaced "emergency response vehicle" with "apparatus".	California has foam-proportioning systems on units other than vehicles (portable trailers, etc.).	
7-4	RKS #7	Added "Identify state and local foam flow requirements and restrictions".	Each jurisdiction has requirements. The individual performing testing is responsible for knowing and abiding by them.	
7-4	RKS #10	Added "in accordance with state and local requirements and restrictions".	Each jurisdiction has requirements. The individual performing testing is responsible for knowing and abiding by them.	
7-7	G #1	Replaced "emergency response vehicle" with "apparatus".	California has compressed air foam systems (CAFS) on units other than vehicles (portable trailers, etc.).	
7-7	RKS #4	Added "Identify state and local foam flow requirements and restrictions".	Each jurisdiction has requirements. The individual performing testing is responsible for knowing and abiding by them.	
7-7	RKS #12	Added "in accordance with state and local requirements and restrictions".	Each jurisdiction has requirements. The individual performing testing is responsible for knowing and abiding by them.	
7-8	G #1	Replaced "emergency response vehicle" with "apparatus".	California has compressed air foam systems (CAFS) on units other than vehicles (portable trailers, etc.).	
7-8	RKS #8	Added "Identify state and local foam flow	Each jurisdiction has requirements. The individual	

## Emergency Vehicle Technician I

### State Fire Training Content

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CTS	Block	Addition	Justification	Source / Reference
		requirements and restrictions".	performing testing is responsible for knowing and abiding by them.	
7-8	RKS #11	Added "in accordance with state and local requirements and restrictions".	Each jurisdiction has requirements. The individual performing testing is responsible for knowing and abiding by them.	
7-13	G #1	Replaced "emergency response vehicle" with "apparatus".	California has breathing-air and air purification systems on units other than vehicles (portable trailers, etc.).	
7-14	G #1	Replaced "emergency response vehicle" with "apparatus".	California has breathing-air compressor systems on units other than vehicles (portable trailers, etc.).	
7-14	G #4	Added "Test, calibration, and diagnostic equipment".	Required to perform JPR but NFPA didn't include it.	
7-14	G #5	Added "Tools".	Required to perform JPR but NFPA didn't include it.	
7-17	G #1	Replaced "emergency response vehicle" with "apparatus".	California has auxiliary air systems on units other than vehicles (portable trailers, etc.).	

## Errata

### Code Key

#### Blocks

- G = Given
- RKS = Requisite Knowledge and Skills
- JPR = Job Performance Requirements
- NCTS = New certification training standard

#### Changes

- New text show in underline
- Deleted text shown in ~~strikeout~~

### May 2019

The May 2019 updated was a document formatting update for compliance with California Government Code (GC) Section 11546.7 (Assembly Bill 434). Additionally, the original CTS Guide was a combined EVT 1, EVT II, and EVT III. The document was split into 3 CTS guide, one for each certification level. No content was changed.

# Emergency Vehicle 2 Technician

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## Certification Training Standards Guide (2020)



California Department of Forestry and Fire  
Protection  
Office of the State Fire Marshal  
State Fire Training

# Emergency Vehicle Technician 2

## Certification Training Standards Guide (2020)

This CTS guide utilizes NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020) to provide the qualifications for State Fire Training's Emergency Vehicle Technician certification.

State Fire Training coordinated the development of this CTS guide. Before its publication, the Statewide Training and Education Advisory Committee (STEAC) and the State Board of Fire Services (SBFS) recommended this CTS guide for adoption by the Office of the State Fire Marshal (OSFM).

Published by State Fire Training.

Published August 2020

Cover photo courtesy of Lawrence Achen, Central Fire Protection District, Santa Cruz, CA



# Table of Contents

State Fire Training .....	1
Acknowledgments.....	2
How to Read a CTS Guide.....	4
Emergency Vehicle Technician 2 .....	6
Section 1: Definition of Duties .....	6
1-1: Definition of Duties for an Emergency Vehicle Technician 2 .....	6
Section 8: Electronic and Electrical Systems .....	7
8-1: Repairing Low-voltage Electrical Systems.....	7
8-2: Testing Low-voltage Electrical System Components.....	9
8-3: Inspecting Electronic Controls and Instrumentation .....	11
8-4: Maintaining Electronic Controls and Instrumentation .....	13
8-5: Repairing Electronic Controls and Instrumentation .....	14
8-6: Testing Electronic Controls and Instrumentation .....	16
Section 9: Aerial Systems .....	18
9-1: Repairing Aerial Sections, Booms, and Platforms.....	18
9-2: Repairing Aerial Device Stabilization Systems .....	19
9-3: Maintaining Aerial Device Lifting, Rotating, and Extension Systems .....	20
9-4: Repairing Aerial Device Lifting, Rotating, and Extension Systems.....	22
9-5: Repairing Aerial Hydraulic Systems .....	23
9-6: Repairing Aerial Device Electrical and Electronic Systems .....	24
9-7: Repairing Aerial Device Waterway Systems .....	25
9-8: Testing Aerial Devices, Systems, and Related Components .....	26
Section 10: Specialized Systems.....	27
10-1: Repairing Electrical Line Voltage Generation Systems .....	27
10-2: Testing Electrical Line Voltage Electrical Systems .....	29
10-3: Repairing Line Voltage Appliances and Controls .....	30
State Fire Training Content.....	31
Errata.....	33

## **State Fire Training**

### **Mission**

To enable the California Fire Service to safely protect life and property through education, training, and certification.

### **The California Fire Services Training and Education System**

The California Fire Service Training and Education System (CFSTES) was established to provide a single statewide focus for fire service training in California. CFSTES is a composite of all the elements that contribute to the development, delivery, and administration of training for the California fire service. The authority for the central coordination of this effort is vested in the Training Division of the California State Fire Marshal's Office with oversight provided by the State Board of Fire Services.

CFSTES facilitates, coordinates, and assists in the development and implementation of standards and certification for the California fire service. CFSTES:

1. Administers the California Fire Academy System
2. Provides accredited courses leading to certification and approved standardized training programs for local and regional delivery
3. Administers the national accreditation process in California
4. Publishes certification training standards, course plans, and a capstone task book for each certified level in the California fire service

CFSTES is a fire service system developed by the fire service, for the fire service. It is only as successful and effective as the people involved in it.

## **Acknowledgments**

State Fire Training appreciates the hard work and accomplishments of those who built the solid foundation on which this program continues to grow.

State Fire Training gratefully acknowledges the following individuals and organizations for their diligent efforts and contributions that made the development and publication of this document possible.

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- Andrew Henning, Chief of State Fire Training
- John Binaski, Chair, Statewide Training and Education Advisory Committee (STEAC)

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- Jim Eastman, Cadre Lead, Training Specialist III, (RA), CAL FIRE, Deputy Chief (ret.), Sacramento Metro Fire District
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## Emergency Vehicle Technician 2

### Acknowledgments

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- Boyd Clegg, *San Ramon Valley Fire Protection District (retired), Vacaville Fire Protection District (retired), Instructor, California Fire Mechanics Academy, Inc.*
- Doug Link, *San Miguel Fire Protection District (retired), Treasurer, California Fire Mechanics Academy, Inc.*
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- Rick Nogueira, *Fleet Mechanic, San Ramon Valley Fire Protection District, President, Northern California Fire Mechanics Association*
- Marty Schmeltz, Emergency Vehicle Services Advisor, Valley Power Systems, Board Member, California Fire Mechanics Academy, Inc.

#### Partners

State Fire Training also extends special acknowledgement and appreciation to the Conference and Training Services Unit with the College of Continuing Education at California State University, Sacramento, for its ongoing meeting logistics and curriculum development support, innovative ideas, and forward-thinking services. This collaboration is made possible through an interagency agreement between CAL FIRE and Sacramento State.

## **How to Read a CTS Guide**

State Fire Training develops a Certification Training Standards (CTS) Guide for a variety of job functions in the fire service such as firefighter, driver/operator, fire instructor, and company officer. The CTS guide lists the requisite knowledge and skills and the job performance requirements a person is expected to complete in order to become certified in a specific function. CTS guides are appropriate for fire service personnel and individuals in related occupations pursuing State Fire Training certification.

Each CTS guide serves as a foundation for the certification programs recommended for adoption by the Office of the State Fire Marshal. Any certification program must be based on job-related knowledge and measurable performance standards. To master the knowledge and skills needed for specialized operations, individuals will require additional training to augment the performance standards included in the CTS guide.

Within the CTS guide, it is impossible to capture the different policies and procedures of each organization in the California fire service. Individuals aspiring to meet State Fire Training's certification training standards must do so in accordance with the codes, standards, regulations, policies, and standard operating procedures applicable within their own departments or jurisdictions.

### **Format**

Each certification training standard included in the CTS guide includes the following:

#### **Section Heading**

The section heading describes a general category for a group of training standards. For example, the Fire Marshal CTS includes the following sections: Administration, Risk Management, Community Relations, Professional Development, Regulatory Programs, Fire and Life Safety, and Investigation. Each section contains one or more individual training standards.

#### **Training Standard Title**

The training standard title provides a general description of the performance requirement contained within the standard.

#### **Authority**

The CTS guide references each standard with one or more paragraphs of the corresponding National Fire Protection Association (NFPA) Professional Qualifications. This ensures that each fire service function within California's certification system meets or exceeds NFPA standards.

## Emergency Vehicle Technician 2

### How to Read a CTS Guide

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When California requirements exceed the NFPA standard, the CTS guide cites the Office of the State Fire Marshal as the authority and prints the corresponding information in *italics*.

#### **Given**

This section lists the objects, equipment, materials, or facilities an individual needs in order to acquire the requisite knowledge and skills or to accomplish the job performance requirement(s) within a training standard.

#### **Requisite Knowledge and Skills**

This section lists the knowledge and skills that an individual must acquire in order to accomplish the job performance requirement(s) within a training standard.

This section does not include NFPA requisite knowledge or skills that are too general to teach or that individuals should develop through life experiences. For example, a training standard would not list “communicate orally and in writing” or “ability to relate interpersonally” unless they specifically apply to a job performance requirement about acquiring communication skills or developing interpersonal relationships.

#### **Job Performance Requirements**

This section includes one or more written statements that describe a specific job-related task and define measurable or observable outcomes. After an individual completes all coursework and requisite requirements, the capstone task book process verifies completion of job performance requirements.

### **Content**

In addition to the individual certification training standards, the CTS guide also includes State Fire Training Revisions and Errata pages.

#### **State Fire Training Content**

Located at the back of the CTS guide, this table documents any significant revisions made by State Fire Training to the NFPA standards in the development of this CTS guide. This table is used to justify content additions and advise the course plan development team.

#### **Errata**

Located at the back of the CTS guide, this page documents any changes made to the CTS guide outside of the five-year NFPA revision cycle.

## **Emergency Vehicle Technician 2**

### **Section 1: Definition of Duties**

#### **1-1: Definition of Duties for an Emergency Vehicle Technician 2**

##### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 5.1.1
- Paragraph 5.1.2
- Paragraph 5.2
- Paragraph 5.3
- Paragraph 5.4
- Paragraph 5.5
- Paragraph 5.6
- Paragraph 5.7

##### **Given**

1. There are no givens identified for this training standard

##### **Requisite Knowledge and Skills**

1. Identify the repair, performance testing, and weight verification duties associated with chassis systems of an EVT 2
2. Identify the repair duties associated with cabs (fixed and tilt) and vehicle bodies of an EVT 2
3. Identify the repair, operational testing, and performance testing duties associated with electronic and electrical systems (low voltage) of an EVT 2
4. Identify the inspection, repair, maintenance, and operational testing duties associated with at least one of the following systems: pump and tank systems, aerial systems, or specialized (foam, line voltage electrical, breathing air, auxiliary air) systems of and EVT 2

##### **Job Performance Requirements**

There are no job performance requirements identified for this training standard.

## Section 8: Electronic and Electrical Systems

### 8-1: Repairing Low-voltage Electrical Systems

#### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 5.4.1

#### Given

1. An emergency response vehicle
2. Manufacturer specifications
3. An assignment or inspection report detailing a deficiency or deformation
4. Standard operating procedures (SOPs)
5. Test, calibration, *and diagnostic* equipment
6. Tools

#### Requisite Knowledge and Skills

1. *Describe the* function, construction, and operation of starting motors, alternators, and accessory electric motors, relays, solenoids, and regulators
2. *Describe* repair and overhaul procedures
3. *Describe the* theory of electricity
4. *Describe* operational, diagnostic, and performance tests
5. *Describe* adjustment and calibration procedures
6. *Describe how to* select test, calibration, *and diagnostic* equipment
7. *Identify* common defects
8. *Describe* electrical troubleshooting procedures
9. *Identify* record-keeping requirements
10. *Describe the* diagnostic and repair procedures of the manufacturer and the authority having jurisdiction
11. Recognize, evaluate, and identify reported conditions
12. Perform required repairs to resolve deficiencies
13. Use test, calibration, *and diagnostic* equipment
14. Measure voltage, amperage, and resistance
15. Distinguish defects and deficiencies
16. Operate and test system
17. Perform electrical calculations
18. Complete required documentation

#### Job Performance Requirements

Perform repairs on low-voltage electrical system components so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of low-voltage electrical system



## **Emergency Vehicle Technician 2**

### Section 8: Electronic and Electrical Systems

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components are repaired, replaced, or rebuilt to manufacturer specifications; charging systems, starting systems, lighting systems, electrical accessories, and other electrical systems are returned to operation; correct test equipment is used; hazards are avoided; correct parts are used; diagnostic checks are conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## **8-2: Testing Low-voltage Electrical System Components**

### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 5.4.3

### **Given**

1. An emergency response vehicle
1. Manufacturer specifications
2. SOPs
3. Test, calibration, *and diagnostic* equipment
4. Tools

### **Requisite Knowledge and Skills**

1. *Describe the* function, construction, and operation of starting motors, alternators, relays, solenoids, and regulators
2. *Describe* repair and overhaul procedures
3. *Describe the* theory of electricity
4. *Describe* operational, diagnostic checks, and performance tests
5. *Describe* adjustment and calibration procedures
6. *Describe how to* select test, calibration, *and diagnostic* equipment
7. *Identify* common defects
8. *Describe* electrical troubleshooting procedures
9. *Identify* record-keeping requirements
10. *Describe the* diagnostic and repair procedures of the manufacturer and the authority having jurisdiction
11. Recognize, evaluate, and identify reported conditions
12. Perform required repairs to resolve deficiencies
13. Use test, calibration, *and diagnostic* equipment
14. Measure voltage, amperage, and resistance
15. Distinguish defects and deficiencies
16. Operate and diagnostically check system and complete performance tests
17. Perform electrical calculations
18. Complete required documentation in accordance with NFPA standards *and the authority having jurisdiction*

### **Job Performance Requirements**

Complete performance testing on low-voltage electrical system components including batteries, charging systems, starting systems, onboard chargers, electrical loads, solenoids, and relay devices in accordance with NFPA 1911 so that components are performance tested to assure they are operating in accordance with manufacturer specifications and NFPA standards; performance tests are conducted to verify that repairs are completed; and all testing is

## **Emergency Vehicle Technician 2**

### Section 8: Electronic and Electrical Systems

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documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

### **8-3: Inspecting Electronic Controls and Instrumentation**

#### **Authority**

*Office of the State Fire Marshal*

#### **Given**

1. *An emergency response vehicle*
2. *SOPs*
3. *Manufacturer specifications*
4. *Tools*
5. *Test, calibration, and diagnostic equipment*
6. *Schematics*
7. *An inspection checklist*

#### **Requisite Knowledge and Skills**

1. *Describe how the principles of magnetism apply to electronic control devices*
2. *Describe how the principles of electricity apply to electronic control devices*
3. *Describe the principles of circuit analysis*
4. *Describe how to select test, calibration, and diagnostic equipment*
5. *Describe test, calibration, and diagnostic equipment to avoid*
6. *Use test, calibration, and diagnostic equipment*
7. *Describe the function, construction, operation, and requirements of electronic controls and instrumentation*
8. *List types of defects, deficiencies, and potential problems associated with electronic controls and instrumentation*
9. *Determine defects and deficiencies*
10. *Describe how to read and interpret schematics*
11. *Read and interpret schematics*
12. *Identify mounting and adjustment requirements*
13. *Recognize and identify potential failure symptoms and conditions of electronic controls and instrumentation*
14. *Describe the inspection procedures of the manufacturer and the AHJ*
15. *Recognize and identify symptoms and conditions of electronic control and instrumentation issues*
16. *Determine defects, deficiencies, and potential problems*
17. *Perform operational tests*
18. *Identify record-keeping requirements*
19. *Complete checklist and inspection documentation*

#### **Job Performance Requirements**

*Inspect the electronic controls and instrumentation so that the mounting security is verified; operation and condition of the electronic control system is verified to be within manufacturer*

## **Emergency Vehicle Technician 2**

### **Section 8: Electronic and Electrical Systems**

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*specifications; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and tests are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)*

## **8-4: Maintaining Electronic Controls and Instrumentation**

### **Authority**

*Office of the State Fire Marshal*

### **Given**

1. *An emergency response vehicle*
2. *Manufacturer specifications*
3. *A maintenance schedule or assignment*
4. *A maintenance checklist*
5. *SOPs*
6. *Test, calibration, and diagnostic equipment*
7. *Tools*

### **Requisite Knowledge and Skills**

1. *Describe troubleshooting and adjustment methods and procedures*
2. *Evaluate reported conditions*
3. *Use test, calibration, and diagnostic equipment*
4. *Perform operational tests*
5. *Perform all required maintenance, including all items on a maintenance checklist*
6. *Correct deficiencies*
7. *Complete required documentation*

### **Job Performance Requirements**

*Perform maintenance on the electronic controls and instrumentation so that deformed, broken, loose, worn, or missing parts are repaired or replaced; the operational condition is preserved or restored; calibration and adjustments are performed; activities are documented; and additional repair needs are reported*

## **8-5: Repairing Electronic Controls and Instrumentation**

### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 5.4.2

### **Given**

1. An emergency response vehicle
2. Manufacturer specifications
3. An assignment or inspection report detailing a deficiency or deformation
4. SOPs
5. Test, calibration, *and diagnostic* equipment
6. Tools

### **Requisite Knowledge and Skills**

1. *Describe the* function, construction, operation, and requirements of electronic engine, transmission, and brake controls, instrumentation, load control devices, onboard chargers, sequencers, interfaces, and interlocks
2. *Describe how to* select test, calibration, *and diagnostic* equipment
3. *Describe how to use a* digital volt-ohmmeter *and* electronic readers
4. *Describe how to interpret* fault codes
5. *Describe* safety procedures
6. *Identify* common deficiencies
7. *Describe* correct repair procedures
8. *Identify* record-keeping requirements
9. *Describe the* diagnostic and repair procedures of the manufacturer and the authority having jurisdiction
10. Recognize, evaluate, and analyze reported conditions, defects, and deficiencies
11. Perform required repairs to resolve deficiencies
12. Use test, calibration, *and diagnostic* equipment
13. Operate and test system(s)
14. Perform calculations
15. Use correct parts
16. Complete required documentation

### **Job Performance Requirements**

Perform repairs on electronic controls and instrumentation so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an electronic control or instrumentation are repaired, replaced, or rebuilt to manufacturer specifications; engine, transmission, and brake electronic control units or electronic control modules, pump throttles and pressure control devices, and instrumentation are returned to operation; programming is correct; load control devices, sequencer, interfaces, and interlocks are operational; correct test

## **Emergency Vehicle Technician 2**

### Section 8: Electronic and Electrical Systems

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equipment is used; correct parts are used; correct tests and programming procedures are followed; operational tests and diagnostic checks are conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.



## **8-6: Testing Electronic Controls and Instrumentation**

### **Authority**

*Office of the State Fire Marshal*

### **Given**

1. *An emergency response vehicle*
2. *Manufacturer specifications*
3. *SOPs*
4. *Test, calibration, and diagnostic equipment*
5. *Tools*

### **Requisite Knowledge and Skills**

1. *Describe operational, diagnostic, and performance tests*
2. *Describe adjustment and calibration procedures*
3. *Describe how to select test, calibration, and diagnostic equipment*
4. *Describe how to test sensors, components, and systems*
  - *5-volt reference circuits*
    - *Throttle position sensor*
    - *Manifold absolute pressure sensor*
    - *Mass airflow sensor*
    - *Intake air temperature sensor*
    - *Coolant temperature sensor*
    - *Oxygen sensor*
5. *Identify common defects*
6. *Describe electronic troubleshooting procedures*
7. *Identify record-keeping requirements*
8. *Describe the diagnostic and repair procedures of the manufacturer and the AHJ*
9. *Recognize, evaluate, and identify reported conditions*
10. *Perform required repairs to resolve deficiencies*
11. *Use test, calibration, and diagnostic equipment*
12. *Measure voltage, amperage, and resistance*
13. *Distinguish defects and deficiencies*
14. *Operate and test system*
15. *Perform electrical calculations*
16. *Complete required documentation in accordance with NFPA standards and the AHJ*

### **Job Performance Requirements**

*Complete performance testing on electronic controls and instrumentation including electronic engine, pump control systems, transmission, brake controls, load control devices, sequencers, interfaces, and interlocks, in accordance with NFPA 1911 so that components are tested to assure they are operating in accordance with manufacturer specifications and NFPA standards;*

## **Emergency Vehicle Technician 2**

### **Section 8: Electronic and Electrical Systems**

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*performance tests are conducted to verify that repairs are completed; and all testing is documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)*

## Section 9: Aerial Systems

### 9-1: Repairing Aerial Sections, Booms, and Platforms

#### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 5.6.1

#### Given

1. An emergency response vehicle with an aerial device
2. An assignment or inspection report detailing a deficiency or deformation
3. Manufacturer specifications
4. Standard operating procedures (SOPs)
5. Test, calibration, *and diagnostic* equipment
6. Tools

#### Requisite Knowledge and Skills

1. *Describe the* function, construction, and operation of aerial devices, components, and systems
2. *Describe how to* select test, calibration, *and complete diagnostic checks for proper operation of* equipment
3. *Identify* fluid types and lubricants
4. *Identify* record-keeping requirements
5. *Describe the* repair and diagnostic procedures of the manufacturer and the authority having jurisdiction
6. Identify and evaluate reported conditions
7. Interpret the manufacturer specifications
8. Perform required repairs to resolve deficiencies
9. Use test, calibration, *and diagnostic* equipment
10. Perform operational tests
11. Complete required documentation

#### Job Performance Requirements

Perform repair on aerial sections, booms and platforms so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an aerial section, boom, or platform are diagnostically checked and repaired, replaced, or rebuilt to manufacturer specifications; the aerial device is tested for proper operation and performance is verified; and the repairs are documented in accordance with the procedures of the authority having jurisdiction.

## **9-2: Repairing Aerial Device Stabilization Systems**

### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 5.6.2

### **Given**

1. An emergency response vehicle with an aerial device stabilization system
2. An assignment or inspection report detailing a deficiency or deformation
3. Manufacturer specifications
4. SOPs
5. Test, calibration, *and diagnostic* equipment
6. Tools

### **Requisite Knowledge and Skills**

1. *Describe the* function, construction, and operation of the aerial device stabilization system
2. *Identify* record-keeping requirements
3. *Describe how to* select test, calibration, *and diagnostic* equipment
4. *Describe the* aerial device repair procedures of the manufacturer and the authority having jurisdiction
5. Identify and evaluate reported conditions
6. Interpret the manufacturer specifications
7. Perform required repairs to resolve deficiencies
8. Use required test, calibration, *and diagnostic* equipment
9. Perform operational tests and diagnostic checks
10. Complete required documentation

### **Job Performance Requirements**

Perform repairs on the aerial device stabilization system so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an aerial device stabilization system are repaired, replaced, or rebuilt to manufacturer specifications; the stabilization system is diagnostically checked for proper operation and performance is verified; and the repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

### 9-3: Maintaining Aerial Device Lifting, Rotating, and Extension Systems

#### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 5.6.3

#### Given

1. An emergency response vehicle with an aerial device
2. A maintenance schedule or an assignment
3. Manufacturer specifications
4. A maintenance checklist
5. SOPs
6. Test, calibration, *and diagnostic* equipment
7. Tools

#### Requisite Knowledge and Skills

1. *Describe the* function, construction, and operation of the aerial device lifting, rotating, and extension systems
2. *Identify* lubrication and fluid types
3. *Describe* adjustment methods and procedures
4. *Describe* troubleshooting procedures
5. *Identify* types of defects and deficiencies
6. *Describe* principles of hydraulics
7. *Describe how to* select test, calibration, *and diagnostic* equipment
8. *Identify* record-keeping requirements
9. *Describe the* aerial device inspection and maintenance procedures of the manufacturer and the authority having jurisdiction
10. Evaluate reported conditions
11. Perform all required maintenance, including all items on a maintenance checklist
12. Correct deficiencies
13. Use required test, calibration, *and diagnostic* equipment
14. Perform operational tests and diagnostic checks
15. Complete required documentation

#### Job Performance Requirements

Perform maintenance on an aerial device lifting, rotating, and extension system so that the lifting, rotating, and extension systems are maintained in accordance with manufacturer specifications; electrical connections are clean and tight; hoses, valves, and fittings are leak-free and in good condition; instrumentation is operational; controls are operational; lubricants are applied; fluids are at recommended levels; the operational condition is preserved or restored; deformed, broken, loose, worn, or missing parts are repaired or replaced; the aerial system is

## **Emergency Vehicle Technician 2**

### Section 9: Aerial Systems

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diagnostically checked for proper operation and the performance is verified; additional repair needs are reported; and the maintenance is documented.

## 9-4: Repairing Aerial Device Lifting, Rotating, and Extension Systems

### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 5.6.4

### Given

1. An emergency response vehicle with an aerial device
2. An assignment or inspection report detailing a deficiency or deformation
3. Manufacturer specifications
4. SOPs
5. Test, calibration, *and diagnostic* equipment
6. Tools

### Requisite Knowledge and Skills

1. *Describe the* function, construction, and operation of the aerial device lifting, rotating, and extension systems
2. *Describe* troubleshooting procedures
3. *Describe how to* select test, calibration, *and diagnostic* equipment
4. *Identify* record-keeping requirements
5. *Describe the* aerial device repair procedures of the manufacturer and the authority having jurisdiction
6. Identify and evaluate reported conditions
7. Interpret manufacturer specifications
8. Perform required repairs to resolve deficiencies
9. Use required test, calibration, *and diagnostic* equipment
10. Perform operational tests and diagnostic checks
11. Complete required documentation

### Job Performance Requirements

Perform repairs on an aerial device lifting, rotating, and extension system so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an aerial device lifting, rotating, and extension system are repaired, replaced, or rebuilt to manufacturer specifications; the aerial device is diagnostically checked for proper operation and the performance is verified; and the repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## **9-5: Repairing Aerial Hydraulic Systems**

### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 5.6.5

### **Given**

1. An emergency response vehicle with an aerial device
2. An assignment or inspection report detailing a deficiency or deformation
3. Manufacturer specifications
4. SOPs
5. Tools
6. Test, calibration, *and diagnostic* equipment

### **Requisite Knowledge and Skills**

1. *Describe the* function, construction, and operation of the aerial device hydraulic system and components
2. *Describe* principles of hydraulics
3. *Identify* lubricants and fluid types
4. *Describe* troubleshooting procedures
5. *Describe how to* select test, calibration, *and diagnostic* equipment
6. *Describe* adjustment methods and procedures
7. *Identify* record-keeping requirements
8. *Describe the* aerial device repair procedures of the manufacturer and the authority having jurisdiction
9. Identify and evaluate reported conditions
10. Perform required repairs to resolve deficiencies
11. Use required test, calibration, *and diagnostic* checks for proper operation and performance
12. Perform operational tests
13. Complete required documentation

### **Job Performance Requirements**

Perform repairs on an aerial hydraulic system so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an aerial hydraulic system are repaired, rebuilt, or replaced according to manufacturer specifications; fluids are restored to recommended levels; the aerial device is diagnostically checked for proper operation and the performance is verified; and the repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.



## **9-6: Repairing Aerial Device Electrical and Electronic Systems**

### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 5.6.6

### **Given**

1. An emergency response vehicle with an aerial device
2. An assignment or inspection report detailing a deficiency or deformation
3. Manufacturer specifications
4. SOPs
5. Test, calibration, *and diagnostic* equipment
6. Tools

### **Requisite Knowledge and Skills**

1. *Describe the* function, construction, and operation of the aerial device electrical or electronic system
2. *Describe* principles of electricity
3. *Describe* electronic theory
4. *Describe how to* select test, calibration, and diagnostic equipment
5. *Identify* record-keeping requirements
6. *Describe the* diagnostic, repair, and performance testing procedures of the manufacturer and the authority having jurisdiction
7. Identify and evaluate reported conditions
8. Interpret manufacturer specifications
9. Perform required diagnosis
10. Perform required repairs to resolve deficiencies
11. Use required test, calibration, and diagnostic equipment
12. Perform operational tests and diagnostic checks
13. Complete required documentation

### **Job Performance Requirements**

Perform repairs on aerial device electrical and electronic systems so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an aerial device electrical or electronic system are repaired, rebuilt, or replaced to manufacturer specifications; the aerial device is diagnostically checked for proper operation and the performance is verified; and the repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## **9-7: Repairing Aerial Device Waterway Systems**

### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 5.6.7

### **Given**

1. An emergency response vehicle with an aerial device and a pre-piped waterway system
2. An assignment or inspection report detailing a deficiency or deformation
3. Manufacturer specifications
4. SOPs
5. Test, calibration, *and diagnostic* equipment
6. Tools

### **Requisite Knowledge and Skills**

1. *Describe the* function, construction, and operation of the aerial device waterway system
2. *Describe* principles of hydraulics
3. *Describe how to* select test, calibration, *and diagnostic* equipment
4. *Describe* adjustment and alignment procedures
5. *Identify* record-keeping requirements
6. *Describe the* aerial device waterway diagnostic, repair, and completes performance testing procedures of the manufacturer and the authority having jurisdiction
7. Identify and evaluate reported conditions
8. Interpret manufacturer specifications
9. Perform required repairs to resolve deficiencies
10. Use required test, calibration, *and diagnostic* equipment
11. Perform diagnostic checks
12. Complete required documentation

### **Job Performance Requirements**

Perform repairs on an aerial device waterway system so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an aerial device waterway system are repaired, rebuilt, or replaced and tested according to manufacturer specifications; the aerial device and the waterway is diagnostically checked for proper operation and the performance is verified; and the repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## **9-8: Testing Aerial Devices, Systems, and Related Components**

### **Authority**

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 5.6.8
2. *Office of the State Fire Marshal*

### **Given**

1. *An emergency response vehicle with an aerial device, systems, and related components*
2. *Test, calibration, and diagnostic equipment*
3. *Tools*
4. *Facilities*
5. *Records*
6. *Forms*

### **Requisite Knowledge and Skills**

1. *Describe the function, construction, and operation of aerial devices, controls, and instrumentation*
2. *Describe how to select test, calibration, and diagnostic equipment*
3. *Identify test equipment calibration requirements*
4. *Describe aerial device performance requirements and testing procedures*
5. *Identify hydraulic flow calculations*
6. *Identify record-keeping requirements*
7. *Evaluate conditions*
8. *Recognize deficiencies*
9. *Interpret and follow performance test procedures*
10. *Conduct required testing and performance tests*
11. *Use test, calibration, and diagnostic equipment*
12. *Complete test forms and required documentation*

### **Job Performance Requirements**

Complete annual performance testing on fire department aerial devices, systems, and related components in accordance with NFPA 1911 and SOPs so that aerial device performance can be evaluated; defects and deficiencies are identified; operation of aerial device systems is verified; and performance test results are documented.

## Section 10: Specialized Systems

### 10-1: Repairing Electrical Line Voltage Generation Systems

#### Authority

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 5.7.5
2. *Office of the State Fire Marshal*

#### Given

1. An *apparatus* with an electrical line voltage system
2. Manufacturer specifications
3. An assignment or an inspection report detailing a deficiency or deformation
4. SOPs
5. Test, calibration, *and diagnostic* equipment
6. Tools

#### Requisite Knowledge and Skills

1. *Describe the* function, construction, operation, and requirements of generators, drive units, controls and instrumentation, interfaces, and interlocks
2. *Describe how to* select test, calibration, *and diagnostic* equipment
3. *Describe the principles of* electricity
4. *Describe* defects and deficiencies
5. *Describe* repair procedures
6. *Describe* troubleshooting procedures
7. *Describe* line voltage wiring procedures and requirements
8. *Identify* safety protection devices
9. *Identify* fluid and lubricant types
10. *Identify* required calibrations
11. *Identify* record-keeping requirements
12. *Describe the* repair and diagnostic procedures of the manufacturer and the authority having jurisdiction
13. Recognize, evaluate, and analyze conditions
14. Perform required diagnostic checks and repairs to resolve deficiencies
15. Use test, calibration, *and diagnostic* equipment
16. Perform system operational tests and diagnostic checks
17. Perform calculations
18. Complete required documentation

#### Job Performance Requirements

## **Emergency Vehicle Technician 2**

### Section 10: Specialized Systems

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Repair all components of an electrical line voltage generation system, its controls, and its instrumentation so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an electrical line voltage generation system are repaired, replaced, or rebuilt to manufacturer specifications; fluids and lubricants are restored; the system is diagnostically checked for proper operation and performance is verified; and the repair and diagnostic checks results are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## **10-2: Testing Electrical Line Voltage Electrical Systems**

### **Authority**

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 5.7.6
2. *Office of the State Fire Marshal*

### **Given**

1. An *apparatus* with a line voltage electrical system
2. Manufacturer specifications
3. SOPs
4. Test, *calibration*, and *diagnostic* equipment
5. Facilities and tools

### **Requisite Knowledge and Skills**

1. *Describe the* function, construction, and operation of a line voltage electrical system and its related components
2. *Describe the* principles of electricity
3. *Identify* generating systems
4. *Describe* wiring and grounding standards
5. *Describe* operational diagnostic checks and performance testing procedure and requirements
6. *Describe how to* select test, *calibration*, and *diagnostic* equipment
7. *Describe* safety procedures
8. *Describe* diagnostic procedures
9. *Identify* electrical load, grounding and insulation calculations
10. *Identify* record-keeping requirements
11. Conduct line voltage electrical performance tests
12. Use test, *calibration*, and *diagnostic* equipment
13. Identify defects and deficiencies
14. Perform GFCI, operational check and load bank testing, and dielectric voltage with-stand tests
15. Perform calculations
16. Complete required documentation

### **Job Performance Requirements**

Complete performance testing on apparatus line voltage electrical system and related components in accordance with NFPA 1911 so that the line voltage electrical system is capable of meeting the performance testing and safety requirements of the original certification test; and all performance testing is documented in accordance with the procedures of NFPA standards and the authority having jurisdiction.

### 10-3: Repairing Line Voltage Appliances and Controls

#### Authority

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 5.7.7
2. *Office of the State Fire Marshal*

#### Given

1. An *apparatus* with line voltage appliances and controls
2. Manufacturer specifications
3. An assignment or inspection report detailing a deficiency or deformation
4. SOPs
5. Test, calibration, *and diagnostic* equipment
6. Tools

#### Requisite Knowledge and Skills

1. *Describe the* function, construction, operation, and requirements of ~~hardwired~~ line voltage appliances and controls, accessories, and equipment
2. *Describe how to* select test, calibration, *and diagnostic* equipment
3. *Identify* types of defects and deficiencies
4. *Describe* troubleshooting procedures
5. *Identify* record-keeping requirements
6. *Describe the* repair and diagnostic procedures of the manufacturer and the authority having jurisdiction
7. Recognize, identify, and evaluate reported conditions of line voltage components and accessories
8. Perform repairs to resolve deficiencies
9. Use test, calibration, *and diagnostic* equipment
10. Perform operational tests and diagnostic checks
11. Complete required documentation

#### Job Performance Requirements

Repair all line voltage appliances and controls so that defective components and accessories are diagnosed; deformed, broken, loose, worn, or missing parts of a line voltage appliance or control are repaired, replaced, or rebuilt to manufacturer specifications; systems are diagnostically checked for proper operation and performance verified; and repairs and test results are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction.

## State Fire Training Content

### Code Key

**Blocks**

- G = Given
- RKS = Requisite Knowledge and Skills
- JPR = Job Performance Requirements
- NCTS = New certification training standard

### Certification: Emergency Vehicle Technician

CTS	Block	Addition	Justification	Source / Reference
8-2	RKS #18	Removed “and SOPS” and added “and the authority having jurisdiction” to “Complete required documentation in accordance with NFPA standards”	The AHJ outranks the department’s standard operating procedures.	
8-3	NCTS	Added standard for “Inspecting Electronic Controls and Instrumentation”	NFPA has a standard for repairing, but not for inspecting, maintaining, or testing. Cadre added to cover critical content.	
8-4	NCTS	Added standard for “Maintaining Electronic Controls and Instrumentation”	NFPA has a standard for repairing, but not for inspecting, maintaining, or testing. Cadre added to cover critical content.	
8-6	NCTS	Added standard for “Testing Electronic Controls and Instrumentation”	NFPA has a standard for repairing, but not for inspecting, maintaining, or testing. Cadre added to cover critical content.	
9-8	G #1	Add “An emergency response vehicle with an aerial device, systems, and related components”.	NFPA oversight. Necessary to complete job performance requirement.	
9-8	RKS #5	Replaced “fire flow calculations” with “hydraulic flow calculations”.	Fire flow is not accurate.	



## Emergency Vehicle Technician 2

### State Fire Training Content

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CTS	Block	Addition	Justification	Source / Reference
10-1	G #1	Replaced "emergency response vehicle" with "apparatus".	California has electrical line voltage systems on units other than vehicles (portable trailers, etc.).	
10-1	RKS #3	Added "Describe the principles of electricity".	This task cannot be performed without this knowledge.	
10-2	G #1	Replaced "emergency response vehicle" with "apparatus".	California has electrical line voltage systems on units other than vehicles (portable trailers, etc.).	
10-3	G #1	Replaced "emergency response vehicle" with "apparatus". Removed "hardwired".	California has electrical line voltage systems on units other than vehicles (portable trailers, etc.). Not all appliances are hardwired anymore.	
10-3	JPR	Removed "hardwired" from both references to "line voltage appliances [and/or] controls".	Not all appliances are hardwired anymore.	

## Errata

### Code Key

#### Blocks

- G = Given
- RKS = Requisite Knowledge and Skills
- JPR = Job Performance Requirements
- NCTS = New certification training standard

#### Changes

- New text show in underline
- Deleted text shown in ~~strikeout~~

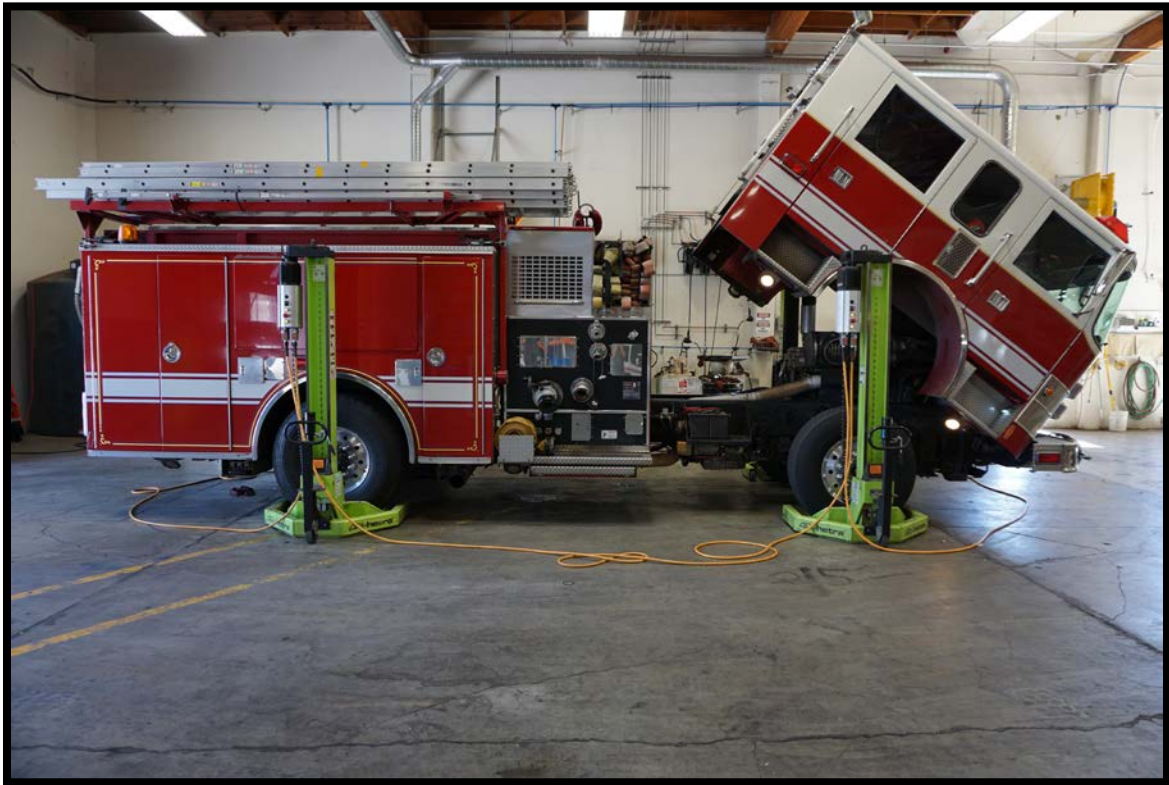
### May 2019

The May 2019 updated was a document formatting update for compliance with California Government Code (GC) Section 11546.7 (Assembly Bill 434). Additionally, the original CTS Guide was a combined EVT 1, EVT 2, and EVT 3. The document was split into 3 CTS guide, one for each certification level. No content was changed.

# Emergency Vehicle Technician 3

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## Certification Training Standards Guide (2020)



California Department of Forestry and Fire  
Protection  
Office of the State Fire Marshal  
State Fire Training

# Emergency Vehicle Technician 3

## Certification Training Standards Guide (2020)

This CTS guide utilizes NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020) to provide the qualifications for State Fire Training's Emergency Vehicle Technician certification.

State Fire Training coordinated the development of this CTS guide. Before its publication, the Statewide Training and Education Advisory Committee (STEAC) and the State Board of Fire Services (SBFS) recommended this CTS guide for adoption by the Office of the State Fire Marshal (OSFM).

Published by State Fire Training.

Published August 2020

Cover photo courtesy of Lawrence Achen, Central Fire Protection District, Santa Cruz, CA

# Table of Contents

State Fire Training .....	1
Acknowledgments.....	2
How to Read a CTS Guide.....	4
Emergency Vehicle Technician 3 .....	6
Section 1: Definition of Duties .....	6
1-1: Definition of Duties for an Emergency Vehicle Technician 3 .....	6
Section 11: Human Resource Management and Evaluation .....	8
11-1: Assigning Tasks or Responsibilities .....	8
11-2: Conducting Individual Technician Training .....	9
11-3: Evaluating Technician Performance .....	10
11-4: Recommending, Specifying, and Enforcing Discipline.....	11
11-5: Recommending and Enforcing Safety Policies and Procedures.....	12
11-6: Monitoring Environmental Safety Compliance.....	13
Section 12: Quality Control and Inspection .....	14
12-1: Inspecting Completed Vehicles.....	14
12-2: Monitoring Outsourced Repairs .....	15
Section 13: Equipment and Parts Management .....	16
13-1: Monitoring Inventory Levels.....	16
13-2: Ordering Parts.....	17
Section 14: Documentation .....	18
14-1: Preparing Estimates .....	18
14-2: Adhering to Repair and Maintenance Schedules .....	19
14-3: Documenting Warranty Repairs .....	20
14-4: Creating Work Orders .....	21
14-5: Validating Maintenance Records .....	22
Section 15: Apparatus Specifications .....	23
15-1: Developing Apparatus Specifications .....	23
State Fire Training Content.....	24
Errata.....	32

## **State Fire Training**

### **Mission**

To enable the California Fire Service to safely protect life and property through education, training, and certification.

### **The California Fire Services Training and Education System**

The California Fire Service Training and Education System (CFSTES) was established to provide a single statewide focus for fire service training in California. CFSTES is a composite of all the elements that contribute to the development, delivery, and administration of training for the California fire service. The authority for the central coordination of this effort is vested in the Training Division of the California State Fire Marshal's Office with oversight provided by the State Board of Fire Services.

CFSTES facilitates, coordinates, and assists in the development and implementation of standards and certification for the California fire service. CFSTES:

1. Administers the California Fire Academy System
2. Provides accredited courses leading to certification and approved standardized training programs for local and regional delivery
3. Administers the national accreditation process in California
4. Publishes certification training standards, course plans, and a capstone task book for each certified level in the California fire service

CFSTES is a fire service system developed by the fire service, for the fire service. It is only as successful and effective as the people involved in it.

## **Acknowledgments**

State Fire Training appreciates the hard work and accomplishments of those who built the solid foundation on which this program continues to grow.

State Fire Training gratefully acknowledges the following individuals and organizations for their diligent efforts and contributions that made the development and publication of this document possible.

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- Andrew Henning, Chief of State Fire Training
- John Binaski, Chair, Statewide Training and Education Advisory Committee (STEAC)

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- Jim Eastman, Cadre Lead, Training Specialist III, (RA), CAL FIRE, Deputy Chief (ret.), Sacramento Metro Fire District
- Allison L. Shaw, Editor, California State University, Sacramento

## Emergency Vehicle Technician 3

### Acknowledgments

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#### Cadre Members

- Lawrence Achen, Training Captain, Central Fire Protection District, Santa Cruz, Vice President, California Fire Mechanics Academy, Inc.
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- Doug Link, *San Miguel Fire Protection District (retired), Treasurer, California Fire Mechanics Academy, Inc.*
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#### Partners

State Fire Training also extends special acknowledgement and appreciation to the Conference and Training Services Unit with the College of Continuing Education at California State University, Sacramento, for its ongoing meeting logistics and curriculum development support, innovative ideas, and forward-thinking services. This collaboration is made possible through an interagency agreement between CAL FIRE and Sacramento State.



## **How to Read a CTS Guide**

State Fire Training develops a Certification Training Standards (CTS) Guide for a variety of job functions in the fire service such as firefighter, driver/operator, fire instructor, and company officer. The CTS guide lists the requisite knowledge and skills and the job performance requirements a person is expected to complete in order to become certified in a specific function. CTS guides are appropriate for fire service personnel and individuals in related occupations pursuing State Fire Training certification.

Each CTS guide serves as a foundation for the certification programs recommended for adoption by the Office of the State Fire Marshal. Any certification program must be based on job-related knowledge and measurable performance standards. To master the knowledge and skills needed for specialized operations, individuals will require additional training to augment the performance standards included in the CTS guide.

Within the CTS guide, it is impossible to capture the different policies and procedures of each organization in the California fire service. Individuals aspiring to meet State Fire Training's certification training standards must do so in accordance with the codes, standards, regulations, policies, and standard operating procedures applicable within their own departments or jurisdictions.

### **Format**

Each certification training standard included in the CTS guide includes the following:

#### **Section Heading**

The section heading describes a general category for a group of training standards. For example, the Fire Marshal CTS includes the following sections: Administration, Risk Management, Community Relations, Professional Development, Regulatory Programs, Fire and Life Safety, and Investigation. Each section contains one or more individual training standards.

#### **Training Standard Title**

The training standard title provides a general description of the performance requirement contained within the standard.

#### **Authority**

The CTS guide references each standard with one or more paragraphs of the corresponding National Fire Protection Association (NFPA) Professional Qualifications. This ensures that each fire service function within California's certification system meets or exceeds NFPA standards.

## Emergency Vehicle Technician 3

### How to Read a CTS Guide

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When California requirements exceed the NFPA standard, the CTS guide cites the Office of the State Fire Marshal as the authority and prints the corresponding information in *italics*.

#### **Given**

This section lists the objects, equipment, materials, or facilities an individual needs in order to acquire the requisite knowledge and skills or to accomplish the job performance requirement(s) within a training standard.

#### **Requisite Knowledge and Skills**

This section lists the knowledge and skills that an individual must acquire in order to accomplish the job performance requirement(s) within a training standard.

This section does not include NFPA requisite knowledge or skills that are too general to teach or that individuals should develop through life experiences. For example, a training standard would not list “communicate orally and in writing” or “ability to relate interpersonally” unless they specifically apply to a job performance requirement about acquiring communication skills or developing interpersonal relationships.

#### **Job Performance Requirements**

This section includes one or more written statements that describe a specific job-related task and define measurable or observable outcomes. After an individual completes all coursework and requisite requirements, the capstone task book process verifies completion of job performance requirements.

### **Content**

In addition to the individual certification training standards, the CTS guide also includes State Fire Training Revisions and Errata pages.

#### **State Fire Training Content**

Located at the back of the CTS guide, this table documents any significant revisions made by State Fire Training to the NFPA standards in the development of this CTS guide. This table is used to justify content additions and advise the course plan development team.

#### **Errata**

Located at the back of the CTS guide, this page documents any changes made to the CTS guide outside of the five-year NFPA revision cycle.

## **Emergency Vehicle Technician 3**

### **Section 1: Definition of Duties**

#### **1-1: Definition of Duties for an Emergency Vehicle Technician 3**

##### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 4.1.1
- Paragraph 4.1.2
- Paragraph 4.2
- Paragraph 4.3
- Paragraph 4.4
- Paragraph 4.5
- Paragraph 4.6
- Paragraph 4.7 (Not addressed in the Revision 2020)
- Paragraph 4.8 (Not addressed in the Revision 2020)
- Paragraph 4.9 (Was the old 4.7 in the 2016 version)

##### **Given**

1. There are no givens identified for this training standard

##### **Requisite Knowledge and Skills**

1. Identify the general knowledge requirements associated with the roles of responsibilities of an EVT I
2. Identify the general skill requirements associated with the roles and responsibilities of an EVT I
3. Identify the inspection and preventative maintenance duties associated with chassis systems
4. Identify the inspection and maintenance duties associated with cabs (fixed and tilt) and vehicle bodies
5. Identify the operational checks duties associate with a vehicle's electronic and electrical systems (low voltage)
6. Identify the inspection, maintenance, and operational testing duties associated with at least one of the following systems: fire pump, auxiliary pump, and tank systems; aerial systems; or specialized (foam, line-voltage electrical, breathing air, auxiliary air) systems

##### **Job Performance Requirements**

There are no job performance requirements identified for this training standard.

**Emergency Vehicle Technician 3**

Section 11: Human Resource Management and Evaluation

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## **Section 11: Human Resource Management and Evaluation**

### **11-1: Assigning Tasks or Responsibilities**

#### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 6.2.1

#### **Given**

1. A work order
2. An *apparatus*
3. Work space
4. Required tools, equipment, and parts

#### **Requisite Knowledge and Skills**

1. *Identify the* function, construction, and operation of vehicles and systems
2. *Identify* required testing
3. *Identify* required record-keeping and documentation
4. *Identify* common deficiencies
5. *Identify* repair procedures
6. *Identify* testing procedures
7. *Identify apparatus* safety requirements
8. *Identify* skill levels of assigned technicians
9. *Identify* agency priorities
10. *Identify* available resources
11. *Communicate* verbally and in writing
12. *Evaluate technician* performance

#### **Job Performance Requirements**

Assign tasks or responsibilities to technicians so that the instructions are complete, clear, and concise; safety considerations are addressed; and the work is completed and within the scheduled time.

## **11-2: Conducting Individual Technician Training**

### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 6.2.2

### **Given**

1. *An apparatus*
2. An assignment
3. A workspace
4. All necessary tools

### **Requisite Knowledge and Skills**

1. *Identify the* function, operation, and construction of component
  2. *Identify* applicable standards
  3. *Identify* manufacturer specifications
  4. *Identify* recommended procedures
  5. *Determine* the technician's capability
1. Research, communicate, and deliver training material based on methods and practices
  2. Evaluate the results

### **Job Performance Requirements**

Conduct individual training for technicians so that the technician understands the procedure and is able to demonstrate proficiency at the given task.

## **11-3: Evaluating Technician Performance**

### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 6.2.3.1

### **Given**

1. A time record
2. Pertinent work orders
3. Evaluation forms

### **Requisite Knowledge and Skills**

1. *Identify* allowable repair times
2. *Describe how to evaluate and analyze technician strengths and weaknesses*
3. *Identify* agency policies and procedures
4. *Describe appropriate workplace* behavior
5. *Identify* job descriptions
6. *Describe* goals of the evaluation program
7. *Communicate verbally and in writing*
8. Evaluate *and document* performance

### **Job Performance Requirements**

Provide input on the performance level of the technician so that the abilities and weaknesses of a technician can be determined; required counseling and training can be scheduled to maintain or improve a technician's proficiency; or an issue can be referred to the next level of supervision.

## **11-4: Recommending, Specifying, and Enforcing Discipline**

### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 6.2.3.2

### **Given**

1. Employee history
2. Department SOPs

### **Requisite Knowledge and Skills**

1. *Identify* agency policies and procedures
2. *Demonstrate an* awareness of the situation and the individual involved
3. *Communicate* verbally and in writing
4. Assess employee abilities and attitudes
5. Implement the most effective alternative

### **Job Performance Requirements**

Recommend, specify, and enforce discipline so that the employee is given the guidance necessary to improve or resolve issues.



## **11-5: Recommending and Enforcing Safety Policies and Procedures**

### **Authority**

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 6.2.3.3
2. *Office of the State Fire Marshal*

### **Given**

1. Agency safety policies and procedures
2. Federal, state, local, and industry standards for workplace safety
3. Safety hazards

### **Requisite Knowledge and Skills**

1. Identify agency safety policies and procedures
2. Identify federal, state, local, and industry standards for workplace safety
3. Identify safety hazards
4. Identify safe practices
5. Identify equipment limitations
6. Identify personal protection devices
7. Communicate verbally and in writing
8. *Promote a safe working environment*

### **Job Performance Requirements**

Recommend and enforce safety policies and procedures so that workplace safety is monitored and recommendations for deficiencies are documented.

## **11-6: Monitoring Environmental Safety Compliance**

### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 6.2.3.4

### **Given**

1. Agency policies and procedures
2. Federal, state, and local environmental regulations
3. Material safety data sheets (MSDS)

### **Requisite Knowledge and Skills**

1. *Identify* agency policies and procedures
2. *Identify* federal, state, and local environmental regulations
3. *Identify location and content of material safety data sheets* (MSDS)
4. Communicate verbally and in writing

### **Job Performance Requirements**

Monitor compliance of applicable environmental regulations so that the workplace is in compliance with all required regulations; and all deficiencies are identified and corrected.

## Section 12: Quality Control and Inspection

### 12-1: Inspecting Completed Vehicles

#### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 6.3.1.1

#### Given

1. An *apparatus*
2. A deficiency list
3. Completed tasks
4. Required license

#### Requisite Knowledge and Skills

1. *Identify the* function, construction, and operation of vehicles and systems
2. *Identify* required testing
3. *Identify* required record-keeping and documentation
4. *Identify* common deficiencies
5. *Identify* repair procedures
6. *Identify* diagnostic checks and performance testing procedures
7. *Identify* vehicle safety requirements and confirm that they are diagnostically checked to manufacturer's specifications
8. Operate *apparatus*
9. *Verify* performance of required tests and checks
10. Use diagnostic equipment and tools
11. Communicate verbally and in writing

#### Job Performance Requirements

Inspect a completed vehicle so that all deficiencies are repaired; documentation is completed; and the vehicle is tested and diagnostically checked to manufacturer specifications.

## **12-2: Monitoring Outsourced Repairs**

### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 6.3.1.2

### **Given**

1. A completed vehicle
2. A deficiency list
3. A list of completed tasks

### **Requisite Knowledge and Skills**

1. *Identify the* function, construction, and operation of vehicles and systems
2. *Identify vendor* qualifications and limitations
3. *Identify* required diagnostic checks and performance testing
4. *Identify* required record-keeping and documentation
5. *Identify* common deficiencies
6. *Identify* repair procedures
7. *Identify* diagnostic checks and performance testing procedures
8. *Identify* vehicle safety requirements
9. Operate vehicles
10. *Verify* diagnostic checks and performance tests of equipment and tools identified by manufacturer's specifications
11. Use diagnostic equipment and tools
12. Communicate verbally and in writing

### **Job Performance Requirements**

Monitor outsourced repairs so that all repairs are verified; and diagnostic checks are completed and documented

## Section 13: Equipment and Parts Management

### 13-1: Monitoring Inventory Levels

#### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 6.4.1

#### Given

1. Current inventory
2. Agency equipment lists
3. Manufacturer specification
4. A maintenance schedule
5. Previous repair history
6. Manufacturer parts manuals

#### Requisite Knowledge and Skills

1. *Identify* current suppliers
2. *Evaluate* previous repair history
3. *Identify* agency and purchase policies
4. Determine current needs
5. Use previous repair history to predict future needs

#### Job Performance Requirements

Monitor inventory levels within the relevant level of responsibility so that the inventory is maintained at the required levels.

## **13-2: Ordering Parts**

### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 6.4.2

### **Given**

1. A part number or specification and application of part required
2. A purchase order form and procedure
3. A vendor list

### **Requisite Knowledge and Skills**

1. *Identify the* function, operation, and construction of component
2. *Identify* applicable standards
3. *Identify* manufacturer specifications
4. *Identify* recommended part substitutions
5. *Identify* parts locations
6. *Identify transportation systems*
7. *Research* written and electronic sources and manuals
8. Communicate verbally and in writing

### **Job Performance Requirements**

Order appropriate parts so that the correct part is ordered from the vendor; purchase orders are tracked; and purchase is recorded.

