

# **Fire Investigation Independent Study Continuing Education**

## **NFPA 921 UNIT #22 – Study Guide**

**NFPA 921 Guide for Fire and Explosion Investigations 2004 Edition**

**Objective:** Given an examination the participant shall demonstrate a knowledge and understanding of the investigation of motor vehicle fires.

**Reading/study assignment:** NFPA 921 Guide for Fire and Explosion Investigations, 2004 Edition, pp. 921-189 through 921-200 (Chapter 25)

### **Study/reference questions:**

What factors influence the ignition of liquids by hot surfaces?

What are two predominate gaseous fuels used in motor vehicles?

What can you conclude from the observation of a “total burnout” vehicle fire?

Why are vehicles stolen, what problems do stolen vehicles present to the fire investigator and what should the fire investigator do in reference to the investigation of these vehicles?

What may cause the breakdown of vehicle electrical insulation that may result in arcing?

How should you use fire patterns and/or degree of damage in vehicle origin and cause determination?

What should the fire investigator do concerning interpretations drawn from fire patterns in reference to a vehicle fire?

Explain the dc electrical system on a vehicle.

What are some of the fuels in a vehicle fire and how do they affect fire growth?

How are liquid fuels associated with vehicle fires?

Is rapid fire growth in today’s vehicles an indication of an incendiary fire? Why?

How does the ignition of liquid fuels on a hot surface relate to published ignition temperatures of the particular fuel?

Where else can propane be found used in motor vehicles other than as a motor fuel?

Study and review Table 25.3.1.

What metal can be found in some vehicles that will burn?

How would you compare fire growth of a vehicle fire and a structure fire? Why?

What investigative methodology should be used with vehicle fires?

What does a leak of a fitting of a propane or natural gas system found in a post fire pressure test indicate?

What does the presence of melted metal indicate when found in a burned vehicle?

Study and review Table 25.3.3.

What ignition sources may be found in a vehicle that is similar to those found in a structure?

What ignition sources may be found in a vehicle that is not similar to those found in a structure?

What are some open flame ignition sources that may be found in a vehicle?

What must usually be present in a vehicle to have an electrical ignition source?

How may the wiring in recreational vehicles differ from other vehicles?

What overcurrent protection devices can be found in a vehicle and how can ignition from an electrical source occur if these are present?

How does the melting temperature of an alloy metal compare to the melting temperature of the metal in its pure form?

Does the vehicle have to be running to have an electrical ignition source? Why?

What is usually used as ground in a vehicle?

Where are electric fuel pumps located on a vehicle?

How can overloaded wiring be the ignition source in a vehicle fire?

What solid fuels may be involved in motor vehicle fire and how can they be ignited?

What after market accessories may cause overloaded wiring? How?

What are some of the variables concerning whether a liquid fuel will be ignited?

If the fire investigator has examined the vehicle at the scene why would he/she want to examine the vehicle again after it has been moved?

What may be an indication to look for the possibility of an overloaded wiring condition that resulted in a fire?

How does a lamp filament react when exposed to ambient air?

What may cause electrical arcing in a vehicle and what may these arcs ignite?

What are some hot surfaces of a vehicle that can be involved as a fire's ignition source?

Are the safety related concerns of vehicle fire investigation the same as a structural fire investigation?

What are some fluids that may ignite what they come in contact with hot manifold?

How does the vacuum/low pressure carburetor system work, and how could a fire occur with this system?

What are the temperatures associated with catalytic converters?

How are mechanical sparks produced as related to vehicles and what are these sparks temperatures?

As an ignition source, what metal sparks are considered an ignition source and which are not?

Will smoking materials easily ignite upholstery fabrics and materials and how can smoking materials cause a vehicle fire?

How should a vehicle fire scene be recorded?

Where may documentation of a vehicle fire take place other than the scene?

What are external electrical sources used in vehicles, what are some examples, and how may they be involved in a fire?

