



Installation Instructions

XVision® IR Camera
 Kit Piece Nos. 801150,
 801489, 5010078 &
 5010187 for XVision®
 IR Camera

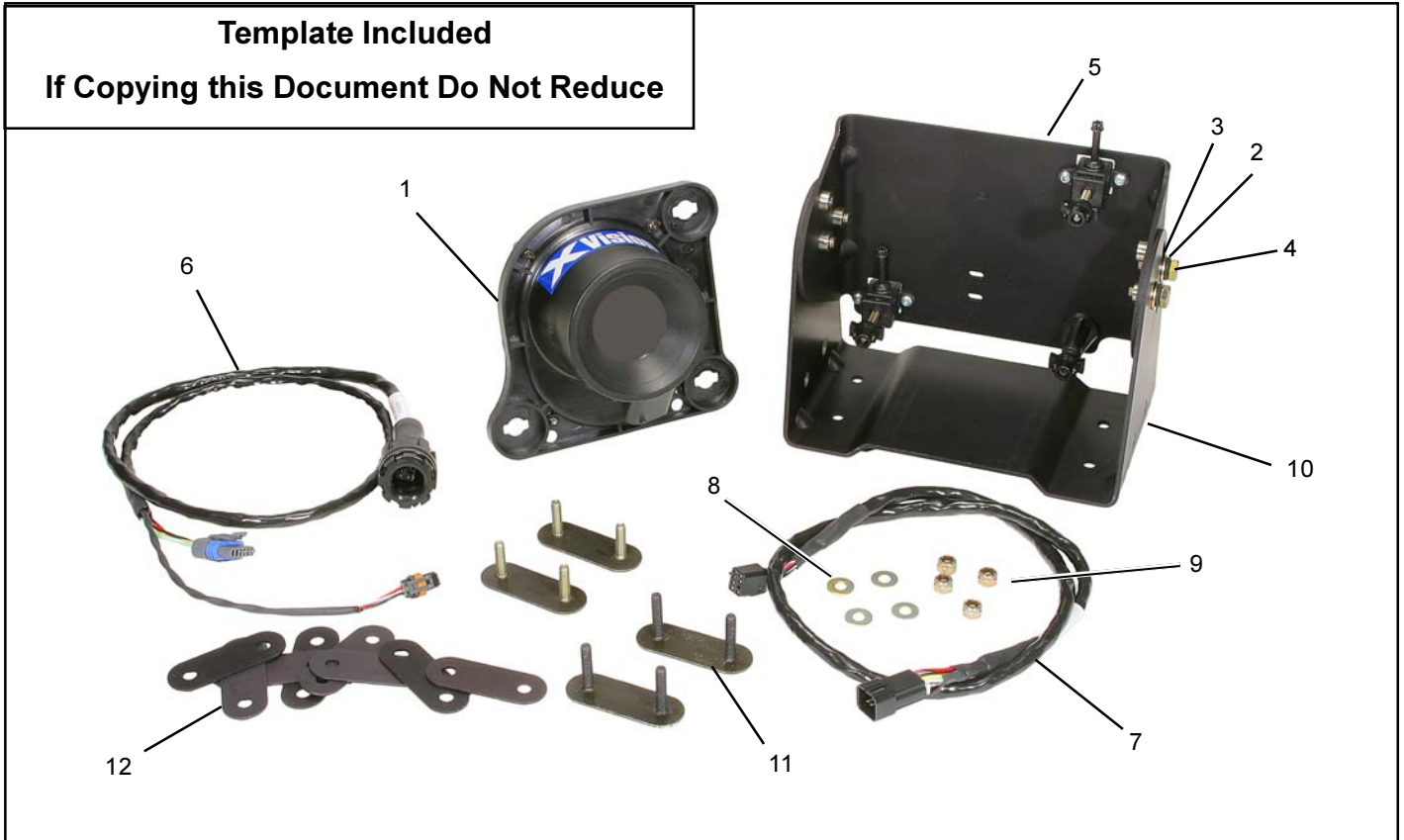


Figure 1 Bendix® XVision® Camera Kits

The Bendix® XVision® IR Camera Kit piece number 801489 consists of the following:

Item No.	Description	Qty.
1	IR Camera Pc. No. 801150	1
-	Camera Bracket Kit 5010078	1
2	5/16" Lockwasher	4
3	5/16" Washer	4
4	5/16" Cap Screw	4
NS	Cable Tie	1
5	Camera Bracket with Adjuster	1
6	IR Camera Harness	1
7	Camera Jumper Harness	1
-	Mounting Bracket Kit 5010187	1
8	1/4" Washer	4
9	Locknut Prevailing Torque	4
10	Mounting Base Bracket	1
11	Stud Plate with 7/8" studs	2
	Stud Plate with 1 1/8" studs	2
12	Leveling Shim	8
N/S	Sealant	1

DESCRIPTION

These instructions are used for the XVision IR Camera Kit which contains all of the components shown on this page as well as the Camera Bracket Kit (items 2 through 5) and Mounting Bracket Kit (items 8 through 12).

IMPORTANT! PLEASE READ AND FOLLOW THESE INSTRUCTIONS TO AVOID PERSONAL INJURY OR DEATH:

When working on or around a vehicle, the following general precautions should be observed at all times.

1. Park the vehicle on a level surface, apply the parking brakes, and always block the wheels.
2. Stop the engine when working around the vehicle.
3. If the vehicle is equipped with air brakes, make certain to drain the air pressure from all reservoirs before beginning ANY work on the vehicle.
4. Following the vehicle manufacturer's recommended procedures, deactivate the electrical system in manner that removes all electrical power from the vehicle.

5. When working in the engine compartment the engine should be shut off. Where circumstances require that the engine be in operation, **EXTREME CAUTION** should be used to prevent personal injury resulting from contact with moving, rotating, leaking, heated, or electrically charged components.
6. Never connect or disconnect a hose or line containing pressure; it may whip. Never remove a component or plug unless you are certain all system pressure has been depleted.
7. Never exceed recommended pressures and always wear safety glasses.
8. Do not attempt to install, remove, disassemble or assemble a component until you have read and thoroughly understand the recommended procedures. Use only the proper tools and observe all precautions pertaining to use of those tools.
9. Use only genuine Bendix® replacement parts, components, and kits. Replacement hardware, tubing, hose, fittings, etc. should be of equivalent size, type, and strength as original equipment and be designed specifically for such applications and systems.
10. Components with stripped threads or damaged parts should be replaced rather than repaired. Repairs requiring machining or welding should not be attempted unless specifically approved and stated by the vehicle or component manufacturer.
11. Prior to returning the vehicle to service, make certain all components and systems are restored to their proper operating condition.

