Opticom™ Infrared System

Model 711 Detector
Model 721 Detector
Model 722 Detector
1 Safety Information

We provide important safety information and warnings to assist you in understanding and avoiding potential harm to yourself and possible damage to equipment during the installation of Opticom™ Infrared System equipment. Although we have included many potential hazards you may encounter during the installation of this equipment, we cannot predict all of the possible hazards and this list should not be a substitute for your judgment and experience.

Please read and observe all safety information and instructions in this manual before installing the system equipment. Also, save this installation manual and keep it near the equipment.

If you are unsure about any part of this installation or of the potential hazards discussed, please contact your supervisor immediately.

1.1 Intended Use

The Opticom Infrared system * is intended to assist authorized priority vehicles through signalized intersections by providing temporary right-of-way through vehicle operator interface to the system and through the use of common traffic controller functions.

*The method of using the components of the Opticom™ Infrared system may be covered by US Patent Number 5172113.

1.2 Technical Support

If you have questions about the system, its use, or operation, please contact your dealer or call the Global Traffic Technologies Technical Service department at: 1-800-258-4610.

1.3 Safety Considerations

Please consider the following safety issues before beginning the installation of Opticom™ Infrared System equipment.

Although we have compiled this list of common safety considerations, it should not be considered as complete. It is not intended to take the place of your good judgment, training, and experience.

1.3.1 Personal Safety Equipment and Clothing

Personal safety equipment and clothing including high visibility vests, hard hats, gloves, electrical shock or electrocution protection clothing and equipment, safety shoes, safety glasses, face shields, goggles, and hearing protection devices are just some of the items available to you.

Choose the right equipment for the job. If you are unsure of which safety equipment is recommended or appropriate for the job, ask your supervisor or foreman.

1.3.2 Work Zone Traffic Control

Proper control of vehicle traffic is important during many procedures. When you switch the traffic controller to and from the flash mode we recommend that you have people trained in manual traffic control, such as police officers, assist you.

When you install devices that require you to position vehicles, equipment, or people in or near the roadway; it is important that you use appropriate work zone traffic control techniques, equipment, and
procedures. Sometimes you may have to work on or near the roadway and these same techniques, equipment, and procedures should be used for your protection.

If you are unsure of which procedures are recommended or appropriate for the job, ask your supervisor or foreman.

1.3.3 Electrical Shock
The possibility of electrical shock exists when installing Opticom Infrared equipment, since connections must be made to open terminals within the traffic control cabinet which may have 120 VAC present. Follow proper work procedures and read and understand the safety messages in this manual.

As a trained installer of electrical equipment you are aware of the dangers associated with installation of electrical devices. Always be sure that the power to the equipment, and all associated equipment, is turned off before beginning any procedure. Use the equipment, techniques, and procedures that you learned during your training or apprenticeship or other electrical industry recognized safety procedures.

If you are unsure of which techniques, procedures, and protective equipment are recommended or appropriate for the job, ask your supervisor or foreman.

1.3.4 Disposal of Device
Please dispose of the device in accordance with all local, state, and federal laws and regulations.

2 Model 711, 721, and 722 Detectors
The Model 711, 721, and 722 detectors receive infrared pulses produced by emitters and convert these pulses into electrical signals. The electrical signals are transmitted by the detector cable to the phase selector or discriminator in the traffic controller cabinet.

The detectors are mounted at or near the intersection in a location that permits an unobstructed line of sight to vehicular approaches. Detectors may be mounted on span wires, pedestals, mast arms, or other appropriate structures in the line of sight of controlled approaches.

The Model 700 series detectors are available in three models.

• Model 711 Detector
The Model 711 detector (Figure 2-1) is a single-input, single-output unit. It is used when a detector controls a single approach to an intersection on a narrow road. The Model 711 detector may also be used as an auxiliary or advance detector.

Figure 2-1. Model 711 Detector
• Model 721 Detector

The Model 721 detector (Figure 2-2) is a dual-input, single-output unit. It is used to control single approaches on wide roads with multiple lanes. This is done by mounting the detector so that both turrets are facing the same approach, but at slightly different angles.

Figure 2-2. Model 721 Detector

• Model 722 Detector

The Model 722 detector (Figure 2-3) is a dual-input, dual-output unit. It is used when two approaches to the intersection will be controlled independently. It must be mounted so that it receives signals from both approaches.

An example of a Model 722 detector application is when the north and south legs of an intersection are independently given a green indication when the Opticom™Infrared system is activated. Coverage of one of the approaches may be reduced due the fact that the detector will not be centered over that approach.

The Model 722 detector is easily identified from the ground by its gray colored access door.

Figure 2-3. Model 722 Detector
3 Features

The Opticom™ Infrared System Model 711, 721, and 722 Detectors have the following features:

- Reception range is adjustable at the phase selector, up to 2500 feet (762 meters) under clear atmospheric conditions
- Each tube has a detection cone angle of 8 degrees
- Additional detectors may be installed at intersections where multiple movements are to be controlled
- Easily reconfigured for span wire mounting
- Mounted easily, using familiar hardware on span wire, pedestal, or mast arm locations
- Wiring connection is simplified with a labeled terminal strip built into the base of the detector
- Turret type design facilitates installation at intersections with skewed approaches
- Transient voltage protection
- Lightweight, durable plastic construction

4 Installation

Model 700 series detectors can be mounted on mast arms, signal head framework, pedestals, span wire, or other appropriate locations in line of sight of controlled approaches.

