Opticom™ GPS System
Vehicle Equipment

**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.

The Opticom GPS system consists of the following matched components:

**Vehicle Equipment**

- Opticom™ Model 1012 GPS Radio Unit containing a GPS receiver and a 2.4 GHz spread spectrum transceiver, with Opticom™ Model 1050 GPS/Radio Antenna and Opticom™ Model 1072 GPS Cable Assembly
- Opticom™ Model 1020 GPS Vehicle Control Unit (high priority)
  –OR–
  Opticom™ Model 1021 GPS Vehicle Control Unit (low priority)
- Opticom™ Model 1071 GPS Vehicle Interface Cable
- Opticom™ Model 1070 GPS Installation Cable

**Intersection Equipment**

- Opticom™ Model 1010 GPS Radio Unit containing a GPS receiver with antenna and a 2.4 GHz spread spectrum transceiver with antenna
  –OR–
  Opticom model 1012 GPS radio unit containing a GPS receiver and a 2.4 GHz spread spectrum transceiver, with Opticom model 1050 GPS/radio antenna and Opticom model 1072 GPS cable assembly
- Opticom™ Model 1000 GPS Phase Selector
- Opticom™ Model 1040 GPS Card Rack
- Opticom™ Model 1030 GPS Auxiliary Interface Panel
- Opticom™ Model 1035 GPS Green Sense Harness
- Opticom model 1070 GPS installation cable

Opticom GPS system vehicle equipment is mounted on the priority vehicle. Its GPS receiver obtains information from the constellation of global positioning satellites. This information is used to compute the location, speed and heading of the vehicle. This information, along with a priority request and the state of the vehicle’s turn signal, is broadcast using the 2.4 GHz spread spectrum transceiver.

Opticom GPS system intersection equipment receives the radio transmission from the vehicle equipment. The intersection equipment then compares the information being received from the vehicle with the parameters stored in the intersection equipment’s memory. If the vehicle is heading toward the intersection in a predefined approach corridor, is requesting preemption or priority and has met all other programmed parameters, the corresponding phase selector output is activated. This output is connected to the traffic controller.
When activated, the controller cycles to grant a green light to the requesting vehicle or holds the green, allowing the vehicle to pass through the intersection.

The Opticom™ Model 1040 GPS Card Rack provides the power and logic wiring for the Opticom™ Model 1000 GPS Phase Selector, which plugs directly into a slot in the unit. An alternate external power supply may be needed for use in cabinets with pre-wired priority control slots that do not have +24 VDC available and do not use the Opticom model 1040 GPS card rack. The Opticom™ Model 1030 GPS Auxiliary Interface Panel provides connections for monitoring green phases and provides additional priority control outputs.

The Opticom™ Model 1035 GPS Green Sense Harness can be used to provide connection for monitoring green phases when the Opticom model 1030 GPS auxiliary interface panel is not required.

**Features**

Opticom™ GPS System vehicle equipment is intended for use on priority vehicles. The vehicle equipment kit consists of 1) the compact, RF-energy-emitting Opticom™ Model 1012 GPS Radio Unit containing a GPS receiver and a 2.4 GHz spread spectrum transceiver, used with the Opticom™ Model 1050 GPS/Radio Antenna and Opticom™ Model 1072 GPS Cable Assembly; 2) an Opticom™ Model 1020 or 1021 GPS Vehicle Control Unit, which provides an interface point for vehicle wiring (an external computer is used for configurations, setup and diagnostics); and 3) the Opticom™ Model 1071 GPS Vehicle Interface Cable.

Opticom GPS system vehicle equipment has the following features:

- More than 38 million vehicle identification code combinations selectable at installation
- Vehicle turn signal status monitoring and transmission
- User-selectable disable mode: latching or non-latching modes, disable trigger mode and +12 VDC to ground or ground to +12 VDC
- Diagnostic and status indicators
- FCC part 15 Class A specifications compliance
- No license requirements
- Easily accessible computer interface
- Easy installation
- Low power consumption
- Additional GPS output in NEMA format for other onboard uses
- Available Windows® configuration and maintenance software
- Choice of configurable activation methods
  - Activated by lightbar
  - Activated by lightbar AND by driver activation
  - Activated by lightbar OR by driver activation

The following reference model numbers appear on the shipping boxes and serial plate labels:

Opticom™ Model 1012 GPS Radio Unit
Opticom™ Model 1020 GPS Vehicle Control Unit (high priority)
Opticom™ Model 1021 GPS Vehicle Control Unit (low priority)
Opticom™ Model 1050 GPS/Radio Antenna
Opticom™ Model 1071 GPS Vehicle Interface Cable
Opticom™ Model 1072 GPS Cable Assembly

**Physical Dimensions**

Opticom model 1012 GPS radio unit
Length: 8.0 in. (20.3 cm)
Width: 4.5 in. (11.4 cm)
Height: 2.7 in. (6.9 cm)
Weight: 1.9 lbs. (0.854 kg)

Opticom model 1020 or 1021 GPS vehicle control unit
Length: 5.75 in. (14.6 cm)
Width: 5.5 in. (14.0 cm)
Height: 1.75 in. (4.4 cm)
Weight: 0.8 lb. (0.363 kg)

