



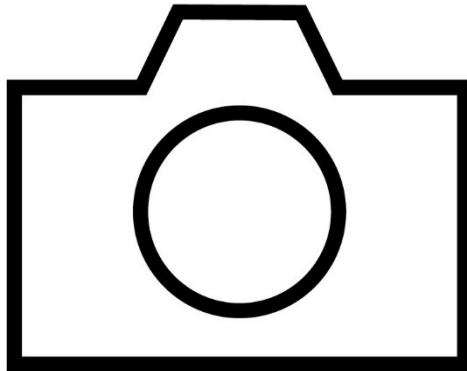
## FAMA BUYER'S GUIDE

### TC061

# Vehicle Camera Systems

Prepared by the FAMA Electrical Subcommittee

This guide does not endorse any manufacturer or product





# Buyer's Guide Vehicle Camera Systems

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# Buyer's Guide Vehicle Camera Systems

## Introduction

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This guide is intended to provide fire service personnel with information about the various types of camera systems and recorders used on fire apparatus. Camera systems and recorders are becoming more popular with fire departments. Large volume production (back-up cameras are required on all new vehicles under 10,000 lb. GVWR) and new technology have made cameras more affordable and more compact in design. One of the primary functions of a vehicle camera system is to assist the driver by allowing him to see blind spots around the vehicle. A secondary function allows the use of recorders to document events.

As technology is continually evolving, this guide is presented as a general information and educational piece. The various options and auxiliary equipment presented may not be available from every manufacturer, and some may be mutually exclusive.

It is the responsibility of the purchaser to determine what best meets their needs and to specify this information to prospective apparatus bidders, sellers, and manufacturers.

## Overview

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This guide will look at various types of camera systems and recording devices that are available to the industry on fire apparatus. This guide does not cover body cameras, helmet cameras or hand held Infrared cameras. The review will be provided for five different types of cameras and applicable recording devices.

- Backup Cameras
- Forward Looking Cameras
- Side Looking Cameras
- 360° Camera Systems
- Specialty Cameras
- Recording Devices

## Backup Cameras

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This most basic camera system provides a high level of safety that can help prevent vehicle damage or serious injury or death by allowing the driver to see what is behind the vehicle while backing up.

The National Safety Council, NHTSA and other sources indicate that nationally all incidents (including fire apparatus) result in 300,000 backing accidents per year. 65% of backing accidents involve a stationary object. Blind spots can extend up to 160 ft. behind the vehicle.

Backup cameras consist of a small camera head typically located below the hose bed on pumper apparatus or mid body height on rescue trucks. This is combined with a monitor in the cab, visible to the driver. Some multiplex screens can display the video image without the need for an additional monitor. Backup cameras are usually hard wired from the back of the truck to the cab. Wireless systems are available. Although more costly, wireless systems can be easily retrofitted on apparatus.



Backup cameras typically activate when the vehicle is put in reverse gear so the monitor image is blank unless the vehicle is actually backing up.

Some backup camera options to consider include:

- Microphone to pick up sounds behind the truck and broadcast to a speaker in the cab
- Covers or guards to prevent damage to the camera
- Infrared Illuminators for night visibility

## Forward Looking Cameras

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The function of forward looking cameras is to record an event taking place in front of the vehicle. Typically, these cameras start recording when triggered by the vehicle ignition system. The purpose of the forward-looking camera is to record driving and emergency response situations from the time the vehicle leaves the fire station until it returns.

This camera is particularly helpful in reconstruction of accidents. The video can show what the traffic and weather conditions were before and during the accident. It can also show how the driver responded to the situation. The forward-looking camera along with the Vehicle Data Recorder can provide unquestionable data important to the accident investigation.

For citizens concerned about delayed response, the forward-looking camera can provide video evidence of traffic congestion, weather conditions, trains stopped at railroad crossing and other factors that could cause a delayed response. Close calls and unusual response situations can also be recorded. The forward-looking camera can be an important training tool showing students real life situations that might be difficult or hazardous to recreate with an actual vehicle.