The typical recommended location of a detector is centered over the approaching traffic on the opposite side of the intersection. See Figure 4-3. Contact your dealer or GTT Technical Service for more details.

⚠️ NOTICE

Before installing a detector, be sure there are no obstructions limiting the view of the detector. If there are obstructions that cannot be removed, choose an alternate installation location.

4.1 Detector Location Considerations

The Opticom Infrared system is a line of site system. Detector mounting location should provide for an unobstructed view of the approach as far out as possible in order to detect approaching vehicles as far out as possible.

- An onsite survey should be done to determine detector placement and model type needed.
- Detectors should be placed and aimed so they have an unobstructed view of the approach.
- Note positions of trees
  - How will trees affect line of sight as they grow?
- Note positions of hills and curves
  - Additional detectors may be needed to account for hills and curves.
- Contact your GTT dealer or GTT technical Service if you would like more information.
4.2 Configuring Detectors

Model 700 series detectors can be configured for either upright or inverted mounting by simply rotating the tube shells. Figure 4-1 shows how to convert a detector for inverted span wire mounting.

A. Shells configured for upright pedestal or mast arm mounting.

B. By hand, rotate tube shells 180 degrees.

C. Shells configured for inverted span wire mounting.

Figure 4-1. Tube Rotation for Upright or Inverted Mounting
4.3 Upright Pedestal/Mast Arm Installation

This subsection describes how to install an Opticom™ Infrared System Model 711, 721, or 722 Detector in an upright position on a pedestal or mast arm.

**Note:**
- It is recommended that inverted mounting only be used when mounting on span wire.

The detector mounting location must provide a 3/4-inch NPT internal thread mount (Figure 4-2).

**NOTICE**
Before installing a detector, punch out the correct weep holes.

Failure to punch out the correct weep holes may result in failure of the detector and void the warranty.

1. Using a pointed object, punch out the weep hole at the bottom of the detector (Figure 4-2).
2. Do not open the hole any larger than the detent or it may become an entry point for insects.
3. Screw the plastic nipple into the base of the detector. Use pipe thread tape to waterproof the joint.
4. Route the detector cable from the traffic controller cabinet through the threaded mount and into the detector.

**NOTICE**
Secure the detector in place by tightening the mounting hardware only.

Forcing the detector into a tightened position by rotating the detector body may severely damage it.

5. Screw the detector into the threaded NPT mount. The tubes should be facing in the direction of approaching traffic. Tighten the locknuts to secure the detector so it will not move.
Figure 4-2. Detector Mount and Weep Hole Location

Note:

- Detector reception angle varies with distance. At a distance of 2500 feet (762 meters), the reception angle is approximately 8 degrees. Due to internal detector reflections, the reception angle increases at close range.

Figure 4-3. Upright Detector Pedestal/Mast Arm Installation
4.4 Span Wire Installation

This subsection describes how to install an Opticom™ Infrared System Model 711, 721, or 722 Detector in an inverted position on a span wire.

**Note:**
- It is recommended that inverted mounting be used when mounting on span wire.

A span wire installation requires a span wire clamp. Span wire clamps (stock number 78-8009-5667-0) (for 3/8” span cable) are available from GTT. Clamps for other sizes of cable are available from Pelco™.

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**NOTICE**

Before installing a detector, punch out the correct weep holes.

Failure to punch out the correct weep holes may result in failure of the detector and void the warranty.

**NOTICE**

Secure the detector in place by tightening the mounting hardware only.

Forcing the detector into a tightened position by rotating the detector body may severely damage it.

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1. Locate the weep hole on the outside of the detector cap and the two weep holes above the access door. Using a pointed object, punch out the weep holes (Figure 4-4).

2. Do not open the holes any larger than the detent or it may become an entry point for insects.

3. Rotate the tube(s) by hand, 180 degrees. Tube rotation will stop at a detent. Figure 4-4 shows a detector with inverted tubes.

4. Wrap pipe thread tape around the threads of the span wire clamp.

5. Screw the span wire clamp into the threaded hole at the base of the detector while holding the flat area with a wrench. The tubes should be facing in the direction of approaching traffic. Tighten the clamp so it will not loosen.

6. Hang the detector from the span wire and secure the clamp to the wire using the span wire clamp hardware. The tubes should be facing in the direction of approaching traffic. The tube/s should be parallel with the road.

7. Route the detector cable from the traffic controller cabinet, down the length of the span wire, and form a drip loop next to the detector (Figure 4-4). Use cable ties to secure the detector cable to the span wire.

8. Unscrew the metal cap and remove the rubber plug from the cable entry port on the side of the detector.

9. Route the detector cable through the metal cap and rubber plug, and then into the detector.

10. Replace the metal cap, sealing the cable entry port. Tighten the metal cap so the detector cable will not slide through the rubber plug. Use a pliers, if necessary, to achieve a tight fit.

