Global Traffic Technologies

Installation Manual   **March 2013**

Opticom™ GPS Priority Control System

Model 1060 IntelliGreen

Table of Contents

1 Description

1.1 Opticom Priority Control System Description

The Opticom GPS system assists authorized priority vehicles through signalized intersections by providing temporary right-of-way through the use of common traffic controller functions.

1.2 IntelliGreen Description

The Opticom GPS model 1060 IntelliGreen is used in locations where a fire station is located close to an Opticom GPS equipped signalized intersection. When the fire station is very close, often times the intersection does not have time to cycle to a green light for the fire vehicle leaving the station. By utilizing the IntelliGreen, the fire personnel can activate the IntelliGreen prior to getting in the vehicle, the extra time gained is usually enough for the intersection to cycle to a green light for the exiting fire vehicles. The IntelliGreen may be configured to be activated remotely such as when the station alarm is activated. In order for the IntelliGreen to operate, it must be located within radio range of a nearby Opticom GPS equipped intersection. If the IntelliGreen radio cannot hear an Opticom GPS intersection radio, it will not transmit and therefore not work. Typical radio range is at least 2500 feet. If there is a clear line of sight between the IntelliGreen radio and the intersection radio, this range will likely be longer. If there are obstructions between the radios, this range may be reduced. It is therefore important to locate the radio/GPS units to minimize obstructions between them.

Once installed and powered up the IntelliGreen is intended to remain powered up at all times. The IntelliGreen will normally operate in a standby mode. It will be transmitting, but it will transmit that it is in standby mode and the nearby Opticom GPS phase selector will not request preemptions from the traffic controller. When one of the buttons is pressed, the IntelliGreen will go into active mode (high priority) and begin requesting preemption from nearby Opticom GPS equipped intersections. The Opticom GPS model 1060 IntelliGreen is intended to work with an Opticom GPS equipped intersection. If the IntelliGreen is located mid block, the IntelliGreen may be configured to request preemption from only the intersection to the right of the fire station, only to the left of the fire station or both intersections.

2 Features

The Opticom GPS system IntelliGreen has the following features:

- Configurable to activate all nearby (within 2500') Opticom GPS equipped intersections or only the one in the direction that vehicles will be exiting.

- Opticom ™IntelliGreen identification encoding; selectable at installation

- Diagnostic indicators

- Wide operational temperature range:

  o –30°F to +165°F (–34°C to +74°C) (Radio/GPS unit)

  o 14°F to +122°F (–10°C to +50°C) (IntelliGreen Control Cabinet)

- Durable construction

- Intuitive operation

- Meets FCC part 15 Class A specifications

- Available Windows™[1] Configuration and Maintenance Software

- May be configured to be activated remotely

- Optional dry contact output for activating other devices.

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[1] Windows is a trademark of Microsoft Corporation.

3   FCC Statement

This equipment has been tested and found to comply within the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interferences when the equipment is operated in a commercial environment. This equipment generates and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. If operation of this equipment in a residential area causes harmful interference, the user is required to correct the interference at their own expense.

4   Parts List

The following components are supplied with the Opticom ™IntelliGreen kit. See figure 4-1
   - Qty 1 IntelliGreen control cabinet
   - Qty 1 Pole Mount radio/GPS unit
   - 150 feet Model 1070 radio/GPS unit installation cable
      o If the supplied cable is not long enough additional cable is available in 500 foot spools (part number 78-8125-0421-1).
      o Maximum allowed cable length is 250 feet.

Additional components to be supplied by the installer:
   - Mounting hardware for radio/GPS unit
   - Mounting hardware for IntelliGreen control cabinet
   - Conduit for radio/GPS installation cable
   - Conduit for 120 VAC service
   - Cable for 120 VAC service

IntelliGreen Control Cabinet

Radio/GPS Unit

Radio/GPS Unit installation Cable

Figure 4-1 IntelliGreen components

5 Power Requirements

The IntelliGreen requires 100-240 VAC, 50/60 Hz 1 amp.

6 Installation

This section describes the installation of the IntelliGreen equipment.

6.1 Installation Personnel Qualifications

- It is recommended that the IntelliGreen equipment be installed by a qualified electrician.
- It is recommended that the phase selector/intersection equipment be installed by a GTT trained technician or a GTT certified dealer.
- It is recommended that the system configuration be done by a GTT trained technician or a GTT certified dealer.

6.2 Typical Installation

Figure 6-1 shows a typical IntelliGreen installation with a fire station located close to an Opticom GPS equipped intersection.
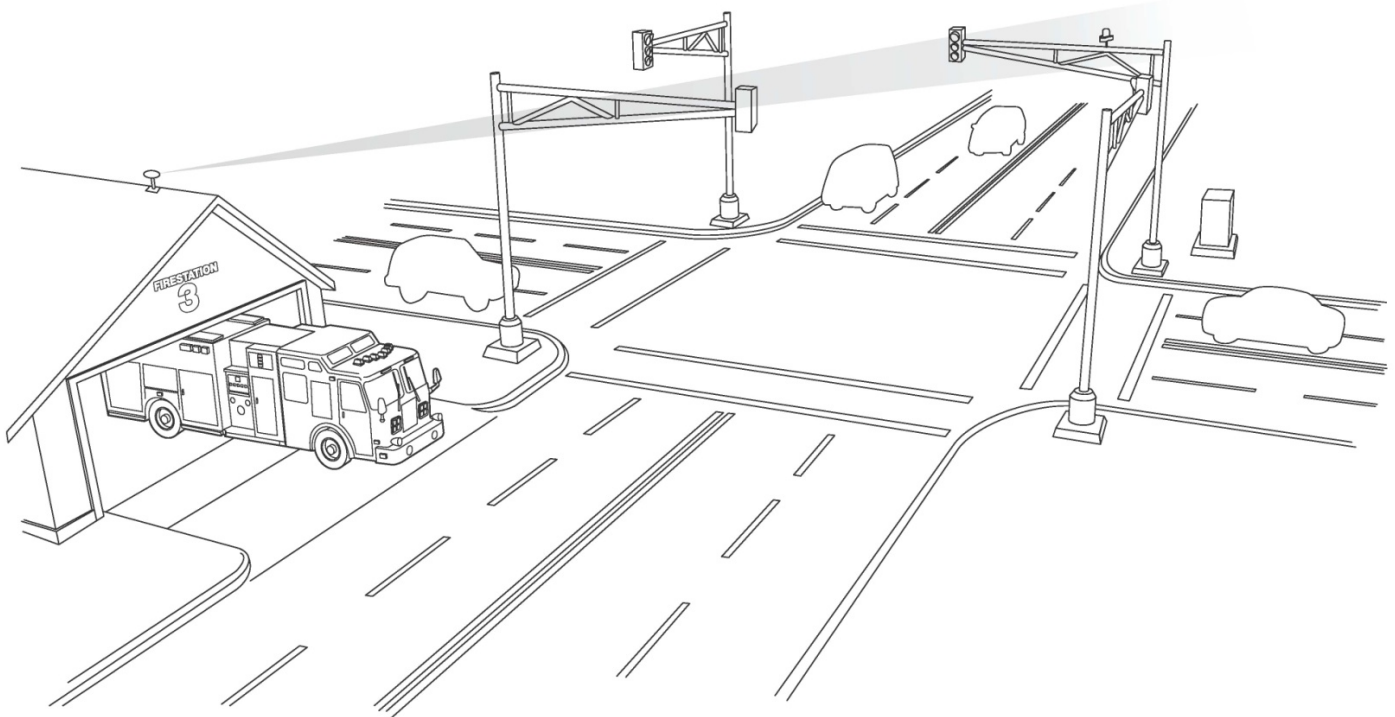