## Section 14: Documentation

### 14-1: Preparing Estimates

#### Authority

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 6.5.1

#### Given

1. An emergency vehicle
2. Repair history
3. Estimate forms
4. Parts lists
5. Required repair or upgrade hours
6. A calculator

#### Requisite Knowledge and Skills

1. *Identify the* function, construction, and operation of emergency response vehicles
2. *Identify estimated* repair times
3. *Identify* parts and component costs
4. *Identify* applicable vehicle standards
5. Estimate and calculate costs and repair times
6. *Complete documentation and* record-keeping
7. Communicate verbally and in writing

#### Job Performance Requirements

Prepare an estimate of deficiencies or upgrades to be completed on an emergency vehicle so that the costs are calculated, documented, and communicated.

## **14-2: Adhering to Repair and Maintenance Schedules**

### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 6.5.2

### **Given**

1. An emergency vehicle
2. A schedule
3. Forms
4. A repair or maintenance request
5. Current staffing and workload
6. Work estimate
7. Work space availability

### **Requisite Knowledge and Skills**

1. *Identify* resource availability
2. *Identify* agency requirements
3. *Identify* the function, construction, and operation of emergency response vehicles
4. Utilize resources
5. Evaluate requests
6. Project *maintenance or repair* results

### **Job Performance Requirements**

Adhere to a schedule for maintenance or repair of an emergency vehicle so that required repairs or maintenance can be assigned and completed in accordance with the projected times.



### **14-3: Documenting Warranty Repairs**

#### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 6.5.3

#### **Given**

1. A repaired vehicle
2. Applicable warranties
3. A deficiency list
4. Technical service bulletins
5. A list of completed tasks

#### **Requisite Knowledge and Skills**

1. *Identify* current warranties
2. *Identify* technical service bulletins
3. *Identify* diagnostic checks or performance tests
4. *Identify* required record-keeping and documentation
5. *Identify* diagnostic checks or performance testing procedures
6. *Identify* vehicle safety requirements
7. *Identify the* function, construction, and operation of emergency response vehicles
8. *Identify* manufacturer specifications
9. *Identify agency* policies and procedures
10. Communicate verbally and in writing
11. Comply with *the record-keeping requirements of the manufacturer* and the authority having jurisdiction

#### **Job Performance Requirements**

Document warranty repairs so that all repairs are completed, and diagnostically checked and performance tested if required are verified, and tested; and the warranty claim is processed.

## **14-4: Creating Work Orders**

### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 6.5.4

### **Given**

1. An emergency response vehicle
2. An assignment
3. Agency work order forms

### **Requisite Knowledge and Skills**

1. *Identify* required record-keeping
2. *Identify* agency record-keeping system
3. *Identify* previous repair history
4. *Identify the* function, construction, and operation of emergency response vehicles
5. Apply agency record-keeping system
6. Communicate verbally and in writing
7. *Utilize* diagnostic skills

### **Job Performance Requirements**

Create work orders so that all work to be performed is documented; all required information is recorded; all necessary information is communicated to the technician(s); and the emergency response vehicle is prepared for repair or maintenance.

## **14-5: Validating Maintenance Records**

### **Authority**

NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)

- Paragraph 6.5.5

### **Given**

1. Completed documentation of maintenance records
2. Agency record-keeping policies

### **Requisite Knowledge and Skills**

1. *Identify* record-keeping and accounting *procedures*
2. *Describe how to analyze* statistics
3. *Identify* agency policy and procedure
4. Recognize, evaluate, analyze, and calculate statistical information, accounting reports, and cost performance reports

### **Job Performance Requirements**

Validate maintenance records so that accurate records are maintained.

## Section 15: Apparatus Specifications

### 15-1: Developing Apparatus Specifications

#### Authority

1. NFPA 1071 Standard for Emergency Vehicle Technician Professional Qualifications (2020)
  - Paragraph 6.6.1
2. *Office of the State Fire Marshal*

#### Given

1. *Agency* recommendations
2. *Agency* policies and procedures
3. Applicable NFPA *and industry* standards

#### Requisite Knowledge and Skills

1. Identify current quality standards and requirements of the *agency, state and local laws and regulations, the American Society of Mechanical Engineers (ASME), the Society of Automotive Engineers (SAE), the Occupational Safety and Health Administration (OSHA), and NFPA* for the construction of a fire apparatus
2. Recognize *agency* guidelines
3. Organize and identify apparatus components based on the needs of the applicable divisions
4. Communicate verbally and in writing

#### Job Performance Requirements

Develop a specification through review and research of existing fire apparatus so that technical criteria are presented as a completed specification.

## State Fire Training Content

### Code Key

#### Blocks

- G = Given
- RKS = Requisite Knowledge and Skills
- JPR = Job Performance Requirements
- NCTS = New certification training standard

### Certification: Emergency Vehicle Technician

CTS	Block	Addition	Justification	Source / Reference
2-1	RKS #2	Added "Describe how to select test, calibration, and diagnostic equipment".	An EVT has to use be able to select and use the appropriate test, calibration, and diagnostic equipment as part of the inspection process.	
2-1	RKS #9	Added "Use test, calibration, and diagnostic equipment".	An EVT has to use be able to select and use the appropriate test, calibration, and diagnostic equipment as part of the inspection process.	
2-1	JPR	Added "brake systems" to the list of chassis system components "...auxiliary drive systems, axles, driveline, steering and suspension system, <i>brake systems</i> , wheels, and tires...".	NFPA 1071 does not address brakes as a separate vehicle system or component. This addition ensures that California EVTs receive adequate brake training.	
2-1	RKS #2	Added "Identify the principles of electricity and operational theory of electronics".	This originally appeared in CTS 2-3 as part of 4.2.3 but cadre requested relocation to CTS 2-1 because it applies to all chassis systems, not just those in emergency vehicles.	
2-3	JPR	Added "brake systems" to the list of chassis system	NFPA 1071 does not address brakes as a separate vehicle	

### Emergency Vehicle Technician 3

#### State Fire Training Content

CTS	Block	Addition	Justification	Source / Reference
		components "...independent suspension systems, all-wheel steering systems, <i>brake systems</i> , secondary braking systems, and interface electronics, and load management systems...".	system or component. This addition ensures that California EVT's receive adequate brake training.	
2-5	JPR	Added "manufacturer and the authority having" to the last segment which now reads "and the repairs are documented in accordance with the procedures of the <i>manufacturer and the authority having jurisdiction</i> ".	NFPA oversight. All repairs are done to manufacturer standards and procedures first.	
2-9	RKS #1	Added "Identify the difference between a road test and a performance test"	Not all performance tests are road tests. Cadre wanted a distinction.	
3-1	RKS #2	Added "Describe how to select test, calibration, and diagnostic equipment".	An EVT has to use be able to select and use the appropriate test, calibration, and diagnostic equipment as part of the inspection process.	
3-1	RKS #10	Added "Use test, calibration, and diagnostic equipment".	An EVT has to use be able to select and use the appropriate test, calibration, and diagnostic equipment as part of the inspection process.	

### Emergency Vehicle Technician 3

#### State Fire Training Content

CTS	Block	Addition	Justification	Source / Reference
3-3	RKS #2	Changed "Recognize metals" to "Identify metals used in cabs"	Cadre didn't feel "metals" was broad enough category of the types of materials encountered in this task.	
3-3	RKS #3	Added "Identify personnel safety restraint systems that may present hazards during cab repair".	Cadre wanted attention placed on air bag safety considerations.	
3-3	RKS #14	Added "Mitigate personnel safety restraint system hazards".	Cadre wanted attention placed on air bag safety considerations.	
3-5	RKS #4	Added "Identify leak classifications and methods to stop them".	Original language didn't include classification.	
3-6	RKS #9	Changed "Recognize metals" to "Identify materials used in cabs and equipment-mounting systems, racks, brackets, and locks"	Cadre didn't feel "metals" was broad enough category of the types of materials encountered in this task.	
3-8	RKS #3	Changed "Recognize metals" to "Identify materials used in cab tilt systems"	Cadre didn't feel "metals" was broad enough category of the types of materials encountered in this task.	
3-11	RKS #8	Changed "Recognize metals" to "Identify materials used in cab bodies, compartments, and storage areas"	Cadre didn't feel "metals" was broad enough category of the types of materials encountered in this task.	
4-1	G #6	Added "Schematics".	Cadre felt the JPR couldn't be performed without them but NFPA did not include.	
4-1	G #5	Added "digital" to "including a belt tension gauge and a multimeter".	Cadre requested clarification to ensure correct equipment.	
4-1	RKS #3	Added "Kirchhoff's law" to "Ohm's law".	Almost everything in vehicles now runs on electronic systems.	
4-1	RKS #4	Added "Describe how to read and interpret schematics".	NFPA omission. This is a necessary skill to complete the JPR.	

### Emergency Vehicle Technician 3

#### State Fire Training Content

CTS	Block	Addition	Justification	Source / Reference
4-1	RKS #10	Added "Read and interpret schematics".	NFPA omission. This is a necessary skill to complete the JPR.	
5-3	RKS #16	Replaced "fire flow calculations" with "hydraulic flow calculations"	Fire flow is not accurate.	
5-4	G #1	Added "or agent" to types of tanks listed.	Curriculum should cover tanks with contents other than water and foam.	
5-4	RKS #1	Added "and mounting" to "function, operation, construction of water/foam tanks".	This is a critical element of this part of the vehicle. The JPR lists it, but the RKS doesn't address it.	
5-4	RKS #1, #5	Combined "agent" with "water/foam" to address all three types of tanks.	NFPA writing read as if water/foam modified agent and it doesn't. Agent is also a noun: water/foam/agent.	
5-4	RKS #2	Added "Describe specialized pressure systems".	This is a very unique system that is becoming more popular but is not yet included in the NFPA standard.	
5-5	G #1	Expanded "water or foam" tank to "water, foam, or agent" tank	California has three tank types and students need to be able to repair all three types.	
5-5	G #5	Added: "Test, calibration, and diagnostic equipment"	NFPA oversight. Selecting and using the equipment was listed in the RKS.	
5-5	RKS #1, #5	Expanded "water" tanks to include "water/foam/agent" tanks.	California has three tank types and students need to be able to repair all three types.	
5-5	JPR	Expanded "water/foam" tanks to include "water/foam/agent" tanks.	California has three tank types and students need to be able to repair all three types.	
5-6	RKS #7, #12	Replaced "fire flow calculations" with "hydraulic flow calculations".	Fire flow is not accurate.	
6-3	JPR	Added "and NFPA performance standards" to "the aerial device is tested for proper operation".	Just because it's operational does not mean it meets minimal requirements. Cadre requested more specificity.	



### Emergency Vehicle Technician 3

#### State Fire Training Content

CTS	Block	Addition	Justification	Source / Reference
6-3	RKS #1	Added "and performance" to "Describe the function, construction, and operation of an aerial device".	Just because it's operational does not mean it meets minimal requirements. Cadre requested more specificity.	
6-3	RKS #9	Added "and performance" to "Perform operational tests".	Just because it performs does not mean it meets minimal requirements. Cadre requested more specificity.	
6-3	G #3	Added "NFPA 1911 (current edition)".	Corresponds to addition in JPR.	
6-4	RKS #6	Added "Describe how to read and interpret schematics".	This is a critical skill not covered by NFPA.	
6-4	RKS #13	Added "Read and interpret schematics".	This is a critical skill not covered by NFPA.	
6-4	G #8	Added "Schematics".	Corresponds to addition in RKS.	
7-2	RKS #2	Added "Describe how to use test, calibration, and diagnostic equipment".	NFPA listed the skill component, but not the knowledge component. Added for consistency and because it's necessary.	
7-3	G #1	Replaced "emergency response vehicle" with "apparatus".	California has foam-proportioning systems on units other than vehicles (portable trailers, etc.).	
7-4	RKS #7	Added "Identify state and local foam flow requirements and restrictions".	Each jurisdiction has requirements. The individual performing testing is responsible for knowing and abiding by them.	
7-4	RKS #10	Added "in accordance with state and local requirements and restrictions".	Each jurisdiction has requirements. The individual performing testing is responsible for knowing and abiding by them.	
7-7	G #1	Replaced "emergency response vehicle" with "apparatus".	California has compressed air foam systems (CAFS) on units other than vehicles (portable trailers, etc.).	
7-7	RKS #4	Added "Identify state and local foam flow requirements and restrictions".	Each jurisdiction has requirements. The individual performing testing is responsible for knowing and abiding by them.	

### Emergency Vehicle Technician 3

#### State Fire Training Content

CTS	Block	Addition	Justification	Source / Reference
7-7	RKS #12	Added "in accordance with state and local requirements and restrictions".	Each jurisdiction has requirements. The individual performing testing is responsible for knowing and abiding by them.	
7-8	G #1	Replaced "emergency response vehicle" with "apparatus".	California has compressed air foam systems (CAFS) on units other than vehicles (portable trailers, etc.).	
7-8	RKS #8	Added "Identify state and local foam flow requirements and restrictions".	Each jurisdiction has requirements. The individual performing testing is responsible for knowing and abiding by them.	
7-8	RKS #11	Added "in accordance with state and local requirements and restrictions".	Each jurisdiction has requirements. The individual performing testing is responsible for knowing and abiding by them.	
7-13	G #1	Replaced "emergency response vehicle" with "apparatus".	California has breathing-air and air purification systems on units other than vehicles (portable trailers, etc.).	
7-14	G #1	Replaced "emergency response vehicle" with "apparatus".	California has breathing-air compressor systems on units other than vehicles (portable trailers, etc.).	
7-14	G #4	Added "Test, calibration, and diagnostic equipment".	Required to perform JPR but NFPA didn't include it.	
7-14	G #5	Added "Tools".	Required to perform JPR but NFPA didn't include it.	
7-17	G #1	Replaced "emergency response vehicle" with "apparatus".	California has auxiliary air systems on units other than vehicles (portable trailers, etc.).	
8-2	RKS #18	Removed "and SOPS" and added "and the authority having jurisdiction" to "Complete required documentation in accordance with NFPA standards"	The AHJ outranks the department's standard operating procedures.	
8-3	NCTS	Added standard for "Inspecting Electronic	NFPA has a standard for repairing, but not for inspecting,	

### Emergency Vehicle Technician 3

#### State Fire Training Content

CTS	Block	Addition	Justification	Source / Reference
		Controls and Instrumentation”	maintaining, or testing. Cadre added to cover critical content.	
8-4	NCTS	Added standard for “Maintaining Electronic Controls and Instrumentation”	NFPA has a standard for repairing, but not for inspecting, maintaining, or testing. Cadre added to cover critical content.	
8-6	NCTS	Added standard for “Testing Electronic Controls and Instrumentation”	NFPA has a standard for repairing, but not for inspecting, maintaining, or testing. Cadre added to cover critical content.	
9-8	G #1	Add “An emergency response vehicle with an aerial device, systems, and related components”.	NFPA oversight. Necessary to complete job performance requirement.	
9-8	RKS #5	Replaced “fire flow calculations” with “hydraulic flow calculations”.	Fire flow is not accurate.	
10-1	G #1	Replaced “emergency response vehicle” with “apparatus”.	California has electrical line voltage systems on units other than vehicles (portable trailers, etc.).	
10-1	RKS #3	Added “Describe the principles of electricity”.	This task cannot be performed without this knowledge.	
10-2	G #1	Replaced “emergency response vehicle” with “apparatus”.	California has electrical line voltage systems on units other than vehicles (portable trailers, etc.).	
10-3	G #1	Replaced “emergency response vehicle” with “apparatus”. Removed “hardwired”.	California has electrical line voltage systems on units other than vehicles (portable trailers, etc.). Not all appliances are hardwired anymore.	
10-3	JPR	Removed “hardwired” from both references to “line voltage appliances [and/or] controls”.	Not all appliances are hardwired anymore.	
11-1	G #2	Replaced “emergency vehicle” with “apparatus”.	California has equipment on units other than vehicles (portable trailers, etc.).	

### Emergency Vehicle Technician 3

#### State Fire Training Content

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CTS	Block	Addition	Justification	Source / Reference
11-2	G #1	Added "An apparatus".	Cadre feels a vehicle or equipment unit it needed for this JPR.	
11-3	RKS #2	Changed "Failure analysis" to "Describe how to evaluate and analyze technician strengths and weaknesses".	The NFPA language is vague as to who/what is failing and is very negative. Revision mirrors JPR language.	
11-3	RKS #4	Changed "Human behavior" to "Demonstrate an understanding of appropriate behavior in a work environment".	The NFPA language is vague as to its intent. Cadre requested a more specific skill set.	
11-3	RKS #8	Added "and document".	There isn't much value in an evaluation if there isn't documentation of the evaluation.	
11-5	RKS #8	Added "Promote a safe working environment".	There were no RKS items that directly referenced this skill.	
11-6	RKS #3	Added "Identify location and content of material safety data sheets" to "MSDS".	There wasn't enough information about what to do with the MSDS.	
12-1	G #1	Replaced "A vehicle" with "An apparatus".	California has equipment on units other than vehicles (portable trailers, etc.).	
15-1	RKS #1	Add "state and local laws and regulations" to a broader segment.	This is a blanket statement to cover anything that applies in California, but not elsewhere.	

## Errata

### Code Key

#### Blocks

- G = Given
- RKS = Requisite Knowledge and Skills
- JPR = Job Performance Requirements
- NCTS = New certification training standard

#### Changes

- New text show in underline
- Deleted text shown in ~~strikeout~~

### May 2019

The May 2019 updated was a document formatting update for compliance with California Government Code (GC) Section 11546.7 (Assembly Bill 434). Additionally, the original CTS Guide was a combined EVT 1, EVT 2, and EVT 3. The document was split into 3 CTS guide, one for each certification level. No content was changed.



# Emergency Vehicle Systems: Chassis, Cab, Body, Tank and Accessories (2020)

## Course Plan

### Course Details

**Certification:** Emergency Vehicle Technician 1

**CTS Guide:** Emergency Vehicle Technician 1 (2020)

**Description:** ***Emergency Vehicle Technician 101 Module:*** This course module provides an overview of the roles and responsibilities of an emergency vehicle technician from entry-level technician knowledge and skills to personnel and fleet management.

***Chassis Systems and Components Module:*** This course module provides an overview of the knowledge and skills needed to inspect, maintain, repair, and test emergency vehicle chassis systems and components.

***Cab and Body Module:*** This course module provides an overview of the knowledge and skills needed to inspect, maintain, repair, and test emergency vehicle cab and body systems and components.

***Tanks and Accessories Module:*** This course module provides an overview of the knowledge and skills utilized by an emergency vehicle technician to inspect, maintain, and repair tanks and their accessories.

**Designed For:** The emergency vehicle technician pursuing SFT-certification or anyone seeking an overview of the roles and responsibilities of an emergency vehicle technician

**Prerequisites:** None

**Standard:** Complete all summative test with a minimum score of 80%.

**Hours:**  
Lecture: 7:30  
Activities: 0:00  
Testing: 0:30

**Hours (Total):** 8:00

## Emergency Vehicle Technician 1A

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**Maximum Class Size:** 40

**Instructor Level:** Primary

**Instructor/Student Ratio:** 1:40

**SFT Designation:** CFSTES

## Required Resources

### Instructor Resources

To teach this course, instructors need:

- NFPA 1071: Standard for Emergency Vehicle Technician Professional Qualifications (current edition / physical copy)
- NFPA 1500: Standard on Fire Department Occupational Safety and Health Program (current edition / physical copy or access to digital copy)
- NFPA 1901: Standard for Automotive Fire Apparatus (current edition / physical copy)
- NFPA 1911: Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Emergency Vehicle (current edition / physical copy)
- Student Supplement
  - Provided by California Fire Mechanics Academy, Inc.
- Manufacturer manuals
- Personal protective equipment (PPE)

### Online Instructor Resources

The following instructor resources are available online at

<https://osfm.fire.ca.gov/divisions/state-fire-training/cfstes-professional-certification/>:

- None

### Student Resources

To participate in this course, students need:

- NFPA 1071: Standard for Emergency Vehicle Technician Professional Qualifications (current edition / physical copy or access to a digital copy)
- NFPA 1500: Standard on Fire Department Occupational Safety and Health Program (current edition / physical copy or access to digital copy)
- NFPA 1911: Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Emergency Vehicle (current edition / physical copy or access to a digital copy)
- Student Supplement
  - Provided by California Fire Mechanics Academy, Inc.
- Personal protective equipment (PPE)

### Facilities, Equipment, and Personnel

The following facilities, equipment, or personnel are required to deliver this course:

- Standard classroom equipped for 40 students
- Projector with appropriate laptop connections
- Wifi/Internet access

Facilities

- OSHA compliant shop



## Emergency Vehicle Technician 1A

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- Lifts
- Safety stands

### Equipment

- Apparatus
- Test, calibration, and diagnostic equipment
- Tools required to inspect, maintain, and repair chassis systems and components
- Appropriate safety gear

## Unit 1: Introduction

### Topic 1-1: Orientation and Administration

#### Terminal Learning Objective

At the end of this topic, a student will be able to identify facility and classroom requirements and identify course objectives, events, requirements, assignments, activities, resources, evaluation methods, and participation requirements in the course syllabus

#### Enabling Learning Objectives

1. Identify facility requirements
  - Restroom locations
  - Food locations
  - Smoking locations
  - Emergency procedures
2. Identify classroom requirements
  - Start and end times
  - Breaks
  - Electronic device policies
  - Special needs and accommodations
  - Other requirements as applicable
3. Review course syllabus
  - Course objectives
  - Calendar of events
  - Course requirements
  - Student evaluation process
  - Assignments
  - Activities
  - Required student resources
  - Class participation requirements

#### Discussion Questions

1. What is a formative test? What is a summative test?

#### Activities

1. To be determined by the instructor

### Topic 1-2: Emergency Vehicle Technician Certification Process

#### Terminal Learning Objective

At the end of this topic, a student will be able to identify different levels in the Emergency Vehicle Technician certification track, the courses and requirements for State Fire Training (SFT) Emergency Vehicle Technician (EVT) certification, and can describe the task book and testing process.

# Emergency Vehicle Technician 1A

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## Enabling Learning Objectives

1. Identify the different levels of certification in the Emergency Vehicle Technician (EVT) certification track
  - EVT 1
  - EVT 2
  - EVT 3
2. Identify the courses required for EVT 1
  - State Fire Training
    - Emergency Vehicle Technician 1A: Chassis, Cab, Body, Tank and Accessories (2020)
    - Emergency Vehicle Technician 1B: Electrical Systems A (2020)
    - Emergency Vehicle Technician 1C: Pumps and Accessories (2020)
  - National Institute for Auto Service Excellence (ASE)
    - Gasoline Engines [T1]
    - Diesel Engines [T2]
    - Drive Train [T3]
    - Brakes [T4]
    - Suspension and Steering [T5]
    - Preventative Maintenance Inspections [T8]
  - Brake Inspector Qualification (CFR 396.25) - Department of Transportation (DOT)
3. Identify the courses required for EVT 2
  - State Fire Training
    - Emergency Vehicle Technician 2A: Electrical Systems B (2020)
  - National Institute for Auto Service Excellence (ASE)
    - Gasoline Engines (T1)
    - Diesel Engines (T2)
    - Drive Train (T3)
    - Brakes (T4)
    - Suspension and Steering (T5)
    - Electrical / Electronic Systems (T6)
    - Heating, Ventilation and Air Conditioning (HVAC) (T7)
    - Preventative Maintenance Inspections (T8)
4. Identify the courses required for EVT 3
  - State Fire Training
    - Emergency Vehicle Technician 3A: Human Resource Management / Fleet Specifications and Records (2020)
  - National Institute for Auto Service Excellence (ASE)
    - Gasoline Engines (T1)
    - Diesel Engines (T2)
    - Drive Train (T3)
    - Brakes (T4)
    - Suspension and Steering (T5)

## Emergency Vehicle Technician 1A

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- Electrical / Electronic Systems (T6)
  - Heating, Ventilation and Air Conditioning (HVAC) (T7)
  - Preventative Maintenance Inspections (T8)
5. Identify additional requirements for Emergency Vehicle Technician 1
- Experience (one of the following)
    - Have a minimum of two (2) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or
    - Have a minimum of three (3) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
    - Have a minimum of four (4) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.
6. Identify additional requirements for Emergency Vehicle Technician 2
- Experience (one of the following)
    - Have a minimum of three (3) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or
    - Have a minimum of four (4) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
    - Have a minimum of five (5) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.
7. Identify additional requirements for Emergency Vehicle Technician 3
- Have a minimum of four (4) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or
  - Have a minimum of five (5) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
  - Have a minimum of six (6) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.
8. The following requirements are required for each EVT 1, EVT 2, and EVT 3
- Code of Federal Regulations (CFR) 396.25: Department of Transportation Brake Inspector Qualification

## Emergency Vehicle Technician 1A

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- Successful completion of the Emergency Vehicle Technician Certification Commission (EVTCC) for the respective SFT Level of Certification. This exam is administered by the California Fire Mechanics Academy (CFMA).
9. Describe the task book process
- Complete all prerequisites and course work
  - Submit application and fees and to request task book
    - A candidate may apply for the EVT 1 and EVT 2 task books at the same time (two applications and two fees), but may not submit the EVT 2 task book until he or she receives EVT 1 certification (a prerequisite for EVT 2)
  - Complete all job performance requirements included in the task book
  - Must have identified evaluator verify individual task completion via signature
  - Must have Fire Chief or authorized representative verify task book completion via signature
  - Must be employed by a California Fire Agency in the position prior to submitting completed task book to State Fire Training
10. Complete Continuing Education
- Persons with EVT Certification are required to renew their certification every five years. The recertification requires that the applicant completes 36 hours of approved continuing education (CE) and meet the all prerequisites stated for Recertification Requirements. All recertification applications must be postmarked on or before the certification expiration date. If the certified EVT did not meet all recertification requirements by the expiration date, the EVT Certification is considered to be lapsed.
  - If the EVT Certification lapsed, the applicant will be required to complete 36 hours of CE in addition to the completion of additional CE hours. If the certification lapsed less than 6 months, you can regain EVT Certification by completing an additional 8 hours of approved CE. If the certification lapsed between 6 months and less than 12 months, you can regain EVT Certification by completing an additional 16 hours of approved CE. If the certification lapsed between 12 months and less than 18 months, you can regain EVT Certification by completing an additional 24 hours of approved CE.
  - For lapses, greater than 18 months, the applicant will need to retake all SFT courses listed in the Certification Requirements Education section and reapply for initial EVT certification, which will require the completion of a new Certification Task Book.
11. Complete all formative and summative tests administered during the course deliveries

### Discussion Questions

1. To be determined by the instructor

### Activities

1. To be determined by the instructor

## Emergency Vehicle Technician 1A

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### Instructor Notes

1. SFT teaches most EVT 1 (inspect and maintain) and EVT 2 (repair and replace) content together because depending on the size of the agency or shop, there are different expectations of the technician.

# Emergency Vehicle Technician 101 Module

## Unit 2: Roles and Responsibilities

### Topic 2-1: Emergency Vehicle Technician 1

#### Terminal Learning Objective

At the end of this topic, a student, given general knowledge and skill requirements, will be able to identify the roles and responsibilities of an Emergency Vehicle Technician (EVT) I, in accordance with State Fire Training (SFT) and NFPA 1071 (current edition)

#### Enabling Learning Objectives

1. Identify the general knowledge requirements associated with the roles and responsibilities of an EVT 1
  - Mission of the fire service
  - Organization of the fire agency and the maintenance facility
  - Role of the EVT in the organization
  - Fire agency's standard operating procedures (SOPs) and rules and regulations as they apply to the EVT
  - Critical aspects of NFPA 1500, NFPA 1901, and NFPA 1911, as they apply to the EVT
  - Federal motor carrier safety regulations
  - Applicable federal, state, and local regulations
  - Interpretation and use of manufacturer specifications, inspection checklists, maintenance schedules, maintenance checklists, and agency SOPs
  - Selection of tools
  - Fastener types and their usage
  - Maintenance equipment and its usage
  - Workplace safety practices
  - Selection and use of cleaning products and procedures
  - Housekeeping
  - Identification and handling of hazardous materials
2. Identify the general skill requirements associated with the roles and responsibilities of an EVT 1
  - Use tools in a recognized safe manner
  - Operate emergency response vehicles in compliance with applicable federal, state, and local regulations
  - Locate information in agency documents, standards, and reference materials
3. Identify the inspection and preventative maintenance duties associated with chassis systems
4. Identify the inspection and maintenance duties associated with cabs (fixed and tilt) and vehicle bodies

## Emergency Vehicle Technician 1A

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5. Identify the operational checks duties associate with a vehicle's electronic and electrical systems (low voltage)
6. Identify the inspection, maintenance, and operational testing duties associated with at least one of the following systems:
  - Fire pump, auxiliary pump, and tank systems
  - Aerial systems
  - Specialized systems
    - Foam
    - Line-voltage electrical
    - Breathing air
    - Auxiliary air

### Discussion Questions

1. Where will you find personal protective safety requirements?
2. What is the general skill set of an EVT 1?
3. What systems are unique to an emergency vehicle?

### Activities

1. Determined by the instructor

**CTS Guide Reference:** CTS 1-1

## Topic 2-2: Emergency Vehicle Technician 2

### Terminal Learning Objective

At the end of this topic, a student, given general knowledge and skill requirements, will be able to identify the roles and responsibilities of an Emergency Vehicle Technician (EVT) 2, in accordance with State Fire Training (SFT) and NFPA 1071 (current edition)

### Enabling Learning Objectives

1. Identify the repair, performance testing, and weight verification duties associated with chassis systems of an EVT 2
2. Identify the repair duties associated with cabs (fixed and tilt) and vehicle bodies of an EVT 2
3. Identify the repair, operational testing, and performance testing duties associated with electronic and electrical systems (low voltage) of an EVT 2
4. Identify the inspection, repair, maintenance, and operational testing duties associated with at least one of the following systems: pump and tank systems, aerial systems, or specialized (foam, line voltage electrical, breathing air, auxiliary air) systems of an EVT 2

### Discussion Questions

1. In what ways does responsibility increase between EVT 1 and EVT 2?

### Activities

1. Determined by the instructor

**CTS Guide Reference:** CTS 1-2

## Topic 2-3: Emergency Vehicle Technician 3



## Emergency Vehicle Technician 1A

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### Terminal Learning Objective

At the end of this topic, a student, given general knowledge and skills requirements, will be able to identify the roles and responsibilities of an Emergency Vehicle Technician (EVT) 3, in accordance with State Fire Training (SFT) and NFPA 1071 (current edition)

### Enabling Learning Objectives

1. Identify the human resource management and performance evaluation duties of an EVT 3
2. Identify the inspection duties of an EVT 3
3. Identify the equipment and parts management duties of an EVT 3
4. Identify the documentation duties of an EVT 3
5. Identify the specifications development duties of an EVT 3

### Discussion Questions

1. How does the job change between EVT 2 and EVT 3?
2. Why is it valuable for an EVT 3 to have been an EVT 1 and 2?
3. How do roles and responsibilities of an EVT 1, 2, and 3 change depending on fleet size and shop staffing levels?

### Activities

1. Determined by the instructor

### Instructor Notes

1. Facilitate open discussion to involve all students regardless of shop size and experience

**CTS Guide Reference:** CTS 1-3

## Topic 2-4: Administrative Quality Assurance

### Terminal Learning Objective

At the end of this topic, a student, given manufacturer specifications, effective communication tools, and basic record-keeping requirements, will be able to successfully manage the administrative day-to-day activities an Emergency Vehicle Technician (EVT), in accordance with the authority having jurisdiction (AHJ), State Fire Training (SFT), and NFPA 1071 (current edition)

### Enabling Learning Objectives

1. Describe manufacturer specifications
  - Design and performance specifications of an apparatus
  - Specific to each manufacturer
  - Should be included with vehicle delivery
2. Identify the importance of inspecting, maintaining, and repairing a vehicle to manufacturer specifications
  - Potential to void warranty
  - Potential component failure
  - Potential for injury or death
3. Identify successful communication loops
  - Effective listening, validation, and follow up between:
    - EVT and end user

## Emergency Vehicle Technician 1A

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- EVT and staff (superiors and peers)
  - EVT and manufacturer/vendor
  - Verbal communication vs. written communication vs. electronic communication
4. Identify the importance of consistent, positive communication
  5. Identify basic record-keeping requirements
    - Inspection requirements, checklists, and records
    - Maintenance requirements, checklists, and records
    - Repair requirements, requests, checklists, and records
    - Warranties
    - Technical service bulletins (TSB)
    - Service requests and records
    - Department of Transportation (DOT) requirements
    - NFPA requirements
    - Manufacturer specifications
    - Communications
    - AHJ requirements
  6. Identify the importance of accurate and organized record keeping
    - Accountability
    - If you don't write it down, it didn't happen
    - Can be used for litigation

### Discussion Questions

1. What is the benefit of a complete "as-built" manufacturer document?
2. Why is it important to document any changes to the manufacturer's design?
3. Why should communications be documented?
4. How long should records be maintained?
5. What happens to a vehicle's documentation if it is involved in an incident?

### Activities

1. Determined by the instructor

### Instructor Notes

1. The general theme of this topic is accountability. Weave that concept into each ELO.

**CTS Guide Reference:** None

## Unit 3: Road and/or Performance Testing

### Topic 3-1: Road and/or Performance Testing

#### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, an applicable driver license (if required), and an approved driving course, will be able to describe how to complete a road performance test on apparatus in accordance with NFPA 1911 so that apparatus system performance is verified to ensure that the drivability of the apparatus complies with requirements of NFPA 1911 and federal and state regulations; and all testing

## Emergency Vehicle Technician 1A

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is documented in accordance with the requirements of NFPA standards and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. *Identify the difference between a road test and a performance test*
2. Describe the legal operation of fire apparatus
3. Demonstrate familiarity with apparatus drivability
4. Identify road performance requirements of NFPA 1911 and federal and state regulations
5. Identify record-keeping requirements of NFPA 1911 and the AHJ
6. Recognize the need for a road and/or performance test

### Discussion Questions

1. What are some of the legal requirements to operate a vehicle in California?
2. Where can you find weight standards for legal vehicle operation?
3. What safety aspects need to be considered during the testing process?

### Activities

1. Determined by the instructor

### Instructor Notes

1. This topic is only intended to cover the cognitive component of road and/or performance testing. Actual testing activities are carried out within each system-specific course.

**CTS Guide Reference:** CTS 2-9

# Chassis Systems and Components Module

## Unit 4: Systems Overview

### Topic 4-1: Terminology

#### Terminal Learning Objective

At the end of this topic, a student, given NFPA 1071 terminology, will be able to define inspection, maintenance, repair, and overhaul (rebuild) in accordance NFPA standards

#### Enabling Learning Objectives

1. Define “inspect(ion)”
  - To determine the condition or operation of a component(s) by comparing its physical, mechanical, and/or electrical characteristics with established standards, recommendations, and requirements through examination by sight, sound, or feel
2. Define “maintenance”
  - The act of servicing a fire apparatus or a component in order to keep the vehicle and its components in proper operating condition
3. Define “repair”
  - To restore to sound condition after failure or damage
4. Define “overhaul (rebuild)”
  - To make extensive repairs in order to restore a component to like-new condition in accordance with the original manufacturer’s specifications

#### Discussion Questions

1. Where would you find these NFPA definitions?
2. What is an AHJ?
  - What is the AHJ over your shop or agency?

#### Activities

1. Determined by instructor

**CTS Guide Reference:** None

### Topic 4-2: The Inspection, Maintenance, Repair, and Testing Cycle

#### Terminal Learning Objective

At the end of this topic, a student, given circumstances that initiate the inspection process, safety requirements, and an overview of appropriate facilities and equipment, will be able to describe the cycle of inspecting, maintaining, repairing, and testing emergency vehicle chassis systems in accordance with NFPA standards

#### Enabling Learning Objectives

1. Identify circumstances that initiate the inspection process
  - Acceptance test of new vehicle
  - Meeting manufacturer and/or AHJ inspection cycle
  - Responding to a suspected or reported problem

## Emergency Vehicle Technician 1A

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- Acceptance test of repaired vehicle
- 2. Identify safety requirements
  - Vehicle safety
  - Technician safety
- 3. Identify facilities and equipment
  - Proper location(s) for inspection, maintenance, repair/replace, testing
  - Required tools/equipment
    - Test, calibration, and diagnostic
      - Tire pressure gauge
      - Tire tread-depth gauge
      - Voltmeter (independent digital voltmeter or onboard unit)
      - Ammeter
      - Tape measure
      - Appropriate electronic diagnostic (e.g. scan tool, laptop, tablet, etc.) equipment
    - Inspection
      - Inspection mirror
      - Flashlight
      - Creeper
      - Basic hand tools
      - Marking tool (e.g. paint pen or chalk)
      - Personal protective equipment (PPE)
    - Maintenance and repair
      - Torque wrench (properly calibrated)
      - Laser level
      - Cleaning supplies (e.g. appropriate cleaners, chemicals, wire brush, etc.)
      - Spectrochemical kit (if adjusting coolant concentrates in-house)
      - Metal fabrication equipment
      - Drill press
      - Hydraulic press
      - Hoists
      - Safety stands
      - Ventilation equipment
      - Lighting
      - Air compressor
      - Fluids and lubricants
      - Parts and hardware
- 4. Describe the inspection process
  - Gather tools and safety equipment
  - Secure vehicle in a safe environment
  - Evaluate reported conditions (if applicable)

## Emergency Vehicle Technician 1A

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- Perform operational tests
    - What if you can't duplicate or validate the concern?
  - Identify and report defects and deficiencies, including broken, loose, worn, or missing parts
  - Complete checklist and document findings
    - Checklists vary by manufacturer and authority having jurisdiction (AHJ)
    - Chassis checklist should, at a minimum, include:
      - Vehicle identification number (VIN) or unit number
      - Engine hours or mileage
      - Manufacturer inspection requirements
      - AHJ inspection requirements
      - Inspector name and signature
      - Inspection date
  - Return vehicle to service or move to maintenance or repair
5. Identify the role of a maintenance schedule and a maintenance checklist
- Scheduling
  - Budgeting
    - Allocation
    - Cost reduction
    - Forecasting
  - Fleet lifecycle
  - Research and development
  - Audits
  - Legal protection
6. Describe the maintenance process
- Identify the appropriate scope and authority for maintenance vs. repair activities
  - Identify individual technician's authorization for maintenance activities
  - Identify maintenance needs from inspection report
  - Gather tools and safety equipment
  - Secure vehicle in a safe environment
  - Evaluate reported conditions
    - Review inspection report
    - Identify repairs (outside maintenance scope)
    - Prioritize maintenance activities
  - Perform operational tests
  - Perform maintenance duties
  - Conduct performance tests
  - Complete checklist and document findings
  - Return vehicle to service or move to repair
7. Describe the repair and/or replacement process
- Identify the appropriate scope and authority for internal vs. external repair activities
  - Identify individual technician's authorization for repair activities

## Emergency Vehicle Technician 1A

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- Identify repair needs from inspection and/or maintenance report
- Gather tools and safety equipment
- Secure vehicle in a safe environment
- Evaluate reported conditions
- Perform operational tests
- Repair or replace deformed, broken, loose, worn, or missing parts
- Conduct performance tests
- Complete checklist and document findings
- Release to manufacturer or third-party shop for repair (if applicable)
  - Acceptance testing (inspection) on returned/repaired vehicle
  - Complete checklist and document findings
- Return vehicle to service

### Discussion Questions

1. How can an AHJ build an inspection form?
2. Where should the inspection checklists reside?
3. What are the advantages to using quality tools?

### Activities

1. Determined by instructor

**CTS Guide Reference:** None

## Unit 5: Chassis Systems and Components

### Topic 5-1: Function, Construction, and Operation

#### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, SOPs, and manufacturer specifications, will be able to describe the function, construction, and operation of chassis systems and components in accordance with manufacturer specifications and the authority having jurisdiction (AHJ) requirements

#### Enabling Learning Objectives

1. Describe the function, construction, and operation of frames, crossmembers, and related components
2. Describe the function, construction, and operation of the steering system
  - Steering wheel to hub
  - Steering column(s)
  - Steering gear(s)
  - Auxiliary steering systems
    - All wheel steering systems
    - Tractor-drawn aerials (TDA)
  - Power steering pump
  - Power steering lines
3. Describe the function, construction, and operation of the suspension system

## Emergency Vehicle Technician 1A

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- Conventional
  - Independent
  - Air
  - Spring
    - Leaf
    - Coil
    - Torsion bar
    - Combination leaf/air spring
4. Describe the function, construction, and operation of the axles
    - Drive
    - Non-drive
    - Conventional beam
    - Steering
    - Tag
    - Pusher
    - Custom (new products entering the market annually)
  5. Describe the function, construction, and operation of the brake system
    - Hydraulic
    - Air
    - Electric
    - Auxiliary or secondary
  6. Describe the function, construction, and operation of the wheels
    - Aluminum
    - Steel
    - Stud mounted
    - Hub mounted
  7. Describe the function, construction, and operation of the tires
    - Bias ply
    - Steel belted
    - Single
    - Super single
    - Wide base single
    - Dual
  8. Describe the function, construction, and operation of the driveline
    - Primary drive
    - Power take off (PTO)
    - Steering
  9. Describe the function, construction, and operation of the auxiliary drive systems
    - Transfer case
    - Driveline
    - Front differential



- Power take off (PTO)
  - Power dividers
  - Hydraulic systems
10. Describe the function, construction, and operation of the cooling systems
- Engine
  - Transmission
  - Pump transmission
  - Fuel
  - Power steering
  - Compressed air foam system (CAFS)
  - Hydraulic
  - Auxiliary
    - Direct cooling
    - Indirect cooling

### Discussion Questions

1. What is the primary purpose of a chassis?
2. What is the function of the suspension system?

### Activities

1. Determined by instructor

**CTS Guide Reference:** CTS 2-1

## Topic 5-2: Electricity and Electronics

### Terminal Learning Objective

At the end of this topic, a student, given principles of electricity and operational theory, will be able to apply those principles and theories to the electrical systems in a chassis in accordance with manufacturer specifications and authority having jurisdiction (AHJ) requirements

### Enabling Learning Objectives

1. Identify the principles of electricity and the operational theory of electronics
  - Principles of electricity and electronics
    - Ohm's law
      - Resistance goes up / amperage goes down
      - Amperage goes up / resistance goes down
    - Watt's law
      - Electrical law of work
    - Kirchhoff's law
      - All voltage is used up by the time the circuit is complete
      - Amperage will be the same throughout the circuit
  - Electrical systems in a chassis
    - Low voltage
      - Batteries
      - Starter

## Emergency Vehicle Technician 1A

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- Alternator
  - Wiring
  - Line voltage
    - Power generation system
    - Shore power
  - Electronic
    - Interface electronics (e.g. pump control module, engine status center, transmission control module, anti-lock brake system module, etc.)
    - Load management systems
2. Describe electrical troubleshooting procedures
    - Test system's all-inclusive voltage drop

### Discussion Questions

1. How is a DVOM utilized in a chassis system inspection?
2. How do you test voltage drop?

### Activities

1. Determined by instructor

### Instructor Notes

1. Electrical is referenced here as part of the complete chassis system. Complete curriculum for inspecting electrical systems is found in Emergency Vehicle Technician 1D : Electrical Systems A and Emergency Vehicle Technician 2A : Electrical Systems B. Keep this brief.
2. Cover the proper use of a DVOM

**CTS Guide Reference:** CTS 2-1

## Unit 6: Inspection, Maintenance, and Repair

### Topic 6-1: Frames and Crossbars

#### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, SOPS, manufacturer specifications, an inspection checklist, a maintenance checklist, a maintenance schedule (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform maintenance and repairs on the frames, crossbars, and related components so that the structural integrity, operation, and condition of frames, crossbars, and related components are verified to be within manufacturer specifications; the mounting is verified; systems and components are preserved, or restored and operational and within manufacturer specifications; multiplexing, interface electronics, and load management systems are operationally checked for proper operation; all checklist items are inspected; defects and deficiencies, including deformed, broken, loose, worn, or missing parts, are identified and reported and then repaired, rebuilt, or replaced to manufacturer specifications; components are lubricated; fluid levels are maintained; calibrations and adjustments are performed; applicable tests are conducted; performance is verified; and

## Emergency Vehicle Technician 1A

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inspections, services, activities, tests, repairs, and operational checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. List types of defects, deficiencies, and potential problems associated with frames, crossbars, and related components
  - Corrosion
  - Rust, oxidation, electrolysis
  - Warping
  - Leaks
    - Class I
    - Class II
    - Class III
  - Fluid and lubrication levels
  - Cracks, fractures, breaks
  - Loose, broken, worn, or missing components
2. Describe the inspection, diagnostic, maintenance, and repair procedures of the manufacturer and the authority having jurisdiction (AHJ)
3. Describe how to select and use test, calibration, and diagnostic equipment
4. Describe operational, diagnostic, and performance tests
  - Component must meet manufacturer, AHJ, and NFPA specifications (if applicable) to be considered operational
5. Identify the role of inspection, maintenance, and repair schedules
6. Describe how to use inspection, maintenance, and repair checklists
7. Identify and evaluate conditions and recognize deficiencies
8. Identify and describe troubleshooting and adjustment methods and procedures
  - Corrosion
    - Clean
    - Correct cause (if possible)
    - Recoat or repaint (if necessary)
  - Rust, oxidation, electrolysis
    - Clean
    - Spectrochemical analysis of fluids (onsite or offsite)
    - Neutralize
    - Correct cause (if possible)
    - Recoat or repaint (if necessary)
  - Warping
    - Send for repair
  - Leaks
    - Clean
    - Correct cause (if possible)
    - Send for repair

## Emergency Vehicle Technician 1A

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- Fluid and lubrication levels
    - Use recommended fluids
    - Adjust to appropriate fluid levels at operating temperature
  - Cracks, fractures, breaks
    - Send for repair
  - Loose, broken, worn, or missing components
    - Tighten
    - Replace
    - Adjust
    - Send for repair
9. Describe electrical troubleshooting procedures
  10. Describe adjustment and calibration procedures
  11. Describe repair and overhaul procedures
  12. Identify inspection, maintenance, and repair record-keeping requirements
    - Manufacturer
    - AHJ (vary)
    - Federal, state, and local government (vary)
      - Manufacturer
      - AHJ
  13. Evaluate reported conditions
  14. Use test, calibration, and diagnostic equipment and any additional maintenance and repair equipment
  15. Perform operational checks and verification tests
  16. Recognize and identify symptoms and conditions
  17. Perform all required maintenance (including checklist items)
  18. Recognize, determine, and correct defects, deficiencies, and potential problems
  19. Perform required repairs to resolve deficiencies
  20. Complete and submit required inspection, maintenance, and repair documentation

### Discussion Questions

1. How do you identify a broken bolt?
2. What are some causes of corrosion?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the frame and crossbars, identify maintenance requirements, and recommend potential repairs.
2. ELO 3: Describe how to select and use tools and equipment from Topic 2-2 / ELO 3 appropriate to this chassis component or system. Applies to all topics in Unit 4.
3. ELO 11: Describe the repair and overhaul procedures for each chassis component or system to the level of detail needed to meet student need. Applies to all topics in Unit 4.
4. ELO 12: Identify record-keeping requirements for each chassis component or system identified. Applies to all topics in Unit 4.

5. Describe how to inspect the physical parts of the multiplexing system.

**CTS Guide Reference:** CTS 2-1 / CTS 2-2 / CTS 2-3 / CTS 2-4 / CTS 2-5

### **Topic 6-2: Steering System – Inspection, Maintenance, and Repair**

#### **Terminal Learning Objective**

At the end of this topic, a student, given an emergency response vehicle, SOPS, manufacturer specifications, an inspection checklist, a maintenance checklist, a maintenance schedule (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform maintenance and repairs on the steering system and related components so that the structural integrity, operation, and condition of the steering system and related components are verified to be within manufacturer specifications; the mounting is verified; systems and components are preserved, or restored and operational and within manufacturer specifications; multiplexing, interface electronics, and load management systems are operationally checked for proper operation; all checklist items are inspected; defects and deficiencies, including deformed, broken, loose, worn, or missing parts, are identified and reported and then repaired, rebuilt, or replaced to manufacturer specifications; components are lubricated; fluid levels are maintained; calibrations and adjustments are performed; applicable tests are conducted; performance is verified; and inspections, activities, tests, repairs, operation checks, and diagnostic checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

#### **Enabling Learning Objectives**

1. List types of defects, deficiencies, and potential problems associated with the steering system and related components
  - Corrosion
  - Rust, oxidation, electrolysis
  - Warping
  - Leaks
    - Class I
    - Class II
    - Class III
  - Fluid and lubrication levels
  - Cracks, fractures, breaks
  - Loose, broken, worn, or missing components
2. Describe the inspection, diagnostic, maintenance, and repair procedures of the manufacturer and the authority having jurisdiction (AHJ)
3. Describe how to select and use test, calibration, and diagnostic equipment
4. Describe operational, diagnostic, and performance tests
5. Identify the role of inspection, maintenance, and repair schedules
6. Describe how to use inspection, maintenance, and repair checklists
7. Identify and evaluate conditions and recognize deficiencies

8. Identify and describe troubleshooting and adjustment methods and procedures
  - Corrosion
    - Clean
    - Correct cause (if possible)
    - Recoat or repaint (if necessary)
  - Rust, oxidation, electrolysis
    - Clean
    - Spectrochemical analysis of fluids (onsite or offsite)
    - Neutralize
    - Correct cause (if possible)
    - Recoat or repaint (if necessary)
  - Warping
    - Send for repair
  - Leaks
    - Clean
    - Correct cause (if possible)
    - Send for repair
  - Fluid and lubrication levels
    - Use recommended fluids
    - Adjust to appropriate fluid levels at operating temperature
  - Cracks, fractures, breaks
    - Send for repair
  - Loose, broken, worn, or missing components
    - Tighten
    - Replace
    - Adjust
    - Send for repair
9. Describe electrical troubleshooting procedures
10. Describe adjustment and calibration procedures
11. Describe repair and overhaul procedures
12. Identify inspection, maintenance, and repair record-keeping requirements
13. Evaluate reported conditions
14. Use test, calibration, and diagnostic equipment and any additional maintenance and repair equipment
15. Perform operational checks and verification tests
16. Recognize and identify symptoms and conditions
17. Perform all required maintenance (including checklist items)
18. Recognize, determine, and correct defects, deficiencies, and potential problems
19. Perform diagnostic checks, and required repairs to resolve deficiencies
20. Complete and submit required inspection, maintenance, and repair documentation

### Discussion Questions

1. What conditions would cause you to check the steering system fluids?

2. How do you test component integrity?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the steering system, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 2-1 / CTS 2-2 / CTS 2-3 / CTS 2-4 / CTS 2-5

## Topic 6-3: Suspension System

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, SOPS, manufacturer specifications, an inspection checklist, a maintenance checklist, a maintenance schedule (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform maintenance and repairs on the suspension system and related components so that the structural integrity, operation, and condition of the suspension system and related components are verified to be within manufacturer specifications; the mounting is verified; systems and components are preserved, or restored and operational and within manufacturer specifications; multiplexing, interface electronics, and load management systems are tested for proper operation; all checklist items are inspected; defects and deficiencies, including deformed, broken, loose, worn, or missing parts, are identified and reported and then repaired, rebuilt, or replaced to manufacturer specifications; components are lubricated; fluid levels are maintained; calibrations and adjustments are performed; applicable tests are conducted; performance is verified; and inspections, activities, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. List types of defects, deficiencies, and potential problems associated with the suspension system and related components
  - Corrosion
  - Rust, oxidation, electrolysis
  - Warping
  - Leaks
    - Class I
    - Class II
    - Class III
  - Fluid and lubrication levels
  - Cracks, fractures, breaks
  - Loose, broken, worn, or missing components
2. Describe the inspection, diagnostic, maintenance, and repair procedures of the manufacturer and the authority having jurisdiction (AHJ)
3. Describe how to select and use test, calibration, and diagnostic equipment

## Emergency Vehicle Technician 1A

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4. Describe operational, diagnostic, and performance tests
5. Identify the role of inspection, maintenance, and repair schedules
6. Describe how to use inspection, maintenance, and repair checklists
7. Identify and evaluate conditions and recognize deficiencies
8. Identify and describe troubleshooting and adjustment methods and procedures
  - Corrosion
    - Clean
    - Correct cause (if possible)
    - Recoat or repaint (if necessary)
  - Rust, oxidation, electrolysis
    - Clean
    - Spectrochemical analysis of fluids (onsite or offsite)
    - Neutralize
    - Correct cause (if possible)
    - Recoat or repaint (if necessary)
  - Warping
    - Send for repair
  - Leaks
    - Clean
    - Correct cause (if possible)
    - Send for repair
  - Fluid and lubrication levels
    - Use recommended fluids
    - Adjust to appropriate fluid levels at operating temperature
  - Cracks, fractures, breaks
    - Send for repair
  - Loose, broken, worn, or missing components
    - Tighten
    - Replace
    - Adjust
    - Send for repair
9. Describe electrical troubleshooting procedures
10. Describe adjustment and calibration procedures
11. Describe repair and overhaul procedures
12. Identify inspection, maintenance, and repair record-keeping requirements
13. Evaluate reported conditions
14. Use test, calibration, and diagnostic equipment and any additional maintenance and repair equipment
15. Perform operational and verification tests
16. Recognize and identify symptoms and conditions
17. Perform all required maintenance (including checklist items)
18. Recognize, determine, and correct defects, deficiencies, and potential problems



19. Perform required repairs to resolve deficiencies
20. Complete and submit required inspection, maintenance, and repair documentation

### Discussion Questions

1. What are the general maintenance requirements of the suspension system?
2. How many leaf springs can be broken before vehicle must be removed from service?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the suspension system, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 2-1 / CTS 2-2 / CTS 2-3 / CTS 2-4 / CTS 2-5

## Topic 6-4: Axles

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, SOPS, manufacturer specifications, an inspection checklist, a maintenance checklist, a maintenance schedule (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform maintenance and repairs on the axles and related components so that the structural integrity, operation, and condition of the axles and related components are verified to be within manufacturer specifications; the mounting is verified; systems and components are preserved, or restored and operational and within manufacturer specifications; multiplexing, interface electronics, and load management systems are tested for proper operation; all checklist items are inspected; defects and deficiencies, including deformed, broken, loose, worn, or missing parts, are identified and reported and then repaired, rebuilt, or replaced to manufacturer specifications; components are lubricated; fluid levels are maintained; calibrations and adjustments are performed; applicable tests are conducted; performance is verified; and inspections, activities, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. List types of defects, deficiencies, and potential problems associated with the axles and related components
  - Corrosion
  - Rust, oxidation, electrolysis
  - Warping
  - Leaks
    - Class I
    - Class II
    - Class III
  - Fluid and lubrication levels
  - Cracks, fractures, breaks

## Emergency Vehicle Technician 1A

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- Loose, broken, worn, or missing components
- 2. Describe the inspection, diagnostic, maintenance, and repair procedures of the manufacturer and the authority having jurisdiction (AHJ)
- 3. Describe how to select and use test, calibration, and diagnostic equipment
- 4. Describe operational, diagnostic, and performance tests
- 5. Identify the role of inspection, maintenance, and repair schedules
- 6. Describe how to use inspection, maintenance, and repair checklists
- 7. Identify and evaluate conditions and recognize deficiencies
- 8. Identify and describe troubleshooting and adjustment methods and procedures
  - Corrosion
    - Clean
    - Correct cause (if possible)
    - Recoat or repaint (if necessary)
  - Rust, oxidation, electrolysis
    - Clean
    - Spectrochemical analysis of fluids (onsite or offsite)
    - Neutralize
    - Correct cause (if possible)
    - Recoat or repaint (if necessary)
  - Warping
    - Send for repair
  - Leaks
    - Clean
    - Correct cause (if possible)
    - Send for repair
  - Fluid and lubrication levels
    - Use recommended fluids
    - Adjust to appropriate fluid levels at operating temperature
  - Cracks, fractures, breaks
    - Send for repair
  - Loose, broken, worn, or missing components
    - Tighten
    - Replace
    - Adjust
    - Send for repair
- 9. Describe electrical troubleshooting procedures
- 10. Describe adjustment and calibration procedures
- 11. Describe repair and overhaul procedures
- 12. Identify inspection, maintenance, and repair record-keeping requirements
- 13. Evaluate reported conditions
- 14. Use test, calibration, and diagnostic equipment and any additional maintenance and repair equipment

15. Perform operational and verification tests
16. Recognize and identify symptoms and conditions
17. Perform all required maintenance (including checklist items)
18. Recognize, determine, and correct defects, deficiencies, and potential problems
19. Perform required repairs to resolve deficiencies
20. Complete and submit required inspection, maintenance, and repair documentation

### Discussion Questions

1. Can an axle housing be welded?
2. Does a warped axle housing remove a vehicle from service?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the axles, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 2-1 / CTS 2-2 / CTS 2-3 / CTS 2-4 / CTS 2-5

## Topic 6-5: Brake System

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, SOPS, manufacturer specifications, an inspection checklist, a maintenance checklist, a maintenance schedule (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform maintenance and repairs on the brake system and related components so that the structural integrity, operation, and condition of the brake system and related components are verified to be within manufacturer specifications; the mounting is verified; systems and components are preserved, or restored and operational and within manufacturer specifications; multiplexing, interface electronics, and load management systems are tested for proper operation; all checklist items are inspected; defects and deficiencies, including deformed, broken, loose, worn, or missing parts, are identified and reported and then repaired, rebuilt, or replaced to manufacturer specifications; components are lubricated; fluid levels are maintained; calibrations and adjustments are performed; applicable tests are conducted; performance is verified; and inspections, activities, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. List types of defects, deficiencies, and potential problems associated with the brake system and related components
  - Corrosion
  - Rust, oxidation, electrolysis
  - Warping
  - Leaks
    - Class I

## Emergency Vehicle Technician 1A

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- Class II
  - Class III
  - Fluid and lubrication levels
  - Cracks, fractures, breaks
  - Loose, broken, worn, or missing components
2. Describe the inspection, diagnostic, maintenance, and repair procedures of the manufacturer and the authority having jurisdiction (AHJ)
  3. Describe how to select and use test, calibration, and diagnostic equipment
  4. Describe operational, diagnostic, and performance tests
  5. Identify the role of inspection, maintenance, and repair schedules
  6. Describe how to use inspection, maintenance, and repair checklists
  7. Identify and evaluate conditions and recognize deficiencies
  8. Identify and describe troubleshooting and adjustment methods and procedures
    - Corrosion
      - Clean
      - Correct cause (if possible)
      - Recoat or repaint (if necessary)
    - Rust, oxidation, electrolysis
      - Clean
      - Spectrochemical analysis of fluids (onsite or offsite)
      - Neutralize
      - Correct cause (if possible)
      - Recoat or repaint (if necessary)
    - Warping
      - Send for repair
    - Leaks
      - Clean
      - Correct cause (if possible)
      - Send for repair
    - Fluid and lubrication levels
      - Use recommended fluids
      - Adjust to appropriate fluid levels at operating temperature
    - Cracks, fractures, breaks
      - Send for repair
    - Loose, broken, worn, or missing components
      - Tighten
      - Replace
      - Adjust
      - Send for repair
  9. Describe electrical troubleshooting procedures
  10. Describe adjustment and calibration procedures
  11. Describe repair and overhaul procedures

12. Identify inspection, maintenance, and repair record-keeping requirements
13. Evaluate reported conditions
14. Use test, calibration, and diagnostic equipment and any additional maintenance and repair equipment
15. Perform operational and verification tests
16. Recognize and identify symptoms and conditions
17. Perform all required maintenance (including checklist items)
18. Recognize, determine, and correct defects, deficiencies, and potential problems
19. Perform required repairs to resolve deficiencies
20. Complete and submit required inspection, maintenance, and repair documentation

### Discussion Questions

1. What methods would you use to evaluate the brake system?
2. How do you identify worn slack adjusters?
3. What can cause an out of service of brake drum?