11. Continue with Subsection 4.5, Aiming Tube Assemblies
Detector reception angle varies with distance. At a distance of 2500 feet (762 meters), the reception angle is approximately 8 degrees. Due to internal detector reflections, the reception angle increases at close range.
4.5 Aiming Tube Assemblies

After installing the Opticom™ Infrared System Model 711, 721, or 722 Detector, the tube assemblies must be aimed for proper system operation.

1. Loosen the cap assembly by loosening the cap screw just enough to rotate the tube assemblies.

   △ NOTICE

   Do not force the tube assemblies past internal rotation stops.
   Forcing the tube assemblies may result in severe damage to the detector.

2. Rotate the tube assemblies to their proper positions. Tubes should be aimed to “see” vehicles approaching the intersection.

3. If using a Model 721 detector, one tube may be aimed to cover a curved approach while the other tube covers the straight part of the road. If the road is straight, aim one tube slightly to the left of the center of the road and the other tube slightly to the right.

4. If proper alignment cannot be achieved because of contact with the internal stops, change the position of the detector on the mounting hardware by slightly loosening the base and realigning the unit.

   △ NOTICE

   Secure the detector in place by tightening the mounting hardware only.
   Forcing the detector into a tightened position by rotating the detector body cause severe damage.

5. Tighten the detector base so the detector cannot rotate.

6. When the tube assemblies are aimed properly, firmly tighten the cap screw so the tube assemblies cannot rotate.

Note:

Use a large flat blade screwdriver when tightening the cap screw.
5 Electrical Connections

This section describes how to connect the detector cable to the Model 711, 721, and 722 detectors. It also describes how to connect the cable to the phase selector or discriminator in the traffic controller cabinet.

5.1 Detector wiring connections inside the detector using Model 138 detector cable

The Model 138 detector cable is a three-conductor cable with yellow, orange, and blue conductor wires. It also has a bare shield drain wire.

Note:

- Opticom System cable (Model 138 or 739) must be used for all detector installation. Use of other detector cable may result in improper operation and may void the warranty.

The Model 700 series detectors have a four-position terminal strip located behind the wiring access door in the base of the detector.

1. Open the wiring access door by loosening the two screws on either side of the door. Allow the door to hang by its tether. The screws are captivated by the access door.
2. Cut off 3 inches (7 cm) of outer jacket from the Model 138 detector cable that has been routed to the inside of the detector housing. Remove the shield with the outer jacket, but leave the bare wire intact.
3. Strip 1/4-inch (6 mm) of insulation from the yellow, orange, and blue wires.
4. Install a spade lug on each of the yellow, orange, blue, and bare wires (Figure 5-1).

Note:

- Each wire must be connected to its own terminal inside of the detector.

5. Insulate the bare wire with electrical tape to prevent it from shorting to other wiring.
6. Connect the wires as shown in Figure 5-2. (A similar illustration is located on the inside of the detector for reference).

   The yellow wire carries the signal from the tube nearest the detector base. For a Model 722 detector, the blue wire carries the signal from the tube nearest the detector cap.
7. Store excess wire in the base of the detector.
8. Close the wiring access door and tighten the screws.
Figure 5-1. Model 138 Detector Cable Preparation for Detector End

Note:
- You may combine the blue and the bare wires in one terminal at the cabinet/phase selector end
  - **BUT NOT INSIDE OF THE DETECTOR.**
  - **ALL FOUR WIRES MUST BE CONNECTED TO THEIR DESIGNATED TERMINALS INSIDE THE DETECTOR.**

Figure 5-2. Model 138 Detector Cable Connections to Terminal Strip

*Note: Shown for normal, upright mount applications. Take care to obtain correct connections for *inverted* mount applications.*
5.2 Cable Preparation Cabinet/Phase Selector End

This section describes how the detector cable is prepared when making connections to the phase selector inside of the traffic cabinet.

Note:

- Each detector input should be connected to its own input into the phase selector. One input may be connected via the primary detector input. Additional detectors should be connected via the auxiliary detector inputs. See the section 5.3.3 and 5.3.4 for details on auxiliary detector connections.

1. Cut off 2 inches (5 cm) of outer jacket from the Model 138 detector cable, which is already routed to the traffic cabinet. Remove the shield with the outer jacket, but leave the bare wire intact.

2. Strip 1/4-inch (6mm) of insulation from the yellow, orange, and blue wires.

3. Install a spade lug on the wires as shown in Figure 5-3.

4. Insulate the bare wire with electrical tape to prevent it from shorting to other wiring.

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**WARNING**

Connecting more than one detector signal wire to a detector input terminal may damage the detectors and may cause improper operation of the input circuitry, which may result in accidents and/or injuries. **To avoid this problem, connect only one detector signal wire to each detector input terminal.** Improper operation of the traffic control system may result in unsafe driver action.
Model 711/721 Detector

- Yellow — Signal
- Orange — Positive voltage
- Blue/Bare — Negative voltage and earth ground

Model 722 Detector

- Yellow — Signal from tube nearest base
- Orange — Positive voltage
- Blue — Signal from tube nearest cap
- Bare — Negative voltage and earth ground

Figure 5-3. Model 138 Detector Cable Connections to cabinet/phase selector

Note:
- You may combine the blue and the bare wires in one terminal at the cabinet/phase selector end
  - BUT NOT INSIDE OF THE DETECTOR.
  - ALL FOUR WIRES MUST BE CONNECTED TO THEIR DESIGNATED TERMINALS INSIDE THE DETECTOR.
5.2.1 Primary detector wiring, 711/721 detector, standalone card rack, 138 cable

This subsection gives a general overview of the wiring required to connect a detector to a phase selector.

