



Opticom™ GPS

Priority Control System

Intersection Equipment

August 2005

Description

The 3M™ Opticom™ GPS Priority Control System assists authorized priority vehicles through signalized intersections by providing temporary right-of-way through the use of common traffic controller functions.

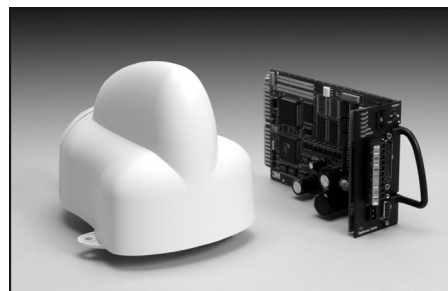
The Opticom GPS system consists of the following matched components:

Intersection Equipment

- Radio/GPS unit containing a GPS receiver with antenna and a 2.4 GHz spread spectrum transceiver with antenna
- Phase selector
- Card rack/input file
- Auxiliary interface panel
- Auxiliary harness
- Installation cable

Vehicle Equipment

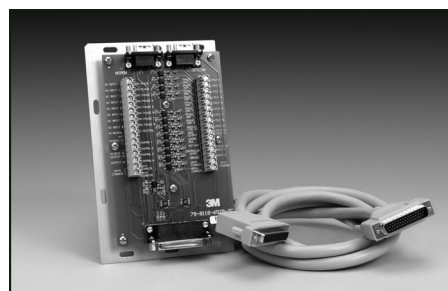
- Radio/GPS unit containing a GPS and a 2.4 GHz spread spectrum transceiver
- Radio/GPS antenna
- Vehicle control unit
- Vehicle interface cable
- Installation cable



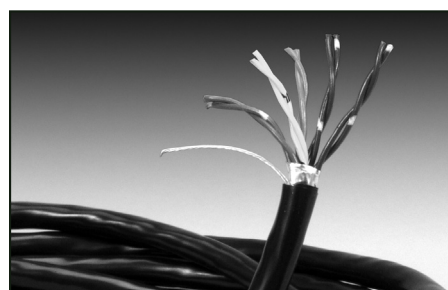
*Radio/GPS
Unit and
Phase Selector*



*Card Rack/
Input File
or external
power supply*



*Auxiliary
Interface
Panel*



*Installation
Cable*

The vehicle equipment is mounted on the priority vehicle. The GPS receiver accepts position information from the constellation of GPS satellites. This information is used to determine 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.

The intersection equipment receives the radio transmission from the vehicle equipment. The intersection equipment then compares the information being received from the vehicle to 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 and has met all other programmed parameters, the corresponding phase selector output is activated. This output is connected to the traffic controller preemption input. 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 card rack/input file provides the power and logic wiring for the phase selector, which plugs directly into a slot in the unit. An external power supply may be needed for use in cabinet with pre-wired priority control slots that do not have +24 VDC available.

The auxiliary interface panel provides connections for monitoring green phases and also provides additional priority control outputs.

The auxiliary harness provides additional connections for monitoring green phases when the auxiliary interface panel is not required.

Intersection Equipment Description

3M™ Opticom™ GPS Priority Control System intersection equipment consists of a compact, weather-resistant, RF energy-emitting radio/GPS unit containing a GPS receiver with antenna and a 2.4 GHz spread spectrum transceiver with antenna. The radio/GPS unit is connected to a phase selector via an 11-conductor radio/GPS cable.

The phase selector can be installed directly into an input file of a Type 170 traffic controller equipped with priority phase selection software. The phase selector can also be installed directly into virtually any other traffic controller equipped with priority phase selection inputs and related software. An external power supply may be needed to provide the +24 VDC.

When input file space is not available, a card rack is required. The phase selector is powered by +24 VDC. A power supply in the card rack or an external power supply provides the +24 VDC that is required to operate the phase selector. The phase selector then provides power to the radio/GPS unit.

