FEDERAL SIGNAL
Safety and Security Systems

Mobile Camera Systems
Installation and Operation Manual

Contents

1 Safety Precautions

For your safety, read this manual thoroughly before installing and operating the Federal Signal Mobile Camera System. The safety messages in this section are reminders to exercise extreme care at all times. To download copies of the manual, go to www.fedsig.com or call the Federal Signal Service Department at 1-800-433-9132, 7 AM to 5 PM, Monday through Friday (Central Time).

Safety Messages to Installers of Federal Signal Mobile Camera Systems

⚠ WARNING

People's lives depend on your proper installation of our products. It is important to read and follow all instructions shipped with this product. In addition, listed below are some other important safety instructions and precautions you should follow:

- To properly install a vehicular camera system, you must have a good understanding of automotive electrical systems along with proficiency in the installation and use of safety warning equipment.

- The mobile camera system is only a supplement to the rear-view/side-view mirrors of the vehicle. The system is not a substitute for the proper use of the rear-view/side-view mirrors of the vehicle. Always use caution when backing up.

- DO NOT install equipment or route wiring in the deployment path of an airbag.

- When drilling into a vehicle structure, be sure that both sides of the surface are clear of anything that could be damaged.

- Locate the camera(s), monitor, keyboard, control box, and digital video recorder (as applicable) so the VEHICLE and SYSTEM can be operated safely under all driving conditions.

- You should frequently inspect the camera system to ensure that it is operating properly and that it is securely attached to the vehicle. The front face of any installed cameras should be kept clean and free from any accumulated dirt or grime so that the cameras may provide the clearest image. Obstructions to the camera image limit the effectiveness of the system.

- If a vehicle seat is temporarily removed, verify with the vehicle manufacturer if the seat needs to be recalibrated for proper airbag deployment.

- Do not open or service the monitor, camera element, or control box. There are no user-serviceable parts inside. Opening or servicing any component will void the component's warranty.

- File these instructions in a safe place and refer to them when maintaining and/or reinstalling the product.

Failure to follow all safety precautions and instructions may result in property damage, serious injury, or death to you or others.

2 An Overview of the Mobile Camera Systems

Federal Signal Mobile Camera Systems provide drivers of vehicles used in towing and recovery, fire/EMS, utilities, highway maintenance/DOT, sanitation, construction, and in many other industries an extended field of view when backing up or maneuvering their vehicles in environments where optimum visibility is important for enhanced safety. Designed exclusively for professional applications, all Federal Signal systems and components are built with the distinct needs of the commercial/industrial market in mind and are backed by our two-year warranty.

Turnkey Systems

Three turnkey mobile camera systems are available:

CAMSET56-NTSC-2/CAMSET56-PAL-2

CAMSET70-NTSC-4/CAMSET70-PAL-4

CAMSET70-NTSC4B/CAMSET70-PAL4B

Each system includes a monitor, a standard rear-view camera, a camera-to-monitor extension cable, and accessories. Components and systems that are NTSC-compatible include "NTSC" in the part number, and those that are PAL-compatible include "PAL" in the part number. The NTSC video standard is primarily a North American video standard, whereas the PAL video standard is predominantly a European video standard.

CAMSET56-NTSC-2/CAMSET56-PAL-2

This system includes:

- a 5.6"-diagonal color TFT LCD monitor (CAMLCD-INT-56)

- a high-resolution rear-view camera with infrared low-light vision capability and a microphone, with a mounting hardware kit (CAMCCD-REARNTSC/CAMCCD-REARPAL)

- a 65.5 ft (20 m) camera-to-monitor extension cable (CAMCABLE-20)

- an input/power/trigger wiring harness with inputs and independent triggers for two cameras (CAMADP-INT-2)

- a monitor mounting bracket with mounting hardware (CAMLCD-BRACKET)

Features

- Support for one or two cameras—an optional additional camera can connect to the CAM2 connector on the input/power/trigger wiring harness

- Automatic triggering of either of two connected cameras via individual camera trigger wires

- Individual camera settings that are configurable for normal view or mirror-image view

- Easy setup with a minimum of connections

- Intuitive controls on the monitor for adjusting the picture quality of the image and the volume of the built-in microphone of the connected camera (as applicable)

- CAMCCD-REARNTSC/CAMCCD-REARPAL is IP68-rated for challenging commercial applications that require a waterproof and dustproof camera

CAMSET70-NTSC-4/CAMSET70-PAL-4

This system includes:

- a 7.0"-diagonal color TFT LCD monitor (CAMLCD-70)

- a high-resolution rear-view camera with infrared low-light vision capability and microphone, with a mounting hardware kit (CAMCCD-REARNTSC/CAMCCD-REARPAL)

- a 65.5 ft (20 m) camera-to-monitor extension cable (CAMCABLE-20)

- four individual trigger wires for each of the available camera inputs

- a four-camera-capable control box with wired remote keyboard that selects the image of any of the connected cameras or a split-screen combination (CAMBOX-4NTSC/CAMBOX-4PAL)

- a monitor mounting bracket with mounting hardware (CAMLCD-BRACKET)

Features

- Support for one to four cameras—optional additional cameras can connect to one of the available inputs on the included control box

- Automatic triggering of any of up to four connected cameras via individual camera trigger wires

- Individual camera settings that are configurable for normal view or mirror-image view

- Easy setup with a minimum of connections

- Split-screen viewing of multiple connected cameras

- Intuitive controls on the monitor for adjusting the picture quality of the image and volume of the built-in microphone of the connected camera (as applicable)

- CAMCCD-REARNTSC/CAMCCD-REARPAL is IP68-rated for challenging commercial applications that require a waterproof and dustproof camera

CAMSET70-NTSC4B/CAMSET70-PAL4B

This system includes:

- a 7.0"-diagonal color TFT LCD monitor (CAMLCD-INT-70-B)

- a high-resolution rear-view camera with infrared low-light vision capability and a microphone, with a mounting hardware kit (CAMCCD-REARNTSC/CAMCCD-REARPAL)

- a 65.5 ft (20 m) camera-to-monitor extension cable (CAMCABLE-20)

- a four individual trigger wires for each of the available camera inputs

- Input/power/trigger wiring harness with inputs and independent triggers for four cameras (CAMADP-INT-4)

- Monitor mounting bracket with mounting hardware (CAMLCD-BRACKET)

Features

- Support for one to four cameras—optional additional cameras can connect to one of the available inputs

- Automatic triggering of any of up to four connected cameras via individual camera trigger wires

- Individual camera settings that are configurable for normal view or mirror-image view

- Easy setup with a minimum of connections

- Split-screen viewing of multiple connected cameras

- Intuitive controls on the monitor for adjusting the picture quality of the image and volume of the built-in microphone of the connected camera (as applicable)

- CAMCCD-REARNTSC/CAMCCD-REARPAL is IP68-rated for challenging commercial applications that require a waterproof and dustproof camera

Customized Systems

To outfit a unique installation for your application, select a monitor, up to four cameras, and camera-to-monitor extension cables of the appropriate length. (If the CAMLCD-70 is selected, either the CAMBOX-4NTSC/CAMBOX-4PAL control box or CAMDVR-4-B digital video recorder is also required as described under "Monitors" below.) For technical details, see "Product Specifications and Part Numbers" on page 54.

Monitors
- 5.6"-diagonal monitor (CAMLCD-INT-56): up to two cameras can be connected

- 7.0"-diagonal monitor (CAMLCD-INT-70): up to two cameras can be connected

- 7.0"-diagonal monitor (CAMLCD-70 with CAMBOX-4NTSC/CAMBOX-4PAL). Up to four cameras can be connected (split-screen viewing enabled)

- 7.0"-diagonal monitor (CAMLCD-70 with CAMDVR-4-B): up to four cameras can be connected (split-screen viewing enabled and no triggering of individual cameras). All connected cameras are digitally recorded to the hard disk of the video recorder

- 7.0"-diagonal monitor (CAMLCD-INT-70-B): up to four cameras can be connected (split-screen viewing enabled)

Cameras
- Standard rear-view camera (CAMCCD-REARNTSC/CAMCCD-REARPAL)

- Flush-mount camera (CAMCCD-FLSHNTSC/CAMCCD-FLSHPAL)

- Side-view camera (CAMCCD-SIDENTSC/CAMCCD-SIDEPAL)

- Ball camera (CAMCCD-BALLNTSC/CAMCCD-BALLPAL)

- Dome camera (CAMCCD-DOMENTSC/CAMCCD-DOMEPAL)

Camera-to-monitor extension cables (one per camera)

- 4 in (0.1 m) (CAMCABLE-SHORT)

- 16.5 ft (5 m) (CAMCABLE-5)

- 33 ft (10 m) (CAMCABLE-10)

- 49 ft (15 m) (CAMCABLE-15)

- 65.5 ft (20 m) (CAMCABLE-20)

- 131 ft (40 m) (CAMCABLE-40)

3 Installing the Mobile Camera System

After unpacking the system components, examine them for damage that may have occurred in transit. If a component has been damaged, do not attempt to install or operate it. File a claim immediately with the carrier stating the extent of damage. Carefully check all envelopes, shipping labels, and tags before removing or destroying them. Ensure that the parts listed in the packing list are contained in the packing carton.

Installing the Rear-View Camera (CAMCCD-REARNTSC/CAMCCD-REARPAL)

Before the installation, find an appropriate location for the rear-view camera with these considerations in mind:

- Although the camera is waterproof, repeatedly exposing it to direct, high-pressure streams of water (as from a pressure washer) is not recommended.

- The material properties and thicknesses of vehicle bodies vary widely. The included hardware can accommodate many different vehicle installations. However, it is recommended that you exercise judgment when drilling holes into vehicle surfaces.

- When drilling into a vehicle structure, be sure that both sides of the surface are clear of anything that could be damaged. Remove all burrs from drilled holes. To prevent electrical shorts, grommet all drilled holes through which wiring passes. (All Federal Signal camera systems include grommets.) Also, ensure that the mounting screws do not cause electrical or mechanical damage to the vehicle.

- This camera is recommended for rear-view applications in heavy duty vehicles. In most installations the trigger wire of this camera would be connected to the reverse lights of the vehicle for automatic viewing when the vehicle is operating in reverse. The camera is also equipped with night-vision and audio capability.

- If the camera is to be used in a typical backup camera application, the camera should be positioned so that the driver can obtain a wide, unobstructed field of vision behind the vehicle.

To install the rear-view camera, follow these steps:

Preparing to install the Rear-View Camera

1. Open the camera mounting hardware kit, which has:

   - four self-tapping screws
   - four machine screws with matching lock washers, flat washers, and nuts
   - four plastic screw insulators
   - an insulating pad
   - an Allen wrench
   - waterproofing tape

2. Use the Allen wrench to remove the sun shield and camera from the mounting bracket so that the bracket can be used as a template for marking drill-hole locations (Figure 1).
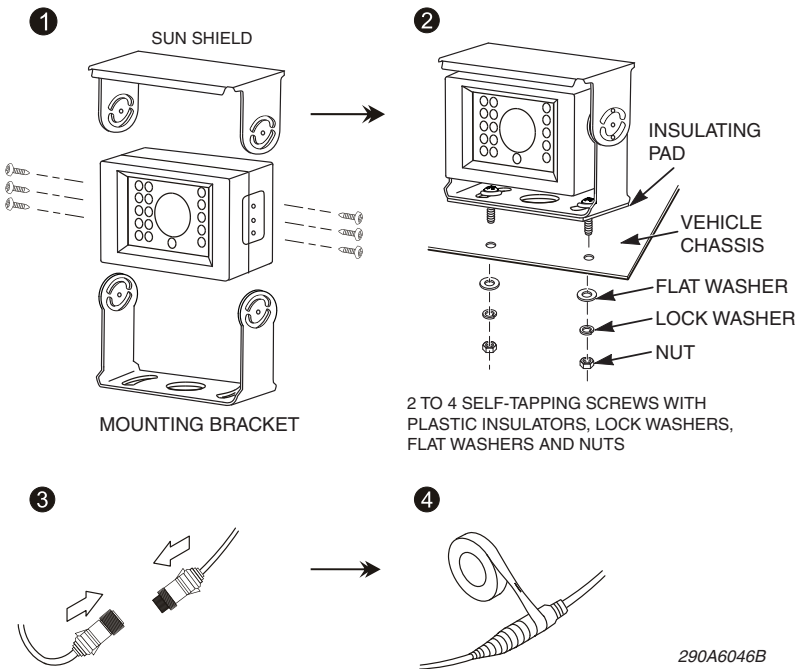

Figure 1. Rear-view camera installation
(CAMCCD-REARNTSC/CAMCCD-REARPAL)

Marking and Drilling the Mounting Holes for the Rear-View Camera

⚠ WARNING

AIRBAG DEPLOYMENT
Do not install equipment or route wiring in the deployment path of an airbag.

