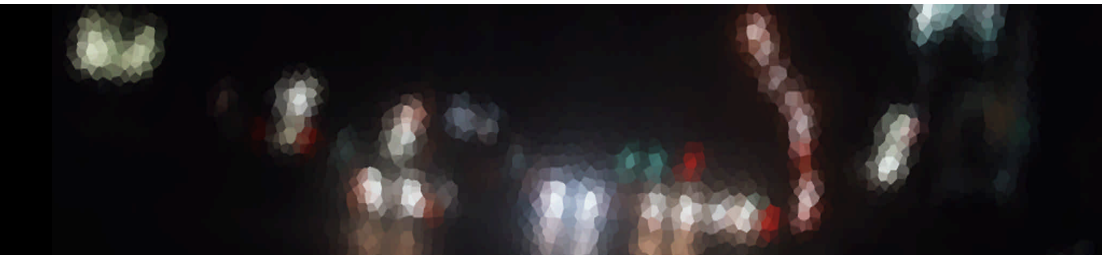




Operating Manual

Sarasota Model 222/224 Gp7

Two Channel and Four Channel Loop Detectors



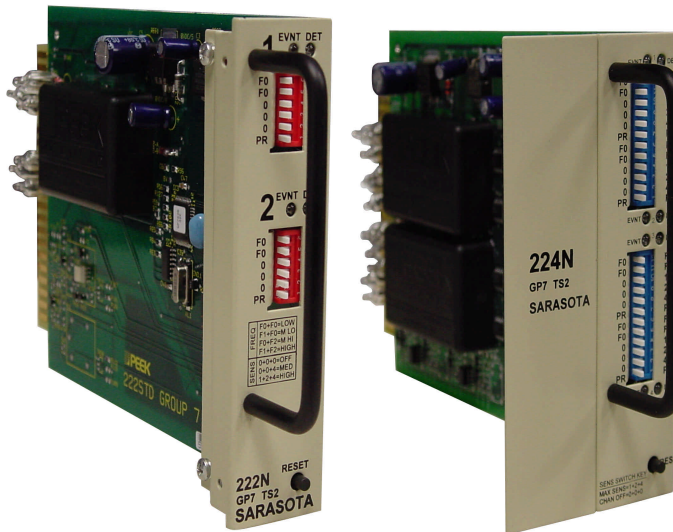


Peek Corporation

Operating Manual

Sarasota Model 222/224 GP7 Detectors

Two and Four Channel Loop Detector Sensor Units



Serial Numbers through: _____

Revision Numbers: _____

Thursday, June 19, 2003

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2511 Corporate Way
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Preface — About This Manual

PURPOSE AND SCOPE

This manual introduces and discusses the Sarasota Model 222 and Model 224 Group 7 multi-channel loop detector cards from Peek Corporation. It describes how to install, configure, and troubleshoot these cards, including the hardware and firmware environment used to control them.

ASSUMPTIONS

It is assumed that the reader and user of this manual and the hardware described herein are authorized to work in and around traffic cabinets by the local traffic governing body. The reader should be familiar with the operation and wiring of traffic control cabinets in their area, and must be aware of, and follow, all safety and security protocols of the traffic agency.

RELATED DOCUMENTS

These documents provide additional information for related Peek products:

Table 1 – Related Peek documentation

p/n	Title
8204C	3000 and 3000E Operating Manual
99-331	3000/E TS-1 Firmware Release Notes
99-332	3000/E TS-2 Firmware Release Notes
99-333	3000/E NTCIP Firmware Release Notes
8314B	Double Diamond MMU Operating Manual
060758	LMD-9200 Operating Manual
5928	M3000 Operating Manual
99-329	M3000 Firmware Release Notes

TECHNICAL ASSISTANCE

If you need assistance or have questions related to the use of this product, call Peek Traffic's Customer Service Group for support.

Region	Phone
North America	Toll free: 1-800-245-7660 or 1-941-845-1200 fax: (941) 845-1504 email: service@peekglobal.com
Europe & Asia	tel: +46.8.556.10.700 fax: +46.8.648.85.40

The Sarasota 222/224 GP7 Detectors

These sections of the manual introduce the products and explain the installation, setup, failure modes, connections, and methods of troubleshooting. The following topics are discussed in detail in this chapter:

- Description and characteristics of the detectors, on page 4
- Theory of operation, on page 8
- Installation instructions, on page 10
- Adjustments to the detector, on page 11
- Understanding failure modes, on page 19
- Making connections, on page 20
- Using timing functions, on page 21
- Troubleshooting the detectors, on page 23
- Ordering information, on page 24
- How to request schematics and PCB assemblies, on page 25
- Warranty information, on page 26

GENERAL DESCRIPTION

The Peek Sarasota Model 222/224 GP7 Series complies with all Standards prescribed in TS1-1989, Section 15, Inductive Loop Detectors and TS2-1998, Section 6.5, Inductive Loop Detector Units.

The Peek Sarasota Model 222/224 GP7 Series has been designed for use in Traffic Control Systems and other associated applications. The Frequency, Sensitivity, and Operating Modes [Pulse (PLS) or Presence (PR)] are individually selectable for each channel from the front panel mounted Dual In-Line Package (DIP) switches. Associated with each operationally independent channel are two front panel LEDs, a detect Light Emitting Diode [LED] (DET) to provide a visual indication of vehicle presence or pulse, and the event (EVNT) LED for loop fault identification. Both LEDs are clear when in a non-activated mode and red when activated.

The Peek Sarasota Model 222/224 GP7 Series operates on a “time multiplexed” scanning principle to eliminate cross talk, which can occur between loops connected to the same detector. To avoid cross talk between loops connected to different units, one of four operating frequencies may be selected for each channel. The use of a microprocessor enables the Peek Sarasota Model 222/224 GP7 Series to combine a high level of performance with ease of use in a compact unit. The tuning of the Peek Sarasota 222/224 GP7 Series is automatic and fast following the application of power or reset. Once tuned, the detector will track all environmental drifts continuously. The presence time is consistent and substantially independent of vehicle type.

Both detectors have a standard response time of 20 Milliseconds (ms) \pm 2 ms, which is designed for high noise immunity for the harsh environment typically associated with intersection detection. All sensitivity settings, except the highest (5 ms \pm 1 ms) activate a Sensitivity Boost. The detection threshold falls by 50% after detection is established to improve detection of high bed vehicles. Original threshold is reinstated as soon as the Detect Status is cleared.