**WARNING**

Connecting more than one detector signal wire to a detector input terminal may damage the detectors and may cause improper operation of the input circuitry, which may result in accidents and/or injuries. **To avoid this problem, connect only one detector signal wire to each detector input terminal.** Improper operation of the traffic control system may result in unsafe driver action.

**NOTICE**

Connect the detector cable power ground connection to earth ground to allow dissipation of static charges on the detector cable. **Failure to make this connection to earth ground may damage the equipment.** If detectors have been mounted but not connected to the phase selector/discriminator, strip insulation from each detector cable and connect all the wires to earth ground until the installation can be completed.

**WARNING**

Improper wiring of the detector may cause improper operation of the traffic control system, which may result in accidents and/or injuries. **To avoid the risk of accidents and/or injuries, each detector must be connected to the detector power source and power return of the same phase selector/discriminator to which it supplies a signal.** Improper operation of the traffic control system may result in unsafe driver action.

**Note:**

- The use of spade lugs depends on the connections to be made. For example, primary detector cables require spade lugs because the connections are made at terminal strips on the input file or card rack. For auxiliary detector cables, spade lugs are not used with the auxiliary interface panel; however, spade lugs are used with the auxiliary harness. Figure 5-4 shows the detector cable wires with spade lugs.

**Model 711 or 721 Detector**

1. Route the detector cable to the card rack. Allow an extra six inches (15 cm) of cable for making connections.

2. Cut off 3 inches (7 cm) of outer insulation and foil from the end of the detector cable.

3. Strip 1/4-inch (6 mm) of insulation from the yellow, orange, and blue wires.

4. Twist the blue and bare wires together, and insulate the pair with electrical tape to prevent them from shorting to other wiring. See Figure 5-4.

5. Install a spade lug on each of the following wires: yellow, orange, and blue/bare twisted pair.
6. Connect the yellow wire to one of the channel terminals listed below (see Figure 5-4):

   Channel A (1) — TB1-1
   Channel B (2) — TB1-2
   Channel C (3) — TB1-3
   Channel D (4) — TB1-4

7. If the yellow wire is connected to channel A or B, connect the orange wire to TB1-5. For channel C or D, connect the orange wire to TB1-6.

8. If the yellow wire is connected to channel A or B, connect the blue/bare twisted pair to TB1-7. For channel C or D, connect the blue/bare twisted pair to TB1-8.

   ![NOTICE]
   Connect Terminals TB1-7 and TB1-8 of the card rack to earth ground to allow dissipation of static charges on the detector cable.
   **Failure to connect Terminals TB1-7 and TB1-8 to earth ground may damage the equipment.** If detectors have been mounted but not connected to the phase selector, strip insulation from each detector cable and connect all the wires to earth ground until the installation can be completed.

9. Connect a wire from TB1-7 and TB1-8 to earth ground.

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**Figure 5-4. Detector Connections for Model 711/721**
5.2.2 Primary detector wiring, 711/721 detector, 170 (33X) cabinet, 138 cable
This section describes detector connections in a cabinet with a built in card rack such as would be found in a 33X cabinet.

The Opticom™ Infrared System Model 711 or 721 Detector must already be installed at the intersection and the Model 138 detector cable routed into the controller cabinet.

**WARNING**
Improper wiring of the detector may cause improper operation of the traffic control system, which may result in accidents and/or injuries. **To avoid the risk of accidents and/or injuries, each detector must be connected to the detector power source and power return of the same phase selector to which it supplies a signal.** Improper operation of the traffic control system may result in unsafe driver action.

**WARNING**
Connecting more than one detector signal wire to a detector input terminal may damage the detectors and may cause improper operation of the input circuitry, which may result in accidents and/or injuries. **To avoid this problem, connect only one detector signal wire to each detector input terminal.** Improper operation of the traffic control system may result in unsafe driver action.

1. Route the detector cable to J12 in the lower input file. Allow an extra six inches of cable for making connections.
2. Cut off 3 inches (7 cm) of outer insulation and foil from the end of the detector cable.
3. Strip 1/4-inch (6 mm) of insulation from the yellow, orange, and blue wires.
4. Twist the blue and bare wires together, and insulate the pair with electrical tape to prevent them from shorting to other wiring.
   See Figure 5-5.
5. Install a spade lug on each of the following wires: yellow, orange, and blue/bare twisted pair.
6. Connect the yellow wire to J12-D for channel A, or J12-J for channel B. See Figure 5-5.
7. Connect the orange wire to J12-E.
8. Connect the blue/bare twisted pair to J12-K.