### Activities

1. Determined by instructor

### Instructor Notes

1. Brakes are only referenced here as part of the complete chassis system. Brake curriculum through the Federal Motor Carrier Safety Administration (CFR 396.25) is required for State Fire Training EVT I certification.
2. Throughout hands-on lecture in the shop, utilize students to inspect the brake system, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 2-1 / CTS 2-2 / CTS 2-3 / CTS 2-4 / CTS 2-5

## Topic 6-6: Wheels and Tires

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, SOPS, manufacturer specifications, an inspection checklist, a maintenance checklist, a maintenance schedule (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform maintenance and repairs on the wheels and tires and related components so that the structural integrity, operation, and condition of the wheels and tires and related components are verified to be within manufacturer specifications; the mounting is verified; systems and components are preserved, or restored and operational and within manufacturer specifications; all checklist items are inspected; defects and deficiencies, including deformed, broken, loose, worn, or missing parts, are identified and reported and then repaired, rebuilt, or replaced to manufacturer specifications; components are lubricated; calibrations and adjustments are performed; applicable tests are conducted; performance is verified; and inspections, activities, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. List types of defects, deficiencies, and potential problems associated with the wheels and tires and related components
  - Corrosion
  - Rust, oxidation, electrolysis
  - Warping
  - Cracks, fractures, breaks
  - Tire age
  - Improper inflation
  - Improper vehicle loading
  - Loose, broken, worn, or missing components
2. Describe the inspection, diagnostic, maintenance, and repair procedures of the manufacturer and the authority having jurisdiction (AHJ)
3. Describe how to select and use test, calibration, and diagnostic equipment
4. Describe operational, diagnostic, and performance tests
5. Identify the role of inspection, maintenance, and repair schedules
6. Describe how to use inspection, maintenance, and repair checklists
7. Identify and evaluate conditions and recognize deficiencies
8. Identify and describe troubleshooting and adjustment methods and procedures
  - Corrosion
    - Clean
    - Correct cause (if possible)
    - Recoat or repaint (if necessary)
  - Rust, oxidation, electrolysis
    - Clean
    - Spectrochemical analysis of fluids (onsite or offsite)
    - Neutralize
    - Correct cause (if possible)
    - Recoat or repaint (if necessary)
  - Warping
    - Send for repair
  - Cracks, fractures, breaks
    - Send for repair
  - Loose, broken, worn, or missing components
    - Tighten
    - Replace
    - Adjust
    - Send for repair
9. Describe electrical troubleshooting procedures
10. Describe adjustment and calibration procedures
11. Describe repair and overhaul procedures
12. Identify inspection, maintenance, and repair record-keeping requirements

## Emergency Vehicle Technician 1A

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13. Evaluate reported conditions
14. Use test, calibration, and diagnostic equipment and any additional maintenance and repair equipment
15. Perform operational and verification tests
16. Recognize and identify symptoms and conditions
17. Perform all required maintenance (including checklist items)
18. Recognize, determine, and correct defects, deficiencies, and potential problems
19. Perform required repairs to resolve deficiencies
20. Complete and submit required inspection, maintenance, and repair documentation

### Discussion Questions

1. How do you read the tire date codes?
2. How do you check for worn rims?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the wheels and tires, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 2-1 / CTS 2-2 / CTS 2-3 / CTS 2-4 / CTS 2-5

## Topic 6-7: Driveline

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, SOPS, manufacturer specifications, an inspection checklist, a maintenance checklist, a maintenance schedule (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform maintenance and repairs on the driveline and related components so that the structural integrity, operation, and condition of the driveline and related components are verified to be within manufacturer specifications; the mounting is verified; systems and components are preserved, or restored and operational and within manufacturer specifications; all checklist items are inspected; defects and deficiencies, including deformed, broken, loose, worn, or missing parts, are identified and reported and then repaired, rebuilt, or replaced to manufacturer specifications; components are lubricated; fluid levels are maintained; calibrations and adjustments are performed; applicable tests are conducted; performance is verified; and inspections, activities, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. List types of defects, deficiencies, and potential problems associated with the driveline and related components
  - Corrosion
  - Rust, oxidation, electrolysis
  - Warping

- Leaks
  - Class I
  - Class II
  - Class III
- Fluid and lubrication levels
- Cracks, fractures, breaks
- Loose, broken, worn, or missing components
- 2. Describe the inspection, diagnostic, maintenance, and repair procedures of the manufacturer and the authority having jurisdiction (AHJ)
- 3. Describe how to select and use test, calibration, and diagnostic equipment
- 4. Describe operational, diagnostic, and performance tests
- 5. Identify the role of inspection, maintenance, and repair schedules
- 6. Describe how to use inspection, maintenance, and repair checklists
- 7. Identify and evaluate conditions and recognize deficiencies
- 8. Identify and describe troubleshooting and adjustment methods and procedures
  - Corrosion
    - Clean
    - Correct cause (if possible)
    - Recoat or repaint (if necessary)
  - Rust, oxidation, electrolysis
    - Clean
    - Spectrochemical analysis of fluids (onsite or offsite)
    - Neutralize
    - Correct cause (if possible)
    - Recoat or repaint (if necessary)
  - Warping
    - Send for repair
  - Leaks
    - Clean
    - Correct cause (if possible)
    - Send for repair
  - Fluid and lubrication levels
    - Use recommended fluids
    - Adjust to appropriate fluid levels at operating temperature
  - Cracks, fractures, breaks
    - Send for repair
  - Loose, broken, worn, or missing components
    - Tighten
    - Replace
    - Adjust
    - Send for repair
- 9. Describe electrical troubleshooting procedures



## Emergency Vehicle Technician 1A

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10. Describe adjustment and calibration procedures
11. Describe repair and overhaul procedures
12. Identify inspection, maintenance, and repair record-keeping requirements
13. Evaluate reported conditions
14. Use test, calibration, and diagnostic equipment and any additional maintenance and repair equipment
15. Perform operational and verification tests
16. Recognize and identify symptoms and conditions
17. Perform all required maintenance (including checklist items)
18. Recognize, determine, and correct defects, deficiencies, and potential problems
19. Perform required repairs to resolve deficiencies
20. Complete and submit required inspection, maintenance, and repair documentation

### Discussion Questions

1. What are the components of a driveline?
2. What can cause a driveline failure?

### Activities

1. Given a chassis system, have students inspect the driveline system, identify maintenance requirements, and recommend potential repairs.

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the driveline system, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 2-1 / CTS 2-2 / CTS 2-3 / CTS 2-4 / CTS 2-5

## Topic 6-8: Auxiliary Drive Systems

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, SOPS, manufacturer specifications, an inspection checklist, a maintenance checklist, a maintenance schedule (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform maintenance and repairs on the auxiliary drive systems and related components so that the structural integrity, operation, and condition of the auxiliary drive systems and related components are verified to be within manufacturer specifications; the mounting is verified; systems and components are preserved, or restored and operational and within manufacturer specifications; all checklist items are inspected; defects and deficiencies, including deformed, broken, loose, worn, or missing parts, are identified and reported and then repaired, rebuilt, or replaced to manufacturer specifications; components are lubricated; fluid levels are maintained; calibrations and adjustments are performed; applicable tests are conducted; performance is verified; and inspections, activities, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. List types of defects, deficiencies, and potential problems associated with the auxiliary drive systems and related components
  - Corrosion
  - Rust, oxidation, electrolysis
  - Warping
  - Leaks
    - Class I
    - Class II
    - Class III
  - Fluid and lubrication levels
  - Cracks, fractures, breaks
  - Loose, broken, worn, or missing components
2. Describe the inspection, diagnostic, maintenance, and repair procedures of the manufacturer and the authority having jurisdiction (AHJ)
3. Describe how to select and use test, calibration, and diagnostic equipment
4. Describe operational, diagnostic, and performance tests
5. Identify the role of inspection, maintenance, and repair schedules
6. Describe how to use inspection, maintenance, and repair checklists
7. Identify and evaluate conditions and recognize deficiencies
8. Identify and describe troubleshooting and adjustment methods and procedures
  - Corrosion
    - Clean
    - Correct cause (if possible)
    - Recoat or repaint (if necessary)
  - Rust, oxidation, electrolysis
    - Clean
    - Spectrochemical analysis of fluids (onsite or offsite)
    - Neutralize
    - Correct cause (if possible)
    - Recoat or repaint (if necessary)
  - Warping
    - Send for repair
  - Leaks
    - Clean
    - Correct cause (if possible)
    - Send for repair
  - Fluid and lubrication levels
    - Use recommended fluids
    - Adjust to appropriate fluid levels at operating temperature
  - Cracks, fractures, breaks
    - Send for repair

## Emergency Vehicle Technician 1A

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- Loose, broken, worn, or missing components
  - Tighten
  - Replace
  - Adjust
  - Send for repair
- 9. Describe electrical troubleshooting procedures
- 10. Describe adjustment and calibration procedures
- 11. Describe repair and overhaul procedures
- 12. Identify inspection, maintenance, and repair record-keeping requirements
- 13. Evaluate reported conditions
- 14. Use test, calibration, and diagnostic equipment and any additional maintenance and repair equipment
- 15. Perform operational and verification tests
- 16. Recognize and identify symptoms and conditions
- 17. Perform all required maintenance (including checklist items)
- 18. Recognize, determine, and correct defects, deficiencies, and potential problems
- 19. Perform required repairs to resolve deficiencies
- 20. Complete and submit required inspection, maintenance, and repair documentation

### Discussion Questions

1. What might cause vibration in the auxiliary drive system?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the auxiliary drive system, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 2-1 / CTS 2-2 / CTS 2-3 / CTS 2-4 / CTS 2-5

## Topic 6-9: Cooling Systems

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, SOPS, manufacturer specifications, an inspection checklist, a maintenance checklist, a maintenance schedule (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform maintenance and repairs on the cooling systems and related components so that the structural integrity, operation, and condition of the cooling systems and related components are verified to be within manufacturer specifications; the mounting is verified; systems and components are preserved, or restored and operational and within manufacturer specifications; multiplexing and interface electronics systems are tested for proper operation; all checklist items are inspected; defects and deficiencies, including deformed, broken, loose, worn, or missing parts, are identified and reported and then repaired, rebuilt, or replaced to manufacturer specifications; fluid levels are maintained; calibrations and adjustments are performed; applicable tests are conducted;

performance is verified; and inspections, activities, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. List types of defects, deficiencies, and potential problems associated with the cooling systems and related components
  - Corrosion
  - Rust, oxidation, electrolysis
  - Warping
  - Leaks
    - Class I
    - Class II
    - Class III
  - Fluid and lubrication levels
  - Cracks, fractures, breaks
  - Loose, broken, worn, or missing components
2. Describe the inspection, diagnostic, maintenance, and repair procedures of the manufacturer and the authority having jurisdiction (AHJ)
3. Describe how to select and use test, calibration, and diagnostic equipment
4. Describe operational, diagnostic, and performance tests
5. Identify the role of inspection, maintenance, and repair schedules
6. Describe how to use inspection, maintenance, and repair checklists
7. Identify and evaluate conditions and recognize deficiencies
8. Identify and describe troubleshooting and adjustment methods and procedures
  - Corrosion
    - Clean
    - Correct cause (if possible)
    - Recoat or repaint (if necessary)
  - Rust, oxidation, electrolysis
    - Clean
    - Spectrochemical analysis of fluids (onsite or offsite)
    - Neutralize
    - Correct cause (if possible)
    - Recoat or repaint (if necessary)
  - Warping
    - Send for repair
  - Leaks
    - Clean
    - Correct cause (if possible)
    - Send for repair
  - Fluid and lubrication levels
    - Use recommended fluids

## Emergency Vehicle Technician 1A

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- Adjust to appropriate fluid levels at operating temperature
  - Cracks, fractures, breaks
    - Send for repair
  - Loose, broken, worn, or missing components
    - Tighten
    - Replace
    - Adjust
    - Send for repair
9. Describe electrical troubleshooting procedures
  10. Describe adjustment and calibration procedures
  11. Describe repair and overhaul procedures
  12. Identify inspection, maintenance, and repair record-keeping requirements
  13. Evaluate reported conditions
  14. Use test, calibration, and diagnostic equipment and any additional maintenance and repair equipment
  15. Perform operational and verification tests
  16. Recognize and identify symptoms and conditions
  17. Perform all required maintenance (including checklist items)
  18. Recognize, determine, and correct defects, deficiencies, and potential problems
  19. Perform required repairs to resolve deficiencies
  20. Complete and submit required inspection, maintenance, and repair documentation

### Discussion Questions

1. What cooling systems are evaluated as part of the chassis system?
2. How do you test coolant?
3. How do you test a radiator cap?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the cooling system, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 2-1 / CTS 2-2 / CTS 2-3 / CTS 2-4 / CTS 2-5

## Unit 7: Testing

### Topic 7-1: Axle Weight Performance Testing

#### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, an applicable driving license (if required), and a commercial certified scale, will be able to complete an axle weight performance test on an apparatus in accordance with NFPA 1911 so that the apparatus weight is determined to ensure that the weight on the vehicle does not exceed the gross axle weight rating (GAWR) and the gross vehicle weight rating (GVWR) or gross combination weight rating (GCWR) as shown on the rating plate on the fire apparatus; and

## Emergency Vehicle Technician 1A

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all testing is documented in accordance with the requirements of NFPA standards and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. Describe the legal operation of fire apparatus
  - Department of Motor Vehicles (DMV) identifies vehicle licensing requirements
  - Individual license holders bear responsibility for knowing which vehicle(s) they may legally operate
2. Identify the location of a certified scale
  - US DOT provides lists of certified scales ([www.transportation.gov](http://www.transportation.gov))
  - California Highway Patrol (CHP) has lists of certified commercial scales
3. Identify record-keeping requirements of NFPA 1911 and the AHJ
  - NFPA 1911 (2012) / Chapter 16: Road Tests and Annual Weight Verification
4. Describe the axle weight performance testing process
5. Complete required documentation
  - Forms identified in NFPA 1911
  - Any additional AHJ requirements

### Discussion Questions

1. Why is it important to weigh an apparatus?
2. Who determines apparatus weight limits?

### Activities

1. Determined by instructor

### Instructor Notes

1. ELO 1: Provide the licensing information current at the time of course offering
2. ELO 3: Use the current NFPA 1911 edition (provide digital or paper copy of Chapter 16)
3. ELO 4: Use current NFPA 1911 edition paragraphs as the outline to teach the process

**CTS Guide Reference:** CTS 2-6

## Topic 7-2: Brake Performance Testing

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, an applicable driving license (if required), and a calibrated driving course, will be able to complete a braking performance test on an apparatus in accordance with NFPA 1911 so that the apparatus braking system performance is verified to ensure that the braking ability of the apparatus complies with the requirements of NFPA 1911 and federal and state regulations; and all testing is documented in accordance with the requirements of NFPA standards and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. Recognize the need for brake performance testing
  - Validate vehicle ability
  - Fire personnel and public safety
  - Budgeting and forecasting
3. Demonstrate familiarity with brake testing course

## Emergency Vehicle Technician 1A

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4. Identify brake performance requirements of NFPA 1911 and federal and state regulations
  - NFPA 1911 (2012) / Chapter 16: Road Tests and Annual Weight Verification
  - US DOT Federal Motor Carrier Safety Administration / Part 393
  - California Vehicle Code (CVC) / Division 12. Equipment of Vehicles / Chapter 3. Brakes
5. Identify record-keeping requirements of NFPA 1911 and the AHJ
  - NFPA 1911 (2012) / Chapter 16: Road Tests and Annual Weight Verification
  - AHJ (vary)
6. Describe the brake performance testing process
  - NFPA covers emergency vehicles / fire apparatus
  - US DOT covers commercial vehicles
  - CVC covers any vehicle with a brake
7. Complete required documentation
  - Forms identified in NFPA 1911
  - Any additional AHJ requirements

### Discussion Questions

1. Who determines brake test requirements?
2. When is a brake performance test required?

### Activities

1. Determined by instructor

### Instructor Notes

1. ELO 4: Use the current NFPA 1911 edition (provide digital or paper copy of Chapter 16)
2. ELO 5: Use the appropriate published regulations or requirements depending on vehicle type as the outline to teach this process

**CTS Guide Reference:** CTS 2-7

## Topic 7-3: Parking Brake Performance Testing

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, an applicable driving license (if required), and an appropriate road grade, will be able to complete a parking brake performance test on an apparatus in accordance with NFPA 1911 so that the apparatus parking brake system performance is verified to ensure that the park braking ability of the apparatus complies with the requirements of NFPA 1911 and federal and state regulations; and all testing is documented in accordance with the procedures of NFPA standards and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. Recognize the need for parking brake testing
2. Demonstrate familiarity with parking brake testing course
3. Identify parking brake performance requirements of NFPA 1911 and federal and state regulations
  - NFPA 1911 (2012) / Chapter 16: Road Tests and Annual Weight Verification

## Emergency Vehicle Technician 1A

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- US DOT Federal Motor Carrier Safety Administration / Part 393
  - California Vehicle Code (CVC) / Division 12. Equipment of Vehicles / Chapter 3. Brakes (26451 (a-c))
4. Identify record-keeping requirements of NFPA 1911 and the AHJ
    - NFPA 1911 (2012) / Chapter 16: Road Tests and Annual Weight Verification
  5. Describe the performance brake testing process
  6. Complete required documentation

### Discussion Questions

1. How do you position a vehicle for park brake testing?
2. What action is required if a vehicle fails park brake testing?

### Activities

1. Determined by instructor

### Instructor Notes

1. ELO 3: Use the current NFPA 1911 edition (provide digital or paper copy of Chapter 16)
2. ELO 5: Use the appropriate published regulations or requirements depending on vehicle type as the outline to teach this process

**CTS Guide Reference:** CTS 2-8



# Cab and Body Systems and Components Module

## Unit 8: Cab and Body Overview

### Topic 8-1: Terminology

#### Terminal Learning Objective

At the end of this topic, a student, given NFPA 1071 terminology, will be able to define inspection, maintenance, repair, and overhaul (rebuild) in accordance NFPA standards

#### Enabling Learning Objectives

1. Define “inspect(ion)”
  - To determine the condition or operation of a component(s) by comparing its physical, mechanical, and/or electrical characteristics with established standards, recommendations, and requirements through examination by sight, sound, or feel
2. Define “maintenance”
  - The act of servicing a fire apparatus or a component in order to keep the vehicle and its components in proper operating condition
3. Define “repair”
  - To restore to sound condition after failure or damage
4. Define “overhaul (rebuild)”
  - To make extensive repairs in order to restore a component to like-new condition in accordance with the original manufacturer’s specifications

#### Discussion Questions

1. Determined by instructor

#### Activities

1. Determined by instructor

CTS Guide Reference: None

### Topic 8-2: The Inspection, Maintenance, Repair, and Testing Cycle

#### Terminal Learning Objective

At the end of this topic, a student, given circumstances that initiate the inspection process, safety requirements, and an overview of appropriate facilities and equipment, will be able to describe the cycle of inspecting, maintaining, repairing, and testing emergency vehicle cabs and bodies and related components in accordance with NFPA standards

#### Enabling Learning Objectives

1. Identify circumstances that initiate the inspection process
  - Acceptance test of new vehicle
  - Meeting manufacturer and/or AHJ inspection cycle
  - Responding to a suspected or reported problem

## Emergency Vehicle Technician 1A

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- Acceptance test of repaired vehicle
- 2. Identify safety requirements
  - Vehicle safety
  - Technician safety
- 3. Identify facilities and equipment
  - Proper location(s) for inspection, maintenance, repair/replace, testing
  - Required tools/equipment
    - Test, calibration, and diagnostic
    - Inspection
    - Maintenance and repair
- 4. Describe the inspection process
  - Gather tools and safety equipment
  - Secure vehicle in a safe environment
  - Evaluate reported conditions (if applicable)
  - Perform operational tests
    - What if you can't duplicate or validate the concern?
  - Identify and report defects and deficiencies, including broken, loose, worn, or missing parts
  - Complete checklist and document findings
    - Checklists vary by manufacturer and authority having jurisdiction (AHJ)
    - Chassis checklist should, at a minimum, include:
      - Vehicle identification number (VIN) or unit number
      - Engine hours or mileage
      - Manufacturer inspection requirements
      - AHJ inspection requirements
      - Inspector name and signature
      - Inspection date
  - Return vehicle to service or move to maintenance or repair
- 5. Identify the role of a maintenance schedule and a maintenance checklist
  - Scheduling
  - Budgeting
    - Allocation
    - Cost reduction
    - Forecasting
  - Fleet lifecycle
  - Research and development
  - Audits
  - Legal protection
- 6. Describe the maintenance process
  - Identify the appropriate scope and authority for maintenance vs. repair activities
  - Identify individual technician's authorization for maintenance activities
  - Identify maintenance needs from inspection report

## Emergency Vehicle Technician 1A

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- Gather tools and safety equipment
  - Secure vehicle in a safe environment
  - Evaluate reported conditions
    - Review inspection report
    - Identify repairs (outside maintenance scope)
    - Prioritize maintenance activities
  - Perform operational tests
  - Perform maintenance duties
  - Conduct performance tests
  - Complete checklist and document findings
  - Return vehicle to service or move to repair
7. Describe the repair and/or replacement process
- Identify the appropriate scope and authority for internal vs. external repair activities
  - Identify individual technician's authorization for repair activities
  - Identify repair needs from inspection and/or maintenance report
  - Gather tools and safety equipment
  - Secure vehicle in a safe environment
  - Evaluate reported conditions
  - Perform operational tests
  - Repair or replace deformed, broken, loose, worn, or missing parts
  - Conduct performance tests
  - Complete checklist and document findings
  - Release to manufacturer or third-party shop for repair (if applicable)
    - Acceptance testing (inspection) on returned/repaired vehicle
    - Complete checklist and document findings
  - Return vehicle to service

### Discussion Questions

1. Determined by instructor

### Activities

1. Determined by instructor

CTS Guide Reference: None

## Unit 9: Cab and Body Systems and Components

### Topic 9-1: Function, Construction, and Operation

#### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, SOPs, and manufacturer specifications, will be able to describe the function, construction, and operation of cab and body systems and components in accordance with manufacturer specifications and the authority having jurisdiction (AHJ) requirements

### Enabling Learning Objectives

1. Describe the function, construction, and operation of the crew and passenger compartments
  - Glass, windows, and mirrors
    - Manual
    - Electronic
  - Seats
  - Seatbelts and safety restraints
  - Doors, door hinges, latches, and door stops
  - Lighting
  - Climate control system
  - Instrumentation
  - Cab mounting system
    - Mounting brackets
    - Cab base structure
    - Resilient cushions
    - Securing fasteners
  - Equipment mounting systems
    - Mounting racks
      - Manual
      - Electronic
    - Brackets
    - Latches
    - Interlocks and warning systems
      - Visual
      - Audible
    - Radios, computers, and siren controls
    - Self-contained breathing apparatus (SCBA)
    - Portable lights
    - Hand tools
    - Emergency medical service (EMS) equipment
    - Books, street directories, maps
  - Cab tilting systems
    - Switches and remote controls
    - Interlocks
    - Motors and pumps
    - Reservoirs
    - Hoses and fittings
    - Cylinders and lifting devices
    - Cab support devices
    - Pivot points
    - Latches and hold-down devices

- Hydraulic fluids
- 2. Describe the function, construction, and operation of the body and compartmentation
  - Compartments and storage areas
  - Lighting
  - Hinges, latches, and seals
  - Doors
  - Shelves and dividers
  - Hazard warning lights and interlocks
    - Visual
    - Audible
  - Steps, platforms, handrails, access ladders
  - Slip-resistant surfaces
  - Mechanical steps
  - Equipment mounting racks and brackets
  - Finishes and reflective stripping
  - Signs and labels

### Discussion Questions

1. What is the main purpose of the safety systems?
2. What might cause corrosion in the cab or body?

### Activities

1. Determined by instructor

**CTS Guide Reference:** CTS 3-1 / CTS 3-3 / CTS 3-4 / CTS 3-6 / CTS 3-7 / CTS 3-8 / CTS 3-9 / CTS 3-11

## Topic 9-2: Electricity and Electronics

### Terminal Learning Objective

At the end of this topic, a student, given principles of electricity, electrical connection, and operational theory, will be able to apply those principles and theories to the electrical systems in the cab and body in accordance with manufacturer specifications and authority having jurisdiction (AHJ) requirements

### Enabling Learning Objectives

1. Identify the principles of electricity and the operational theory of electronics
  - Principles of electricity and electronics
    - Ohm's law
      - Resistance goes up / amperage goes down
      - Amperage goes up / resistance goes down
    - Watt's law
      - Electrical law of work
    - Kirchhoff's law
      - All voltage is used up by the time the circuit is complete
      - Amperage will be the same throughout the circuit
  - Electrical systems in the cab and body

## Emergency Vehicle Technician 1A

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- Low voltage
    - Batteries
    - Starter
    - Alternator
    - Wiring
  - Line voltage
    - Power generation system
    - Shore power
  - Electronic
    - Interface electronics (e.g. pump control module, engine status center, transmission control module, anti-lock brake system module, etc.)
    - Load management systems
2. Identify electrical connection theory and maintenance
  3. Describe electrical troubleshooting procedures
    - Test system's all-inclusive voltage drop
  4. Measure voltage, amperage, and resistance

### Discussion Questions

1. What are some grounding sources?

### Activities

1. Determined by instructor

### Instructor Notes

1. Electrical is referenced here as part of the complete cab and body system. Complete curriculum for inspecting electrical systems is found in Emergency Vehicle Technician 1B: Electrical Systems A and Emergency Vehicle Technician 2A : Electrical Systems B. Keep this brief.

**CTS Guide Reference:** CTS 3-5 / CTS 3-6 / CTS 3-8

## Topic 9-3: Welding and Fabrication

### Terminal Learning Objective

At the end of this topic, a student, given basic welding and fabrication principles and techniques, will be able to apply welding and fabrication procedures needed to maintain and repair systems and components and in the cab and body in accordance with manufacturer specifications and authority having jurisdiction (AHJ) requirements

### Enabling Learning Objectives

1. Describe basic welding and fabrication procedures
2. Identify welding experience and/or certification requirements for different parts of an apparatus

### Discussion Questions

1. Determined by instructor

### Activities

1. Determined by instructor

### Instructor Notes

1. It is beyond the scope of this course to teach welding. However students should be familiar with basic techniques for minor repairs.

**CTS Guide Reference:** CTS 3-3 / CTS 3-6 / CTS 3-8 / CTS 3-11

## Unit 10: Inspection, Maintenance, and Repair

### Topic 10-1: Crew and Passenger Compartments

#### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle (with a cab tilt system) and its assigned equipment, SOPs, manufacturer specifications, an inspection checklist (or assignment), a maintenance checklist, a maintenance schedule (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform maintenance and repairs on the crew and passenger compartments and related components so that the operation and condition of the crew and passenger compartments and related components are verified, or preserved and restored, to be within manufacturer specifications; the condition of finishes, signs, labels, and paint is determined and documented; climate control systems are tested for proper operation; the tilt mechanism is readied safe; the structural integrity is assessed; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; warning system components function; all hoses are tight; leaks are stopped; latches are aligned and adjusted to operational condition; fluids are checked and filled; any electrical connections are clean and tight; worn pads are replaced; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; components are fabricated, adjusted, aligned, and lubricated; all checklist items are inspected; additional repair needs are reported; defective components are diagnosed; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported and then repaired, rebuilt, or replaced to manufacturer specifications; operational tests are conducted and performance is verified; hazardous conditions are avoided or resolved; and inspections, activities, tests, and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

#### Enabling Learning Objectives

1. Identify types of defects, deficiencies, and potential problems associated with crew and passenger compartments and related components
2. Describe the inspection, diagnostic, maintenance, and repair procedures of the manufacturer and the authority having jurisdiction
3. Describe how to select test, calibration, and diagnostic equipment
4. Identify materials used in crew and passenger compartments and related components
5. Identify and describe types of fluids and lubricants
6. Identify failures and restoration of finishes, signs, labels, and paint
7. Identify leak classifications and methods to stop them
8. Describe troubleshooting procedures

## Emergency Vehicle Technician 1A

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9. Describe adjustment, calibration, and alignment methods and procedures
10. Identify personnel safety restraint systems that may present hazards during cab repair
11. Describe principles of pneumatic, hydraulic, and electric operation
12. Describe repair, rebuild, and replacement procedures
13. Identify required verification testing
14. Identify inspection, maintenance, and repair record-keeping requirements
15. Recognize and identify symptoms and conditions of crew and passenger compartments and related components
16. Use test, calibration, and diagnostic equipment
17. Determine defects, deficiencies, and potential problems
18. Recognize, identify, and evaluate reported conditions
19. Perform all required maintenance (including checklist items) to resolve deficiencies
20. Mitigate personnel safety restraint system hazards
21. Apply paint and finish materials
22. Perform all required repairs to resolve deficiencies
23. Perform operational checks and verification tests
24. Complete inspection, maintenance, and repair checklists and documentation

### Discussion Questions

1. What can cause an out of service seat belt?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the crew and passenger compartments, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 3-3 / CTS 3-1 / CTS 3-2 / CTS 3-11

## Topic 10-2: Cab Mounting System

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle (with a cab tilt system) and its assigned equipment, SOPs, manufacturer specifications, an inspection checklist (or assignment), a maintenance checklist, a maintenance schedule (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform maintenance and repairs on the cab mounting system and related components so that the operation and condition of the cab mounting system and related components are verified, or preserved and restored, to be within manufacturer specifications; the condition of finishes, signs, labels, and paint is determined and documented; climate control systems are tested for proper operation; the tilt mechanism is readied safe; the structural integrity is assessed; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; warning system components function; all hoses are tight; leaks are stopped; latches are aligned and adjusted to operational condition; fluids are checked and filled; any electrical



connections are clean and tight; worn pads are replaced; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; components are fabricated, adjusted, aligned, and lubricated; all checklist items are inspected; additional repair needs are reported; defective components are diagnosed; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported and then repaired, rebuilt, or replaced to manufacturer specifications; operational tests, diagnostic checks, are conducted and performance is verified; hazardous conditions are avoided or resolved; and inspections, activities, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. Identify types of defects, deficiencies, and potential problems associated with cab mounting system and related components
2. Describe the inspection, diagnostic, maintenance, and repair procedures of the manufacturer and the authority having jurisdiction
3. Describe how to select test, calibration, and diagnostic equipment
4. Identify materials used in cab mounting system and related components
5. Identify and describe types of fluids and lubricants
6. Identify failures and restoration of finishes, signs, labels, and paint
7. Identify leak classifications and methods to stop them
8. Describe troubleshooting procedures
9. Describe adjustment, calibration, and alignment methods and procedures
10. Identify personnel safety restraint systems that may present hazards during cab repair
11. Describe principles of pneumatic, hydraulic, and electric operation
12. Describe repair, rebuild, and replacement procedures
13. Identify required verification testing
14. Identify inspection, maintenance, and repair record-keeping requirements
15. Recognize and identify symptoms and conditions of cab mounting system and related components
16. Use test, calibration, and diagnostic equipment
17. Determine defects, deficiencies, and potential problems
18. Recognize, identify, and evaluate reported conditions
19. Perform all required maintenance (including checklist items) to resolve deficiencies
20. Mitigate personnel safety restraint system hazards
21. Apply paint and finish materials
22. Perform all required repairs to resolve deficiencies
23. Perform operational checks, diagnostic checks, and verification tests
24. Complete inspection, maintenance, and repair checklists and documentation

### Discussion Questions

1. What might cause worn cab bushings?
2. Does fluid type matter?

### Activities

1. Determined by instructor

2. Throughout hands-on lecture in the shop, utilize students to inspect the cab mounting system, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 3-3 / CTS 3-4 / CTS 3-5 / CTS 3-6

### Topic 10-3: Equipment Mounting Systems

#### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle (with a cab tilt system) and its assigned equipment, SOPs, manufacturer specifications, an inspection checklist (or assignment), a maintenance checklist, a maintenance schedule (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform maintenance and repairs on the equipment mounting systems and related components so that the operation and condition of the equipment mounting systems and related components are verified, or preserved and restored, to be within manufacturer specifications; the condition of finishes, signs, labels, and paint is determined and documented; the tilt mechanism is readied safe; the structural integrity is assessed; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; warning system components function; all hoses are tight; leaks are stopped; latches are aligned and adjusted to operational condition; fluids are checked and filled; any electrical connections are clean and tight; worn pads are replaced; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; components are fabricated, adjusted, aligned, and lubricated; all checklist items are inspected; additional repair needs are reported; defective components are diagnosed; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported and then repaired, rebuilt, or replaced to manufacturer's specifications; operational checks and diagnostic checks are conducted and performance is verified; hazardous conditions are avoided or resolved; and inspections and checks, activities, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

#### Enabling Learning Objectives

1. Identify types of defects, deficiencies, and potential problems associated with equipment mounting system and related components
2. Describe the inspection, diagnostic, maintenance, and repair procedures of the manufacturer and the authority having jurisdiction
3. Describe how to select test, calibration, and diagnostic equipment
4. Identify materials used in equipment mounting system and related components
5. Identify and describe types of fluids and lubricants
6. Identify failures and restoration of finishes, signs, labels, and paint
7. Identify leak classifications and methods to stop them
8. Describe troubleshooting procedures
9. Describe adjustment, calibration, and alignment methods and procedures
10. Identify personnel safety restraint systems that may present hazards during cab repair
11. Describe principles of pneumatic, hydraulic, and electric operation

12. Describe repair, rebuild, and replacement procedures
13. Identify required verification testing
14. Identify inspection, maintenance, and repair record-keeping requirements
15. Recognize and identify symptoms and conditions of equipment mounting system and related components
16. Use test, calibration, and diagnostic equipment
17. Determine defects, deficiencies, and potential problems
18. Recognize, identify, and evaluate reported conditions
19. Perform all required maintenance (including checklist items) to resolve deficiencies
20. Mitigate personnel safety restraint system hazards
21. Apply paint and finish materials
22. Perform all required repairs to resolve deficiencies
23. Perform operational checks, diagnostic checks and verification tests
24. Complete inspection, maintenance, and repair checklists and documentation

### Discussion Questions

1. Should broken equipment supports be fixed?
2. What are some different classes of leaks?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the equipment mounting systems, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 3-3 / CTS 3-4 / CTS 3-5 / CTS 3-6

## Topic 10-4: Cab Tilting Systems

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle (with a cab tilt system) and its assigned equipment, SOPs, manufacturer specifications, an inspection checklist (or assignment), a maintenance checklist, a maintenance schedule (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform maintenance and repairs on the cab tilting systems and related components so that the operation and condition of the cab tilting systems and related components are verified, or preserved and restored, to be within manufacturer specifications; the condition of finishes, signs, labels, and paint is determined and documented; the tilt mechanism is readied safe; the structural integrity is assessed; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; warning system components function; all hoses are tight; leaks are stopped; latches are aligned and adjusted to operational condition; fluids are checked and filled; any electrical connections are clean and tight; worn pads are replaced; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; components are fabricated, adjusted, aligned, and lubricated; all checklist items are inspected; additional

## Emergency Vehicle Technician 1A

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repair needs are reported; defective components are diagnosed; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported and then repaired, rebuilt, or replaced to manufacturer specifications; diagnostic checks are conducted and performance is verified; hazardous conditions are avoided or resolved; and inspections, activities, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. Identify types of defects, deficiencies, and potential problems associated with the cab tilting system and related components
2. Describe the inspection, diagnostic, maintenance, and repair procedures of the manufacturer and the authority having jurisdiction
3. Describe how to select test, calibration, and diagnostic equipment
4. Identify materials used in the cab tilting system and related components
5. Identify and describe types of fluids and lubricants
6. Identify failures and restoration of finishes, signs, labels, and paint
7. Identify leak classifications and methods to stop them
8. Describe troubleshooting procedures
9. Describe adjustment, calibration, and alignment methods and procedures
10. Identify personnel safety restraint systems that may present hazards during cab repair
11. Describe principles of pneumatic, hydraulic, and electric operation
12. Describe repair, rebuild, and replacement procedures
13. Identify required verification testing and diagnostic checks
14. Identify inspection, maintenance, and repair record-keeping requirements
15. Recognize and identify symptoms and conditions of the cab tilting system and related components
16. Use test, calibration, and diagnostic equipment
17. Determine defects, deficiencies, and potential problems
18. Recognize, identify, and evaluate reported conditions
19. Perform all required maintenance (including checklist items) to resolve deficiencies
20. Mitigate personnel safety restraint system hazards
21. Apply paint and finish materials
22. Perform all required repairs to resolve deficiencies
23. Perform operational, verification tests, and diagnostic checks
24. Complete inspection, maintenance, and repair checklists and documentation

### Discussion Questions

1. How are an electric cab tilt system and a hydraulic cab tilt system different?
  - How are they similar?
2. Is a “locked” indicator required?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the cab tilting systems, identify maintenance requirements, and recommend potential repairs.

CTS Guide Reference: CTS 3-7 / CTS 3-8

### Topic 10-5: Body and Compartmentation

#### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle (with a cab tilt system) and its assigned equipment, SOPs, manufacturer specifications, an inspection checklist (or assignment), a maintenance checklist, a maintenance schedule (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform maintenance and repairs on the body and compartmentation and related components so that the operation and condition of the body and compartmentation and related components are verified, or preserved and restored, to be within manufacturer specifications; the condition of finishes, signs, labels, and paint is determined and documented; climate control systems are tested for proper operation; the tilt mechanism is readied safe; the structural integrity is assessed; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; warning system components function; all hoses are tight; leaks are stopped; latches are aligned and adjusted to operational condition; fluids are checked and filled; any electrical connections are clean and tight; worn pads are replaced; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; components are fabricated, adjusted, aligned, and lubricated; all checklist items are inspected; additional repair needs are reported; defective components are diagnosed; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported and then repaired, rebuilt, or replaced to manufacturer specifications; operational tests are conducted and performance is verified; hazardous conditions are avoided or resolved; and inspections, checks, activities, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

#### Enabling Learning Objectives

1. Identify types of defects, deficiencies, and potential problems associated with the body and compartmentation and related components
2. Describe the inspection, diagnostic, maintenance, and repair procedures of the manufacturer and the authority having jurisdiction
3. Describe how to select test, calibration, and diagnostic equipment
4. Identify materials used in the body and compartmentation and related components
5. Identify and describe types of fluids and lubricants
6. Identify failures and restoration of finishes, signs, labels, and paint
7. Identify leak classifications and methods to stop them
8. Describe troubleshooting procedures
9. Describe adjustment, calibration, and alignment methods and procedures
10. Identify personnel safety restraint systems that may present hazards during cab repair
11. Describe principles of pneumatic, hydraulic, and electric operation
12. Describe repair, rebuild, and replacement procedures
13. Identify required verification testing

## Emergency Vehicle Technician 1A

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14. Identify inspection, maintenance, and repair record-keeping requirements
15. Recognize and identify symptoms and conditions of the body and compartmentation and related components
16. Use test, calibration, and diagnostic equipment
17. Determine defects, deficiencies, and potential problems
18. Recognize, identify, and evaluate reported conditions
19. Perform all required maintenance (including checklist items) to resolve deficiencies
20. Mitigate personnel safety restraint system hazards
21. Apply paint and finish materials
22. Perform all required repairs to resolve deficiencies
23. Perform operational checks and verification tests
24. Complete inspection, maintenance, and repair checklists and documentation

### Discussion Questions

1. Are loose mountings a concern?
2. Will “cosmetic damage” put a unit out of service?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the body and compartmentation, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 3-1 / CTS 3-2 / CTS 3-3 / CTS 3-9 / CTS 3-10 / CTS 3-11

# Tank and Accessories Module

## Unit 11: Tank and Accessories Overview

### Topic 11-1: Tank and Accessories Terminology

#### Terminal Learning Objective

At the end of this topic, a student, given NFPA 1071 terminology, will be able to define inspection, maintenance, repair, and overhaul (rebuild) in accordance NFPA standards

#### Enabling Learning Objectives

1. Define “inspect(ion)”
  - To determine the condition or operation of a component(s) by comparing its physical, mechanical, and/or electrical characteristics with established standards, recommendations, and requirements through examination by sight, sound, or feel
2. Define “maintenance”
  - The act of servicing a fire apparatus or a component in order to keep the vehicle and its components in proper operating condition
3. Define “repair”
  - To restore to sound condition after failure or damage
4. Define “overhaul (rebuild)”
  - To make extensive repairs in order to restore a component to like-new condition in accordance with the original manufacturer’s specifications

#### Discussion Questions

1. Determined by instructor

#### Activities

1. Determined by instructor

CTS Guide Reference: None

### Topic 11-2: The Inspection, Maintenance, Repair, and Testing Cycle

#### Terminal Learning Objective

At the end of this topic, a student, given circumstances that initiate the inspection process, safety requirements, and an overview of appropriate facilities and equipment, will be able to describe the cycle of inspecting, maintaining, repairing, and testing emergency vehicle pumps and tanks in accordance with NFPA standards

#### Enabling Learning Objectives

1. Identify circumstances that initiate the inspection process
  - Acceptance test of new vehicle
  - Meeting manufacturer and/or AHJ inspection cycle
  - Responding to a suspected or reported problem
  - Acceptance test of repaired vehicle
2. Identify safety requirements

## Emergency Vehicle Technician 1A

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- Vehicle safety
- Technician safety
- 3. Identify facilities and equipment
  - Proper location(s) for inspection, maintenance, repair/replace, testing
  - Required tools/equipment
    - Test, calibration, and diagnostic
    - Maintenance and repair
- 4. Describe the inspection process
  - Evaluate reported conditions (if applicable)
  - Perform operational tests
    - What if you can't duplicate or validate the concern?
  - Identify and report defects and deficiencies, including broken, loose, worn, or missing parts
  - Complete checklist and document findings
  - Return vehicle to service or move to maintenance or repair
- 5. Describe the maintenance process
  - Evaluate reported conditions
  - Perform operational tests
  - Perform maintenance duties
  - Conduct performance tests
  - Complete checklist and document findings
  - Return vehicle to service or move to repair
- 6. Describe the repair and/or replacement process
  - Evaluate reported conditions
  - Perform operational tests
  - Repair or replace deformed, broken, loose, worn, or missing parts
  - Conduct performance tests and diagnostic checks
  - Complete checklist and document findings
  - Release to manufacturer or third-party shop for repair (if applicable)
    - Acceptance testing (inspection) on returned/repared vehicle
    - Complete checklist and document findings
  - Return vehicle to service

### Discussion Questions

1. Determined by instructor

### Activities

1. Determined by instructor

**CTS Guide Reference:** None

## Unit 12: Inspection and Repair Water/Foam/Agent Tanks

### Topic 12-1: Function, Construction, Operation, and Mounting



## Emergency Vehicle Technician 1A

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### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle with a water, foam, or agent tank, SOPs, and manufacturer specifications, will be able to describe the function, construction, operation, and mounting of water, foam, and agent tanks and related components, diagnostic checks, and inspections in accordance with manufacturer specifications and the authority having jurisdiction (AHJ) requirements

### Enabling Learning Objectives

1. Describe the function, construction, operation, and mounting of water tanks
2. Describe the function, construction, operation, and mounting of foam tanks
3. Describe the function, construction, operation, and mounting of agent tanks

### Discussion Questions

1. Is "foam" required on an apparatus?
2. What is the minimum foam tank size?

### Activities

1. Determined by instructor

**CTS Guide Reference:** CTS 5-4 / CTS 5-5

## Topic 12-2: Water and Foam Tanks

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle with a water, foam, or agent tank, manufacturer specifications, SOPS, an inspection checklist (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform repairs on water and foam tanks so that the mounting and condition of the tank is verified; all coated and non-coated interior and exterior surfaces are free of corrosion; sacrificial anodes are evaluated for life-cycle condition and replaced if necessary; the tank is flushed; all checklist items are inspected; leaks are repaired; coatings are renewed; and defects and deficiencies, including deformed, broken, loose, worn, or missing parts, are identified and reported, and repaired, replaced, or rebuilt to manufacturer specifications; service flow test of the tank(s) is conducted; and inspection, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. Describe types of materials used in water and foam tanks
2. Identify types of defects, deficiencies, and potential problems associated with water and foam tanks and related components
  - Corrosion
  - Rust, oxidation, electrolysis
  - Warping
  - Leaks
  - Cracks, fractures, breaks
  - Incompatible foam combinations
  - Loose, broken, worn, or missing components

## Emergency Vehicle Technician 1A

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3. Describe the inspection, diagnostic, and repair procedures of the manufacturer and the authority having jurisdiction
4. Describe how to select test, calibration, and diagnostic equipment
5. Describe testing procedures
  - Component must meet manufacturer, AHJ, and NFPA specifications (if applicable) to be considered operational
6. Describe specialized pressure systems
7. Identify flushing procedures
8. Describe sacrificial anode replacement procedures and schedules
9. Identify flow requirements
10. Describe cleaning and coating procedures
11. Describe principles of welding and fabrication
12. Describe troubleshooting procedures
13. Identify record-keeping requirements
14. Recognize and identify the effects of corrosion by different types of water and foam on selected tank materials
15. Determine defects and deficiencies
16. Recognize, evaluate, and identify reported conditions of water and foam tanks and related components
17. Use test, calibration, and diagnostic equipment
18. Perform required repairs to resolve deficiencies
19. Perform operational checks and service flow tests
20. Complete inspection and repair checklists and documentation

### Discussion Questions

1. Do you have to have OEM (original equipment manufacturer) parts to warranty a tank?
2. Are tank baffles required?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the water or foam tank, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 5-4 / CTS 5-5

## Topic 12-3: Agent Tanks

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle with a water, foam, or agent tank, manufacturer specifications, SOPS, an inspection checklist (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform repairs on agent tanks so that the mounting and condition of the tank is verified; all coated and non-coated interior and exterior surfaces are free of corrosion; sacrificial anodes are evaluated for life-cycle condition and replaced if necessary; the tank is flushed; all checklist items are

## Emergency Vehicle Technician 1A

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inspected; leaks are repaired; coatings are renewed; and defects and deficiencies, including deformed, broken, loose, worn, or missing parts, are identified and reported, and repaired, replaced, or rebuilt to manufacturer specifications; service flow test of the tank(s) is conducted; and inspection, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. Describe types of materials used in water/foam/agent tanks
2. Identify types of defects, deficiencies, and potential problems associated with agent tanks and related components
  - Corrosion
  - Rust, oxidation, electrolysis
  - Warping
  - Leaks
  - Cracks, fractures, breaks
  - Pressure vessel requirements
  - Loose, broken, worn, or missing components
3. Describe the inspection, diagnostic, and repair procedures of the manufacturer and the authority having jurisdiction
4. Describe how to select test, calibration, and diagnostic equipment
5. Describe performance testing procedures
  - Component must meet manufacturer, AHJ, and NFPA specifications (if applicable) to be considered operational
6. Describe specialized pressure systems
7. Identify flushing procedures
8. Identify flow requirements
9. Describe cleaning and coating procedures
10. Describe principles of welding and fabrication
11. Describe troubleshooting procedures
12. Identify record-keeping requirements
13. Recognize and identify the effects of corrosion by different types of agents on selected tank materials
14. Determine defects and deficiencies
15. Recognize, evaluate, and identify reported conditions of agent tanks and related components
16. Use test, calibration, and diagnostic equipment
17. Perform required repairs to resolve deficiencies
18. Perform operational and service flow tests
19. Complete inspection and repair checklists and documentation

### Discussion Questions

1. What are the requirements of a pressure vessel test?

### Activities

1. Determined by instructor

## Emergency Vehicle Technician 1A

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### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the agent tank, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 5-4 / CTS 5-5

## Emergency Vehicle Technician 1A

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### Time Table

Segment	Lecture Time	Activity Time	Total Unit Time
<b>Unit 1: Introduction</b>			
Topic 1-1: Orientation and Administration			
Lecture	0:30		
Activity 1-1: Determined by instructor		0:00	
Topic 1-2: Emergency Vehicle Technician Certification Process			
Lecture	0:30		
Activity 1-2: Determined by instructor		0:00	
<b>Unit 1 Totals</b>	<b>1:00</b>	<b>0:00</b>	<b>1:00</b>

### Emergency Vehicle Technician 101 Module

Segment	Lecture Time	Activity Time	Total Unit Time
<b>Unit 2: Roles and Responsibilities</b>			
Topic 2-1: Emergency Vehicle Technician I			
Lecture	2:00		
Activity 2-1: Determined by instructor		0:00	
Topic 2-2: Emergency Vehicle Technician 2			
Lecture	1:00		
Activity 2-2: Determined by instructor		0:00	
Topic 2-3: Emergency Vehicle Technician 3			
Lecture	1:00		
Activity 2-3: Determined by instructor		0:00	
Topic 2-4: Administrative Quality Assurance			
Lecture	1:00		
Activity 2-4: Determined by instructor		0:00	
<b>Unit 2 Totals</b>	<b>5:00</b>	<b>0:00</b>	<b>5:00</b>
<b>Unit 3: Road and/or Performance Testing</b>			
Topic 3-1: Road and/or Performance Testing			
Lecture	1:30		
Activity 3-1: Determined by instructor		0:00	
<b>Unit 3 Totals</b>	<b>1:30</b>	<b>0:00</b>	<b>0:00</b>

## Chassis Systems and Components Module

Segment	Lecture Time	Activity Time	Total Unit Time
<b>Unit 4: Systems Overview</b>			
Topic 4-1: Terminology			
Lecture	0:10		
Activity 4-1: Determined by instructor		0:00	
Topic 4-1: The Inspection, Maintenance, Repair, and Testing Cycle			
Lecture	0:20		
Activity 4-1: Determined by instructor		0:00	
<b>Unit 4 Totals</b>	<b>0:30</b>	<b>0:00</b>	<b>0:30</b>
<b>Unit 5: Chassis Systems and Components</b>			
Topic 5-1: Function, Construction, and Operation			
Lecture	0:20		
Activity 5-1: Determined by instructor		0:00	
Topic 5-2: Electricity and Electronics			
Lecture	0:10		
Activity 5-2: Determined by instructor		0:00	
<b>Unit 5 Totals</b>	<b>0:30</b>	<b>0:00</b>	<b>0:30</b>
<b>Unit 6: Inspection, Maintenance, and Repair</b>			
Topic 6-1: Frames and Cross Bars			
Lecture	1:00		
Activity 6-1: Determined by instructor		0:00	
Topic 6-2: Steering System			
Lecture	1:45		
Activity 6-2: Determined by instructor		0:00	
Topic 6-3: Suspension System			
Lecture	1:15		
Activity 6-3: Determined by instructor		0:00	
Topic 6-4: Axles			
Lecture	0:15		
Activity 6-4: Determined by instructor		0:00	
Topic 6-5: Brake System			
Lecture	1:45		
Activity 6-5: Determined by instructor		0:00	
Topic 6-6: Wheels and Tires			
Lecture	1:00		

## Emergency Vehicle Technician 1A

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Segment	Lecture Time	Activity Time	Total Unit Time
Activity 6-6: Determined by instructor		0:00	
Topic 6-7: Driveline			
Lecture	1:00		
Activity 6-7: See recommended activity		0:00	
Topic 6-8: Steering System			
Lecture	1:00		
Activity 6-8: Determined by instructor		0:00	
Topic 6-9: Cooling Systems			
Lecture	1:00		
Activity 6-9: Determined by instructor		0:00	
<b>Unit 6 Totals</b>	<b>10:00</b>	<b>0:00</b>	<b>10:00</b>
<b>Unit 7: Testing</b>			
Topic 7-1: Axle Weight Performance Testing			
Lecture	1:00		
Activity 7-1: Determined by instructor		0:00	
Topic 7-2: Brake Performance Testing			
Lecture	1:00		
Activity 7-2: Determined by instructor		0:00	
Topic 7-3: Parking Brake Performance Testing			
Lecture	1:00		
Activity 7-3: Determined by instructor		0:00	
<b>Unit 7 Totals</b>	<b>3:00</b>	<b>0:00</b>	<b>3:00</b>
<b>Lecture, Activity, and Unit Totals:</b>	<b>15:00</b>	<b>0:00</b>	<b>15:00</b>

## Cab and Body Systems and Components Module

Segment	Lecture Time	Activity Time	Total Unit Time
<b>Unit 8: Cab and Body Overview</b>			
Topic 8-1: Terminology			
Lecture	0:10		
Activity 8-1: Determined by instructor		0:00	
Topic 8-2: The Inspection, Maintenance, Repair, and Testing Cycle			
Lecture	0:20		
Activity 8-2: Determined by instructor		0:00	
<b>Unit 8 Totals</b>	<b>0:30</b>	<b>0:00</b>	<b>0:30</b>

## Emergency Vehicle Technician 1A

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Segment	Lecture Time	Activity Time	Total Unit Time
<b>Unit 9: Cab and Body Systems and Components</b>			
Topic 9-1: Function, Construction, and Operation			
Lecture	0:30		
Activity 9-1: Determined by instructor		0:00	
Topic 9-2: Electricity and Electronics			
Lecture	0:30		
Activity 9-2: Determined by instructor		0:00	
Topic 9-3: Welding and Fabrication			
Lecture	0:30		
Activity 9-3: Determined by instructor		0:00	
<b>Unit 9 Totals</b>	<b>1:30</b>	<b>0:00</b>	<b>1:30</b>
<b>Unit 10: Inspection, Maintenance, and Repair</b>			
Topic 10-1: Crew and Passenger Compartments			
Lecture	0:30		
Activity 10-1: Determined by instructor		0:00	
Topic 10-2: Cab Mounting System			
Lecture	3:00		
Activity 10-2: Determined by instructor		0:00	
Topic 10-3: Equipment Mounting Systems			
Lecture	0:30		
Activity 10-3: Determined by instructor		0:00	
Topic 10-4: Cab Tilting Systems			
Lecture	3:00		
Activity 10-4: Determined by instructor		0:00	
Topic 10-5: Body and Compartmentation			
Lecture	1:00		
Activity 10-5: Determined by instructor		0:00	
<b>Unit 10 Totals</b>	<b>8:00</b>	<b>0:00</b>	<b>8:00</b>

### Tank and Accessories Module

Segment	Lecture Time	Activity Time	Total Unit Time
<b>Unit 11: Tank and Accessories Overview</b>			
Topic 11-1: Terminology			



## Emergency Vehicle Technician 1A

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Segment	Lecture Time	Activity Time	Total Unit Time
Lecture	0:10		
Activity 11-1: Determined by instructor		0:00	
Topic 11-2: The Inspection, Maintenance, Repair, and Testing Cycles			
Lecture	0:20		
Activity 11-2: Determined by instructor		0:00	
<b>Unit 11 Totals</b>	<b>0:30</b>	<b>0:00</b>	<b>0:30</b>
<b>Unit 12: Inspection and Repair Water/Foam/Agent Tanks</b>			
Topic 12-1: Function, Construction, Operation, and Mounting			
Lecture	2:00		
Activity 12-1: Determined by instructor		0:00	
Topic 12-2: Water and Foam Tanks			
Lecture	2:00		
Activity 12-2: Determined by instructor		0:00	
Topic 12-3: Agent Tanks			
Lecture	2:00		
Activity 12-3: Determined by instructor		0:00	
<b>Unit 12 Totals</b>	<b>6:00</b>	<b>0:00</b>	<b>6:00</b>
<b>Total Lecture, Activity, and Unit Totals:</b>	<b>7:30</b>	<b>0:00</b>	<b>7:30</b>

### Course Totals

Segment Type	Time
Total Lecture Time (LT)	7:30
Total Activity Time (AT)	0:00
Total Testing Time (TT)	0:30
<b>Total Course Time</b>	<b>8:00</b>



# Electrical Systems A (2020)

## Course Plan

### Course Details

<b>Certification:</b>	Emergency Vehicle Technician 1
<b>CTS Guide:</b>	Emergency Vehicle Technician (2020)
<b>Description:</b>	This course provides an overview of the knowledge and skills needed to inspect and maintain low-voltage electrical systems in emergency vehicles
<b>Designed For:</b>	The emergency vehicle technicians pursuing SFT certification or anyone seeking an overview of low-voltage electrical systems
<b>Prerequisites:</b>	Emergency Vehicle Technician 1A: Chassis, Cab, Body, Tank and Accessories
<b>Standard:</b>	Complete all activities and formative tests Complete all summative tests with a minimum score of 80%
<b>Hours:</b>	Lecture: 26:00 Activities: 8:00 Testing: 2:00
<b>Hours (Total):</b>	36:00
<b>Maximum Class Size:</b>	20
<b>Instructor Level:</b>	Primary
<b>Instructor/Student Ratio:</b>	1:20
<b>Restrictions:</b>	Increasing class size requires an additional qualified instructor
<b>SFT Designation:</b>	CFSTES

## Required Resources

### Instructor Resources

To teach this course, instructors need:

- *Medium/Heavy Duty Truck Electricity and Electronics* (1<sup>st</sup> edition)
  - Classroom manual and shop manual
  - Author: Sulev Oun
  - ISBN 13: 978-0827370067
  - One copy of each item per student + a personal copy for the instructor
- Student Supplement
  - Provided by California Fire Mechanics Academy, Inc.
- Personal protective equipment (PPE)
- Items from the tools and test, calibration, and diagnostic equipment listed in Topic 2-1, ELO 4 (as many as possible)

### Online Instructor Resources

The following instructor resources are available online at

<https://osfm.fire.ca.gov/divisions/state-fire-training/cfstes-professional-certification/>:

- None

### Student Resources

To participate in this course, students need:

- *Medium/Heavy Duty Truck Electricity and Electronics* (1<sup>st</sup> edition)
  - Classroom manual and shop manual
  - Author: Sulev Oun
  - ISBN 13: 978-0827370067
  - Provided by instructor for in-class use
- Student Supplement
  - Provided by California Fire Mechanics Academy, Inc.
- Personal protective equipment (PPE)
  - Student must bring to class
- Digital multimeter (DVOM)
  - Student must bring to class

### Facilities, Equipment, and Personnel

The following facilities, equipment, or personnel are required to deliver this course:

Facilities

- Standard classroom equipped for 20 students
- Projector with appropriate laptop connections

## Emergency Vehicle Technician 1B

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- Wifi/Internet access
- Outdoor space for emergency response vehicle with a clear perimeter for student activities

### Equipment

- Emergency response vehicle
- One circuit training station per student that includes:
  - Battery/power supply (12 volt)
  - Lights (LED and incandescent)
  - Connectors
  - Wires
  - Fuse
  - Fuse holder
  - Circuit breaker
  - Switches
  - Relays
- Working alternator model
- Working starter model
- Fuse replacement ammeter
- Belt tension gauge
- Schematics
  - Digital or physical
  - Must correspond to an onsite emergency response vehicle
  - Five needed for Topic 2-1 activity
- Ammeter
  - Five needed for Topic 2-1 activity
- Baseline voltage checklist
  - Five needed for Topic 2-1 activity
- Solenoids
  - Intermittent and continuous duty
  - Five needed for Topic 2-1 activity
- Inspection checklist
  - Five copies for Topic 3-1 activity
- Service repair document
  - Five copies for Topic 3-1 activity

## Unit 1: Introduction

### Topic 1-1: Orientation and Administration

#### Terminal Learning Objective

At the end of this topic, a student will be able to identify facility and classroom requirements and identify course objectives, events, requirements, assignments, activities, resources, evaluation methods, and participation requirements in the course syllabus.