A loop inductance outside the tuning range, a short, open circuit loop, or an inductance change of greater than 25% is sensed as a loop fault. As a result of a loop fault the channel event (EVNT) LED will illuminate and the output will maintain a presence call until the fault is cleared, at which time normal operation will resume. Each channel has a loop fault diagnostic memory which stores the last occurrence of a loop fault that has occurred since the unit was last powered-up or reset. The loop fault indication is displayed on the front panel as detailed in the ‘Trouble Analysis’ section of this manual.

General Characteristics

Independent Channels	Two Channel (222) or four channel (224)
Wide Inductance Range	18 to 2,400 micro henries (µH) nominal
Loop Fault Diagnostics	LED indication for Open Loop, Shorted Loop or Sudden Loop Drift.
Detection Indication	A high intensity LED (one per channel) is illuminated when a vehicle is detected.
Operating Temperature Range	-40° F to +176° F (-40° C to +80° C).
Power Requirements	10.8 VDC Minimum to 30.0 VDC Maximum; Nominal is 24VDC; Maximum Permissible RMS Ripple is 700 milli volts; Input Supply Current for normal operation is 80 milli amps (mA), and maximum operation with shorted loop(s) inputs is 140 mA.
Outputs Ratings	Solid-State, Optically Isolated NPN Transistor. Max hold-off voltage 80VDC. OFF resistance 10 ⁶ Ohms. ON voltage ≤1.2 VDC @ 50mA. Opto has <20us turn on/turn off time.
Physical Dimensions	Two Channel Rack Card: 4.5" (114.3mm) H. x 6.875" (174.63mm) L x 1.12" (28.448mm) W. Four Channel Rack Card: 4.5" (114.3mm) H. x 6.875" (174.63mm) L x 2.2" (55.88mm) W. (Conformal coated), with 44 contacts, gold plated, double sided edge connector mates with Cinch Jones 50-44A-30M.
Front Panel Hand Pull	Handle: 3" L. extends 1" from front panel.
Weight	Net 8 Ounces (0.226 Kg), shipping 1.0 lb. (0.45Kg)

The Sensitivity, Mode and Frequency are selected separately for each channel by means of front panel DIP switches. For best performance select the lowest sensitivity and shortest presence time for your application.

Seven Sensitivity levels may be selected. The values are expressed as the change in Inductance of the loop with a vehicle in its field divided by the Inductance of the loop without a vehicle in it's field, or Delta of Loop/Loop (dl/L). The selected sensitivity is independent of loop inductance.

Mode: Each channel may be operated in Pulse or Presence mode by selecting PL for pulse or PR for presence. Presence time is substantially independent of vehicle type. A 100ms min. presence time is available by special request, as this presence time must be preprogrammed at the factory.

In pulse mode the output signal is active for 125 ± 25 ms when a vehicle is detected. Further outputs are inhibited for 2 seconds or until the vehicle leaves the loop, whichever occurs first.

A detector channel is switched off (by setting the channel to lowest sensitivity 0+ 0 + 0) the loop is de-energized and the output assumes a 'no-detect' state.

Frequency.....One of four operating frequencies may be selected to avoid cross talk between adjacent loops connected to different detector units. It is recommended that the channel be reset after changing frequencies.

Loop RequirementsThe detector will automatically tune to any combination of loop and lead-in wire within the parameters of 18-2500 μ H total inductance with a Q factor (Quality ratio that evaluates the effectiveness of a specific loop by comparing reactance to its effective series resistance at a given frequency) of 4 or greater.

Transformer isolated loop connections allow operation with poor quality loops including a single point short to ground. The Peek/Sarasota 222/224 GP7 Series Loop Detector Sensor Unit is capable of driving a loop lead-in cable (Home Run) of up to one mile. The loop and lead-in cable combination cannot fall outside of the stated inductance range. When using long lead-ins, the inductance of the loop must be far greater than the inductance of the lead-in cable or the sensitivity of the Loop Detector Sensor Unit will be reduced.

Loop Fault DiagnosticA loop inductance outside the tuning range, a short, or open circuit loop, or a change in inductance of greater than 25% is sensed as a loop fault. The channel LED will be ON and the output will give a constant detect call. The detector will continuously attempt to tune to the faulty loop until the loop is restored, at which time the channel will go back into normal operation. The loop fault diagnostic memory will store the occurrence of the LAST loop fault for later reference. To clear the memory, remove power or reset the Peek Sarasota 222/224 GP7 Series detector unit.

ResetThe detector is automatically reset when the power is applied. This function can also be initiated by applying a reset signal (logic

ground to reset) to pin C of the edge connector. An individual channel can be reset by momentarily selecting another operational mode and then returning to the desired setting.

Lightning and Transient Protection ..The detector will withstand the discharge of a 10mF capacitor charged to 1000V across the loop terminals. It will also withstand the discharge of the same capacitor charged to 2000V across the loop terminals or earth ground with a 5 Ohm load across the loop terminals.

Presence times are substantially independent of sensitivity while operate and release delays as short as 5mS are obtainable. Seven levels of sensitivity are provided and sensitivity boost increases the detect threshold to assist in holding small and high body vehicles.

THEORY OF OPERATION

Systems Description

The Peek Sarasota 222/224 GP7 Series is an Inductive Loop Sensor Unit, which responds to the presence and/or passage of vehicles on the road by monitoring the effect of the conductive material of the vehicle on the alternating magnetic field of an inductive loop sensor buried in the road surface.

The front end of the Peek Sarasota 222/224 GP7 Series Inductive Loop Sensor Unit contains an oscillator, the resonant frequency of which is determined primarily by the frequency switch setting and secondarily by the Inductive Loop Sensor Unit's loop oscillator components, and the inductance of the loop configuration, which is connected to the loop transformer. When a vehicle passes over the inductive loop connected to the loop transformer it causes a reduction in the inductance of the loop, a small negative change in the inductance of the loop generates a higher resonant frequency therefore, when a vehicle passes over the loop a higher resonant frequency in the oscillator circuitry results.