Failure to observe this warning will reduce the effectiveness of the airbag or potentially dislodge the equipment, causing serious injury.

⚠ WARNING

SEAT REMOVAL PRECAUTION
If a vehicle seat is temporarily removed, verify with the vehicle manufacturer if the seat needs to be recalibrated for proper airbag deployment.

Failure to heed this warning could result in death or serious injury.

⚠ CAUTION

LOCATING OPERATORS CONTROLS
Locate the camera(s), monitor, keyboard, control box, and digital video recorder (as applicable) so the VEHICLE and SYSTEM can be operated safely under all driving conditions.

Failure to heed this caution could result in driver distraction or driver error while operating the vehicle.

NOTICE

DRILLING PRECAUTIONS
When drilling holes, check the area into which you are drilling to be sure you do not damage vehicle components while drilling. All drilled holes should be deburred and all sharp edges should be smoothed. All wire routings going through drilled holes should be protected by a grommet or convolute/split loom tubing.

1. Use the camera mounting bracket as a guide to mark the locations of two to four mounting holes to be drilled into the vehicle (Figure 1 on page 9). These locations should lie in the two channels on either side of the circular hole in the center of the bracket.

2. Mark a location for a 3/4 in (19.0 mm) hole, typically centered between the marked locations of the mounting holes, which will accept the rubber grommet on the camera output cable. Once you drill the center hole, you can route the camera output cable through it to:

   a) a camera-to-monitor extension cable that can be either:

      • one CAMCABLE-SHORT/-5/-10/-15/-20/-40 *or*

      • two CAMCABLE-SHORT/-5/-10/-15/-20 connected in series with adapter CAMCABLE-EXT

      • that is then connected to

      • either the CAM1 or CAM2 input on the input/power/trigger wiring harness (CAMADP-INT-2) of the CAMLCD-INT-56/CAMLCD-INT-70 monitor *or*

      • one of the four camera inputs on the CAMBOX-4NTSC/CAMBOX-4PAL control box (for use with the CAMLCD-70 monitor) *or*

      • one of the four camera inputs on the input/power/trigger wiring harness (CAMADP-INT-4) of the CAMLCD-INT-70-B

      or

   b) a special DVR system camera-extension cable that is connected to one of the four camera inputs on the CAMDVR-4-B

3. Drill holes at the drill-position marks that are correctly sized for the screws you are using:

   a) If you are using the self-tapping screws, drill two to four 9/64 in (3.5 mm) holes.

   b) If you are using the machine screws, drill two to four 13/64 in (5.2 mm) clearance holes.

4. Drill a 3/4 in (19.0 mm) hole at the mark for the camera output cable. Smooth and deburr the hole.

Mounting the Rear-View Camera

1. Install the insulating pad on the bottom of the camera mounting bracket. If you are using the center hole in the bracket for the camera output cable, route the cable through the hole.

2. Align the mounting bracket with the drilled mounting holes, guide the camera output cable into the 3/4 in (19.0 mm) hole, and secure the rubber grommet in the hole.

3. To fasten the mounting bracket to the vehicle, choose the appropriate screws for the mounting holes you drilled:

   a) If you are using the self-tapping screws, guide each screw through a plastic insulator, then through one of the two channels in the mounting bracket and into the drilled holes. Fasten the screws tightly to the vehicle body.

   b) If you are using the machine screws, guide each screw through a plastic insulator, then through one of the two channels in the mounting bracket into the drilled holes. On the opposite side of the vehicle chassis at the mounting location, install the flat washer followed by the lock washer and nut. Fasten the mounting hardware tightly to the vehicle body.

4. Connect a one of these camera extension cable to the camera:

   • one CAMCABLE-SHORT/-5/-10/-15/-20

   • two CAMCABLE-SHORT/-5/-10/-15/-20 connected in series with adapter CAMCABLE-EXT

   • one CAMCABLE-40

   • special DVR cable (as applicable)

5. Wrap the cable connection in the supplied black waterproofing tape.

Installing the Side-View Camera (CAMCCD-SIDENTSC/CAMCCD-SIDEPAL)

Before the installation, find an appropriate location for the side-view camera with these considerations in mind:

- Although the camera is waterproof, repeatedly exposing it to direct, high-pressure streams of water (as from a pressure washer) is not recommended.

- The material properties and thicknesses of vehicle bodies vary widely. The included hardware can accommodate many different vehicle installations. However, it is recommended that you exercise judgment when drilling holes into vehicle surfaces.

- This camera is recommended for installation on either the left or right side of a vehicle. Typically, the trigger wire for the camera is connected to the turn-signal circuit of the vehicle for automatic viewing when the vehicle is turning. The camera is also equipped with night-vision and audio capability.

- When drilling into a vehicle structure, be sure that both sides of the surface are clear of anything that could be damaged. Remove all burrs from drilled holes. To prevent electrical shorts, grommet all drilled holes through which wiring passes (all Federal Signal cameras include grommets). Also, ensure that the mounting screws do not cause electrical or mechanical damage to the vehicle.

- If the camera is to be used in a typical side-view camera application, the camera should be positioned so that the driver can obtain a wide, unobstructed field of vision of the left or right side of the vehicle.

To install the side-view camera, follow these steps:

Preparing to Install the Side-View Camera

1. Open the camera mounting hardware kit, which has:

   - four self-tapping screws
   - four machine screws with matching lock washers, flat washers, and nuts
   - an Allen wrench for adjusting the orientation of the camera cover (left or right side of vehicle)
   - waterproofing tape

2. To access the mounting holes in the base as a guide for marking drill-position holes, remove the four screws that secure the camera cover (Figure 2, step 3).

290A6047B
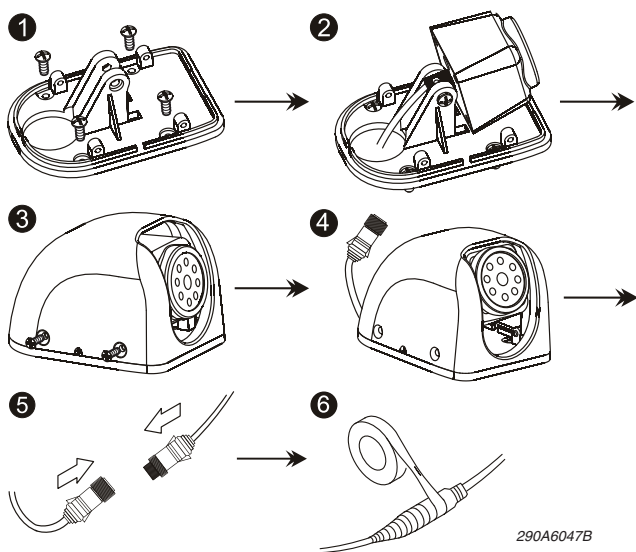
*Figure 2. Side-view camera installation
(CAMCCD-SIDENTSC/CAMCCD-SIDEPAL*

3. To verify the orientation of the camera in its housing before the installation, connect the camera to the monitor and turn on the system.

You can adjust the camera assembly inside the housing for either the left or right side of the vehicle. If the image on the monitor appears upside down on the preferred installation side of the vehicle, use the Allen wrench to remove and flip the camera assembly 180 degrees. Then install it to switch the camera from a left-side-view camera to a right-side-view camera or vice-versa.

Marking and Drilling the Mounting Holes for the Side-View Camera

⚠ **WARNING**

AIRBAG DEPLOYMENT
Do not install equipment or route wiring in the deployment path of an airbag.

Failure to observe this warning will reduce the effectiveness of the airbag or potentially dislodge the equipment, causing serious injury.

⚠ **WARNING**

SEAT REMOVAL PRECAUTION
If a vehicle seat is temporarily removed, verify with the vehicle manufacturer if the seat needs to be recalibrated for proper airbag deployment.

Failure to heed this warning could result in death or serious injury.

⚠ **CAUTION**

LOCATING OPERATORS CONTROLS
Locate the camera(s), monitor, keyboard, control box, and digital video recorder (as applicable) so the VEHICLE and SYSTEM can be operated safely under all driving conditions.

Failure to heed this caution could result in driver distraction or driver error while operating the vehicle.

NOTICE

DRILLING PRECAUTIONS
When drilling holes, check the area into which you are drilling to be sure you do not damage vehicle components while drilling. All drilled holes should be deburred and all sharp edges should be smoothed. All wire routings going through drilled holes should be protected by a grommet or convolute/split loom tubing.

1. Use the mounting base as a guide to mark the locations of four mounting holes on the vehicle chassis and the 3/4 in (19.0 mm) hole for the camera output cable. Once you drill this hole, you can route the camera output cable through it to:

    a)   a camera extension cable that can be either:

- one CAMCABLE-SHORT/-5/-10/-15/-20/-40 *or*

- two CAMCABLE-SHORT/-5/-10/-15/-20 connected in series with adapter CAMCABLE-EXT

that is connected to:

- either the CAM1 or CAM2 input on the input/power/trigger wiring harness (CAMADP-INT-2) of the CAMLCD-INT-56/CAMLCD-INT-70 monitor or

- one of the four camera inputs on the CAMBOX-4NTSC/CAMBOX-4PAL control box (for use with the CAMLCD-70 monitor) or

- one of the four camera inputs on the input/power/trigger wiring harness (CAMADP-INT-4) of the CAMLCD-INT-70-B

or

    b)   a special DVR system camera-extension cable that is connected to one of the four camera inputs on the CAMDVR-4-B

2. Whether you are using either self-tapping or machine screws, drill 0.116 in (3.0 mm) holes (a #32 drill bit can be used) at the marked positions for the four mounting holes.

3. Drill a 3/4 in (19.0 mm) hole at the mark for the camera output cable. Smooth and deburr the hole.

Mounting the Side-View Camera

1. Align the mounting base with the drilled mounting holes on the vehicle. Guide the camera output cable into the 3/4 in (19.0 mm) hole and secure the rubber grommet on the cable in this hole.

2. To affix the camera to the vehicle, choose the appropriate screws for the holes you drilled above:

    a)   If you are using the self-tapping screws, guide each screw through the camera base, then into the drilled holes. Fasten the screws tightly to the vehicle body.

    b)   If you are using the machine screws, guide each screw with a lock washer and flat washer through the camera base. Install the matching nut on the opposite side of the vehicle surface. Fasten the mounting hardware tightly to the vehicle body.

3. Connect the camera extension cable (one CAMCABLE-SHORT/-5/-10/-15/-20/-40 or two connected in series with CAM-CABLE-EXT) or special DVR cable (as applicable) to the camera.

4. Wrap the cable connection in the supplied black waterproofing tape.

Installing the Flush-Mount Camera (CAMCCD-FLSHNTSC/CAMCCD-FLSHPAL)

Before the installation, find an appropriate location for the flush-mount camera with these considerations in mind:

• Although the camera is waterproof, repeatedly exposing it to direct, high-pressure streams of water (as from a pressure washer) is not recommended.

• Decide whether you will be mounting the camera to the vehicle with the included bracket or flush to a vehicle surface.

• The material properties and thickness of vehicle bodies vary widely. The included hardware can accommodate many different vehicle installations. However, it is recommended that you exercise judgment when drilling holes into vehicle surfaces.

• When drilling into a vehicle structure, be sure that both sides of the surface are clear of anything that could be damaged. Remove all burrs from drilled holes. To prevent electrical shorts, grommet all drilled holes through which wiring passes (all Federal Signal cameras include grommets). Also, ensure that the mounting screws do not cause electrical or mechanical damage to the vehicle.

• This camera is recommended for flush-mount installation on a vehicle. As an alternative, a mounting bracket is included for mounting above the surface of the vehicle.

• The camera should be positioned so that the driver can obtain a wide, unobstructed field of vision.

To install the flush-mount camera, follow these steps:

Preparing to Install the Flush-Mount Camera

1. Open the camera mounting hardware kit, which includes:

   - Four self-tapping screws
   - Four machine screws with matching lock washers, flat washers, and nuts
   - Waterproofing tape

2. Decide whether you will be mounting the camera to the vehicle with the included bracket or flush to a vehicle surface.