Figure 6-1 Typical IntelliGreen application

6.3   IntelliGreen Control Cabinet Installation

Mount the cabinet to a wall in a location that is easily accessible to the vehicle drivers. Cabinet should be located so that the button may be pressed in time for the nearby signalized intersections to be activated. **Notes:**
- **The wall surface should be capable of supporting the 13 pounds of the IntelliGreen.**
- **The wall surface should also be able to support users pushing the buttons.**
- **The maximum allowed cable run from the control cabinet to the radio/GPS unit is 250 feet.**
- <u>**To prevent water from entering the cabinet via the conduits, the conduits should enter the cabinet from the bottom or side of the cabinet and contain a drain hole to allow condensation to drain.**</u>

6.3.1   IntelliGreen Power Connections

1. Comply with all local and national electrical codes.

2. Attach the IntelliGreen control cabinet to the wall using the appropriate mounting hardware.

3. Install a length of conduit from the IntelliGreen control cabinet to the 120 VAC source.

4. Run a length of electrical cable from the IntelliGreen control cabinet to the 120 VAC source. Use sufficient gauge wire to supply a 1 amp load.

5. The IntelliGreen does not have an On/Off switch, so if needed a switch may be installed on the service line.

6. Connect the 120VAC wires to the hot, neutral and ground terminals on TB-1 inside of the IntelliGreen control cabinet. **Do not connect the power source at this time.**

6.3.2   IntelliGreen radio/GPS cable connections

1. Install a length of conduit from the IntelliGreen control cabinet to the location of the radio/GPS unit.

2. The IntelliGreen kit includes 150 feet of radio/GPS cable. If the supplied cable is not long enough additional cable is available in 500 foot spools (part number 78-8125-0421-1). **The maximum allowed cable run from the control cabinet to the radio/GPS unit is 250 feet.**

3. Route the radio/GPS cable through the conduit from the location of the radio/GPS unit to the IntelliGreen control cabinet

4. Use the strain relief in the IntelliGreen control cabinet to retain the cable.

5. Cut the radio/GPS cable to the proper length.

6. Strip approximately 3 inches of the outer jacket from the end of the cable. Be careful not to cut the wires inside.

7. Strip 1/4 inch of insulation from each wire.

   Note: It is very important not to strip too much insulation, which may lead to short circuits; or too little insulation, which may prevent the wire from making good contact.

8. Place each wire into the appropriate terminal in the 10-pin terminal block located on the back of the control unit and tighten the screw to secure the wire. The label on the terminal block shows the color for each wire. Table 6-1 also shows the terminal block pin number, wire color, and function for each wire.

   The terminal block may be removed from the circuit board to allow easier connections.

9. Crimp a spade lug to the bare wire and connect to the grounding stud located near the terminal block.

Pin	Wire Color	Function
1	Yellow	Radio transmit (+)
2	Yellow Black	Radio transmit (–)
3	Blue	Radio receive (+)
4	Blue White	Radio receive (–)
5	Orange	Radio clock (+)
6	Orange Green	Radio clock (–)
7	Brown	GPS power
8	Brown White	Common
9	Violet	Radio power
10	Violet White	Common

Table 6-1. Control Unit Terminal Block Pin Index

6.4   Radio/GPS Unit Installation

This section describes the details of mounting the radio/GPS unit.

6.4.1   Radio/GPS Unit Mounting Location Considerations

Read and understand the following precautionary paragraphs before starting the installation.

- The radio/GPS unit should be mounted on the outside of the building.
- Mounting on the roof is the preferred mounting location.
- The radio/GPS unit should be mounted in a location that has an unobstructed view of all the radio/GPS unit(s) at the nearby intersection/s to which the IntelliGreen is intended to communicate with.
- Blockage by things such as, buildings, trees and building ledges /overhangs should be avoided.
- The radio/GPS unit should have an unobstructed view of at least 50% of the sky.

- The radio/GPS unit should be mounted level.
- Do not mount the unit upside down.
- The mounting location should be such that the cable run from the radio/GPS unit to the IntelliGreen control cabinet is no more than 250 feet.
- The radio/GPS cable may be run through conduit or attached to a messenger wire. The cable should not be suspended unsupported.
- The radio/GPS unit should be oriented such that the cable retainer is facing an area other than the nearby intersection/s. See Figure 6-2.
- Do not paint the radio/GPS unit cover. Metals or metal oxides in the paint may interfere with GPS reception and/or radio reception/transmission.
- Do not modify the radio/GPS unit circuitry. There are no user-serviceable parts inside.

⚠ **IMPORTANT NOTE**
Modifying the radio/GPS unit may seriously damage the equipment and void the warranty. **Do not attempt to modify the radio/GPS circuitry in any way.** Modifying the radio and/or antenna in any way may cause the radio to violate FCC/IC requirements.