The Peek Sarasota 222/224 GP7 Series Inductive Loop Sensor Unit monitors the resonant loop oscillator frequency at regular timed intervals dependent upon the sensitivity setting. A processor controls the digital processing which measures the small resonant frequency change caused by a vehicle. The Inductive Loop Sensor Unit uses a high-speed processor to monitor all of the unit's functions and enables sophisticated detection and tracking techniques to be utilized. Each measurement of the resonant loop frequency is compared with previous resonant frequency measurements, so that a decision can be made as to whether the increase in resonant frequency of the loop oscillator is sufficient to indicate the presence and/or passage of a vehicle, where upon a detection indication output is given.

Block Diagram

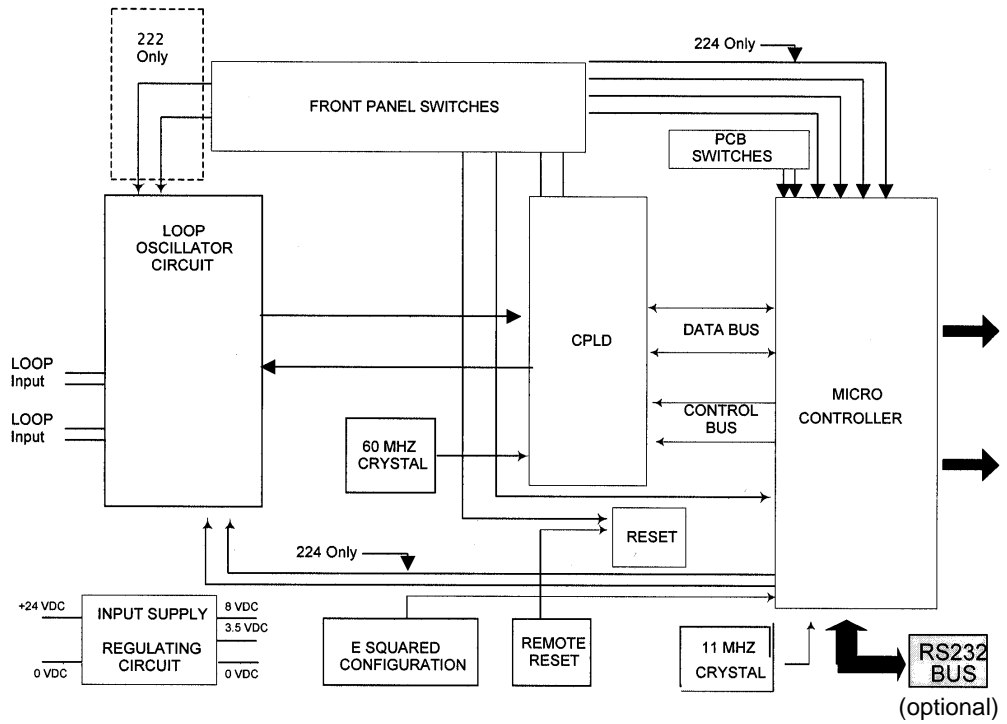


Figure 1 – Data flow in the Model 222/224 GP7 Detectors

INSTALLATION

The Peek/Sarasota 222/224 GP7 Series Loop Detector Sensor Unit can be installed or removed from the input file/detector rack while power is applied without damage to the unit itself or the detector rack.



Caution Safe Operating Practices should be followed at All Times to Avoid Electrical Shock Hazards as Maybe Present in the Cabinet.

1. Select Presence or Pulse (PR/PL). If Presence is selected, select 4, 8, 16 or 120 minute or permanent presence times using PCB switch 8. The standard setting is 16 minutes.
2. Set Frequency switches and Sensitivity switches as required. If cross talk with an adjacent loop connected to another detector is apparent, select a different frequency to maximize the frequency separation.
3. Select the minimum sensitivity consistent with reliable detection; in most cases a range from 3 to 5 (0.16% - 0.04%) will be adequate.
4. Depress RESET or apply power to activate automatic tuning.
5. Observe detection of vehicles on the DETECT LED.

Installing the loop

The Peek/Sarasota 222/224 GP7 Series Loop Detector Sensor Unit will operate loop and lead-in systems whose composite inductance falls between 18 and 2500 μ H. Loops as small as 1.5' x 6' or as large as 10' x 100' will fall well within this range. Loops having perimeters less than 30' should have 3 turns, between 30' and 120' should have 2 turns and perimeters greater than 120' should be 1 turn.

Loop and lead-in wire should be #14 AWG; lead-in wire should be twisted in order to maintain conductors as close as possible. Shielded lead-in is not essential but does serve to optimize loop systems.

Loop and lead-in should have an insulation resistance to ground greater than 100 megohms measured at 500V and a series resistance of less than 10 ohms.

Loop size and placement are a function of application and are dictated by experience; SARASOTA detectors will handle a wide range of loop designs.