CAMERA INSTALLATION

In all cases, the camera **MUST** be mounted externally on the vehicle. If possible, the camera should be centered directly above the driver's head. The camera mounting bracket assembly can accommodate various mounting surface angles.

HARNESS ROUTING

The vehicle harness will need to reach the fuse panel as well as the camera harness and display harness.

POWER INPUTS

The camera and display are compatible with 12V DC battery systems with a negative ground.

The camera is operational within the range of -40° C to 75° C.

IMPORTANT: In temperatures between 0° C and 40° C, the system will activate within 45 to 60 seconds after power up. In temperatures below this range, it may take longer.

The XVision® IR Camera system is powered by the vehicle electrical system through a vehicle harness. The vehicle harness consists of three wires: **ignition** (A, red), **ground** (B, black), and **headlamp** (C, blue). Refer to Table 1 for wiring and fuse information.

Table 1 Electrical Wiring Configuration

Vehicle Harness Connector 3 Contacts		Fused	Color
A	Vehicle ignition +12 Volts	3 A slow blow fuse (max.)	RED
B	Vehicle ground		BLACK
C	Headlamp active	1 A fast fuse (max.)	BLUE

IMPORTANT: When replacing a fuse, it is important to use only the specified fuse with the correct amperage and blow ratings, listed above. The use of a fuse with a rating other than indicated may result in a dangerous electrical system overload. If a properly rated fuse continues to blow, it indicates a problem in the circuit that must be corrected.

INSTALLATION OF IR CAMERA BRACKETS

CAMERA MOUNTING BRACKET

1. Make sure the truck is parked on a level surface.
2. Remove the panel of the headliner above the driver's head to inspect for electrical wires, tubing, or support members.
3. Depending on the cab style, choose whether the bracket should be installed to the vehicle roof or faring area. Refer to Figure 2.

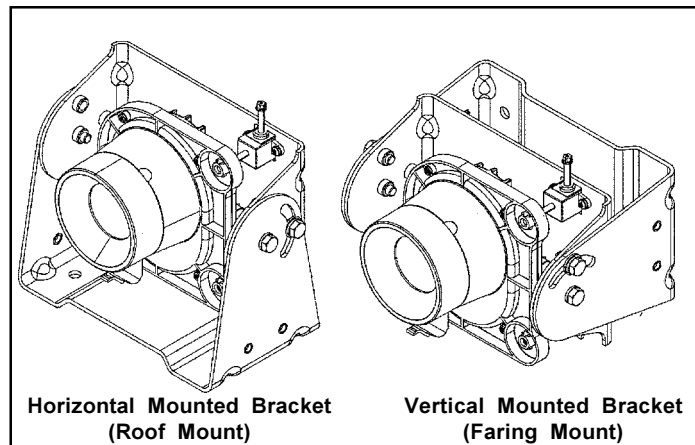


Figure 2 IR Camera Mounting Configurations

4. On the roof of the vehicle above the driver's head, find and mark the driver's centerline of sight.
5. Tape down the Camera Mounting Bracket Template. For best results, the bracket should be mounted anywhere along the driver's centerline of sight. See Figure 3.

NOTE: For optimum performance, the centerlines of the template and driver should line up. Refer to the template on page 10.
6. Verify that the template is parallel to the lateral axis of the vehicle. This ensures that the bracket, when mounted, will face squarely forward. See Figure 3.
7. Center punch the four holes of the template.

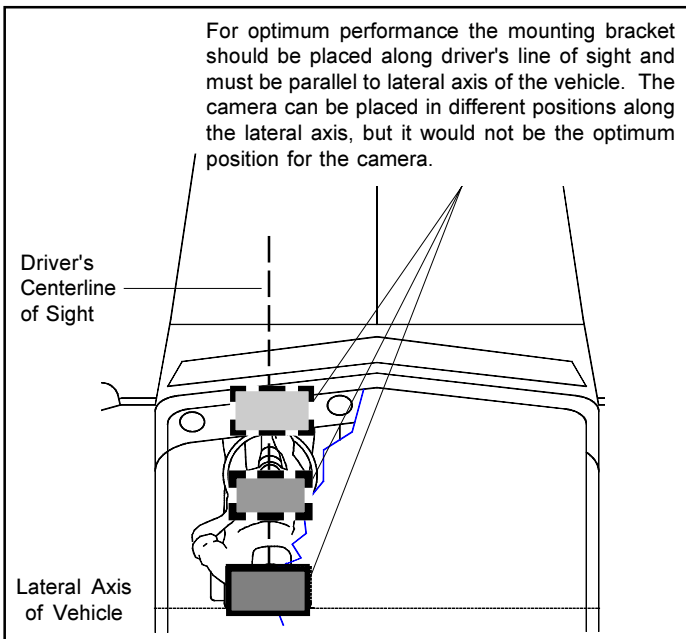


Figure 3 Mounting bracket location with respect to lateral axis of vehicle and driver's centerline of sight.

8. Drill through the four punched holes with a 5/16 in. drill bit.
9. Remove the template.
10. Place the mounting bracket over the holes.
11. Using a torpedo level, make sure the mounting bracket is seated level on the surface of the roof. If it is not, use the shims(12) included with the kit to make it level.
12. Install the stud plates(11) on both sides of the mounting bracket.

NOTE: Make sure the studs protrude into the cab so a nut can be fastened.
13. Remove all parts and clean the surfaces you wish to seal.
14. Apply sealant between all contact areas (between the roof and the shims, between each shim, between the shim and the bracket, and between the bracket and stud plates). See Figure 4.