**NOTICE**
Connect Terminal K of the Type 170 controller to earth ground to allow dissipation of static charges on the detector cable. **Failure to connect Terminal K to earth ground may damage the equipment.** If detectors have been mounted but not connected to the phase selector, strip insulation from each detector cable and connect all the wires to earth ground until the installation can be completed.
9. Connect a wire from J12-K to earth ground.

10. If a second phase selector is being installed, or a 4-channel phase selector is being used, repeat the above steps, substituting J13 for J12, and channels C and D for channels A and B, respectively.

Note:

- Some cabinets may have another terminal block that will allow you to terminate the detector wires. Refer to your cabinet schematic to determine this.

Figure 5-5. Detector Connections for Model 711/721
5.2.3 Primary detector wiring, 722 detector, standalone card rack, 138 cable

This subsection gives a general overview of the wiring required to connect a detector to a phase selector.

**WARNING**

Connecting more than one detector signal wire to a detector input terminal may damage the detectors and may cause improper operation of the input circuitry, which may result in accidents and/or injuries. **To avoid this problem, connect only one detector signal wire to each detector input terminal.** Improper operation of the traffic control system may result in unsafe driver action.

**NOTICE**

Connect the detector cable power ground connection to earth ground to allow dissipation of static charges on the detector cable. **Failure to make this connection to earth ground may damage the equipment.** If detectors have been mounted but not connected to the phase selector/discriminator, strip insulation from each detector cable and connect all the wires to earth ground until the installation can be completed.

**WARNING**

Improper wiring of the detector may cause improper operation of the traffic control system, which may result in accidents and/or injuries. **To avoid the risk of accidents and/or injuries, each detector must be connected to the detector power source and power return of the same phase selector/discriminator to which it supplies a signal.** Improper operation of the traffic control system may result in unsafe driver action.

**Note:**
- The use of spade lugs depends on the connections to be made. For example, primary detector cables require spade lugs because the connections are made at terminal strips on the input file or card rack. For auxiliary detector cables, spade lugs are not used with the auxiliary interface panel; however, spade lugs are used with the auxiliary harness. Figure 5-6 shows the detector cable wires with spade lugs.

**Model 722 Detector**

1. Route the detector cable to the card rack. Allow an extra six inches (15 cm) of cable for making connections.

2. Cut off 3 inches (7 cm) of outer insulation and foil from the end of the detector cable.

3. Strip 1/4-inch (6 mm) of insulation from the yellow, orange, and blue wires.

4. Install a spade lug on each of the following wires: yellow, orange, and blue/bare twisted pair.

5. Connect each of the yellow and blue wires to one of the channel terminals listed below (see Figure 5-6):
Channel A (1) — TB1-1
Channel B (2) — TB1-2
Channel C (3) — TB1-3
Channel D (4) — TB1-4

6. If the yellow wire is connected to channel A or B, connect the orange wire to TB1-5. For channel C or D, connect the orange wire to TB1-6.

7. If the yellow wire is connected to channel A or B, connect the blue/bare twisted pair to TB1-7. For channel C or D, connect the blue/bare twisted pair to TB1-8.

**NOTICE**

Connect Terminals TB1-7 and TB1-8 of the card rack to earth ground to allow dissipation of static charges on the detector cable.

*Failure to connect Terminals TB1-7 and TB1-8 to earth ground may damage the equipment.* If detectors have been mounted but not connected to the phase selector, strip insulation from each detector cable and connect all the wires to earth ground until the installation can be completed.

8. Connect a wire from TB1-7 and TB1-8 to earth ground.

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**Figure 5-6. Detector Connections for Model 722**
5.2.4 Primary detector wiring, 722 detector, 170 (33X) cabinet, 138 cable

The Opticom™ Infrared System Model 722 Detector must already be installed at the intersection and the Model 138 detector cable routed into the controller cabinet.

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**WARNING**

Improper wiring of the detector may cause improper operation of the traffic control system, which may result in accidents and/or injuries. **To avoid the risk of accidents and/or injuries, each detector must be connected to the detector power source and power return of the same phase selector to which it supplies a signal.** Improper operation of the traffic control system may result in unsafe driver action.

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**WARNING**

Connecting more than one detector signal wire to a detector input terminal may damage the detectors and may cause improper operation of the input circuitry, which may result in accidents and/or injuries. **To avoid this problem, connect only one detector signal wire to each detector input terminal.** Improper operation of the traffic control system may result in unsafe driver action.

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1. Route the detector cable to J12 in the lower input file. Allow an extra six inches of cable for making connections.

2. Cut off 3 inches (7 cm) of outer insulation and foil from the end of the detector cable.

3. Strip 1/4-inch (6 mm) of insulation from the yellow, orange, and blue wires.

4. Twist the blue and bare wires together, and insulate the pair with electrical tape to prevent them from shorting to other wiring. See Figure 5-7.