ADJUSTMENTS

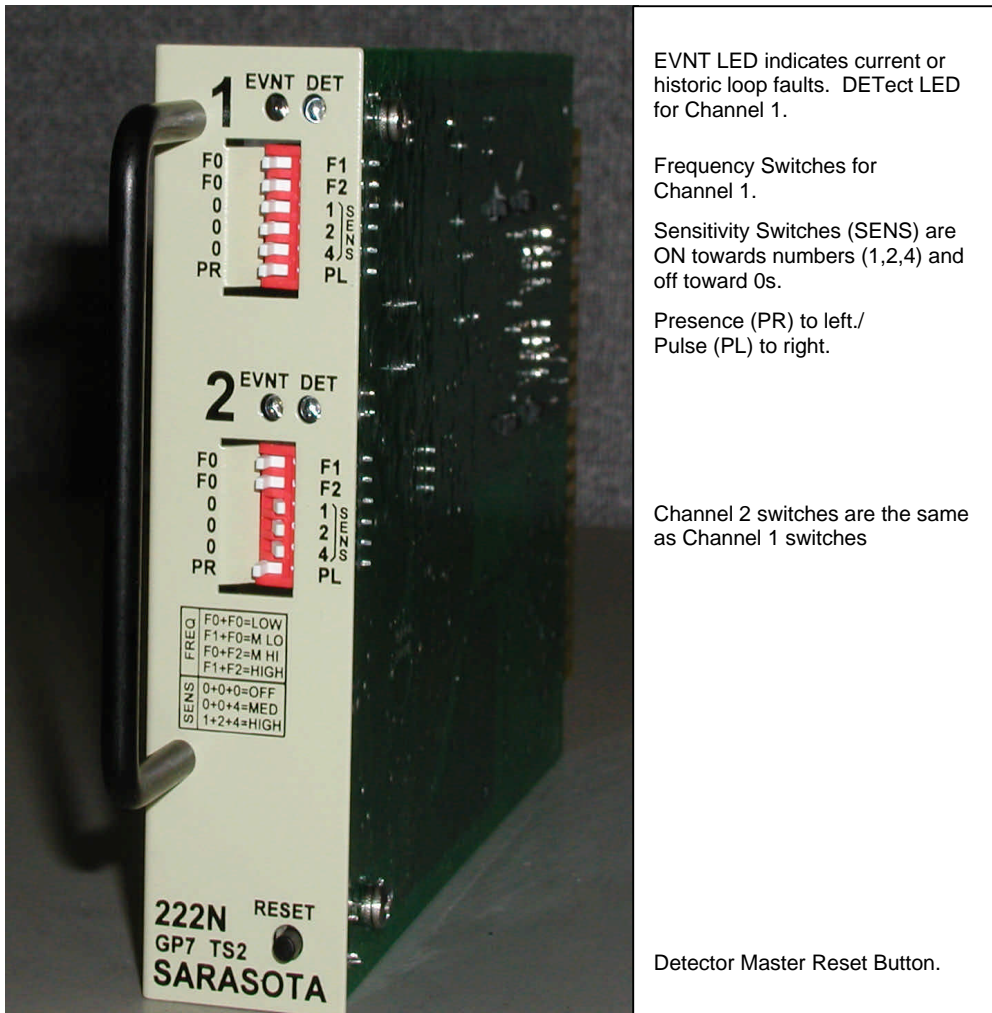


Figure 2 – Front panel of a Model 222 GP7 card



- ◀ EVNT LED indicates current or historic loop faults. DETect LED for Channel 1.
- ◀ Frequency Switches for Channel 1.
- ◀ Sensitivity Switches (SENS) are ON toward numbers (1,2,4) and OFF toward the 0's.
- ◀ Presence (PR) to left./Pulse (PL) to right.
- ◀ Channel 2 switches are the same as Channel 1 above.
- ◀ Channel 2 LED indicators
- ◀ Channel 3 LED indicators
- ◀ Channel 3 switches
- ◀ Channel 4 switches
- ◀ Channel 4 LED indicators
- ◀ Detector Master Reset button.

Figure 3 – Front panel of a Model 224 GP7 card

Frequency

Each channel of the Peek/Sarasota 222/224 GP7 Series Loop Detector Sensor Unit is sequentially activated to eliminate crosstalk between loops connected to the same detector. In order to avoid crosstalk between adjacent loops connected to different detectors, one of four frequencies can be selected for each channel using the Loop Detector Sensor Unit front panel mounted Frequency Switches. Frequency settings and their associated range of inductance tuned are shown below:


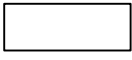

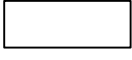
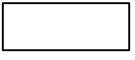


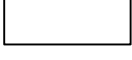

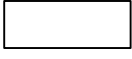
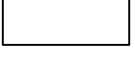

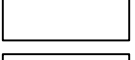

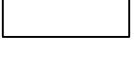

FREQUENCY Switch Settings			
F0F0 = Low			18 -700μH
			
F1F0 = Medium Low			26 -1200μH
			
F2F0 = Medium High			38 -1700μH
			
F1F2 = High			46 -2400μH
			

Figure 4 – Frequency switch settings - position shown by shaded area

Peek Corporation recommends using the highest frequency separation possible between two Loop Detector Sensor Units with adjacent loops. The table below displays the percentage (%) of frequency separation between the different frequency selections when connected to a 120uH loop.

Table 2 – Frequency Selections

	F0F0	F1F0	F2F0	F1F2
F0F0	X	12%	35%	71%
F1F0	12%	X	21%	52%
F2F0	35%	21%	X	26%
F1F2	71%	52%	26%	X

Sensitivity

Seven levels of sensitivity (SENS) may be individually selected per channel using the Loop Detector Sensor Unit front panel mounted SENS switches. Each level of sensitivity (SENS) is independent of loop inductance and frequency. Channels can individually be turned OFF using the SENS switches. When in the OFF SENS switch setting, the selected channel will not respond to changes in loop inductance or loop failures.









Setting	DIL Setting	% Sensitivity	Threshold dL/L
7		1+2+4	0.01
6		0+2+4	0.02
5		1+0+4	0.04
4		0+0+4	0.08
3		1+2+0	0.16
2		0+2+0	0.32
1		1+0+0	0.64
0		0+0+0	Channel Off

Figure 5 – Sensitivity switch settings - position shown by shaded area

Changing the sensitivity setting while the Loop Detector Sensor Unit is powered, resets the corresponding channel. All sensitivity settings, except the highest, activate a sensitivity boost feature that increases the detection threshold by 50%. This feature enables the Loop Detector Sensor Unit to hold presence on small and high body vehicles.

Response Time

Response Time is the time the Loop Detector Sensor Unit takes to respond to a vehicle entering or leaving the field of the loop. Response Time is sensitivity dependent. This dependence relationship is displayed in the table below. To select a specific Response Time all channels **must** be programmed to the Sensitivity Levels corresponding to that Response Time. For example, to get a 5 mS Response Time the Sensitivity for each channel utilized must be set to 0.16%, 0.32% or 0.64%.

Table 3 – Response Time settings

Sensitivity	Sum of Switches	Response Time
0.64%	1	5mS \pm 1.0mS
0.32%	2	5mS \pm 1.0mS
0.16%	3	5mS \pm 1.0mS
0.08%	4	20mS \pm 2.0mS
0.04%	5	20mS \pm 2.0mS
0.02%	6	35mS \pm 4.0mS
0.01%	7	35mS \pm 4.0mS

Operating Modes

Two operational modes are available using the mode selection switch. They are the Presence (PR) and Pulse (PL) modes for each channel of detection.

Presence Time

Times are given from first vehicle entry and are substantially independent of signal strength. Presence (PR) Standard Times are PCB Switch 6 (SW6) selectable for 16, 60, 120 minutes and permanent presence in the Peek/Sarasota 222/224 Series GP7 Series Loop Detector Sensor Unit. Other options are available – the Peek/Sarasota 222/224 Series GP7 Series Loop Detector Sensor Unit can be manufactured with a non-standard, optional Presence Time from 1 to 127 minutes by one-half or one minute increments. See Section 10, Ordering Information for details. The pictures below displays SW6. Switches 3 and 4 are utilized to select the various Presence Times.