Weakest Signal at This End
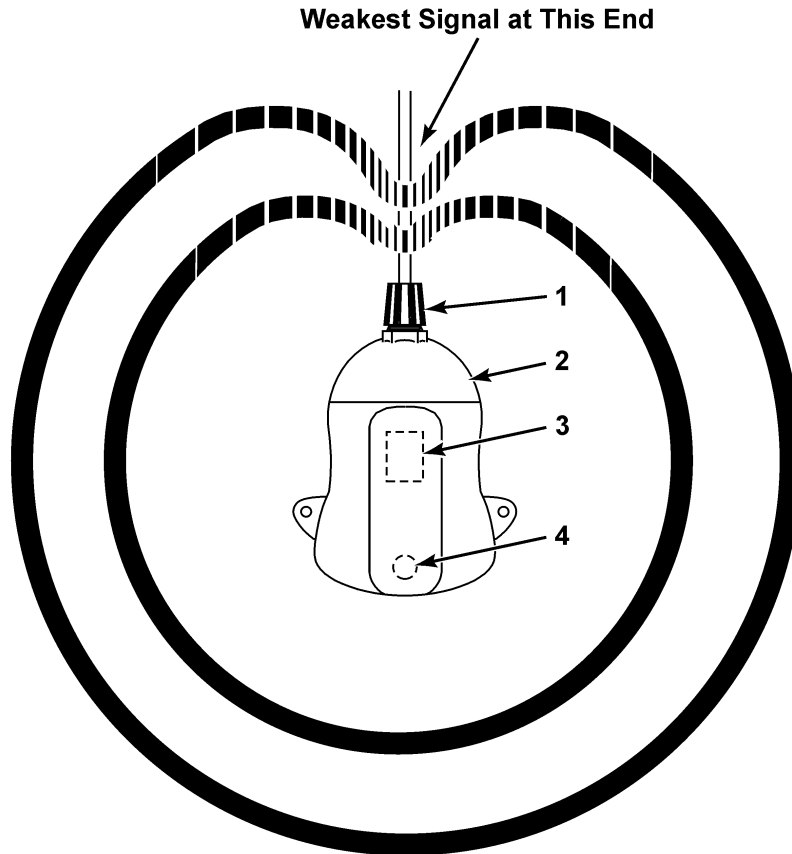
Opticom-521R

Figure 6-2. Radio Signal Pattern

1. Cable retainer	3. GPS antenna
2. Intersection radio/GPS unit	4. Radio antenna

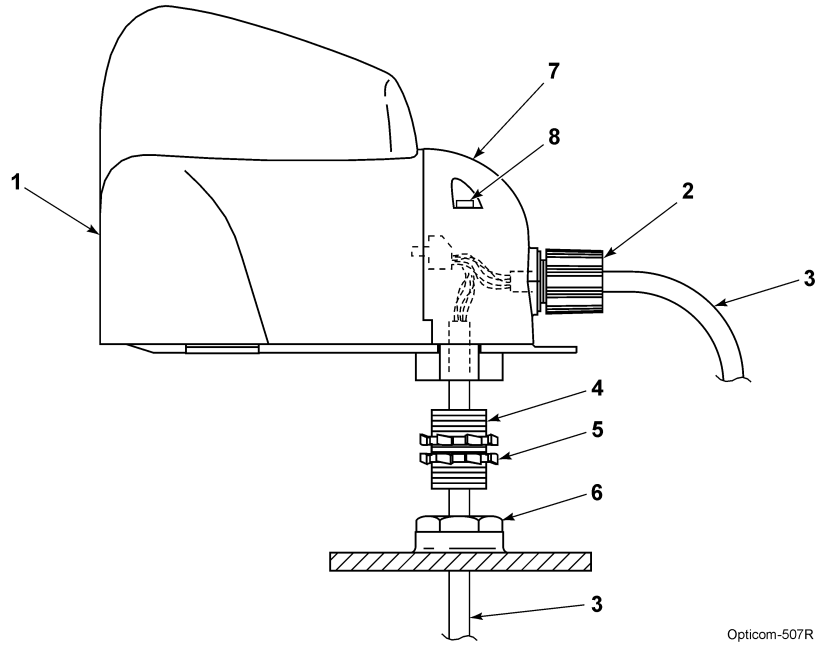### 6.4.2 Radio/GPS Unit Installation and Wiring

1. Screw a nipple (or pipe) into the base of the radio/GPS unit. See figure 6-3

2. Attach the pipe to the structure using the appropriate mounting hardware.

3. Loosen the two cover screws and remove the wiring cover.

4. Route the radio/GPS cable from the radio mounting location to the IntelliGreen cabinet inside the building.

5. The cable may enter the radio/GPS unit either through the cable retainer in the access cover or through the nipple/pipe at the base of the unit. See Figure 6-3. In either case, the wiring connections are the same.

6. For purposes of discussion, these instructions assume the cable enters the radio/GPS unit through the cable retainer.

7. Disassemble the weather-tight cable retainer and route the cable through the compression nut, plastic washer, rubber bushing, and into the cover as shown in Figure 6-4.

8. Leave approximately 4 inches of cable inside the cover and tighten the compression nut to secure the cable.

9. Strip approximately 3 inches of the outer jacket from the end of the cable. Be careful not to cut the wires inside. Make sure the outer jacket is held in place by the rubber bushing.

10. Strip 1/4 inch of insulation from each wire.

Note: It is very important to not strip too much insulation, which may lead to short circuits; or too little insulation, which may prevent the wire from making good contact.

11. Place each wire into the appropriate hole in the 11-pin terminal block and tighten the screw to secure the wire. The label on the terminal block shows the color of each wire. Table 6-1 also shows the terminal block pin number, wire color, and function of each wire.

**The terminal block may be removed to allow easier connections.**

12. Replace the access cover and tighten the screws.

13. Orient the radio/GPS unit so that the cable retainer is facing an area other than the nearby intersection/s.

14. Tighten the locknuts on the nipple/pipe to secure the radio/GPS unit so it will not move.

15. Finish routing and securing the cable. Use cable ties as required. Keep the cable lower than the entry point or use a drip loop.

Figure 6-3. Radio/GPS Unit Mounting

1.	Radio/GPS unit	5.	Locknut (2)
2.	Cable retainer	6.	3/4-inch NPT mount
3.	Radio/GPS cable	7.	Wiring cover
4.	Nipple/Pipe	8.	Cover screws (2)
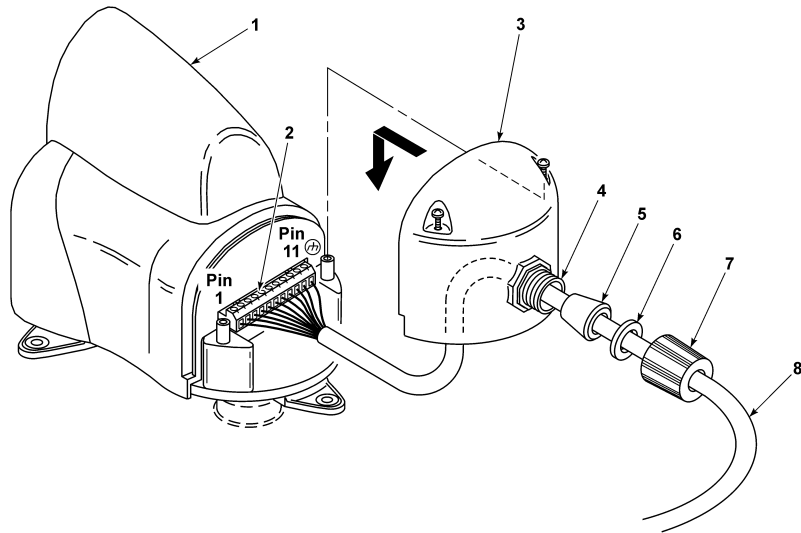
Figure 6-4. Radio/GPS Cable Installation

1.	Radio/GPS unit	5.	Rubber bushing
2.	11-pin terminal block	6.	Plastic washer
3.	Wiring cover	7.	Compression nut
4.	Cable retainer	8.	Radio/GPS cable

6.5   Remote Activation Option

This section describes how to activate the IntelliGreen remotely. For instance, the IntelliGreen may be wired to activate when a call comes into the station from the dispatch center.