5. Install a spade lug on each of the following wires: yellow, orange, and blue/bare twisted pair.

6. Connect the yellow wire to J12-D for channel A, or J12-J for channel B. See Figure 5-7.

7. Connect the orange wire to J12-E.

8. Connect the blue/bare twisted pair to J12-K.

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**NOTICE**

Connect Terminal K of the Type 170 controller to earth ground to allow dissipation of static charges on the detector cable. **Failure to connect Terminal K to earth ground may damage the equipment.** If detectors have been mounted but not connected to the phase selector, strip insulation from each detector cable and connect all the wires to earth ground until the installation can be completed.

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9. Connect a wire from J12-K to earth ground.
10. If a second phase selector is being installed, or a 4-channel phase selector is being used, repeat the above steps, substituting J13 for J12, and channels C and D for channels A and B, respectively.

Note:

- Some cabinets may have another terminal block that will allow you to terminate the detector wires. Refer to your cabinet schematic to determine this.

![Detector Connections for Model 722](image-url)
5.2.5  **Auxiliary detector wiring, 711/721 detector, 138 cable using an Auxiliary Interface Panel**

**WARNING**

Improper wiring of the detector may cause improper operation of the traffic control system, which may result in accidents and/or injuries. **To avoid the risk of accidents and/or injuries, each detector must be connected to the detector power source and power return of the same phase selector to which it supplies a signal.** Improper operation of the traffic control system may result in unsafe driver action.

**WARNING**

Connecting more than one detector signal wire to a detector input terminal may damage the detectors and may cause improper operation of the input circuitry, which may result in accidents and/or injuries. **To avoid this problem, connect only one detector signal wire to each detector input terminal.** Improper operation of the traffic control system may result in unsafe driver action.

1. Strip sufficient outer insulation and foil from the detector cable(s) to allow wires to connect to the terminal block of the auxiliary interface panel.

2. Strip 1/4-inch (6 mm) of insulation from the yellow, orange, and blue wires.

3. Insulate the bare wire with electrical tape to prevent shorting to other wiring. Leave 1/4-inch (6 mm) of bare wire sticking out. See Figure 5-8.

4. Make the following connections. See Figure 5-8.
   
   a) Connect the orange wire to the auxiliary interface panel terminal labeled VDET or DET. PWR. OUT. Tighten the terminal block screw.

   b) Connect both the blue and bare wires to the auxiliary interface panel terminal labeled or RTN or DET. PWR. GND. Tighten the terminal block screw.

   c) Connect the yellow wire to the desired auxiliary interface panel terminal. (For example, A AUX1 would be channel A auxiliary detector number 1.) Tighten the terminal block screw.

5. Check all wiring and connections.

6. Repeat steps 1 through 5 for any additional auxiliary detectors.

**Note:**

- **The Model 758 Auxiliary Interface Panel has the auxiliary detector connections in slightly different location than a Model 768 which is shown in figure 5-8. Refer to the text on the 758 auxiliary interface panel for the location of these connections.**
Figure 5-8. Auxiliary Detector Connections for Model 711/721, Model 768 Auxiliary Interface Panel
5.2.6 Auxiliary detector wiring, 722 detector, 138 cable using an Auxiliary Interface Panel

1. Strip sufficient outer insulation and foil from the detector cable(s) to allow wires to connect to the terminal block of the auxiliary interface panel.

2. Strip 1/4-inch (6 mm) of insulation from the yellow, orange, and blue wires.

3. Insulate the bare wire with electrical tape to prevent shorting to other wiring. Leave 1/4-inch (6 mm) of bare wire sticking out. See Figure 5-8.

4. Make the following connections. See Figure 5-9.
   a. Connect the orange wire to the auxiliary interface panel terminal labeled VDET or DET. PWR. OUT. Tighten the terminal block screw.
   b. Connect the bare wire to the auxiliary interface panel terminal labeled RTN or DET. PWR. GND. Tighten the terminal block screw.
   c. Connect the yellow wire to the desired auxiliary interface panel terminal. (For example, A AUX1 would be channel A auxiliary detector number 1.) Tighten the terminal block screw.
   d. Connect the blue wire to the desired auxiliary interface panel terminal. (For example, B AUX1 would be channel B auxiliary detector number 1.) Tighten the terminal block screw.

5. Check all wiring and connections.

6. Repeat steps 1 through 5 for any additional auxiliary detectors.

Note:

- On 722 detectors the Yellow wire is the signal from the detector tube nearest the base.
- On 722 detectors the Blue wire is the signal from the detector tube nearest the cap.
- The Model 758 Auxiliary Interface Panel has the auxiliary detector connections in slightly different location than a Model 768 which is shown in figure 5-8. Refer to the text on the 758 auxiliary interface panel for the location of these connections.
Figure 5-9. Auxiliary Detector Connections for Model 722, Model 768 Auxiliary Interface Panel
5.2.7 Auxiliary Detector Wiring 711/721/722 detectors, 138 cable using an Auxiliary Harness

This section is for making auxiliary detector connections using a 757 harness on a 452/454 or 752/754 phase selector only.

This section does not apply to Model 762/764 phase selectors. See section 5.2.5-5.2.6 for auxiliary detector connections when using a model 762 or 764 phase selector.

- **WARNING** Improper wiring of the detector may cause improper operation of the traffic control system, which may result in accidents and/or injuries. **To avoid the risk of accidents and/or injuries, each detector must be connected to the detector power source and power return of the same phase selector to which it supplies a signal.** Improper operation of the traffic control system may result in unsafe driver action.