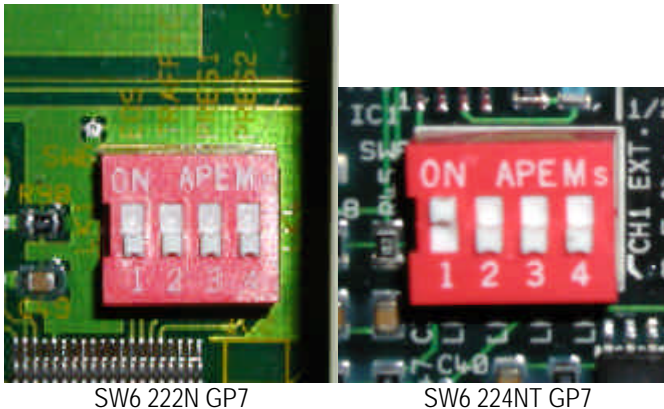


Figure 6 – Presence Time PCB switches

The table below displays the SW6 switch 3 and 4 combination settings to select the desired Presence Time in seconds.

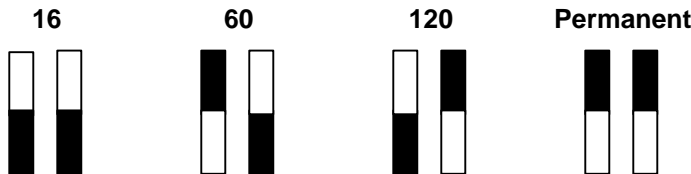


Figure 7 – Presence Time switches 3 & 4 of SW6 - position shown by shaded area

In the Presence Mode, a vehicle entering the loop field causes Loop Detector Sensor Unit to produce an output and immediately start the Presence Timer. The Presence Timer starts upon entry into the loop field and its duration is set by the position of the board switches 3 and 4 on SW6 of the Mode Switch. The Presence Time output is maintained for as long as the vehicle remains in the loop field or until the Presence Timer terminates the Loop Detector Sensor Unit output, whichever comes first.

If the vehicle exits the loop field before the Presence Timer terminates, the Presence output ends, and the Loop Detector Sensor Unit resumes normal operation. If the Presence Timer terminates while the vehicle is still in the loop field, the Presence

output is terminated and Loop Detector Sensor Unit tunes to the loop inductance with the vehicle present. This feature allows other vehicles to be detected provided the resulting long loop inductance with the vehicle present does not exceed the capabilities of the detector.

Pulse Mode

Pulse Mode (PL) provides a momentary, standard output with a Pulse Width of 125+/- 25 milliseconds (ms) at first vehicle entry. A two-second Pulse Paralysis Time (minimum time between successive pulses) is provided to improve count accuracy. In the Pulse Mode, a vehicle entering the loop field causes a momentary output whose duration is set by the Pulse Width. When the momentary output terminates, the Pulse Paralysis Timer is started. While this Pulse Paralysis Timer is running the Loop Detector Sensor Unit ignores any changes in inductance caused on the loop by the initial or following vehicle(s). When the Pulse Paralysis Timer terminates the Loop Detector Sensor Unit resumes normal operation and responds immediately to changes in loop inductance. Non-standard Pulse Width times are available from 1 to 65,535 milliseconds. See "Ordering Information" (on page 24) to have non-standard Pulse Width Times factory loaded.

Reset

There are several methods of resetting the Peek/Sarasota 222/224 Series GP7 Series Loop Detector Sensor Unit. The Loop Detector Sensor Unit automatically initiates reset when the power is applied. Reset can be initiated by grounding (0 VDC via solid state [opto-isolator] or relay contact) Pin C of the edge connector for a minimum of 15 milliseconds. The Loop Detector Sensor Unit can also be reset by momentarily depressing the black plastic RESET (222) or RES (224) button at the bottom, right of the front panel. Reset initiated by any method clears any channel's historical fault indication and activates automatic tuning. Changing the channel's sensitivity setting can independently reset each channel. A reset initiated in this manner does not clear any historical fault indication present for that channel reset. All other channels continue to operate without being affected in any way.

Automatic Tuning

The Peek/Sarasota 222/224 Series GP7 Series Loop Detector Sensor Unit automatically tunes to loop inductances ranging from 18 to 2400 micro-Henrys (μ H). Automatic tuning occurs after the Loop Detector Sensor Unit, using its loop oscillator, drives the loop at the frequency set on the Frequency Switches with secondary input from the loop and loop lead-in inductance.

The Loop(s) is/are automatically tuned as the oscillator/loop circuit finds its resonant frequency. This frequency is maintained as reference and is updated to track small changes due to environmental drift. Detection occurs when the reference increases past the threshold set by the sensitivity switches. If the change is larger than 25%, (too large for a vehicle) the loop is re-tuned automatically, and maintains the new reference.

Sensitivity boost increases the detect threshold sensitivity and assists in Boost: maintaining presence on small and high body vehicles.

Loop Faults and Fault Diagnostic Indications

The Peek/Sarasota 222/224 Series GP7 Series Loop Detector Sensor Unit provides internal diagnostics identifying and differentiating between the three faults of an open loop, a shorted loop or a sudden, 25% change (drift) in inductance. One (1) event (EVNT) LED per channel is provided to display fault conditions and concurrently indicate if the condition is currently present or if a temporary fault occurred and is no longer present (historical fault).

To indicate a present fault, the EVNT LED cycles between steady illumination (ON) for two (2) seconds and then flashes at a rate that indicates the type of fault for two (2) seconds. To indicate a historical fault, the EVNT LED continuously flashes at the rate that indicates the fault type. The Loop Detector Sensor Unit must be reset to clear historical fault indicators.

A delay of 3 seconds is incorporated before a loop fault is recognized. Historical fault indicates LAST FAULT recognized under running conditions.

For Open Circuit Loop (or above maximum Loop Inductance):

1. Output LED lights, continuously.
2. Detect output device falls into detect, continuously. EVNT LED lights for 2 seconds, then flashes for 2 seconds at a 16Hz rate and repeats.
3. As soon as fault is eliminated and auto re-tune is completed, the Loop Detector Sensor Unit returns to normal operation with EVNT LED flashing continuously at a 16Hz rate, thus indicating historical fault condition. Master RESET will re-tune the Loop Detector Sensor Unit and clears the historical fault.