Skip this section if only the manual activation button(s) will be used to activate the IntelliGreen.

The remote activation option essentially allows the dispatcher to remotely "push" the ALL button from the dispatch center at the same time they are activating your station call alarm.

The remote activation may only be wired to "push" the ALL button. Therefore the option of varying which intersection you want to activate from a mid-block fire station is not available.

6.5.1   Remote Activation Requirements

- A dry contact or a contact with no voltage on it is required.
- An open collector input may be used.

Notes:
- **Do not apply a voltage to the remote activation terminals. The +A and B– references are to indicate the proper polarity of an open collector connection (if used).**
- **Do not apply a constant closure. This will be perceived by the IntelliGreen as an error condition and will prevent the system from operating normally.   The signal should be normally OPEN and close to activate the system.   The signal should return to the open state before the end of the hold timing cycle.**

6.5.2   Remote Activation Wiring

1. Punch an additional hole in the IntelliGreen cabinet and attach a conduit connector.
2. Install a length of conduit from the IntelliGreen cabinet to the location where the remote activation cable originates.
3. Connect the remote activation wires to the terminal block, see figure 6-5.

6.5.3   Delay and Hold Timer Setting

Be sure and calculate and set the appropriate values for hold and delay timers to account for the difference between manual activation and remote activation. For instance a longer delay time is probably required for remote activation than would be required for manual activation.

6.6 Output Relay Option

This section describes the operation of the optional output relay. This relay is an option that must be ordered separately. This relay provides a set of dry contacts that may be used to activate a device such as a fire station warning flasher. By using this relay, the user can press one button on the IntelliGreen that will active the nearby Opticom GPS equipped intersection and a warning flasher at the same time.

Skip this section if you are not using this option.

6.6.1 Output relay wiring

1. Punch an additional hole in the IntelliGreen cabinet and attach a conduit connector.
2. Install a length of conduit from the IntelliGreen cabinet to the location of the control box of the device to be activated.
3. Connect a wire from the C terminal to one side of the switch of the device to be activated,
4. Connect a wire from the NO terminal to the other side of the switch of the device to be activated
5. See figure 6-6.

Notes:
- **The relay will activate as soon as any button is depressed.**
    - **Delay times set in section 8.1.1.2 (if set) are not used.**
- **The relay will also activate if the remote activation input is used. (Section 6-5)**
- **The hold time set for the button that is depressed in section 8.1.1.3 will be used and hold the relay accordingly.**
- **There is normally continuity between the C and NC contact of the output relay.**
    - **When the relay activates, the continuity switches to the C and NO contacts of the output relay.**
- **Output relay contact description**
    - **C = Common**
    - **NC = Normally Closed**
    - **NO= Normally Open**
- **The output relay contacts are rated at up to 4A, 120 VAC.**
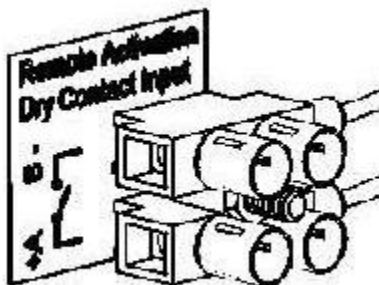- **The minimum recommended load on the relay contacts is 300mA, 12VDC.**

Figure 6-5 Remote Connections
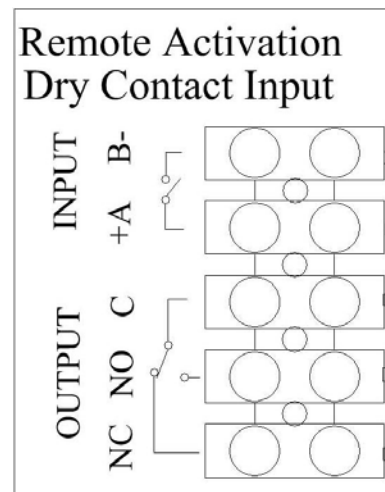**(Without relay)**

Figure 6-6 Remote Connections
(With relay)

7 Power up and Initial Test

Connect the 120 VAC power to the IntelliGreen. After initial start-up the LED indicators will be illuminated as follows:

- POWER: Green
- STANDBY/ACTIVE   Amber
- GPS   Green (may take several minutes until it changes from amber to green)
- RADIO   Green

Press any of the three buttons. The button that you pressed should light up for 20 seconds and the Standby/Active indicator should shut off and remain off for 20 seconds.
See the troubleshooting section for troubleshooting instructions.

8 System Configuration

This section describes the steps required to configure the IntelliGreen and the phase selector in the nearby intersection(s). It is recommended that a GTT trained technician or a GTT dealer perform the system configuration.

8.1 System Configuration Requirements

- On-site v2.0 or later is needed to configure the IntelliGreen equipment.
- On-site v2.0 or later or CMS v2.0 or later are required to set-up the phase selector in the nearby intersection/s.

8.1.1 IntelliGreen Configuration

IntelliGreen configuration consists of setting the IntelliGreen ID and other parameters using On-site software as well as setting operating parameters via switches inside of the IntelliGreen control cabinet.

Open the IntelliGreen control cabinet cover to access the hold time, delay time and button configuration switches. See Figure 8-1