Marking and Drilling the Mounting Holes for the Flush-Mount Camera

⚠ WARNING

AIRBAG DEPLOYMENT
Do not install equipment or route wiring in the deployment path of an airbag.

Failure to observe this warning will reduce the effectiveness of the airbag or potentially dislodge the equipment, causing serious injury to you or others.

⚠ WARNING

SEAT REMOVAL PRECAUTION
If a vehicle seat is temporarily removed, verify with the vehicle manufacturer if the seat needs to be recalibrated for proper airbag deployment.

Failure to heed this warning could result in death or serious injury.

⚠ CAUTION

LOCATING OPERATORS CONTROLS
Locate the camera(s), monitor, keyboard, control box, and digital video recorder (as applicable) so the VEHICLE and SYSTEM can be operated safely under all driving conditions.

Failure to heed this caution could result in driver distraction or driver error while operating the vehicle.

DRILLING PRECAUTIONS

When drilling holes, check the area into which you are drilling to be sure you do not damage vehicle components while drilling. All drilled holes should be deburred and all sharp edges should be smoothed. All wire routings going through drilled holes should be protected by a grommet or convolute/split loom tubing.

Option 1: Marking and drilling holes for the flush-mount camera with the included bracket

1. Use the mounting bracket as a guide to mark the locations of two to four mounting holes on the vehicle chassis (Figure 3 on page 20). These locations should lie in the two channels in the base of the bracket.

2. Mark a location for the 3/4 in (19.0 mm) hole for the output cable. Once you drill this larger hole, you can route the camera output cable through it to:

   a) a camera-to-monitor extension cable that can be either

      • one CAMCABLE-SHORT/-5/-10/-15/-20/-40 *or*

      • two CAMCABLE-SHORT/-5/-10/-15/-20 connected in series with adapter CAMCABLE-EXT

      that is then connected to

      • either the CAM1 or CAM2 input on the input/power/trigger wiring harness (CAMADP-INT-2) of the CAMLCD-INT-56/CAMLCD-INT-70 monitor *or*

      • one of the four camera inputs on the CAMBOX-4NTSC/CAMBOX-4PAL control box (for use with the CAMLCD-70 monitor) *or*

      • one of the four camera inputs on the input/power/trigger wiring harness (CAMADP-INT-4) of the CAMLCD-INT-70-B

      or

   b) a special DVR system camera-extension cable that is connected to one of the four camera inputs on the CAMDVR-4-B

3. Drill the correctly sized holes at the drill-position marks for the type of screws you are using:

a) If you are using the self-tapping screws, drill two to four 0.089 in (2.2 mm) holes (a #43 drill bit can be used).

b) If you are using the machine screws, drill two to four 1/8 in (3.2 mm) clearance holes.

4. Drill a 3/4 in (19.0 mm) hole at the mark for the camera output cable. Smooth and deburr the hole.
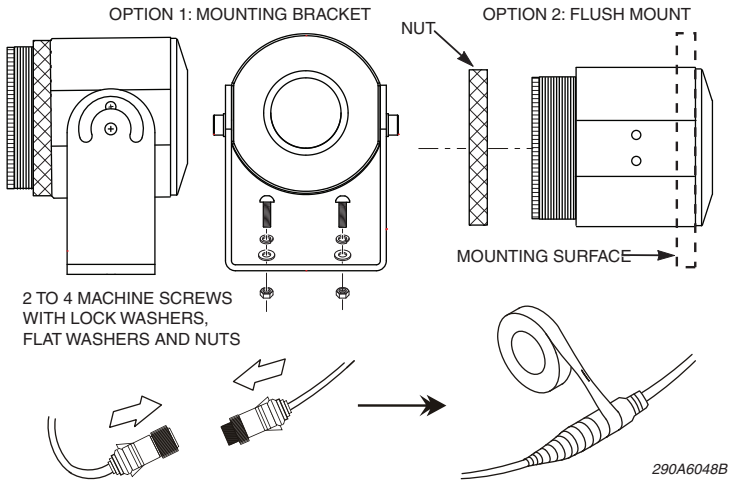
Figure 3. Options for mounting flush-mount camera
(CAMCCD-FLSHNTSC/CAMCCD-FLSHPAL)

Option 2: Marking and drilling holes for mounting the flush-mount camera flush to the vehicle surface

1. Mark a location for the 1.25 in (32.0 mm) mounting hole on the vehicle surface that will accommodate the full diameter and depth of the camera body. Once you drill this hole, you can route the camera output cable to:

   a) a camera-to-monitor extension cable that can be either

      • one CAMCABLE-SHORT/-5/-10/15/-20/-40 or

      • two CAMCABLE-SHORT/-5/-10/15/-20 connected in series with adapter CAMCABLE-EXT

   that is then connected to

      • either the CAM1 or CAM2 input on the input/pow-

er/trigger wiring harness (CAMADP-INT-2) of the CAMLCD-INT-56/CAMLCD-INT-70 monitor or

- one of the four camera inputs on the CAMBOX-4NTSC/CAMBOX-4PAL control box (for use with the CAMLCD-70 monitor) or

- one of the four camera inputs on the input/power/trigger wiring harness (CAMADP-INT-4) of the CAMLCD-INT-70-B

  or

b) a special DVR system camera-extension cable that is connected to one of the four camera inputs on the CAMDVR-4-B

Mounting the Flush-Mount Camera

Option 1: Mounting the camera with the included bracket

1. Align the mounting bracket on the vehicle with the drilled mounting holes, and then guide the camera output cable through the camera barrel and nuts of the mounting bracket assembly (Figure 3 on page 20).

2. Guide the camera output cable into the 3/4 in (19.0 mm) hole and secure the rubber grommet of the cable in the hole.

3. To affix the mounting bracket to the vehicle, choose the appropriate screws for the holes you drilled:

   - a) If you are using the self-tapping screws, guide each screw through the camera mounting bracket, then into the drilled holes. Fasten the screws tightly to the vehicle body.

   - b) If you are using the machine screws, guide each screw with its lock washer and flat washer through the camera's mounting bracket. Install the matching nut on the opposite side of the vehicle surface. Fasten the mounting hardware tightly to the vehicle body.

4. Install the camera and camera barrel, while adjusting the viewing angle, in the mounting bracket with the included short screws (with matching lock and flat washers).

5. Connect the camera to the monitor via a camera extension cable (one CAMCABLE-SHORT/-5/-10/-15/-20/-40 or two connected in series with CAMCABLE-EXT) or special DVR system camera cable (as applicable). To obtain the correct image orientation, it may be necessary to rotate the camera in the barrel of

the mounting bracket assembly. Once you obtain the image you want, tighten the nuts of the camera mounting bracket assembly to fix the camera position.

6. Wrap the cable connection in the supplied black waterproofing tape.

Option 2: Mounting the camera flush to the vehicle surface

Note: Before routing the camera cable through the hole, you can install an included angled nut so that the camera can be slightly tilted from the horizontal surface of the vehicle.

1. Guide the camera output cable through the drilled 1.25 in (32.0 mm) hole.

2. On the opposite side of the vehicle surface, route the camera output cable through the camera mounting barrel and nut.

3. Install the camera/barrel, while adjusting it to the desired viewing angle.

4. Connect the camera to the monitor via a camera extension cable (one CAMCABLE-SHORT/-5/-10/-15/-20/-40 or two connected in series with CAMCABLE-EXT) or special DVR system camera cable (as applicable). To obtain the correct image orientation, it may be necessary to rotate the camera in the barrel of the mounting bracket assembly. Once you obtain the image you want, tighten the camera mounting nut to the barrel to fix the camera position.

5. Wrap the camera extension cable connection in the supplied black waterproofing tape.

Installing the Ball Camera (CAMCCD-BALLNTSC/ CAMCCD-BALLPAL)

Before the installation, find an appropriate location for the ball camera with these considerations in mind:

• Although the camera is waterproof, repeatedly exposing it to direct, high-pressure streams of water (as from a pressure washer) is not recommended.

- The material properties and thicknesses of vehicle bodies vary widely. The included hardware can accommodate many different vehicle installations. However, it is recommended that you exercise judgment when drilling holes into vehicle surfaces.

- When drilling into a vehicle structure, be sure that both sides of the surface are clear of anything that could be damaged. Remove all burrs from drilled holes. To prevent electrical shorts, grommet all drilled holes through which wiring passes (all Federal Signal cameras include grommets). Also, ensure that the mounting screws do not cause electrical or mechanical damage to the vehicle.

- This camera is recommended for installation anywhere flexibility in positioning the camera is required after it has been permanently installed. The included Allen wrench is all that is needed to rotate the ball camera within its mount. A typical installation might be mounting the ball camera on a side-view mirror assembly. The camera should be positioned so that the driver can obtain a wide, unobstructed field of vision.

To install the ball camera, follow these steps:

Preparing to Install the Ball Camera

1. Open the included camera mounting hardware kit, which has:
    - two self-tapping screws
    - two machine screws with matching lock washers, flat washers, and nuts
    - an insulating pad
    - an Allen wrench (for adjusting the orientation of the camera in the housing)
    - waterproofing tape

2. Before the installation, connect the camera to the monitor and turn on the system to verify the camera orientation.

3. For access to the bottom half of the mounting bracket where the mounting screws enter, use the included Allen wrench to remove the two screws and nuts on both sides of the camera mounting bracket (Figure 4 on page 26).

Marking and Drilling the Mounting Holes
for the Ball Camera

⚠ WARNING

AIRBAG DEPLOYMENT
Do not install equipment or route wiring in the deployment path of an airbag.

Failure to observe this warning will reduce the effectiveness of the airbag or potentially dislodge the equipment, causing serious injury.

⚠ WARNING

SEAT REMOVAL PRECAUTION
If a vehicle seat is temporarily removed, verify with the vehicle manufacturer if the seat needs to be recalibrated for proper airbag deployment.

Failure to heed this warning could result in death or serious injury.

⚠ CAUTION

LOCATING OPERATORS CONTROLS
Locate the camera(s), monitor, keyboard, control box, and digital video recorder (as applicable) so the VEHICLE and SYSTEM can be operated safely under all driving conditions.

Failure to heed this caution could result in driver distraction or driver error while operating the vehicle.

NOTICE

DRILLING PRECAUTIONS
When drilling holes, check the area into which you are drilling to be sure you do not damage vehicle components while drilling. All drilled holes should be deburred and all sharp edges should be smoothed. All wire routings going through drilled holes should be protected by a grommet or convolute/split loom tubing.

1. Use the bottom half of the camera mounting bracket as a guide to mark the locations of two mounting holes on the vehicle chassis.

2. Mark a location nearby for the 3/4 in (19.0 mm) hole for the camera output cable. Once this larger hole is drilled, the camera output cable can be routed through it to:

    a)   a camera-to-monitor extension cable that can be either

- one CAMCABLE-SHORT/-5/-10/-15/-20/-40 *or*

- two CAMCABLE-SHORT/-5/-10/-15/-20 connected in series with adapter CAMCABLE-EXT

    that is then connected to

- either the CAM1 or CAM2 input on the input/power/trigger wiring harness (CAMADP-INT-2) of the CAMLCD-INT-56/CAMLCD-INT-70 monitor or

- one of the four camera inputs on the CAMBOX-4NTSC/CAMBOX-4PAL control box (for use with the CAMLCD-70 monitor) or

- one of the four camera inputs on the input/power/trigger wiring harness (CAMADP-INT-4) of the CAMLCD-INT-70-B

    or

    b)   a special DVR system camera-extension cable that is connected to one of the four camera inputs on the CAMDVR-4-B

3.   Drill the correctly sized holes at the drill-position marks for the type of screws you are using:

    a)   If you are using the self-tapping screws, drill two 0.116 in (3.0 mm) holes (a #32 drill bit can be used).

    b)   If you are using the machine screws, drill two 13/64 in (5.2 mm) clearance holes.