For Short Circuit Loop (or below minimum Loop Inductance):

1. Output LED lights, continuously.
2. Detect output device fall into detect, continuously.
3. EVNT LED lights for 2 seconds, then flashes for 2 seconds at a 4Hz rate and repeats.
4. As soon as fault is eliminated and auto re-tune is completed the Loop Detector Sensor Unit returns to normal operation with EVNT LED flashing continuously at a 4Hz rate thus indicating historical fault condition. Master RESET will re-tune the Loop Detector Sensor Unit and the clear historical fault.

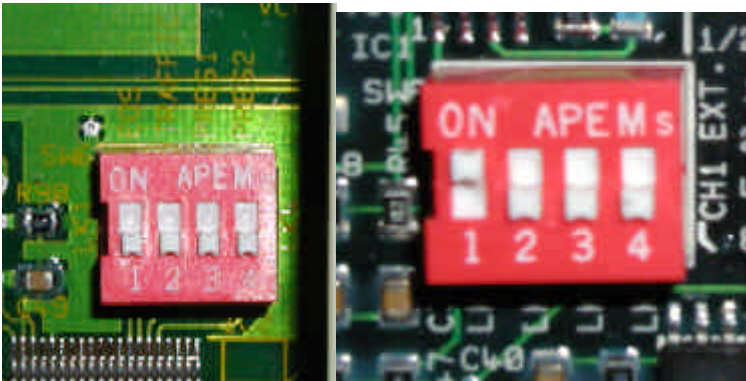
For \pm 25% Loop Drift:

1. Output LED lights during auto re-tune.
2. Output device falls into detect during auto re-tune.
3. EVNT LED lights. Re-tuning takes place within 3 seconds, the historical Fault indication is established by flashing continuously at a 1Hz rate.
4. Master RESET will re-tune the Loop Detector Sensor Unit and clears historical fault.
5. If the 25% drift made the Loop Inductance out of range, according to the selected frequency mode, an open or short circuit fault is indicated.

FAILURE MODES

The Peek/Sarasota 222/224 Series GP7 Series Loop Detector Sensor Unit has two modes of failure operation. These two modes define the operation of all of the Loop Detector Sensor Unit's channel outputs during loop and power failures. The two modes are Fail Safe and Fail Secure. When in the Fail Safe mode of operation, a detection output is given during any of the following three failed conditions: Open Loop; Shorted Loop or Power Failure. The output remains on during the entire duration of the failed condition. The standard configuration for the Peek/Sarasota 222/224 Series GP7 Series Loop Detector Sensor Unit is the Fail Safe Mode. In Fail Secure operation, no outputs are given during any of the three failed conditions. See "Ordering Information" on page 24.

The Peek/Sarasota 222/224 Series GP7 Series Loop Detector Sensor Unit has an Event Output Status (EOS) switch, which selects the output status of the Loop Detector Sensor Unit during a loop failure. The EOS switch is Switch #1, on SW6.



SW6 222N GP7

SW6 224NT GP7

Placing switch #1, in the marked ON (up) position is failsafe and will give an output during a loop failure. Placing switch #1, in the OFF (down) position is the fail-secure mode and will not give an output during a loop failure. The Peek/Sarasota 222/224 Series GP7 Series Loop Detector Sensor Unit has an option to place a hard link (LK1) under the EOS switch # 1 for those agencies that do not want this switch to be selectable. See Section 10, Ordering for procedures to request this option.

CONNECTIONS

Connection is made via a double-sided card edge connector 0.156" spacing mating with Cinch Jones 50-44A-30M connector designed for keys between contacts B and C, E and F plus M and N. Lettered pins are on the bottom of the PCB. The numbered pins are on the top or the component side of the PCB. The 222 Series functions are listed in brackets [].

Table 4 – Pin outputs of the Model 222/224 Detection cards

Pin	Function	Pin	Function
A	DC common (-)	1	Spare
B	DC 24V (+)	2	Spare
C	Reset	3	Spare
D	Ch. 1 loop input	4	Spare
E	Ch. 1 loop input	5	Spare
F	Ch. 1 output collector (+)	6	Spare
H	Ch. 1 output emitter (-)	7	Ch. 1 status output
J	Ch. 2 loop input	8	Spare
K	Ch. 2 loop input	9	Spare
L	Chassis ground	10	Spare
M	Not used	11	Spare
N	Not used	12	Spare
P	Ch. 3 loop input [Spare]	13	Spare
R	Ch. 3 loop input [Spare]	14	Spare
S	Ch. 3 output collector (+) [Spare]	15	Spare
T	Ch. 3 output emitter (-) [Spare]	16	Ch. 3 status output
U	Ch. 4 loop input [Spare]	17	Spare
V	Ch. 4 loop input [Spare]	18	Spare
W	Ch. 2 output collector (+)	19	Spare
X	Ch. 2 output emitter (-)	20	Ch. 2 status output
Y	Ch. 1 output collector (+) [Spare]	21	Spare



Note The Peek Sarasota 222/224 GP7 Series Inductive Loop Sensor Unit is designed to NEMA standards and may not be compatible with some Type 170 Detector Rack configurations.

TIMING FUNCTIONS

Peek Sarasota 222NT GP7 Two Channel Inductive Loop Sensor Unit and the 224NT GP7 Series Inductive Loop Sensor Unit each are produced with a timing function, as identified by the “T” in the model number. The two timing functions are Extension, sometimes referred to as Stretch and Delay. An Extension (Stretch) is the amount of Presence Time added to the output after the vehicle leaves the field of the inductive loop.

A Delay is a measured amount of time that the Inductive Loop Sensor Unit waits to output after a vehicle enters the field of the Inductive Loop Sensor Unit. These times are switch programmable by channel of detection on both the Peek Sarasota 222NT GP7 Two Channel Inductive Loop Sensor Unit and the 224NT GP7 Series Inductive Loop Sensor Units.