- The activation button configuration switch is labeled "LCK_ALL" it may be set to ON or OFF.
- The delay and hold timer switches are rotary dial switches. You may change the values of these switches using a small straight blade screwdriver.
    - The switches labeled "HUND" changes the hundreds digit.
    - The switches labeled "TEN" changes the tens digit.
    - The switches labeled "ONE" changes the ones digit.
    - Example 1
        - HUND = 1, TEN=4, ONE =6 sets a value of 146 seconds
    - Example 2
        - HUND = 0, TEN=3, ONE =0 sets a value of 30 seconds
    - Example 3 (Figure 8-1)
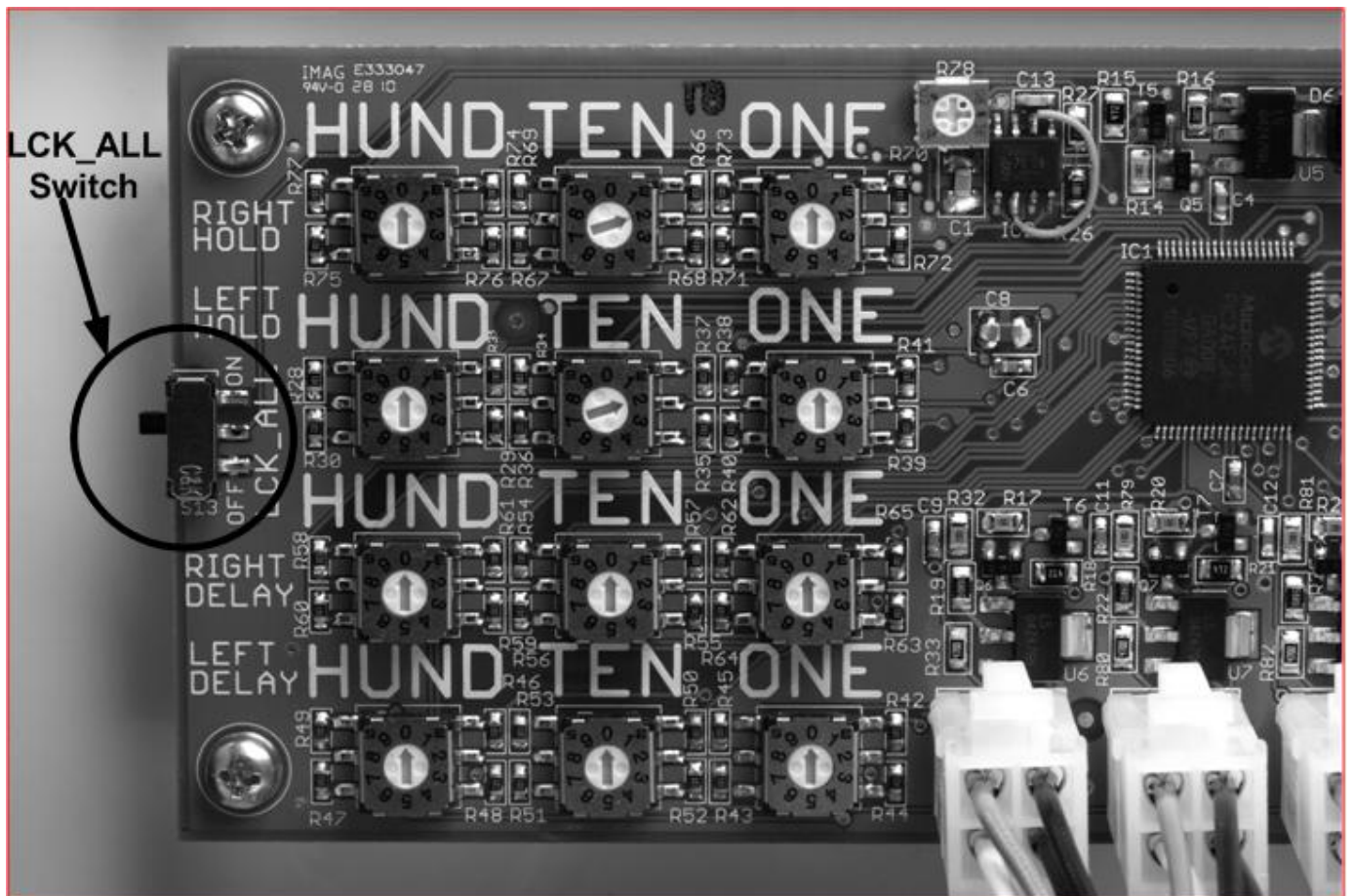   - Right and left Hold time set to 20 seconds

Figure 8-1

8.1.1.1 Activation Button Configuration

Description: The switch labeled "**LCK_ALL**" determines if the Left and Right buttons will broadcast their labeled direction status or straight direction status when pressed.

If the switch is in the **OFF** position.
> Pressing the LEFT button will cause the IntelliGreen to broadcast a left direction status.
> Pressing the RIGHT button will cause the IntelliGreen to broadcast a right direction status.
> Pressing the ALL button will cause the IntelliGreen to broadcast a straight direction status.

If the switch is in the **ON** position.
> Pressing any of the buttons will cause the IntelliGreen to broadcast a straight direction status.

See Figure 8-1

Valid Values: ON or OFF

Default Value: OFF

Recommendations: If the fire station is located mid block and you wish to only preempt the intersection to the right when exiting to the right and only preempt the intersection to the left when you are exiting to the left, then set the switch to OFF. Pressing the ALL button will preempt both intersections.

If the fire station is not located mid block or you want to preempt the intersections to both the left and the right when exiting, then set the switch to ON.

Note: The outputs must be configured correctly in the phase selector for this function to operate as described. See Section 8.1.3

8.1.1.2 Set Delay Timers

Delay Timer Description: The delay timer(s) determines the amount of time that the system takes to go from standby to requesting preemption when one of the buttons is pressed.

The right delay time is applied when the RIGHT button is pressed.

The left delay time is applied when the LEFT button is pressed.

If the ALL button is pressed, the shorter of the two delay times will be used.

Valid Values: With LCK_ALL set to ON
Left Delay 0-180 Seconds
Right Delay, 0-180 Seconds

With LCK_ALL set to OFF
Left Delay 2-180 Seconds
Right Delay, 2-180 Seconds
The delay may be set to zero when the ALL button is pressed.

Notes:
- **Even though the delay time may be set up to 999 seconds, 180 seconds is the maximum value that will be used.**
    - **Values of 181-999 will be seen as 180 seconds.**
- **When the LCK_ALL switch is set OFF there will be an additional two second delay applied. This means that values of zero or one will automatically apply a two second delay. However if the ALL button is pressed, the additional two seconds is not applied.**
    - **The two second delay is to ensure that the left and right signals are being transmitted prior to going into active mode.**
- **The indicator light in the button will flash while hold time is in effect and go solid when the hold time has expired.**

Default Value: 0 Seconds

Recommendations: The delay timer(s) should be used to fine tune when the preemption request starts. In cases where the IntelliGreen control cabinet is located near the vehicles, the time/s should be short. When the IntelliGreen control cabinet is a longer distance from the vehicles, the value/s should be set higher.

If the value is set too high, there may not be enough time for the traffic signals to change before the vehicle arrives.

If the value is set too low, the traffic signal may be held too long, unnecessarily disrupting traffic.

8.1.1.3 Set Hold Timers

Hold Timer Description: The hold timer/s determines the amount of time that the preemption request will be held once it has started. When the hold time expires, the system will go back to standby mode.

The right hold time is applied when the RIGHT button is pressed.

The left hold time is applied when the LEFT button is pressed.

If the ALL button is pressed, the longer of the two hold times will be used.