4.   Drill a 3/4 in (19.0 mm) hole at the mark for the camera output cable. Smooth and deburr the hole.
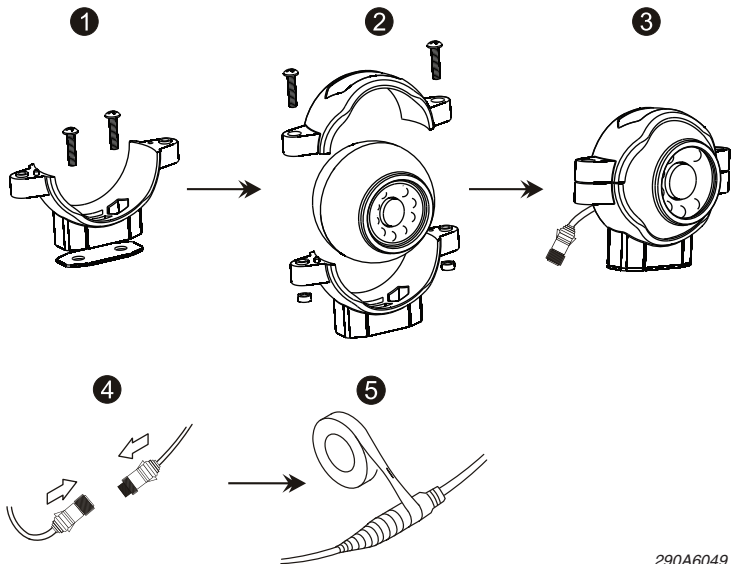
290A6049

Figure 4. Ball camera installation CAMCCD-BALLNTSC/CAMCCD-BALLPAL

Mounting the Ball Camera

1. Align the bottom half of the camera mounting bracket with the drilled mounting holes on the vehicle while inserting the insulating pad between the vehicle surface and the camera mounting bracket.

2. To affix the bottom half of the camera mounting bracket to the vehicle, choose the appropriate screws for the mounting holes you drilled.

   a) If you are using the self-tapping screws, guide each screw through the bottom half of the camera mounting bracket, then into the drilled holes. Fasten the screws tightly to the vehicle body.

   b) If you are using the machine screws, guide each screw through the camera mounting bracket, then into the drilled holes. Install the matching lock and flat washers followed by the nuts on the opposite side of the vehicle surface. Fasten the mounting hardware tightly to the vehicle body.

3. Install the camera while adjusting the viewing angle in the mounting bracket using the included Allen wrench. To verify the image

orientation, connect the camera to the monitor with a camera extension cable (one CAMCABLE-SHORT/-5/-10/-15/-20/-40 or two connected in series with CAMCABLE-EXT) or special DVR system camera cable (as applicable). It may be necessary to rotate the camera in the mounting bracket to obtain the correct orientation. Once you obtain the image you want, tighten the screws on the mounting bracket to fix the camera position.

4. Wrap the cable connection in the supplied black waterproofing tape.

Installing the Dome Camera (CAMCCD-DOMENTSC/ CAMCCD-DOMEPAL)

Before the installation, find an appropriate location for the dome camera with these considerations in mind:

•   **This camera is intended for only indoor use. Installing it on the exterior of a vehicle is not recommended.**

•   The material properties and thicknesses of vehicle bodies vary widely. The included hardware can accommodate many different vehicle installations. However, it is recommended you exercise judgment when drilling holes into vehicle surfaces.

•   When drilling into a vehicle structure, be sure that both sides of the surface are clear of anything that could be damaged. Remove all burrs from drilled holes. To prevent electrical shorts, grommet all drilled holes through which wiring passes (all Federal Signal cameras include grommets). Also, ensure that the mounting screws do not cause electrical or mechanical damage to the vehicle.

•   This camera is recommended for installation in vehicle interior spaces like the cargo bay of a delivery vehicle. The camera should be positioned so that the driver can obtain a wide, unobstructed field of vision.

To install the dome camera, follow these steps:

Preparing to Install the Dome Camera

1. Open the included camera mounting hardware kit, which has:

    •   Four self-tapping screws

    •   Four machine screws with matching lock washers, flat washers, and nuts

    •   Waterproofing tape

2.   Remove the four screws that secure the camera housing cover/ dome to its base (Figure 5 on page 30).

3.   The holes in the base can be used as a template for marking drill-holes for mounting screws. To access the mounting holes in the base, disconnect the cable that connects the built-in microphone and record indicator LED to the internal PCB assembly.

4.   Before the installation, connect the camera to the monitor and turn on the system to verify the orientation of the camera in the housing. The angle of the camera within the dome can be adjusted by loosening the two miniature screws at its base within the housing. Secure the camera at the desired angle.

Marking and Drilling the Mounting Holes for the Dome Camera

⚠ WARNING

AIRBAG DEPLOYMENT
Do not install equipment or route wiring in the deployment path of an airbag.

Failure to observe this warning will reduce the effectiveness of the airbag or potentially dislodge the equipment, causing serious injury.

⚠ WARNING

SEAT REMOVAL PRECAUTION
If a vehicle seat is temporarily removed, verify with the vehicle manufacturer if the seat needs to be recalibrated for proper airbag deployment.

Failure to heed this warning could result in death or serious injury.

⚠ CAUTION

LOCATING OPERATORS CONTROLS
Locate the camera(s), monitor, keyboard, control box, and digital video recorder (as applicable) so the VEHICLE and SYSTEM can be operated safely under all driving conditions.

Failure to heed this caution could result in driver distraction or driver error while operating the vehicle.

DRILLING PRECAUTIONS
When drilling holes, check the area into which you are drilling to be sure you do not damage vehicle components while drilling. All drilled holes should be deburred and all sharp edges should be smoothed. All wire routings going through drilled holes should be protected by a grommet or convolute/split loom tubing.

1. Use the mounting base as a guide to mark the locations of four mounting holes on the vehicle chassis and a 3/4 in (19.0 mm) hole for the camera output cable. Once this hole is drilled, you can route the camera output cable through it to:

    a) a camera-to-monitor extension cable that can be either

        •   one CAMCABLE-SHORT/-5/-10/-15/-20/-40 or

        •   two CAMCABLE-SHORT/-5/-10/-15/-20 connected in series with adapter CAMCABLE-EXT

        that is then connected to:

        •   either the CAM1 or CAM2 input on the input/power/trigger wiring harness (CAMADP-INT-2) of the CAMLCD-INT-56/CAMLCD-INT-70 monitor *or*

        •   one of the four camera inputs on the CAMBOX-4NTSC/CAMBOX-4PAL control box (for use with the CAMLCD-70 monitor) *or*

        •   one of the four camera inputs on the input/power/trigger wiring harness (CAMADP-INT-4) of the CAMLCD-INT-70-B

        or

    a) a special DVR system camera-extension cable that is connected to one of the four camera inputs on the CAMDVR-4-B

2. Drill the correctly sized holes at the drill-position marks for the type of screws you are using:

    a) If you are using the self-tapping screws, drill four 0.116 in (3.0 mm) holes.

    b) If you are using the machine screws, drill four 5/32 in (4.0 mm) clearance holes.

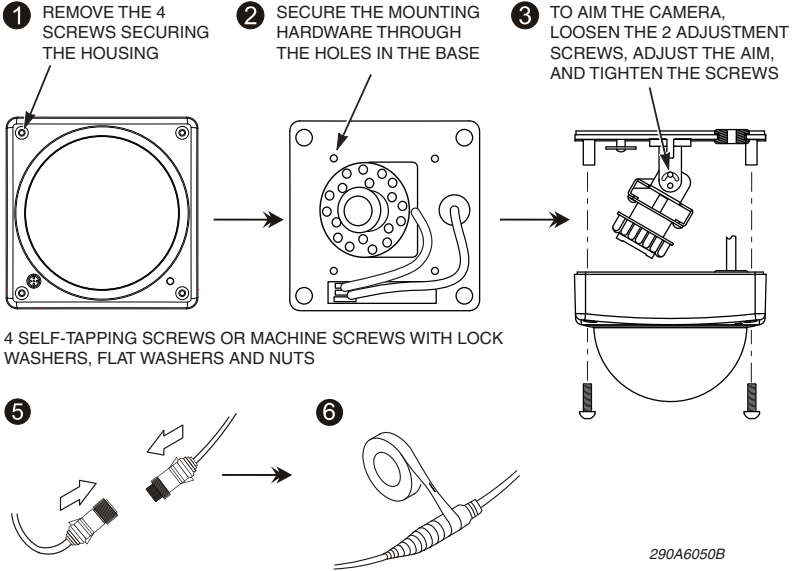3. Drill a 3/4 in (19.0 mm) hole at the mark for the camera output cable. Smooth and deburr this hole.

Figure 5. Dome camera installation CAMCCD-BALLNTSC/CAMCCD-BALLPAL

Mounting the Dome Camera

1. Align the mounting base on the vehicle with the drilled mounting holes and guide the camera output cable into the 3/4 in (19.0 mm) hole.

2. To affix the camera to the vehicle, choose the appropriate screws for the mounting holes you drilled:

   a) If you are using the self-tapping screws, guide each screw through the camera base, then into the drilled holes. Fasten the screws tightly to the vehicle body.

   b) If you are using the machine screws, guide each screw with its lock washer and flat washer through the camera base. Install the matching nut on the opposite side of the vehicle surface. Fasten the mounting hardware tightly to the vehicle body.

3. Connect a camera extension cable (one CAMCABLE-SHORT/-5/-10/-15/-20/-40 or two connected in series with CAMCABLE-EXT) or special DVR cable (as applicable) to the camera.

4. Wrap the cable connection in the supplied black waterproofing tape.

Installing the Truck/Trailer Kit (CAMCABLE-TRK)

Find an appropriate location for installing the these components:

- a 65.5 ft (20 m) camera extension cable with heavy-duty 7-pin covered connector, typically connected on a trailer

- a 15 ft (4.5 m) (straight length) coiled cable for connection between truck and trailer

- a 16.5 ft (5 m) camera extension cable with heavy-duty 7-pin covered connector, typically connected on the portion of the vehicle with the monitor (e.g., passenger compartment of a truck)

Marking and Drilling Holes for the Heavy-Duty 7-Pin Connectors

⚠ WARNING

AIRBAG DEPLOYMENT
Do not install equipment or route wiring in the deployment path of an airbag.

Failure to observe this warning will reduce the effectiveness of the airbag or potentially dislodge the equipment, causing serious injury.

⚠ WARNING

SEAT REMOVAL PRECAUTION
If a vehicle seat is temporarily removed, verify with the vehicle manufacturer if the seat needs to be recalibrated for proper airbag deployment.

Failure to heed this warning could result in death or serious injury.

⚠ CAUTION

LOCATING OPERATORS CONTROLS
Locate the camera(s), monitor, keyboard, control box, and digital video recorder (as applicable) so the VEHICLE and SYSTEM can be operated safely under all driving conditions.

Failure to heed this caution could result in driver distraction or driver error while operating the vehicle.

NOTICE

DRILLING PRECAUTIONS

When drilling holes, check the area into which you are drilling to be sure you do not damage vehicle components while drilling. All drilled holes should be deburred and all sharp edges should be smoothed. All wire routings going through drilled holes should be protected by a grommet or convolute/split loom tubing.

1. Mark a location on the vehicle for the 2.0 in/50.8 mm diameter, heavy-duty, 7-pin connector. Be sure to have enough depth behind the vehicle surface at this location to accommodate the full length of the connector.

2. Mark two holes 2.935 in (74.55 mm) apart to accommodate user-supplied 5/16 in (8 mm) bolts/screws to attach the connector to the vehicle surface.

3. Double-check your marks by referring to the connectors included in the kit, then drill the holes.

4. Attach the connector with user-supplied hardware.

Installing the Monitor (CAMLCD-INT-56, CAMLCD-INT-70, CAMLCD-INT-70-B, CAMLCD-70)

Before the installation, find an appropriate location for the monitor with these considerations in mind:

• The location should be able to support 9 lb (4 kg) and should not obstruct the view of the driver.

• The monitor should be installed so that the driver can easily view the rear-view mirrors of the vehicle. This system does not replace the need for these mirrors, it is strictly a supplement. Typically a center console in the cab or dashboard can be a good mounting location; mounting from the ceiling of the vehicle is also possible.

• Avoid placing the monitor where it will be constantly exposed to direct sunlight, moisture, a strong magnetic field (as near a speaker) or a heat source (A/C or heater duct).

• Before choosing a mounting location, decide where to route the monitor cable. The installation requires an appropriately sized hole to accommodate whichever cable your system has:

- CAMLCD-INT-56/CAMLCD-INT-70: This monitor has an input/power/trigger wiring harness that has two camera inputs, power/ground, and two trigger wires.

- CAMLCD-70: This monitor has a single output cable that either connects to a CAMBOX-4NTSC/CAMBOX-4PAL control box or to a CAMDVR-4-B digital video recorder. The CAMBOX-4NTSC/CAMBOX-4PAL functions as the central input/output "control box" for use with the CAMLCD-70 for a split-screen capable, four-camera system. Alternatively, the CAMDVR-4-B requires this monitor as the system display. Many holes or an appropriately sized conduit will be needed to accommodate all inputs and outputs for either of these systems.