The switches are depicted here:

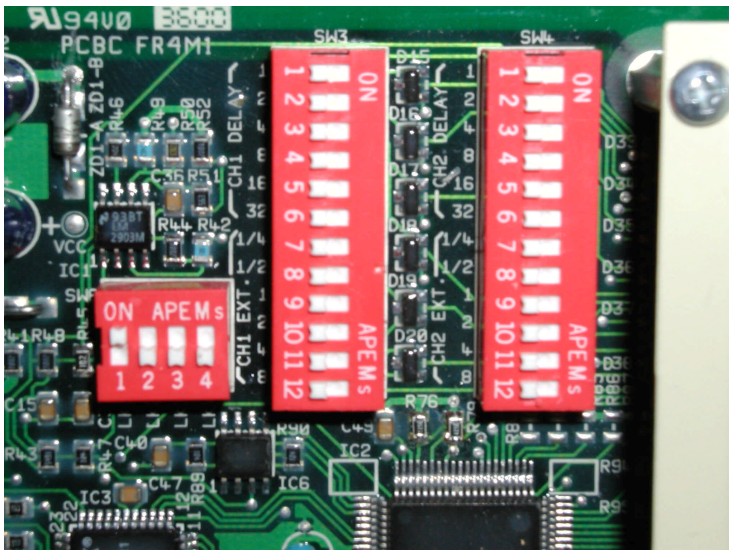


Figure 8 –Timing function switches on the Model 222 circuit board

On the Sarasota 222NT GP7 Two Channel Inductive Loop Sensor Unit has Switch 3 (SW3) controlling Channel 1 and Switch 4 (SW4) controlling Channel 2. On the switch box, switches numbered 1 through 6, manage the Delay time settings. The switches are binary. Placing a switch or combination of switches in the ON position will cumulatively activate the depicted delay times of 1, 2, 4, 8, 16 and 32 seconds.

To obtain a delay of 5 seconds, place the #1 switch (1 second) and the #3 switch (4 seconds) to the ON position for a cumulative total delay of 5 seconds. Each channel operates independently and can be set at different delays. Delay values can be obtained from 0 to 63 seconds. On the switch box, switches numbered 7 through 12, manage the Extension time settings. The switches are binary. Placing a switch or combination of switches in the ON position will cumulatively activate the depicted extend times of 1/4, 1/2, 1, 2, 4 and 8 seconds. To obtain an extension of 5 seconds,

place the #9 switch (1 second) and the #11 switch (4 seconds) to the ON position for a cumulative total delay of 5 seconds. Each channel operates independently and can be set at different delays. Extension values can be obtained from 0 to 15.75 seconds.

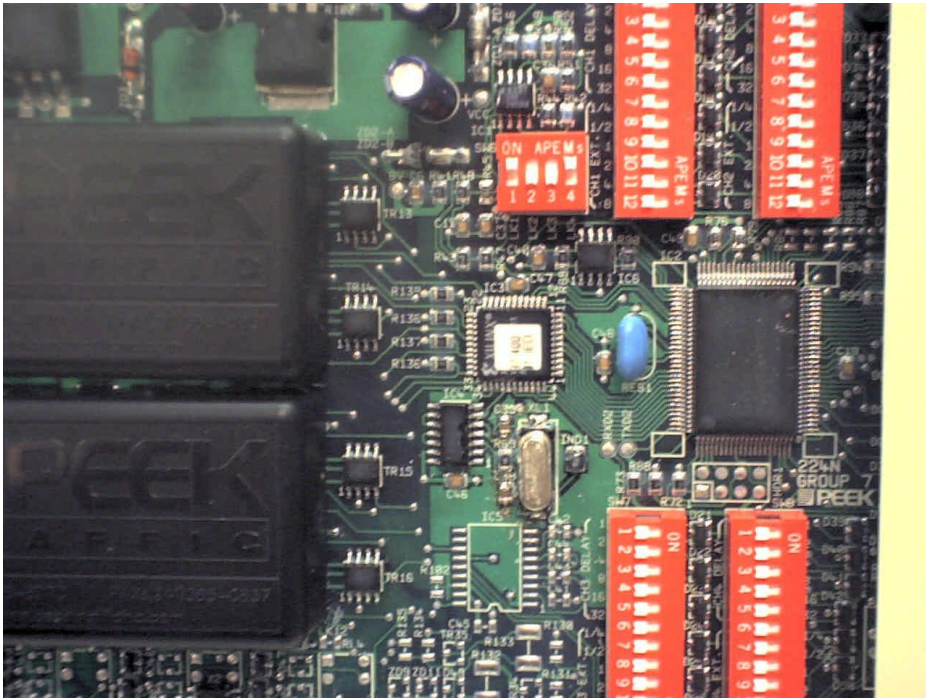


Figure 9 – Model 224 timing function switches

Peek Sarasota 224NT GP7 Four Channel Inductive Loop Sensor Unit (shown above) operates exactly the same as the Peek Sarasota 222NT GP7 Two Channel Inductive Loop Sensor Unit, except that Switch 7 (SW7) controls Channel 3 and Switch 8 (SW8) controls Channel 4.

TROUBLESHOOTING

Qualified technicians should carry out Troubleshooting and Repair. Normal precautions for handling circuitry should be taken when troubleshooting this unit.

The following four checks are intended to ensure that the suspected fault is not external to the detector unit.

1. The input supply to the detector should be in the range +10.8 VDC to +26.5 VDC.
2. Ensure that the remote reset input line to pin C of the edge connector is not grounded. This would cause the detector to remain in the reset state with both outputs and LEDs on.
3. If the fault LEDs flash, then a loop fault is suspected on that channel. Check the loops and lead-in wiring.
4. Check that the correct sensitivity and mode have been selected on each channel. If the lowest sensitivity (0 + 0 + 0) is selected then the channel will be switched OFF and no vehicles will be detected on that channel.

If the above checks are performed and no problems found then the following tests may be made on the detector itself to isolate the possible fault.

The detector should be connected to power, with either simulated or actual loops connected to the loop inputs. Both channels should be set for presence mode, sensitivity of .02% and low frequency. All measurements should be taken with respect to logic ground which may be found at the anode of ZD1 or on the heat sink of the REG1. Channel outputs should be monitored to ensure that when the detector indicates a detect that the relevant output is ON.

Test 1

The voltage across ZD1 should be +3.5 VDC, plus or minus 0.2 VDC, utilizing the +VCC point for the positive meter lead and the 0 (zero) VDC point for the negative meter lead. If the voltage is out of stated limits, then the possible component failures are: REG2, ZD3, C2, C4, R99, R100, IC2, IC3 or any component across VCC being shorted.

Test 2

The voltage across ZD2 should be +8 VDC, plus or minus 0.2 VDC, utilizing the +8 VDC point for the positive meter lead and the 0 (zero) VDC point for the negative meter lead. If the voltage is out of stated limits, then the possible component failures are: REG1 or any component across +8 VDC being shorted.