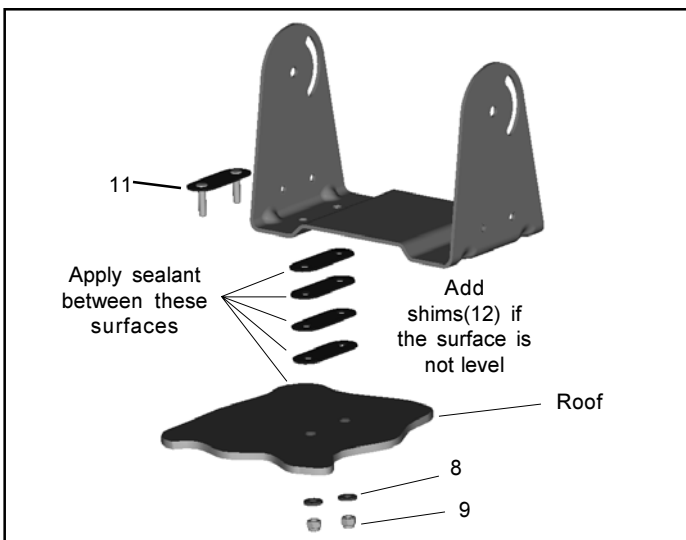


Figure 4 Sealant and Camera Mounting Bracket

INSTALLATION OF IR CAMERA BRACKETS (CONT'D)

CAMERA BRACKET

1. Choose the threaded insert on the camera bracket that is appropriate for the mounting (horizontal or vertical) that you have chosen. Refer to Figure 5.

IMPORTANT:

For a faring mount, use the uppermost inserts

For a horizontal mount, use the rear-most inserts

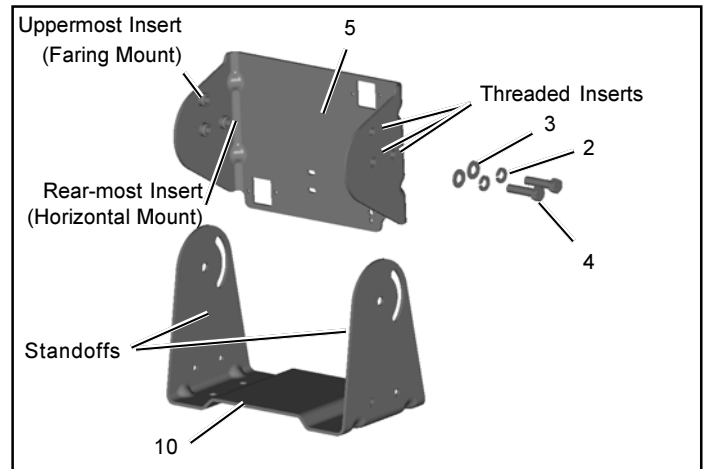


Figure 5 Camera Mounting Bracket Threaded Inserts

2. Position the camera bracket between the standoffs of the mounting bracket. Refer to Figures 4 and 5.

NOTE: Line up the holes in the standoffs of the mounting bracket(10) with the threaded inserts chosen in step 1.

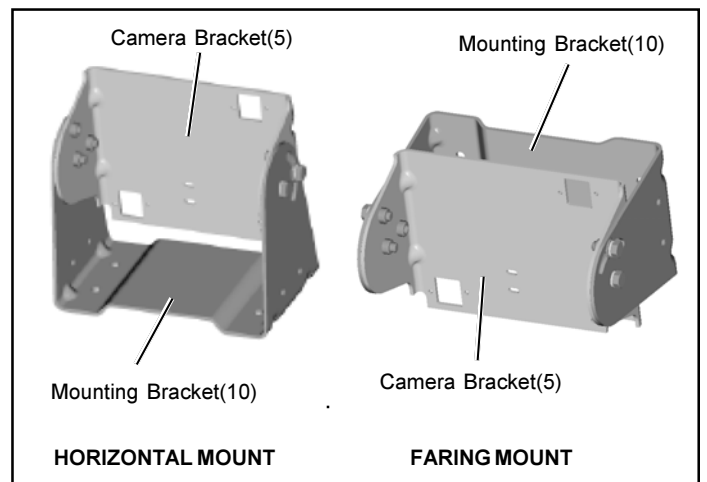


Figure 6 Mating Camera Bracket to Mounting Bracket

3. Make sure that the camera bracket(5) is parallel to the ground using a torpedo level.
4. Insert 5/16 in. cap screws(4) through the chosen threaded inserts and through the mounting bracket(10)holes.

- Hand-tighten the nuts to keep the camera bracket in place.

NOTE: Allow enough mobility for adjustments to be made later in the installation, during the aiming procedure.

ROUTE THE CAMERA HARNESS

- Drill a 1 in. diameter hole through the roof of the truck cab using a step drill like the Unibit®. Drill the hole approximately 3 to 5 in. behind the installed mounting bracket. Refer to Figure 6.
- De-burr the hole.
- Remove the externally threaded nut from the heat shrinkable shroud assembly on the harness.

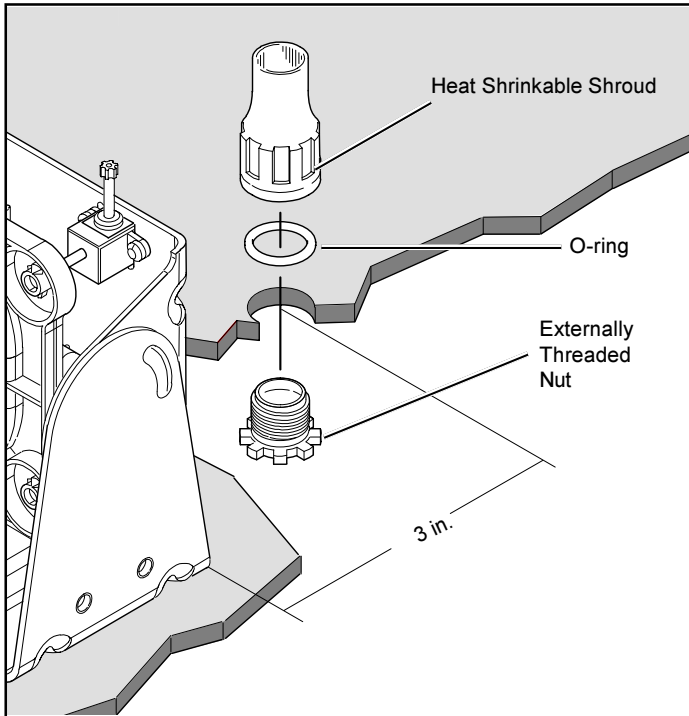


Figure 7 Heat Shrinkable Shroud Assembly (camera harness not shown)

- From inside the cab, push the threaded nut through the hole in the roof.