- **WARNING** Connecting more than one detector signal wire to a detector input terminal may damage the detectors and may cause improper operation of the input circuitry, which may result in accidents and/or injuries. **To avoid this problem, connect only one detector signal wire to each detector input terminal.** Improper operation of the traffic control system may result in unsafe driver action.

1. Locate an unused terminal block in the traffic control cabinet. This terminal block will be used to connect the auxiliary detector cable wires to the auxiliary harness wires.

2. Connect P1 of the auxiliary harness to connector J1 on the front panel of the phase selector. Route the free end of the wiring harness to the terminal block. Remove cable ties from the wiring harness as necessary.

3. Route the detector cable to the terminal block. Allow an extra six inches of cable for making connections.

4. Prepare the auxiliary detector cable.
   a) Cut off 3 inches (8 cm) of outer insulation and foil from the end of the detector cable.
   b) Strip 1/4-inch (6 mm) of insulation from the yellow, orange, and blue wires.
   c) For Model 711 or 721 detectors, twist the blue and bare wires together, and insulate the pair with electrical tape to prevent them from shorting to other wiring. See Figure 5-10.
   d) For Model 722 detectors, insulate the bare wire with electrical tape to prevent it from shorting to other wiring. See Figure 5-11.

5. Install spade lugs on the wires, as shown in Figure 5-3.

6. Connect the detector cable and the wiring harness to the terminal block.
   a) For Model 711 or 721 detectors, continue with step 7.
   b) For Model 722 detectors, go to step 8.

7. For Model 711 or 721 detectors, make the following connections. See Figure 5-14. See Table 5-1 to select the proper wires from the wiring harness. Strip 1/4-inch (6 mm) of insulation from these wires and install spade lugs on them.
a) Connect the detector cable orange wire to the terminal block. Locate the detector power source used for the primary detectors (J12-E, J13-E, or the DC+ terminal on the card rack) and connect a wire from this power source to the other screw of the same terminal connection where the orange wire is connected. Tighten both screws.

b) Connect the detector cable blue/bare twisted pair to the terminal block. Locate the detector power ground used for the primary detectors (J12-K, J13-K, or the DC– terminal on the card rack) and connect a wire from this power source to the other screw of the same terminal connection where the blue/bare twisted pair is connected. Tighten both screws.

**NOTICE**

Connect the detector cable power ground connection to earth ground to allow dissipation of static charges on the detector cable. **Failure to make this connection to earth ground may damage the equipment.** If detectors have been mounted but not connected to the phase selector, strip insulation from each detector cable and connect all the wires to earth ground until the installation can be completed.

c) Connect a wire from the Detector Power Ground terminal connection to earth ground. Tighten the screw.

d) Connect the detector cable yellow wire to the terminal block. Connect the desired wiring harness Auxiliary Detector Input wire (for example, Channel A Aux. Detector 1) to the other screw of the same terminal connection. Tighten both screws.

e) Go to step 8.

![Figure 5-10. Auxiliary Detector Connections for Model 711/721](image_url)
<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Wire Color</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Yellow/Blue</td>
<td>Channel A Aux. Detector 2 (Input)</td>
</tr>
<tr>
<td>14</td>
<td>Yellow/White</td>
<td>Channel B Aux. Detector 2 (Input)</td>
</tr>
<tr>
<td>15</td>
<td>Yellow/Black</td>
<td>Channel B Aux. Detector 1 (Input)</td>
</tr>
<tr>
<td>28</td>
<td>Yellow/ Brown</td>
<td>Channel A Aux. Detector 1 (Input)</td>
</tr>
<tr>
<td>29</td>
<td>Yellow/ Orange</td>
<td>Channel C Aux. Detector 2 (Input)</td>
</tr>
<tr>
<td>30</td>
<td>Yellow/ Green</td>
<td>Channel C Aux. Detector 1 (Input)</td>
</tr>
<tr>
<td>43</td>
<td>Yellow/ Violet</td>
<td>Channel D Aux. Detector 2 (Input)</td>
</tr>
<tr>
<td>44</td>
<td>Yellow/ Gray</td>
<td>Channel D Aux. Detector 1 (Input)</td>
</tr>
</tbody>
</table>

Table 5-1. Model 757 Auxiliary Harness Connector Pin Index

Note:
- The model 757 contains additional wires for green sense connections. See the pin index included with the 757 or the 752/754 manual for these connections.

8. For Model 722 Detectors, make the following connections. See Figure 5-15. See Table 5-5 to select the proper wires from the auxiliary harness. Strip 1/4-inch of insulation from these wires and install spade lugs on them.
   a) Connect the detector cable orange wire to the terminal block. Locate the detector power source used for the primary detectors (J12-E, J13-E, or the DC+ terminal on the Model 760 card rack) and connect a wire from this power source to the other screw of the same terminal connection where the orange wire is connected. Tighten both screws.
   b) Connect the detector cable bare wire to the terminal block. Locate the detector power ground used for the primary detectors (J12-K, J13-K, or the DC– terminal on the card rack) and connect a wire from this power source to the other screw of the same terminal connection where the bare wire is connected. Tighten both screws.
   c) Connect a wire from the wiring harness Detector Power Ground terminal connection to earth ground. Tighten the screw.