Phase Selector Indicators

Indicator	Color or Condition	Meaning
POWER	Green	Power applied to phase selector
A	Amber*	Low priority call on channel A
	Green*	High priority call on channel A
B	Amber*	Low priority call on channel B
	Green*	High priority call on channel B
C	Amber*	Low priority call on channel C
	Green*	High priority call on channel C
D	Amber*	Low priority call on channel D
	Green*	High priority call on channel D
GPS	Amber	Not receiving GPS, radio not transmitting
	Green	GPS has a good 3D fix
RADIO	Amber	No communication between radio/GPS unit and phase selector
	Green	Good communication between radio/GPS unit and phase selector

* Flashing indicator means the call is present, but the output is pending.

The phase selector processes the signal from the radio/GPS unit and activates outputs, which are connected to the preemption inputs on the traffic controller. There are four channel outputs accessible on the rear connector of the phase selector and up to 12 additional channel outputs on the auxiliary interface panel.

Each channel output delivers a constant output for high priority activation, and a pulsed output for low priority activation. A high priority signal received on a channel will override any low priority activation. In certain modes of operation, outputs may be activated that are dependent on the state of the requesting vehicle's turn signal. Another mode provides separate constant outputs for high priority and low priority. The use of an auxiliary interface panel is required to access these additional modes and outputs.

Opticom GPS system intersection equipment has the following features:

- More than 38 million vehicle identification code combinations selectable at installation
- Vehicle turn signal status monitoring and transmission
- Green sensing
- High and Low priority
- First come, first served priority within each priority level
- Ranges variable by vehicle class
- Plugs directly into CA/NY Type 170 input files
- User-settable range threshold settable by ETA and/or distance
- Outputs may be varied depending on turn signal status of requesting vehicle
- Output modes for NEMA controllers with separate high and low priority inputs
- GPS data output in NEMA format (4800 baud)

- Multi-function test switches
 - High and low priority test call
 - Turn signal dependent test calls
 - Reset to default parameters
- Built-in diagnostics and testing
- Diagnostic and status indicators
- Optically isolated outputs
- Meets FCC Part 15 Class A specifications
- License not required
- Easy installation (no coaxial cables required)
- Compatible with most traffic controllers
- Easily accessible RS232 communication port
- Customizable timing parameters
- Detailed real-time information display
- Available Windows® configuration and maintenance software
- Low power consumption
- History log of most recent activities (10,000 entries)
- Intersection name
- Date and time of the activity
- Vehicle class code of the activating vehicle
- Activating vehicle's ID number
- Agency ID of activating vehicle
- Channel called
- Priority of the activity
- Final green signal indications displayed at the end of the call
- Time spent in the final greens
- Duration of the activation
- No preempt reason

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

Phase Selector
Model 1000

Card Rack with power supply
Model 1040

Auxiliary Interface panel
Model 1030

Radio/GPS Unit
Model 1010

Physical Dimensions

Phase Selector

Length 8.25 inches (21.0 cm)
Width 2.0 inches (5.1 cm)
Height 4.5 inches (11.4 cm)
Weight 0.5 lb (0.227 kg)

Card Rack

Length 8.25 inches (21.0 cm)
Width 5.25 inches (13.3 cm)
Height 5.1 inches (12.9 cm)
Weight 2.3 lb (1.043 kg)

AIP

Length 7.25 inches (18.4 cm)
Width 4.5 inches (11.4 cm)
Height 1.0 inches (2.5 cm)
Weight (w/cable) 1.42 lb (0.644 kg)

Radio/GPS Unit

Length 9.0 inches (22.9 cm)
Width 6.5 inches (16.5 cm)
Height 6.0 inches (15.2 cm)
Weight 1.8 lbs (0.816 kg)

Electrical

Phase Selector

Input voltage 24 VDC
Current < 500 mA

Environmental

Phase Selector

Temperature -30°F to +165°F
(-34°C to +74°C)
Relative Humidity 5–95%

Radio/GPS Unit Terminal Block Pin Index

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
11	Bare	Shield drain wire

9-Pin Harness Wiring

Pin	Wire Color	Function
1	Black	115 VAC (AC+)
2	White	AC return (AC-)
3	Green	Chassis ground
4	—	Not used
5	Gray/White	Rear output 1
6	Blue/White	Rear output 2
7	Violet/White	Rear output 3
8	Brown/White	Rear output 4
9	Gray/Black	Logic ground