NOTE: The threaded section of the nut should protrude past the vehicle surface. Refer to Figure 16.
- Place the O-ring over the externally threaded end.
- Thread the harness through the externally threaded nut.
- Fasten the heat shrinkable shroud onto the nut.
- Hand-tighten the shroud from the outside of the roof.
- Torque the heat-shrinkable shroud with a Spanner Wrench to approximately 15 to 20 in-lbs. or until the O-ring is slightly flattened.
- Route the camera harness to the "A" pillar of the cab.

ATTACH THE CAMERA HARNESS

- Pull the camera harness through the opening between the camera bracket(5) and mounting bracket(10).
- Plug the 2-pin connector of the camera harness into the window heater. Refer to Figure 8.
- Plug the 6-pin connector of the camera harness into the camera connection. Refer to Figure 8.
- Loosely install the harness cable-tie around the harness.

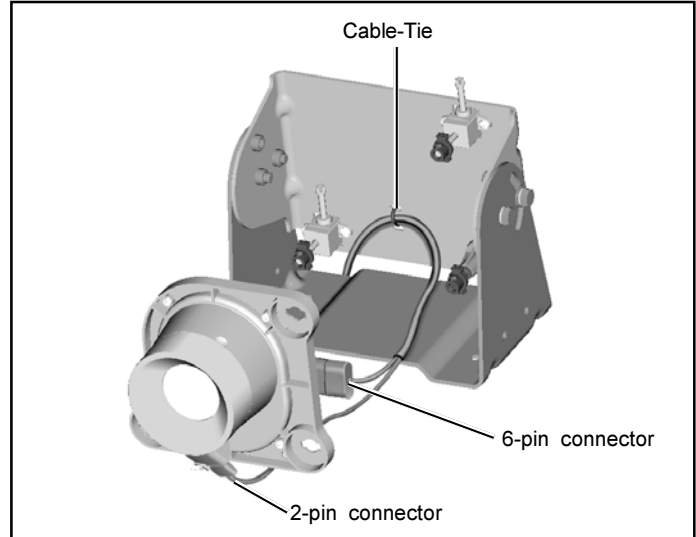


Figure 8 Connecting the Camera Harnesses

ATTACH THE IR CAMERA TO THE CAMERA BRACKET

- Position the camera onto the factory-installed aiming assemblies. Refer to Figure 8.
- Rotate the pivot locks on the ends of the aiming assemblies 1/4 turn clockwise using the included aiming adjuster tool. This will lock the camera in position.
- Adjust the harness accordingly and securely tighten the harness cable tie.
- After the camera harness is properly secured and routed, heat shrink the shroud assembly from the outside of the vehicle using a heat gun. Once the shroud assembly is heat shrunk the harness can not be moved or adjusted.

WARNING: Do not touch the shroud assembly after it has been heat-shrunk. It will be hot and may cause burns.

IMPORTANT: Be careful not to melt the wiring or O-Ring during the heat shrinking process.
- Re-install the headliner.

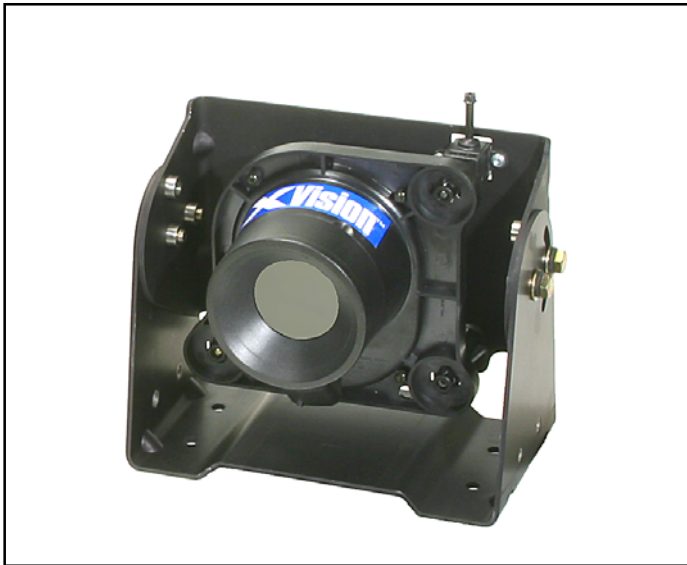


Figure 9 Fully Assembled Camera

IMPORTANT: When replacing a fuse, it is important to use only the specified fuse with the correct amperage and opening time, listed below. The use of a fuse with a rating other than indicated may result in a dangerous electrical system overload. If a properly rated fuse continues to open, it indicates a problem in the circuit that must be corrected.

Table 3 Vehicle Harness Wiring

Vehicle Harness Connector 3 Contacts		Fused	Color
A	Vehicle ignition +12 Volts	3 A slow open fuse (max.)	RED
B	Vehicle ground		BLACK
C	Headlamp active	1 A fast open fuse(max.)	BLUE

CONNECTING THE HARNESSES

WARNING: Improper installation of the vehicle harness can cause damage to your vehicle's wiring and/or the XVision® system. It is the responsibility of the installer to review wiring and service information for the vehicle and to identify proper locations for connecting the vehicle harness to the power. Many modern vehicles have additional fused accessory power breakouts built into their systems and these breakouts should be used if at all possible.

After installation of the camera and display is complete, all harnesses should be routed to the "A" pillar. At the "A" pillar, both the display harness and camera harness will connect to the vehicle harness. The following steps explain how the harnesses should be installed.

1. Connect the 8-pin connector of the camera harness to the 8-pin connector of the display harness.

NOTE: If the display harness does not reach the camera harness (i.e. they are greater than 6 feet apart), the jumper harness can be used as an "extension" between the two. To install the jumper harness, connect the 8-pin connectors to both the display harness and camera harness.

2. Plug the 3-pin connector of the vehicle harness to the 3-pin connector of the display harness.
3. Route the vehicle harness to the fuse panel.
4. Cut the vehicle harness to an appropriate length.
5. Strip the ends of the three wires of the vehicle harness.
6. According to Table 3, connect the three wires of the vehicle harness to the electrical hook-ups on the vehicle.