Opticom model 1050 GPS/radio antenna
Length: 15.0 ft. (4.6 m)
Diameter: 2.85 in. (7.2 cm)
Height: 1.4 in. (3.5 cm)
Weight with cables: 0.6 lbs. (0.30 kg)

**Electrical**

Input voltage: 10–16 VDC
Current: Less than 2 amps

**Environmental**

Temperature: -30° F to +165° F (-34° C to +74° C)
Relative humidity: 5% to 95%
Operating Parameters
- High or low priorities selected by model
- User-programmable number, which is transmitted to intersection equipment
  - 254 agency IDs
  - 15 vehicle classes
  - 9999 vehicle IDs
  - Over 38 million combinations per priority level
- User-programmable reference vehicle name (up to 40 characters)
- Configurable disable operating mode
  - Latching or non-latching
  - Disable trigger method
  - +12 VDC to ground
  - Ground to +12 VDC
- Less than 2 amps peak current draw
- Self-diagnosis
- Non-obstructed transmission at least 2,500 feet (762 m)
- Turn signal monitoring transmitted to intersection
- R5485/J1708 serial interfaces

Radio Unit Terminal Block Pin Index

<table>
<thead>
<tr>
<th>Pin</th>
<th>Wire Color</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yellow</td>
<td>Radio transmit (+)</td>
</tr>
<tr>
<td>2</td>
<td>Yellow/Black</td>
<td>Radio transmit (–)</td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>Radio receive (+)</td>
</tr>
<tr>
<td>4</td>
<td>Blue/White</td>
<td>Radio receive (–)</td>
</tr>
<tr>
<td>5</td>
<td>Orange</td>
<td>Radio clock (+)</td>
</tr>
<tr>
<td>6</td>
<td>Orange/Green</td>
<td>Radio clock (–)</td>
</tr>
<tr>
<td>7</td>
<td>Brown</td>
<td>GPS power</td>
</tr>
<tr>
<td>8</td>
<td>Brown/White</td>
<td>Common</td>
</tr>
<tr>
<td>9</td>
<td>Violet</td>
<td>Radio power</td>
</tr>
<tr>
<td>10</td>
<td>Violet/White</td>
<td>Common</td>
</tr>
<tr>
<td>11</td>
<td>Bare</td>
<td>Shield drain wire</td>
</tr>
</tbody>
</table>

Vehicle Control Unit Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Color or Condition</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER</td>
<td>Green</td>
<td>Power applied to unit</td>
</tr>
<tr>
<td>ON/OFF</td>
<td>Green</td>
<td>Power applied to unit</td>
</tr>
<tr>
<td></td>
<td>Flashing Green</td>
<td>Vehicle in disable mode</td>
</tr>
<tr>
<td>DISABLE</td>
<td>Off</td>
<td>Vehicle NOT in disable mode</td>
</tr>
<tr>
<td></td>
<td>Amber</td>
<td>Operating in probe mode</td>
</tr>
<tr>
<td></td>
<td>Flashing Green</td>
<td>Vehicle in disable mode</td>
</tr>
<tr>
<td>GPS</td>
<td>Amber</td>
<td>Not receiving GPS, radio not transmitting</td>
</tr>
<tr>
<td></td>
<td>Green</td>
<td>GPS has good 3D fix</td>
</tr>
<tr>
<td>RADIO</td>
<td>Amber</td>
<td>No communication between radio unit and vehicle control unit</td>
</tr>
<tr>
<td></td>
<td>Green</td>
<td>Good communication between radio unit and vehicle control unit</td>
</tr>
</tbody>
</table>

Interface Harness Connector Pin Index

<table>
<thead>
<tr>
<th>Pin</th>
<th>Wire Color</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>White/Yellow</td>
<td>J1708 (+)</td>
</tr>
<tr>
<td>2</td>
<td>Blue</td>
<td>Lightbar sense or ignition switch</td>
</tr>
<tr>
<td>3</td>
<td>Brown</td>
<td>Low priority</td>
</tr>
<tr>
<td>4</td>
<td>Gray</td>
<td>Probe</td>
</tr>
<tr>
<td>6</td>
<td>White</td>
<td>Disable sense</td>
</tr>
<tr>
<td>7</td>
<td>Green</td>
<td>Right turn sense</td>
</tr>
<tr>
<td>8</td>
<td>Yellow</td>
<td>Left turn sense</td>
</tr>
<tr>
<td>9</td>
<td>Black</td>
<td>Ground</td>
</tr>
<tr>
<td>10</td>
<td>Red</td>
<td>+12 VDC</td>
</tr>
<tr>
<td>13</td>
<td>White/Orange</td>
<td>GPS TXD (–)</td>
</tr>
<tr>
<td>14</td>
<td>White/Brown</td>
<td>GPS TXD (+)</td>
</tr>
<tr>
<td>15</td>
<td>White/Blue</td>
<td>J1708 (–)</td>
</tr>
</tbody>
</table>
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Since the availability of the GPS signal is out of GTT’s control and is required for system operations, GTT does not warrant against Opticom GPS system failures due to the unavailability of the GPS signal for any reason.