- CAMLCD-INT-70-B: This monitor has an input/power/trigger wiring harness that has four camera inputs, power/ground, and four trigger wires.

To install the monitor, follow these steps:

Mounting the Monitor in the Vehicle

⚠ WARNING

AIRBAG DEPLOYMENT
Do not install equipment or route wiring in the deployment path of an airbag.

Failure to observe this warning will reduce the effectiveness of the airbag or potentially dislodge the equipment, causing serious injury.

⚠ WARNING

SEAT REMOVAL PRECAUTION
If a vehicle seat is temporarily removed, verify with the vehicle manufacturer if the seat needs to be recalibrated for proper airbag deployment.

Failure to heed this warning could result in death or serious injury.

⚠ CAUTION

LOCATING OPERATORS CONTROLS
Locate the camera(s), monitor, keyboard, control box, and digital video recorder (as applicable) so the VEHICLE and SYSTEM can be operated safely under all driving conditions.

Failure to heed this caution could result in driver distraction or driver error while operating the vehicle.

NOTICE

DRILLING PRECAUTIONS

When drilling holes, check the area into which you are drilling to be sure you do not damage vehicle components while drilling. All drilled holes should be deburred and all sharp edges should be smoothed. All wire routings going through drilled holes should be protected by a grommet or convolute/split loom tubing.

1. Use the standard mounting bracket for the monitor as a template to mark the five mounting holes for the self-tapping mounting screws (Figure 6). If you are using the optional heavy-duty mount, use the mount as a template for marking mounting holes.

2. When you are ready to install the monitor mounting bracket, remove the red backing off of the bottom of the bracket to expose the adhesive. No adhesive is included with the heavy-duty mount.

3. Place the monitor in the mounting location and secure it with the five self-tapping screws.

4. Attach the monitor to the mounting bracket and adjust it to the preferred viewing angle.
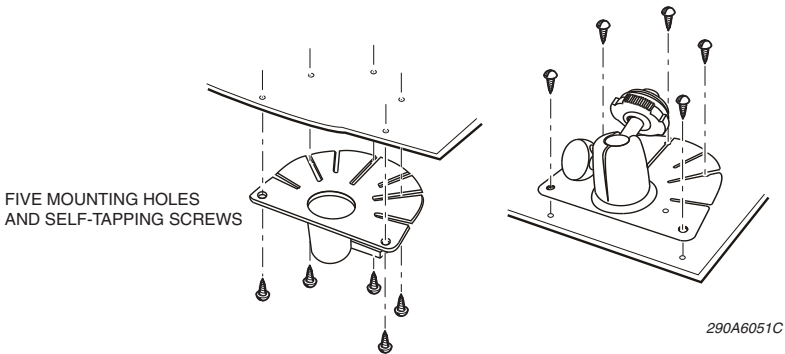
FIVE MOUNTING HOLES
AND SELF-TAPPING SCREWS

290A6051C

Figure 6. Monitor mounting bracket and hardware

Installing the Control Box (with the CAMLCD-70 Monitor)

Mount the CAMBOX-4NTSC/CAMBOX-4PAL control box with the included self-tapping hardware. The control box should be centrally located within the vehicle in relative proximity to the monitor. The control box is not intended for installation outside the vehicle. For an illustration of a typical installation, see Figure 8 on page 41.

4   Connecting the Mobile Camera System

This section describes how to connect four Mobile Camera System configurations:

- **Option 1:** System configured with a CAMLCD-INT-56 monitor (as in the CAMSET56-NTSC-2/CAMSET56-PAL-2) or CAMLCD-INT-70 monitor

- **Option 2:** System configured with a CAMLCD-70 monitor and CAMBOX-4NTSC/CAMBOX-4PAL (as in the CAMSET70-NTSC-4/CAMSET70-PAL-4)

- **Option 3:** Option 3: System configured with a CAMLCD-INT-70-B monitor (as in the CAMSET70-NTSC4B/CAMSET70-PAL4B)

- **Option 4:** Option 4: System configured with a CAMLCD-70 monitor and CAMDVR-4-B digital video recorder

Option 1: Connections for system configured with CAMLCD-INT-56/CAMLCD-INT-70/CAMLCD-MIR monitor, as in the CAMSET56-NTSC-2/CAMSET56-PAL-2/ CAMSETMIR-4RW

For an illustration of a typical installation, see Figure 7 on page 40.

1. The included input/power/trigger wiring harness (CAMADP-INT-2) has the following connections:

   - Red (RED/DC INPUT): Connect this to the 12V or 24V vehicle battery. To avoid drawing current when the vehicle is not running, connect this wire to the vehicle ignition "accessory" or "on" position.

   - Black (BLK/GND): Connect this to the vehicle or chassis ground.

   - Green (GREEN/REVERSE): Applies a 12V–24V signal to the green wire functions as a trigger to display CAM1 on the monitor. If the camera connected to the CAM1 input is used in a standard rear-view application, you can connect the green wire to the reverse light circuit of the vehicle for automatic display of the rearview camera when the vehicle is in reverse. When this trigger is removed, the monitor will return to standby mode with no image displayed.

For any other configuration, connect a suitable 12V–24V trigger to this wire to signal when the monitor should view CAM1. This wire has priority over the white wire (CAM2) when both wires are triggered.

- White (WHITE/CAM2): Connect a 12V–24V signal to this wire to trigger when the monitor should display CAM2. The green (CAM1) wire trigger will override a trigger from this wire.

- CAM1 and CAM2: Connect cameras to these inputs. A CAMCA-BLE-SHORT/-5/-10/-15/-20/-40 connected to one of these inputs can provide camera cable extension up to 131 ft (40 m). With the CAMADP-EXT, two CAMCABLE-SHORT/-5/-10/-15/-20 cables can also be connected in series to achieve lengths up to 131 ft (40 m).

- MONITOR: Connect this 13-pin connector to the monitor.

2. Any connections made outside the vehicle interior (camera cable extensions, for example) should be wrapped in the waterproofing tape.

Option 2: System configured with CAMLCD-70 monitor and CAMBOX-4NTSC/CAMBOX-4PAL (as in the CAMSET70-NTSC-4/CAMSET70-PAL-4)

A example system is shown in Figure 8 on page 41:

1. One to four cameras can be connected to CAMERA inputs 1 to 4. Camera connections are made through 6-pin-plug/4-pin-receptacle adapters (included with the CAMBOX-4NTSC/CAMBOX-4PAL and with the CAMSET70-NTSC-4/CAMSET70-PAL-4).

    A CAMCABLE-SHORT/-5/-10/-15/-20/-40 connected to one of these inputs can provide camera cable extension up to 131 ft (40 m. Alternatively, using the CAMADP-EXT, two CAMCABLE-SHORT/-5/-10/-15/-20 cables can also be connected in series to achieve lengths up to 131 ft (40 m).

2. The monitor is connected through a 6-pin-plug/4-pin-receptacle adapter to the MONITOR input. If necessary, a monitor extension cable is included with the CAMLCD-70 (and with the CAMSET70-NTSC-4/CAMSET70-PAL-4) to accommodate various installations that may require additional cable length between the control box and monitor.

3. The included keyboard is connected to the KEYBOARD input.

4. The two-wire power wiring harness is connected to POWER IN DC12-24V input.

5. Connect a 12V–24V trigger to the appropriate wire to signal when the monitor should display Camera 1, 2, 3, or 4. The four-wire trigger wiring harness is connected to CAM TRIGGER input (Figure 8 on page 41):

   - Green: Trigger for Camera 1

   - White: Trigger for Camera 2

   - Yellow: Trigger for Camera 3

   - Blue: Trigger for Camera 4

   The priority from highest to lowest for the camera triggers is: Camera 1 > Camera 2 > Camera 3 > Camera 4. In other words, the Camera 1 trigger has the highest priority and overrides other triggers. Connect a 12–24V trigger to the appropriate wire to signal when the monitor should display Camera 1, 2, 3, or 4.

6. The control box includes mirror/normal (MIR/NOR) switches for each of the four camera inputs. Each switch can be set to the driver's preference.

7. RCA connections for audio and composite video are included for connection to a VCR or DVR system.

8. Any connections made outside of the vehicle interior should be wrapped in black waterproofing tape.

Option 3: System configured with CAMLCD-INT-70-B monitor, as in the CAMSET70-NTSC4B/CAMSET70-PAL4B /CAMSET70-N4BW

An example system is shown in Figure 9 on page 42.

1. Connect the 26-pin male connector on the monitor to the 26-pin female connector on the CAMADP-INT-4 input/power/trigger wiring harness.

2. One to four cameras can be connected to camera inputs 1 to 4 of the input/power/trigger wiring harness, CAMADP-INT-4.

   A CAMCABLE-SHORT/-5/-10/-15/-20/-40 connected to one of these inputs can provide camera cable extension up to 131 ft (40 m).

   Alternatively, using adapter CAMADP-EXT, two CAMCABLE-SHORT/-5/-10/-15/-20 cables can be connected in series to achieve lengths up to approximately 131 ft (40 m).

3.   Connect 12V–24V to the red wire.

4.   Connect vehicle or chassis ground to the black wire.

5.   Connect camera trigger wires as follows:

   •   green/red: trigger for Camera 1

   •   blue/red: trigger for Camera 2

   •   brown/red: trigger for Camera 3

   •   black/red: trigger for Camera 4

   The priority from highest to lowest for the camera triggers is: Camera 1 > Camera 2 > Camera 3 > Camera 4. In other words, the Camera 1 trigger has the highest priority and overrides other triggers.

7.   Connect a 12V–24V trigger to the appropriate wire to signal when the monitor should display Camera 1, 2, 3, or 4.

8.   Any connections made outside of the vehicle interior should be wrapped in waterproofing tape.

Option 4: System configured with CAMLCD-70 monitor and CAMDVR-4-B Digital Video Recorder

The CAMDVR-4-B digital video recorder system requires the CAMLCD-70 monitor if a system display is desired (video can still be recorded without a monitor.) If you are using this system, also note that the four included camera extension cables—two 16.5 ft (5 m) and two 33 ft (10 m) cables—are different from the CAMCABLE-SHORT/-5/-10/-15/-20/-40 cables. They are not interchangeable. For installation and operation instructions, refer to the manual included with the CAMDVR-4-B system.

CAMCCD #1

CAMCCD #2

CAMCABLE-SHORT/-5/-10/-15/-20/-40

MONITOR
(CAMLCD-INT-56
OR
CAMLCD-INT-70)

OR

CAM1
INPUT

CAM2
INPUT

CAMADP-INT-2

MIRROR MONITOR
(CAMLCD-MIR)

CAM1 TRIGGER (GREEN/REVERSE)
CAM2 TRIGGER (WHITE/CAM2)
GROUND (BLK/GND)
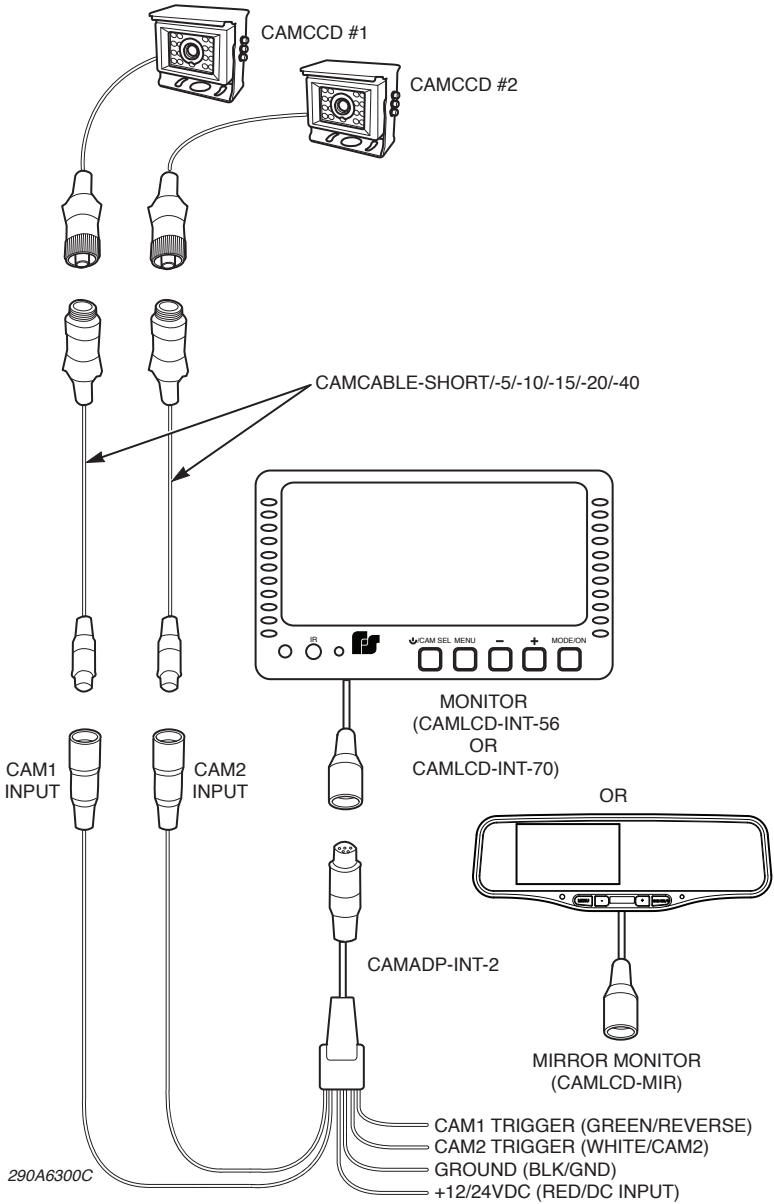+12/24VDC (RED/DC INPUT)