ORDERING INFORMATION

Standard product configured as Opto Isolator Output, Presence timing from Entry.

Order as: **Peek Sarasota GP7 Loop Detector Unit**

Model 224N	Four Channel NEMA TS1/TS2	Part # 82-1336-02
Model 224NT	Four Channel NEMA with Timing TS1/TS2	Part # 82-1336-01
Model 222N	Two Channel NEMA TS2	Part # 82-1339-01
Model 222NT	Two Channel NEMA with Timing TS2	Part # 82-1341-01
Model 222N	Two Channel NEMA TS1	Part # 82-1339-02

The standard configuration for the Peek/Sarasota 222/224 Series GP7 Series Loop Detector Sensor Unit is the Fail Safe Mode. In Fail Secure operation, no outputs are given during any of the three failed conditions. To order GP7 Loop Detector Sensor Units with the optional Fail Secure mode contact Peek Corporation Sales at 1-800-245-7660 or www.peakglobal.com.

The standard configuration for the Peek/Sarasota 222/224 Series GP7 Series Loop Detector Sensor Unit is a 125 millisecond Pulse Width Time. Pulse Width Times are available by special order from 1 to 65,535 milliseconds. To order GP7 Loop Detector Sensor Units with the optional Pulse Width Times contact Peek Corporation Sales at 1-800-245-7660 or www.peakglobal.com.

The standard configuration for the Peek/Sarasota 222/224 Series GP7 Series Loop Detector Sensor Unit is a Presence Time selection of 16, 60, 120 minutes or permanent. Presence Times are available by special order from 1 to 127 in one-half or one minute increments. To order GP7 Loop Detector Sensor Units with the optional Presence Times contact Peek Corporation Sales at 1-800-245-7660 or www.peakglobal.com.

The standard configuration for the Peek/Sarasota 222/224 Series GP7 Series Loop Detector Sensor Unit has the EOS switch # 1, on SW3, to be selectable with up as on and down as off. An EOS switch #1 with a hard link (LK1) under the EOS switch # 1 for those agencies that do not want this switch to be selectable is available by special order. To order GP7 Loop Detector Sensor Units with the optional non-selectable EOS outputs contact Peek Corporation Sales at 1-800-245-7660 or www.peakglobal.com.

The standard configuration for the Peek/Sarasota 222/224 Series GP7 Series Loop Detector Sensor Unit is with forward directional logic. Forward directional logic is Channel 1 to Channel 2, where Channel 1 enters detect before Channel 2. Reverse directional logic is an option, where Channel 2 enters detect before Channel 1, or Channel 1 enters detect while Channel 2 is still in detect. To order GP7 Loop Detector Sensor Units with the optional Reverse Directional Logic contact Peek Corporation Sales at 1-800-245-7660 or www.peakglobal.com.

ORDERING SCHEMATICS AND PCB DIAGRAMS

The following Peek/Sarasota 222/224 Series GP7 Series Loop Detector Sensor Unit schematic and PCB Assembly Diagrams are available by request, from Peek Corporation Customer Service at 1-800-245-7660 or service@peekglobal.com:

Model 224N Four Channel NEMA TS1/TS2..... Part # 82-1336-02

1. Circuit Diagram – Drawing No.: 72-646
2. PC Board Assembly – Drawing Number.: 82-1335-02

Model 224NT Four Channel NEMA with Timing TS1/TS2 Part # 82-1336-01

3. Circuit Diagram – Drawing No.: 72-646
4. PC Board Assembly – Drawing Number.: 82-1335-01

Model 222N Two Channel NEMA TS2..... Part # 82-1339-01

5. Circuit Diagram – Drawing No.: 72-649
6. PC Board Assembly – Drawing Number.: 82-1338-01

Model 222NT Two Channel NEMA with Timing TS2 Part # 82-1341-01

7. Circuit Diagram – Drawing No.: 72-648
8. PC Board Assembly – Drawing Number.: 82-1340-01

Model 222N Two Channel NEMA TS1 Part # 82-1339-02

9. Circuit Diagram – Drawing No.: 72-649
10. PC Board Assembly – Drawing Number.: 82-1338-02

TWO YEAR LIMITED WARRANTY

Peek Corporation warrants** all Peek/Sarasota 222/224 Series GP7 Series Loop Detector Sensor Units against manufacturing defects in materials and workmanship for two years from the date of shipment from the Peek Corporation factory. One or more U.S. and foreign patents protect Peek/Sarasota 222/224 Series GP7 Series Loop Detector Sensor Units. Peek Corporation reserves the right to modify and/or improve its products at any time without notice.

** For specific details about the Sarasota Model 222/224 GP7 warranty, contact Peek Corporation at 1-800-245-7660 or www.peekglobal.com.

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**Corporate Headquarters
Peek Corporation**

USA

2511 Corporate Way
Palmetto, FL 34221
ph: 941.366.8770
in U.S.: 866.260.7335
fx: 941.365.0837
email: usinfo@peekglobal.com

**Peek Promet d.o.o.
Croatia**

Selska 34
1000 Zagreb, Croatia
ph: 385.364.3160
fx: 385.364.3163

**Peek Traffic, Ltd.
United Kingdom**

Kings Worthy
Winchester
Hampshire SO23 7QA, UK
ph: +44.1962.883200
fx: +44.1962.884026
email: ukinfo@peekglobal.com

**Peek Traffic AB
Sweden**

P.O. Box 101 58
S-121 28 Stockholm-Globen
ph: +46.8.556.10.700
fx: +46.8.648.85.40

**Peek Traffik a-s
Denmark**

Avedoreholmen 84
DK 2650 Hvidovre
ph: +45.36.88.88.88
fx: +45.36.88.88.00
email: dkinfo@peekglobal.com

**Peek Traffic BV
The Netherlands**

PO Box 2542
3800 GB
Amersfoort, Netherlands
ph: +31.33.454.1777
fx: +31.33.454.1850
email: nlinfo@peekglobal.com

**Peek Traffic Oy
Finland**

Niittylänpolku 16
FI 00620 Helsinki
ph: +358.9.777.600
fx: +358.9.777.3103
email: fiinfo@peekglobal.com

**Peek Traffic AS
Norway**

Tvetenveien 152
Postboks 6242
Etterstad
N-0603 Oslo, Norway
ph: +47.22.76.1900
fx: +47.22.76.1919
email: noinfo@peekglobal.com