WARNING: Vehicle power and headlight circuits **WILL** be fused. Permanent damage to display and/or camera could occur. Eliminating fuses from circuit will void all warranties.

- Fuse the Red wire (A-contact) of the vehicle harness to the ignition bus with a 3 A slow open fuse. See Figure 10.

WARNING: Use a slow blow fuse with a 3 A maximum.

- The Blue wire (C-contact) of the vehicle harness must be fused with a 1 A fast open fuse to the headlamp circuit. When the headlamps are on, the Blue wire should have 12 V applied to it. See Figure 10.
- Connect the Black wire to the vehicle ground bus. See Figure 10.

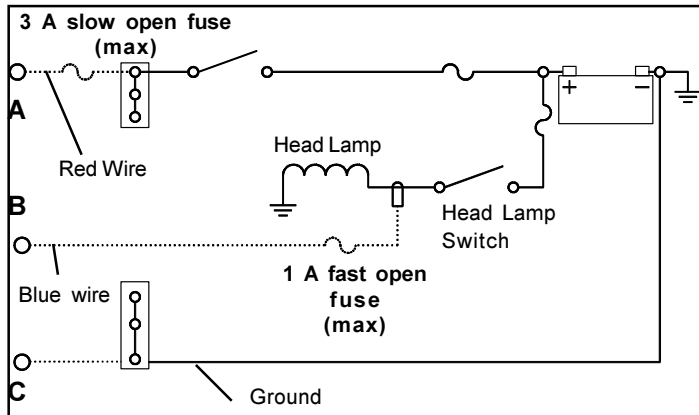


Figure 10 Power Supply Schematic

OPERATING THE XVISION® SYSTEM

Under optimal conditions, the XVision® system will be fully operational within 45 to 60 seconds following power up.

To activate the XVision® system, five conditions must be met:

- The vehicle must have accessory power on.
- The vehicle must have its headlights on.
- The display power must be on.
- The notebook must be opened.
- The intensity knob must be turned to a visible intensity.

NOTE: During warm-up, the Bendix® logo will be displayed on the combiner for approximately 45 seconds.

After the system has warmed up, the combiner will display the image in the driver's forward field of view.

NOTE: This is the appropriate time to set the intensity control. Adjust the intensity level to suit the driver's preference.

ADJUSTING THE CAMERA

The aiming adjusters on the camera bracket allow the forward field of view (FOV) of the camera to be adjusted horizontally and vertically. The adjustment screw head(s) will accommodate an E8 external Torx® or a T15 internal Torx®.

When the camera is mounted, adjust the horizontal and vertical aiming adjusters enough to align the camera FOV with the display. The position of the virtual image presented to the driver and how the virtual image correlates to objects in the road depends directly on camera aiming.

NOTE: Use two people to aim and adjust the camera. One technician should view the virtual image on the display while the other technician aims the camera.

NOTE: Verify that the vehicle is level and that the tires are properly inflated before beginning the camera aiming procedure.

HORIZONTAL AIMING AND ADJUSTING

Align the display image horizontally with the objects in the road to give the driver a sense of object location.

- Refer to Figures 12-14 to understand how to properly adjust for the horizontal view, adjust the angle of the camera as needed.

NOTE: Two and one-quarter turns of the horizontal adjuster is equal to one degree of camera movement.

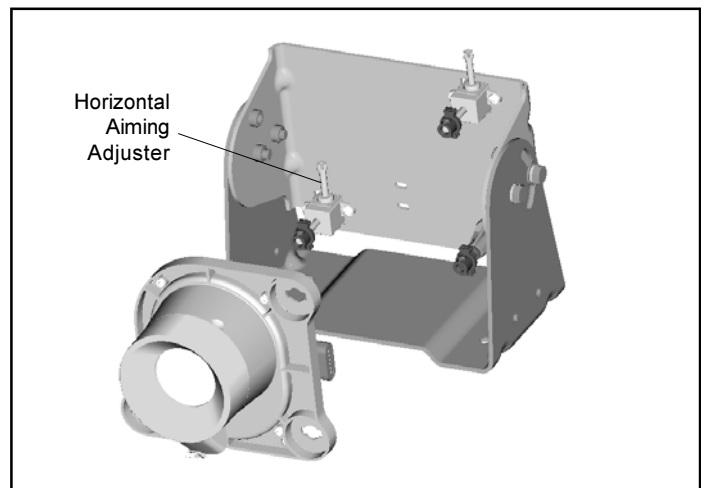


Figure 11 Horizontal Aiming Adjuster

NOTE: Do not tamper with or adjust any factory-installed screws while aiming the camera. Only turn the horizontal aiming adjuster.