What should the fire investigator determine when recording a motor vehicle fire?

Where is the VIN plate found on today's vehicles?

If the VIN plate is unreadable, what should you do?

Where can you obtain information in reference to fires and fire causes in vehicles of the same make, model and year as the vehicle fire you are investigating?

Study and review Table 25.3.2.

How do hydraulically geared transmissions operate and how may they be related to a fire?

What should be done by the fire investigator if the vehicle has been moved from the scene?

What should be done if the vehicle is to be stored outside?

What is the temperature of lamp filaments and what can be ignited if bulbs are broken?

Who and how should persons relevant to a vehicle fire be interviewed?

What information should be gathered concerning the vehicle prior to the fire?

If the vehicle was being driven at the time of the fire, what information should be obtained?

What may the fire investigator want to do to ensure no details of the vehicle type involved in the fire are overlooked?

Why is it essential the fire investigator be able to identify vehicle systems and functions?

What two basic fuel systems are used on today's gasoline powered vehicles?

How does the high-pressure fuel injection system work, and how could a fire occur with this system?

How does a diesel fuel system operate a how could a fire occur in this system?

What are some of the safety concerns at a vehicle fire investigation?

How does the ignition of diesel fuel on a hot surface compare to the ignition of gasoline on a hot surface?

What is a "runaway" diesel engine?

Natural gas and propane gas may be used for what in vehicles?

Where can hydrogen gas be found in motor vehicles?

How does a natural gas or propane fuel system operate and how could a fire occur in this system?

What NFPA publications reference natural gas and LP gases?

What is a turbocharger, how does it operate, and why could it be involved in a fire?

How do vehicle liquid cooling systems operate?

What vehicle electrical conductors rarely have overcurrent protection?

What is the pressure noted in NFPA 921 in reference to fuel injected systems?

What general techniques should be used when investigating a vehicle fire?

What are some of the components of a vehicles emission control system, how do they operate, and how may they be involved in a fire?

What are some of the components of a vehicle's exhaust system and how can an exhaust system be involved in a fire?

What may a catalytic converter ignite?

How and why may a windshield washer system be involved in a fire and what should the fire investigator do in reference to this system?

How could a brake system be involved in a vehicle fire?

How does the 12 volt electrical system operate and how may they be involved in a fire?

What should the fire investigator be very careful of concerning stranded conductors?

What is produced when a vehicle battery charges and how may this be involved in a fire?

What vehicle circuits typically have + 12 volt potential when the switch is off?

How do lubrication systems operate and how may a failure be fire related?

What are air-cooled engine systems and how may they fail?

What is a firewall and will it stop the progression of a fire in a vehicle? Why or why not?

How may recreational vehicles differ from other vehicles and what should the investigator do concerning these vehicles?

What is mechanical power distribution and why is it needed?

How do mechanically geared transmissions operate and how may they be related to a fire?

What are some of the accessories the mechanical power system of a vehicle that has the potential to malfunction?

How may the body system on the modern vehicle be involved in the vehicle fire?

What is a total burn and what should be done in reference to the fire investigation?

What switches, handles, and levers should be examined in reference to a fire and what should be noted?

What photographs should be taken in reference to a vehicle fire?

When is an electric fuel pump energized and how and when may they be shut off?

What is the significance of interior finishes and accessories and what should the fire investigator try to determine?

What should the fire investigator do in reference to cargo areas of a vehicle?

What is heavy equipment, how do many of them operate and what failures may be fire related?

What should the fire investigator do in reference to fire involving vehicles in structures?

How should motor vehicle examinations be conducted and what may the patterns reveal?

What lines may be present with a fuel injected vehicle system and what effect, if any, could a minute leak of these lines have in reference to a fire?

Where is it preferable to examine a burned vehicle?

When conducting the examination of vehicle systems, what would the fire investigator want to examine in reference to the fuel system?