#### Enabling Learning Objectives

1. Identify facility requirements
  - Restroom locations
  - Food locations
  - Smoking locations
  - Emergency procedures
2. Identify classroom requirements
  - Start and end times
  - Breaks
  - Electronic device policies
  - Special needs and accommodations
  - Other requirements as applicable
3. Review course syllabus
  - Course objectives
  - Calendar of events
  - Course requirements
  - Student evaluation process
  - Assignments
  - Activities
  - Required student resources
  - Class participation requirements

#### Discussion Questions

1. What is a formative test? What is a summative test?

#### Activities

1. To be determined by the instructor.

### Topic 1-2: Emergency Vehicle Technician Certification Process

#### Terminal Learning Objective

At the end of this topic, a student will be able to identify different levels in the Emergency Vehicle Technician certification track, the courses and requirements for State Fire Training (SFT) Emergency Vehicle Technician (EVT) certification, and be able to describe the capstone task book and testing process.

## Emergency Vehicle Technician 1B

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### Enabling Learning Objectives

1. Identify the different levels of certification in the Emergency Vehicle Technician (EVT) certification track
  - EVT 1
  - EVT 2
  - EVT 3
2. Identify the courses required for EVT 1
  - State Fire Training
    - Emergency Vehicle Technician 1A: Chassis, Cab, Body, Tank and Accessories (2020)
    - Emergency Vehicle Technician 1B: Electrical Systems A (2020)
    - Emergency Vehicle Technician 1C: Pumps and Accessories (2020)
  - National Institute for Auto Service Excellence (ASE)
    - Gasoline Engines [T1]
    - Diesel Engines [T2]
    - Drive Train [T3]
    - Brakes [T4]
    - Suspension and Steering [T5]
    - Preventative Maintenance Inspections [T8]
  - Brake Inspector Qualification (CFR 396.25) - Department of Transportation (DOT)
3. Identify the courses required for EVT 2
  - State Fire Training
    - Emergency Vehicle Technician 2A: Electrical Systems B (2020)
  - National Institute for Auto Service Excellence (ASE)
    - Gasoline Engines (T1)
    - Diesel Engines (T2)
    - Drive Train (T3)
    - Brakes (T4)
    - Suspension and Steering (T5)
    - Electrical / Electronic Systems (T6)
    - Heating, Ventilation and Air Conditioning (HVAC) (T7)
    - Preventative Maintenance Inspections (T8)
4. Identify the courses required for EVT 3
  - State Fire Training
    - Emergency Vehicle Technician 3A: Human Resource Management / Fleet Specifications and Records (2020)
  - National Institute for Auto Service Excellence (ASE)
    - Gasoline Engines (T1)
    - Diesel Engines (T2)
    - Drive Train (T3)
    - Brakes (T4)
    - Suspension and Steering (T5)

## Emergency Vehicle Technician 1B

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- Electrical / Electronic Systems (T6)
  - Heating, Ventilation and Air Conditioning (HVAC) (T7)
  - Preventative Maintenance Inspections (T8)
5. Identify additional requirements for Emergency Vehicle Technician 1
- Experience (one of the following)
    - Have a minimum of two (2) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or
    - Have a minimum of three (3) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
    - Have a minimum of four (4) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.
6. Identify additional requirements for Emergency Vehicle Technician 2
- Experience (one of the following)
    - Have a minimum of three (3) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or
    - Have a minimum of four (4) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
    - Have a minimum of five (5) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.
7. Identify additional requirements for Emergency Vehicle Technician 3
- Have a minimum of four (4) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or
  - Have a minimum of five (5) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
  - Have a minimum of six (6) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.
8. The following requirements are required for each EVT 1, EVT 2, and EVT 3
- Code of Federal Regulations (CFR) 396.25: Department of Transportation Brake Inspector Qualification

## Emergency Vehicle Technician 1B

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- Successful completion of the Emergency Vehicle Technician Certification Commission (EVTCC) for the respective SFT Level of Certification. This exam is administered by the California Fire Mechanics Academy (CFMA).
9. Describe the task book process
- Complete all prerequisites and course work
  - Submit application and fees and to request task book
    - A candidate may apply for the EVT 1 and EVT 2 task books at the same time (two applications and two fees), but may not submit the EVT 2 task book until he or she receives EVT 1 certification (a prerequisite for EVT 2)
  - Complete all job performance requirements included in the task book
  - Must have identified evaluator verify individual task completion via signature
  - Must have Fire Chief or authorized representative verify task book completion via signature
  - Must be employed by a California Fire Agency in the position prior to submitting completed task book to State Fire Training
10. Complete Continuing Education
- Persons with EVT Certification are required to renew their certification every five years. The recertification requires that the applicant completes 36 hours of approved continuing education (CE) and meet the all prerequisites stated for Recertification Requirements. All recertification applications must be postmarked on or before the certification expiration date. If the certified EVT did not meet all recertification requirements by the expiration date, the EVT Certification is considered to be lapsed.
  - If the EVT Certification lapsed, the applicant will be required to complete 36 hours of CE in addition to the completion of additional CE hours. If the certification lapsed less than 6 months, you can regain EVT Certification by completing an additional 8 hours of approved CE. If the certification lapsed between 6 months and less than 12 months, you can regain EVT Certification by completing an additional 16 hours of approved CE. If the certification lapsed between 12 months and less than 18 months, you can regain EVT Certification by completing an additional 24 hours of approved CE.
  - For lapses, greater than 18 months, the applicant will need to retake all SFT courses listed in the Certification Requirements Education section and reapply for initial EVT certification, which will require the completion of a new Certification Task Book.
11. Complete all formative and summative tests administered during the course deliveries

### Discussion Questions

1. To be determined by the instructor

### Activities

1. To be determined by the instructor



### Instructor Notes

1. SFT teaches most EVT I (inspect and maintain) and EVT II (repair and replace) content together because depending on the size of the agency or shop, there are different expectations of the technician.

## Unit 2: Inspection

### Topic 2-1: Inspecting Low-voltage Electrical Systems

#### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, SOPs, manufacturer specifications, tools, test, calibration, and diagnostic equipment, including a belt tension gauge and a digital multimeter (DVOM), schematics, an assignment, and an inspection checklist, will be able to inspect the low-voltage electrical system so that the mounting security is verified; operation and condition of the low-voltage electrical system is verified to be within manufacturer specifications; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

#### Enabling Learning Objectives

1. Describe the principles of magnetism
  - Magnetic fields
  - Impacts of magnetic fields
2. Describe the principles of electricity
  - Kirchhoff's laws
  - Watt's law
  - Ohm's law
  - Series and parallel circuits
3. Describe the principles of circuit analysis
  - Difference in potential (flowing vs. not flowing)
  - Application of Kirchhoff's laws
  - Application of Ohm's law
  - Application of Watt's law
  - Parasitic drain
4. Describe how to select test, calibration, and diagnostic equipment
  - Digital voltmeter (DVOM)
  - Ammeter
    - Inductive
      - Low amperage (< 100 A)
      - High amperage (<= 1,000 A)
    - Series
      - Shunt or direct wire
      - Fuse replacement ammeter

## Emergency Vehicle Technician 1B

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- Battery testers
  - Carbon pile
  - Conductance / battery impedance testers
- Power probes / powered test lights
  - Benefits
    - Ability to power a device
    - Ease of use
  - Problems
    - Excess voltage to computer circuits
    - Piercing
- Test lights
  - Benefits
    - Ease of use
    - Very fast
  - Problems
    - Overloading sensitive electronics
    - Trigger low amperage devices
    - Piercing
    - No accurate readings
  - Safety
    - Understand impacts of misuse (energizing relays, etc.)
- Test leads
  - Quality is critical
  - Various lengths and sizes
  - Coiled or extendable
  - Auxiliary meter leads
- Digital storage oscilloscopes (DSO)
- Scanners
  - Code readers
  - Manufacture specific
  - Bi-directional
  - Laptop with interface
- Relay substitution device
- Soldering equipment
  - 100W (medium sized electrical, base wiring, lighting systems, etc.)
  - Temperature controlled (< 25W) (circuit boards, power distribution systems, computers, etc.)
  - Battery powered
  - Torch (propane, mapp, etc.)
  - Rosin-core solder
- Crimping equipment
  - Correct crimper for device

## Emergency Vehicle Technician 1B

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- Manufacturer specific
  - Hydraulic
  - Manual ratcheting
  - Remote start switches
    - Safety concerns during use
  - Remote power supplies
    - Battery chargers
    - Jump batteries (traditional and lightweight)
    - Bench test power supplies (adjustable current and voltage)
    - Auxiliary electronic control module/unit (ECM / ECU) power supply
  - Wire strippers
5. Use test, calibration, and diagnostic equipment
  6. Describe the function, construction, operation, and requirements of starting systems
    - Starter converts electrical energy into mechanical energy to start the engine
    - Starter must meet engine manufacturer performance standard
  7. Describe the function, construction, operation, and requirements of charging systems
    - Alternator converts mechanical energy into electrical energy
    - Alternator (and all associated systems) must meet vehicle requirements
  8. Describe the function, construction, operation, and requirements of chassis electrical components
    - Components include relays, solenoids (intermittent vs. continuous duty), wiring, modules, nodes, sensors, circuit protection devices, power distribution modules
    - Chassis electrical components must meet electrical load requirements and manufacturer specifications
    - High-voltage safety concerns (i.e. injector drivers, hybrid vehicles)
  9. Describe the function, construction, operation, and requirements of lighting systems (chassis, emergency, and accessory)
    - Components include relays, solenoids (intermittent vs. continuous duty), wiring, modules, nodes, sensors, circuit protection devices, power distribution modules, controls
    - Lighting system components must meet electrical load requirements and manufacturer specifications
    - High-voltage safety concerns
      - Strobe lights
      - High-intensity discharge (HID)
  10. List types of defects, deficiencies, and potential problems associated with low-voltage electrical systems
    - Open circuit
    - Short to power
    - Short to ground
    - Cross short
    - Excessive resistance

11. Determine defects and deficiencies
  - Troubleshooting
  - Design deficiencies
12. Describe how to read and interpret schematics
  - Basic schematic symbols
  - Manufacturer-specific schematic symbols
  - As-built schematics (per vehicle)
13. Read and interpret schematics
14. Identify mounting and adjustment requirements
15. Recognize and identify potential failure symptoms and conditions of low-voltage electrical systems
  - Hard or noisy starting
  - Smoke (sight or smell)
  - Excess heat (on contact or evidenced by melting, warping, discolor, etc.)
  - Improper charging (too high or too low)
  - Failure to function
  - Onboard instrumentation readings outside parameters
  - Operator error
  - Arcing and sparking
16. Describe the inspection procedures of the manufacturer and the AHJ
  - Gather tools and safety equipment
  - Secure vehicle in a safe environment
  - Set parking brake
  - Place wheel chocks
  - Inspect low-voltage electrical system
    - Recognize and identify symptoms and conditions
    - Determine defects, deficiencies, and potential problems
    - Determine impact if not corrected
  - Complete manufacturer and AHJ inspection checklist
  - Perform operational tests
  - Complete checklist and inspection documentation
  - Release vehicle for in-service use or maintenance/repair
17. Recognize and identify symptoms and conditions
18. Determine defects, deficiencies, and potential problems
19. Perform operational checks
20. Identify record-keeping requirements
21. Complete checklist and inspection documentation

### Discussion Questions

1. What do you know about voltage drop?
  - What are some causes of voltage drop?
  - What impact does voltage drop have on a circuit (or vehicle)?
  - What is an acceptable voltage drop level?

## Emergency Vehicle Technician 1B

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2. What problems can using the wrong test equipment create?
3. Where in the electrical system do you need to address high-voltage safety concerns?
  - What are those concerns?

### Activities

1. Given an emergency apparatus and its corresponding electrical schematic, have students:
  - Identify and describe at least one circuit on the apparatus and its component relationships on the schematic
  - Select a component or device on the apparatus and locate it on the schematic
2. Given an emergency apparatus, a voltmeter, and an inductive ammeter, have students:
  - Determine proper charging system voltage and amperage
  - Measure power side and ground side voltage drops and document results
3. Given a baseline checklist, have students:
  - Compare baseline checklist data with Activity 2 data
  - Diagnose and document any potential problems
4. Given solenoids, have students:
  - Determine whether they are intermittent or continuous duty
  - Describe the mounting position of the solenoids

### Instructor Notes

1. ELO 4: Use ELO 4 as a way to demonstrate the laws taught in ELO 2 and 3.
2. ELO 4: All items must be covered. Demonstrate as many as possible, bringing the equipment to the class.
3. ELO 5: Teach students when and how to use the equipment identified in ELO 4.

**CTS Guide Reference:** CTS 4-1

## Unit 3: Maintenance

### Topic 3-1: Maintaining Low-voltage Electrical Systems

#### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, manufacturer specifications, a maintenance schedule or assignment, a maintenance checklist, SOPs, test, calibration, and diagnostic equipment, and tools, will be able to perform maintenance on the low-voltage electrical system so that deformed, broken, loose, worn, or missing parts are repaired or replaced; the operational condition is preserved or restored; calibration and adjustments are performed; activities are documented; and additional repair needs are reported

#### Enabling Learning Objectives

1. Describe troubleshooting and adjustment methods and procedures
  - Dead battery
    - Replace
    - Charge
  - Corrosion

## Emergency Vehicle Technician 1B

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- Clean
  - Correct cause (if possible)
  - Recoat or repaint (if necessary)
  - Faulty connections
    - Clean
    - Tighten
    - Rewire
    - Replace
  - Low or high voltage
    - Adjust
    - Replace
    - Rebuild
    - Send for repair
  - Deformed, broken, loose, worn, missing, or failed components
    - Tighten
    - Replace
    - Adjust
    - Send for repair
2. Evaluate reported conditions
  3. Use test, calibration, and diagnostic equipment
  4. Perform operational checks
  5. Perform all required maintenance, including all items on a maintenance checklist
  6. Correct deficiencies
  7. Complete required documentation

### Discussion Questions

1. What tools and information are needed to perform a proper alternator output test?
2. What are the advantages and disadvantages of using the following circuit protection devices:
  - Fuses
  - Fusible links
  - Circuit breakers
  - PTC (positive temperature coefficient)
3. What would you do if:
  - One headlight is dimmer than the other?
  - The starter cranks slowly?
  - There is no power at all?

### Activities

1. Given an inspection document, have students working in groups of up to four:
  - Evaluate reported conditions and identify the problem
  - Develop and document a maintenance plan
  - Complete repairs or correct deficiencies
  - Perform operational test of the circuit

## Emergency Vehicle Technician 1B

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- Complete required documentation

### **Instructor Notes**

1. Bring as many different pieces of test, calibration, and diagnostic equipment as possible for students to manipulate in class
2. For Activity 1, create sample scenarios for the students to resolve or have them use the inspection checklist issues identified in Topic 2-1: Activity 3

**CTS Guide Reference:** CTS 4-2

## Emergency Vehicle Technician 1B

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### Time Table

Segment	Lecture Time	Activity Time	Total Unit Time
<b>Unit 1: Introduction</b>			
Topic 1-1: Orientation and Administration			
Lecture	0:30		
Activity 1-1: Determined by instructor		0:00	
Topic 1-2: Emergency Vehicle Technician Certification Process			
Lecture	0:30		
Activity 1-2: Determined by instructor		0:00	
<b>Unit 1 Totals</b>	<b>1:00</b>	<b>0:00</b>	<b>1:00</b>
<b>Unit 2: Inspection</b>			
Topic 2-1: Inspecting Low-voltage Electrical Systems			
Lecture			
ELO 1	1:00		
ELO 2	1:00		
ELO 3	1:00		
ELO 4	6:00		
ELO 6	1:00		
ELO 7	1:00		
ELO 8	2:00		
ELO 9	2:00		
ELO 10	2:00		
ELO 11	2:00		
ELO 12	1:00		
ELO 14	0:30		
ELO 15	2:00		
ELO 16	0:30		
Activities		4:00	
<b>Unit 2 Totals</b>	<b>23:00</b>	<b>4:00</b>	<b>27:00</b>
<b>Unit 3: Maintenance</b>			
Topic 3-1: Maintaining Low-voltage Electrical Systems			
Lecture	2:00		
Activities		4:00	
<b>Unit 3 Totals</b>	<b>2:00</b>	<b>4:00</b>	<b>6:00</b>
<b>Lecture, Activity, and Unit Totals:</b>	<b>26:00</b>	<b>8:00</b>	<b>34:00</b>



## Emergency Vehicle Technician 1B

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### Course Totals

<b>Segment Type</b>	<b>Time</b>
Total Lecture Time (LT)	26:00
Total Activity Time (AT)	8:00
Total Testing Time (TT)	2:00
<b>Total Course Time</b>	<b>36:00</b>



# Pumps and Accessories (2020)

## Course Plan

### Course Details

<b>Certification:</b>	Emergency Vehicle Technician 1
<b>CTS Guide:</b>	Emergency Vehicle Technician (2020)
<b>Description:</b>	This course provides an overview of the knowledge and skills utilized by an emergency vehicle technician to inspect, maintain, repair, and test pumps and their accessories including the priming system, plumbing and valves, gauges, indicator and warning systems, interlocks, and packing and seals.
<b>Designed For:</b>	The emergency vehicle technician pursuing SFT-certification or anyone seeking an overview of how to inspect, maintain, repair, and test pumps and their accessories
<b>Prerequisites:</b>	Emergency Vehicle Technician 1A: Chassis, Cab, Body, Tank and Accessories
<b>Standard:</b>	Complete all labs, activities, and formative tests. Complete all summative tests with a minimum score of 80%.
<b>Hours:</b>	Lecture: 35:00 Activities: 0:00 Testing: 1:00
<b>Hours (Total):</b>	36:00
<b>Maximum Class Size:</b>	50
<b>Instructor Level:</b>	Primary Instructor
<b>Instructor/Student Ratio:</b>	1:50
<b>Restrictions:</b>	None
<b>SFT Designation:</b>	CFSTES

## Required Resources

### Instructor Resources

To teach this course, instructors need:

- NFPA 1901: Standard for Automotive Fire Apparatus (current edition/ physical copy)
- NFPA 1911: Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus (current edition / physical copy)
- Student Supplement
  - Provided by California Fire Mechanic's Academy, Inc.
- Personal protective equipment (PPE)

### Online Instructor Resources

The following instructor resources are available online at

<https://osfm.fire.ca.gov/divisions/state-fire-training/cfstes-professional-certification/>:

- None

### Student Resources

To participate in this course, students need:

- Access to NFPA 1901: Standard for Automotive Fire Apparatus (current edition)
- Access to NFPA 1911: Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus (current edition)
- Student Supplement
  - Provided by California Fire Mechanic's Academy, Inc.
- Personal protective equipment (PPE)

### Facilities, Equipment, and Personnel

The following facilities, equipment, or personnel are required to deliver this course:

#### Classroom

- Standard classroom equipped for 50 students
- Projector with appropriate laptop connections
- Wifi/Internet access

#### Facilities

- Outdoor space for emergency response vehicle with a clear perimeter for student activities
- Pump test pit

#### Equipment

- Emergency response vehicle with a pump or an apparatus

## Emergency Vehicle Technician 1C

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- Pitot gauge set or flow meter
- Test, calibration, and diagnostic equipment
- Tools required to inspect, maintain, and repair tanks and accessories
- Appropriate safety gear

## Unit 1: Introduction

### Topic 1-1: Orientation and Administration

#### Terminal Learning Objective

At the end of this topic, a student will be able to identify facility and classroom requirements and identify course objectives, events, requirements, assignments, activities, resources, evaluation methods, and participation requirements in the course syllabus.

#### Enabling Learning Objectives

1. Identify facility requirements
  - Restroom locations
  - Food locations
  - Smoking locations
  - Emergency procedures
2. Identify classroom requirements
  - Start and end times
  - Breaks
  - Electronic device policies
  - Special needs and accommodations
  - Other requirements as applicable
3. Review course syllabus
  - Course objectives
  - Calendar of events
  - Course requirements
  - Student evaluation process
  - Assignments
  - Activities
  - Required student resources
  - Class participation requirements

#### Discussion Questions

1. What is a formative test? What is a summative test?

#### Activities

1. To be determined by the instructor

### Topic 1-2: Emergency Vehicle Technician Certification Process

#### Terminal Learning Objective

At the end of this topic, a student will be able to identify different levels in the Emergency Vehicle Technician certification track, the courses and requirements for State Fire Training (SFT) Emergency Vehicle Technician (EVT) certification, and be able to describe the capstone task book and testing process.

# Emergency Vehicle Technician 1C

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## Enabling Learning Objectives

1. Identify the different levels of certification in the Emergency Vehicle Technician (EVT) certification track
  - EVT 1
  - EVT 2
  - EVT 3
2. Identify the courses required for EVT 1
  - State Fire Training
    - Emergency Vehicle Technician 1A: Chassis, Cab, Body, Tank and Accessories (2020)
    - Emergency Vehicle Technician 1B: Electrical Systems A (2020)
    - Emergency Vehicle Technician 1C: Pumps and Accessories (2020)
  - National Institute for Auto Service Excellence (ASE)
    - Gasoline Engines [T1]
    - Diesel Engines [T2]
    - Drive Train [T3]
    - Brakes [T4]
    - Suspension and Steering [T5]
    - Preventative Maintenance Inspections [T8]
  - Brake Inspector Qualification (CFR 396.25) - Department of Transportation (DOT)
3. Identify the courses required for EVT 2
  - State Fire Training
    - Emergency Vehicle Technician 2A: Electrical Systems B (2020)
  - National Institute for Auto Service Excellence (ASE)
    - Gasoline Engines (T1)
    - Diesel Engines (T2)
    - Drive Train (T3)
    - Brakes (T4)
    - Suspension and Steering (T5)
    - Electrical / Electronic Systems (T6)
    - Heating, Ventilation and Air Conditioning (HVAC) (T7)
    - Preventative Maintenance Inspections (T8)
4. Identify the courses required for EVT 3
  - State Fire Training
    - Emergency Vehicle Technician 3A: Human Resource Management / Fleet Specifications and Records (2020)
  - National Institute for Auto Service Excellence (ASE)
    - Gasoline Engines (T1)
    - Diesel Engines (T2)
    - Drive Train (T3)
    - Brakes (T4)
    - Suspension and Steering (T5)

## Emergency Vehicle Technician 1C

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- Electrical / Electronic Systems (T6)
  - Heating, Ventilation and Air Conditioning (HVAC) (T7)
  - Preventative Maintenance Inspections (T8)
5. Identify additional requirements for Emergency Vehicle Technician 1
- Experience (one of the following)
    - Have a minimum of two (2) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or
    - Have a minimum of three (3) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
    - Have a minimum of four (4) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.
6. Identify additional requirements for Emergency Vehicle Technician 2
- Experience (one of the following)
    - Have a minimum of three (3) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or
    - Have a minimum of four (4) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
    - Have a minimum of five (5) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.
7. Identify additional requirements for Emergency Vehicle Technician 3
- Have a minimum of four (4) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or
  - Have a minimum of five (5) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
  - Have a minimum of six (6) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.
8. The following requirements are required for each EVT 1, EVT 2, and EVT 3
- Code of Federal Regulations (CFR) 396.25: Department of Transportation Brake Inspector Qualification

## Emergency Vehicle Technician 1C

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- Successful completion of the Emergency Vehicle Technician Certification Commission (EVTCC) for the respective SFT Level of Certification. This exam is administered by the California Fire Mechanics Academy (CFMA).
9. Describe the task book process
- Complete all prerequisites and course work
  - Submit application and fees and to request task book
    - A candidate may apply for the EVT 1 and EVT 2 task books at the same time (two applications and two fees), but may not submit the EVT 2 task book until he or she receives EVT 1 certification (a prerequisite for EVT 2)
  - Complete all job performance requirements included in the task book
  - Must have identified evaluator verify individual task completion via signature
  - Must have Fire Chief or authorized representative verify task book completion via signature
  - Must be employed by a California Fire Agency in the position prior to submitting completed task book to State Fire Training
10. Complete Continuing Education
- Persons with EVT Certification are required to renew their certification every five years. The recertification requires that the applicant completes 36 hours of approved continuing education (CE) and meet the all prerequisites stated for Recertification Requirements. All recertification applications must be postmarked on or before the certification expiration date. If the certified EVT did not meet all recertification requirements by the expiration date, the EVT Certification is considered to be lapsed.
  - If the EVT Certification lapsed, the applicant will be required to complete 36 hours of CE in addition to the completion of additional CE hours. If the certification lapsed less than 6 months, you can regain EVT Certification by completing an additional 8 hours of approved CE. If the certification lapsed between 6 months and less than 12 months, you can regain EVT Certification by completing an additional 16 hours of approved CE. If the certification lapsed between 12 months and less than 18 months, you can regain EVT Certification by completing an additional 24 hours of approved CE.
  - For lapses, greater than 18 months, the applicant will need to retake all SFT courses listed in the Certification Requirements Education section and reapply for initial EVT certification, which will require the completion of a new Certification Task Book.
11. Complete all formative and summative tests administered during the course deliveries

### Discussion Questions

1. To be determined by the instructor

### Activities

1. To be determined by the instructor



## Instructor Notes

1. SFT teaches most EVT I (inspect and maintain) and EVT II (repair and replace) content together because depending on the size of the agency or shop, there are different expectations of the technician.

## Unit 2: Overview

### Topic 2-1: Terminology

#### Terminal Learning Objective

At the end of this topic, a student, given NFPA 1071 terminology, will be able to define inspection, maintenance, repair, and overhaul (rebuild) in accordance NFPA standards

#### Enabling Learning Objectives

1. Define “inspect(ion)”
  - To determine the condition or operation of a component(s) by comparing its physical, mechanical, and/or electrical characteristics with established standards, recommendations, and requirements through examination by sight, sound, or feel
2. Define “maintenance”
  - The act of servicing a fire apparatus or a component in order to keep the vehicle and its components in proper operating condition
3. Define “repair”
  - To restore to sound condition after failure or damage
4. Define “overhaul (rebuild)”
  - To make extensive repairs in order to restore a component to like-new condition in accordance with the original manufacturer’s specifications

#### Discussion Questions

1. Why is it important to inspect before testing?

#### Activities

1. To be determined by the instructor

**CTS Guide Reference:** None

### Topic 2-2: The Inspection, Maintenance, Repair, and Testing Cycle

#### Terminal Learning Objective

At the end of this topic, a student, given circumstances that initiate the inspection process, safety requirements, and an overview of appropriate facilities and equipment, will be able to describe the cycle of inspecting, maintaining, repairing, testing, diagnostics checks, and documentation of emergency vehicle pumps and tanks in accordance with NFPA standards

#### Enabling Learning Objectives

1. Identify circumstances that initiate the inspection process
  - Acceptance test of new vehicle
  - Meeting manufacturer and/or AHJ inspection cycle
  - Responding to a suspected or reported problem

## Emergency Vehicle Technician 1C

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- Acceptance test of repaired vehicle
- 2. Identify safety requirements
  - Vehicle safety
  - Technician safety
- 3. Identify facilities and equipment
  - Proper location(s) for inspection, maintenance, repair/replace, testing
  - Required tools/equipment
    - Test, calibration, and diagnostic
      - Pitot gauge
      - Flowmeter
      - External test vacuum
      - External pressure gauge
    - Maintenance and repair
- 4. Describe the inspection process
  - Evaluate reported conditions (if applicable)
  - Perform operational checks
    - What if you can't duplicate or validate the concern?
  - Identify and report defects and deficiencies, including broken, loose, worn, or missing parts
  - Complete checklist and document findings
  - Return vehicle to service or move to maintenance or repair
- 5. Describe the maintenance process
  - Evaluate reported conditions
  - Perform operational checks
  - Perform maintenance duties
  - Conduct performance tests
  - Complete checklist and document findings
  - Return vehicle to service or move to repair
- 6. Describe the repair and/or replacement process
  - Evaluate reported conditions
  - Perform operational checks
  - Repair or replace deformed, broken, loose, worn, or missing parts
  - Conduct performance checks
  - Complete checklist and document findings
  - Release to manufacturer or third-party shop for repair (if applicable)
    - Acceptance testing (inspection) on returned/repaired vehicle
    - Complete checklist and document findings
  - Return vehicle to service
- 7. Identify basic record-keeping requirements
  - Regular inspection
  - Static operation
  - Annual service test

## Emergency Vehicle Technician 1C

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- Major engine, transmission, pump, or auxiliary devices calibration, repairs, or parts replacement
- Completed pump service test form

### Discussion Questions

1. Why do pump operations need to be tested?
2. When should you test pump operations?

### Activities

1. Determined by instructor

CTS Guide Reference: None

## Unit 3: Inspection, Maintenance, and Repair

### Topic 3-1: Function, Construction, and Operation

#### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle with a fire pump or an auxiliary pump, wildland pump, ultra-high-pressure, or industrial pump, SOPs, and manufacturer specifications, will be able to describe the function, construction, and operation of fire pumps, auxiliary pumps, primer pumps, and related components, and associated diagnostic checks, in accordance with manufacturer specifications and the authority having jurisdiction (AHJ) requirements

#### Enabling Learning Objectives

1. Identify the function of a pump within an emergency response vehicle
  - Move water
    - Move by volume
    - Move by pressure
2. Identify types of pumps
  - Centrifugal
  - Positive displacement
3. Describe the function, construction, and operation of the pump system
  - Fire Pump (Centrifugal)
    - Impeller
    - Volute
    - Cutwater
    - Clearance rings
    - Shaft
    - Bearings
    - Packing/seals
    - Housing/casing
    - Pump drive
      - Hydraulic
      - PTO (power take off unit)
      - Crankshaft

- Midship
    - Fly wheel
    - Direct engine drive
      - Diesel
      - Gas
    - Single-stage pump
    - Multi-stage pump
      - Transfer valve and controls
  - Auxiliary Pump
    - Impeller
    - Volute
    - Cutwater
    - Clearance rings
    - Shaft
    - Bearings
    - Packing/seals
    - Housing
    - Pump drive
      - Hydraulic
      - PTO (power take off unit)
      - Crankshaft
      - Midship
      - Fly wheel
      - Direct engine drive
        - Diesel
        - Gas
4. Describe the function, construction, and operation of the priming system [(A or B) + C]
- Positive displacement pump
    - Rotary gear
    - Rotary vane
    - Piston
  - Miscellaneous priming systems
    - Air
    - Engine vacuum
    - Engine exhaust
    - Hand primers
      - Piston
      - Diaphragm
  - Priming valve and controls
5. Describe the function, construction, and operation of the plumbing
- Piping system
    - Intake

- Discharge
- Fittings
- Materials
  - Static
    - Stainless steel
    - Steel
    - Galvanized steel
    - Brass
    - Copper tube
  - Flexible
    - Braided line
    - PVC/poly
    - Rubber
- Hoses
  - Steel braid
  - Poly
- 6. Describe the function, construction, and operation of the valves
  - Circulating valve
  - Booster line cooling valve
  - Ball-type valve
  - Gate valve
  - Butterfly valve
  - Drain valve
  - Bleeder valve
  - Transfer valve
  - Check valve
  - Thermal valve
  - Indirect cooling valve
  - Valve actuators
    - Push/pull (manual) handle
    - Hydraulic
    - Pneumatic
    - Electric
    - Manual rotary/crank
  - Pressure control devices
    - Internal and/or external relief valve
    - Engine governor
    - Controlled manually or electronically
  - Valve operation
    - Manual
    - Air
    - Water

- Electric
- Valve parts
  - Housing
  - Actuator
  - O-rings
  - Ball or butterfly/keystone
  - Seals
- 7. Describe the function, construction, and operation of the gauges
  - Engine
  - Oil
  - Water temperature
  - Volts
  - Vacuum
  - Pressure
  - Water level
  - Tachometer
  - Individual pressure gauges
- 8. Describe the function, construction, and operation of the indicator/warning systems
  - Audible
  - Visual
- 9. Describe the function, construction, and operation of the interlocks
  - Park/Brake
  - Transmission Neutral interlock/pump shift
- 10. Describe the function, construction, and operation of the packing
  - Adjustable
    - Rope
    - Pellets
  - Mechanical
    - Non-adjustable
- 11. Describe the function, construction, and operation of the seals
  - Gear box
  - Valve

### Discussion Questions

1. What is the purpose of a primer?
2. What is the purpose of the anodes?

### Activities

1. Determined by instructor

**CTS Guide Reference:** CTS 5-1 / CTS 5-2 / CTS 5-3

## Topic 3-2: Pump System

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle with a fire pump or an auxiliary pump, wildland pump, ultra-high-pressure, or industrial pump, SOPs, manufacturer specifications, an inspection checklist, a maintenance checklist (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment will be able to inspect and perform maintenance and repairs on fire pumps and auxiliary pumps so that the security of the mounting of all system components (e.g., primer pump, plumbing and valves, pressure control devices, gauges) is verified; operation and condition of the system components, warning system, and interlocks are verified to be within manufacturer specifications; adjustments are made where required; fluids are at recommended levels; leaks and fluid contamination are identified and reported; recommended lubricants are applied; all checklist items are inspected; defective and deficient components are diagnosed; additional repair needs are reported; deformed, broken, loose, worn, or missing parts are identified and reported and then repaired, replaced, or rebuilt to manufacturer specifications; all packing and seals are adjusted to specification; hoses, valves, and fittings are in good condition and free of leaks; indicator lights are operational and electrical connections are clean and tight; instrumentation is operational; controls are adjusted, lubricated, and operational; the system's operational condition is preserved or restored; operational and service tests are conducted and performance is verified; and inspection, tests, repairs, and diagnostic checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. Identify types of defects, deficiencies, and potential problems associated with fire pumps, auxiliary pumps, and related components
  - Engagement
    - Full input speed and power to impeller
    - Correct transmission range
  - Restricted intake/discharge
    - Debris clogs
    - Hose collapse
    - Valve not fully open/closed
  - Low pressure/flow
    - Incorrect pressure control device settings
    - Air/vacuum leaks
    - Damaged impeller
    - Worn clearance ring
    - Worn shaft
  - Priming pump
    - Vent plugged
    - Out of oil
    - Worn primer shaft
  - Auxiliary input drives

- Power take off
  - Auxiliary engine
  - Electric driven
  - Cavitation
    - Sounds
    - Gauge readings
    - Potential damage
  - Suction/friction lift loss (impacted by elevation)
2. Describe the inspection, diagnostic, and repair procedures of the manufacturer and the authority having jurisdiction
  3. Describe how to select test, calibration, and diagnostic equipment
  4. Identify types, grades, and viscosity of lubricating oils
    - Per manufacturer specifications
    - Primary pump oils
      - Automatic transmission fluid
      - 80w – 140 gear oil
      - hydraulic fluid
  5. Describe packing and seal adjustment and replacement methods and procedures
  6. Describe sacrificial anode replacement procedure and schedules
  7. Describe principles of pressure control devices
  8. Describe troubleshooting procedures
  9. Describe overhaul procedures
    - Drain pump
    - Remove drive shafts
    - Remove transfer case
    - Remove plumbing, cooling, and gauge lines/hoses/fittings
    - Remove front and rear impeller shaft support and bearings/bushings
    - Remove shell casing (as needed)
    - Remove impeller shaft assembly
    - Remove wear ring
    - Repair or replace damaged or defective parts as needed to manufacturer specifications
    - Reassemble per manufacturer specifications
  10. Describe operational and service testing procedure and requirements
  11. Identify inspection, maintenance, and repair record-keeping requirements
  12. Recognize and identify symptoms and conditions of fire pumps and auxiliary pumps
  13. Recognize characteristics of fluid contamination
  14. Determine defects and deficiencies
  15. Identify and evaluate reported conditions
  16. Use test, calibration, and diagnostic equipment
  17. Perform all required maintenance (including checklist items)
  18. Perform all required repairs to resolve deficiencies



19. Perform operational checks
20. Perform hydraulic flow calculations
21. Complete inspection, maintenance, repair checklists, and diagnostic checks and performance test systems and complete required documentation

### Discussion Questions

1. How do you check for water in the transfer case?
2. How does water get into the transfer case?
3. What is a stripping edge?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the pump system, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 5-1 / CTS 5-2 / CTS 5-3

## Topic 3-3: Priming System

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle with a fire pump or an auxiliary pump, wildland pump, ultra-high-pressure, or industrial pump, SOPs, manufacturer specifications, an inspection checklist, a maintenance checklist (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment will be able to inspect and perform maintenance and repairs on the priming system and related components so that the security of the mounting of all system components is verified; operation and condition of the system components are verified to be within manufacturer specifications; adjustments are made where required; fluids are at recommended levels; leaks and fluid contamination are identified and reported; recommended lubricants are applied; all checklist items are inspected; defective and deficient components are diagnosed; additional repair needs are reported; deformed, broken, loose, worn, or missing parts are identified and reported and then repaired, replaced, or rebuilt to manufacturer specifications; all packing and seals are adjusted to specification; hoses, valves, and fittings are in good condition and free of leaks; indicator lights are operational and electrical connections are clean and tight; instrumentation is operational; controls are adjusted, lubricated, and operational; the system's operational condition is preserved or restored; operational and service tests are conducted and performance is verified; and inspection, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. Identify types of defects, deficiencies, and potential problems associated with priming system and related components
2. Describe the inspection, diagnostic, and repair procedures of the manufacturer and the authority having jurisdiction

3. Describe how to select test, calibration, and diagnostic equipment
4. Identify types, grades, and viscosity of lubricating oils
5. Describe packing and seal adjustment and replacement methods and procedures
6. Describe sacrificial anode replacement procedure and schedules
7. Describe principles of pressure control devices
8. Describe troubleshooting procedures
9. Describe overhaul procedures
10. Describe operational and service testing procedure and requirements
11. Identify inspection, maintenance, and repair record-keeping requirements
12. Recognize and identify symptoms and conditions of priming system and related components
13. Recognize characteristics of fluid contamination
14. Determine defects and deficiencies
15. Identify and evaluate reported conditions
16. Use test, calibration, and diagnostic equipment
17. Perform all required maintenance (including checklist items)
18. Perform all required repairs to resolve deficiencies
19. Perform operational tests and diagnostic checks
20. Complete inspection, maintenance, and repair checklists and documentation

### Discussion Questions

1. For how long should you operate the primer meter?
2. What components make up a primer system?
  - What do the different components do?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the priming system, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 5-1 / CTS 5-2 / CTS 5-3

## Topic 3-4: Plumbing and Valves

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle with a fire pump or an auxiliary pump, wildland pump, ultra-high-pressure, or industrial pump, SOPs, manufacturer specifications, an inspection checklist, a maintenance checklist (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment will be able to inspect and perform maintenance and repairs on plumbing and valves and related component so that the security of the mounting of all system components is verified; operation and condition of the system components are verified to be within manufacturer specifications; adjustments are made where required; all checklist items are inspected; defective and deficient components are diagnosed; additional repair needs are reported; deformed, broken, loose,

## Emergency Vehicle Technician 1C

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worn, or missing parts are identified and reported and then repaired, replaced, or rebuilt to manufacturer specifications; hoses, valves, and fittings are in good condition and free of leaks; indicator lights are operational and electrical connections are clean and tight; instrumentation is operational; controls are adjusted, lubricated, and operational; the system's operational condition is preserved or restored; operational and service tests are conducted and performance is verified; and inspection, tests, repairs, and diagnostic checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. Identify types of defects, deficiencies, and potential problems associated with plumbing and valves
2. Describe the inspection, diagnostic, and repair procedures of the manufacturer and the authority having jurisdiction
3. Describe how to select test, calibration, and diagnostic equipment
4. Identify types, grades, and viscosity of lubricating oils
5. Describe packing and seal adjustment and replacement methods and procedures
6. Describe sacrificial anode replacement procedure and schedules
7. Describe principles of pressure control devices
8. Describe troubleshooting procedures
9. Describe overhaul procedures
  -
10. Describe operational and service testing procedure and requirements
11. Identify inspection, maintenance, and repair record-keeping requirements
12. Recognize and identify symptoms and conditions of plumbing and valves
13. Recognize characteristics of fluid contamination
14. Determine defects and deficiencies
15. Identify and evaluate reported conditions
16. Use test, calibration, and diagnostic equipment
17. Perform all required maintenance (including checklist items)
18. Perform all required repairs to resolve deficiencies
19. Perform operational tests
20. Perform hydraulic flow calculations
21. Complete inspection, maintenance, and repair checklists and documentation

### Discussion Questions

1. Why do you need to exercise the valves?
2. How do you find leaky valves?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the plumbing and valves, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 5-1 / CTS 5-2 / CTS 5-3

### Topic 3-5: Gauges

#### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle with a fire pump or an auxiliary pump, wildland pump, ultra-high-pressure, or industrial pump, SOPs, manufacturer specifications, an inspection checklist, a maintenance checklist (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment will be able to inspect and perform maintenance and repairs on gauges and related components so that the security of the mounting of all system components is verified; operation and condition of the system components are verified to be within manufacturer specifications; adjustments are made where required; fluids are at recommended levels; leaks and fluid contamination are identified and reported; recommended lubricants are applied; all checklist items are inspected; defective and deficient components are diagnosed; additional repair needs are reported; deformed, broken, loose, worn, or missing parts are identified and reported and then repaired, replaced, or rebuilt to manufacturer specifications; all packing and seals are adjusted to specification; hoses, valves, and fittings are in good condition and free of leaks; the system's operational condition is preserved or restored; operational and service tests are conducted and performance is verified; and inspection, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

#### Enabling Learning Objectives

1. Identify types of defects, deficiencies, and potential problems associated with gauges
2. Describe the inspection, diagnostic, and repair procedures of the manufacturer and the authority having jurisdiction
3. Describe how to select test, calibration, and diagnostic equipment
4. Identify types, grades, and viscosity of lubricating oils
5. Describe troubleshooting procedures
6. Describe overhaul procedures
7. Describe operational and service testing procedure and requirements
8. Identify inspection, maintenance, and repair record-keeping requirements
9. Recognize and identify symptoms and conditions of gauges
10. Recognize characteristics of fluid contamination
11. Determine defects and deficiencies
12. Identify and evaluate reported conditions
13. Use test, calibration, and diagnostic equipment
14. Perform all required maintenance (including checklist items)
15. Perform all required repairs to resolve deficiencies
16. Perform operational tests
17. Complete inspection, maintenance, and repair checklists and documentation

### Discussion Questions

1. If a dampened gauge leaks, does the vehicle go out of service?
2. Can gauges be calibrated?
  - Why or why not?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the gauges, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 5-1 / CTS 5-2 / CTS 5-3

## Topic 3-6: Indicator/Warning Systems

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle with a fire pump or an auxiliary pump, wildland pump, ultra-high-pressure, or industrial pump, SOPs, manufacturer specifications, an inspection checklist, a maintenance checklist (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment will be able to inspect and perform maintenance and repairs on interlock/warning systems and related components so that the security of the mounting of all system components is verified; operation and condition of the system components are verified to be within manufacturer specifications; adjustments are made where required; all checklist items are inspected; defective and deficient components are diagnosed; additional repair needs are reported; deformed, broken, loose, worn, or missing parts are identified and reported and then repaired, replaced, or rebuilt to manufacturer specifications; indicator lights are operational and electrical connections are clean and tight; instrumentation is operational; controls are adjusted, lubricated, and operational; the system's operational condition is preserved or restored; operational and service tests are conducted and performance is verified; and inspection, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. Identify types of defects, deficiencies, and potential problems associated with interlock/warning systems
2. Describe the inspection, diagnostic, and repair procedures of the manufacturer and the authority having jurisdiction
3. Describe how to select test, calibration, and diagnostic equipment
4. Describe troubleshooting procedures
5. Describe overhaul procedures
6. Describe operational and service testing procedure and requirements
7. Identify inspection, maintenance, and repair record-keeping requirements
8. Recognize and identify symptoms and conditions of interlock/warning systems
9. Determine defects and deficiencies

10. Identify and evaluate reported conditions
11. Use test, calibration, and diagnostic equipment
12. Perform all required maintenance (including checklist items)
13. Perform all required repairs to resolve deficiencies
14. Perform operational tests
15. Complete inspection, maintenance, and repair checklists and documentation

### Discussion Questions

1. What is the purpose of the different warning devices in the pump system?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the indicator/warning systems, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 5-1 / CTS 5-2 / CTS 5-3

## Topic 3-7: Interlocks

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle with a fire pump or an auxiliary pump, wildland pump, ultra-high-pressure, or industrial pump, SOPs, manufacturer specifications, an inspection checklist, a maintenance checklist (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment will be able to inspect and perform maintenance and repairs on interlocks and related components so that the security of the mounting of all system components is verified; operation and condition of the system components are verified to be within manufacturer specifications; adjustments are made where required; all checklist items are inspected; defective and deficient components are diagnosed; additional repair needs are reported; deformed, broken, loose, worn, or missing parts are identified and reported and then repaired, replaced, or rebuilt to manufacturer specifications; the system's operational condition is preserved or restored; operational and service tests are conducted and performance is verified; and inspection, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. Identify types of defects, deficiencies, and potential problems associated with interlocks
2. Describe the inspection, diagnostic, and repair procedures of the manufacturer and the authority having jurisdiction
3. Describe how to select test, calibration, and diagnostic equipment
4. Describe troubleshooting procedures
5. Describe overhaul procedures
6. Describe operational and service testing procedure and requirements
7. Identify inspection, maintenance, and repair record-keeping requirements

## Emergency Vehicle Technician 1C

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8. Recognize and identify symptoms and conditions of interlocks
9. Determine defects and deficiencies
10. Identify and evaluate reported conditions
11. Use test, calibration, and diagnostic equipment
12. Perform all required maintenance (including checklist items)
13. Perform all required repairs to resolve deficiencies
14. Perform operational tests
15. Complete inspection, maintenance, and repair checklists and documentation

### Discussion Questions

1. Do defective interlocks put a vehicle out of service?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the interlocks, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 5-1 / CTS 5-2 / CTS 5-3

## Topic 3-8: Packing and Seals

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle with a fire pump or an auxiliary pump, wildland pump, ultra-high-pressure, or industrial pump, SOPs, manufacturer specifications, an inspection checklist, a maintenance checklist (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment will be able to inspect and perform maintenance and repairs on packing and seals and related components so that the security of the mounting of all system components is verified; operation and condition of the system components are verified to be within manufacturer specifications; adjustments are made where required; fluids are at recommended levels; leaks and fluid contamination are identified and reported; recommended lubricants are applied; all checklist items are inspected; defective and deficient components are diagnosed; additional repair needs are reported; deformed, broken, loose, worn, or missing parts are identified and reported and then repaired, replaced, or rebuilt to manufacturer specifications; all packing and seals are adjusted to specification; the system's operational condition is preserved or restored; operational and service tests are conducted and performance is verified; and inspection, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. Identify types of defects, deficiencies, and potential problems associated with packing and seals
2. Describe the inspection, diagnostic, and repair procedures of the manufacturer and the authority having jurisdiction
  - Mechanical seal = no maintenance, always replaced

## Emergency Vehicle Technician 1C

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- Adjustable packing = maintain and repair per manufacturer specifications
- 3. Describe how to select test, calibration, and diagnostic equipment
- 4. Identify types, grades, and viscosity of lubricating oils
- 5. Describe troubleshooting procedures
- 6. Describe overhaul procedures
- 7. Describe operational and service testing procedure and requirements
- 8. Identify inspection, maintenance, and repair record-keeping requirements
- 9. Recognize and identify symptoms and conditions of packing and seals
- 10. Recognize characteristics of fluid contamination
- 11. Determine defects and deficiencies
- 12. Identify and evaluate reported conditions
- 13. Use test, calibration, and diagnostic equipment
- 14. Perform all required maintenance (including checklist items)
- 15. Perform all required repairs to resolve deficiencies
- 16. Perform operational tests
- 17. Complete inspection, maintenance, and repair checklists and documentation

### Discussion Questions

1. What different are the ways to seal a pump system?
2. Should pump seals leak?
  - Why or why not?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the packing and seals, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 5-1 / CTS 5-2 / CTS 5-3



## Unit 4: Testing

### Topic 4-1: Testing

#### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle with a fire pump or auxiliary pump, wildland pump, ultra-high-pressure, or industrial pump, and related components, manufacturer specifications, SOPs, facilities, tools, and test, calibration, and diagnostic equipment, will be able to complete performance testing on fire pumps and related components in accordance with NFPA 1911 so that the pump/engine combination, and pumping systems, is capable of meeting the performance requirements of the original certification without exceeding 110 per cent of the original certification test rpm; and all testing is documented in accordance with the procedures of NFPA standards and the authority having jurisdiction (AHJ)

#### Enabling Learning Objectives

1. Describe operational and performance testing procedures and requirements
  - Apply parking brakes, put vehicle in neutral, and chock wheels
  - Engage pump
  - Direct drive and auxiliary pump procedures per manufacturer specifications
  - Reverse procedure to disengage pump
  - Prime until attaining positive discharge pressure
  - Maintain water supply
    - Draft
    - Tank
    - Hydrant
  - Adjust discharge pressure using input RPM and valve control
  - Set pressure control device
    - Relief valve
    - Pressure governor
2. Describe how to select test, calibration, and diagnostic equipment
3. Describe safety procedures
4. Describe diagnostic checking and performance testing procedures
5. Describe hydraulic flow calculations
6. Identify testing record-keeping requirements
7. Conduct fire pump performance tests
8. Use test, calibration, and diagnostic equipment
9. Identify defects and deficiencies
10. Perform hydraulic flow calculations
11. Complete required documentation

#### Discussion Questions

1. How do you “engage” pump mode?
2. Do you inspect prior to testing pump test?

## Emergency Vehicle Technician 1C

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### Activities

1. Determined by instructor

### Instructor Notes

1. There are 9 hours allotted to this topic to enable every student to perform at least a portion of a full NFPA 1911 pump test.

**CTS Guide Reference:** CTS 5-6

## Emergency Vehicle Technician 1C

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### Time Table

Segment	Lecture Time	Activity Time	Total Unit Time
<b>Unit 1: Introduction</b>			
Topic 1-1: Orientation and Administration			
Lecture	0:30		
Activity 1-1: Determined by instructor		0:00	
Topic 1-2: Emergency Vehicle Certification Process			
Lecture	0:30		
Activity 1-2: Determined by instructor		0:00	
<b>Unit 1 Totals</b>	<b>1:00</b>	<b>0:00</b>	<b>1:00</b>
<b>Unit 2: Overview</b>			
Topic 2-1: Terminology			
Lecture	0:10		
Activity 2-1: Determined by instructor		0:00	
Topic 2-2: The Inspection, Maintenance, Repair, and Testing Cycle			
Lecture	0:20		
Activity 2-2: Determined by instructor		0:00	
<b>Unit 2 Totals</b>	<b>0:30</b>	<b>0:00</b>	<b>0:30</b>
<b>Unit 3: Inspection, Maintenance, and Repair</b>			
Topic 3-1: Function, Construction, and Operation			
Lecture	12:00		
Activity 3-1: Determined by instructor		0:00	
Topic 3-2: Pump System			
Lecture	8:00		
Activity 3-2: Determined by instructor		0:00	
Topic 3-3: Priming System			
Lecture	1:00		
Activity 3-3: Determined by instructor		0:00	
Topic 3-4: Plumbing and Valves			
Lecture	1:00		
Activity 3-4: Determined by instructor		0:00	
Topic 3-5: Gauges			
Lecture	0:30		
Activity 3-5: Determined by instructor		0:00	
Topic 3-6: Indicator/Warning Systems			

## Emergency Vehicle Technician 1C

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Segment	Lecture Time	Activity Time	Total Unit Time
Lecture	0:30		
Activity 3-6: Determined by instructor		0:00	
Topic 3-7: Interlocks			
Lecture	1:00		
Activity 3-7: Determined by instructor		0:00	
Topic 3-8: Packing and Seals			
Lecture	0:30		
Activity 3-8: Determined by instructor		0:00	
<b>Unit 3 Totals</b>	<b>24:30</b>	<b>0:00</b>	<b>24:30</b>
<b>Unit 4: Testing</b>			
Topic 4-1: Testing			
Lecture	9:00		
Activity 4-1: Determined by instructor		0:00	
<b>Unit 4 Totals</b>	<b>9:00</b>	<b>0:00</b>	<b>9:00</b>
<b>Lecture, Activity, and Unit Totals:</b>	<b>35:00</b>	<b>0:00</b>	<b>35:00</b>

### Course Totals

Segment Type	Time
Total Lecture Time (LT)	35:00
Total Activity Time (AT)	0:00
Total Testing Time (TT)	1:00
<b>Total Course Time</b>	<b>36:00</b>

### Testing Electrical Systems and Electrical Controls

#### Activity 2-2

**Format:** Small Group (3-5 students)

**Time Frame:**

- 1:30 (chassis voltage systems, parasitic loads, individual circuit loads)
- 3:00 (5-volt reference circuits)

**Description**

This activity provides students with an opportunity to use test, calibration, and diagnostic equipment; measure voltage, amperage, and resistance; operate and test systems, distinguish defects and deficiencies; perform electrical calculations; and recommend required repairs to resolve deficiencies on low-voltage electrical systems and electronic controls and instrumentation.