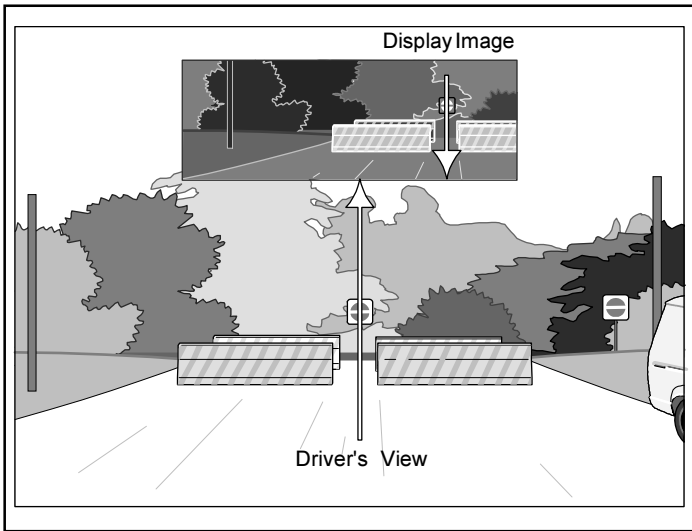


Figure 12 IR camera aimed too far left

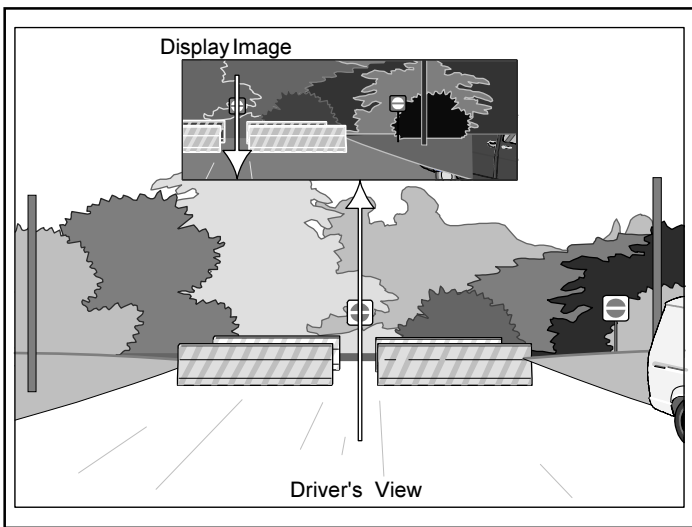


Figure 13 IR camera aimed too far right

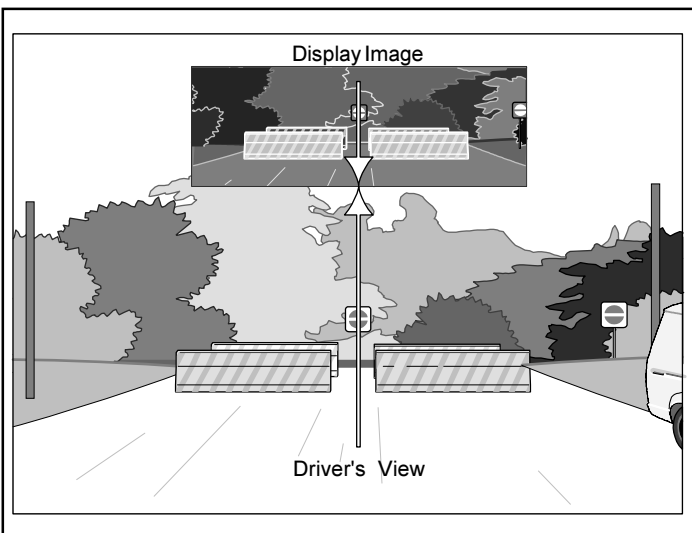


Figure 14 IR camera aimed correctly

VERTICAL AIMING AND ADJUSTING

The virtual image should be aligned vertically so that the horizon appears in the lower one-half to one-third of the display. Keeping the image at this adjustment should provide a view of the road when the vehicle is driven up and down hills.

1. Refer to Figures 16-18 to understand how to properly adjust for the horizontal view, adjust the angle of the camera as needed.

NOTE: Two turns of the vertical adjuster is equal to one degree of camera movement.

NOTE: It is recommended that the camera adjusters be aimed to view approximately 200 ft (61m) in front of the vehicle. Any thermal objects closer than 200 feet will already be illuminated by the headlamps.

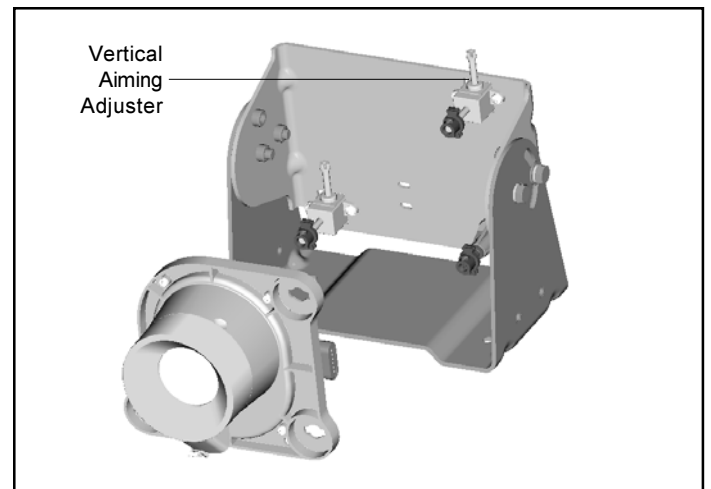


Figure 15 Vertical Aiming Adjuster

MAINTAINING AND CLEANING THE VISION SYSTEM COMPONENTS

IMPORTANT: Use a soft, damp cloth moistened with window cleaning solution to clean the camera window. Shop rags and paper towels will scratch optical surfaces.

IMPORTANT: Do not use ammonia to clean the mirrors of the display components, as it will remove scratch-resistant and anti-glare coatings from their surface.

IMPORTANT: Do not store or use the display in any location that is extremely dusty, damp, or wet.

IR CAMERA

The camera is an optical element and should be cleaned when it becomes dirty or filled with debris. Dirt and debris can affect camera performance.

To clean the camera, use a clean soft cloth and an ammonia-free window cleaning solvent.

If the camera lens has been contaminated due to a damaged seal or window, carefully remove the debris and replace the damaged part according to instructions in your "Service Data" manual.

If a window cleaning solvent is used to clean the lens, make sure all of the moisture is removed from the sealed cavity between the window and lens prior to reassembly. If moisture remains in the sealed area after reassembly, it will affect the performance of the camera.

IMPORTANT: When cleaning the window, do not use scrapers or other sharp instruments that may scratch or break it.

NOTE: When cleaning ice or snow from the IR Sensor, use a commercially-available spray deicer.