290A6300C

Figure 7. Option 1: System configured with a CAMLCD-INT-56 monitor (as in the CAMSET56-NTSC-2/CAMSET56-PAL-2), CAMLCD-INT-70 monitor, or CAMLED-MIR (as in the CAMSETMIR-4RW)
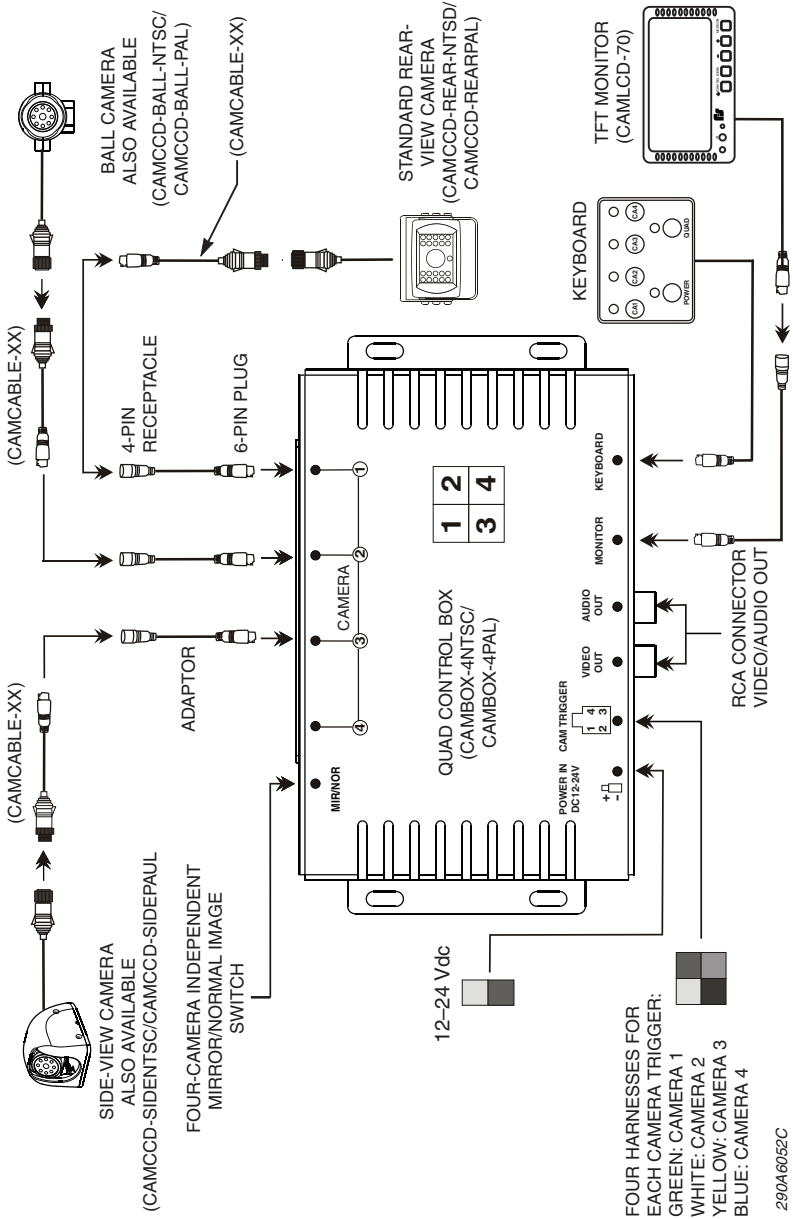
Figure 8. Option 2: System configured with a CAMLCD-70 monitor and CAMBOX-4NTSC/CAMBOX-4PAL (as in the CAMSET70-NTSC-4/CAMSET70-PAL-4)
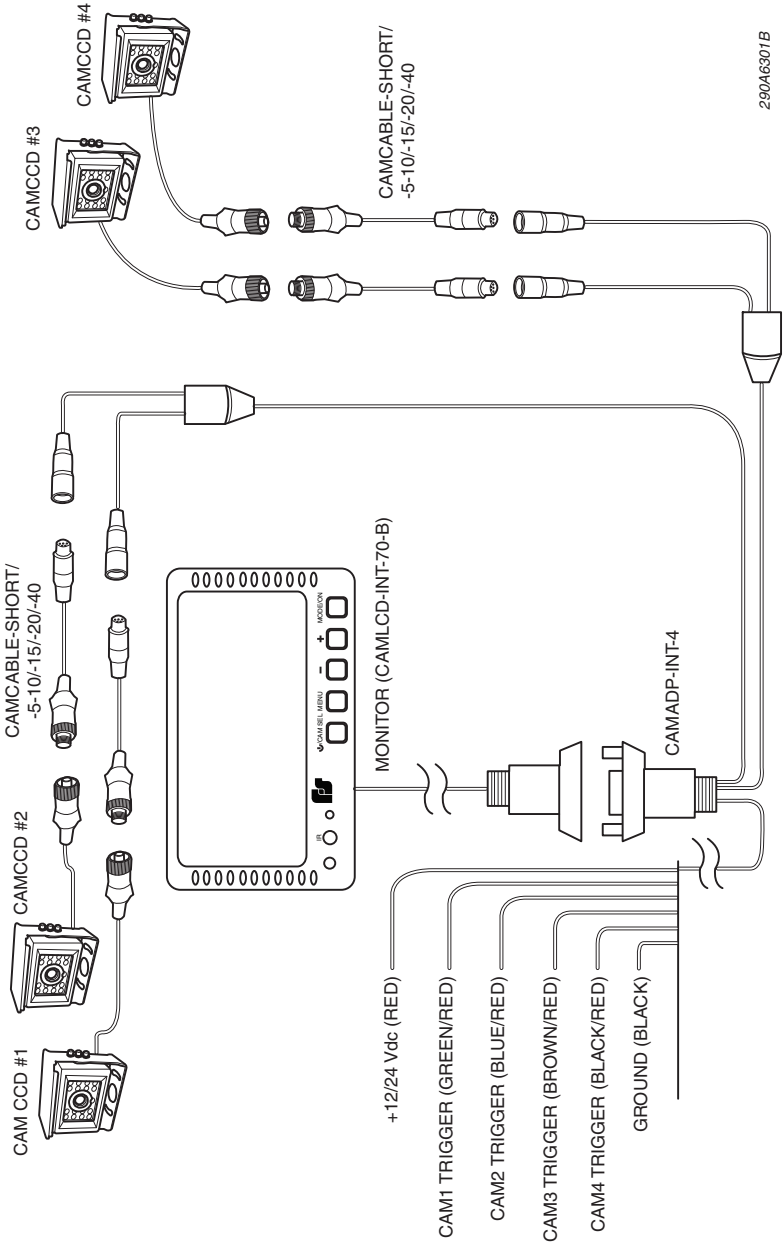
Figure 9. Option 3: System configured with a CAMLCD-INT-70-B monitor (as in the CAMSET70-NTSC4B/CAMSET70-PAL4B/CAMSET70-N4BW)

5 Testing the System

After the installation, test the emergency warning system to ensure that it is operating properly. Also test all vehicle functions, including horn operation, vehicle safety functions, and vehicle lighting systems to ensure proper operation. Ensure that the installation has not affected the vehicle operation or changed any vehicle safety functions or circuits.

Do not test the sound and light system of the vehicle while driving. Operating the vehicle warning systems may pose a hazard to the operator and other drivers if the systems do not function as expected. Test the vehicle only in a controlled environment.

After testing is complete, provide a copy of these instructions to the instructional staff and all operating personnel.

6 Operating the Mobile Camera System

This section describes how to operate these Mobile Camera System configurations:

- **Option 1:** System configured with a CAMLCD-INT-56 monitor (as in the CAMSET56-NTSC-2/CAMSET56-PAL-2) or CAMLCD-INT-70 monitor

- **Option 2:** System configured with a CAMLCD-70 monitor and CAMBOX-4NTSC/CAMBOX-4PAL (as in the CAMSET70-NTSC-4/CAMSET70-PAL-4)

- **Option 3:** System configured with a CAMLCD-INT-70-B monitor (as in the CAMSET70-NTSC4B/CAMSET70-PAL4B)

For instructions on how to operate the CAMDVR-4-B digital video recorder, which uses the CAMLCD-70 monitor, refer to the manual included with CAMDVR-4-B

Option 1: System Configured with CAMLCD-INT-56/ CAMLCD-INT-70 Monitor, as in the CAMSET56-NTSC-2/ CAMSET56-PAL-2

When you turn on the camera system by turning the vehicle ignition key to either the "accessory" or "on" position, the red LED on the monitor turns on (Figure 10 on page 47). The LED indicates Standby Mode, which conserves power by turning off the monitors until you manually turn on the system.

To manually turn on the system, briefly press the ⏻ /CAM SEL (power/ camera select) button. The image of CAM1 (Camera 1) or the last camera selected, the number of which is stored in memory, appears on the monitor. The LED turns off when the system is powered on and an image is displayed.

To automatically turn CAM1 (Camera 1) on, 12V–24 V should be applied to the GREEN/REVERSE wire. This can both power the monitor from Standby Mode and select Camera 1.

To automatically turn CAM2 (Camera 2) on, apply 12V–24V to the WHITE CAM2 wire. This can both power the monitor from Standby Mode and select Camera 2.

If two cameras are connected, briefly pressing the ⏻ /CAM SEL button enables you to manually switch to CAM2 from CAM1 and from CAM1 to CAM2. You can also switch cameras when the system is on by applying 12V–24V to the appropriate trigger wire. When you turn on the system or switch between cameras, CAM1 or CAM2 appears for approximately four seconds to show which camera is being viewed.

To return the system to Standby Mode, press and hold ⏻ /CAM SEL. The red LED lights.

Menu Options

The MENU button enables you to access these options:

- COLOR: Adjusts the amount of color information in the monitor image on a scale of 0 to 30.

- BRIGHTNESS: Adjusts the degree of brightness in the monitor image on a scale of 0 to 30.

- CONTRAST: Adjusts the amount of contrast in the monitor image on a scale of 0 to 30.

- VOLUME: Adjusts the volume of the sound from microphone in the selected camera on a scale of 0 to 30, as applicable.

- RETURN: Returns you to the image of the current camera and exits the menu.

After you press MENU, select one of the options by moving up and down the menu options with the **+** (up) and **–** (down) buttons and pressing the MENU button. The selected option is red; all other options are yellow. Then adjust the scale with the **+** (increase) and **–** (decrease) buttons. The scale disappears after approximately four seconds of inactivity. Select RETURN if you are finished setting the menu options and the menu disappears.

The MIR/NOR button enables you to switch the displayed camera image to either a mirror-image or a normal image. This setting is retained in memory so that even when the system is turned off, the preferred setting (mirror or normal) is recalled when you turn on the system.

Option 2: System Configured with a CAMLCD-70 Monitor and CAMBOX-4NTSC/CAMBOX-4PAL (as in CAMSET70-NTSC-4/CAMSET70-PAL-4)

When you turn on the camera system by turning the vehicle ignition key to either the "accessory" or "on" position, the monitor turns on and displays all connected cameras as noted below. The system configures the display based on the number of cameras connected to the system.