**Materials**

- Activity sheet
- Pen/pencil
- Emergency response vehicle
- DVOM
- Ammeter
- Fuse-resistance chart

**Instructions**

1. For each table below, complete the diagnostic measurements and the document whether you would repair or replace the component/system.
2. Share your findings with the class.

**Instructor Notes (Delete before printing student copies)**

1. Before distributing the Activity 3-1 to the students, complete column 3 (Acceptable Range) based on specifications for the vehicle used for the activity.
2. For each sensor, component, or system tested, describe any characteristics that would indicate failed or faulty parts or other operational deficiencies.

## Chassis Voltage Systems

Using a DVOM, complete and document diagnostic measurements on **chassis voltage systems**.

**Chassis Voltage Systems**

Sensor, Component, or System to test	Acceptable Range	Actual Reading	Recommended Action
Relay system			
Solenoid system			
Lighting system			
Starting system			
Charging system			
DC motor system			
Warning system			

## Parasitic Loads

Using a DVOM and ammeter, complete and document diagnostic measurements for **parasitic loads**:

- Agency-added: flashlights, radio chargers, computer chargers, EMS equipment, etc.
- Vehicle-based: onboard computers, lights, keep-alive memories, etc.

### Vehicle-based Parasitic Loads

Time	Acceptable Range	Actual Reading	Recommended Action
5 minutes			
10 minutes			
15 minutes			

### Agency-added Parasitic Loads

Time	Acceptable Range	Actual Reading	Recommended Action
5 minutes			
10 minutes			
15 minutes			

## Individual Circuit Loads

Use fuse voltage drop to determine individual circuit loads.

- Using a DVOM, measure voltage drop at the fuse for the circuit being tested
- Using a fuse-resistance chart, determine the resistance of the specific fuse
- Using Ohm's law, calculate amperage per circuit

**Individual Circuit Loads**

Circuit/System	Acceptable Range	Actual Reading	Resistance	Amperage per Circuit



## 5-volt Reference Circuits

Using a DVOM, complete and document diagnostic measurements on 5-volt reference circuits.

5-volt Reference Circuit

Sensor, Component, or System to Test	Acceptable Range	Actual Reading	Recommended Action
Throttle position sensor			
Manifold absolute pressure sensor			
Mass airflow sensor			
Intake air temperature sensor			
Coolant temperature sensor			
Oxygen sensor			



# Electrical Systems B (2020)

## Course Plan

### Course Details

<b>Certification:</b>	Emergency Vehicle Technician 2
<b>CTS Guide:</b>	Emergency Vehicle Technician (2020)
<b>Description:</b>	This course provides an overview of the knowledge and skills needed to repair low-voltage electrical systems, and inspect, maintain, and repair electronic controls and instrumentation in emergency vehicles
<b>Designed For:</b>	The SFT-certified Emergency Vehicle Technician (EVT) 1 advancing to EVT 2 or anyone seeking an overview of electronic controls and instrumentation
<b>Prerequisites:</b>	Emergency Vehicle Technician 1D: Electrical Systems A
<b>Standard:</b>	Complete all activities and formative tests. Complete all summative tests with a minimum score of 80%.
<b>Hours:</b>	Lecture: 19:00 Activities: 15:00 Testing: 2:00
<b>Hours (Total):</b>	36:00
<b>Maximum Class Size:</b>	20
<b>Instructor Level:</b>	Primary
<b>Instructor/Student Ratio:</b>	1/20
<b>Restrictions:</b>	Increasing class size requires an additional qualified instructor
<b>SFT Designation:</b>	CFSTES

## Emergency Vehicle Technician 2A

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### Instructor Resources

To teach this course, instructors need:

- *Medium/Heavy Duty Truck Electricity and Electronics* (1<sup>st</sup> edition)
  - Classroom manual and shop manual
  - Author: Sulev Oun
  - ISBN 13: 978-0827370067
  - One copy of each item per student + a personal copy for the instructor
- Student Supplement
  - Provided by California Fire Mechanics Academy, Inc.
- Personal protective equipment (PPE)

### Online Instructor Resources

The following instructor resources are available online at

<https://osfm.fire.ca.gov/divisions/state-fire-training/cfstes-professional-certification/>:

- Activity 2-2: Testing Electrical Systems and Electronic Controls

### Student Resources

To participate in this course, students need:

- *Medium/Heavy Duty Truck Electricity and Electronics* (1<sup>st</sup> edition)
  - Classroom manual and shop manual
  - Author: Sulev Oun
  - ISBN 13: 978-0827370067
  - Provided by instructor for in-class use
- Student Supplement
  - Provided by California Fire Mechanics Academy, Inc.
- Personal protective equipment (PPE)
  - Student must bring to class
- Digital multimeter (DVOM)
  - Student must bring to class

### Facilities, Equipment, and Personnel

The following facilities, equipment, or personnel are required to deliver this course:

Facilities

- Standard classroom equipped for 20 students
- Projector with appropriate laptop connections
- Wifi/Internet access
- Outdoor space for emergency response vehicle with a clear perimeter for student activities

## Emergency Vehicle Technician 2A

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### Equipment

- Emergency response vehicle
- Schematics
  - Digital or physical
  - Must correspond to an onsite emergency response vehicle
- Low-voltage electrical systems (test, calibration, and diagnostic equipment, and tools)
  - Digital voltmeter (DVOM)
  - Ammeter
  - Battery testers
  - Power probes / powered test lights
  - Test lights
  - Test leads
  - Digital storage oscilloscopes (DSO)
  - Scanners
  - Relay substitution device
  - Soldering equipment
  - Crimping equipment
  - Remote start switches
  - Remote power supplies
  - Wire strippers
- Electronic controls and instrumentation (test, calibration, and diagnostic equipment, and tools)
  - Working alternator model
  - Working starter model
  - Working multiplex model
- Activity 2-1
  - Four different solenoids (at least four sets of each)
  - DVOM
  - Power Probe™ or jumper test lead
- Activity 2-2: Testing Electrical Systems and Electronic Controls
  - DVOM
  - Ammeter
  - Fuse-resistance chart

### Unit 1: Introduction

#### Topic 1-1: Orientation and Administration

##### Terminal Learning Objective

At the end of this topic, a student will be able to identify facility and classroom requirements and identify course objectives, events, requirements, assignments, activities, resources, evaluation methods, and participation requirements in the course syllabus.

##### Enabling Learning Objectives

1. Identify facility requirements
  - Restroom locations
  - Food locations
  - Smoking locations
  - Emergency procedures
2. Identify classroom requirements
  - Start and end times
  - Breaks
  - Electronic device policies
  - Special needs and accommodations
  - Other requirements as applicable
3. Review course syllabus
  - Course objectives
  - Calendar of events
  - Course requirements
  - Student evaluation process
  - Assignments
  - Activities
  - Required student resources
  - Class participation requirements

##### Discussion Questions

1. What is a formative test? What is a summative test?

##### Activities

1. To be determined by the instructor.

#### Topic 1-2: Emergency Vehicle Technician Certification Process

##### Terminal Learning Objective

At the end of this topic, a student will be able to identify different levels in the Emergency Vehicle Technician certification track, the courses and requirements for State Fire Training (SFT) Emergency Vehicle Technician (EVT) certification, and be able to describe the capstone task book and testing process.

## Emergency Vehicle Technician 2A

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### Enabling Learning Objectives

1. Identify the different levels of certification in the Emergency Vehicle Technician (EVT) certification track
  - EVT 1
  - EVT 2
  - EVT 3
2. Identify the courses required for EVT 1
  - State Fire Training
    - Emergency Vehicle Technician 1A: Chassis, Cab, Body, Tank and Accessories (2020)
    - Emergency Vehicle Technician 1B: Electrical Systems A (2020)
    - Emergency Vehicle Technician 1C: Pumps and Accessories (2020)
  - National Institute for Auto Service Excellence (ASE)
    - Gasoline Engines [T1]
    - Diesel Engines [T2]
    - Drive Train [T3]
    - Brakes [T4]
    - Suspension and Steering [T5]
    - Preventative Maintenance Inspections [T8]
  - Brake Inspector Qualification (CFR 396.25) - Department of Transportation (DOT)
3. Identify the courses required for EVT 2
  - State Fire Training
    - Emergency Vehicle Technician 2A: Electrical Systems B (2020)
  - National Institute for Auto Service Excellence (ASE)
    - Gasoline Engines (T1)
    - Diesel Engines (T2)
    - Drive Train (T3)
    - Brakes (T4)
    - Suspension and Steering (T5)
    - Electrical / Electronic Systems (T6)
    - Heating, Ventilation and Air Conditioning (HVAC) (T7)
    - Preventative Maintenance Inspections (T8)
4. Identify the courses required for EVT 3
  - State Fire Training
    - Emergency Vehicle Technician 3A: Human Resource Management / Fleet Specifications and Records (2020)
  - National Institute for Auto Service Excellence (ASE)
    - Gasoline Engines (T1)
    - Diesel Engines (T2)
    - Drive Train (T3)
    - Brakes (T4)
    - Suspension and Steering (T5)

## Emergency Vehicle Technician 2A

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- Electrical / Electronic Systems (T6)
  - Heating, Ventilation and Air Conditioning (HVAC) (T7)
  - Preventative Maintenance Inspections (T8)
5. Identify additional requirements for Emergency Vehicle Technician 1
- Experience (one of the following)
    - Have a minimum of two (2) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or
    - Have a minimum of three (3) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
    - Have a minimum of four (4) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.
6. Identify additional requirements for Emergency Vehicle Technician 2
- Experience (one of the following)
    - Have a minimum of three (3) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or
    - Have a minimum of four (4) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
    - Have a minimum of five (5) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.
7. Identify additional requirements for Emergency Vehicle Technician 3
- Have a minimum of four (4) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or
  - Have a minimum of five (5) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
  - Have a minimum of six (6) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.
8. The following requirements are required for each EVT 1, EVT 2, and EVT 3
- Code of Federal Regulations (CFR) 396.25: Department of Transportation Brake Inspector Qualification

## Emergency Vehicle Technician 2A

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- Successful completion of the Emergency Vehicle Technician Certification Commission (EVTCC) for the respective SFT Level of Certification. This exam is administered by the California Fire Mechanics Academy (CFMA).
9. Describe the task book process
- Complete all prerequisites and course work
  - Submit application and fees and to request task book
    - A candidate may apply for the EVT 1 and EVT 2 task books at the same time (two applications and two fees), but may not submit the EVT 2 task book until he or she receives EVT 1 certification (a prerequisite for EVT 2)
  - Complete all job performance requirements included in the task book
  - Must have identified evaluator verify individual task completion via signature
  - Must have Fire Chief or authorized representative verify task book completion via signature
  - Must be employed by a California Fire Agency in the position prior to submitting completed task book to State Fire Training
10. Complete Continuing Education
- Persons with EVT Certification are required to renew their certification every five years. The recertification requires that the applicant completes 36 hours of approved continuing education (CE) and meet the all prerequisites stated for Recertification Requirements. All recertification applications must be postmarked on or before the certification expiration date. If the certified EVT did not meet all recertification requirements by the expiration date, the EVT Certification is considered to be lapsed.
  - If the EVT Certification lapsed, the applicant will be required to complete 36 hours of CE in addition to the completion of additional CE hours. If the certification lapsed less than 6 months, you can regain EVT Certification by completing an additional 8 hours of approved CE. If the certification lapsed between 6 months and less than 12 months, you can regain EVT Certification by completing an additional 16 hours of approved CE. If the certification lapsed between 12 months and less than 18 months, you can regain EVT Certification by completing an additional 24 hours of approved CE.
  - For lapses, greater than 18 months, the applicant will need to retake all SFT courses listed in the Certification Requirements Education section and reapply for initial EVT certification, which will require the completion of a new Certification Task Book.
11. Complete all formative and summative tests administered during the course deliveries

### Discussion Questions

1. To be determined by the instructor

### Activities

1. To be determined by the instructor



### Instructor Notes

1. SFT teaches most EVT I (inspect and maintain) and EVT II (repair and replace) content together because depending on the size of the agency or shop, there are different expectations of the technician.

## Unit 2: Low-voltage Electrical Systems

### Topic 2-1: Repairing Low-voltage Electrical Systems

#### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, manufacturer specifications, an assignment or inspection report detailing a deficiency or deformation, SOPs, test, calibration, and diagnostic equipment, and tools, will be able to perform repairs on low-voltage electrical system components so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts are repaired, replaced, or rebuilt to manufacturer specifications; charging systems, starting systems, lighting systems, electrical accessories, and other electrical systems are returned to operation; correct test equipment is used; hazards are avoided; correct parts are used; diagnostic checks are conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

#### Enabling Learning Objectives

1. Describe the theory of electricity
2. Describe the function, construction, and operation of starting motors, alternators, and accessory electric motors, relays, solenoids, and regulators
3. Describe repair and overhaul procedures
4. Describe operational, diagnostic, and performance tests
5. Describe adjustment and calibration procedures
6. Describe how to select test, calibration, and diagnostic equipment
7. Identify common defects
8. Describe electrical troubleshooting procedures
9. Identify record-keeping requirements
10. Describe the diagnostic and repair procedures of the manufacturer and the AHJ
11. Recognize, evaluate, and identify reported conditions
12. Perform required repairs to resolve deficiencies
13. Use test, calibration, and diagnostic equipment
14. Measure voltage, amperage, and resistance
15. Distinguish defects and deficiencies
16. Operate and test system
17. Perform electrical calculations
18. Complete required documentation

#### Discussion Questions

1. What type of electrical problems have you experienced with your fleet?
  - How did you resolve them?

## Emergency Vehicle Technician 2A

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2. What does a digital multimeter measure?
  - What does a DVOM not measure?
3. What high-voltage safety concerns must you address when working with electrical systems?
4. What is the difference between a relay and a solenoid?
  - How would you confirm whether you had an intermittent duty or continuous duty solenoid?

### Activities

1. Given at least four different solenoids, a DVOM, and a Power Probe™ or jumper test lead, have students determine the following for each solenoid:
  - Is it good?
  - How would it work?
  - Is it intermittent duty or continuous duty?

### Instructor Notes

1. Topic 2-1 is a review of Emergency Vehicle Technician 1D: Electrical Systems A (units 2 and 3)

**CTS Guide Reference:** CTS 8-1

## Topic 2-2: Testing Low-voltage Electrical Systems

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, manufacturer specifications, SOPs, test, calibration, and diagnostic equipment, and tools, will be able to complete performance testing on low-voltage electrical system components including batteries, charging systems, starting systems, electrical loads, solenoids, and relay devices in accordance with NFPA 1911 so that components are performance tested to assure they are operating in accordance with manufacturer specifications and NFPA standards; performance tests are conducted to verify that repairs are completed; and all testing is documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. Describe operational, diagnostic checks, and performance tests
2. Describe adjustment and calibration procedures
3. Describe how to select test, calibration, and diagnostic equipment
4. Describe how to test sensors, components, and systems
  - Chassis voltage systems
    - A relay system
    - A solenoid system
    - A lighting system
    - A starting system
    - A charging system
    - A DC motor system
    - A warning system

## Emergency Vehicle Technician 2A

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- Parasitic loads
  - Vehicle-based
  - Agency/body builder-added
- 5. Identify common defects
- 6. Describe electrical troubleshooting procedures
- 7. Identify record-keeping requirements
- 8. Describe the diagnostic and repair procedures of the manufacturer and the AHJ
- 9. Recognize, evaluate, and identify reported conditions
- 10. Perform required repairs to resolve deficiencies
- 11. Use test, calibration, and diagnostic equipment
- 12. Measure voltage, amperage, and resistance
- 13. Distinguish defects and deficiencies
- 14. Operate and diagnostically check system and performance tests
- 15. Perform electrical calculations
- 16. Complete required documentation in accordance with NFPA standards and the AHJ

### Discussion Questions

1. Determined by instructor

### Activities

1. Activity 2-2: Testing Electrical Systems and Electronic Controls
  - Chassis Voltage Systems
  - Parasitic Loads
  - Individual Circuit Loads

### Instructor Notes

1. ELO 4: Recommend using the schematics for the vehicle used for the course to demonstrate measurement location and technique.
2. ELO 9-16 – Covered by activity.

**CTS Guide Reference:** CTS 8-2

## Unit 3: Electronic Controls and Instrumentation

### Topic 3-1: Inspecting Electronic Controls and Instrumentation

#### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, SOPs, manufacturer specifications, tools, test, calibration, and diagnostic equipment, schematics, and an inspection checklist, will be able to inspect the electronic controls and instrumentation so that the mounting security is verified; operation and condition of the electronic control system is verified to be within manufacturer specifications; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and tests are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

#### Enabling Learning Objectives

1. Describe how the principles of magnetism apply to electronic control devices

- Magnetic fields
  - Impacts of magnetic fields
  - Proper wire routing
2. Describe how the principles of electricity apply to electronic control devices
    - Kirchhoff's laws
    - Watt's law
    - Ohm's law
    - Series and parallel circuits
    - Shared current paths
  3. Describe the principles of circuit analysis
    - Difference in potential (flowing vs. not flowing)
    - Application of Kirchhoff's laws
    - Application of Ohm's law
    - Application of Watt's law
    - Parasitic drain
1. Describe the function, construction, operation, and requirements of:
    - Electronic engine
      - Input, output, and regulations devices
    - Transmission
      - Input, output, and regulation devices
    - Brake controls
      - Input, output, and regulation devices
  2. Describe the function, construction, operation, and requirements of:
    - Instrumentation
    - Load control devices
    - Sequencers
    - Interfaces
    - Interlocks
  3. Describe how to select test, calibration, and diagnostic equipment
    - Digital voltmeter (DVOM)
    - Ammeter
      - Inductive
        - Low amperage (< 100 A)
        - High amperage (<= 1,000 A)
      - Series
        - Shunt or direct wire
        - Fuse replacement ammeter
    - Battery testers
      - Carbon pile
      - Conductance / battery impedance testers
    - Power probes / powered test lights
      - Benefits

- Ability to power a device
      - Ease of use
    - Problems
      - Excess voltage to delicate computer circuits
      - Piercing
  - Test leads
    - Quality is critical
    - Various lengths and sizes
    - Coiled or extendable
    - Auxiliary meter leads
  - Digital storage oscilloscopes (DSO)
  - Scanners
    - Code readers
    - Manufacture specific
    - Bi-directional
    - Laptop with interface
  - Relay substitution device
  - Soldering equipment
    - 100W (medium sized electrical, base wiring, lighting systems, etc.)
    - Temperature controlled (< 25W) (circuit boards, power distribution systems, computers, etc.)
    - Battery powered
    - Torch (propane, mapp, etc.)
    - Rosin-core solder
  - Crimping equipment
    - Correct crimper for device
    - Manufacturer specific
    - Hydraulic
    - Manual ratcheting
  - Remote start switches
    - Safety concerns during use
  - Remote power supplies
    - Battery chargers
    - Jump batteries (traditional and lightweight)
    - Bench test power supplies (adjustable current and voltage)
    - Auxiliary electronic control module/unit (ECM / ECU) power supply
  - Wire strippers
4. Describe test, calibration, and diagnostic equipment to avoid
- Test lights
    - Benefits
      - Ease of use
      - Very fast

- Problems
  - Overloading sensitive electronics
  - Trigger low amperage devices
  - Piercing
  - No accurate readings
- Safety
  - Understand impacts of misuse (energizing relays, etc.)
- 5. Use test, calibration, and diagnostic equipment
- 6. Describe how to use a DVOM and electronic readers
  - Challenges with 5-volt reference and control circuits
- 7. Describe how to test sensors, components, and systems
- 8. Describe how to interpret fault codes
  - Generic
  - Enhanced (manufacturer specific)
- 9. List types of defects, deficiencies, and potential problems associated with electronic controls and instrumentation
  - Open circuit
  - Short to power
  - Short to ground
  - Cross short
  - Excessive resistance
  - Shielding and cable routing
- 10. Determine defects and deficiencies
  - Troubleshooting
  - Design deficiencies
- 11. Describe how to read and interpret schematics
  - Basic schematic symbols
  - Manufacturer-specific schematic symbols
  - As-built schematics (per vehicle)
- 12. Read and interpret schematics
- 13. Identify mounting and adjustment requirements
- 14. Recognize and identify potential failure symptoms and conditions of electronic controls and instrumentation
  - Smoke (sight or smell)
  - Improper charging (too high or too low / AC voltage issues)
  - Failure to function
  - Onboard chargers instrumentation reading outside parameters
  - Operator error
  - Arcing and sparking
- 15. Describe the inspection procedures of the manufacturer and the AHJ
  - Gather tools and safety equipment
  - Secure vehicle in a safe environment

- Set parking brake
  - Place wheel chocks
  - Inspect impact of low-voltage electrical system on electronic controls and instrumentation
    - Recognize and identify symptoms and conditions
    - Determine defects, deficiencies, and potential problems
    - Determine impact if not corrected
  - Complete manufacturer and AHJ inspection checklist
  - Perform operational tests
  - Complete checklist and inspection documentation
  - Release vehicle for in-service use or maintenance/repair
16. Recognize and identify symptoms and conditions of electronic control and instrumentation issues
  17. Determine defects, deficiencies, and potential problems
  18. Perform operational tests
  19. Identify record-keeping requirements
  20. Complete checklist and inspection documentation

### Discussion Questions

1. What impact does voltage drop have on electronic control circuits?
2. What problems can using the wrong test equipment create?
3. What safety concerns are associated with using electronic control interlocks?
4. How does vehicle parasitic drain related to electronic controls?
5. How does agency/body builder based parasitic dram relate to electronic controls?

### Activities

1. Determined by instructor

**CTS Guide Reference:** CTS 8-3

## Topic 3-2: Maintaining Electronic Controls and Instrumentation

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, manufacturer specifications, a maintenance schedule or assignment, a maintenance checklist, SOPs, test, calibration, and diagnostic equipment, and tools, will be able to perform maintenance on the electronic controls and instrumentation so that deformed, broken, loose, worn, or missing parts are repaired or replaced; the operational condition is preserved or restored; calibration and adjustments are performed; activities are documented; and additional repair needs are reported

### Enabling Learning Objectives

1. Describe troubleshooting and adjustment methods and procedures
  - Corrosion
    - Clean
    - Correct cause (if possible)
    - Recoat or repaint (if necessary)

- Faulty connections
    - Clean
    - Tighten
    - Rewire
    - Replace
  - Low or high voltage
    - Adjust
    - Replace
    - Rebuild
    - Send for repair
  - Deformed, broken, loose, worn, missing, or failed components
    - Tighten
    - Replace
    - Adjust
    - Send for repair
2. Evaluate reported conditions
  3. Use test, calibration, and diagnostic equipment
  4. Perform operational tests
  5. Perform all required maintenance, including all items on a maintenance checklist
  6. Correct deficiencies
  7. Complete required documentation

### Discussion Questions

1. How does the voltage drop on an electronic control system differ from the voltage drop on a 12-volt electrical chassis circuit?

### Activities

1. Determined by instructor

**CTS Guide Reference:** CTS 8-4

## Topic 3-3: Repairing Electronic Controls and Instrumentation

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, manufacturer specifications, an assignment or inspection report detailing a deficiency or deformation, SOPs, test, calibration, and diagnostic equipment, and tools, will be able to perform repairs on electronic controls and instrumentation so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts are repaired, replaced, or rebuilt to manufacturer specifications; engine, transmission, and brake electronic control units or electronic control modules, pump throttles and pressure control devices, and instrumentation are returned to operation; programming is correct; load control devices, sequencer, interfaces, and interlocks are operational; correct test equipment is used; correct parts are used; correct tests and programming procedures are followed; operational tests and diagnostic checks are conducted and performance is verified; and repairs are



## Emergency Vehicle Technician 2A

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documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. Describe how to select test, calibration, and diagnostic equipment
2. Describe safety procedures
  - Personnel
    - Solenoid inductive kick
    - Strobe lights
    - High-intensity discharge (HID)
  - Vehicle
    - Welding precautions on vehicle chassis
3. Identify common deficiencies and describe correct repair procedures
  - Voltage drop
  - Sensor failure
  - Circuit driver failure
  - Radio frequency effects
  - Parasitic drain
4. Identify record-keeping requirements
  - Manufacturer requirements
  - NFPA requirements
  - Agency/shop requirements
5. Describe the diagnostic and repair procedures of the manufacturer and the AHJ
6. Recognize, evaluate, and analyze reported conditions, defects, and deficiencies
7. Perform required repairs to resolve deficiencies
8. Use test, calibration, and diagnostic equipment
9. Operate and test system(s)
10. Perform calculations
11. Use correct parts
12. Complete required documentation

### Discussion Questions

1. What types of in-house electrical repairs do you do?
  - What repairs do you transfer out?
2. What is parasitic drain?
3. What is the purpose of reference voltages?
  - How do they differ from signal voltages?

### Activities

1. To be determined by the instructor

### Instructor Notes

1. ELO 5 – Covered in detail in Topic 4-1: Testing Low-voltage Electrical Systems
2. ELO 11-17 – Covered by Activity 4-1: Testing Low-voltage Electrical Systems

CTS Guide Reference: CTS 8-5

### Topic 3-4: Testing Electronic Controls and Instrumentation

#### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, manufacturer specifications, SOPs, test, calibration, and diagnostic equipment, and tools, will be able to complete performance testing on electronic controls and instrumentation including electronic engine, pump control systems, transmission, brake controls, load control devices, sequencers, interfaces, and interlocks, in accordance with NFPA 1911 so that components are tested to assure they are operating in accordance with manufacturer specifications and NFPA standards; performance tests are conducted to verify that repairs are completed; and all testing is documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

#### Enabling Learning Objectives

1. Describe operational, diagnostic, and performance tests
2. Describe adjustment and calibration procedures
3. Describe how to select test, calibration, and diagnostic equipment
4. Describe how to test sensors, components, and systems
  - 5-volt reference circuits
    - Throttle position sensor
    - Manifold absolute pressure sensor
    - Mass airflow sensor
    - Intake air temperature sensor
    - Coolant temperature sensor
    - Oxygen sensor
5. Identify common defects
6. Describe electronic troubleshooting procedures
7. Identify record-keeping requirements
8. Describe the diagnostic and repair procedures of the manufacturer and the AHJ
9. Recognize, evaluate, and identify reported conditions
10. Perform required repairs to resolve deficiencies
11. Use test, calibration, and diagnostic equipment
12. Measure voltage, amperage, and resistance
13. Distinguish defects and deficiencies
14. Operate and test system
15. Perform electrical calculations
16. Complete required documentation in accordance with NFPA standards and the AHJ

#### Discussion Questions

1. What impact will a 12-volt chassis system have on a 5-volt control system?
2. What is the purpose of twisted pair cabling in an electronic control circuit?
  - What will happen if you don't properly re-twist the wires?
3. How can AC voltage end up in an electronic control circuit?

## Emergency Vehicle Technician 2A

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### Activities

1. Activity 2-2: Testing Electrical Systems and Electronic Controls
  - 5-volt Reference Circuits

### Instructor Notes

1. ELO 4: Recommend using the schematics for the vehicle used for the course to demonstrate measurement location and technique.
2. ELO 11-16 – Covered by activity.

**CTS Guide Reference:** CTS 8-6

## Emergency Vehicle Technician 2A

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### Time Table

Segment	Lecture Time	Activity Time	Total Unit Time
<b>Unit 1: Introduction</b>			
Topic 1-1: Orientation and Administration			
Lecture	0:30		
Activity 1-1: Determined by instructor		0:00	
Topic 1-2: Emergency Vehicle Technician Certification Process			
Lecture	0:30		
Activity 1-2: Determined by instructor		0:00	
<b>Unit 1 Totals</b>	<b>1:00</b>	<b>0:00</b>	<b>1:00</b>
<b>Unit 2: Low-voltage Electrical Systems</b>			
Topic 2-1: Repairing Low-voltage Electrical Systems			
Lecture	2:00		
Activity 2-1: Solenoids		1:30	
Topic 2-2: Testing Low-voltage Electrical Systems			
Lecture	2:00		
Activity 2-2: Testing Electrical Systems and Electronic Controls		1:30	
<b>Unit 2 Totals</b>	<b>4:00</b>	<b>3:00</b>	<b>7:00</b>
<b>Unit 3: Electronic Controls and Instrumentation</b>			
Topic 3-1: Inspecting Electronic Controls and Instrumentation			
Lecture	5:00		
Activity 3-1: Determined by instructor		3:00	
Topic 3-2: Maintaining Electronic Controls and Instrumentation			
Lecture	3:00		
Activity 3-2: Determined by instructor		2:00	
Topic 3-3: Repairing Electronic Controls and Implementation			
Lecture	4:00		
Activity 3-3: Determined by instructor		4:00	
Topic 3-4: Testing Electronic Controls and Implementation			
Lecture	2:00		

## Emergency Vehicle Technician 2A

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Segment	Lecture Time	Activity Time	Total Unit Time
Activity 2-2: Testing Electrical Systems and Electronic Controls		3:00	
<b>Unit 3 Totals</b>	<b>14:00</b>	<b>12:00</b>	<b>26:00</b>
<b>Lecture, Activity, and Unit Totals:</b>	<b>19:00</b>	<b>15:00</b>	<b>34:00</b>

### Course Totals

Segment Type	Time
Total Lecture Time (LT)	19:00
Total Activity Time (AT)	15:00
Total Testing Time (TT)	2:00
<b>Total Course Time</b>	<b>36:00</b>



# Human Resource Management / Fleet Specifications and Records (2020)

## Course Plan

### Course Details

<b>Certification:</b>	Emergency Vehicle Technician 3
<b>CTS Guide:</b>	Emergency Vehicle Technician (2020)
<b>Description:</b>	<p><b>Human Resource Management Unit:</b> This course provides an overview of human resource management knowledge and skills utilized by a supervisory or managerial level emergency vehicle technician in a multiple technician agency or shop.</p> <p><b>Fleet Specifications and Records Unit:</b> This course provides an overview of the knowledge and skills utilized by an emergency vehicle technician to oversee outsourced repair quality control, forecast inventory needs and order parts, and develop the documentation needed to prepare estimates, adhere to maintenance and repair schedule, document warranty repairs, create work orders, validate maintenance records, and develop apparatus specifications.</p>
<b>Designed For:</b>	The SFT-certified Emergency Vehicle Technician (EVT) 2 advancing to EVT 3 or anyone with supervisory or managerial level responsibilities in a multiple technician agency or shop
<b>Prerequisites:</b>	Emergency Vehicle Technician 1A: Emergency Vehicle Systems: Chassis, Cab, Body, Tank and Accessories
<b>Standard:</b>	Complete all activities and formative tests. Complete all summative tests with a minimum score of 80%.
<b>Hours:</b>	Lecture: 18:45 Activities: 6:15 Testing: 3:00

## Emergency Vehicle Technician 3B

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**Hours (Total):** 28:00

**Maximum Class Size:** 30

**Instructor Level:** Primary Instructor

**Instructor/Student Ratio:** 1:30

**Restrictions:** None

**SFT Designation:** CFSTES

### Required Resources

#### Instructor Resources

To teach this course, instructors need:

- NFPA 1901: Standard for Automotive Fire Apparatus (current edition / physical copy)
- 1. NFPA 1911: Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Emergency Vehicles (current edition / physical copy)
- Student Supplement
  - Provided by California Fire Mechanics Academy, Inc.
- Sample policies and procedures that address:
  - Safety compliance
  - Discipline
  - Employee evaluations
  - Professional development
- Manufacturer manuals
- Manufacturer specification sheets
- Manufacturer websites

#### Online Instructor Resources

The following instructor resources are available online at

<https://osfm.fire.ca.gov/divisions/state-fire-training/cfstes-professional-certification/>:

- Activity 5-2: Inspecting Completed Vehicles
- Activity 6-1: Forecasting Inventory Needs
  - Sample Repair History Documents
- Activity 6-2: Ordering Inventory
- Activity 7-1: Preparing Estimates
- Activity 7-2: Scheduling Maintenance and Repairs

#### Student Resources

To participate in this course, students need:

- NFPA 1901: Standard for Automotive Fire Apparatus (current edition / physical copy or access to a digital copy)
- NFPA 1911: Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Emergency Vehicles (current edition / physical copy or access to a digital copy)
- Student Supplement
  - Provided by California Fire Mechanics Academy, Inc.
- Agency or AHJ policies and procedures that address:
  - Safety compliance



## Emergency Vehicle Technician 3B

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- Discipline
- Employee evaluations
- Professional development

### Facilities, Equipment, and Personnel

The following facilities, equipment, or personnel are required to deliver this course:

- Standard classroom equipped for 30 students
- Projector with appropriate laptop connections
- Wifi/Internet access
- Outdoor space for emergency response vehicle with a clear perimeter for student activities
- Activity 5-2: Inspecting Completed Vehicles
  - Vehicle/apparatus
  - Appropriate test, calibration, and diagnostic equipment and tools
- Activity 6-2: Ordering Inventory
  - Appropriate parts catalogs and manuals
- Activity 7-1: Preparing Estimates
  - Appropriate repair history, estimate forms, and parts list
- Activity 7-2: Scheduling Maintenance and Repairs
  - Black calendar pages (January – December) for the year in which the course is taught

### Unit 1: Introduction

#### Topic 1-1: Orientation and Administration

##### Terminal Learning Objective

At the end of this topic, a student will be able to identify facility and classroom requirements and identify course objectives, events, requirements, assignments, activities, resources, evaluation methods, and participation requirements in the course syllabus.

##### Enabling Learning Objectives

1. Identify facility requirements
  - Restroom locations
  - Food locations
  - Smoking locations
  - Emergency procedures
2. Identify classroom requirements
  - Start and end times
  - Breaks
  - Electronic device policies
  - Special needs and accommodations
  - Other requirements as applicable
3. Review course syllabus
  - Course objectives
  - Calendar of events
  - Course requirements
  - Student evaluation process
  - Assignments
  - Activities
  - Required student resources
  - Class participation requirements

##### Discussion Questions

4. What is a formative test? What is a summative test?

##### Activities

1. To be determined by the instructor

#### Topic 1-2: Emergency Vehicle Technician Certification Process

##### Terminal Learning Objective

At the end of this topic, a student will be able to identify different levels in the Emergency Vehicle Technician certification track, the courses and requirements for State Fire Training (SFT) Emergency Vehicle Technician (EVT) certification, and be able to describe the capstone task book and testing process.

## Emergency Vehicle Technician 3B

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### Enabling Learning Objectives

1. Identify the different levels of certification in the Emergency Vehicle Technician (EVT) certification track
  - EVT 1
  - EVT 2
  - EVT 3
2. Identify the courses required for EVT 1
  - State Fire Training
    - Emergency Vehicle Technician 1A: Chassis, Cab, Body, Tank and Accessories (2020)
    - Emergency Vehicle Technician 1B: Electrical Systems A (2020)
    - Emergency Vehicle Technician 1C: Pumps and Accessories (2020)
  - National Institute for Auto Service Excellence (ASE)
    - Gasoline Engines [T1]
    - Diesel Engines [T2]
    - Drive Train [T3]
    - Brakes [T4]
    - Suspension and Steering [T5]
    - Preventative Maintenance Inspections [T8]
  - Brake Inspector Qualification (CFR 396.25) - Department of Transportation (DOT)
3. Identify the courses required for EVT 2
  - State Fire Training
    - Emergency Vehicle Technician 2A: Electrical Systems B (2020)
  - National Institute for Auto Service Excellence (ASE)
    - Gasoline Engines (T1)
    - Diesel Engines (T2)
    - Drive Train (T3)
    - Brakes (T4)
    - Suspension and Steering (T5)
    - Electrical / Electronic Systems (T6)
    - Heating, Ventilation and Air Conditioning (HVAC) (T7)
    - Preventative Maintenance Inspections (T8)
4. Identify the courses required for EVT 3
  - State Fire Training
    - Emergency Vehicle Technician 3A: Human Resource Management / Fleet Specifications and Records (2020)
  - National Institute for Auto Service Excellence (ASE)
    - Gasoline Engines (T1)
    - Diesel Engines (T2)
    - Drive Train (T3)
    - Brakes (T4)
    - Suspension and Steering (T5)

## Emergency Vehicle Technician 3B

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- Electrical / Electronic Systems (T6)
  - Heating, Ventilation and Air Conditioning (HVAC) (T7)
  - Preventative Maintenance Inspections (T8)
5. Identify additional requirements for Emergency Vehicle Technician 1
- Experience (one of the following)
    - Have a minimum of two (2) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or
    - Have a minimum of three (3) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
    - Have a minimum of four (4) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.
6. Identify additional requirements for Emergency Vehicle Technician 2
- Experience (one of the following)
    - Have a minimum of three (3) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or
    - Have a minimum of four (4) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
    - Have a minimum of five (5) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.
7. Identify additional requirements for Emergency Vehicle Technician 3
- Have a minimum of four (4) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or
  - Have a minimum of five (5) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
  - Have a minimum of six (6) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.
8. The following requirements are required for each EVT 1, EVT 2, and EVT 3
- Code of Federal Regulations (CFR) 396.25: Department of Transportation Brake Inspector Qualification

## Emergency Vehicle Technician 3B

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- Successful completion of the Emergency Vehicle Technician Certification Commission (EVTCC) for the respective SFT Level of Certification. This exam is administered by the California Fire Mechanics Academy (CFMA).
9. Describe the task book process
- Complete all prerequisites and course work
  - Submit application and fees and to request task book
    - A candidate may apply for the EVT 1 and EVT 2 task books at the same time (two applications and two fees), but may not submit the EVT 2 task book until he or she receives EVT 1 certification (a prerequisite for EVT 2)
  - Complete all job performance requirements included in the task book
  - Must have identified evaluator verify individual task completion via signature
  - Must have Fire Chief or authorized representative verify task book completion via signature
  - Must be employed by a California Fire Agency in the position prior to submitting completed task book to State Fire Training
10. Complete Continuing Education
- Persons with EVT Certification are required to renew their certification every five years. The recertification requires that the applicant completes 36 hours of approved continuing education (CE) and meet the all prerequisites stated for Recertification Requirements. All recertification applications must be postmarked on or before the certification expiration date. If the certified EVT did not meet all recertification requirements by the expiration date, the EVT Certification is considered to be lapsed.
  - If the EVT Certification lapsed, the applicant will be required to complete 36 hours of CE in addition to the completion of additional CE hours. If the certification lapsed less than 6 months, you can regain EVT Certification by completing an additional 8 hours of approved CE. If the certification lapsed between 6 months and less than 12 months, you can regain EVT Certification by completing an additional 16 hours of approved CE. If the certification lapsed between 12 months and less than 18 months, you can regain EVT Certification by completing an additional 24 hours of approved CE.
  - For lapses, greater than 18 months, the applicant will need to retake all SFT courses listed in the Certification Requirements Education section and reapply for initial EVT certification, which will require the completion of a new Certification Task Book.
11. Complete all formative and summative tests administered during the course deliveries

### Discussion Questions

1. To be determined by the instructor

### Activities

1. To be determined by the instructor

## Emergency Vehicle Technician 3B

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### Instructor Notes

1. SFT teaches most EVT I (inspect and maintain) and EVT II (repair and replace) content together because depending on the size of the agency or shop, there are different expectations of the technician.

# Human Resource Management Module

## Unit 2: Employee Development

### Topic 2-1: Assigning Tasks or Responsibilities

#### Terminal Learning Objective

At the end of this topic, a student, given a work order, an apparatus, work space, and required tools, equipment, and parts, will be able to assign tasks or responsibilities to technicians so that the instructions are complete, clear, and concise; safety considerations are addressed; and the work is completed and within the scheduled time

#### Enabling Learning Objectives

1. Identify the function, construction, and operation of vehicles and systems
2. Identify required testing
3. Identify required record-keeping and documentation
4. Identify common deficiencies
5. Identify repair procedures
6. Identify testing procedures
7. Identify apparatus safety requirements
8. Identify skill levels of assigned technicians
  - Involve labor and management
  - Job performance analysis
    - Training
    - Monitoring
    - Evaluation
    - Feedback
    - Modification
9. Identify agency priorities
10. Identify available resources
11. Communicate verbally and in writing
12. Evaluate technician performance

#### Discussion Questions

1. How does your agency identify technician skill level?

#### Activities

1. Determined by instructor

**CTS Guide Reference:** CTS 11-1

### Topic 2-2: Conducting Individual Technician Training

#### Terminal Learning Objective

At the end of this topic, a student, given an apparatus, an assignment, a workspace, and all necessary tools, will be able to conduct individual training for technicians so that the

## Emergency Vehicle Technician 3B

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technician understands the procedure and is able to demonstrate proficiency at the given task

### Enabling Learning Objectives

1. Identify the function, operation, and construction of component
2. Identify applicable standards
3. Identify manufacturer specifications
4. Identify recommended procedures
5. Determine the technician's capability
6. Research, communicate, and deliver training material based on methods and practices
7. Evaluate the results

### Discussion Questions

1. How can an EVT utilize a work order?
2. How can you determine EVT work hours for a work order?
3. What are an administrator's responsibilities for work injury reduction in the assigned shop area?

### Activities

1. Determined by instructor

### Instructor Notes

1. If time permits, review the individual training and professional development policies and procedures that students bring to class.

**CTS Guide Reference:** CTS 11-2

## Unit 3: Employee Evaluation

### Topic 3-1: Evaluating Technician Performance

#### Terminal Learning Objective

At the end of this topic, a student, given time records, pertinent work orders, and evaluation forms, will be able to provide input on the performance level of a technician so that the abilities and weaknesses of the technician can be determined; required counseling and training can be scheduled to maintain or improve a technician's proficiency; or an issue can be referred to the next level of supervision

#### Enabling Learning Objectives

1. Identify allowable repair times
2. Describe how to evaluate and analyze technician strengths and weaknesses
  - Give assignment
  - Measure performance completion
  - Evaluate skill completion (or lack of completion)
    - Skill degradation
    - Skill enhancement
  - Maintain work history base on equipment/specific brand
  - Sometimes it may intuition or instinct
3. Identify agency policies and procedures



## Emergency Vehicle Technician 3B

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4. Describe appropriate workplace behavior
5. Identify job descriptions
6. Describe goals of the evaluation program
7. Communicate verbally and in writing
  - 5 W's (who, what, when, when, why)
  - End date / start date
  - "What ifs"
  - Write first, then communicate verbally
8. Evaluate and document performance

### Discussion Questions

1. How does your agency evaluate technician performance?
2. How does your agency recognize outstanding performance?
3. How does your agency handle weak performance?

### Activities

1. Given several sample employee evaluations have students:
  - Prepare a professional development plan for employee improvement
  - Identify strengths and how they can be acknowledged or rewarded

### Instructor Notes

1. If time permits, review the individual employee evaluation policies and procedures that students bring to class.

**CTS Guide Reference:** CTS 11-3

## Topic 3-2: Recommending and Enforcing Discipline

### Terminal Learning Objective

At the end of this topic, a student, given an employee's history and agency SOPs, will be able to recommend, specify, and enforce discipline so that the employee is given the guidance necessary to improve or resolve issues

### Enabling Learning Objectives

1. Identify agency policies and procedures
2. Demonstrate an awareness of the situation and the individual involved
3. Communicate verbally and in writing
4. Assess employee abilities and attitudes
5. Implement the most effective alternative

### Discussion Questions

1. What is the difference between discipline and professional development?
2. Who is involved in the disciplinary process?

### Activities

1. Given the following scenario, have students break into small groups and identify what they would do for each option listed below. Share with the group and share strategies.
  - Two employees are horsing around in the shop throwing a rag at each other. One escalates the event by soaking or spraying accelerant on the rag, which catches on fire. He or she throws it back, just as you enter the workspace.

## Emergency Vehicle Technician 3B

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- Option 1: Both are technicians who work for you
- Option 2: One is your technician and one is management
- Option 3: One is your technician and one is a firefighter dropping off a vehicle

### Instructor Notes

1. If time permits, review the individual disciplinary policies and procedures that students bring to class.

**CTS Guide Reference:** CTS 11-4

## Unit 4: Employee Safety

### Topic 4-1: Recommending and Enforcing Safety Policies and Procedures

#### Terminal Learning Objective

At the end of this topic, a student, given agency safety policies and procedures; federal, state, local, and industry standards for workplace safety; and safety hazards, will be able to recommend and enforce safety policies and procedures so that workplace safety is monitored and recommendations for deficiencies are documented

#### Enabling Learning Objectives

1. Identify agency safety policies and procedures
2. Identify federal, state, local, and industry standards for workplace safety
3. Identify safety hazards
4. Identify safe practices
5. Identify equipment limitations
6. Identify personal protection devices
7. Communicate verbally and in writing
8. Promote a safe working environment

#### Discussion Questions

1. How does your agency enforce safety policies and procedures?
2. How do you determine which safety policy or procedure takes priority?

#### Activities

1. Determined by instructor

#### Instructor Notes

1. If time permits, review the individual safety policies and procedures that students bring to class.

**CTS Guide Reference:** CTS 11-5

### Topic 4-2: Monitoring Environmental Safety Compliance

#### Terminal Learning Objective

At the end of this topic, a student, given agency policies and procedures; federal, state, and local environmental regulations; and material safety data sheets (MSDS), will be able to monitor compliance of applicable environmental regulations so that the workplace is in compliance with all required regulations; and all deficiencies are identified and corrected

## Emergency Vehicle Technician 3B

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### Enabling Learning Objectives

1. Identify agency policies and procedures
  - Annual inspections
  - Location of documents
2. Identify federal, state, and local environmental regulations
  - Occupational Safety and Health Administration (OSHA)
    - 29 CFR 1910.1020 (Code of Federal Regulations)
    - Hazard Communication Standard (HCS) / HazCom 2012
  - Fire marshal
  - Authority having jurisdiction (AHJ)
3. Identify location of material safety data sheets (MSDS)
4. Identify the 16 sections of the SDS
5. Communicate verbally and in writing

### Discussion Questions

1. What is the replacement document for the material safety data sheet (MSDS)?
2. Do the MSDS in your agency have pictograms?
  - Are they required on an SDS?

### Activities

1. Determined by instructor

### Instructor Notes

1. In 2012 OSHA renamed the MSDS (material safety data sheet). It is now SDS (safety data sheet).

**CTS Guide Reference:** CTS 11-6

# Fleet Specifications and Records Module

## Unit 5: Outsourced Repair Quality Control

### Topic 5-1: Monitoring Outsourced Repairs

#### Terminal Learning Objective

At the end of this topic, a student, given a completed vehicle, a deficiency list, and a list of completed tasks, will be able to monitor outsourced repairs so that all repairs are verified and diagnostic checks are completed and documented

#### Enabling Learning Objectives

1. Identify the function, construction, and operation of vehicles and systems
2. Identify qualifications and limitations of entity performing maintenance or repairs
  - In-house technicians
  - Vendor
  - Manufacturer
  - Third-party shop
3. Identify required diagnostic checks and performance testing
4. Identify required record-keeping and documentation
  - Work order identifying maintenance or repair need
  - Outsourced vehicle tracking document or database:
    - List of outsourced vehicles
    - Outsource location
    - Primary contact information
    - Outsource reason
      - Maintenance
      - Repair
    - Projected return date
    - Progress reports
      - Written
      - Verbal
      - Photos
    - Anticipated cost
  - Completed work order from entity performing maintenance or repairs
  - Inspection and return to service checklists and documentation
5. Identify common deficiencies
6. Identify repair procedures
7. Identify diagnostic checks and performance testing procedures
8. Identify vehicle safety requirements
9. Operate vehicles
10. Verify diagnostic checks and performance tests of equipment and tools identified by manufacturer's specifications

## Emergency Vehicle Technician 3B

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11. Use diagnostic equipment and tools
12. Communicate verbally and in writing

### Discussion Questions

1. Under what circumstances might you send a vehicle out for maintenance or repair?
2. What information should you track when you send a vehicle sent out of service?

### Activities

1. To be determined by the instructor

### Instructor Notes

1. ELOs 1, 3, and 5-12 are covered extensively in EVT I and should be common knowledge for most students. Refresh this content if needed, but focus on ELOs 2 and 4.

**CTS Guide Reference:** CTS 12-2

## Topic 5-2: Inspecting Completed Vehicles

### Terminal Learning Objective

At the end of this topic, a student, given an apparatus, a deficiency list, completed tasks, and a required license, will be able to inspect a completed vehicle so that all deficiencies are repaired; documentation is completed; and the vehicle is diagnostically checked to manufacturer specifications

### Enabling Learning Objectives

1. Identify the function, construction, and operation of vehicles and systems
  - Vehicle types
    - Type I
    - Type III
  - Systems (and components)
    - Chassis
    - Cab and body
    - Pumps and tanks
    - Electrical
2. Identify diagnostic checks and performance testing procedures
  - Performance test (was the vehicle repaired correctly)
3. Identify required record-keeping and documentation
  - Manufacturer requirements
  - AHJ requirements
4. Identify common deficiencies
  - Corrosion
  - Rust, oxidation, electrolysis
  - Warping
  - Leaks
    - Class I
    - Class II
    - Class III
  - Fluid and lubrication levels

## Emergency Vehicle Technician 3B

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- Cracks, fractures, breaks
  - Loose, broken, worn, or missing components
5. Identify repair procedures
  6. Identify vehicle safety requirements and confirm that they are diagnostically checked to manufacturer's specifications
    - Gather tools and safety equipment
    - Secure vehicle in a safe environment
    - Set parking brake and place wheel chocks
    - Wear appropriate PPE
  7. Observe proper apparatus operation
  8. Verify performance of required tests and checks
  9. Use test, calibration, and diagnostic equipment and tools
  10. Communicate verbally and in writing

### Discussion Questions

1. Who is responsible to validate that an outsourced repair was completed and the vehicle is ready for service?

### Activities

1. Activity 5-2: Inspecting Completed Vehicles

### Instructor Notes

1. These inspection principles also apply to an apparatus, not just an entire vehicle.
2. ELO 1 – Addresses the minimum vehicles and systems to be addressed.
3. ELO 7 – Describe this process to the students as you do it if time, safety, and liability considerations restrict students from operating the vehicle themselves.
4. ELOs 8-10 – Covered by the required activity.

**CTS Guide Reference:** CTS 12-1

## Unit 6: Inventory Control

### Topic 6-1: Monitoring Inventory Levels

#### Terminal Learning Objective

At the end of this topic, a student, given current inventory, agency equipment lists, manufacturer specifications, manufacturer parts manuals, a maintenance schedule, and previous repair history, will be able to monitor inventory levels within the relevant level of responsibility so that the inventory is maintained at the required levels

#### Enabling Learning Objectives

1. Identify current suppliers
2. Evaluate previous repair history
3. Identify agency and purchase policies
4. Determine current needs
5. Use previous repair history to predict future needs

#### Discussion Questions

1. Does your shop stock parts?

## Emergency Vehicle Technician 3B

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- Why or why not?
  - What are the pros and cons?
2. How does your agency track inventory?

### Activities

1. Activity 6-1: Forecasting Inventory Needs

### Instructor Notes

1. Use the activity to generate ELO/content discussion.
2. ELO 4 and 5 – Covered by required activity.

**CTS Guide Reference:** CTS 13-1

## Topic 6-2: Ordering Parts

### Terminal Learning Objective

At the end of this topic, a student, given a part number or specification and application of part required, a purchase order form and procedure, and a vendor list, will be able to order appropriate parts so that the correct part is ordered from the vendor; purchase orders are tracked; and purchase is recorded

### Enabling Learning Objectives

1. Identify the function, operation, and construction of component
2. Identify applicable standards
3. Identify manufacturer specifications
4. Identify recommended part substitutions
5. Identify parts locations
6. Identify transportation systems
7. Research written and electronic sources and manuals
8. Communicate verbally and in writing

### Discussion Questions

1. Which is more important, cost or delivery timeframe?
2. Which is more important, cost or quality?
  - “Buy the best, cry once”

### Activities

1. Activity 6-2: Ordering Inventory

### Instructor Notes

1. Use the activity to generate ELO/content discussion as activity is completed.

**CTS Guide Reference:** CTS 13-2

## Unit 7: Documentation Control

### Topic 7-1: Preparing Estimates

#### Terminal Learning Objective

At the end of this topic, a student, given an emergency vehicle, repair history, estimate forms, parts lists, required repair or upgrade hours, and a calculator, will be able to prepare

## Emergency Vehicle Technician 3B

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an estimate of deficiencies or upgrades to be completed on an emergency vehicle so that the costs are calculated, documented, and communicated

### Enabling Learning Objectives

1. Identify the function, construction, and operation of emergency response vehicles
2. Identify estimated repair times
  - Technician experience and skill level
  - Fleet priority
  - Parts availability
  - Staffing levels
3. Identify parts and component costs
  - Replacement part cost
  - Secondary costs
    - Replacing associated parts impacted by new part
    - Replacing items damaged during repair
    - Additional problems discovered during repair
  - Shipping cost
  - Labor cost
4. Identify applicable vehicle standards
  - Manufacturer specifications (vehicle)
  - Original equipment manufacturer (OEM) specifications (part or component)
  - NFPA standards
  - AHJ standards
5. Estimate and calculate costs and repair times
6. Complete documentation and record-keeping
7. Communicate verbally and in writing

### Discussion Questions

1. What factors impact repair time?
2. What factors impact repair cost?

### Activities

1. Activity 7-1: Preparing Estimates

### Instructor Notes

1. ELOs 5-7 – Covered by Activity 7-1: Preparing Estimates

**CTS Guide Reference:** CTS 14-1

## Topic 7-2: Adhering to Repair and Maintenance Schedules

### Terminal Learning Objective

At the end of this topic, a student, given an emergency vehicle, a schedule, forms, a repair or maintenance request, current staffing and workload, work estimate, and work space availability, will be able to adhere to a schedule for maintenance or repair of an emergency vehicle so that required repairs or maintenance can be assigned and completed in accordance with the projected times



### Enabling Learning Objectives

1. Identify the function, construction, and operation of emergency response vehicles
2. Identify resource availability
  - Matching resources to workload
    - Technicians available to do the work
    - Vehicle available to cover for vehicles out of service
3. Identify factors that impact resource availability
  - Fleet management
    - Required scheduled inspection cycles
    - New vehicle prep
    - Budget cycles
  - Climate
    - Fire season
    - Wet season
    - Weather
  - Staff levels
    - Training schedules
    - Vacation time
    - Work injury/illness
  - Event
    - Accident
    - Catastrophic failure
4. Identify agency requirements
5. Utilize resources
6. Evaluate requests
7. Project maintenance or repair results

### Discussion Questions

1. What routine activities should you factor into your maintenance/repair schedule?
2. What events may impact your maintenance/repair schedule?

### Activities

1. Activity 7-2: Scheduling Maintenance and Repairs

**CTS Guide Reference:** CTS 14-2

## Topic 7-3: Documenting Warranty Repairs

### Terminal Learning Objective

At the end of this topic, a student, given a repaired vehicle, applicable warranties, a deficiency list, technical service bulletins, and a list of completed tasks, will be able to document warranty repairs so that all repairs are completed, and diagnostically checked and performance tested if required are verified, and tested; and the warranty claim is processed

### Enabling Learning Objectives

1. Identify the function, construction, and operation of emergency response vehicles

2. Identify current warranties
3. Identify technical service bulletins
  - Purpose/use
  - Where to locate
4. Identify required diagnostic checks or performance tests
5. Identify required record-keeping and documentation
6. Identify diagnostic checks or performance testing procedures
7. Identify vehicle safety requirements
8. Identify manufacturer specifications
  - Whether or not something is covered by warranty
  - Who can perform warranty repairs
    - Manufacturer-designated repair facility
    - Manufacturer-negotiated in-house repairs
9. Identify agency policies and procedures
10. Communicate verbally and in writing
11. Comply with the record-keeping requirements of the manufacturer and the authority having jurisdiction (AHJ)

### Discussion Questions

1. How are inventory numbers determined?
2. Is it necessary to inspect the unit and documents prior to releasing the unit back into service?
  - Why or why not?

### Activities

1. Determined by instructor

### Instructor Notes

1. ELOs 1, 4, 6, and 7 are covered extensively in EVT I courses and should be common knowledge for most students. Refresh this content if needed, but focus on ELOs 2, 4, 5, and 8.

**CTS Guide Reference:** CTS 14-3

## Topic 7-4: Creating Work Orders

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, an assignment, and agency work order forms, will be able to create work orders so that all work to be performed is documented; all required information is recorded; all necessary information is communicated to the technician(s); and the emergency response vehicle is prepared for repair or maintenance

### Enabling Learning Objectives

1. Identify required record-keeping
2. Identify agency record-keeping system
3. Identify previous repair history
4. Identify the function, construction, and operation of emergency response vehicles

## Emergency Vehicle Technician 3B

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5. Apply agency record-keeping system
6. Communicate verbally and in writing
7. Utilize diagnostic skills

### Discussion Questions

1. Why is documentation important?
2. How long do you keep completed work orders?
  - How long should you keep them?

### Activities

1. Given a completed work order, have students review for complete and accurate information and correct any deficiencies.

### Instructor Notes

1. Recommend bringing in sample work orders and walking students through the different components and why they are important.