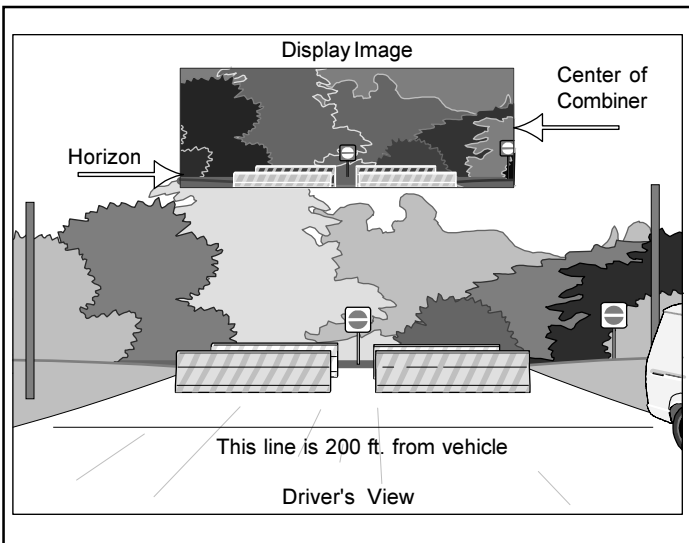


Figure 16 IR camera aimed too high

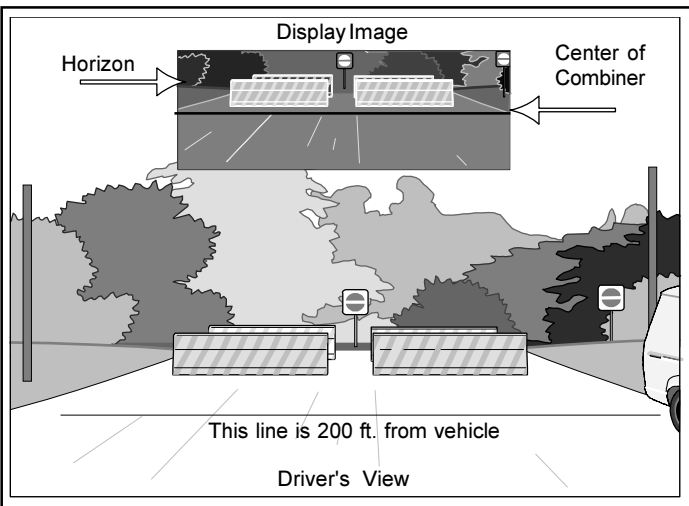


Figure 17 IR camera aimed too low

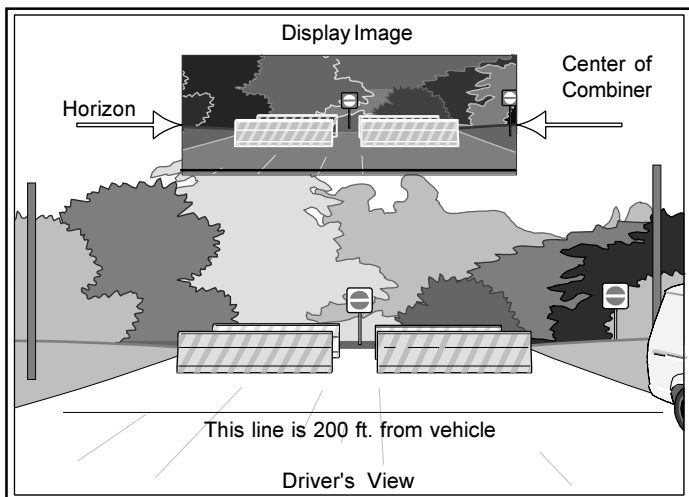
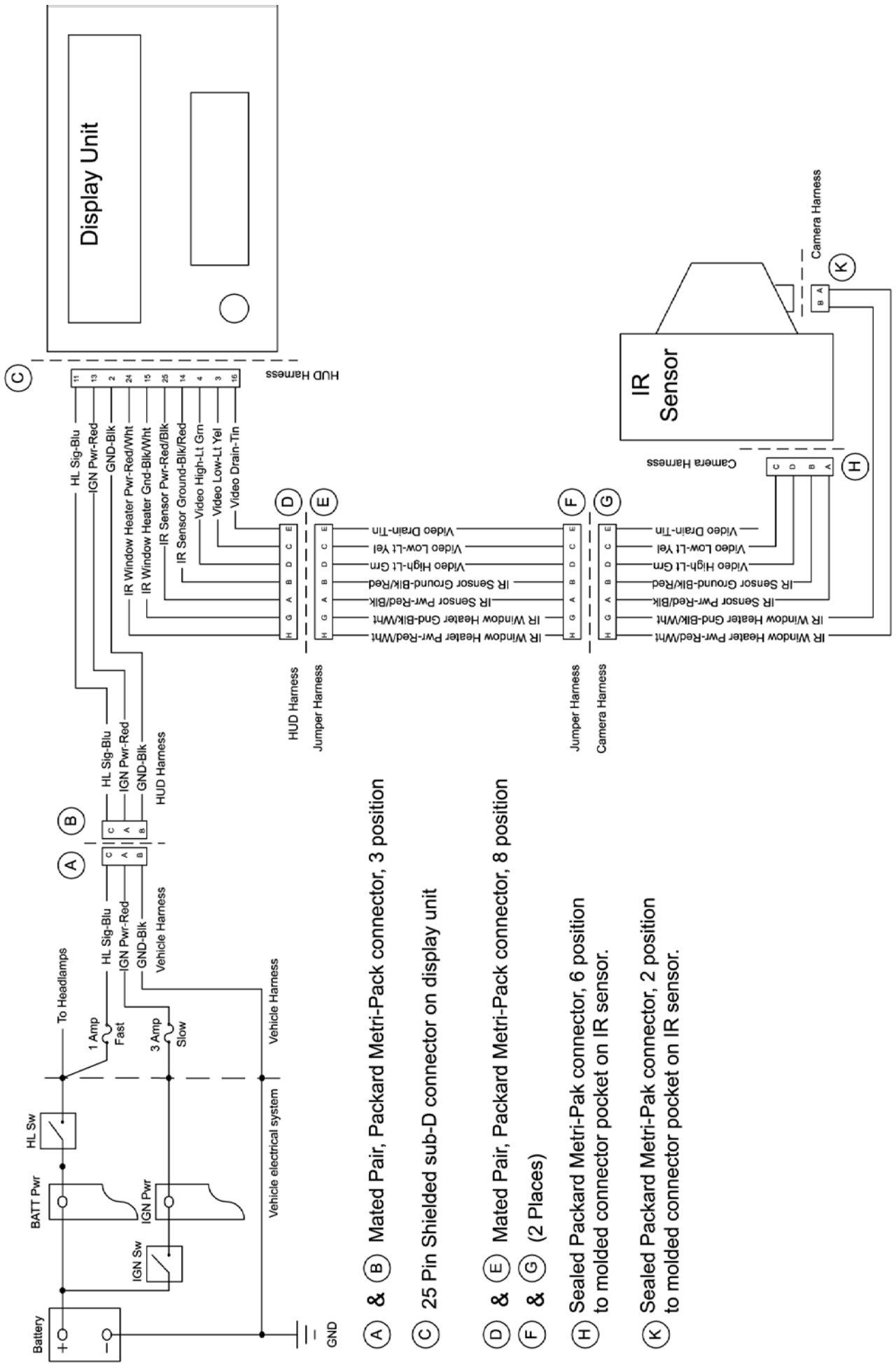