## Side Looking Cameras

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Like rear view cameras, side mounted cameras make visible blind spot areas that cannot be covered by conventional mirrors. Side mount cameras with a regular-angle lens (no distorted image) can reduce about 64% of the blind zones of a flat mirror system. Using a wide-angle lens, the blind zones on both sides of the vehicle can be completely eliminated.\*

Side looking cameras are generally connected to the left or right turn signal. When the signal is activated, the monitor automatically switches images for the left or right camera. However, the greatest blind spot is the right-side mirror. So, a single side looking camera only on the right side can be beneficial. The camera will clearly show cars, pedestrians, or other object that might be in the blind spot area and could come in contact with the vehicle while making a turn. Like forward looking cameras, the side looking system can be connected to a video recorder to provide a record of the event.

Side looking cameras may also be connected to a screen near the rear crew seating area and adjacent door to provide a view of that side so that personnel exiting the vehicle may see oncoming traffic, or other obstacles prior to exiting. The cameras may be activated when the truck parking brake is applied.



\*Florida Department of Transportation Research Center

## 360° Camera Systems

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360° camera systems provide a “bird’s eye view” completely around the vehicle. Four wide angle cameras one on each side, one front and one rear of the vehicle cover the entire perimeter and surrounding area including all blind spots. The cameras use a “stitching” technology that electronically merges the images that overlap the corners of the vehicle along with a top view rendition of the vehicle to create a panoramic view as though you were looking down on top of the vehicle at some distance away. Since the cameras are extreme wide angle some distortion of the image will occur. The longer the vehicle the more distortion there will be.



When in a driving mode, triggers automatically switch camera images to reverse and left or right turn signals. Some systems will shift the image more to the left or right to enhance the side view.

At the fire scene, some 360° camera systems can record all of the activity around the vehicle such as when equipment was removed, when hose lines were connected or accident recording such as a vehicle running into the truck while it was blocking the highway.

## Specialty Cameras

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A video monitor can be located at the pump panel to give the pump operator views of areas around the truck. Most monitors will take 2 or more camera feeds. You can connect to a camera on the opposite side of the truck, and/or at the top of a ladder, and/or a backup camera. The point is to provide the pump operator visibility to areas around the truck they cannot see. Cameras and monitors are available in wireless packages, which makes it easier to retrofit systems.

Driver monitoring cameras are available to record driver actions in route to a scene. The camera can be used to identify risks, increase driver performance, correct unsafe habits or, when combined with a forward-looking camera, provide additional detail for accident reconstruction.

Forward Looking Infrared (FLIR) cameras are available to provide enhanced night time visibility and the ability to see through fog or smoke. These cameras are used to assist



the driver when inclement conditions would make driving dangerous. Most FLIR systems are available with a pan and tilt feature that allows the operator to move the camera and view conditions at the fire scene such as hot spots that might be obscured by smoke.

## Recording Devices

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Mobile digital recording from vehicle mounted camera systems can provide an accurate witness to an event. Video evidence can protect drivers who may be wrongly accused. Video footage can help recreate an accident scene for legal proceedings. Recordings can also be used for driver training and best practice procedures.

To insure compatibility, recording devices are usually supplied by the camera manufacturer. Depending on the recording device, it may only record what is shown on the video monitor. Thus, if you had a side view camera and were making a right-hand turn, the video monitor would only show the right-side camera. If you were struck by a vehicle on the left side, that event would not be captured if you are only recording what is shown on the monitor. Depending on the manufacturer, you may be able to select recording of raw footage from all cameras. In the case of 360° camera systems, some models can show both the 360° view and the triggered camera on a split screen.

Another consideration is how to access the recorded data. Most systems will allow you to play back the event on the cab monitor. However, to remove the recording for security reasons, you may need to access a hard drive or SD card. And, you may need special software in order to access the video. Other methods of video transfer include wireless remote transfer that allows you to copy the video file remotely. Many recording systems also have integrated GPS mapping to identify the vehicle's position.

Recently live video has been added to DVR systems. The LIVE VIDEO allows you to monitor vehicle camera systems from almost anyplace you have internet service. The system in the truck would need 3g or 4g service. This can be done with a computer or apps on phone.