**CTS Guide Reference:** CTS 14-4

## Topic 7-5: Validating Maintenance Records

### Terminal Learning Objective

At the end of this topic, a student, given completed documentation of maintenance records and agency record-keeping policies will be able to validate maintenance records so that accurate records are maintained

### Enabling Learning Objectives

1. Identify record-keeping and accounting procedures
2. Describe how to analyze statistics
3. Identify agency policy and procedure
4. Recognize, evaluate, analyze, and calculate statistical information, accounting reports, and cost performance reports

### Discussion Questions

1. Who keeps/maintains maintenance records in your shop?
2. Should all defects and repairs be "signed off"?
  - Why or why not?

### Activities

1. Determined by instructor

**CTS Guide Reference:** CTS 14-5

## Topic 7-6: Developing Apparatus Specifications

### Terminal Learning Objective

At the end of this topic, a student, given agency recommendations, agency policies and procedures, and applicable NFPA and industry standards, will be able to develop a specification through review and research of existing fire apparatus so that technical criteria are presented as a completed specification

## Emergency Vehicle Technician 3B

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### Enabling Learning Objectives

1. Identify current quality standards and requirements of the agency, state and local laws and regulations, the American Society of Mechanical Engineers (ASME), the Society of Automotive Engineers (SAE), the Occupational Safety and Health Administration (OSHA), and NFPA for the construction of a fire apparatus
2. Recognize agency guidelines
3. Organize and identify apparatus components based on the needs of the applicable divisions
4. Communicate verbally and in writing

### Discussion Questions

1. What role does maintenance play when developing apparatus specifications?
2. Should warranty [word] be considered when developing apparatus specifications?
  - Why or why not?

### Activities

1. Determined by instructor

**CTS Guide Reference:** CTS 15-1

## Emergency Vehicle Technician 3B

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### Time Table

Segment	Lecture Time	Activity Time	Total Unit Time
<b>Unit 1: Introduction</b>			
Topic 1-1: Orientation and Administration			
Lecture	00:30		
Activity 1-1: To be determined by instructor		00:00	
Topic 1-2: Emergency Vehicle Technician Certification Process			
Lecture	00:30		
Activity 1-2: Determined by instructor		00:00	
<b>Unit 1 Totals</b>	<b>1:00</b>	<b>00:00</b>	<b>1:00</b>

### Human Resource Management Module

Segment	Lecture Time	Activity Time	Total Unit Time
<b>Unit 2: Employee Development</b>			
Topic 2-1: Assigning Tasks or Responsibilities			
Lecture	1:00		
Activity 2-1: Determined by instructor		0:00	
Topic 2-2: Conducting Individual Technician Testing			
Lecture	1:00		
Activity 2-2: Determined by instructor		0:00	
<b>Unit 2 Totals</b>	<b>2:00</b>	<b>0:00</b>	<b>2:00</b>
<b>Unit 3: Employee Evaluation</b>			
Topic 3-1: Evaluating Technician Performance			
Lecture	1:00		
Activity 3-1: See recommended activity		1:00	
Topic 3-2: Recommending and Enforcing Discipline			
Lecture	2:00		
Activity 3-2: See recommended activity		1:00	
<b>Unit 3 Totals</b>	<b>3:00</b>	<b>2:00</b>	<b>5:00</b>
<b>Unit 4: Employee Safety</b>			
Topic 4-1: Recommending and Enforcing Safety Policies and Procedures			
Lecture	2:00		

## Emergency Vehicle Technician 3B

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Segment	Lecture Time	Activity Time	Total Unit Time
Activity 4-1: Determined by instructor		0:00	
Topic 4-2: Monitoring Environmental Safety Compliance			
Lecture	1:00		
Activity 4-2: Determined by instructor		0:00	
<b>Unit 4 Totals</b>	<b>3:00</b>	<b>0:00</b>	<b>3:00</b>

### Fleet Specifications and Records Module

Segment	Lecture Time	Activity Time	Total Unit Time
<b>Unit 5: Outsourced Repair Quality Control</b>			
Topic 5-1: Monitoring Outsourced Repairs			
Lecture	0:30		
Activity 2-1: Determined by instructor		0:00	
Topic 5-2: Inspecting Completed Vehicles			
Lecture	1:00		
Activity 5-2: Inspecting Completed Vehicles		1:30	
<b>Unit 5 Totals</b>	<b>1:30</b>	<b>1:30</b>	<b>3:00</b>
<b>Unit 6: Inventory Control</b>			
Topic 6-1: Monitoring Inventory Levels			
Lecture	0:45		
Activity 6-1: Forecasting Inventory Needs		0:15	
Topic 6-2: Ordering Parts			
Lecture	0:00		
Activity 6-2: Ordering Inventory		0:30	
<b>Unit 6 Totals</b>	<b>0:45</b>	<b>0:45</b>	<b>1:30</b>
<b>Unit 7: Documentation</b>			
Topic 7-1: Preparing Estimates			
Lecture	0:30		
Activity 7-1: Preparing Estimates		0:30	
Topic 7-2: Adhering to Repair and Maintenance Schedules			
Lecture	1:30		
Activity 7-2: Scheduling Maintenance and Repairs		1:00	
Topic 7-3: Documenting Warranty Repairs			
Lecture	1:00		

## Emergency Vehicle Technician 3B

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Segment	Lecture Time	Activity Time	Total Unit Time
Activity 4-3: Determined by instructor		0:00	
Topic 7-4: Creating Work Orders			
Lecture	1:00		
Activity 4-4: See recommended activity		0:30	
Topic 7-5: Validating Maintenance Records			
Lecture	1:00		
Activity 4-5 Determined by instructor		0:00	
Topic 7-6: Developing Apparatus Specifications			
Lecture	2:30		
Activity 4-6: Determined by instructor		0:00	
<b>Unit 7 Totals</b>	<b>7:30</b>	<b>2:00</b>	<b>9:30</b>
<b>Total Lecture, Activity, and Unit Totals:</b>	<b>18.75</b>	<b>6.25</b>	<b>25:00</b>

Course Totals.

Segment Type	Time
Total Lecture Time (LT)	18:45
Total Activity Time (AT)	6:15
Total Testing Time (TT)	3:00
<b>Total Course Time</b>	<b>28.00</b>

### Inspecting Completed Vehicles

#### Activity 5-2

**Format:** Small Group (3-5 students)

**Time Frame:** 1:30

#### Description

This activity provides students with an opportunity to inspect a completed vehicle/apparatus in order to validate whether or not recommended repairs were completed in accordance with manufacturer and AHJ specifications and to determine whether or not the vehicle/apparatus can be released to return to service.

#### Materials

- Activity sheet
- Pen/pencil
- Vehicle/apparatus
- Test, calibration, and diagnostic equipment and tools appropriate to evaluate the identified problems

#### Instructions

1. The instructor will assign a problem to each group.
2. In your group, create a list of potential causes for the problem.
3. Identify a repair solution for each cause.
4. Inspect the vehicle/apparatus and perform the appropriate tests:
  - Determine whether or not the problem has been resolved
  - Document findings and any further recommendations
5. Discuss your findings with the class.



**Problem:**

<b>Potential Cause</b>	<b>Potential Solution</b>	<b>Type of Testing</b>	<b>Additional Recommendations</b>

**Instructor Notes (Do not distribute to students)**

Before the activity set up the vehicle/apparatus so that some of the “Recommended Vehicle Problems” are resolved and some are not.

Recommended Vehicle Problems

- Pump would not engage
- Malfunctioning pressure control device
- Dash-side voltmeter at 12 volts with engine running
- Driver-side door won't latch to number 2 position on the Nader pin
- Vehicle leans to the left while parked

### Forecasting Inventory Needs

#### Activity 6-1

**Format:** Small Group (3-5 students)

**Time Frame:** 0:15

#### Description

This activity provides students with an opportunity to utilize previous repair history to determine current and predict future inventory needs.

#### Materials

- Activity sheet
- Pen/pencil
- Sample repair history documents (provided by instructor)

#### Instructions

1. Using the provided repair history documents, create a list of future inventory needs.
2. Share your findings with the class.



# Emergency Vehicle Technician 3A

## Activity 6-2

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### Ordering Inventory

#### Activity 6-2

**Format:** Small Group (3-5 students) or Individual

**Time Frame:** 0:30

#### Description

This activity provides students with an opportunity to research written and electronic sources and manuals and communicate their findings verbally and in writing.

#### Materials

- Activity sheet
- Pen/pencil
- Catalogs and manuals
- Laptop, tablet, or smartphone

#### Instructions

1. Using the provided table, identify the parts, supplier, item number, and cost.
2. Share your findings with the class.

#### Instructor Notes (Remove before distributing to students)

Before the activity, prepopulate the part table with at least two columns of the information, varying columns by line.

Example:

- Parts + Supplier
- Supplier + Item Number
- Parts + Item Number

# Emergency Vehicle Technician 3A

## Activity 3-2

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Part(s)	Supplier	Item Number	Cost
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

# Emergency Vehicle Technician 3A

## Activity 7-1

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### Preparing Estimates

#### Activity 7-1

**Format:** Small Group (3-5 students)

**Time Frame:** 0:30

#### Description

This activity provides students with an opportunity to estimate and calculate costs and repair times, complete documentation and record keeping, and communicate their findings verbally and in writing.

#### Materials

- Activity sheet
- Pen/pencil
- Repair history
- Estimate forms
- Parts lists
- Required repair or upgrade hours
- A calculator

#### Instructions

1. Calculate an estimate for a front axle brake job on one of the following vehicles:
  - A staff car
  - An ambulance
  - A type 1 fire engine
2. Share your findings with the class.

# Emergency Vehicle Technician 3A

## Activity 7-2

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### Scheduling Maintenance and Repairs

#### Activity 7-2

**Format:** Small Group (3-5 students)

**Time Frame:** 1:00

#### Description

This activity provides students with an opportunity to prepare a maintenance and repair schedule for one-person shop so that required repairs or maintenance can be completed in accordance with the projected times.

#### Materials

- Activity sheet
- Pen/pencil
- Blank calendar pages (one year)

#### Instructions

1. Using the following parameters, develop a one-year maintenance and repair schedule.
2. Share your findings with the class.

Staff	Vehicles	Stable Factors	Unexpected Factors
One-person shop	<ul style="list-style-type: none"><li>• Type 1 engines (10)</li><li>• Ambulances (4)</li><li>• Staff cars (12)</li></ul>	<ul style="list-style-type: none"><li>• 4-week academy (June)</li><li>• Fire season</li><li>• 4 weeks of vacation</li><li>• Annual inspections and testing</li><li>• 90-day inspections and testing</li></ul>	<ul style="list-style-type: none"><li>• 1 rig in an accident on March 1<sup>st</sup></li><li>• 1 rig blows a motor in October</li></ul>



# Emergency Vehicle Technician 1

(NFPA Emergency Vehicle Technician I)

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## Certification Task Book (2020)



California Department of Forestry and Fire Protection  
Office of the State Fire Marshal  
State Fire Training

## Overview

### Authority

This certification task book includes the certification training standards set forth in the Emergency Vehicle Technician 1 Certification Training Standards Guide (2020) which is based on NFPA 1071: Standard for Emergency Vehicle Technician Professional Qualifications (2020).

Published: August 2020

Published by: State Fire Training, 2251 Harvard Street, Suite 400, Sacramento, CA 95815

Cover photo courtesy of Lawrence Achen, Central Fire Protection District, Santa Cruz, CA.

### Purpose

The State Fire Training certification task book is a performance-based document that identifies the minimum requirements necessary to perform the duties of that certification. Completion of a certification task book verifies that the candidate has the required experience, holds the required position if applicable, and has demonstrated the job performance requirements to obtain that certification.

### Assumptions

State Fire Training holds the opinion that a Emergency Vehicle Technician 1, Emergency Vehicle Technician 2, or Emergency Vehicle Technician 3 certification candidate may initiate a task book and obtain verification signatures for job performance requirements (JPR) demonstrated during training. A fire chief retains the option to require a candidate to repeat any JPR completed and signed off on during training and to document that performance with a second signature in the candidate's task book.

For candidates who do not work for a California Fire Agency (i.e. non-fire public agency or private industry), the highest-ranking individual (i.e Fleet Manager) assumes the Fire Chief's responsibilities as listed within this certification task book.

Each job JPR shall be evaluated after the candidate initiates the task book.

An evaluator may verify satisfactory execution of a job performance requirement (JPR) through the following methods:

- First-hand observation
- Review of documentation that verifies prior satisfactory execution

State Fire Training task books do not count towards the NWCG task book limit. There is no limit to the number of State Fire Training task books a candidate may pursue at one time if the candidate meets the initiation requirements of each.

It is the candidate's responsibility to routinely check the State Fire Training website for updates to an initiated task book. Any State Fire Training issued update or addendum is required for task book completion.

A candidate must complete a task book within five years its initiation date. Otherwise, a candidate must initiate a new task books using the certification's current published version.

## Roles and Responsibilities

### Candidate

The candidate is the individual pursuing certification.

### Initiation

The candidate shall:

1. Complete all **Initiation Requirements**.
  - Please print or type.

### Completion

The candidate shall:

1. Complete all **Job Performance Requirements**.
  - Ensure that an evaluator initials, signs, and dates each task to verify completion.
2. Complete all **Completion Requirements**.
3. Sign and date the candidate verification statement under **Review and Approval** with a handwritten signature.
4. Obtain their fire chief's handwritten (not stamped) signature on the fire chief verification section.
5. Create and retain a physical or high-resolution digital copy of the completed task book

### Submission

The candidate shall:

1. Submit a copy (physical or digital) of the completed task book and any supporting documentation to State Fire Training.
  - See Submission and Review below.

A candidate should not submit a task book until they have completed all requirements and obtained all signatures. State Fire Training will reject and return an incomplete task book.

### Evaluator

An evaluator is any individual who verifies that the candidate can satisfactorily execute a job performance requirement (JPR).

An evaluator may verify satisfactory execution through the following methods:

- First-hand observation
- Review of documentation that verifies prior satisfactory execution

A qualified evaluator is designated by the candidate's fire chief and holds an equivalent or higher-level certification. If no such evaluator is present, the fire chief shall designate an individual with more experience than the candidate and a demonstrated ability to execute the job performance requirements. If the candidate is being evaluated in a public agency or private industry, the highest-ranking individual familiar with the candidate's experience should sign this task book.

A task book evaluator may be, but is not required to be, a registered skills evaluator who oversees a State Fire Training certification exam.

A certification task book may have more than one evaluator.

All evaluators shall:

1. Complete a block on the **Signature Verification** page with a handwritten signature.
2. Review and understand the candidate's certification task book requirements and responsibilities.
3. Verify the candidate's successful completion of one or more job performance requirements through observation or review.
  - Sign all appropriate lines in the certification task book with a handwritten signature or approved digital signature (e.g. Docusign or Adobe Sign) to record demonstrated performance of tasks.

## Fire Chief

The fire chief is the individual who reviews and confirms the completion of a candidate's certification task book.

A fire chief may identify an authorized designee already on file with State Fire Training to fulfill any task book responsibilities assigned to the fire chief. (See *State Fire Training Procedures Manual*, 4.2.2: Authorized Signatories.)

If the candidate is being evaluated in a public agency or private industry, the highest-ranking individual familiar with the candidate's experience should sign this task book.

## Completion

The fire chief shall:

1. Confirm that the candidate has obtained the appropriate signatures to verify successful completion of each job performance requirement.
2. Confirm that the candidate meets the **Completion Requirements**.
3. Sign and date the Fire Chief verification statement under **Review and Approval** with a handwritten signature.
  - If signing as an authorized designee, verify that your signature is on file with State Fire Training.

## Submission and Review

A candidate should not submit a task book until he or she has completed all requirements and obtained all signatures. State Fire Training will reject and return an incomplete task book.

To submit a completed task book, please send the following to the address below:

- A copy of the completed task book (candidate may retain the original)
- All supporting documentation
- Payment

State Fire Training  
Attn: Certification  
2251 Harvard Street, Suite 400  
Sacramento, CA 95815

State Fire Training reviews all submitted task books.

- If the task book is complete, State Fire Training will authorize the task book and retain a digital copy of the authorized task book in the candidate's State Fire Training file.
- If the task book is incomplete, State Fire Training will return the task book with a notification indicating what needs to be completed prior to resubmission.

Completion of this certification task book is one step in the certification process. Please refer to the *State Fire Training Procedures Manual* for the complete list of qualifications required for certification.

## Initiation Requirements

The following requirements must be completed prior to initiating this task book.

### Candidate Information

Name: \_\_\_\_\_

SFT ID Number: \_\_\_\_\_

Fire Agency: \_\_\_\_\_

Initiation Date: \_\_\_\_\_

The following requirements must be completed prior to initiating this task book.

### Prerequisites

State Fire Training confirms that there are no prerequisites for initiating this certification task book.

### Education

State Fire Training confirms that there are no education requirements for initiating this certification task book.

### Position

State Fire Training confirms that there are no position requirements for initiating this certification task book.

### Fire Chief Approval

State Fire Training confirms that a Fire Chief's approval is not required to initiate this task book.

## Signature Verification

The following individuals have the authority to verify portions of this certification task book using the signature recorded below.

Please print except for the Signature line where a handwritten signature is required. Add additional signature pages as needed.

**Name:** \_\_\_\_\_  
Job Title: \_\_\_\_\_  
Organization: \_\_\_\_\_  
Signature: \_\_\_\_\_

**Name:** \_\_\_\_\_  
Job Title: \_\_\_\_\_  
Organization: \_\_\_\_\_  
Signature: \_\_\_\_\_

**Name:** \_\_\_\_\_  
Job Title: \_\_\_\_\_  
Organization: \_\_\_\_\_  
Signature: \_\_\_\_\_

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Organization: \_\_\_\_\_  
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Job Title: \_\_\_\_\_  
Organization: \_\_\_\_\_  
Signature: \_\_\_\_\_

**Name:** \_\_\_\_\_  
Job Title: \_\_\_\_\_  
Organization: \_\_\_\_\_  
Signature: \_\_\_\_\_



## Job Performance Requirements

The candidate must complete each job performance requirement (JPR) in accordance with the standards of the authority having jurisdiction (AHJ) or the National Fire Protection Association (NFPA), whichever is more restrictive.

All JPRs must be completed within a California fire agency, California Public Agency, California Private Industry or while attending the California Fire Mechanics Academy.

For JPRs that are not part of a candidate's regular work assignment or are a rare event, the evaluator may develop a scenario or interview that supports the required task and evaluate the candidate to the stated standard.

Each JPR shall be evaluated after the candidate initiates the task book.

### Chassis Systems

1. Inspect the chassis systems, given an emergency response vehicle, standard operating procedures (SOPs), manufacturer's specifications, tools and test equipment, an assignment, and an inspection checklist, *calibration, and diagnostic* equipment, so that the structural integrity, the operation, and the condition of the auxiliary drive systems, axles, driveline, steering and suspension system, wheels, and tires are verified to be within manufacturer's specifications; the mounting security is verified; the chassis components are operational and within manufacturer's specifications; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; inspections and services are documented; and any deficiencies found during the inspection and diagnostic check process are documented. (NFPA 4.2.1 / OSFM) (CTS 2-1)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

2. Perform maintenance on the chassis system, given an emergency response vehicle, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, standard operating procedures (SOPs), test and calibration equipment, and tools, so that deformed, broken, loose, worn, or missing parts are repaired or replaced; components are lubricated; fluid levels are maintained; calibrations and adjustment are performed; the system's operational condition is preserved or restored; activities are documented; and additional repair needs are reported. (NFPA 4.2.2) (CTS 2-2)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

3. Inspect chassis systems and components unique to emergency response vehicles, given an emergency response vehicle, standard operating procedures (SOPs), manufacturer's specifications, tools, test and calibration equipment, an assignment, and an inspection checklist, so that the structural integrity of the frame is verified; the operation and condition of independent suspension systems, all-wheel steering systems, secondary braking systems, and auxiliary cooling systems are verified to be within manufacturer's specifications; multiplexing, interface electronics, and load management systems are operationally checked; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and operational checks are documented. (NFPA 4.2.3) (CTS 2-3)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

4. Perform maintenance on chassis systems and components unique to emergency response vehicles, given an emergency response vehicle, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, standard operating procedures (SOPs), test and calibration equipment, and tools and diagnostic equipment, so that deformed, broken, loose, worn, or missing parts are repaired or replaced; components are lubricated; fluid levels are maintained; calibrations and adjustment are performed; the system's operational condition is preserved or restored; activities are documented; and additional repair needs are reported. (NFPA 4.2.4) (CTS 2-4)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

5. Perform repairs on chassis systems and components, given an emergency response vehicle with an identified defective component(s), manufacturer's specifications, standard operating procedures (SOPs), an assignment or inspection report detailing a deficiency or deformation, and test and calibration equipment and tools, so that the identified defective component is diagnosed; deformed, broken, loose, worn, or missing parts of a chassis system or its components are repaired, rebuilt, or replaced to manufacturer's specifications; diagnostic checks are conducted and performance is verified; and the repairs are documented in accordance with the procedures of the jurisdiction. (NFPA 5.2.1 / OSFM) (CTS 2-5)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

6. Complete axle weight performance test on apparatus in accordance with NFPA 1911, given an emergency response vehicle, an applicable driving license (if required) and a commercial certified scale, so that the apparatus weight is determined to ensure that the weight on the vehicle does not exceed the gross axle weight rating (GAWR) and the gross vehicle weight rating (GVWR) or gross combination weight rating (GCWR) as shown on the rating plate on the fire apparatus; and all testing is documented in accordance with the requirements of NFPA standards and the authority having jurisdiction. (NFPA 5.2.2) (CTS 2-6)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

7. Complete braking performance test on apparatus in accordance with NFPA 1911, given an emergency response vehicle, an applicable driving license (if required), and a calibrated driving course so that the apparatus braking system performance is verified to ensure that the braking ability of the apparatus complies with the requirements of NFPA 1911 and federal and state regulations; and all testing is documented in accordance with the requirements of NFPA standards and the authority having jurisdiction. (NFPA 5.2.3) (CTS 2-7)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

8. Complete parking brake performance test on apparatus in accordance with NFPA 1911, given an emergency response vehicle, an applicable driving license (if required), and an appropriate road grade, so that the apparatus parking brake system performance is verified to ensure that the park braking ability of the apparatus complies with the requirements of NFPA 1911 and federal and state regulations; and all testing is documented in accordance with the procedures of NFPA standards and the authority having jurisdiction. (NFPA 5.2.4) (CTS 2-8)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

9. Complete road performance test on apparatus in accordance with NFPA 1911, given an emergency response vehicle, an applicable driving license (if required), and an approved driving course, so that apparatus system performance is verified to ensure that the drivability of the apparatus complies with requirements of NFPA 1911 and federal and state regulations; and all testing is documented in accordance with the requirements of NFPA standards and the authority having jurisdiction. (NFPA 5.2.5 / OSFM) (CTS 2-9)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

## Cab and Body

10. Inspect the cab, given an emergency response vehicle, applicable standard operating procedures (SOPs), manufacturer's specifications, tools and test equipment, an assignment, and an inspection checklist, so that the operation of the cab and components is verified; the condition of finishes, signs, labels, and paint is determined; the operation and condition of the doors, latches, trays, glass, and associated hardware are verified to be within manufacturer's specifications; climate control systems are tested for proper operation; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented. (NFPA 4.3.1) (CTS 3-1)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

11. Perform maintenance on the cab, given an emergency response vehicle, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, standard operating procedures (SOPs), and tools and test equipment, so that the operational condition is preserved or restored; deformed, broken, loose, worn, or missing parts are repaired or replaced; components are lubricated; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; activities are documented; and additional repair needs are reported. (NFPA 4.3.2) (CTS 3-2)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

12. Inspect equipment mounting systems and mounting racks, brackets, and latches, given an emergency response vehicle and its assigned equipment, standard operating procedures (SOPs), manufacturer's specifications, tools and test equipment, an assignment, and an inspection checklist, so that the operation and condition of the mounting system and mounting racks are verified to be within manufacturer's specifications; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and operational checks are documented. (NFPA 4.3.3) (CTS 3-4)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

13. Perform maintenance on equipment mounting systems and mounting racks, brackets, and latches, given an emergency response vehicle, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, standard operating procedures (SOPs), and tools and test equipment, so that warning system components function; all hoses are tight; leaks are stopped; latches are aligned and adjusted to operational condition; fluids are checked and filled; lubricants are applied; any electrical connections are clean and tight; worn pads are replaced; deformed, broken, loose, worn, or missing parts are repaired or replaced; operational condition is preserved or restored; activities are documented; and additional repair needs are reported. (NFPA 4.3.4 / OSFM) (CTS 3-5)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

14. Inspect the operation of the cab tilt system and components, given an emergency response vehicle with a cab tilt system, standard operating procedures (SOPs), manufacturer's specifications, tools and test equipment, an assignment, and an inspection checklist, so that the tilt mechanism is readied safe; the structural integrity is assessed; the operation and condition of all cab tilt components and warning systems are verified to be within manufacturer's specifications; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspections and checks are documented. (NFPA 4.3.5) (CTS 3-7)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

15. Inspect body, compartments, and storage areas, given an emergency response vehicle, standard operating procedures (SOPs), manufacturer's specifications, tools and test equipment, an assignment, and an inspection checklist, so that the operation and condition of the body, compartments, doors, latches, trays, and associated hardware are verified to be within manufacturer's specifications; the condition of finishes, signs, labels, and paint is determined and documented; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 4.3.6) (CTS 3-9)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

16. Perform maintenance on body, compartments, and storage areas, given an emergency response vehicle, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, standard operating procedures (SOPs), and tools and test equipment, so that operational condition is preserved or restored; deformed, broken, loose, worn, or missing parts are repaired or replaced; components are lubricated; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; activities are documented; and additional repair needs are reported. (NFPA 4.3.7) (CTS 3-10)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

17. Perform repairs on equipment-mounting systems and racks, given an emergency response vehicle, an assignment or inspection report detailing a deficiency or deformation, manufacturer's specifications, standard operating procedures (SOPs), and test and calibration equipment and tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an equipment-mounting system or rack are repaired, rebuilt, or replaced to manufacturer's specifications; diagnostic checks are conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.3.1 / OSFM) (CTS 3-6)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

18. Perform repairs on cab tilt systems, given an emergency response vehicle with a cab tilt system, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, standard operating procedures (SOPs), and test and calibration equipment and tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of a cab tilt system are repaired, replaced, or rebuilt to manufacturer's specifications; diagnostic checks are conducted and performance is verified; hazards are avoided; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.3.2 / OSFM) (CTS 3-8)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

19. Perform repairs on body, compartments, and storage areas, given an emergency response vehicle, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, standard operating procedures (SOPs), test and calibration equipment, and tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of a body, compartment, or storage area are repaired, replaced, or rebuilt to manufacturer's specifications; components are fabricated, adjusted, aligned, and lubricated; hazardous conditions are resolved; diagnostic checks are conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.3.3 / OSFM) (CTS 3-11)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

20. Perform repairs on a cab, given an emergency response vehicle, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, standard operating procedures (SOPs), test and calibration equipment, and tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of a cab are repaired, replaced, or rebuilt to manufacturer's specifications; diagnostic checks are conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.3.4 / OSFM) (CTS 3-3)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

## Tank and Accessories

21. Inspect water/foam agent tanks, given an emergency response vehicle with a water or foam tank, standard operating procedures (SOPs), manufacturer's specifications, tools and test equipment, an assignment, and an inspection checklist, so that the mounting and condition of the water/foam agent tank is verified; all coated and noncoated surfaces are free of corrosion; sacrificial anodes are evaluated for life-cycle condition and replaced if necessary; the tank is flushed; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspections and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 4.5.2 / OSFM) (CTS 5-4)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

22. Perform repairs on water/foam tanks, given an emergency response vehicle with a water or foam tank, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, standard operating procedures (SOPs), and tools, so that

leaks are repaired; interior and exterior surfaces are free of corrosion; coatings are renewed; deformed, broken, loose, worn, or missing parts are repaired, replaced, or rebuilt to manufacturer's specifications; service flow test of the tank(s) is conducted; and the repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.5.2 / OSFM) (CTS 5-5)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

## Electrical and Electronic Systems

23. Inspect the low-voltage electrical system, given an emergency response vehicle; standard operating procedures (SOPs), manufacturer's specifications; tools and test equipment, including a belt tension gauge and a digital multimeter (DVOM); an assignment; and an inspection checklist, so that the mounting security is verified; operation and condition of the low-voltage electrical system is verified to be within manufacturer's specifications; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 4.4.1 / OSFM) (CTS 4-1)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

24. Perform maintenance on the low-voltage electrical system, given an emergency response vehicle, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, standard operating procedures (SOPs), test and calibration equipment, and tools, so that deformed, broken, loose, worn, or missing parts are repaired or replaced; the operational condition is preserved or restored; calibration and adjustments are performed; activities are documented; and additional repair needs are reported. (NFPA 4.4.2) (CTS 4-2)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

## Pumps and Accessories

25. Inspect fire pumps or auxiliary pump and related components, given an emergency response vehicle with a fire pump or an auxiliary pump, standard operating procedures (SOPs), manufacturer's specifications, tools and test equipment, an assignment, and an inspection checklist, so that the security of the mounting of all system components (e.g., primer pump, plumbing and valves, pressure control devices, gauges) is verified; operation and condition of the system components, warning system, and interlocks are verified to be within manufacturer's specifications; adjustments are made where required; recommended fluid levels are verified; leaks and fluid contamination are identified and reported; all checklist items are inspected; defects and deficiencies,

including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 4.5.1 / OSFM) (CTS 5-1)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

26. Perform maintenance on a fire pump or auxiliary pump and related components, given an emergency response vehicle with a fire pump or an auxiliary pump, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, standard operating procedures (SOPs), test and calibration equipment, and tools, so that deformed, broken, loose, worn, or missing parts are repaired or replaced; all packing and seals are adjusted to specification; hoses, valves, and fittings are in good condition and are leak-free; fluids are at recommended levels; recommended lubricants are applied; indicator lights are operational and electrical connections are clean and tight; instrumentation is operational; controls are adjusted, lubricated, and operational; the system's operational condition is preserved or restored; activities are documented; and additional repair needs are reported. (NFPA 4.5.3) (CTS 5-2)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

27. Perform repairs on fire pumps or auxiliary pumps and related components, given an emergency response vehicle with a fire pump or auxiliary pump, wildland pump, ultra-high-pressure or industrial pump; manufacturer specifications; an assignment or inspection report detailing a deficiency or deformation; standard operating procedures (SOPs), test, calibration, and diagnostic equipment, and tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts on a fire pump, auxiliary pumps, or related components are repaired, replaced, or rebuilt to manufacturer specifications; operational and service tests are conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.5.1 / OSFM) (CTS 5-3)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

28. Complete performance testing on apparatus fire pumps and related components in accordance with NFPA 1911, given an emergency response vehicle with a fire pump, wildland pump, ultra-high-pressure pump or industrial pump, manufacturer's specifications, standard operating procedures (SOPs), test and calibration equipment, facilities, and tools, so that the pumping systems are capable of meeting the performance requirements without exceeding 110 percent of the original certification test rpm, and all testing is documented in accordance with the procedures of NFPA standards and the authority having jurisdiction. (NFPA 5.5.3 / OSFM) (CTS 5-6)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_



## Completion Requirements

The following requirements must be completed prior to submitting this task book.

### Experience

The candidate meets the following experience requirements.

- Have a minimum of two (2) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles

OR

- Have a minimum of three (3) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required

OR

- Have a minimum of four (4) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.

Agency	Experience	Start Date	End Date

### Position

The candidate meets the qualifications for this level of certification. The position requirement is met when the applicant fulfills the role of the specific duties as defined by the Fire Chief.

## Updates

The candidate has completed and enclosed all updates to this certification task book released by State Fire Training since its initial publication.

Number of enclosed updates: \_\_\_\_\_

## Completion Timeframe

The candidate has completed all requirements documented in this certification task book within five years of its initiation date.

Initiation Date (see Fire Chief signature under **Initiation Requirements**): \_\_\_\_\_

## Review and Approval

### Candidate

Candidate (please print): \_\_\_\_\_

I, the undersigned, am the person applying for Emergency Vehicle Technician 1 certification. I hereby certify under penalty of perjury under the laws of the State of California, that the completion of all requirements documented herein is true in every respect. I understand that misstatements, omissions of material facts, or falsification of information or documents may be cause for rejection or revocation.

Signature and Date: \_\_\_\_\_

### Fire Chief

Candidate's Fire Chief (please print): \_\_\_\_\_

I, the undersigned, am the person authorized to verify the candidate's qualifications for Emergency Vehicle Technician 1 certification. I hereby certify under penalty of perjury under the laws of the State of California, that the completion of all requirements documented herein are true in every respect. I understand that misstatements, omissions of material facts, or falsification of information or documents may be cause for rejection.

Signature and Date: \_\_\_\_\_

# Emergency Vehicle Technician 2

## (NFPA Emergency Vehicle Technician II)

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### Certification Task Book (2020)



California Department of Forestry and Fire Protection  
Office of the State Fire Marshal  
State Fire Training

## Overview

### Authority

This certification task book includes the certification training standards set forth in the Emergency Vehicle Technician 2 Certification Training Standards Guide (2020) which is based on NFPA 1071: Standard for Emergency Vehicle Technician Professional Qualifications (2020).

Published: August 2020

Published by: State Fire Training, 2251 Harvard Street, Suite 400, Sacramento, CA 95815

Cover photo courtesy of Lawrence Achen, Central Fire Protection District, Santa Cruz, CA.

### Purpose

The State Fire Training certification task book is a performance-based document that identifies the minimum requirements necessary to perform the duties of that certification. Completion of a certification task book verifies that the candidate has the required experience, holds the required position if applicable, and has demonstrated the job performance requirements to obtain that certification.

### Assumptions

State Fire Training holds the opinion that a Emergency Vehicle Technician 1, Emergency Vehicle Technician 2, or Emergency Vehicle Technician 3 certification candidate may initiate a task book and obtain verification signatures for job performance requirements (JPR) demonstrated during training. A fire chief retains the option to require a candidate to repeat any JPR completed and signed off on during training and to document that performance with a second signature in the candidate's task book.

For candidates who do not work for a California Fire Agency (i.e. non-fire public agency or private industry), the highest-ranking individual (i.e Fleet Manager) assumes the Fire Chief's responsibilities as listed within this certification task book.

Each job JPR shall be evaluated after the candidate initiates the task book.

An evaluator may verify satisfactory execution of a job performance requirement (JPR) through the following methods:

- First-hand observation
- Review of documentation that verifies prior satisfactory execution

State Fire Training task books do not count towards the NWCG task book limit. There is no limit to the number of State Fire Training task books a candidate may pursue at one time if the candidate meets the initiation requirements of each.

It is the candidate's responsibility to routinely check the State Fire Training website for updates to an initiated task book. Any State Fire Training issued update or addendum is required for task book completion.

A candidate must complete a task book within five years its initiation date. Otherwise, a candidate must initiate a new task books using the certification's current published version.

## Roles and Responsibilities

### Candidate

The candidate is the individual pursuing certification.

### Initiation

The candidate shall:

1. Complete all **Initiation Requirements**.
  - Please print or type.

### Completion

The candidate shall:

1. Complete all **Job Performance Requirements**.
  - Ensure that an evaluator initials, signs, and dates each task to verify completion.
2. Complete all **Completion Requirements**.
3. Sign and date the candidate verification statement under **Review and Approval** with a handwritten signature.
4. Obtain their fire chief's handwritten (not stamped) signature on the fire chief verification section.
5. Create and retain a physical or high-resolution digital copy of the completed task book

### Submission

The candidate shall:

1. Submit a copy (physical or digital) of the completed task book and any supporting documentation to State Fire Training.
  - See Submission and Review below.

A candidate should not submit a task book until they have completed all requirements and obtained all signatures. State Fire Training will reject and return an incomplete task book.

### Evaluator

An evaluator is any individual who verifies that the candidate can satisfactorily execute a job performance requirement (JPR).

An evaluator may verify satisfactory execution through the following methods:

- First-hand observation
- Review of documentation that verifies prior satisfactory execution

A qualified evaluator is designated by the candidate's fire chief and holds an equivalent or higher-level certification. If no such evaluator is present, the fire chief shall designate an individual with more experience than the candidate and a demonstrated ability to execute the job performance requirements. If the candidate is being evaluated in a public agency or private industry, the highest-ranking individual familiar with the candidate's experience should sign this task book.

A task book evaluator may be, but is not required to be, a registered skills evaluator who oversees a State Fire Training certification exam.

A certification task book may have more than one evaluator.

All evaluators shall:

1. Complete a block on the **Signature Verification** page with a handwritten signature.
2. Review and understand the candidate's certification task book requirements and responsibilities.
3. Verify the candidate's successful completion of one or more job performance requirements through observation or review.
  - Sign all appropriate lines in the certification task book with a handwritten signature or approved digital signature (e.g. Docusign or Adobe Sign) to record demonstrated performance of tasks.

## Fire Chief

The fire chief is the individual who reviews and confirms the completion of a candidate's certification task book.

A fire chief may identify an authorized designee already on file with State Fire Training to fulfill any task book responsibilities assigned to the fire chief. (See *State Fire Training Procedures Manual*, 4.2.2: Authorized Signatories.)

If the candidate is being evaluated in a public agency or private industry, the highest-ranking individual familiar with the candidate's experience should sign this task book.

## Completion

The fire chief shall:



1. Confirm that the candidate has obtained the appropriate signatures to verify successful completion of each job performance requirement.
2. Confirm that the candidate meets the **Completion Requirements**.
3. Sign and date the Fire Chief verification statement under **Review and Approval** with a handwritten signature.
  - If signing as an authorized designee, verify that your signature is on file with State Fire Training.

## Submission and Review

A candidate should not submit a task book until he or she has completed all requirements and obtained all signatures. State Fire Training will reject and return an incomplete task book.

To submit a completed task book, please send the following to the address below:

- A copy of the completed task book (candidate may retain the original)
- All supporting documentation
- Payment

State Fire Training  
Attn: Certification  
2251 Harvard Street, Suite 400  
Sacramento, CA 95815

State Fire Training reviews all submitted task books.

- If the task book is complete, State Fire Training will authorize the task book and retain a digital copy of the authorized task book in the candidate's State Fire Training file.
- If the task book is incomplete, State Fire Training will return the task book with a notification indicating what needs to be completed prior to resubmission.

Completion of this certification task book is one step in the certification process. Please refer to the *State Fire Training Procedures Manual* for the complete list of qualifications required for certification.

## Initiation Requirements

The following requirements must be completed prior to initiating this task book.

### Candidate Information

Name: \_\_\_\_\_

SFT ID Number: \_\_\_\_\_

Fire Agency: \_\_\_\_\_

Initiation Date: \_\_\_\_\_

The following requirements must be completed prior to initiating this task book.

### Prerequisites

State Fire Training confirms that there are no prerequisites for initiating this certification task book.

### Education

State Fire Training confirms that there are no education requirements for initiating this certification task book.

### Position

State Fire Training confirms that there are no position requirements for initiating this certification task book.

### Fire Chief Approval

State Fire Training confirms that a Fire Chief's approval is not required to initiate this task book.

## Signature Verification

The following individuals have the authority to verify portions of this certification task book using the signature recorded below.

Please print except for the Signature line where a handwritten signature is required. Add additional signature pages as needed.

**Name:** \_\_\_\_\_  
Job Title: \_\_\_\_\_  
Organization: \_\_\_\_\_  
Signature: \_\_\_\_\_

**Name:** \_\_\_\_\_  
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**Name:** \_\_\_\_\_  
Job Title: \_\_\_\_\_  
Organization: \_\_\_\_\_  
Signature: \_\_\_\_\_

## Job Performance Requirements

The candidate must complete each job performance requirement (JPR) in accordance with the standards of the authority having jurisdiction (AHJ) or the National Fire Protection Association (NFPA), whichever is more restrictive.

All JPRs must be completed within a California fire agency, California Public Agency, California Private Industry or while attending the California Fire Mechanics Academy.

For JPRs that are not part of a candidate's regular work assignment or are a rare event, the evaluator may develop a scenario or interview that supports the required task and evaluate the candidate to the stated standard.

Each JPR shall be evaluated after the candidate initiates the task book.

### Electrical and Electronic Systems

1. Perform repairs on low-voltage electrical system components, given an emergency response vehicle, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, SOPs, test and calibration equipment, and tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of low-voltage electrical system components are repaired, replaced, or rebuilt to manufacturer's specifications; charging systems, starting systems, lighting systems, electrical accessories, and other electrical systems are returned to operation; correct test equipment is used; hazards are avoided; correct parts are used; diagnostic checks are conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.4.1) (CTS 8-1)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

2. Complete performance testing on low-voltage electrical system components including batteries, charging systems, starting systems, onboard chargers, electrical loads, solenoids, and relay devices in accordance with NFPA 1911, given an emergency response vehicle, manufacturer's specifications, SOPs, test and calibration equipment, and tools, so that components are performance tested to assure they are operating in accordance with manufacturer's specifications and NFPA standards; performance tests are conducted to verify that repairs are completed; and all testing is documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.4.3) (CTS 8-2)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

3. Inspect the electronic controls and instrumentation, given an emergency response vehicle; SOPs; manufacturer specifications; tools; test, calibration, and diagnostic equipment; schematics; and an inspection checklist, so that the mounting security is verified; operation and condition of the electronic control system is verified to be within manufacturer specifications; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and tests are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (AHJ / OSFM) (CTS 8-3)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

4. Perform maintenance on the electronic controls and instrumentation, given an emergency response vehicle; manufacturer specifications; a maintenance schedule or assignment; a maintenance checklist; SOPs; test, calibration, and diagnostic equipment; and tools, so that deformed, broken, loose, worn, or missing parts are repaired or replaced; the operational condition is preserved or restored; calibration and adjustments are performed; activities are documented; and additional repair needs are reported. (OSFM) (CTS 8-4)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

5. Perform repairs on electronic controls and instrumentation, given an emergency response vehicle, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, SOPs, test and calibration equipment, and tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an electronic control or instrumentation are repaired, replaced, or rebuilt to manufacturer's specifications; engine, transmission, and brake electronic control units or electronic control modules, pump throttles and pressure control devices, and instrumentation are returned to operation; programming is correct; load control devices, sequencer, interfaces, and interlocks are operational; correct test equipment is used; correct parts are used; correct tests and programming procedures are followed; diagnostic checks are conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.4.2) (CTS 8-5)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

6. Complete performance testing on electronic controls and instrumentation including electronic engine, pump control systems, transmission, brake controls, load control devices, sequencers, interfaces, and interlocks, given an emergency response vehicle; manufacturer specifications; SOPs; test, calibration, and diagnostic equipment; and tools, in accordance with NFPA 1911 so that components are tested to assure they are operating in accordance with manufacturer specifications and NFPA standards; performance tests are conducted to verify that repairs are completed; and all testing is documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (AHJ / OSFM) (CTS 8-6)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

## Completion Requirements

The following requirements must be completed prior to submitting this task book.

### Experience

The candidate meets the following experience requirements.

- Have a minimum of three (3) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles

OR

- Have a minimum of four (4) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required

OR

- Have a minimum of five (5) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.

Agency	Experience	Start Date	End Date

### Position

The candidate meets the qualifications for this level of certification. The position requirement is met when the applicant fulfills the role of the specific duties as defined by the Fire Chief.

## Updates

The candidate has completed and enclosed all updates to this certification task book released by State Fire Training since its initial publication.

Number of enclosed updates: \_\_\_\_\_

## Completion Timeframe

The candidate has completed all requirements documented in this certification task book within five years of its initiation date.

Initiation Date (see Fire Chief signature under **Initiation Requirements**): \_\_\_\_\_



## Review and Approval

### Candidate

Candidate (please print): \_\_\_\_\_

I, the undersigned, am the person applying for Emergency Vehicle Technician 2 certification. I hereby certify under penalty of perjury under the laws of the State of California, that the completion of all requirements documented herein is true in every respect. I understand that misstatements, omissions of material facts, or falsification of information or documents may be cause for rejection or revocation.

Signature and Date: \_\_\_\_\_

### Fire Chief

Candidate's Fire Chief (please print): \_\_\_\_\_

I, the undersigned, am the person authorized to verify the candidate's qualifications for Emergency Vehicle Technician 2 certification. I hereby certify under penalty of perjury under the laws of the State of California, that the completion of all requirements documented herein are true in every respect. I understand that misstatements, omissions of material facts, or falsification of information or documents may be cause for rejection.

Signature and Date: \_\_\_\_\_

# Emergency Vehicle Technician 3 (NFPA Emergency Vehicle Technician III)

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## Certification Task Book (2020)



California Department of Forestry and Fire Protection  
Office of the State Fire Marshal  
State Fire Training

## Overview

### Authority

This certification task book includes the certification training standards set forth in the Emergency Vehicle Technician 3 Certification Training Standards Guide (2020) which is based on NFPA 1071: Standard for Emergency Vehicle Technician Professional Qualifications (2020).

Published: August 2020

Published by: State Fire Training, 2251 Harvard Street, Suite 400, Sacramento, CA 95815

Cover photo courtesy of Lawrence Achen, Central Fire Protection District, Santa Cruz, CA.

### Purpose

The State Fire Training certification task book is a performance-based document that identifies the minimum requirements necessary to perform the duties of that certification. Completion of a certification task book verifies that the candidate has the required experience, holds the required position if applicable, and has demonstrated the job performance requirements to obtain that certification.

### Assumptions

State Fire Training holds the opinion that a Emergency Vehicle Technician 1, Emergency Vehicle Technician 2, or Emergency Vehicle Technician 3 certification candidate may initiate a task book and obtain verification signatures for job performance requirements (JPR) demonstrated during training. A fire chief retains the option to require a candidate to repeat any JPR completed and signed off on during training and to document that performance with a second signature in the candidate's task book.

For candidates who do not work for a California Fire Agency (i.e. non-fire public agency or private industry), the highest-ranking individual (i.e Fleet Manager) assumes the Fire Chief's responsibilities as listed within this certification task book.

Each job JPR shall be evaluated after the candidate initiates the task book.

An evaluator may verify satisfactory execution of a job performance requirement (JPR) through the following methods:

- First-hand observation
- Review of documentation that verifies prior satisfactory execution

State Fire Training task books do not count towards the NWCG task book limit. There is no limit to the number of State Fire Training task books a candidate may pursue at one time if the candidate meets the initiation requirements of each.

It is the candidate's responsibility to routinely check the State Fire Training website for updates to an initiated task book. Any State Fire Training issued update or addendum is required for task book completion.

A candidate must complete a task book within five years its initiation date. Otherwise, a candidate must initiate a new task books using the certification's current published version.

## Roles and Responsibilities

### Candidate

The candidate is the individual pursuing certification.

### Initiation

The candidate shall:

1. Complete all **Initiation Requirements**.
  - Please print or type.

### Completion

The candidate shall:

1. Complete all **Job Performance Requirements**.
  - Ensure that an evaluator initials, signs, and dates each task to verify completion.
2. Complete all **Completion Requirements**.
3. Sign and date the candidate verification statement under **Review and Approval** with a handwritten signature.
4. Obtain their fire chief's handwritten (not stamped) signature on the fire chief verification section.
5. Create and retain a physical or high-resolution digital copy of the completed task book

### Submission

The candidate shall:

1. Submit a copy (physical or digital) of the completed task book and any supporting documentation to State Fire Training.
  - See Submission and Review below.

A candidate should not submit a task book until they have completed all requirements and obtained all signatures. State Fire Training will reject and return an incomplete task book.

### Evaluator

An evaluator is any individual who verifies that the candidate can satisfactorily execute a job performance requirement (JPR).

An evaluator may verify satisfactory execution through the following methods:

- First-hand observation
- Review of documentation that verifies prior satisfactory execution

A qualified evaluator is designated by the candidate's fire chief and holds an equivalent or higher-level certification. If no such evaluator is present, the fire chief shall designate an individual with more experience than the candidate and a demonstrated ability to execute the job performance requirements. If the candidate is being evaluated in a public agency or private industry, the highest-ranking individual familiar with the candidate's experience should sign this task book.

A task book evaluator may be, but is not required to be, a registered skills evaluator who oversees a State Fire Training certification exam.

A certification task book may have more than one evaluator.

All evaluators shall:

1. Complete a block on the **Signature Verification** page with a handwritten signature.
2. Review and understand the candidate's certification task book requirements and responsibilities.
3. Verify the candidate's successful completion of one or more job performance requirements through observation or review.
  - Sign all appropriate lines in the certification task book with a handwritten signature or approved digital signature (e.g. Docusign or Adobe Sign) to record demonstrated performance of tasks.

## Fire Chief

The fire chief is the individual who reviews and confirms the completion of a candidate's certification task book.

A fire chief may identify an authorized designee already on file with State Fire Training to fulfill any task book responsibilities assigned to the fire chief. (See *State Fire Training Procedures Manual*, 4.2.2: Authorized Signatories.)

If the candidate is being evaluated in a public agency or private industry, the highest-ranking individual familiar with the candidate's experience should sign this task book.

## Completion

The fire chief shall:

1. Confirm that the candidate has obtained the appropriate signatures to verify successful completion of each job performance requirement.
2. Confirm that the candidate meets the **Completion Requirements**.
3. Sign and date the Fire Chief verification statement under **Review and Approval** with a handwritten signature.
  - If signing as an authorized designee, verify that your signature is on file with State Fire Training.

## Submission and Review

A candidate should not submit a task book until he or she has completed all requirements and obtained all signatures. State Fire Training will reject and return an incomplete task book.

To submit a completed task book, please send the following to the address below:

- A copy of the completed task book (candidate may retain the original)
- All supporting documentation
- Payment

State Fire Training  
Attn: Certification  
2251 Harvard Street, Suite 400  
Sacramento, CA 95815

State Fire Training reviews all submitted task books.

- If the task book is complete, State Fire Training will authorize the task book and retain a digital copy of the authorized task book in the candidate's State Fire Training file.
- If the task book is incomplete, State Fire Training will return the task book with a notification indicating what needs to be completed prior to resubmission.

Completion of this certification task book is one step in the certification process. Please refer to the *State Fire Training Procedures Manual* for the complete list of qualifications required for certification.

## Initiation Requirements

The following requirements must be completed prior to initiating this task book.

### Candidate Information

Name: \_\_\_\_\_

SFT ID Number: \_\_\_\_\_

Fire Agency: \_\_\_\_\_

Initiation Date: \_\_\_\_\_

The following requirements must be completed prior to initiating this task book.

### Prerequisites

State Fire Training confirms that there are no prerequisites for initiating this certification task book.

### Education

State Fire Training confirms that there are no education requirements for initiating this certification task book.

### Position

State Fire Training confirms that there are no position requirements for initiating this certification task book.

### Fire Chief Approval

State Fire Training confirms that a Fire Chief's approval is not required to initiate this task book.



## Signature Verification

The following individuals have the authority to verify portions of this certification task book using the signature recorded below.

Please print except for the Signature line where a handwritten signature is required. Add additional signature pages as needed.

**Name:** \_\_\_\_\_  
Job Title: \_\_\_\_\_  
Organization: \_\_\_\_\_  
Signature: \_\_\_\_\_

**Name:** \_\_\_\_\_  
Job Title: \_\_\_\_\_  
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Signature: \_\_\_\_\_

**Name:** \_\_\_\_\_  
Job Title: \_\_\_\_\_  
Organization: \_\_\_\_\_  
Signature: \_\_\_\_\_

## Job Performance Requirements

The candidate must complete each job performance requirement (JPR) in accordance with the standards of the authority having jurisdiction (AHJ) or the National Fire Protection Association (NFPA), whichever is more restrictive.

All JPRs must be completed within a California fire agency, California Public Agency, California Private Industry or while attending the California Fire Mechanics Academy.

For JPRs that are not part of a candidate's regular work assignment or are a rare event, the evaluator may develop a scenario or interview that supports the required task and evaluate the candidate to the stated standard.

Each JPR shall be evaluated after the candidate initiates the task book.

### Human Resource Management and Evaluation

1. Assign tasks or responsibilities to technicians, given a work order, an emergency vehicle, work space, and required tools, equipment, and parts, so that the instructions are complete, clear, and concise; safety considerations are addressed; and the work is completed and within the scheduled time. (NFPA 6.2.1) (CTS 11-1)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

2. Conduct individual training for technicians, given an apparatus, an assignment, a workspace, and all necessary tools, so that the technician understands the procedure and is able to demonstrate proficiency at the given task. (NFPA 6.2.2) (CTS 11-2)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

3. Provide input on the performance level of the technician, given a time record, pertinent work orders, and evaluation forms, so that the abilities and weaknesses of a technician can be determined; required counseling and training can be scheduled to maintain or improve a technician's proficiency; or an issue can be referred to the next level of supervision. (NFPA 6.2.3.1) (CTS 11-3)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

4. Recommend, specify, and enforce discipline, given employee history and department SOPs, so that the employee is given the guidance necessary to improve or resolve issues. NFPA 6.2.3.2) (CTS 11-4)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

5. Recommend and enforce safety policies and procedures, given agency safety policies and procedures; federal, state, local, and industry standards for workplace safety; and safety hazards, so that workplace safety is monitored and recommendations for deficiencies are documented. (NFPA 6.2.3.3 / OSFM) (CTS 11-5)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

6. Monitor compliance of applicable environmental regulations, given agency policies and procedures; federal, state, and local environmental regulations; and material safety data sheets (MSDS), so that the workplace is in compliance with all required regulations; and all deficiencies are identified and corrected. (NFPA 6.2.3.4) (CTS 11-6)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

## Inspection

7. Inspect a completed vehicle, given a vehicle, a deficiency list, completed tasks, and required license, so that all deficiencies are repaired; documentation is completed; and the vehicle is diagnostically checked to manufacturer's specifications. (NFPA 6.3.1.1) (CTS 12-1)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

8. Monitor outsourced repairs, given a completed vehicle, a deficiency list, and a list of completed tasks, so that all repairs are verified; and diagnostic checks are completed and documented. (NFPA 6.3.1.2) (CTS 12-2)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

## Equipment and Parts Management

9. Monitor inventory levels within the relevant level of responsibility, given current inventory, agency equipment lists, manufacturer specification, a maintenance schedule, previous repair history, and manufacturer parts manuals, so that the inventory is maintained at the required levels. (NFPA 6.4.1) (CTS 13-1)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

10. Order appropriate parts, given a part number of specification and application of part required, a purchase order form and procedures, and a vendor list, so that the correct part is ordered from the vendor; purchase orders are tracked; and purchase is recorded. (NFPA 6.4.2) (CTS 13-2)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

## Documentation

11. Prepare an estimate of deficiencies or upgrades to be completed on an emergency vehicle, given an emergency vehicle, repair history, estimate forms, parts lists, required repair or upgrade hours, and a calculator, so that the costs are calculated, documented, and communicated. (NFPA 6.5.1) (CTS 14-1)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

12. Adhere to a schedule for maintenance or repair of an emergency vehicle, given an emergency vehicle, a schedule, forms, a repair or maintenance request, current staffing and workload, work estimate, and work space availability, so that required repairs or maintenance can be assigned and completed in accordance with the projected times. (NFPA 6.5.2) (CTS 14-2)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

13. Document warranty repairs, given a repaired vehicle, applicable warranties, a deficiency list, technical service bulletins, and a list of completed tasks, so that all repairs are completed, and diagnostically checked and performance tested if required; and the warranty claim is processed. (NFPA 6.5.3) (CTS 14-3)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

14. Create work orders, given an emergency response vehicle, an assignment, and agency work order forms, so that all work to be performed is documented; all required information is recorded; all necessary information is communicated to the technician(s); and the emergency response vehicle is prepared for repair or maintenance. (NFPA 6.5.4) (CTS 14-4)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

15. Validate maintenance records, given completed documentation of maintenance records and agency record-keeping policies, so that accurate records are maintained. (NFPA 6.5.5) (CTS 14-5)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

## Apparatus Specifications

16. Develop a specification through review and research of existing fire apparatus, given agency recommendations, agency policies and procedures, and applicable NFPA and industry standards, so that technical criteria are presented as a completed specification. (NFPA 6.6.1 / OSFM) (CTS 15-1)

Evaluator Signature: \_\_\_\_\_ Date Verified: \_\_\_\_\_

## Completion Requirements

The following requirements must be completed prior to submitting this task book.

### Experience

The candidate meets the following experience requirements.

- Have a minimum of four (4) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles

OR

- Have a minimum of five (5) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required

OR

- Have a minimum of six (6) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.

Agency	Experience	Start Date	End Date

### Position

The candidate meets the qualifications for this level of certification. The position requirement is met when the applicant fulfills the role of the specific duties as defined by the Fire Chief.

## Updates

The candidate has completed and enclosed all updates to this certification task book released by State Fire Training since its initial publication.

Number of enclosed updates: \_\_\_\_\_

## Completion Timeframe

The candidate has completed all requirements documented in this certification task book within five years of its initiation date.

Initiation Date (see Fire Chief signature under **Initiation Requirements**): \_\_\_\_\_

## Review and Approval

### Candidate

Candidate (please print): \_\_\_\_\_

I, the undersigned, am the person applying for Emergency Vehicle Technician 3 certification. I hereby certify under penalty of perjury under the laws of the State of California, that the completion of all requirements documented herein is true in every respect. I understand that misstatements, omissions of material facts, or falsification of information or documents may be cause for rejection or revocation.