NOTICE

Connect the detector cable power ground connection to earth ground to allow dissipation of static charges on the detector cable. **Failure to make this connection to earth ground may damage the equipment.** If detectors have been mounted but not connected to the phase selector, strip insulation from each detector cable and connect all the wires to earth ground until the installation can be completed.
d) Connect the detector cable yellow wire to the terminal block. Connect the desired wiring harness Auxiliary Detector Input wire (for example, Channel A Aux. Detector 1) to the other screw of the same terminal connection. Tighten both screws.

e) Connect the detector cable blue wire to the terminal block. Connect the desired wiring harness Auxiliary Detector Input wire (for example, Channel B Aux. Detector 1) to the other screw of the same terminal connection. Tighten both screws.

9. Check all wiring and connections.

10. Repeat steps 1 through 8 for any additional auxiliary detectors.

Figure 5-11. Auxiliary Detector Connections for Model 722
5.2.7.1 Changing Where Wires Exit Connector Housing

The auxiliary harness is shipped with the wires exiting straight out the back of the connector housing as shown in Figure 5-12. If this configuration causes interference problems, you can reconfigure the connector so that the wires exit from the bottom of the connector. Perform the following steps:

1. Remove the screws and open the cover.
2. Lift the wiring harness away from the connector housing.
3. Swap positions of the strain relief and blank insert. See Figure 5-13.
4. Bend the wiring harness and place it in the connector housing so that the wires exit the bottom as shown in Figure 5-13. Be sure that all of the wires are contained in the strain relief and are not being pinched by the connector cover.
5. Close the cover and secure it to the base with the screws removed in step 1.

Figure 5-12. Wires Exit Back of Connector Housing

Figure 5-13. Wires Exit Bottom of Connector Housing
5.3 Detector Wiring with Model 739 Detector Cable

The Opticom™ Infrared System Model 739 Detector Cable is a four-conductor cable with yellow, orange, blue, and green conductor wires. It also has a bare shield drain wire.

5.3.1 Model 739 cable Description

- Model 739 cable contains an additional green conductor.
- The green conductor is required in countries with CE requirements.
- The green wire in the Model 739 cable performs the same function that the bare wire does in the Model 138 cable.
  - The green conductor is used to carry the DC- (RTN, DET PWR GND) signal.
  - With the model 138 cable the bare wire is used to carry this signal.

5.3.2 Wiring differences using Model 739 cable

1. Refer to sections 5.2 for wiring connections using the various models of detectors, racks and auxiliary panel and harness.
   a. **Substitute the green wire for the bare wire in all installations.**

2. Cut off the bare wire inside of the detector. See Figure 5-14

3. In the traffic cabinet at the phase selector end, connect the bare wire to the card rack frame or some other earth ground.

![Figure 5-14. Model 739 Detector Cable Preparation for Detector End](image)

**Note:**

- You may combine the blue and the green wires in one terminal at the phase selector/discriminator end (In the traffic cabinet) **BUT NOT INSIDE OF THE DETECTOR.**
- **ALL FOUR WIRES MUST BE CONNECTED TO THEIR DESIGNATED TERMINALS INSIDE THE DETECTOR.**
Figure 5-15. Model 739 Detector Cable Connections to Terminal Strip

Note:

- You may combine the blue and the green wires in one terminal at the phase selector/discriminator end (In the traffic cabinet) BUT NOT INSIDE OF THE DETECTOR.
- ALL FOUR WIRES MUST BE CONNECTED TO THEIR DESIGNATED TERMINALS INSIDE THE DETECTOR.
6 System Test

**WARNING**

A completed installation that is not tested may result in improper system operation, which may result in accidents and/or injuries. **To avoid this problem, test the system to verify proper operation.** Improper system operation may result in unsafe driver action.

These installation instructions are the result of tests performed in our laboratory and we believe these tests to be accurate and complete. However, each installation involves variables that cannot be controlled or predicted. These variables may affect the operational characteristics of the system.

To ensure proper system operation, GTT strongly recommends that, when the system is turned on, the installer functionally tests the system using a vehicle equipped with an Opticom™ Infrared System emitter.

**Notes:**

- For Opticom systems that include both filtered and non-filtered emitters, there will be a slight difference in system performance between the two types of emitters. Filtered emitters operate at a slightly reduced range.

- For consistent operation throughout the system, GTT recommends setting the ranges for all intersections in the system using a visible light filtered emitter. This will improve the system performance for both filtered and non-filtered emitters.

- GTT strongly recommends periodic, routine inspection and maintenance of the system to ensure proper operation. Please refer to the Opticom system *Operation Manual* for inspection and maintenance instructions.

1. To test the system, first set the range at an intersection by following the instructions for adjusting the activation point (Range Setting). Refer to the appropriate procedure in the *Installation Instructions* for the phase selector/discriminator that you are using.

2. Drive the emitter-equipped vehicle through the intersection to verify that the system is performing in accordance with customer requirements.
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