Valid Values: Left Hold 0-360 Seconds
Right Hold, 0-360 Seconds

Note:
- **Even though the hold time may be set up to 999 seconds, 360 seconds is the maximum value that will be used.**
  - **Values of 361-999 will be seen as 360 seconds.**

Default Value: 20 Seconds

Recommendations: The hold timer(s) should be set to allow enough time for all exiting vehicles to travel through the nearby signalized intersections(s). If vehicles typically leave the station at different times the hold timer(s) should be set to allow all vehicles to exit the station.

If the value(s) is set too low, the preemption request will end before all vehicles are able to travel through the intersection

If the value(s) is set too high, the traffic signal may be held too long, unnecessarily disrupting traffic.

The max times set in the phase selector for each of the channels will still apply. If the max time set for the phase selector channel is less than the hold time programmed in the IntelliGreen, then the phase selector will stop requesting preemption when the max time is reached

Change the phase selector max call time and or the IntelliGreen hold time to allow enough time for all vehicles to exit the fire station.

8.1.1.4 Set IntelliGreen ID

The IntelliGreen ID is set using the On-site software.
Notes:
- **The IntelliGreen is detected as a vehicle by the On-site software.**
    - i) **The On-site software will refer to the IntelliGreen ID as vehicle values.**
    - ii) **See Figure 8-2**

1. Connect a COM cable between the DB-9 connector on the front of the IntelliGreen control cabinet and a laptop computer running the On-site software.
2. Launch the On-Site software.
    - Verify that the correct COM port has been selected, Baud Rate is set to 115, 200 and Use Wildcard is checked.
3. Press read from device
4. Go to the current activity screen in the On-site software and verify that you can hear the nearby Opticom GPS intersection(s). See the software help file for more details.
5. Go to the GPS status screen and verify that you are tracking GPS satellites. See the software help screen for more details.
6. The following settings have been preset in the factory. Verify that these settings are correct. Change them if they are not set to the following default values.
    - Disable Operating mode: **Non-Latching**.
    - Disable Triggering mode: **Apply Ground**.
    - GPS Receiver Power Options: **Always On**.
7. Vehicle Name: Recommend that the name of the fire station be entered.
    - Example: Station 51 IntelliGreen
Notes:
- **The following values (Agency, Class, and Id) must also be entered into the base station code section of the phase selector in the nearby intersection(s) that you wish to be activated by the IntelliGreen.**
- **If the values do not match, the nearby phase selector(s) will not respond to preemption requests from the IntelliGreen.**

Click on the button with the three dots to bring up the select base station (IntelliGreen) code window.

8. Agency:
    - Recommend using the same Agency Id used by the vehicles in this fire station.
9. Class:
    - Recommend using 15.
10. Id:
    - Recommend using the number of this fire station.
Note:
- **The default code of 1:1:1 is not an allowed code.**
- **You must select a code other than the default.**

11. Press OK and then write to device and then verify that all settings are correct.

General Configuration

⊟ General		
Vehicle Name	**Station 51 IntelliGreen**	
Vehicle Code	**3:15:51**	...
Last Updated	*11/22/2010 5:58:51 PM*	
Priority	*High*	
⊟ Communications		
⊞ Communication Settings		
⊟ Driver Feedback		
⊞ In-vehicle Confirmation		
⊟ Operating Mode		
Disable Operating Mode	**Non-Latching**	▼
Disable Triggering Mode	**Apply Ground**	▼
GPS Receiver Power Options	**Standby**	▼

Select Vehicle Code ✖

Agency	Class	Id
3 ▼	15 ▼	51 ▼

OK   Cancel

Figure 8-2 On-site IntelliGreen (vehicle) Configuration Screen

8.1.1.5 Confirmation Indication

You may activate the confirmation indication. When activated, the indicators on the IntelliGreen control cabinet will flash specific patterns to let you know if the nearby phase selector(s) has acknowledged your preemption request.

Select the Enable High Priority Confirmation check box. to enable this feature.

Notes:
- **Activation of this feature is only available with the On-site software. It is not possible to activate the confirmation indication using ITS Explorer.**
- **Even though the software says "In-vehicle" it is the indicators on the IntelliGreen control box that will flash.**
- **This feature only indicates that the preemption request has been acknowledged by the Opticom GPS phase selector in the nearby intersection(s). It is not a guarantee that the traffic controller will display the green light for the approaching vehicle or hold an existing green light.**

Indicator Meaning:
- **All flashing green** means that the phase selector in the nearby intersection(s) has acknowledged the preemption request from the IntelliGreen.
- **Alternating flashing all green and all amber** means that the phase selector in the nearby intersection(s) has acknowledged the preemption request from the IntelliGreen and that there is an Opticom GPS equipped vehicle approaching the intersection(s) from another direction.
- **All flashing amber** means that the phase selector in the nearby intersection(s) has acknowledged the preemption request from a vehicle approaching the intersection. This will likely result in a delay to the IntelliGreen preemption request.

Notes:
- **Once the phase selector in the nearby intersection(s) has started processing the preemption request, the request will continue even if radio communication between the IntelliGreen and the phase selector is lost temporarily.**

    - **This will happen because of the lost signal timeout feature of the phase selector.**

    - **The confirmation indication on the IntelliGreen may terminate and restart during these communication dropouts.**

- **If you are located mid-block and activating two nearby intersections simultaneously, the indication may start and stop if the IntelliGreen alternates displaying acknowledgement from the two intersections.**

8.1.2 Phase Selector Configuration

These values are set using the On-site or CMS software. ITS Explorer does not support IntelliGreen set-up in the phase selector. A Model 764 phase selector or a Model 1000 may be used.

1. Connect a COM cable between the DB-9 connector on the front of the phase selector and a laptop computer running the On-site software.
2. Launch the On-site software.
   - Verify that correct the COM port has been selected, Baud Rate is set to 115, 200 and the Use Wildcard box is checked.
3. Press read from device.
4. Go to the current activity screen in the On-site software and verify that you can hear the nearby IntelliGreen. See the software help file for more details.