Phase Selector Edge Connector Pin Index

Pin	Function
A	Ground
B	24 VDC input
C	Not used
D	Not used
E	Not used
F	Rear output 1, collector (+)
H	Rear output 1, emitter (-)
J	Not used
K	Not used
L	Earth ground
M	Not used
N	Not used
P	Not used
R	Not used
S	Rear output 3, collector (+)
T	Rear output 3, emitter (-)
U	Not used
V	Not used
W	Rear output 2, collector (+)
X	Rear output 2, emitter (-)
Y	Rear output 4, collector (+)
Z	Rear output 4, emitter (-)
19	Transmit data
21	Receive data

Phase Selector AIP Pin Index

Pin	Function
1	Phase 1 green input (AC+)
2	Phase 2 green input (AC+)
3	Phase 3 green input (AC+)
4	Logic ground
5	Logic ground
6	Not used
7	AIP output 2
8	AIP output 8
9	AIP output 6
10	Confirmation light 1 output (future use)
11	Confirmation light 2 output (future use)
12	Not used
13	Disable input
14	Modem RS232 transmit
15	Modem RS232 receive
16	Phase 4 green input (AC+)
17	Phase 5 green input (AC+)
18	Phase 6 green input (AC+)
19	Opticom RS232 transmit
20	Opticom RS232 receive
21	AIP output 4
22	AIP output 3
23	AIP output 1
24	AIP output 7

Pin	Function
25	AIP output 5
26	Confirmation light 3 output (future use)
27	Confirmation light 4 output (future use)
28	Not used
29	Not used
30	Not used
31	Phase 7 green input (AC+)
32	Phase 8 green input (AC+)
33	AC common (green sense)
34	Ground
35	Ground
36	Not used
37	Not used
38	Controller +24 VDC
39	AIP output 9
40	AIP output 12
41	AIP output 11
42	AIP output 10
43	Modem RS232 clear to send
44	Modem RS232 ready to send

Phase Selector 24 VDC Connector Pin Index

Pin	Function
1	Common
2	24 VDC

Communication Port Pin Assignments

Front Panel	
COM Port Pin Number	Signal Name
2	TXD (transmit data)
3	RXD (receive data)
5	GND (ground)

Important Notice to the Purchaser

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3M will repair or replace any Opticom™ GPS Priority Control System component found not to meet 3M's specifications within two (2) years from the date of shipment from 3M. This warranty shall not apply to any system component which has been (1) repaired or modified by persons not authorized by 3M; (2) subjected to incorrect installation, misuse, neglect or accident; or (3) has been damaged by extreme atmospheric or weather-related conditions.

Since the availability of the GPS signal is outside of 3M's control and is required for system operation. 3M is not liable for Opticom GPS system failure due to the unavailability of the GPS signal for any reason.

IN NO EVENT SHALL 3M BE LIABLE IN CONTRACT OR IN TORT FOR ANY INJURY, LOSS, OR DAMAGE, WHETHER NON-SPECIFIED DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL, ARISING OUT OF THE USE OR INABILITY TO USE THE OPTICOM GPS SYSTEM OR ANY COMPONENT THEREOF, REGARDLESS OF THE LEGAL THEORY ASSERTED.

3M has designed, developed and tested each Opticom GPS priority control system component as part of a matched component system. 3M makes no warranty whatsoever concerning the reliability or safety of Opticom GPS system components when used with non-Opticom GPS system products. 3M shall not be responsible for any Opticom GPS component which 3M determines has been damaged in whole or in part by its use with a non-Opticom GPS system product.

Sale and use of the Opticom GPS priority control system is expressly restricted to authorized agencies of government customers, within their respective jurisdictions. However, because the radio signal generated by the Opticom GPS system is not exclusive, 3M cannot ensure exclusive activation by purchaser. Authorized users who desire to use or coordinate use of the Opticom GPS system with that of other jurisdictions must first obtain the prior written approval of each authorized user in the jurisdiction where use is sought.

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