Signature and Date: \_\_\_\_\_

### Fire Chief

Candidate's Fire Chief (please print): \_\_\_\_\_

I, the undersigned, am the person authorized to verify the candidate's qualifications for Emergency Vehicle Technician 3 certification. I hereby certify under penalty of perjury under the laws of the State of California, that the completion of all requirements documented herein are true in every respect. I understand that misstatements, omissions of material facts, or falsification of information or documents may be cause for rejection.

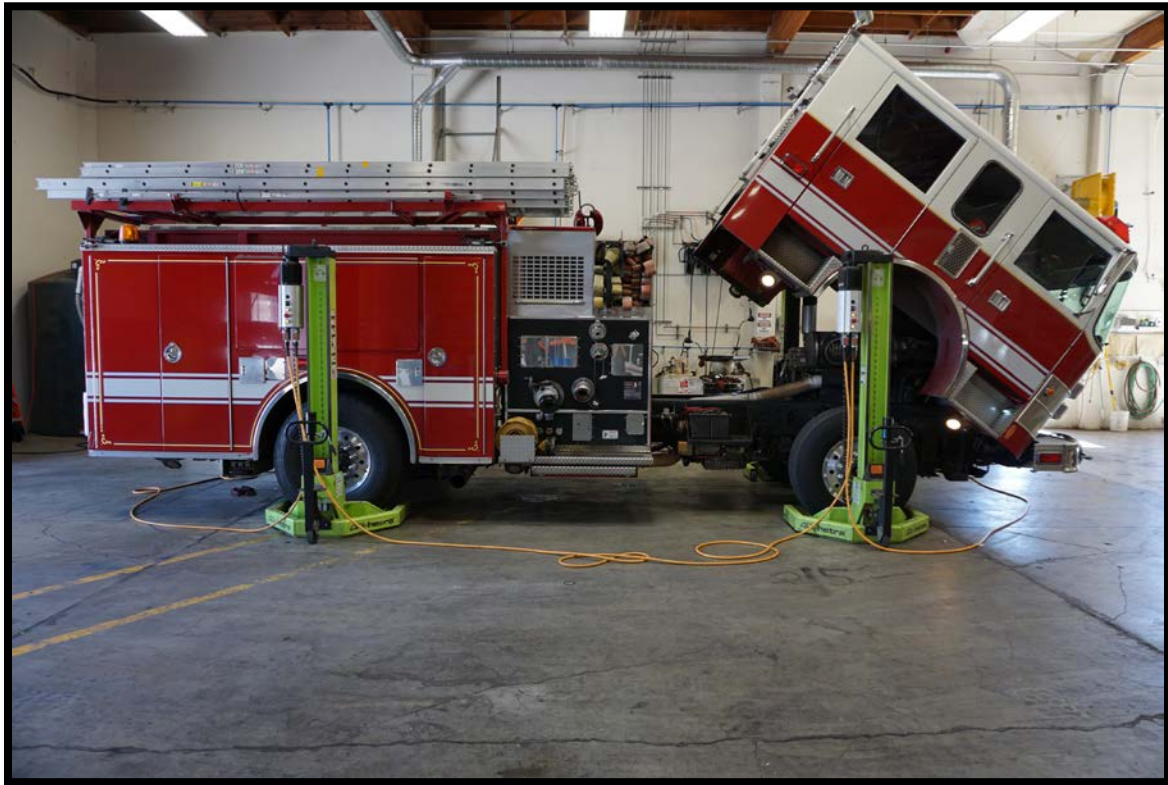
Signature and Date: \_\_\_\_\_



# Emergency Vehicle Technician 1

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## Instructor Task Book (2020)



California Department of Forestry and Fire Protection  
Office of the State Fire Marshal  
State Fire Training

## Purpose and Process

### Purpose

The State Fire Training Instructor: Emergency Vehicle Technician 1 instructor trainee task book is a performance-based document. It lists the minimum Job Performance, Certification, Education, and Position requirements a candidate must meet to teach Emergency Vehicle Technician 1 courses.

### Initiation and Completion Process

#### Candidate Responsibilities

The candidate is the individual pursuing instructor registration.

The candidate shall:

1. Complete the “Candidate” and “Task Book Initiation Requirements” sections on the Task Book Initiation page.
  - Please print.
2. Complete a block on the Signature Verification page with an original wet-ink signature.
3. Complete all Experience requirements.
4. Complete all Position requirements.
5. Obtain the registered instructor’s signature as approval to open the task book using the “Task Book Initiation Approval” section on the Task Book Initiation page.
  - A candidate may not obtain evaluation signatures for any job performance requirements completed prior to the initiation approval date.
6. Complete all Job Performance Requirements.
  - Ensure that an evaluator initials, signs, and dates each task to verify completion.
7. Sign and date the “Candidate” verification section on the Review and Approval page with an original wet-ink signature.
8. Obtain his or fire chief’s original wet-ink signature on the “Candidate’s Fire Chief” verification section on the Review and Approval page.
9. Create and retain a physical or scanned digital copy of the complete task book.
10. Submit the completed task book and any supporting documentation to State Fire Training when registering to instruct Emergency Vehicle Technician 1.

It is the candidate’s responsibility to routinely check the State Fire Training website for updates and addendums to open task books. When State Fire Training issues an update or addendum to an open task book, that update, or addendum is required for task book completion.

A candidate should not submit a task book until they have completed all requirements and obtained all signatures. State Fire Training will reject and return an incomplete task book.

### **Evaluator Responsibilities**

An evaluator is any individual who verifies that the candidate can satisfactorily execute a job performance requirement.

A qualified evaluator is a State Fire Training Registered Instructor for Emergency Vehicle Technician or approved Vendor Expert Instructor authorized by the Instructor of Record.

An instructor task book may have more than one evaluator.

All evaluators shall:

1. Complete a block on the Signature Verification page with an original wet-ink signature.
2. Review and understand the candidate's instructor task book requirements and responsibilities.
3. Verify the candidate's successful completion of one or more job performance requirements through observation or review.
  - A candidate may not obtain evaluation signatures for any job performance requirements completed prior to the initiation approval date.
  - Sign all appropriate lines in the instructor task book with an original wet-ink signature or approved digital signature (e.g. DocuSign or Adobe Sign; a scanned copy of a signature is not acceptable) to record demonstrated performance of tasks.

### **Registered Instructor / Instructor of Record Responsibilities**

The State Fire Training Registered of the Emergency Vehicle Technician 1 courses is the individual who reviews and confirms the completion of a candidate's task book initiation requirements.

The registered instructor shall:

1. Review and understand the candidate's instructor task book requirements and responsibilities.
2. Verify that the candidate has met all requirements and prerequisites prior to initiating the candidate's task book.
3. Open the candidate's task book by signing the "Task Book Initiation Approval" section on the Task Book Initiation page with a wet-ink signature.

## Submission and Review Process

A candidate should not submit a task book until they have completed all requirements and obtained all signatures. State Fire Training will reject and return an incomplete task book.

**Note: For the Emergency Vehicle Technician 1 Instructor Task Book, a candidate only has to complete the JPRs for the course they are seeking to teach.**

Submit the completed task book and any supporting documentation to State Fire Training.

Office of the State Fire Marshal  
State Fire Training  
Attn: Instructor Registration  
2251 Harvard Street, Suite 400  
Sacramento, CA 95815

State Fire Training reviews all submitted task books.

If the task book is complete, State Fire Training will authorize the task book and retain a digital copy of the authorized task book in the candidate's career file.

If the task book is incomplete, State Fire Training will return the task book with a notification indicating what needs to be completed prior to resubmission.

Completion of this instructor task book is one step in the instructor registration process. Please refer to the *State Fire Training Procedures Manual* for the complete list of qualifications required to teach Emergency Vehicle Technician 1 courses.

## Task Book Initiation

Each JPR shall be conducted, reviewed, and validated after the candidate initiates the task book.

This task book must be completed within three years of initiation.

### Candidate

Name: \_\_\_\_\_

SFT ID Number: \_\_\_\_\_

Fire Agency: \_\_\_\_\_

### Task Book Initiation Requirements

The following requirements must be completed prior to opening this task book.

<b>Certification</b>	<b>Complete</b>
Emergency Vehicle Technician 1	<input type="checkbox"/>
Instructor II, or Current Registered Instructor with State Fire Training	<input type="checkbox"/>

<b>Education</b>	<b>Complete</b>
Emergency Vehicle Technician 1A: Emergency Vehicle Systems: Chassis, Cab, Body, Tank and Accessories	<input type="checkbox"/>
Emergency Vehicle Technician 1B: Electrical Systems A; or Preventative Maintenance (CFMA) and Knowing Your Fire Apparatus (CFMA)	<input type="checkbox"/>
Emergency Vehicle Technician 1C: Pumps and Accessories; or Fire Mechanic I: Fire Pumps and Accessories	<input type="checkbox"/>
Gasoline Engines [T1] (ASE)	<input type="checkbox"/>
Diesel Engines [T2] (ASE)	<input type="checkbox"/>
Drive Train [T3] (ASE)	<input type="checkbox"/>
Brakes [T4] (ASE)	<input type="checkbox"/>
Suspension and Steering [T5] (ASE)	<input type="checkbox"/>
Preventative Maintenance Inspections [T8] (ASE)	<input type="checkbox"/>
CFR 396.25: Brake Inspector Qualification (DOT)	<input type="checkbox"/>

## Task Book Initiation Approval

SFT Registered Instructor / Instructor of Record: \_\_\_\_\_  
Printed Name

I, the undersigned, am the person authorized to verify the candidate's task book requirements and to initiate this task book in partial fulfillment of the requirements to teach Emergency Vehicle Technician 1. I hereby certify under penalty of perjury under the laws of the State of California, that the completion of all requirements to open the task book documented herein are true in every respect. I understand that misstatements, omissions of material facts, or falsification of information or documents may be cause for rejection.

\_\_\_\_\_  
SFT Registered Instructor / Instructor of Record Signature

\_\_\_\_\_  
Date

## Signature Verification

The following individuals are SFT registered Emergency Vehicle Technician 1 instructors and have the authority to verify portions of this instructor task book using the signature recorded below.

Please print except for the Signature line. Print and add additional signature pages as needed.

<b>Name:</b> _____	<b>Name:</b> _____
Job Title: _____	Job Title: _____
Organization: _____	Organization: _____
Signature: _____	Signature: _____
<b>Name:</b> _____	<b>Name:</b> _____
Job Title: _____	Job Title: _____
Organization: _____	Organization: _____
Signature: _____	Signature: _____
<b>Name:</b> _____	<b>Name:</b> _____
Job Title: _____	Job Title: _____
Organization: _____	Organization: _____
Signature: _____	Signature: _____
<b>Name:</b> _____	<b>Name:</b> _____
Job Title: _____	Job Title: _____
Organization: _____	Organization: _____
Signature: _____	Signature: _____
<b>Name:</b> _____	<b>Name:</b> _____
Job Title: _____	Job Title: _____
Organization: _____	Organization: _____
Signature: _____	Signature: _____

## Job Performance Requirements

This instructor task book includes the training objectives included in the Instructor Emergency Vehicle Technician course plan, which is based on NFPA 1071: Standard for Emergency Vehicle Technician Professional Qualifications (2020).

The candidate must complete each job performance requirement (JPR) in accordance with the standards of the authority having jurisdiction (AHJ) or the National Fire Protection Association (NFPA), whichever is more restrictive.

Each task must be performed twice.

- The two instances must occur during two different courses.
- The same evaluator can sign off on the same task twice.

Example of correct evaluation:

**Correct:** Task completed during two separate courses and may be evaluated by the same individuals.

	Course Code	Date	Initials
<b>1<sup>st</sup> Evaluation</b>	AAA123	6/10/2020	JAS
<b>2<sup>nd</sup> Evaluation</b>	BBB123	10/10/2020	JAS

**Incorrect:** Task completed twice during one course but evaluated by two separate individuals

	Course Code	Date	Initials
<b>1<sup>st</sup> Evaluation</b>	AAA123	6/10/2020	JAS
<b>2<sup>nd</sup> Evaluation</b>	AAA123	6/10/2020	CWJ

### Emergency Vehicle Technician 1A: Emergency Vehicle Systems: Chassis, Cab, Body, Tank and Accessories (2020)

1. Inspect the chassis systems, given an emergency response vehicle, standard operating procedures (SOPs), manufacturer’s specifications, tools and test equipment, an assignment, and an inspection checklist, calibration, and diagnostic equipment, so that the structural integrity, the operation, and the condition of the auxiliary drive systems, axles, driveline, steering and suspension system, wheels, and tires are verified to be within manufacturer’s specifications; the mounting security is verified; the chassis



components are operational and within manufacturer's specifications; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; inspections and services are documented; and any deficiencies found during the inspection and diagnostic check process are documented. (NFPA 4.2.1 / OSFM) (CTS 2-1)

	Course Code	Date	Initials
1 <sup>st</sup> Evaluation			
2 <sup>nd</sup> Evaluation			

2. Perform maintenance on the chassis system, given an emergency response vehicle, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, standard operating procedures (SOPs), test and calibration equipment, and tools, so that deformed, broken, loose, worn, or missing parts are repaired or replaced; components are lubricated; fluid levels are maintained; calibrations and adjustment are performed; the system's operational condition is preserved or restored; activities are documented; and additional repair needs are reported. (NFPA 4.2.2) (CTS 2-2)

	Course Code	Date	Initials
1 <sup>st</sup> Evaluation			
2 <sup>nd</sup> Evaluation			

3. Inspect chassis systems and components unique to emergency response vehicles, given an emergency response vehicle, standard operating procedures (SOPs), manufacturer's specifications, tools, test and calibration equipment, an assignment, and an inspection checklist, so that the structural integrity of the frame is verified; the operation and condition of independent suspension systems, all-wheel steering systems, secondary braking systems, and auxiliary cooling systems are verified to be within manufacturer's specifications; multiplexing, interface electronics, and load management systems are operationally checked; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and operational checks are documented. (NFPA 4.2.3) (CTS 2-3)

	Course Code	Date	Initials
1 <sup>st</sup> Evaluation			
2 <sup>nd</sup> Evaluation			

4. Perform maintenance on chassis systems and components unique to emergency response vehicles, given an emergency response vehicle, manufacturer's specifications,

a maintenance schedule or an assignment, a maintenance checklist, standard operating procedures (SOPs), test and calibration equipment, and tools and diagnostic equipment, so that deformed, broken, loose, worn, or missing parts are repaired or replaced; components are lubricated; fluid levels are maintained; calibrations and adjustment are performed; the system's operational condition is preserved or restored; activities are documented; and additional repair needs are reported. (NFPA 4.2.4) (CTS 2-4)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

5. Perform repairs on chassis systems and components, given an emergency response vehicle with an identified defective component(s), manufacturer's specifications, standard operating procedures (SOPs), an assignment or inspection report detailing a deficiency or deformation, and test and calibration equipment and tools, so that the identified defective component is diagnosed; deformed, broken, loose, worn, or missing parts of a chassis system or its components are repaired, rebuilt, or replaced to manufacturer's specifications; diagnostic checks are conducted and performance is verified; and the repairs are documented in accordance with the procedures of the jurisdiction. (NFPA 5.2.1 / OSFM) (CTS 2-5)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

6. Complete axle weight performance test on apparatus in accordance with NFPA 1911, given an emergency response vehicle, an applicable driving license (if required) and a commercial certified scale, so that the apparatus weight is determined to ensure that the weight on the vehicle does not exceed the gross axle weight rating (GAWR) and the gross vehicle weight rating (GVWR) or gross combination weight rating (GCWR) as shown on the rating plate on the fire apparatus; and all testing is documented in accordance with the requirements of NFPA standards and the authority having jurisdiction. (NFPA 5.2.2) (CTS 2-6)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

7. Complete braking performance test on apparatus in accordance with NFPA 1911, given an emergency response vehicle, an applicable driving license (if required), and a

calibrated driving course so that the apparatus braking system performance is verified to ensure that the braking ability of the apparatus complies with the requirements of NFPA 1911 and federal and state regulations; and all testing is documented in accordance with the requirements of NFPA standards and the authority having jurisdiction. (NFPA 5.2.3) (CTS 2-7)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

8. Complete parking brake performance test on apparatus in accordance with NFPA 1911, given an emergency response vehicle, an applicable driving license (if required), and an appropriate road grade, so that the apparatus parking brake system performance is verified to ensure that the park braking ability of the apparatus complies with the requirements of NFPA 1911 and federal and state regulations; and all testing is documented in accordance with the procedures of NFPA standards and the authority having jurisdiction. (NFPA 5.2.4) (CTS 2-8)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

9. Complete road performance test on apparatus in accordance with NFPA 1911, given an emergency response vehicle, an applicable driving license (if required), and an approved driving course, so that apparatus system performance is verified to ensure that the drivability of the apparatus complies with requirements of NFPA 1911 and federal and state regulations; and all testing is documented in accordance with the requirements of NFPA standards and the authority having jurisdiction. (NFPA 5.2.5 / OSFM) (CTS 2-9)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

10. Inspect the cab, given an emergency response vehicle, applicable standard operating procedures (SOPs), manufacturer's specifications, tools and test equipment, an assignment, and an inspection checklist, so that the operation of the cab and components is verified; the condition of finishes, signs, labels, and paint is determined; the operation and condition of the doors, latches, trays, glass, and associated hardware are verified to be within manufacturer's specifications; climate control systems are tested for proper operation; all checklist items are inspected; defects and deficiencies,

including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented. (NFPA 4.3.1) (CTS 3-1)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

11. Perform maintenance on the cab, given an emergency response vehicle, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, standard operating procedures (SOPs), and tools and test equipment, so that the operational condition is preserved or restored; deformed, broken, loose, worn, or missing parts are repaired or replaced; components are lubricated; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; activities are documented; and additional repair needs are reported. (NFPA 4.3.2) (CTS 3-2)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

12. Inspect equipment mounting systems and mounting racks, brackets, and latches, given an emergency response vehicle and its assigned equipment, standard operating procedures (SOPs), manufacturer's specifications, tools and test equipment, an assignment, and an inspection checklist, so that the operation and condition of the mounting system and mounting racks are verified to be within manufacturer's specifications; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and operational checks are documented. (NFPA 4.3.3) (CTS 3-4)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

13. Perform maintenance on equipment mounting systems and mounting racks, brackets, and latches, given an emergency response vehicle, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, standard operating procedures (SOPs), and tools and test equipment, so that warning system components function; all hoses are tight; leaks are stopped; latches are aligned and adjusted to operational condition; fluids are checked and filled; lubricants are applied; any electrical connections are clean and tight; worn pads are replaced; deformed, broken, loose, worn, or missing parts are repaired or replaced; operational condition is preserved or

restored; activities are documented; and additional repair needs are reported. (NFPA 4.3.4 / OSFM) (CTS 3-5)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

14. Inspect the operation of the cab tilt system and components, given an emergency response vehicle with a cab tilt system, standard operating procedures (SOPs), manufacturer's specifications, tools and test equipment, an assignment, and an inspection checklist, so that the tilt mechanism is readied safe; the structural integrity is assessed; the operation and condition of all cab tilt components and warning systems are verified to be within manufacturer's specifications; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspections and checks are documented. (NFPA 4.3.5) (CTS 3-7)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

15. Inspect body, compartments, and storage areas, given an emergency response vehicle, standard operating procedures (SOPs), manufacturer's specifications, tools and test equipment, an assignment, and an inspection checklist, so that the operation and condition of the body, compartments, doors, latches, trays, and associated hardware are verified to be within manufacturer's specifications; the condition of finishes, signs, labels, and paint is determined and documented; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 4.3.6) (CTS 3-9)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

16. Perform maintenance on body, compartments, and storage areas, given an emergency response vehicle, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, standard operating procedures (SOPs), and tools and test equipment, so that operational condition is preserved or restored; deformed, broken, loose, worn, or missing parts are repaired or replaced; components are

lubricated; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; activities are documented; and additional repair needs are reported. (NFPA 4.3.7) (CTS 3-10)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

17. Perform repairs on equipment-mounting systems and racks, given an emergency response vehicle, an assignment or inspection report detailing a deficiency or deformation, manufacturer's specifications, standard operating procedures (SOPs), and test and calibration equipment and tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an equipment-mounting system or rack are repaired, rebuilt, or replaced to manufacturer's specifications; diagnostic checks are conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.3.1 / OSFM) (CTS 3-6)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

18. Perform repairs on cab tilt systems, given an emergency response vehicle with a cab tilt system, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, standard operating procedures (SOPs), and test and calibration equipment and tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of a cab tilt system are repaired, replaced, or rebuilt to manufacturer's specifications; diagnostic checks are conducted and performance is verified; hazards are avoided; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.3.2 / OSFM) (CTS 3-8)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

19. Perform repairs on body, compartments, and storage areas, given an emergency response vehicle, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, standard operating procedures (SOPs), test and calibration equipment, and tools, so that defective components are diagnosed;

deformed, broken, loose, worn, or missing parts of a body, compartment, or storage area are repaired, replaced, or rebuilt to manufacturer's specifications; components are fabricated, adjusted, aligned, and lubricated; hazardous conditions are resolved; diagnostic checks are conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.3.3 / OSFM) (CTS 3-11)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

20. Perform repairs on a cab, given an emergency response vehicle, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, standard operating procedures (SOPs), test and calibration equipment, and tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of a cab are repaired, replaced, or rebuilt to manufacturer's specifications; diagnostic checks are conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.3.4 / OSFM) (CTS 3-3)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

21. Inspect water/foam agent tanks, given an emergency response vehicle with a water or foam tank, standard operating procedures (SOPs), manufacturer's specifications, tools and test equipment, an assignment, and an inspection checklist, so that the mounting and condition of the water/foam agent tank is verified; all coated and noncoated surfaces are free of corrosion; sacrificial anodes are evaluated for life-cycle condition and replaced if necessary; the tank is flushed; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspections and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 4.5.2 / OSFM) (CTS 5-4)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

22. Perform repairs on water/foam tanks, given an emergency response vehicle with a water or foam tank, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, standard operating procedures (SOPs), and tools, so that leaks are repaired; interior and exterior surfaces are free of corrosion; coatings are renewed; deformed, broken, loose, worn, or missing parts are repaired, replaced, or rebuilt to manufacturer's specifications; service flow test of the tank(s) is conducted; and the repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.5.2 / OSFM) (CTS 5-5)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

### **Emergency Vehicle Technician 1B: Electrical Systems A (2020)**

23. Inspect the low-voltage electrical system, given an emergency response vehicle; standard operating procedures (SOPs), manufacturer's specifications; tools and test equipment, including a belt tension gauge and a digital multimeter (DVOM); an assignment; and an inspection checklist, so that the mounting security is verified; operation and condition of the low-voltage electrical system is verified to be within manufacturer's specifications; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 4.4.1 / OSFM) (CTS 4-1)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

24. Perform maintenance on the low-voltage electrical system, given an emergency response vehicle, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, standard operating procedures (SOPs), test and calibration equipment, and tools, so that deformed, broken, loose, worn, or missing parts are repaired or replaced; the operational condition is preserved or restored; calibration and adjustments are performed; activities are documented; and additional repair needs are reported. (NFPA 4.4.2) (CTS 4-2)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			



<b>2<sup>nd</sup> Evaluation</b>			

**Emergency Vehicle Technician 1C: Pumps and Accessories (2020)**

25. Inspect fire pumps or auxiliary pump and related components, given an emergency response vehicle with a fire pump or an auxiliary pump, standard operating procedures (SOPs), manufacturer’s specifications, tools and test equipment, an assignment, and an inspection checklist, so that the security of the mounting of all system components (e.g., primer pump, plumbing and valves, pressure control devices, gauges) is verified; operation and condition of the system components, warning system, and interlocks are verified to be within manufacturer’s specifications; adjustments are made where required; recommended fluid levels are verified; leaks and fluid contamination are identified and reported; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and checks are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 4.5.1 / OSFM) (CTS 5-1)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

26. Perform maintenance on a fire pump or auxiliary pump and related components, given an emergency response vehicle with a fire pump or an auxiliary pump, manufacturer’s specifications, a maintenance schedule or an assignment, a maintenance checklist, standard operating procedures (SOPs), test and calibration equipment, and tools, so that deformed, broken, loose, worn, or missing parts are repaired or replaced; all packing and seals are adjusted to specification; hoses, valves, and fittings are in good condition and are leak-free; fluids are at recommended levels; recommended lubricants are applied; indicator lights are operational and electrical connections are clean and tight; instrumentation is operational; controls are adjusted, lubricated, and operational; the system's operational condition is preserved or restored; activities are documented; and additional repair needs are reported. (NFPA 4.5.3) (CTS 5-2)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

27. Perform repairs on fire pumps or auxiliary pumps and related components, given an emergency response vehicle with a fire pump or auxiliary pump, wildland pump, ultra-high-pressure or industrial pump; manufacturer specifications; an assignment or inspection report detailing a deficiency or deformation; standard operating procedures (SOPs), test, calibration, and diagnostic equipment, and tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts on a fire pump, auxiliary pumps, or related components are repaired, replaced, or rebuilt to manufacturer specifications; operational and service tests are conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.5.1 / OSFM) (CTS 5-3)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

28. Complete performance testing on apparatus fire pumps and related components in accordance with NFPA 1911, given an emergency response vehicle with a fire pump, wildland pump, ultra-high-pressure pump or industrial pump, manufacturer's specifications, standard operating procedures (SOPs), test and calibration equipment, facilities, and tools, so that the pumping systems are capable of meeting the performance requirements without exceeding 110 percent of the original certification test rpm, and all testing is documented in accordance with the procedures of NFPA standards and the authority having jurisdiction. (NFPA 5.5.3 / OSFM) (CTS 5-6)

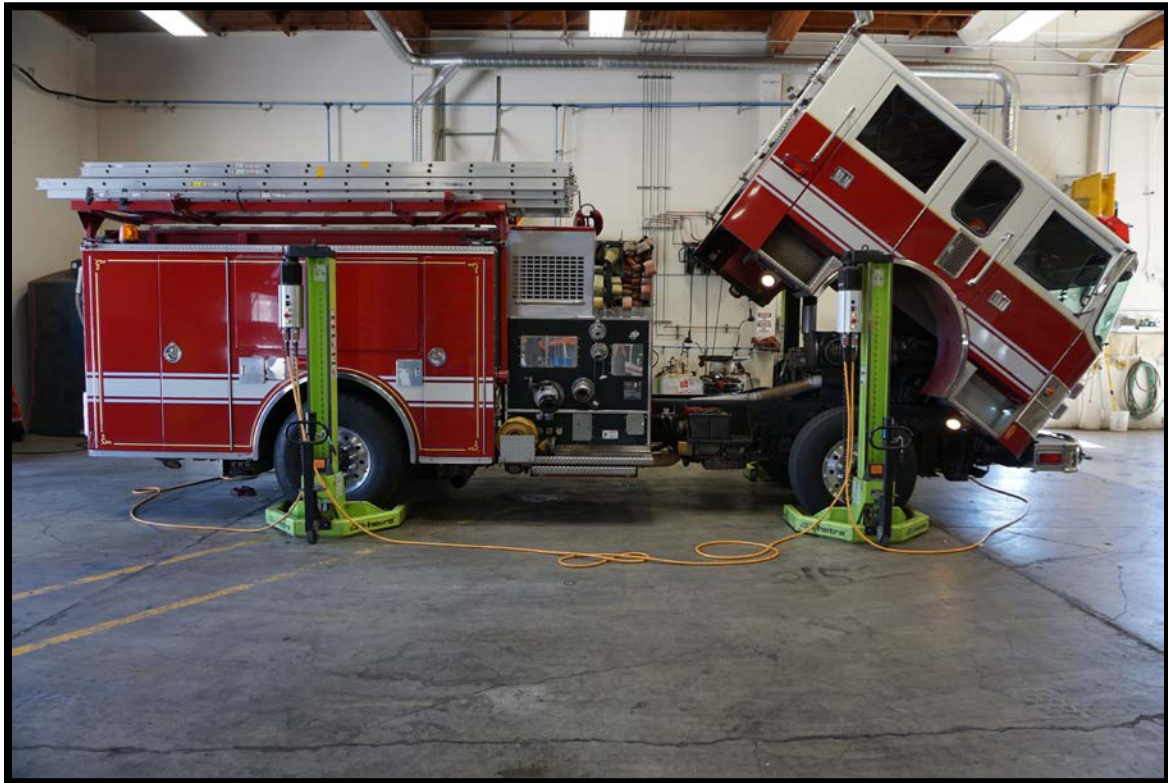
	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			



# Emergency Vehicle Technician 2

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## Instructor Task Book (2020)



California Department of Forestry and Fire Protection  
Office of the State Fire Marshal  
State Fire Training

## Purpose and Process

### Purpose

The State Fire Training Instructor: Emergency Vehicle Technician 2 instructor trainee task book is a performance-based document. It lists the minimum Job Performance, Certification, Education, and Position requirements a candidate must meet to teach Emergency Vehicle Technician 2 courses.

### Initiation and Completion Process

#### Candidate Responsibilities

The candidate is the individual pursuing instructor registration.

The candidate shall:

1. Complete the “Candidate” and “Task Book Initiation Requirements” sections on the Task Book Initiation page.
  - Please print.
2. Complete a block on the Signature Verification page with an original wet-ink signature.
3. Complete all Experience requirements.
4. Complete all Position requirements.
5. Obtain the registered instructor’s signature as approval to open the task book using the “Task Book Initiation Approval” section on the Task Book Initiation page.
  - A candidate may not obtain evaluation signatures for any job performance requirements completed prior to the initiation approval date.
6. Complete all Job Performance Requirements.
  - Ensure that an evaluator initials, signs, and dates each task to verify completion.
7. Sign and date the “Candidate” verification section on the Review and Approval page with an original wet-ink signature.
8. Obtain his or fire chief’s original wet-ink signature on the “Candidate’s Fire Chief” verification section on the Review and Approval page.
9. Create and retain a physical or scanned digital copy of the complete task book.
10. Submit the completed task book and any supporting documentation to State Fire Training when registering to instruct Emergency Vehicle Technician 2.

It is the candidate’s responsibility to routinely check the State Fire Training website for updates and addendums to open task books. When State Fire Training issues an update or addendum to an open task book, that update, or addendum is required for task book completion.

A candidate should not submit a task book until they have completed all requirements and obtained all signatures. State Fire Training will reject and return an incomplete task book.

### **Evaluator Responsibilities**

An evaluator is any individual who verifies that the candidate can satisfactorily execute a job performance requirement.

A qualified evaluator is a State Fire Training Registered Instructor for Emergency Vehicle Technician or approved Vendor Expert Instructor authorized by the Instructor of Record.

An instructor task book may have more than one evaluator.

All evaluators shall:

1. Complete a block on the Signature Verification page with an original wet-ink signature.
2. Review and understand the candidate's instructor task book requirements and responsibilities.
3. Verify the candidate's successful completion of one or more job performance requirements through observation or review.
  - A candidate may not obtain evaluation signatures for any job performance requirements completed prior to the initiation approval date.
  - Sign all appropriate lines in the instructor task book with an original wet-ink signature or approved digital signature (e.g. DocuSign or Adobe Sign; a scanned copy of a signature is not acceptable) to record demonstrated performance of tasks.

### **Registered Instructor / Instructor of Record Responsibilities**

The State Fire Training Registered Instructor of the Emergency Vehicle Technician courses is the individual who reviews and confirms the completion of a candidate's task book initiation requirements.

The registered instructor shall:

1. Review and understand the candidate's instructor task book requirements and responsibilities.
2. Verify that the candidate has met all requirements and prerequisites prior to initiating the candidate's task book.
3. Open the candidate's task book by signing the "Task Book Initiation Approval" section on the Task Book Initiation page with a wet-ink signature.

## Submission and Review Process

A candidate should not submit a task book until they have completed all requirements and obtained all signatures. State Fire Training will reject and return an incomplete task book.

Submit the completed task book and any supporting documentation to State Fire Training.

Office of the State Fire Marshal  
State Fire Training  
Attn: Instructor Registration  
2251 Harvard Street, Suite 400  
Sacramento, CA 95815

State Fire Training reviews all submitted task books.

If the task book is complete, State Fire Training will authorize the task book and retain a digital copy of the authorized task book in the candidate's career file.

If the task book is incomplete, State Fire Training will return the task book with a notification indicating what needs to be completed prior to resubmission.

Completion of this instructor task book is one step in the instructor registration process. Please refer to the *State Fire Training Procedures Manual* for the complete list of qualifications required to teach Emergency Vehicle Technician 2 courses.

## Task Book Initiation

Each JPR shall be conducted, reviewed, and validated after the candidate initiates the task book.

This task book must be completed within three years of initiation.

### Candidate

Name: \_\_\_\_\_

SFT ID Number: \_\_\_\_\_

Fire Agency: \_\_\_\_\_

### Task Book Initiation Requirements

The following requirements must be completed prior to opening this task book.

#### Certification

#### Complete

Emergency Vehicle Technician 2

Instructor II, or Current Registered Instructor with State Fire Training

#### Education

#### Complete

Emergency Vehicle Technician 2A: Electrical Systems B; **or** Fire Mechanic 2A:  
Fire Apparatus Electrical Systems

Gasoline Engines [T1] (ASE)

Diesel Engines [T2] (ASE)

Drive Train [T3] (ASE)

Brakes [T4] (ASE)

Suspension and Steering [T5] (ASE)

Electrical/Electronic Systems [T6] (ASE)

Heating, Ventilation, and Air Conditioning (HVAC) [T7] (ASE)

Preventative Maintenance Inspections [T8] (ASE)

CFR 396.25: Brake Inspector Qualification (DOT)



## Task Book Initiation Approval

SFT Registered Instructor / Instructor of Record: \_\_\_\_\_  
Printed Name

I, the undersigned, am the person authorized to verify the candidate's task book requirements and to initiate this task book in partial fulfillment of the requirements to teach Emergency Vehicle Technician 2. I hereby certify under penalty of perjury under the laws of the State of California, that the completion of all requirements to open the task book documented herein are true in every respect. I understand that misstatements, omissions of material facts, or falsification of information or documents may be cause for rejection.

\_\_\_\_\_  
SFT Registered Instructor / Instructor of Record Signature

\_\_\_\_\_  
Date

## Signature Verification

The following individuals are SFT registered Emergency Vehicle Technician 2 instructors and have the authority to verify portions of this instructor task book using the signature recorded below.

Please print except for the Signature line. Print and add additional signature pages as needed.

<b>Name:</b> _____	<b>Name:</b> _____
Job Title: _____	Job Title: _____
Organization: _____	Organization: _____
Signature: _____	Signature: _____
<b>Name:</b> _____	<b>Name:</b> _____
Job Title: _____	Job Title: _____
Organization: _____	Organization: _____
Signature: _____	Signature: _____
<b>Name:</b> _____	<b>Name:</b> _____
Job Title: _____	Job Title: _____
Organization: _____	Organization: _____
Signature: _____	Signature: _____
<b>Name:</b> _____	<b>Name:</b> _____
Job Title: _____	Job Title: _____
Organization: _____	Organization: _____
Signature: _____	Signature: _____

## Job Performance Requirements

This instructor task book includes the training objectives included in the Instructor Emergency Vehicle Technician course plan, which is based on NFPA 1071: Standard for Emergency Vehicle Technician Professional Qualifications (2020).

The candidate must complete each job performance requirement (JPR) in accordance with the standards of the authority having jurisdiction (AHJ) or the National Fire Protection Association (NFPA), whichever is more restrictive.

Each task must be performed twice.

- The two instances must occur during two different courses.
- The same evaluator can sign off on the same task twice.

Example of correct evaluation:

**Correct:** Task completed during two separate courses and may be evaluated by the same individuals.

	Course Code	Date	Initials
<b>1<sup>st</sup> Evaluation</b>	AAA123	6/10/2020	JAS
<b>2<sup>nd</sup> Evaluation</b>	BBB123	10/10/2020	JAS

**Incorrect:** Task completed twice during one course but evaluated by two separate individuals

	Course Code	Date	Initials
<b>1<sup>st</sup> Evaluation</b>	AAA123	6/10/2020	JAS
<b>2<sup>nd</sup> Evaluation</b>	AAA123	6/10/2020	CWJ

### Emergency Vehicle Technician 2A: Electrical Systems B (2020)

1. Perform repairs on low-voltage electrical system components, given an emergency response vehicle, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, SOPs, test and calibration equipment, and tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of low-voltage electrical system components are repaired, replaced, or rebuilt to manufacturer's specifications; charging systems, starting systems, lighting systems, electrical accessories, and other electrical systems are returned to operation; correct

test equipment is used; hazards are avoided; correct parts are used; diagnostic checks are conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.4.1) (CTS 8-1)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

2. Complete performance testing on low-voltage electrical system components including batteries, charging systems, starting systems, onboard chargers, electrical loads, solenoids, and relay devices in accordance with NFPA 1911, given an emergency response vehicle, manufacturer's specifications, SOPs, test and calibration equipment, and tools, so that components are performance tested to assure they are operating in accordance with manufacturer's specifications and NFPA standards; performance tests are conducted to verify that repairs are completed; and all testing is documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.4.3) (CTS 8-2)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

3. Inspect the electronic controls and instrumentation, given an emergency response vehicle; SOPs; manufacturer specifications; tools; test, calibration, and diagnostic equipment; schematics; and an inspection checklist, so that the mounting security is verified; operation and condition of the electronic control system is verified to be within manufacturer specifications; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and tests are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (AHJ / OSFM) (CTS 8-3)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

4. Perform maintenance on the electronic controls and instrumentation, given an emergency response vehicle; manufacturer specifications; a maintenance schedule or assignment; a maintenance checklist; SOPs; test, calibration, and diagnostic equipment; and tools, so that deformed, broken, loose, worn, or missing parts are repaired or

replaced; the operational condition is preserved or restored; calibration and adjustments are performed; activities are documented; and additional repair needs are reported. (OSFM) (CTS 8-4)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

5. Perform repairs on electronic controls and instrumentation, given an emergency response vehicle, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, SOPs, test and calibration equipment, and tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an electronic control or instrumentation are repaired, replaced, or rebuilt to manufacturer's specifications; engine, transmission, and brake electronic control units or electronic control modules, pump throttles and pressure control devices, and instrumentation are returned to operation; programming is correct; load control devices, sequencer, interfaces, and interlocks are operational; correct test equipment is used; correct parts are used; correct tests and programming procedures are followed; diagnostic checks are conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.4.2) (CTS 8-5)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

6. Complete performance testing on electronic controls and instrumentation including electronic engine, pump control systems, transmission, brake controls, load control devices, sequencers, interfaces, and interlocks, given an emergency response vehicle; manufacturer specifications; SOPs; test, calibration, and diagnostic equipment; and tools, in accordance with NFPA 1911 so that components are tested to assure they are operating in accordance with manufacturer specifications and NFPA standards; performance tests are conducted to verify that repairs are completed; and all testing is documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (AHJ / OSFM) (CTS 8-6)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

7. :Complete braking performance test on apparatus in accordance with NFPA 1911, given an emergency response vehicle, an applicable driving license (if required), and a calibrated driving course so that the apparatus braking system performance is verified to ensure that the braking ability of the apparatus complies with the requirements of NFPA 1911 and federal and state regulations; and all testing is documented in accordance with the requirements of NFPA standards and the authority having jurisdiction. (NFPA 5.2.3) (CTS 2-7)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			



# Emergency Vehicle Technician 3

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## Instructor Task Book (2020)



California Department of Forestry and Fire Protection  
Office of the State Fire Marshal  
State Fire Training



## Purpose and Process

### Purpose

The State Fire Training Instructor: Emergency Vehicle Technician 3 instructor trainee task book is a performance-based document. It lists the minimum Job Performance, Certification, Education, and Position requirements a candidate must meet to teach Emergency Vehicle Technician 3 courses.

### Initiation and Completion Process

#### Candidate Responsibilities

The candidate is the individual pursuing instructor registration.

The candidate shall:

1. Complete the “Candidate” and “Task Book Initiation Requirements” sections on the Task Book Initiation page.
  - Please print.
2. Complete a block on the Signature Verification page with an original wet-ink signature.
3. Complete all Experience requirements.
4. Complete all Position requirements.
5. Obtain the registered instructor’s signature as approval to open the task book using the “Task Book Initiation Approval” section on the Task Book Initiation page.
  - A candidate may not obtain evaluation signatures for any job performance requirements completed prior to the initiation approval date.
6. Complete all Job Performance Requirements.
  - Ensure that an evaluator initials, signs, and dates each task to verify completion.
7. Sign and date the “Candidate” verification section on the Review and Approval page with an original wet-ink signature.
8. Obtain his or fire chief’s original wet-ink signature on the “Candidate’s Fire Chief” verification section on the Review and Approval page.
9. Create and retain a physical or scanned digital copy of the complete task book.
10. Submit the completed task book and any supporting documentation to State Fire Training when registering to instruct Emergency Vehicle Technician 3.

It is the candidate’s responsibility to routinely check the State Fire Training website for updates and addendums to open task books. When State Fire Training issues an update or addendum to an open task book, that update, or addendum is required for task book completion.

A candidate should not submit a task book until they have completed all requirements and obtained all signatures. State Fire Training will reject and return an incomplete task book.

### **Evaluator Responsibilities**

An evaluator is any individual who verifies that the candidate can satisfactorily execute a job performance requirement.

A qualified evaluator is a State Fire Training Registered Instructor for Emergency Vehicle Technician or approved Vendor Expert Instructor authorized by the Instructor of Record.

An instructor task book may have more than one evaluator.

All evaluators shall:

1. Complete a block on the Signature Verification page with an original wet-ink signature.
2. Review and understand the candidate's instructor task book requirements and responsibilities.
3. Verify the candidate's successful completion of one or more job performance requirements through observation or review.
  - A candidate may not obtain evaluation signatures for any job performance requirements completed prior to the initiation approval date.
  - Sign all appropriate lines in the instructor task book with an original wet-ink signature or approved digital signature (e.g. DocuSign or Adobe Sign; a scanned copy of a signature is not acceptable) to record demonstrated performance of tasks.

### **Registered Instructor / Instructor of Record Responsibilities**

The State Fire Training Registered Instructor of the Emergency Vehicle Technician courses is the individual who reviews and confirms the completion of a candidate's task book initiation requirements.

The registered instructor shall:

1. Review and understand the candidate's instructor task book requirements and responsibilities.
2. Verify that the candidate has met all requirements and prerequisites prior to initiating the candidate's task book.
3. Open the candidate's task book by signing the "Task Book Initiation Approval" section on the Task Book Initiation page with a wet-ink signature.

## Submission and Review Process

A candidate should not submit a task book until they have completed all requirements and obtained all signatures. State Fire Training will reject and return an incomplete task book.

Submit the completed task book and any supporting documentation to State Fire Training.

Office of the State Fire Marshal  
State Fire Training  
Attn: Instructor Registration  
2251 Harvard Street, Suite 400  
Sacramento, CA 95815

State Fire Training reviews all submitted task books.

If the task book is complete, State Fire Training will authorize the task book and retain a digital copy of the authorized task book in the candidate's career file.

If the task book is incomplete, State Fire Training will return the task book with a notification indicating what needs to be completed prior to resubmission.

Completion of this instructor task book is one step in the instructor registration process. Please refer to the *State Fire Training Procedures Manual* for the complete list of qualifications required to teach Emergency Vehicle Technician 3 courses.

## Task Book Initiation

Each JPR shall be conducted, reviewed, and validated after the candidate initiates the task book.

This task book must be completed within three years of initiation.

### Candidate

Name: \_\_\_\_\_

SFT ID Number: \_\_\_\_\_

Fire Agency: \_\_\_\_\_

### Task Book Initiation Requirements

The following requirements must be completed prior to opening this task book.

<b>Certification</b>	<b>Complete</b>
Emergency Vehicle Technician 3	<input type="checkbox"/>
Instructor II, or Current Registered Instructor with State Fire Training	<input type="checkbox"/>

<b>Education</b>	<b>Complete</b>
Emergency Vehicle Technician 3A: Human Resource Management / Fleet Specifications and Records B; <b>or</b> Specifications Writing Class (CFMA) <b>and</b> Fire Management I <b>or</b> Company Officer 2A (SFT)	<input type="checkbox"/>
Gasoline Engines [T1] (ASE)	<input type="checkbox"/>
Diesel Engines [T2] (ASE)	<input type="checkbox"/>
Drive Train [T3] (ASE)	<input type="checkbox"/>
Brakes [T4] (ASE)	<input type="checkbox"/>
Suspension and Steering [T5] (ASE)	<input type="checkbox"/>
Electrical/Electronic Systems [T6] (ASE)	<input type="checkbox"/>
Heating, Ventilation, and Air Conditioning (HVAC) [T7] (ASE)	<input type="checkbox"/>
Preventative Maintenance Inspections [T8] (ASE)	<input type="checkbox"/>
CFR 396.25: Brake Inspector Qualification (DOT)	<input type="checkbox"/>

## Task Book Initiation Approval

SFT Registered Instructor / Instructor of Record: \_\_\_\_\_  
Printed Name

I, the undersigned, am the person authorized to verify the candidate has successfully completed the Instructor: Emergency Vehicle Technician 3 course and verify the candidate's task book requirements and to initiate this task book in partial fulfillment of the requirements to teach Emergency Vehicle Technician 3. I hereby certify under penalty of perjury under the laws of the State of California, that the completion of all requirements to open the task book documented herein are true in every respect. I understand that misstatements, omissions of material facts, or falsification of information or documents may be cause for rejection.

\_\_\_\_\_  
SFT Registered Instructor / Instructor of Record Signature

\_\_\_\_\_  
Date

## Signature Verification

The following individuals are SFT registered Emergency Vehicle Technician 3 instructors and have the authority to verify portions of this instructor task book using the signature recorded below.

Please print except for the Signature line. Print and add additional signature pages as needed.

<b>Name:</b> _____	<b>Name:</b> _____
Job Title: _____	Job Title: _____
Organization: _____	Organization: _____
Signature: _____	Signature: _____
<b>Name:</b> _____	<b>Name:</b> _____
Job Title: _____	Job Title: _____
Organization: _____	Organization: _____
Signature: _____	Signature: _____
<b>Name:</b> _____	<b>Name:</b> _____
Job Title: _____	Job Title: _____
Organization: _____	Organization: _____
Signature: _____	Signature: _____
<b>Name:</b> _____	<b>Name:</b> _____
Job Title: _____	Job Title: _____
Organization: _____	Organization: _____
Signature: _____	Signature: _____

## Job Performance Requirements

This instructor task book includes the training objectives included in the Instructor Emergency Vehicle Technician course plan, which is based on NFPA 1071: Standard for Emergency Vehicle Technician Professional Qualifications (2020).

The candidate must complete each job performance requirement (JPR) in accordance with the standards of the authority having jurisdiction (AHJ) or the National Fire Protection Association (NFPA), whichever is more restrictive.

Each task must be performed twice.

- The two instances must occur during two different courses.
- The same evaluator can sign off on the same task twice.

Example of correct evaluation:

**Correct:** Task completed during two separate courses and may be evaluated by the same individuals.

	Course Code	Date	Initials
<b>1<sup>st</sup> Evaluation</b>	AAA123	6/10/2020	JAS
<b>2<sup>nd</sup> Evaluation</b>	BBB123	10/10/2020	JAS

**Incorrect:** Task completed twice during one course but evaluated by two separate individuals

	Course Code	Date	Initials
<b>1<sup>st</sup> Evaluation</b>	AAA123	6/10/2020	JAS
<b>2<sup>nd</sup> Evaluation</b>	AAA123	6/10/2020	CWJ

### Emergency Vehicle Technician 3A: Human Resource Management / Fleet Specifications and Records (2020)

1. Perform repairs on low-voltage electrical system components, given an emergency response vehicle, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, SOPs, test and calibration equipment, and tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of low-voltage electrical system components are repaired, replaced, or rebuilt to manufacturer's specifications; charging systems, starting systems, lighting systems,

electrical accessories, and other electrical systems are returned to operation; correct test equipment is used; hazards are avoided; correct parts are used; diagnostic checks are conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.4.1) (CTS 8-1)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

- Complete performance testing on low-voltage electrical system components including batteries, charging systems, starting systems, onboard chargers, electrical loads, solenoids, and relay devices in accordance with NFPA 1911, given an emergency response vehicle, manufacturer's specifications, SOPs, test and calibration equipment, and tools, so that components are performance tested to assure they are operating in accordance with manufacturer's specifications and NFPA standards; performance tests are conducted to verify that repairs are completed; and all testing is documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.4.3) (CTS 8-2)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

- Inspect the electronic controls and instrumentation, given an emergency response vehicle; SOPs; manufacturer specifications; tools; test, calibration, and diagnostic equipment; schematics; and an inspection checklist, so that the mounting security is verified; operation and condition of the electronic control system is verified to be within manufacturer specifications; all checklist items are inspected; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported; and inspection and tests are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (AHJ / OSFM) (CTS 8-3)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

- Perform maintenance on the electronic controls and instrumentation, given an emergency response vehicle; manufacturer specifications; a maintenance schedule or assignment; a maintenance checklist; SOPs; test, calibration, and diagnostic equipment;



and tools, so that deformed, broken, loose, worn, or missing parts are repaired or replaced; the operational condition is preserved or restored; calibration and adjustments are performed; activities are documented; and additional repair needs are reported. (OSFM) (CTS 8-4)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

5. Perform repairs on electronic controls and instrumentation, given an emergency response vehicle, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, SOPs, test and calibration equipment, and tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an electronic control or instrumentation are repaired, replaced, or rebuilt to manufacturer's specifications; engine, transmission, and brake electronic control units or electronic control modules, pump throttles and pressure control devices, and instrumentation are returned to operation; programming is correct; load control devices, sequencer, interfaces, and interlocks are operational; correct test equipment is used; correct parts are used; correct tests and programming procedures are followed; diagnostic checks are conducted and performance is verified; and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (NFPA 5.4.2) (CTS 8-5)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

6. Complete performance testing on electronic controls and instrumentation including electronic engine, pump control systems, transmission, brake controls, load control devices, sequencers, interfaces, and interlocks, given an emergency response vehicle; manufacturer specifications; SOPs; test, calibration, and diagnostic equipment; and tools, in accordance with NFPA 1911 so that components are tested to assure they are operating in accordance with manufacturer specifications and NFPA standards; performance tests are conducted to verify that repairs are completed; and all testing is documented in accordance with the procedures of the manufacturer and the authority having jurisdiction. (AHJ / OSFM) (CTS 8-6)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			

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7. Complete braking performance test on apparatus in accordance with NFPA 1911, given an emergency response vehicle, an applicable driving license (if required), and a calibrated driving course so that the apparatus braking system performance is verified to ensure that the braking ability of the apparatus complies with the requirements of NFPA 1911 and federal and state regulations; and all testing is documented in accordance with the requirements of NFPA standards and the authority having jurisdiction. (NFPA 5.2.3) (CTS 2-7)

	<b>Course Code</b>	<b>Date</b>	<b>Initials</b>
<b>1<sup>st</sup> Evaluation</b>			
<b>2<sup>nd</sup> Evaluation</b>			





# Emergency Vehicle Technician 1 Certification / Recertification Instructions

## Overview

The California Office of the State Fire Marshal Emergency Vehicle Technician (EVT) 1 Certification is based on the NFPA 1071: Emergency Vehicle Technician I Professional Qualifications set by the National Fire Protection Association (NFPA).

Persons with EVT 1 Certification are required to renew their certification every five (5) years. The recertification requires that the applicant completes 100 hours of approved continuing education (CE) and meet the all prerequisites stated in Recertification Requirements (Option B). All recertification applications must be postmarked on or before the certification expiration date. If the certified EVT 1 did not meet all recertification requirements by the expiration date, the EVT 1 Certification is considered to be lapsed.

If the EVT 1 Certification lapsed, the applicant will be required to complete 100 hours of CE in addition to the completion of additional CE hours. If the certification lapsed less than 6 months, you can regain EVT 1 Certification by completing an additional 8 hours of approved CE. If the certification lapsed between 6 months and less than 12 months, you can regain EVT 1 Certification by completing an additional 16 hours of approved CE. If the certification lapsed between 12 months and less than 18 months, you can regain EVT 1 Certification by completing an additional 24 hours of approved CE. For lapses, greater than 18 months, the applicant will need to retake all SFT courses listed in the Certification Requirements (Option A) Education section and reapply for initial EVT 1 certification, which will require the completion of a new Certification Task Book.

Applicants for initial certification use Option A and Applicants for recertification use Option B.

## Certification Requirements (Option A)

**Prerequisites** (all documents must be current at time of submittal)

- Gasoline Engines [T1] (ASE)
- Diesel Engines [T2] (ASE)
- Drive Train [T3] (ASE)
- Brakes [T4] (ASE)
- Suspension and Steering [T5] (ASE)
- Preventative Maintenance Inspections [T8] (ASE)
- Brake Inspector Qualification (CFR 396.25) - Department of Transportation (DOT)

### Education

- Emergency Vehicle Technician 1A: Emergency Vehicle Systems: Chassis, Cab, Body, Tank and Accessories (2020)
- Emergency Vehicle Technician 1B: Electrical Systems A; **or** Preventative Maintenance (*CFMA*) **AND** Knowing Your Fire Apparatus (*CFMA*)
- Emergency Vehicle Technician 1C: Pumps and Accessories; **or** Fire Mechanic I: Fire Pumps and Accessories (*SFT*)

### Certification Exam

- EVT Certification Commission, Inc. Level I Fire Apparatus Technician (delivered through California Fire Mechanics Academy, Inc. (CFMA)), issued within 5 years from date of application.

### **Certification Task Book**

- Emergency Vehicle Technician 1 Certification Task Book

### **Experience**

- Have a minimum of two (2) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or
- Have a minimum of three (3) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
- Have a minimum of four (4) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.

### **Fee**

- \$65 non-refundable EVT 1 certification fee - payable to: State Fire Training

## **Recertification Requirements (Option B)**

### **Prerequisites** (all must be current/valid)

- Current OSFM Certified Emergency Vehicle Technician 1
- Gasoline Engines [T1] (ASE)
- Diesel Engines [T2] (ASE)
- Drive Train [T3] (ASE)
- Brakes [T4] (ASE)
- Suspension and Steering [T5] (ASE)
- Preventative Maintenance Inspections [T8] (ASE)
- Brake Inspector Qualification (CFR 396.25) - Department of Transportation (DOT)

### **Certification Exam**

- EVT Certification Commission, Inc. Level I Fire Apparatus Technician (delivered through California Fire Mechanics Academy, Inc. (CFMA)), issued within 5 years from date of application.

### **Continuing Education**

- A minimum of 100 hours of CFMA approved continuing education (within five (5) years of attaining Emergency Vehicle Technician 1 certification)
- Additional hours, as required, for lapsed certifications

### **Fee**

- \$60 non-refundable EVT 1 certification fee - payable to: State Fire Training

## **Application Process**

1. Applicant mails the Emergency Vehicle Technician (EVT) 1 Certification / Recertification Application, supporting documentation, and fee to: State Fire Training, EVT Certification, 2251 Harvard Street, Suite 400, Sacramento, CA 95815
2. State Fire Training conducts an application review.
  - If the applicant does not meet the eligibility requirements, SFT issues a denial.

- If the applicant meets the eligibility requirements, SFT issues the digital course diploma(s) through the applicant's SFT User Portal.



**Emergency Vehicle Technician 1 Certification / Recertification Application**  
(REV. 08/20)

**Identification**

**Full Name:** \_\_\_\_\_  
**SFT ID Number:** \_\_\_\_\_  
**Phone (Mobile):** \_\_\_\_\_  
**Email:** \_\_\_\_\_

Submit documentation to verify completion of the following requirements. You do not need to submit verification for anything issued by State Fire Training (SFT) already documented in your SFT User Portal.

**Option A: EVT 1 Certification Submission Requirements**

**Prerequisites**

- Copies of all course completions/certifications shall be submitted.

**Certification Exam**

- EVT Certification Commission, Inc. Level I Fire Apparatus Technician

**Certification Task Book**

- Emergency Vehicle Technician 1 Certification Task Book

**Fees**

- \$65 non-refundable EVT 1 certification fee - payable to: State Fire Training

**Option B: EVT 1 Recertification Submission Requirements**

**Prerequisites**

- Copies of all course completions/certifications shall be submitted.

**Certification Exam**

- EVT Certification Commission, Inc. Level I Fire Apparatus Technician

**Continuing Education**

- A minimum of 100 hours of CFMA approved continuing education (within five (5) years of attaining Emergency Vehicle Technician 1 certification)
- Additional hours, as required, for lapsed certifications

**Fees**

- \$60 non-refundable EVT 1 recertification fee - payable to: State Fire Training

**Authority**

I, the undersigned, am the person applying for Emergency Vehicle Technician 1 certification. I hereby certify under penalty of perjury under the laws of the State of California, that all information contained in this application is true in every respect. I understand that misstatements, omissions of material facts, or falsification of information or documents may be cause for rejection.

Applicant Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
(CAL FIRE Account Code: 0198-\_\_\_\_\_-4143500-413500014-35405902-59210)



# Emergency Vehicle Technician 2 Certification / Recertification Instructions

## Overview

The California Office of the State Fire Marshal Emergency Vehicle Technician (EVT) 2 Certification is based on the NFPA 1071: Emergency Vehicle Technician I Professional Qualifications set by the National Fire Protection Association (NFPA).

Persons with EVT 2 Certification are required to renew their certification every five (5) years. The recertification requires that the applicant completes 100 hours of approved continuing education (CE) and meet the all prerequisites stated in Recertification Requirements (Option B). All recertification applications must be postmarked on or before the certification expiration date. If the certified EVT 2 did not meet all recertification requirements by the expiration date, the EVT 2 Certification is considered to be lapsed.