Notes:
- **On-site will refer to the IntelliGreen as a Base Station.**
- **Other intersections that are within radio range may treat the IntelliGreen like a regular vehicle.**
   - **This may cause issues with call forwarding.**
   - **It is recommended that the ID of the IntelliGreen be blocked in other intersections that are within radio range.**

8.1.2.1 Settings in the Setup for Base Station Use Section:

- Check the Enabled check box. See Figure 8-3.
- Set the Preempt outputs using the pull down menu

8.1.2.2 Preempt Outputs

|	
Description:	The preempt outputs section determines which phase selector output will be activated when it hears a request from a IntelliGreen. Different settings are available for the three direction statuses that the IntelliGreen might be transmitting.
Valid Values:	None (no output is activated), Same as Channel A, B, C, D, Straight Right , Left A total of 13 possibilities for each Left, Right, Straight
Default Value:	None
Recommendations:	You may use an existing output which will use an existing controller preemption input that is used when vehicles approach this intersection. Or you may use a special preemption specifically for vehicles exiting the station. If the fire station is located mid block and you wish to preempt in a specific direction set the intersections phase selectors as follows. Intersection to the right – set the left output to "none". Intersection to the left – set the right output to "none'. .See section 8.1.1.1 for more detail.
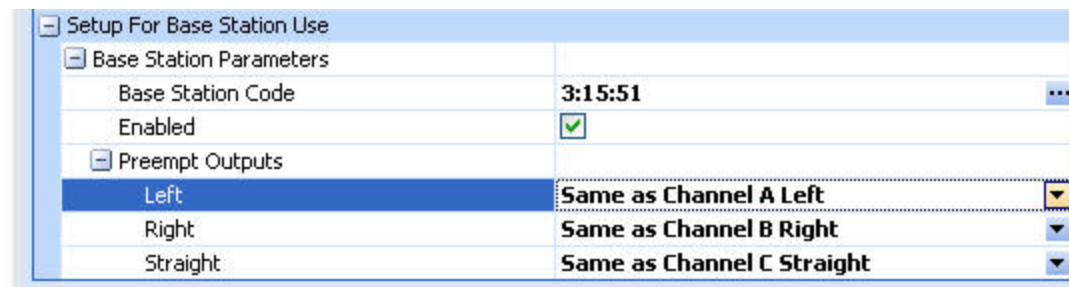
Figure 8-3

8.1.2.3 Select base station code (Phase Selector)

Notes:
- **The following values (Agency, Class, Id) must also be entered into the IntelliGreen.**
- **If the values do not match, the phase selector will not respond to preemption requests from the IntelliGreen.**

Click on the button with the three dots to bring up the select base station code window.
- Agency:
  - Must be the same as what was entered in the IntelliGreen.
    - Recommend using the same Agency ID used by the vehicles in the nearby fire station.
- Class:
  - Must be the same as what was entered in the IntelliGreen.
    - Recommend using 15.
- Id:
  - Must be the same as what was entered in the IntelliGreen.
    - Recommend using the number of the nearby fire station.
- Press Apply or write to device and then verify that all settings are correct.
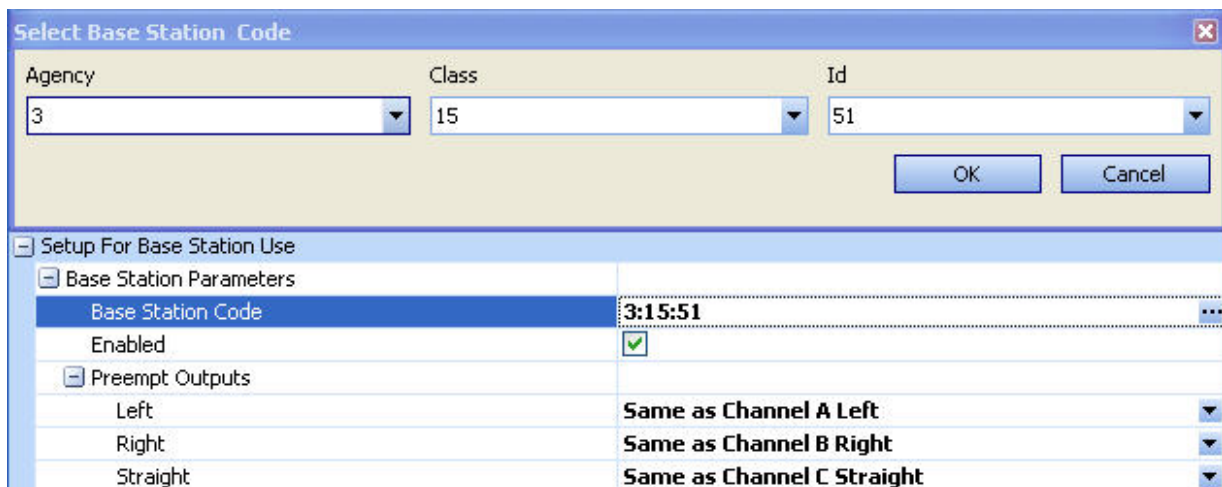
Figure 8-4

Notes:
- **The max times for each of the channels will still apply. If the max time set for the phase selector channel is less than the hold time programmed in the IntelliGreen then the phase selector will stop requesting preemption when the max time is reached**
  - **Change the phase selector max call time and or the IntelliGreen hold time to allow enough time for all vehicles to exit the fire station.**

- **IntelliGreen calls will be logged in the phase selector when the IntelliGreen is in active mode (requesting preemption).**

- **The IntelliGreen will not log while in standby (probe) mode.**

  - **Nearby intersections within radio range that are not configured as a Base Station will log the Base Station in Probe mode.**

    - **Either disable Probe logging or setup the phase selector for base station and assign "None" for its outputs.**

  - **When monitoring a IntelliGreen, the values for ETA, Distance, Speed and Heading will always be zero whether in standby (probe) or Active (high) mode.**

9   Performance Tests

It is recommended that the system be fully tested after installation. The following is needed for proper testing:
- Two people
  - o   One person should be in front of the IntelliGreen
  - o   One person should be in the nearby traffic cabinet/s
- Access to the traffic cabinet.
- Laptop computer with the On-site software and communication cable.
- Two-way radio or cell phones.

Traffic Cabinet/Phase Selector
1. Connect a COM cable between the DB-9 connector on the front of the phase selector and a laptop computer running On-site software.
2. Launch On-site
3. Press read from device
4. Go to the vehicles heard section of the current activity screen.
   a.   Verify that you can hear the code broadcast by the nearby IntelliGreen.
   b.   The priority level should be **Probe**.
   c.   There should be an **icon that looks like the IntelliGreen control box.**
   d.   The source should say **Base Station**
   e.   Status should be **Comm only**
   f.   Channel should be **–**
   g.   Preempt should say **No**
5. Ask the person in front of the IntelliGreen to press the ALL button.
   a.   They should see the button begin to flash (if delay time is applied)
   b.   After the delay time (if any) expires they should see the amber Active/Standby light should go off and the button they pressed should go solid.
   c.   After about three seconds you should see the following on the current activity screen
      i.   Priority level change to **Base Station**
      ii.   **A green oval** should appear over the IntelliGreen icon.
      iii.   Preempt should say **Yes**
      iv.   The status should say **In Service**
      v.   Turn signal status should match what you configured in the preempt outputs section.
      vi.   The channel should match what you configured in the preempt outputs section.
      vii.   The corresponding phase selector output should be activated, displayed on bottom of the screen
      viii.   The traffic controller should see the preemption input and cycle to the appropriate green light.
6. Ask the person in front of the fire station to let you know when the button light goes out and the standby light goes back to amber.

a. This should occur when the hold time expires.
b. About three seconds after that (and after phase selector hold time expires), you should see the following:
   i. Priority level should change back to **Probe**.
   ii. The **green oval** over the IntelliGreen icon should disappear.
   iii. Status should go back to **Comm only**
   iv. Channel should go back to **–**
   v. Preempt should say **No**
   vi. The output should stop being activated
   vii. The traffic controller should go back to normal operation.
7. Repeat steps 5 and 6 for the other two buttons.
8. Check the logs to verify that the preemptions have been logged. See the On-site software help file for more details.