Screen Configurations

- If one camera is connected, its image is displayed full-screen.

- If two cameras are connected, one camera is displayed on the top half of the screen and the other on the bottom half in a split-screen.

- If three cameras are connected, one camera is displayed on the left half of the screen, while the other two are displayed on the right side of the screen in a split-screen or vice versa.

- If four cameras are connected, the screen is split into four sections with each section filled with an image from one of the cameras.

Screen configurations can be accessed from the keyboard (Figure 10) as follows:

- Press CA1 for a full-screen image of Camera 1

- Press CA2 for a full-screen image of Camera 1

- Press CA3 for a full-screen image of Camera 1

- Press CA4 for a full-screen image of Camera 1

- Press QUAD for the split-screen display. The display varies depending on how many cameras are connected to the control box. Refer to the list above for the image displayed based on the number of cameras connected when you press QUAD once.

  Pressing QUAD a second time splits the screen into four sections with images where cameras are connected and blue sections where none are connected.
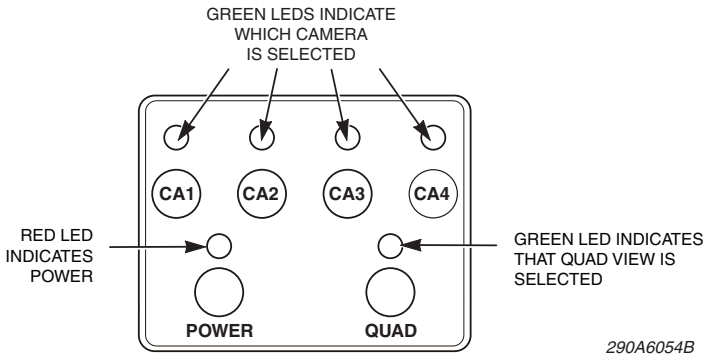
GREEN LEDS INDICATE
WHICH CAMERA
IS SELECTED

CA1   CA2   CA3   CA4

RED LED
INDICATES
POWER

GREEN LED INDICATES
THAT QUAD VIEW IS
SELECTED

POWER   QUAD

290A6054B

Figure 10. Camera system keyboard

To manually turn the system off, press the POWER button on the keyboard. The red standby LED on the POWER button will light. To manually turn the system on, press the POWER button on the keyboard briefly. The split-screen image of all connected cameras, or the last screen configuration selected (if power has not been removed), will appear on the monitor.

The red LED on the monitor turns off when the system is powered on and an image is displayed. Please note that pressing the ⏻ /CAM SEL button on the monitor can also turn the monitor on and off in this system, but using the keypad is recommended.

Automatic camera triggering

Automatic triggering of connected cameras is supported as follows:

- To automatically turn on Camera 1, apply 12V–24V to the green wire. This can both power the monitor from standby and select Camera 1.

- To automatically turn on Camera 2, apply 12V–24V to the white wire. This can both power the monitor from standby and select Camera 2.

- To automatically turn on Camera 3, apply 12V–24V to the yellow wire. This can both power the monitor from standby and select Camera 3.

- To automatically turn on Camera 4, apply 12V–24V to the blue wire. This can both power the monitor from standby and select Camera 4.

Priority for the camera triggers is, from highest to lowest: Camera 1 > Camera 2 > Camera 3 > Camera 4. In other words, the Camera 1 trigger has the highest priority and overrides other triggers.

Menu options

Press the MENU button for these options:

- COLOR: Adjusts the amount of color information in the image on the monitor on a scale of 0 to 24.

- BRIGHTNESS: Adjusts the degree of brightness in the image on the monitor on a scale of 0 to 24.

- CONTRAST: Adjusts the amount of contrast in the image on the monitor on a scale of 0 to 24.

- VOLUME: Adjusts the volume of the sound from the selected camera microphone on a scale of 0 to 24, as applicable.

After you press MENU, select one of the options by moving up and down the menu with the – (down) and + (up) buttons and pressing the MENU button. The selected menu item is red; all other options are yellow. Then adjust the scale that appears with the – (decrease) and + (increase) buttons. The scale disappears after approximately eight seconds of inactivity.

The MIR/NOR button on the monitor enables you to temporarily switch the displayed image of the camera to either a mirror image or a normal image. This setting is set in memory so that even when the system is turned off, the preferred setting is recalled when you turn on the system. However, in a system using the CAMLCD-70, it is recommended that the mirror/normal configuration is set with the switches on the back of the CAMBOX-4NTSC/CAMBOX-4PAL for each of the up to four cameras connected to the system. These switches provide a mirror/normal setting that is preserved regardless of different split-screen views on the monitor.

Option 3: System Configured with a CAMLCD-INT-70-B monitor (as in CAMSET70-NTSC4B/CAMSET70-PAL4B)

When you turn on the camera system by turning the vehicle ignition key to either the "Accessory" or "On" position, the monitor operates in one of two ways, depending on the POWER BUTTON setting in the monitor menu.

If POWER BUTTON is set to ACTION when you turn on the camera system by turning the vehicle ignition key to either the "Accessory" or "On" position, the red power indicator LED on the monitor turns on (Figure 11). To manually turn the system on, briefly press the ⏻ /CAM SEL (power/camera select) button. The split-screen image of all connected cameras, or the last display configuration selected, which is stored in memory, will appear on the monitor. See below for screen configuration specifics.

If POWER BUTTON is set to OFF when you turn on the camera system by turning the vehicle ignition key to either the "Accessory" or "On" position, the red power indicator LED on the monitor illuminates and the monitor configures the display based on the number of cameras connected to the system as follows.
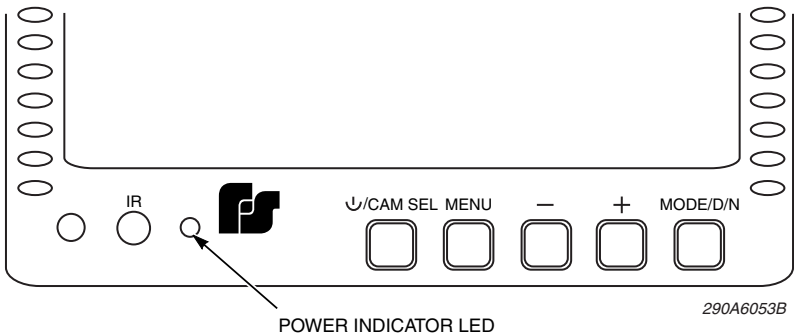

POWER INDICATOR LED

290A6053B

Figure 11. Monitor control panel

Screen Configurations

- If one camera is connected, its image is displayed full screen.

- If two cameras are connected, one camera is displayed on the top half of the screen and the other on the bottom half in a split-screen.

- If three cameras are connected, one camera is displayed on the right half of the screen, while the other two are displayed on the left side of the screen in a split-screen.

- If four cameras are connected, the screen is split into four sections with each section filled with an image from one of the cameras.

- Different screen configurations can be accessed by pressing the MODE/D/N button on the monitor (Figure 11) as follows:

- Press MODE/D/N once for a single camera full-screen image. Successive brief presses of the ⏻ /CAM SEL (power/camera select) button select each of the connected cameras' images.

- Press MODE/D/N a second time for a dual-camera split-screen view, with one camera on the left and one on the right. Successive brief presses of the ⏻ /CAM SEL (power/camera select) button select a different pair of the images of the connected camera (i.e., CAM1/CAM2, CAM2/CAM3, etc.).

- Press MODE/D/N a third time to return to a split-screen image of all connected cameras.

Automatic Camera Triggering

Automatic triggering of connected cameras is supported as follows:

- To automatically turn on Camera 1, apply 12V–24V to the green/red wire. This can both power the monitor from standby and select Camera 1.

- To automatically turn on Camera 2, apply 12V–24V to the blue/red wire. This can both power the monitor from standby and select Camera 2.

- To automatically turn on Camera 3, apply 12V–24V to the brown/red wire. This can both power the monitor from standby and select Camera 3.

- To automatically turn on Camera 4, apply 12V–24V to the black/red wire. This can both power the monitor from standby and select Camera 4.

Priority for the camera triggers is, from highest to lowest: Camera 1 > Camera 2 > Camera 3 > Camera 4. In other words, the Camera 1 trigger has the highest priority and it overrides other triggers.

Menu Options

Pressing the MENU button enables you to access these options:

- BRIGHTNESS: Adjusts the degree of brightness in the monitor image on a scale of 0 to 30.

- CONTRAST: Adjusts the amount of contrast in the monitor image on a scale of 0 to 30.

- COLOR: Adjusts the amount of color information in the monitor image on a scale of 0 to 30.

- VOLUME: Adjusts the volume of the sound from the selected camera microphone on a scale of 0 to 30, as applicable.

- LANGUAGE: Selects the language used in the monitor menu. Available languages are English, French, German, Spanish, Portuguese, Italian, and Polish. Select RETURN to return to the previous menu.

- MIRROR: Selects mirror or normal mode for each of the four monitor inputs. Set the applicable input to ON when a mirror image is required and to OFF when a normal view is desired. Select RETURN to return to the previous menu.

- VIDEO: Selects the video standard for the monitor. Select PAL for use with PAL-compatible cameras (European market) and NTSC for use with NTSC-compatible cameras (North American market). Select RETURN to return to the previous menu.

- POWER BUTTON: Selects the operation of the ⏻ /CAM SEL (power/camera select) button.

  ACTION activates this button and CAM disables it. See the description at the beginning of this section regarding operation.

- EXIT: Exits the menu.

7 Obtaining Service and Support

There are no user-serviceable parts inside the device. Unauthorized dismantling or repairing of the device will void the warranty. For service or technical assistance, please contact the Federal Signal Service Department at these addresses:

Federal Signal Corporation
Safety and Security Systems
2645 Federal Signal Drive
University Park, IL 60484-3167
www.fedsig.com

For service or technical assistance in the U.S:
Phone: (800) 433-9132
Fax: (800) 343-9706
E-mail: empserviceinfo@fedsig.com

For service or technical assistance in Europe:
Phone: +32 50 373534
Fax: +32 50 375411
E-mail: info@fedsig.be

Returning a Product to Federal Signal

Before returning a product to Federal Signal, call 800-264-3578, 800-433-9132, or 800-824-0254 to obtain a Returned Merchandise Authorization number (RMA number). To expedite the process please be prepared with the following information:

- Your Federal Signal customer or account number.

- The purchase order number under which the items were purchased.

- The shipping method.

- The model or part number of the product being returned.

- The quantity of products being returned.

- Drop ship information as needed.

- Any estimate required.

When you receive your RMA Number:

- Write the RMA number on the outside of the box of returned items.

- Reference the RMA number on your paperwork inside of the box.

- Write the RMA number down, so that you can easily check on status of the returned equipment.

Send all material with the issued RMA Number to:

Federal Signal Corporation
2645 Federal Signal Drive
University Park, IL 60484-3167
Attn: Service Department
RMA: #_____

8 Product Specifications and Part Numbers

This section has specifications for each model of camera and monitor, and for the control box and the digital video recorder.