If the EVT 2 Certification lapsed, the applicant will be required to complete 100 hours of CE in addition to the completion of additional CE hours. If the certification lapsed less than 6 months, you can regain EVT 2 Certification by completing an additional 8 hours of approved CE. If the certification lapsed between 6 months and less than 12 months, you can regain EVT 2 Certification by completing an additional 16 hours of approved CE. If the certification lapsed between 12 months and less than 18 months, you can regain EVT 2 Certification by completing an additional 24 hours of approved CE. For lapses, greater than 18 months, the applicant will need to retake all SFT courses listed in the Certification Requirements (Option A) Education section and reapply for initial EVT 2 certification, which will require the completion of a new Certification Task Book.

Applicants for initial certification use Option A and Applicants for recertification use Option B.

## Certification Requirements (Option A)

**Prerequisites** (all documents must be current at time of submittal)

- Current OSFM Certified Emergency Vehicle Technician 1
- Gasoline Engines [T1] (ASE)
- Diesel Engines [T2] (ASE)
- Drive Train [T3] (ASE)
- Brakes [T4] (ASE)
- Suspension and Steering [T5] (ASE)
- Electrical/Electronic Systems [T6] (ASE)
- Heating, Ventilation, and Air Conditioning (HVAC) [T7] (ASE)
- Preventative Maintenance Inspections [T8] (ASE)
- Brake Inspector Qualification (CFR 396.25) - Department of Transportation (DOT)

### Education

- Emergency Vehicle Technician 2A: Electrical Systems B (2020) (36 Hours) (SFT); or Fire Mechanic 2A: Fire Apparatus Electrical Systems (SFT)

### Certification Exam

- EVT Certification Commission, Inc. Level II Fire Apparatus Technician (delivered through California Fire Mechanics Academy, Inc. (CFMA)), issued within 5 years from date of application.



## **Certification Task Book**

- Emergency Vehicle Technician 2 Certification Task Book

## **Experience**

- Have a minimum of three (3) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or
- Have a minimum of four (4) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
- Have a minimum of five (5) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.

## **Fee**

- \$65 non-refundable EVT 2 certification fee - payable to: State Fire Training

## **Recertification Requirements (Option B)**

### **Prerequisites** (all must be current/valid)

- Current OSFM Certified Emergency Vehicle Technician 2
- Gasoline Engines [T1] (ASE)
- Diesel Engines [T2] (ASE)
- Drive Train [T3] (ASE)
- Brakes [T4] (ASE)
- Suspension and Steering [T5] (ASE)
- Electrical/Electronic Systems [T6] (ASE)
- Heating, Ventilation, and Air Conditioning (HVAC) [T7] (ASE)
- Preventative Maintenance Inspections [T8] (ASE)
- Brake Inspector Qualification (CFR 396.25) - Department of Transportation (DOT)

## **Certification Exam**

- EVT Certification Commission, Inc. Level II Fire Apparatus Technician (delivered through California Fire Mechanics Academy, Inc. (CFMA)), issued within 5 years from date of application.

## **Continuing Education**

- A minimum of 100 hours of CA Fire Mechanics Academy approved continuing education (within five (5) years of attaining Emergency Vehicle Technician 2 certification)
- Additional hours, as required, for lapsed certifications

## **Fee**

- \$60 non-refundable EVT 2 certification fee - payable to: State Fire Training

## **Application Process**

1. Applicant mails the Emergency Vehicle Technician (EVT) 2 Certification / Recertification Application, supporting documentation, and fee to: State Fire Training, EVT Certification, 2251 Harvard Street, Suite 400, Sacramento, CA 95815
2. State Fire Training conducts an application review.
  - If the applicant does not meet the eligibility requirements, SFT issues a denial.
  - If the applicant meets the eligibility requirements, SFT issues the digital course diploma(s) through the applicant's SFT User Portal.



**Emergency Vehicle Technician 2 Certification / Recertification Application**  
(REV. 08/20)

**Identification**

**Full Name:** \_\_\_\_\_  
**SFT ID Number:** \_\_\_\_\_  
**Phone (Mobile):** \_\_\_\_\_  
**Email:** \_\_\_\_\_

Submit documentation to verify completion of the following requirements. You do not need to submit verification for anything issued by State Fire Training (SFT) already documented in your SFT User Portal.

**Option A: EVT 2 Certification Submission Requirements**

**Prerequisites**

- Copies of all course completions/certifications shall be submitted.

**Certification Task Book**

- Emergency Vehicle Technician 2 Certification Task Book

**Certification Exam**

- EVT Certification Commission, Inc. Level II Fire Apparatus Technician

**Fees**

- \$65 non-refundable EVT 2 certification fee - payable to: State Fire Training

**Option B: EVT 2 Recertification Submission Requirements**

**Prerequisites**

- Copies of all course completions/certifications shall be submitted.

**Continuing Education**

- A minimum of 100 hours of CA Fire Mechanics Academy approved continuing education (within five (5) years of attaining Emergency Vehicle Technician 2 certification)
- Additional hours, as required, for lapse certifications

**Certification Exam**

- EVT Certification Commission, Inc. Level II Fire Apparatus Technician

**Fees**

- \$60 non-refundable EVT 2 recertification fee - payable to: State Fire Training

**Authority**

I, the undersigned, am the person applying for Emergency Vehicle Technician 2. I hereby certify under penalty of perjury under the laws of the State of California, that all information contained in this application is true in every respect. I understand that misstatements, omissions of material facts, or falsification of information or documents may be cause for rejection.

Applicant Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
(CAL FIRE Account Code: 0198-\_\_\_\_\_-4143500-4143500014-35405902-59210)



# Emergency Vehicle Technician 3 Certification / Recertification Instructions

## Overview

The California Office of the State Fire Marshal Emergency Vehicle Technician (EVT) 3 Certification is based on the NFPA 1071: Emergency Vehicle Technician I Professional Qualifications set by the National Fire Protection Association (NFPA).

Persons with EVT 3 Certification are required to renew their certification every five (5) years. The recertification requires that the applicant completes 100 hours of approved continuing education (CE) and meet the all prerequisites stated in Recertification Requirements (Option B). All recertification applications must be postmarked on or before the certification expiration date. If the certified EVT 3 did not meet all recertification requirements by the expiration date, the EVT 3 Certification is considered to be lapsed.

If the EVT 3 Certification lapsed, the applicant will be required to complete 100 hours of CE in addition to the completion of additional CE hours. If the certification lapsed less than 6 months, you can regain EVT 3 Certification by completing an additional 8 hours of approved CE. If the certification lapsed between 6 months and less than 12 months, you can regain EVT 3 Certification by completing an additional 16 hours of approved CE. If the certification lapsed between 12 months and less than 18 months, you can regain EVT 3 Certification by completing an additional 24 hours of approved CE. For lapses greater than 18 months, the applicant will need to retake all SFT courses listed in the Certification Requirements (Option A) Education section and reapply for initial EVT 3 certification, which will require the completion of a new Certification Task Book.

Applicants for initial certification use Option A and Applicants for recertification use Option B.

## Certification Requirements (Option A)

**Prerequisites** (all documents must be current at time of submittal)

- Current OSFM Certified Emergency Vehicle Technician 2
- Gasoline Engines [T1] (ASE)
- Diesel Engines [T2] (ASE)
- Drive Train [T3] (ASE)
- Brakes [T4] (ASE)
- Suspension and Steering [T5] (ASE)
- Electrical/Electronic Systems [T6] (ASE)
- Heating, Ventilation, and Air Conditioning (HVAC) [T7] (ASE)
- Preventative Maintenance Inspections [T8] (ASE)
- Brake Inspector Qualification (CFR 396.25) - Department of Transportation (DOT)

### Education

- Emergency Vehicle Technician 3A: Human Resource Management / Fleet Specifications and Records; or Specifications Writing Class (CFMA) **AND** Fire Management I **OR** Company Officer 2A

### Certification Exam

- EVT Certification Commission, Inc. Master Level III Fire Apparatus Technician (delivered through California Fire Mechanics Academy, Inc. (CFMA)), issued within 5 years from date of application.

### **Certification Task Book**

- Emergency Vehicle Technician 3 Certification Task Book

### **Experience**

- Have a minimum of four (4) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or
- Have a minimum of five (5) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
- Have a minimum of six (6) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.

### **Fee**

- \$65 non-refundable EVT 3 certification fee - payable to: State Fire Training

## **Recertification Requirements (Option B)**

### **Prerequisites** (all must be current/valid)

- Current OSFM Certified Emergency Vehicle Technician 3
- Gasoline Engines [T1] (ASE)
- Diesel Engines [T2] (ASE)
- Drive Train [T3] (ASE)
- Brakes [T4] (ASE)
- Suspension and Steering [T5] (ASE)
- Electrical/Electronic Systems [T6] (ASE)
- Heating, Ventilation, and Air Conditioning (HVAC) [T7] (ASE)
- Preventative Maintenance Inspections [T8] (ASE)
- Brake Inspector Qualification (CFR 396.25) - Department of Transportation (DOT)

### **Certification Exam**

- EVT Certification Commission, Inc. Master Level III Fire Apparatus Technician (delivered through California Fire Mechanics Academy, Inc. (CFMA)), issued within 5 years from date of application

### **Continuing Education**

- A minimum of 100 hours of CA Fire Mechanics Academy approved continuing education (within five (5) years of attaining Emergency Vehicle Technician 3)
- Additional hours, as required, for lapse certifications

### **Fee**

- \$60 non-refundable EVT 3 certification fee - payable to: State Fire Training

## **Application Process**

1. Applicant mails the Emergency Vehicle Technician (EVT) 3 Certification / Recertification Application, supporting documentation, and fee to: State Fire Training, EVT Certification, 2251 Harvard Street, Suite 400, Sacramento, CA 95815
2. State Fire Training conducts an application review.
  - If the applicant does not meet the eligibility requirements, SFT issues a denial.

- If the applicant meets the eligibility requirements, SFT issues the digital course diploma(s) through the applicant's SFT User Portal.



**Emergency Vehicle Technician 3 Certification / Recertification Application**  
(REV. 08/20)

**Identification**

**Full Name:** \_\_\_\_\_  
**SFT ID Number:** \_\_\_\_\_  
**Phone (Mobile):** \_\_\_\_\_  
**Email:** \_\_\_\_\_

Submit documentation to verify completion of the following requirements. You do not need to submit verification for anything issued by State Fire Training (SFT) already documented in your SFT User Portal.

**Option A: EVT 3 Certification Submission Requirements**

**Prerequisites**

- Copies of all course completions/certifications shall be submitted.

**Certification Task Book**

- Emergency Vehicle Technician 3 Certification Task Book

**Certification Exam**

- EVT Certification Commission, Inc. Master Level III Fire Apparatus Technician

**Fees**

- \$65 non-refundable EVT 3 certification fee - payable to: State Fire Training

**Option B: EVT 3 Recertification Submission Requirements**

**Prerequisites**

- Copies of all course completions/certifications shall be submitted.

**Continuing Education**

- A minimum of 100 hours of CA Fire Mechanics Academy approved continuing education (within five (5) years of attaining Emergency Vehicle Technician 3 certification)
- Additional hours, as required, for lapse certifications

**Certification Exam**

- EVT Certification Commission, Inc. Master Level III Fire Apparatus Technician

**Fees**

- \$60 non-refundable EVT 3 recertification fee - payable to: State Fire Training

**Authority**

I, the undersigned, am the person applying for Emergency Vehicle Technician 3 certification. I hereby certify under penalty of perjury under the laws of the State of California, that all information contained in this application is true in every respect. I understand that misstatements, omissions of material facts, or falsification of information or documents may be cause for rejection.

Applicant Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
(CAL FIRE Account Code: 0198-\_\_\_\_\_-4143500-4143500014-35405902-59210)



# Fire Mechanic 1 to Emergency Vehicle Technician 1 Historical Lateral Certification

## Overview

The California Office of the State Fire Marshal Emergency Vehicle Technician (EVT) 1 Certification is based on the NFPA 1071: Emergency Vehicle Technician I Professional Qualifications set by the National Fire Protection Association (NFPA).

This application is for persons with a current Fire Mechanic 1 Certification seeking lateral certification to the new Emergency Vehicle Technician 1. For Fire Mechanic 1 Certifications which have expired apply using the EVT 1 Certification Application.

Applicants for initial EVT 1 shall complete the following requirements.

## Certification Requirements

**Prerequisites** (all documents must be current at time of submittal)

- Current OSFM Certified Fire Mechanic 1
- Gasoline Engines [T1] (ASE)
- Diesel Engines [T2] (ASE)
- Drive Train [T3] (ASE)
- Brakes [T4] (ASE)
- Suspension and Steering [T5] (ASE)
- Preventative Maintenance Inspections [T8] (ASE)
- Brake Inspector Qualification (CFR 396.25) - Department of Transportation (DOT)

## Certification Exam

- EVT Certification Commission, Inc. Level I Fire Apparatus Technician (delivered through California Fire Mechanics Academy, Inc. (CFMA)), issued within 5 years from date of application

## Education

- Emergency Vehicle Technician 1A: Emergency Vehicle Systems: Chassis, Cab, Body, Tank and Accessories (2020) (36 hours) (SFT)
- Emergency Vehicle Technician 1B: Electrical Systems A (2020) (36 Hours) (SFT)  
OR Preventative Maintenance (CFMA) AND Knowing Your Fire Apparatus (CFMA)
- Emergency Vehicle Technician 1C: Pumps and Accessories (2020) (36 Hours) (SFT)  
OR Fire Mechanic I: Fire Pumps and Accessories (SFT)

## Fee

- \$65 non-refundable EVT 1 certification fee - payable to: State Fire Training

## Application Process

1. Applicant mails the Fire Mechanic 1 to Emergency Vehicle Technician 1 Historical Lateral Certification Application, supporting documentation, and fee to: State Fire Training, EVT Certification, 2251 Harvard Street, Suite 400, Sacramento, CA 95815
2. State Fire Training conducts an application review.

- If the applicant does not meet the eligibility requirements, SFT issues a denial.
- If the applicant meets the eligibility requirements, SFT issues the digital course diploma(s) through the applicant's SFT User Portal.





# Fire Mechanic 1 to Emergency Vehicle Technician 1 Historical Lateral Certification Application

(REV. 08/20)

## Identification

Full Name: \_\_\_\_\_

SFT ID Number: \_\_\_\_\_

Phone (Mobile): \_\_\_\_\_

Email: \_\_\_\_\_

## Submission Requirements

Submit documentation to verify completion of the following requirements. You do not need to submit verification for anything issued by State Fire Training (SFT) already documented in your SFT User Portal.

### Prerequisites

- Copies of all course completions/certifications shall be submitted.

### Certification Exam

- EVT Certification Commission, Inc. Level I Fire Apparatus Technician

### Fees

- \$65 non-refundable EVT 1 recertification fee - payable to: State Fire Training

## Authority

I, the undersigned, am the person applying for Emergency Vehicle Technician 1 certification. I hereby certify under penalty of perjury under the laws of the State of California, that all information contained in this application is true in every respect. I understand that misstatements, omissions of material facts, or falsification of information or documents may be cause for rejection.

Applicant Signature: \_\_\_\_\_ Date: \_\_\_\_\_

(CAL FIRE Account Code: 0198-\_\_\_\_\_-4143500-4143500014-35405902-59210)



# Fire Mechanic 1 to Emergency Vehicle Technician 2 (EVT 2) Historical Upgrade Certification

## Overview

The California Office of the State Fire Marshal Emergency Vehicle Technician (EVT) 2 Certification is based on the NFPA 1071: Emergency Vehicle Technician I Professional Qualifications set by the National Fire Protection Association (NFPA).

This application is for persons with a Fire Mechanic 1 Certification seeking to upgrade their certification to the new Emergency Vehicle Technician 2 certification.

For Applicants with a current Fire Mechanic 2 certification seeking lateral certification to the new Emergency Vehicle Technician 2 apply using the Fire Mechanic 2 to Emergency Vehicle Technician 2 Historical Lateral Certification Application. For Applicants seeking initial certification as a EVT 2 apply using Emergency Vehicle Technician 2 Certification Application.

Applicants for initial EVT 2 shall complete the following requirements.

## Certification Requirements

**Prerequisites** (all documents must be current at time of submittal)

- Current OSFM Certified Fire Mechanic 1
- Gasoline Engines [T1] (ASE)
- Diesel Engines [T2] (ASE)
- Drive Train [T3] (ASE)
- Brakes [T4] (ASE)
- Suspension and Steering [T5] (ASE)
- Electrical/Electronic Systems [T6] (ASE)
- Heating, Ventilation, and Air Conditioning (HVAC) [T7] (ASE)
- Preventative Maintenance Inspections [T8] (ASE)
- Brake Inspector Qualification (CFR 396.25) - Department of Transportation (DOT)

### Education

- Emergency Vehicle Technician 2A: Electrical Systems B; or Fire Mechanic 2A: Fire Apparatus Electrical Systems

### Certification Task Book

- Emergency Vehicle Technician 2 Certification Task Book

### Certification Exam

- EVT Certification Commission, Inc. Level II Fire Apparatus Technician (delivered through California Fire Mechanics Academy, Inc. (CFMA)), issued within 5 years from date of application

### Experience

- Have a minimum of three (3) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or
- Have a minimum of four (4) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
- Have a minimum of five (5) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.

### Fee

- \$65 non-refundable EVT 2 certification fee - payable to: State Fire Training

### Application Process

1. Applicant mails the Fire Mechanic 1 to Emergency Vehicle Technician 2 (EVT) 2 Certification Application, supporting documentation, and fee to: State Fire Training, EVT Certification, 2251 Harvard Street, Suite 400, Sacramento, CA 95815
2. State Fire Training conducts an application review.
  - If the applicant does not meet the eligibility requirements, SFT issues a denial.
  - If the applicant meets the eligibility requirements, SFT issues the digital course diploma(s) through the applicant's SFT User Portal.



## Fire Mechanic 1 to Emergency Vehicle Technician 2 Historical Upgrade Certification Application

(REV. 08/20)

### Identification

Full Name: \_\_\_\_\_

SFT ID Number: \_\_\_\_\_

Phone (Mobile): \_\_\_\_\_

Email: \_\_\_\_\_

### Fire Mechanic 1 to Emergency Vehicle Technician 2 Certification Submission Requirements

Submit documentation to verify completion of the following requirements. You do not need to submit verification for anything issued by State Fire Training (SFT) already documented in your SFT User Portal.

#### Prerequisites

- Copies of all course completions/certifications shall be submitted.

#### Certification Exam

- EVT Certification Commission, Inc. Level II Fire Apparatus Technician

#### Certification Task Book

- Emergency Vehicle Technician 2 Certification Task Book

#### Fees

- \$65 non-refundable EVT 2 certification fee - payable to: State Fire Training

### Authority

I, the undersigned, am the person applying for course equivalency/s. I hereby certify under penalty of perjury under the laws of the State of California, that all information contained in this application is true in every respect. I understand that misstatements, omissions of material facts, or falsification of information or documents may be cause for rejection.

Applicant Signature: \_\_\_\_\_ Date: \_\_\_\_\_

(CAL FIRE Account Code: 0198-XXXX-4143500-4143500014-35405902-59210)



# Fire Mechanic 2 to Emergency Vehicle Technician 2 Historical Lateral Certification

## Overview

The California Office of the State Fire Marshal Emergency Vehicle Technician (EVT) 2 Certification is based on the NFPA 1071: Emergency Vehicle Technician I Professional Qualifications set by the National Fire Protection Association (NFPA).

This application is for persons with a current Fire Mechanic 2 Certification seeking lateral certification to the new Emergency Vehicle Technician 2. For Fire Mechanic 2 Certifications which have expired apply using the EVT 2 Certification Application.

Applicants for initial EVT 2 shall complete the following requirements.

## Certification Requirements

**Prerequisites** (all documents must be current at time of submittal)

- Current OSFM Certified Fire Mechanic 2
- Gasoline Engines [T1] (ASE)
- Diesel Engines [T2] (ASE)
- Drive Train [T3] (ASE)
- Brakes [T4] (ASE)
- Suspension and Steering [T5] (ASE)
- Electrical/Electronic Systems [T6] (ASE)
- Heating, Ventilation, and Air Conditioning (HVAC) [T7] (ASE)
- Preventative Maintenance Inspections [T8] (ASE)
- Brake Inspector Qualification (CFR 396.25) - Department of Transportation (DOT)

## Education

- Emergency Vehicle Technician 2A: Electrical Systems B (2020) (36 Hours) (SFT); or Fire Mechanic 2A: Fire Apparatus Electrical Systems (SFT)

## Certification Exam

- EVT Certification Commission, Inc. Level II Fire Apparatus Technician (delivered through California Fire Mechanics Academy, Inc. (CFMA)), issued within 5 years from date of application

## Fee

- \$65 non-refundable EVT 2 certification fee - payable to: State Fire Training

## Application Process

1. Applicant mails the Fire Mechanic 2 to Emergency Vehicle Technician 2 Historical Lateral Certification Application, supporting documentation, and fee to: State Fire Training, EVT Certification, 2251 Harvard Street, Suite 400, Sacramento, CA 95815
2. State Fire Training conducts an application review.
  - If the applicant does not meet the eligibility requirements, SFT issues a denial.

- If the applicant meets the eligibility requirements, SFT issues the digital course diploma(s) through the applicant's SFT User Portal.



## Fire Mechanic 2 to Emergency Vehicle Technician 2 Historical Lateral Certification Application

(REV. 04/20)

### Identification

Full Name: \_\_\_\_\_

SFT ID Number: \_\_\_\_\_

Phone (Mobile): \_\_\_\_\_

Email: \_\_\_\_\_

### Submission Requirements

Submit documentation to verify completion of the following requirements. You do not need to submit verification for anything issued by State Fire Training (SFT) already documented in your SFT User Portal.

#### Prerequisites

- Copies of all course completions/certifications shall be submitted.

#### Certification Exam

- EVT Certification Commission, Inc. Level II Fire Apparatus Technician

#### Fees

- \$65 non-refundable EVT 2 recertification fee - payable to: State Fire Training

### Authority

I, the undersigned, am the person applying for Emergency Vehicle Technician 2 certification. I hereby certify under penalty of perjury under the laws of the State of California, that all information contained in this application is true in every respect. I understand that misstatements, omissions of material facts, or falsification of information or documents may be cause for rejection.

Applicant Signature: \_\_\_\_\_ Date: \_\_\_\_\_

(CAL FIRE Account Code: 0198-\_\_\_\_\_-4143500-4143500014-35405902-59210)



# Fire Mechanic 2 to Emergency Vehicle Technician 3 Historical Upgrade Certification

## Overview

The California Office of the State Fire Marshal Emergency Vehicle Technician (EVT) 2 Certification is based on the NFPA 1071: Emergency Vehicle Technician I Professional Qualifications set by the National Fire Protection Association (NFPA).

This application is for persons with a Fire Mechanic 2 Certification seeking to upgrade their certification to the new Emergency Vehicle Technician 3 certification.

For Applicants with a current Fire Mechanic 3 certification seeking lateral certification to the new Emergency Vehicle Technician 3 apply using the Fire Mechanic 3 to Emergency Vehicle Technician 3 Historical Lateral Certification Application. For Applicants seeking initial certification as a EVT 3 apply using Emergency Vehicle Technician 3 Certification.

Applicants for initial EVT 3 shall complete the following requirements.

## Certification Requirements

**Prerequisites** (all documents must be current at time of submittal)

- Current OSFM Certified Fire Mechanic 2
- Gasoline Engines [T1] (ASE)
- Diesel Engines [T2] (ASE)
- Drive Train [T3] (ASE)
- Brakes [T4] (ASE)
- Suspension and Steering [T5] (ASE)
- Electrical/Electronic Systems [T6] (ASE)
- Heating, Ventilation, and Air Conditioning (HVAC) [T7] (ASE)
- Preventative Maintenance Inspections [T8] (ASE)
- Brake Inspector Qualification (CFR 396.25) - Department of Transportation (DOT)

## Education

- Emergency Vehicle Technician 3A: Human Resource Management / Fleet Specifications and Records; **or** Specifications Writing Class (CFMA) **AND** Fire Management I **OR** Company Officer 2A

## Certification Exam

- EVT Certification Commission, Inc. Master Level III Fire Apparatus Technician (delivered through California Fire Mechanics Academy, Inc. (CFMA)), issued within 5 years from date of application

## Certification Task Book

- Emergency Vehicle Technician 3 Certification Task Book

## Experience

- Have a minimum of four (4) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or



- Have a minimum of five (5) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
- Have a minimum of six (6) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.

### **Fee**

- \$65 non-refundable EVT 2 certification fee - payable to: State Fire Training

### **Application Process**

1. Applicant mails the Fire Mechanic 2 to Emergency Vehicle Technician 3 Application, supporting documentation, and fee to: State Fire Training, EVT Certification, 2251 Harvard Street, Suite 400, Sacramento, CA 95815
2. State Fire Training conducts an application review.
  - If the applicant does not meet the eligibility requirements, SFT issues a denial.
  - If the applicant meets the eligibility requirements, SFT issues the digital course diploma(s) through the applicant's SFT User Portal.



## Fire Mechanic 2 to Emergency Vehicle Technician 3 Historical Upgrade Certification Application

(REV. 08/20)

### Identification

Full Name: \_\_\_\_\_

SFT ID Number: \_\_\_\_\_

Phone (Mobile): \_\_\_\_\_

Email: \_\_\_\_\_

### Submission Requirements

Submit documentation to verify completion of the following requirements. You do not need to submit verification for anything issued by State Fire Training (SFT) already documented in your SFT User Portal.

#### Prerequisites

- Copies of all course completions/certifications shall be submitted.

#### Certification Task Book

- Emergency Vehicle Technician 3 Certification Task Book

#### Certification Exam

- EVT Certification Commission, Inc. Master Level III Fire Apparatus Technician

#### Fees

- \$65 non-refundable EVT 3 certification fee - payable to: State Fire Training

### Authority

I, the undersigned, am the person applying for Emergency Vehicle Technician 3 certification. I hereby certify under penalty of perjury under the laws of the State of California, that all information contained in this application is true in every respect. I understand that misstatements, omissions of material facts, or falsification of information or documents may be cause for rejection.

Applicant Signature: \_\_\_\_\_ Date: \_\_\_\_\_

(CAL FIRE Account Code: 0198-\_\_\_\_\_-4143500-4143500014-35405902-59210)



# Fire Mechanic 3 to Emergency Vehicle Technician 3 (EVT 3) Historical Lateral Certification

## Overview

The California Office of the State Fire Marshal Emergency Vehicle Technician (EVT) 2 Certification is based on the NFPA 1071: Emergency Vehicle Technician I Professional Qualifications set by the National Fire Protection Association (NFPA).

This application is for persons with a current Fire Mechanic 3 Certification seeking lateral certification to the new Emergency Vehicle Technician 3. For Fire Mechanic 3 Certifications which have expired apply using the EVT 3 Certification Application.

Applicants for initial EVT 3 shall complete the following requirements.

## Certification Requirements

**Prerequisites** (all documents must be current at time of submittal)

- Current OSFM Certified Fire Mechanic 3
- Gasoline Engines [T1] (ASE)
- Diesel Engines [T2] (ASE)
- Drive Train [T3] (ASE)
- Brakes [T4] (ASE)
- Suspension and Steering [T5] (ASE)
- Electrical/Electronic Systems [T6] (ASE)
- Heating, Ventilation, and Air Conditioning (HVAC) [T7] (ASE)
- Preventative Maintenance Inspections [T8] (ASE)
- Brake Inspector Qualification (CFR 396.25) - Department of Transportation (DOT)

## Education

- Emergency Vehicle Technician 3A: Human Resource Management / Fleet Specifications and Records; **or** Specifications Writing Class (CFMA) **AND** Fire Management I **OR** Company Officer 2A

## Certification Exam

- EVT Certification Commission, Inc. Master Level III Fire Apparatus Technician (delivered through California Fire Mechanics Academy, Inc. (CFMA)), issued within 5 years from date of application

## Fee

- \$65 non-refundable EVT 3 certification fee - payable to: State Fire Training

## Application Process

1. Applicant mails the Emergency Vehicle Technician 3 Historical Lateral Certification Application, supporting documentation, and fee to: State Fire Training, EVT Certification, 2251 Harvard Street, Suite 400, Sacramento, CA 95815
2. State Fire Training conducts an application review.
  - If the applicant does not meet the eligibility requirements, SFT issues a denial.

- If the applicant meets the eligibility requirements, SFT issues the digital course diploma(s) through the applicant's SFT User Portal.



## Fire Mechanic 3 to Emergency Vehicle Technician 3 Historical Lateral Certification Application

(REV. 08/20)

### Identification

Full Name: \_\_\_\_\_

SFT ID Number: \_\_\_\_\_

Phone (Mobile): \_\_\_\_\_

Email: \_\_\_\_\_

### Submission Requirements

Submit documentation to verify completion of the following requirements. You do not need to submit verification for anything issued by State Fire Training (SFT) already documented in your SFT User Portal.

#### Prerequisites

- Copies of all course completions/certifications shall be submitted.

#### Certification Exam

- EVT Certification Commission, Inc. Master Level III Fire Apparatus Technician

#### Fees

- \$65 non-refundable EVT 3 recertification fee - payable to: State Fire Training

### Authority

I, the undersigned, am the person applying for Emergency Vehicle Technician 3 certification. I hereby certify under penalty of perjury under the laws of the State of California, that all information contained in this application is true in every respect. I understand that misstatements, omissions of material facts, or falsification of information or documents may be cause for rejection.

Applicant Signature: \_\_\_\_\_ Date: \_\_\_\_\_

(CAL FIRE Account Code: 0198-\_\_\_\_\_-4143500-4143500014-35405902-59210)



# Fire Mechanic I, II, and III Interim Procedures

Issued: August 2020

## Procedure Changes

- Edition:** January 2019 edition of the State Fire Training Procedures Manual
- Effective Date:** August 1, 2020
- Section Change:** Modify Section 7.9.1, 7.9.3, and 7.9.5: Fire Mechanic I, II, and III
- Justification:** The State Board of Fire Service approved the new Emergency Vehicle Technician 1, 2, and 3 certification tracks and curriculum. Additionally, the State Board of Fire Service approved the implementation plan to retire the Fire Mechanic I, II, and III certification tracks and curriculum on December 31, 2021.
- SFT Contact** [Contact SFT Staff](#) assigned to Instructor Registration.
- Note:** All new text appears in underline. All deleted text appears in ~~strikeout~~

### 7.9.1: FIRE MECHANIC I

#### 7.9.1.1: Overview

- A. Fire Mechanic I certification identifies the skills and knowledge necessary for the Fire Apparatus Mechanic. This certification recognizes the level of expertise needed to properly maintain fire apparatus.
- B. Candidates pursuing Fire Mechanic I certification under the requirements listed here must complete all requirements and submit all application materials and fees postmarked on or before December 31, ~~2019~~2021.

### 7.9.3: FIRE MECHANIC II

#### 7.9.3.1: Overview

- A. Fire Mechanic II certification identifies the advanced skills and knowledge necessary for the contemporary fire apparatus Mechanic. This certification addresses the level of expertise needed to properly maintain the new and complex fire apparatus in service today.
- B. Candidates pursuing Fire Mechanic II certification under the requirements listed here must complete all requirements and submit all application materials and fees postmarked on or before December 31, ~~2019~~2021.



# Fire Mechanic I, II, and III Interim Procedures

## 7.9.5: FIRE MECHANIC III / MASTER MECHANIC

### 7.9.5.1: Overview

- A. Fire Mechanic III/Master Mechanic identifies the advanced skills and knowledge necessary for specialized emergency vehicle fleet repair and program management. This certification addresses the latest level of expertise needed to properly maintain the new and complex fire apparatus in service today.
  
- B. Candidates pursuing Fire Mechanic III/Master Mechanic certification under the requirements listed here must complete all requirements and submit all application materials and fees postmarked on or before December 31, ~~2019~~2021.



# Emergency Vehicle Technician 1 Interim Procedures

Issued: August 2020

## Procedure Changes

- Edition:** January 2019 edition of the State Fire Training Procedures Manual
- Effective Date:** August 1, 2020
- Section Change:** Modify Section 7.9.2: Emergency Vehicle Technician 1
- Justification:** The State Board of Fire Service approved the new Emergency Vehicle Technician 1, 2, and 3 certification tracks and curriculum. Additionally, the State Board of Fire Service approved the implementation plan to retire the Fire Mechanic I, II, and III certification tracks and curriculum on December 31, 2021.
- SFT Contact** [Contact SFT Staff](#) assigned to Instructor Registration.
- Note:** Repeal section 7.9.2 from the January 2019 edition of the State Fire Training Procedures Manual in its entirety. 7.9.2 will be replaced with the text shown below.

## 7.9.2: EMERGENCY VEHICLE TECHNICIAN 1

### 7.9.2.1: Overview

- A. Emergency Vehicle Technician 1 certification identifies the knowledge and skills necessary for the proper inspection and maintenance of emergency apparatus.
- B. Emergency Vehicle Technician 1 certification replaces Fire Mechanic I, scheduled to retire on December 31, 2021.
- C. Candidates pursuing Fire Mechanic I certification under that certification's requirements must complete all requirements and submit all application materials and fees postmarked on or before December 31, 2021.
- D. As of August 1, 2020, candidates pursuing Emergency Vehicle Technician 1 certification should utilize the Emergency Vehicle Technician 1 curriculum.

### 7.9.2.2: History

- A. Established
  - September 1, 1984
- B. Revised
  - January 1, 2001





# Emergency Vehicle Technician 1 Interim Procedures

- National Institute for Auto Service Excellence (ASE) test on Preventative Maintenance Inspections (T8) added
- ASE test on Drive Train (T3) deleted
- ASE test on Engine Performance (A8) deleted
- Experience requirement of heavy equipment mechanic changed to automotive or truck mechanic
- Recertification requirement added
  - Fire Mechanic I certificates expire within one year are eligible for recertification
- January 1, 2003
  - Experience acquired through private industry qualifies
- October 1, 2018
  - Curriculum updated using 2012 State Fire Training Curriculum Development Model and to align with *NFPA 1071: Standard for Emergency Vehicle Technician Professional Qualifications* (2016 edition)
  - Fire Mechanic terminology changed to Emergency Vehicle Technician
  - The following classes will be retired or moved to the Fire Service Training and Education Program (FSTEP):
    - Allison Transmission
    - Ambulance Service and Maintenance
    - Aerial Apparatus
- August 1, 2020
  - Curriculum updated using 2012 State Fire Training Curriculum Development Model and to align with *NFPA 1071: Standard for Emergency Vehicle Technician Professional Qualifications* (2020 edition)

## 7.9.2.3: Prerequisites

A. Not applicable

## 7.9.2.4: Education

- A. CAL FIRE State Fire Training (SFT)
1. Emergency Vehicle Technician 1A: Emergency Vehicle Systems: Chassis, Cab, Body, Tank and Accessories
  2. Emergency Vehicle Technician 1B: Electrical Systems A
    - i. The following California Fire Mechanics Academy courses can meet this requirement: Preventative Maintenance and Knowing Your Fire Apparatus.



# Emergency Vehicle Technician 1 Interim Procedures

3. Emergency Vehicle Technician 1C: Pumps and Accessories; or Fire Mechanic I: Fire Pumps and Accessories
- B. National Institute for Auto Service Excellence (ASE). Must be valid (not expired) at time of application.
1. Gasoline Engines (T1)
  2. Diesel Engines (T2)
  3. Drive Train (T3)
  4. Brakes (T4)
  5. Suspension and Steering (T5)
  6. Preventative Maintenance Inspections (T8)
- C. Department of Transportation (DOT). Must be valid (not expired) at time of application.
1. Brake Inspector Qualification

## 7.9.2.5: Certification Exam

- A. EVT Certification Commission, Inc. Level I Fire Apparatus Technician
1. An independent third-party testing agency will administer certification exams.
- B. The California Fire Mechanics Academy, Inc. (CFMA) will proctor and administer certification exams developed by Emergency Vehicle Technician Certification Commission (EVTCC) for each level of certification.
- C. EVTCC certification examinations will be valid for five (5) years. The EVTCC certification examination must be current in order to complete the application process.

## 7.9.2.6: Certification Task Book

- A. Emergency Vehicle Technician 1 Certification Task Book

## 7.9.2.7: Experience

- A. Fire Service (one of the following three options required)
1. Have a minimum of two (2) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or



# Emergency Vehicle Technician 1 Interim Procedures

2. Have a minimum of three (3) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
3. Have a minimum of four (4) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.

## 7.9.2.8: Position

- A. Not applicable

## 7.9.2.9: Application

- A. See **7.2.4: Application Process – With a Certification Task Book.**
- B. Supporting Documentation
  1. Copies of ASE test completion certificates
    - i. ASE certificates must be current at the time of application.
  2. Copy of DOT Brake Inspector Qualification
  3. Copy of Emergency Vehicle Technician I Certification (EVTCC)

## 7.9.2.10: Maintenance

- A. Emergency Vehicle Technician 1 certification is valid for five years from the date of issuance.

## 7.9.2.11: Recertification

- A. Emergency Vehicle Technician 1 recertification is designed for an individual currently certified as an Emergency Vehicle Technician 1.
- B. The candidate shall have the following six tests from the ASE that are valid (not expired) at time of application:
  1. Gasoline Engines (T1)
  2. Diesel Engines (T2)
  3. Drive Train (T3)
  4. Brakes (T4)
  5. Suspension and Steering (T5)
  6. Preventative Maintenance Inspections (T8)
- C. The candidate shall have a Department of Transportation (DOT) Brake Inspector



# Emergency Vehicle Technician 1 Interim Procedures

Qualification that is valid (not expired) at time of application.

- D. EVT Certification Commission, Inc. Level I Fire Apparatus Technician (issued within five (5) years)
- E. The candidate shall successfully complete a minimum of 100 hours of CFMA-approved continuing education courses.
- F. **See 7.2.4: Application Process – Without a Certification Task Book.**
- G. Supporting documentation:
  - 1. Copies of completion certificates for ASE tests
  - 2. A copy of DOT Brake Inspector Qualification
  - 3. A copy of Emergency Vehicle Technician I Certification (EVTCC)
  - 4. A copy of a completion certificate for CMFA continuing education
- H. SFT shall review applications as they are received.
  - 1. **See 7.2.3.2: State Fire Training Review.**

## 7.9.2.12: Lapsed Certification

- A. Emergency Vehicle Technician 1 certification candidates who did not submit all recertification requirements by the expiration date, the SFT certification is considered to be lapsed.
  - 1. All recertification requirements must be completed and postmarked to SFT by the expiration date.
- B. For a lapsed certification you can regain a SFT Certification by completing additional CFMA-approved continuing education courses and other listed requirements. The continuing education hours are in addition to the 100 hours required for recertification. Once these requirements are met, certification candidates can apply for recertification.
  - 1. For lapses less than 6 months: 8 hours of continuing education
  - 2. For lapses 6 months to less than 12 months: 16 hours of continuing education
  - 3. For lapses of 12 months to 24 months:
    - i. 24 hours continuing education; and
    - ii. Complete Emergency Vehicle Technician I certification exam (see **7.9.2.5: Certification Exam**)
  - 4. For lapses greater than 24 months:
    - i. Complete entire Emergency Vehicle Technician I education courses (see



# Emergency Vehicle Technician 1 Interim Procedures

## 7.9.2.4: Education)

- ii. Complete Emergency Vehicle Technician I certification exam (see **7.9.2.5: Certification Exam**)

## 7.9.2.13: Historical Lateral

- A. Emergency Vehicle Technician 1 historical lateral is designed for an individual currently certified as a Fire Mechanic I.
- B. The candidate shall meet the requirements for Emergency Vehicle Technician 1 certification Section **7.9.2.4** through **7.9.2.5**; **Section 7.9.2.9 (B)** and Section **7.9.2.11 (F)** through **7.9.2.11 (G.3)**



# Emergency Vehicle Technician 2 Interim Procedures

Issued: August 2020

## Procedure Changes

- Edition:** January 2019 edition of the State Fire Training Procedures Manual
- Effective Date:** August 1, 2020
- Section Change:** Modify Section 7.9.4: Emergency Vehicle Technician 2
- Justification:** The State Board of Fire Service approved the new Emergency Vehicle Technician 1, 2, and 3 certification tracks and curriculum. Additionally, the State Board of Fire Service approved the implementation plan to retire the Fire Mechanic I, II, and III certification tracks and curriculum on December 31, 2021.
- SFT Contact** [Contact SFT Staff](#) assigned to Instructor Registration.
- Note:** Repeal section 7.9.4 from the January 2019 edition of the State Fire Training Procedures Manual in its entirety. 7.9.4 will be replaced with the text shown below.

## 7.9.4: EMERGENCY VEHICLE TECHNICIAN 2

### 7.9.4.1: Overview

- A. Emergency Vehicle Technician 2 certification identifies the advanced knowledge and skills necessary for the proper repair of emergency apparatus.
- B. Emergency Vehicle Technician 2 certification replaces Fire Mechanic II, scheduled to retire on December 31, 2021.
- C. Candidates pursuing Fire Mechanic II certification under that certification's requirements must complete all requirements and submit all application materials and fees postmarked on or before December 31, 2021.
- D. As of August 1, 2020, candidates pursuing Emergency Vehicle Technician 2 certification should utilize the Emergency Vehicle Technician 2 curriculum.

### 7.9.4.2: History

- A. Established
  - September 1, 1984
- B. Revised
  - January 1, 2001



# Emergency Vehicle Technician 2 Interim Procedures

- National Institute for Auto Service Excellence (ASE) test on Preventative Maintenance Inspections (T8) added
- ASE test on Drive Train (T3) deleted
- ASE test on Engine Performance (A8) deleted
- Experience requirement of heavy equipment mechanic changed to automotive or truck mechanic
- Recertification requirement added
  - Fire Mechanic I certificates expired within one year are eligible for recertification
- January 1, 2003
  - Experience acquired through private industry qualifies
- January 1, 2010
  - Curriculum updated to align with NFPA 1071: Standard for Emergency Vehicle Technician Professional Qualifications (2011 edition)
- October 1, 2018
  - Curriculum updated using 2012 State Fire Training Curriculum Development Model and to align with *NFPA 1071: Standard for Emergency Vehicle Technician Professional Qualifications* (2016 edition)
  - Fire Mechanic terminology changed to Emergency Vehicle Technician
  - The following classes will be retired or moved to the Fire Service Training and Education Program (FSTEP):
    - Allison Transmission
    - Ambulance Service and Maintenance
    - Aerial Apparatus
- August 1, 2020
  - Curriculum updated using 2012 State Fire Training Curriculum Development Model and to align with *NFPA 1071: Standard for Emergency Vehicle Technician Professional Qualifications* (2020 edition)

## 7.9.4.3: Prerequisites

- A. Office of the State Fire Marshal (OSFM) certified Emergency Vehicle Technician 1

## 7.9.4.4: Education

- A. CAL FIRE State Fire Training (SFT)
  1. Emergency Vehicle Technician 2A: Electrical Systems B; or Fire Mechanic 2A: Fire Apparatus Electrical Systems



## Emergency Vehicle Technician 2 Interim Procedures

- B. National Institute for Auto Service Excellence (ASE). Must be valid (not expired) at time of application.
  - 1. Gasoline Engines (T1)
  - 2. Diesel Engines (T2)
  - 3. Drive Train (T3)
  - 4. Brakes (T4)
  - 5. Suspension and Steering (T5)
  - 6. Electrical/Electronic Systems (T6)
  - 7. Heating, Ventilation, and Air Conditioning (HVAC) (T7)
  - 8. Preventative Maintenance Inspections (T8)
- C. Department of Transportation (DOT). Must be valid (not expired) at time of application.
  - 1. Brake Inspector Qualification

### 7.9.4.5: Certification Exam

- A. EVT Certification Commission, Inc. Level II Fire Apparatus Technician
  - 1. An independent third-party testing agency will administer certification exams.
- B. The California Fire Mechanics Academy, Inc. (CFMA) will proctor and administer certification exams developed by Emergency Vehicle Technician Certification Commission (EVTCC) for each level of certification.
- C. EVTCC certification examinations will be valid for five (5) years. The EVTCC certification examination must be current in order to complete the application process.

### 7.9.4.6: Certification Task Book

- A. Emergency Vehicle Technician 2 Certification Task Book

### 7.9.4.7: Experience

- A. Fire Service (one of the following three options required)
  - 1. Have a minimum of three (3) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or
  - 2. Have a minimum of four (4) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or





## Emergency Vehicle Technician 2 Interim Procedures

3. Have a minimum of five (5) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.

### 7.9.4.8: Position

- A. Not applicable

### 7.9.4.9: Application

- A. See **7.2.4: Application Process – With a Certification Task Book.**

- B. Supporting Documentation

1. Copies of ASE test completion certificates
  - i. ASE certificates must be current at the time of application.
2. Copy of DOT Brake Inspector Qualification
3. Copy of Emergency Vehicle Technician II Certification (EVTCC)

### 7.9.4.10: Maintenance

- A. Emergency Vehicle Technician 2 certification is valid for five years from the date of issuance.

### 7.9.4.11: Recertification

- A. Emergency Vehicle Technician 2 recertification is designed for an individual currently certified as an Emergency Vehicle Technician 2.
- B. The candidate shall have the following six tests from the ASE that are valid (not expired) at time of application:
  1. Gasoline Engines (T1)
  2. Diesel Engines (T2)
  3. Drive Train (T3)
  4. Brakes (T4)
  5. Suspension and Steering (T5)
  6. Electrical/Electronic Systems (T6)
  7. Heating, Ventilation, and Air Conditioning (HVAC) (T7)
  8. Preventative Maintenance Inspections (T8)
- C. The candidate shall have a Department of Transportation (DOT) Brake Inspector Qualification that is valid (not expired) at time of application.



## Emergency Vehicle Technician 2 Interim Procedures

- D. EVT Certification Commission, Inc. Level I Fire Apparatus Technician (issued within five (5) years)
- E. The candidate shall successfully complete a minimum of 100 hours of CFMA-approved continuing education courses.
- F. **See 7.2.4: Application Process – Without a Certification Task Book.**
- G. Supporting documentation:
  - 1. Copies of completion certificates for ASE tests
  - 2. A copy of DOT Brake Inspector Qualification
  - 3. A copy of Emergency Vehicle Technician II Certification Exam
  - 4. A copy of a completion certificate for CMFA continuing education
- H. SFT shall review applications as they are received.
  - 1. **See 7.2.3.2: State Fire Training Review.**

### 7.9.4.12: Lapsed Certification

- A. Emergency Vehicle Technician 2 certification candidates who did not submit all recertification requirements by the expiration date, the SFT certification is considered to be lapsed.
  - 1. All recertification requirements must be completed and postmarked to SFT by the expiration date.
- B. For a lapsed certification you can regain a SFT Certification by completing additional CFMA-approved continuing education courses and other listed requirements. The continuing education hours are in addition to the 100 hours required for recertification. Once these requirements are met, certification candidates can apply for recertification.
  - 1. For lapses less than 6 months: 8 hours of continuing education
  - 2. For lapses 6 months to less than 12 months: 16 hours of continuing education
  - 3. For lapses of 12 months to 24 months:
    - i. 24 hours continuing education; and
    - ii. Complete Emergency Vehicle Technician II certification exam (see **7.9.4.5: Certification Exam**)
  - 4. For lapses greater than 24 months:
    - i. Complete entire Emergency Vehicle Technician 2 education courses (see **7.9.4.4: Education**)



## Emergency Vehicle Technician 2 Interim Procedures

- ii. Complete Emergency Vehicle Technician II certification exam (see **7.9.4.5: Certification Exam**)

### **7.9.4.13: Historical Lateral**

- A. Emergency Vehicle Technician 2 historical lateral is designed for an individual currently certified as a Fire Mechanic II.
- B. The candidate shall meet the requirements for Emergency Vehicle Technician 2 certification **Section 7.9.4.4** through **7.9.4.5**; **Section 7.9.4.9 (B)**; and **Section 7.2.4**

### **7.9.4.13: Historical Upgrade**

- A. Emergency Vehicle Technician 2 historical upgrade is designed for an individual currently certified as a Fire Mechanic 1 seeking to upgrade their certification to the new Emergency Vehicle Technician 2 certification.
- B. The candidate shall meet the requirements for Emergency Vehicle Technician 2 certification **Section 7.9.4.3** through **7.9.4.9**.



# Emergency Vehicle Technician 3 Interim Procedures

Issued: August 2020

## Procedure Changes

- Edition:** January 2019 edition of the State Fire Training Procedures Manual
- Effective Date:** August 1, 2020
- Section Change:** Modify Section 7.9.6: Emergency Vehicle Technician 3
- Justification:** The State Board of Fire Service approved the new Emergency Vehicle Technician 1, 2, and 3 certification tracks and curriculum. Additionally, the State Board of Fire Service approved the implementation plan to retire the Fire Mechanic I, II, and III certification tracks and curriculum on December 31, 2021.
- SFT Contact** [Contact SFT Staff](#) assigned to Instructor Registration.
- Note:** Repeal section 7.9.6 from the January 2019 edition of the State Fire Training Procedures Manual in its entirety. 7.9.6 will be replaced with the text shown below.

## 7.9.6: EMERGENCY VEHICLE TECHNICIAN 3

### 7.9.6.1: Overview

- A. Emergency Vehicle Technician 3 certification identifies the advanced knowledge and skills necessary to properly manage fleet specifications, records, and personnel in a multiple-technician agency or shop.
- B. Emergency Vehicle Technician 3 certification replaces Fire Mechanic III/Master Mechanic, scheduled to retire on December 31, 2021.
- C. Candidates pursuing Fire Mechanic III/Master Mechanic certification under that certification's requirements must complete all requirements and submit all application materials and fees postmarked on or before December 31, 2021.
- D. As of August 1, 2020, candidates pursuing Emergency Vehicle Technician 3 certification should utilize the Emergency Vehicle Technician 3 curriculum.

### 7.9.6.2: History

- A. Established
  - September 1, 1984
- B. Revised
  - January 1, 2001



# Emergency Vehicle Technician 3 Interim Procedures

- National Institute for Auto Service Excellence (ASE) test on Preventative Maintenance Inspections (T8) added
- ASE test on Drive Train (T3) deleted
- ASE test on Engine Performance (A8) deleted
- Experience requirement of heavy equipment mechanic changed to automotive or truck mechanic
- Recertification requirement added
  - Fire Mechanic I certificates expired within one year are eligible for recertification
- January 1, 2003
  - Experience acquired through private industry qualifies
- January 1, 2010
  - Curriculum updated to align with NFPA 1071: Standard for Emergency Vehicle Technician Professional Qualifications (2011 edition)
- October 1, 2018
  - Curriculum updated using 2012 State Fire Training Curriculum Development Model and to align with *NFPA 1071: Standard for Emergency Vehicle Technician Professional Qualifications* (2016 edition)
  - Fire Mechanic terminology changed to Emergency Vehicle Technician
  - The following classes will be retired or moved to the Fire Service Training and Education Program (FSTEP):
    - Allison Transmission
    - Ambulance Service and Maintenance
    - Aerial Apparatus
- August 1, 2020
  - Curriculum updated using 2012 State Fire Training Curriculum Development Model and to align with *NFPA 1071: Standard for Emergency Vehicle Technician Professional Qualifications* (2020 edition)

## 7.9.6.3: Prerequisites

- A. Office of the State Fire Marshal (OSFM) certified Emergency Vehicle Technician 2

## 7.9.6.4: Education

- A. CAL FIRE State Fire Training (SFT)
  1. Emergency Vehicle Technician 3A: Human Resource Management / Fleet Specifications and Records; or Specifications Writing Class (CFMA) and Fire Management I or Company Officer 2A



## Emergency Vehicle Technician 3 Interim Procedures

- B. National Institute for Auto Service Excellence (ASE). Must be valid (not expired) at time of application.
  - 1. Gasoline Engines (T1)
  - 2. Diesel Engines (T2)
  - 3. Drive Train (T3)
  - 4. Brakes (T4)
  - 5. Suspension and Steering (T5)
  - 6. Electrical/Electronic Systems (T6)
  - 7. Heating, Ventilation, and Air Conditioning (HVAC) (T7)
  - 8. Preventative Maintenance Inspections (T8)
- C. Department of Transportation (DOT). Must be valid (not expired) at time of application.
  - 1. Brake Inspector Qualification

### 7.9.6.5: Certification Exam

- A. EVT Certification Commission, Inc. Master Level III Fire Apparatus Technician
  - 1. An independent third-party testing agency will administer certification exams.
- B. The California Fire Mechanics Academy, Inc. (CFMA) will proctor and administer certification exams developed by Emergency Vehicle Technician Certification Commission (EVTCC) for each level of certification.
- C. EVTCC certification examinations will be valid for five (5) years. The EVTCC certification examination must be current in order to complete the application process.

### 7.9.6.6: Certification Task Book

- A. Emergency Vehicle Technician 3 Certification Task Book

### 7.9.6.7: Experience

- A. Fire Service (one of the following three options required)
  - 1. Have a minimum of four (4) years full-time, paid experience in a California fire department, public agency, or private industry as an automotive or truck mechanic, with one (1) year of which must be related to the maintenance of emergency response vehicles; or



## Emergency Vehicle Technician 3 Interim Procedures

2. Have a minimum of five (5) years full-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with no emergency response vehicles required; or
3. Have a minimum of six (6) years volunteer time or paid part-time, paid experience in a California fire department, public agency, or private industry as a truck mechanic with primary duties performing as a truck mechanic.

### 7.9.6.8: Position

- A. Not applicable

### 7.9.6.9: Application

- A. See **7.2.4: Application Process – With a Certification Task Book**.
- B. Supporting Documentation
  1. Copies of ASE test completion certificates
    - i. ASE certificates must be current at the time of application.
  2. Copy of DOT Brake Inspector Qualification
  3. Copy of Emergency Vehicle Technician III Certification (EVTCC)

### 7.9.6.10: Maintenance

- A. Emergency Vehicle Technician 3 certification is valid for five years from the date of issuance.

### 7.9.6.11: Recertification

- A. Emergency Vehicle Technician 3 recertification is designed for an individual currently certified as an Emergency Vehicle Technician 3.
- B. The candidate shall have the following six tests from the ASE that are valid (not expired) at time of application:
  1. Gasoline Engines (T1)
  2. Diesel Engines (T2)
  3. Drive Train (T3)
  4. Brakes (T4)
  5. Suspension and Steering (T5)
  6. Electrical/Electronic Systems (T6)
  7. Heating, Ventilation, and Air Conditioning (HVAC) (T7)
  8. Preventative Maintenance Inspections (T8)



## Emergency Vehicle Technician 3 Interim Procedures

- C. The candidate shall have a Department of Transportation (DOT) Brake Inspector Qualification that is valid (not expired) at time of application.
- D. The candidate shall have a current Emergency Vehicle Technician III Certification Exam (issued within five (5) years)
- E. The candidate shall successfully complete a minimum of 100 hours of CFMA-approved continuing education courses.
- F. **See 7.2.4: Application Process – Without a Certification Task Book.**
- G. Supporting documentation:
  - 1. Copies of completion certificates for ASE tests
  - 2. A copy of DOT Brake Inspector Qualification
  - 4. A copy of Emergency Vehicle Technician II Certification (EVTCC)
  - 3. A copy of a completion certificate for CMFA continuing education
- H. SFT shall review applications as they are received.
  - 1. **See 7.2.3.2: State Fire Training Review.**

### 7.9.6.12: Lapsed Certification

- A. Emergency Vehicle Technician 3 certification candidates who did not submit all recertification requirements by the expiration date, the SFT certification is considered to be lapsed.
  - 1. All recertification requirements must be completed and postmarked to SFT by the expiration date.
- B. For a lapsed certification you can regain a SFT Certification by completing additional CFMA-approved continuing education courses and other listed requirements. The continuing education hours are in addition to the 100 hours required for recertification. Once these requirements are met, certification candidates can apply for recertification.
  - 1. For lapses less than 6 months: 8 hours of continuing education
  - 2. For lapses 6 months to less than 12 months: 16 hours of continuing education
  - 3. For lapses of 12 months to 24 months:
    - i. 24 hours continuing education; and
    - ii. Complete Emergency Vehicle Technician III certification exam (see **7.9.6.5: Certification Exam**)





## Emergency Vehicle Technician 3 Interim Procedures

4. For lapses greater than 24 months:
  - i. Complete entire Emergency Vehicle Technician 3 education courses (see **7.9.6.4: Education**)
  - ii. Complete Emergency Vehicle Technician III certification exam (see **7.9.6.5: Certification Exam**)

### **7.9.6.13: Historical Lateral**

- A. Emergency Vehicle Technician 3 historical lateral is designed for an individual currently certified as a Fire Mechanic III.
- B. The candidate shall meet the requirements for Emergency Vehicle Technician 2 certification **Section 7.9.6.4** through **7.9.6.5**; **Section 7.9.6.9 (B)** ; and **Section 7.2.4**

### **7.9.4.13: Historical Upgrade**

- A. Emergency Vehicle Technician 3 historical upgrade is designed for an individual currently certified as a Fire Mechanic II seeking to upgrade their certification to the new Emergency Vehicle Technician 3 certification.
- B. The candidate shall meet the requirements for Emergency Vehicle Technician 3 certification **Section 7.9.6.3** through **7.9.6.9**.