10 Indicator light Summary

Power *	**Green** means that the equipment is powered up. **Off** means the IntelliGreen is powered off. (other indicators will also be off)
Standby/Active *	**Amber** means that the IntelliGreen is in standby mode. **Off** means that the IntelliGreen is actively requesting preemption.
GPS *	**Amber** means a GPS signal is not available and the IntelliGreen is not operating. **Green** means a GPS signal is available.
Radio *	**Amber** indicates a possible wiring issue; see the troubleshooting section for details. **Green** means normal operation.
Buttons	**Flashing** means that the button has been depressed but the delay time is in effect. **Solid** means that the IntelliGreen is actively requesting preemption.

* If the Power, Standby/Active, GPS and Radio indicators are flashing that means that the confirmation feature has been activated per section 8.1.1.5.

- **All flashing green** means that the phase selector in the nearby intersection(s) has acknowledged the preemption request from the IntelliGreen.
- **Alternating flashing all green and all amber** means that the phase selector in the nearby intersection(s) has acknowledged the preemption request from the IntelliGreen and that there is an Opticom GPS equipped vehicle approaching the intersection(s) from another direction.
- **All flashing amber** means that the phase selector in the nearby intersection(s) has acknowledged the preemption request from a vehicle approaching the intersection. This will likely result in a delay to the IntelliGreen preemption request.

11 Troubleshooting

Table 10-1 shows the symptoms of equipment installation and setup problems. The table also shows the possible causes of the problems and suggests solutions to correct them.

Table 10-2 shows the expected voltages at various wiring terminals

Table 10-1. Troubleshooting Symptoms, Possible Causes, and Solutions

Symptom	Possible Cause	Solution
POWER LED will not light.	Wiring incorrect.	Check wiring. Verify that control unit is getting 120 VAC
	IntelliGreen unit failed.	Return unit to GTT for service.
GPS will not acquire. (GPS LED is amber.)	Initial start-up may take up to 15 minutes.	Wait 15 minutes.
	Radio/GPS unit's view of sky is obstructed.	Move unit or remove obstructions.
	Incorrect wiring.	Check wiring at both ends of radio/GPS cable.
	No power to GPS receiver.	Check voltage between brown (+) and brown/white (–) wires at both ends. It should be about 8.3 VDC.
	Radio/GPS unit failed.	Return unit to GTT for service.
	IntelliGreen unit failed.	Return unit to GTT for service.
All three buttons are flashing	Unit in error condition	Push and hold left and right buttons for 3 seconds Or remove and reconnect power
	Remote activation input is stuck	Clear remote activation input
Pressing the left or right button with no delay time applies a two second delay	This is intended operation	The two second delay is to ensure that the left and right signals are being transmitted prior to going into active mode.
Phase selector in nearby intersection does not respond to Intelligreen	Base Station not configured in phase selector	Configure the phase selector to respond to the IntelliGreen
	ID configured in IntelliGreen does not match ID configured in phase selector	Change IDs to match

Table 10-1. Troubleshooting Symptoms, Possible Causes, and Solutions (Continued)

Symptom	Possible Cause	Solution
RADIO LED is amber.	Incorrect wiring.	Check wiring at both ends of radio/GPS cable.
	Radio/GPS cable damaged or poor terminations.	Replace cable, redo terminations.
	No power to radio.	Check voltage between violet (+) and violet/white (–) wires. It should be about 9.0 VDC.
	Radio/GPS unit failed.	Return unit to GTT for service.
	IntelliGreen unit failed.	Return unit to GTT for service.
Unable to communicate with IntelliGreen unit.	Communication cable not connected.	Check cable connection at vehicle control unit and at computer.
	Baud rate/serial port incorrect.	Change baud rate/serial port
Intersection name not heard listed instead of intersection name.	Name not heard yet.	Press Get Intersections Heard button again. Cycle power on vehicle control unit.
	Name not assigned in intersection.	Assign an intersection name.
Traffic signal does not turn green in time.	IntelliGreen delay time too long	Decrease delay time
	Activation button not pressed soon enough	Press button as soon as station alarm sounds
	Poor communication between IntelliGreen and nearby intersection	Verify that there are no obstructions between IntelliGreen radio and intersection radio.
	Multiple IntelliGreen calls delays intersection response for second activation	Increase hold time so all vehicles have time to exit and travel through intersection
Traffic signal stays in preemption too long after vehicle travels through intersection	IntelliGreen hold time too long	Decrease hold time
Pressing any of the three buttons activates both directions	LCK_ALL switch set to ON	Set switch to OFF
	Phase selector output not set correctly	Set outputs correctly

Table 10-2. Expected Voltages

Location/Terminal	Expected Voltage	Notes
Black to White on terminal strip near power supply	120VAC	Check circuit breaker
Red to Black wires on power supply	12 VDC	Check circuit breaker
Brown to Brown/White	Approximately 8.3 VDC	GPS power source, check for at least 5 seconds.
Violet to Violet/White	Approximately 9.0 VDC	Radio receiver power source, check for at least 5 seconds.

12 Maintenance

Opticom GPS system components are designed for reliable operation. Inspect the components at regular intervals to ensure proper system operation.

GTT recommends the following:

- All components should be inspected at least every twelve months.

- Verify that radios are broadcasting using On-site software.

- Each intersection, vehicle system and IntelliGreen should be inspected and tested at least every twelve months to ensure that it functions to your specifications and requirements.

- Intersection systems should be tested with known good vehicle systems.

- Vehicle systems should be tested with known good intersection systems.

- The IntelliGreen should be tested with known good intersection systems.

- You should develop a test plan that fits your department's operations and meets the needs of your system.

- You should keep accurate and up-to-date records of system performance and test results.

13 Technical Support

If you have questions about the system, its use, or operation, please contact your dealer or call the GTT Technical Service department at 1-800-258-4610. Outside the United States or Canada call at 651-789-7333

Important Notice to Purchaser:

Global Traffic Technologies