Camera Specifications

CAMCCD-REARNTSC/CAMCCD-REARPAL: Rear-View Camera

Imaging sensor: Sony 1/4-inch color CCD

Resolution (pixels): NTSC 510 (H) x 492 (V); PAL 500 (H) x 582 (V)

Horizontal resolution: 420 TV lines

Lens: Focal length 2.6 mm, F2.0, 110° viewing angle (measured diagonally)

Low-light/night vision: 16 infrared LEDs with photosensor

Microphone: Integrated

Camera housing: Anticorrosion aluminum alloy

Environmental rating: IP68 waterproof and dust-resistant

Voltage: 12 Vdc

Power consumption: ≤ 2.5 W

Operating temperature range: –22°F to 149°F / –30°C to 65°C

Dimensions:
in: 3.40 (W) x 2.87 (H) x 2.32 (D)
mm: 86.4 (W) x 72.9 (H) x 58.9 (D)

Weight (including mounting bracket): 0.84 lb / 0.38 kg

Certifications: FCC, CE, E-mark, RoHS

CAMCCD-SIDENTSC/CAMCCD-SIDEPAL: Side-View Camera

Imaging sensor: Sony 1/4-inch color CCD

Resolution (pixels): NTSC: 510 (H) x 492 (V); PAL 500 (H) x 582 (V)

Horizontal resolution: 420 TV lines

Lens: Focal length 2.6 mm, F2.0, 110° viewing angle (measured diagonally)

Low-light/night vision: 9 infrared LEDs with photosensor

Microphone: Integrated

Camera housing: Anticorrosion aluminum alloy

CAMCCD-SIDENTSC/CAMCCD-SIDEPAL:
Side-View Camera *(continued)*

Environmental rating: IP68 waterproof and dust-resistant

Voltage: 12 Vdc

Power consumption: ≤ 1.5 W

Operating temperature range: –22°F to 149°F / –30°C to 65°C

Dimensions:
in: 2.56 (W) x 3.74 (L) x 2.54 (H)
mm: 65.0 (W) x 95.0 (L) x 64.5 (H)

Weight (including mounting bracket): 0.39 lb / 0.18 kg

Certifications: FCC, CE, E-mark, RoHS

CAMCCD-FLSHNTSC/CAMCCD-FLSHPAL: Flush-Mount Camera

Imaging sensor: Sony 1/4-inch color CCD

Resolution (pixels): NTSC 510 (H) x 492 (V); PAL 500 (H) x 582 (V)

Horizontal resolution: 420 TV lines

Lens: Focal length 2.1 mm, F2.5, 150° viewing angle (measured diagonally)

Low-light/night vision: N/A

Microphone: N/A

Camera housing: Anticorrosion aluminum alloy

Environmental rating: IP68 waterproof and dust-resistant

Voltage: 12 Vdc

Power consumption: ≤ 1.2 W

Operating temperature range: –22°F to 149°F / –30°C to 65°C

Dimensions, camera only:
in: 1.87 (L) x 1.42 (W)
mm: 47.5 (L) x 36.1 (W)

Dimensions, suspended with U-bracket:
in: 1.87 (L) x 1.57 (W) x 2.13 (H)
mm: 47.5 (L) x 39.9 (W) x 54.1 (H)

Weight (including mounting bracket): 0.44 lb / 0.20 kg

Certifications: FCC, CE, E-mark, RoHS

CAMCCD-BALLNTSC/CAMCCD-BALLPAL: Ball Camera

Imaging sensor: Sony 1/4-inch color CCD

Resolution (pixels): NTSC 510 (H) x 492 (V); PAL 500 (H) x 582 (V)

Horizontal resolution: 420 TV lines

Lens: Focal length—2.6 mm, F2.0, 110° viewing angle (measured diagonally)

Low-light/night vision: 9 infrared LEDs with photosensor

Microphone: Integrated

Camera housing: Anticorrosion aluminum alloy

Environmental rating: IP68 waterproof and dust-resistant

Voltage: 12 Vdc

Power consumption: ≤ 1.5 W

Operating Temperature Range: –22°F to 149°F / –30°C to 65°C

Dimensions:
in: 3.05 (W) x 2.50 (H) x 2.01 (D)
mm: 77.5 (W) x 63.5 (H) x 51.1 (D)

Weight (including mounting bracket): 0.34 lb / 0.15 kg

Certifications: FCC, CE, E-mark, RoHS

CAMCCD-DOMENTSC/CAMCCD-DOMEPAL: Dome Camera

Imaging sensor: Sony 1/4-inch color CCD

Resolution (pixels): NTSC 510 (H) x 492 (V); PAL 500 (H) x 582 (V)

Horizontal resolution: 420 TV lines

Lens: Focal length—2.6 mm, F2.0, 110° viewing angle (measured diagonally)

Low-light/night vision: 18 infrared LEDs with photosensor

Microphone: Integrated

Camera housing: Anticorrosion aluminum alloy

Environmental rating: IP65 water- and dust-resistant; not intended for outdoor applications

Voltage: 12 Vdc

Power consumption: ≤ 2.5 W

Operating temperature range: –22°F to 149°F / –30°C to 65°C

Dimensions:
in: 4.09 (L) x 4.09 (W) x 2.82 (H)
mm: 103.9 (L) x 103.9 (L) x 71.6 (H)

CAMCCD-DOMENTSC/CAMCCD-DOMEPAL:
Dome Camera *(continued)*

in: 4.10 (W) x 2.82 (H)
mm: 103.9 (W) x 71.6 (H)

Weight (including mounting bracket): 0.85 lb / 0.39 kg

Certifications: FCC, CE, E-mark, RoHS

Monitor Specifications

CAMLCD-INT-56: 5.6-inch monitor w/ dual integrated camera inputs
Screen type, size: Color TFT LCD, 5.6 in (diagonal)
Viewing angle (up/down, left/right): 45°/45°, 65°/65°

Brightness: 300 cd/m2

Resolution (pixels): 224600

Camera inputs & trigger wires: 2

Built-in speaker

Photo-sensor for automatic monitor brightness adjustment in low-light/
no-light conditions

Voltage: 12/24 Vdc

Power consumption: ≤ 5 W

Operating temperature range: –22°F to 149°F / –30°C to 65°C

Dimensions:
in: 5.91 (L) x 4.72 (W) x 1.10 (D)
mm: 150.1 (L) x 119.9 (W) x 27.9 (D)

Weight (including mounting stand): 1.18 lb / 0.54 kg

Certifications: FCC, CE, E-mark, RoHS

CAMLCD-INT-70: 7.0-inch monitor w/ dual integrated camera inputs
Screen type, size: Color TFT LCD, 7.0 in (diagonal)
Viewing angle (up/down, left/right): 40°/40°, 60°/60°
Brightness: 350 cd/m2
Resolution (pixels): 336960
Camera inputs & trigger wires: 2
Built-in speaker
Photo-sensor for automatic monitor brightness adjustment in low-light/
no-light conditions

CAMLCD-INT-70: 7.0-inch monitor w/ dual integrated camera inputs *(continued)*

Voltage: 12/24 Vdc

Power consumption: ≤ 7 W

Operating Temperature Range: –22°F to 149°F / –30°C to 65°C

Dimensions:
in: 7.50 (L) x 4.82 (W) x 1.15 (D)
mm: 190.5 (L) x 122.4 (W) x 29.2 (D)

Weight (including mounting stand): 1.26 lb / 0.57 kg

Certifications: FCC, CE, E-mark, RoHS

CAMLCD-INT-70-B: 7.0-inch monitor w/ four integrated camera inputs

Screen type, size: Color TFT LCD, 7.0 in (diagonal)

Viewing angle (up/down, left/right): 40°/40°, 60°/60°

Brightness: 350 cd/m2

Resolution (pixels): 336960

Camera inputs & trigger wires: 4

Split-screen capable

Built-in speaker

Voltage: 12/24 VDC

Power consumption: ≤ 5 W

Operating temperature range: 14°F to 149°F / –10°C to 65°C

Dimensions:
in: 7.50 (L) x 4.82 (W) x 1.50 (D)
mm: 190.5 (L) x 122.4 (W) x 38.1 (D)

Weight (including mounting stand): 1.41 lb / 0.64 kg

Certifications: FCC, CE, E-mark, RoHS

CAMLCD-70: 7.0-inch monitor for use with CAMBOX-4NTSC/ CAMBOX-4PAL or CAMDVR-4-B

Screen type, size: Color TFT LCD, 7.0 in (diagonal)

Viewing angle (up/down, left/right): 40°/40°, 60°/60°

Brightness: 350 cd/m2

Resolution (pixels): 336960

Camera inputs and trigger wires: none; uses CAMBOX-4NTSC/CAM-BOX-4PAL or CAMDVR-4-B

Built-in speaker

Photo-sensor for automatic monitor brightness adjustment in low-light/ no-light conditions

Voltage: 12 Vdc (12/24 Vdc with CAMBOX-4NTSC/CAMBOX-4PAL or CAMDVR-4-B)

Power consumption: ≤ 7 W

Operating Temperature Range: −22°F to 149°F / −30°C to 65°C

Dimensions:
in: 7.50 (L) x 4.82 (W) x 1.15 (D)
mm: 190.5 (L) x 122.4 (W) x 29.2 (D)

Weight (including mounting stand): 1.19 lb / 0.54 kg

Certifications: FCC, CE, E-mark, RoHS

CAMLCD-MIR: 4.3-inch mirror monitor with two integrated camera inputs

Screen type, size: Color TFT LCD, 4.3 in (diagonal)

Viewing angle (up/down, left/right): 50°/70°, 70°/70°

Brightness: 400 cd/m2

Resolution (pixels): 480 x 3 (RGB) x 272

Camera inputs and trigger wires: 2

Voltage: 12/24 Vdc

Power consumption: ≤ 5 W

Operating Temperature Range: −4°F to 158°F / −20°C to 70°C

Dimensions:
in: 11.02 (L) x 3.58 (W) x 1.18 (D)
mm: 280 (L) x 91 (W) x 30 (D)

Weight (including bracket): 1.28 lb / 0.58 kg

Certifications: FCC, CE, E-mark, RoHS

Control Box Specifications

CAMBOX-4NTSC/CAMBOX-4PAL: Four-camera control box for use with CAMLCD-70

Camera inputs & trigger wires: 4

Split-screen capable

Control keypad included for mode selection (individual camera or split-screen multiple cameras)

RCA inputs for audio and composite video

Voltage: 12/24 Vdc

Dimensions:
in: 6.12 (L) x 3.54 (W) x 1.32 (H)
mm: 155.4 (L) x 89.9 (W) x 33.5 (D)

Weight: 1.16 lb / 0.53 kg

Digital Video Recorder Specifications

CAMDVR-4-B

Power consumption: 35 W maximum

Operating temperature range: 14 °F to 122 °F / –10 °C to 50 °C

Dimensions:
in: 9.23 (L) x 6.52 (W) x 3.15 (D)
mm: 234.5 mm (L) x 165.5 mm (W) x 80 mm (D)

Weight including mounting brackets: 4.85 lb / 2.2 kg

Recording quality: near DVD-quality (MPEG-2)

Display mode: Quad-view or selectable single camera display

Hard disk capacity: 120 GB for approximately 51 hours of MPEG-2 (highest quality) video/audio; video can be transferred to PC via USB

Video/audio (camera) inputs: 4.85 lb / 2.2 kg

Monitoring/recording frame rate: 30 frames/second (NTSC) or 25 frames/second (PAL)

Recording resolution: 4 levels of image quality; maximum resolution is 720 x 576 pixels

Accessories included: Infrared remote, external power supply with trigger wires for BRAKE, LEFT TURN, RIGHT TURN, and ACC.

Voltage: 12/24 Vdc

Certifications: FCC, CE, E-mark, RoHS

Cables

CAMCABLE-40: 131 ft (40 m) camera extension cable with waterproof connector

CAMCABLE-20: 65.5 ft (20 m) camera extension cable with water-proof connector

CAMCABLE-15: 49 ft (15 m) camera extension cable with waterproof connector

CAMCABLE-10: 33 ft (10 m) camera extension cable with waterproof connector

CAMCABLE-5: 16.5 ft (5 m) camera extension cable with waterproof connector

CAMCABLE-SHORT: 4 in (0.1-m camera extension cable with water-proof connector

CAMADP-EXT: 4 in (0.1 m) cable for connecting two CAMCABLE-XX in series for extended lengths

Monitor Mounting Brackets

CAMLCD-BRACKET: Mounting bracket for monitor

CAMBRK-HD: Heavy-duty mounting bracket for monitor

Adapters

CAMADP-RCA-IN: Adapter for connecting video/audio input from an external RCA-connector-equipped source to monitor

• 4-pin DIN screw-type (male) to three male RCA connectors (yellow, white, and red)

CAMADP-RCA-OUT: adapter for connecting Federal Signal camera to external RCA-connector-equipped input

• 4-pin DIN screw-type (female) to two male RCA connectors (yellow and white) and red (+12 Vdc) and black (ground) wires

Replacement Wiring Harnesses

CAMADP-INT-2: Replacement input/power/trigger-wiring harness for CAMLCD-INT-56/CAMLCD-INT-70

CAMADP-INT-4: Replacement input/power/trigger-wiring harness for CAMLCD-INT-70-B

FCC Compliance Statement

For part numbers:

For the following part numbers—CAMCCD-REARNTSC, CAMCCD-REARPAL, CAMCCD-SIDENTSC, CAMCCD-SIDEPAL, CAMCCD-DOMENTSC, CAMCCD-DOMEPAL, CAMCCD-FLSHNTSC, CAMCCD-FLSHPAL, CAMCCD-BALLNTSC, CAMCCD-BALLPAL, CAMLCD-70, CAMLCD-INT-56, CAMLCD-INT-70, CAMLCD-INT-70-B, CAMBOX-4NTSC, CAMBOX-4PAL, and CAMDVR-4-B:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

FEDERAL SIGNAL
Safety and Security Systems