Figure 18 IR camera aimed correctly

TROUBLESHOOTING

Table 4 Troubleshooting

Troubleshooting Your XVision® System	
Situation	Possible Solutions
Display does not have an image.	Combiner Display: Check that the combiner is open to an angle that allows you to see the image.
	Make sure the vehicle accessory power, headlights, and the XVision® system are all on.
	Make sure that a thermal entity is in the view of the camera.
	Wait two minutes for the display to warm up.
	Check that the display intensity is set at an appropriate level to view the infrared image.
	Verify that the video in/out switch is set to "out."
	Check that the 25-pin connector of the display harness is completely plugged into the display.
	Verify that both the 2-pin window heater connector and the 6-pin video connector of the camera harness are connected to the camera.
	Remove the "A " pillar cover and verify that : (a) the camera harness is connected to the display harness, and (b) the display harness is connected to the vehicle harness.
	Check that the 3 A slow blow fuse connecting the red wire of the vehicle harness to the 12 V battery is intact. Also check that there is a 12 V current at this location, using a multimeter.
	Check that the 1 A fast fuse connecting the blue wire of the vehicle harness to the head lamp circuit is intact. Also check that there is a 12 V current at this location, using a multimeter.
Combiner Display: Check that the DIP switch is set correctly .	



(A) & (B) Mated Pair, Packard Metri-Pack connector, 3 position

(C) 25 Pin Shielded sub-D connector on display unit

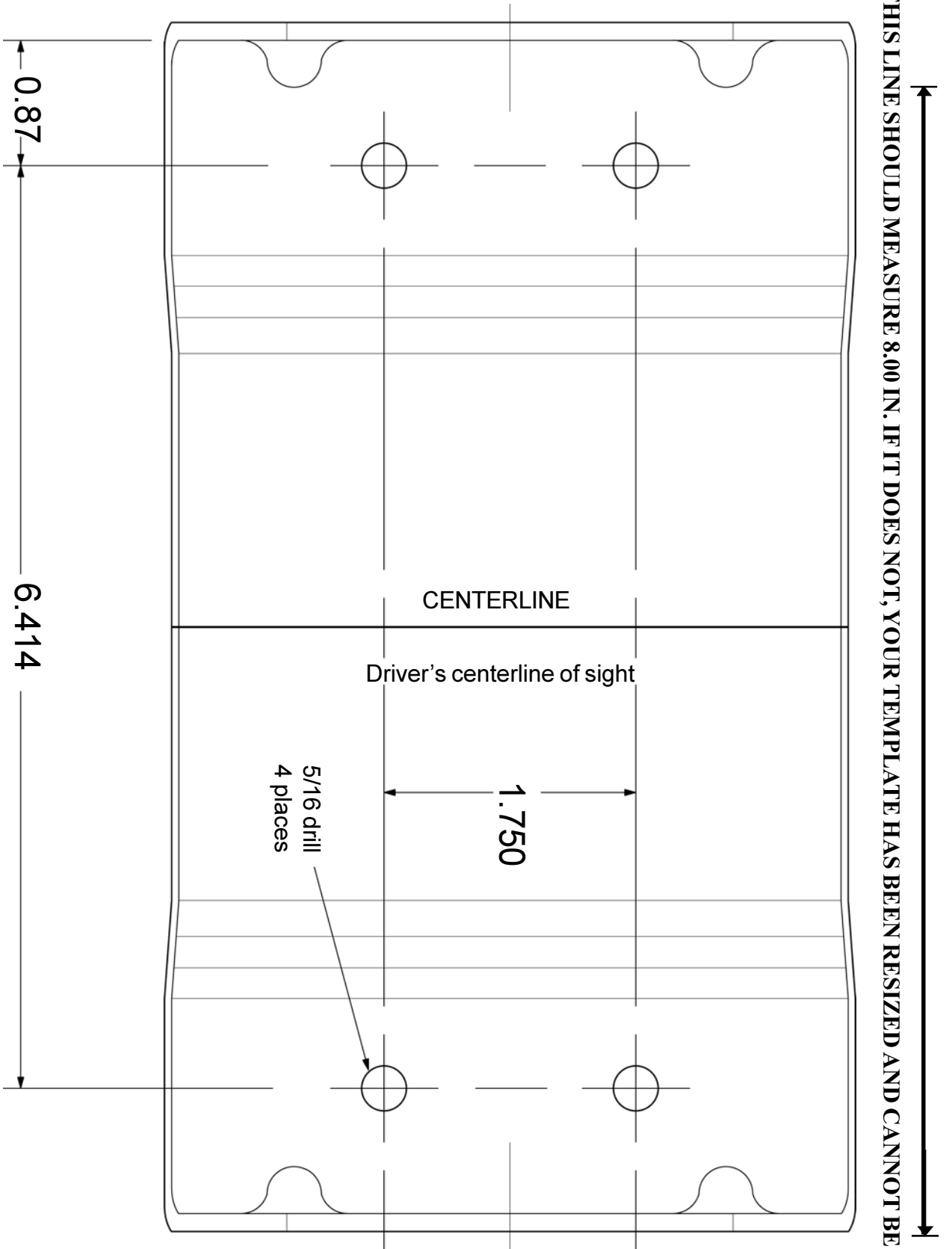
(D) & (E) Mated Pair, Packard Metri-Pack connector, 8 position

(F) & (G) (2 Places)

(H) Sealed Packard Metri-Pak connector, 6 position to molded connector pocket on IR sensor.

(K) Sealed Packard Metri-Pak connector, 2 position to molded connector pocket on IR sensor.

THIS LINE SHOULD MEASURE 8.00 IN. IF IT DOES NOT, YOUR TEMPLATE HAS BEEN RESIZED AND CANNOT BE USED



IR Camera Bracket Template