Siemens Mobility, Traffic Solutions
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Heimdall Detector
General Handbook
Part no.
667/HB/31900/000

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Preface

Safety of Installation and Maintenance Personnel

In the interests of health and safety, when installing, using or servicing this equipment the following instructions must be noted and adhered to:

(1) Only skilled or instructed personnel, with relevant technical knowledge and experience, who are also familiar with the safety procedures required when dealing with modern electrical/electronic equipment, are to be allowed to use and/or work on this equipment. All work shall be performed in accordance with the Electricity at Work Regulations 1989.

(2) Such personnel must take heed of all relevant notes, cautions and warnings in this Handbook and any other Document or Handbook associated with the equipment including, but not restricted to, the following:

(3) The equipment must be correctly connected to the specified incoming power supply.

(4) Mains voltages may be present within traffic signal heads. Before any maintenance work within the signal head is carried out, any mains supply to it must be isolated / switched off.

(5) Only trained / competent persons should work on this equipment.

(6) Surfaces within the associated traffic signal get hot, e.g. lamp, lens and reflector. Therefore care should be taken when working in such areas.

(7) Any power tools must be regularly inspected and tested.

(8) Any ladders used must be inspected before use to ensure they are sound and not damaged.

(9) When using a ladder, before climbing it, ensure that it is erected properly and is not liable to collapse or move. If using a ladder near a carriageway ensure that the area is properly coned off and signed.

(10) Any personnel working on site must wear the appropriate protective clothing, e.g. reflective vests, etc.

Wireless Safety

The Heimdall detector hardware is a radar device.

This product does emit RF signals which are below the statuary requirements. However, it is recommended that precautions are taken to reduce prolonged exposure when operating directly in front of the Heimdall antenna area.

The Heimdall detectors may also include a wireless device which will only transmit when a wireless connection is made from authorised maintenance personnel using Siecom software. When connected to Siecom, the wireless transmitter within the plastic case should have a separation of at least 20cm between the case and the body of the user or nearby persons, excluding hands, wrists, feet and ankles.

Safety of Road Users

It is important that all personnel are aware of the dangers to road users that could arise during repair and maintenance of traffic control equipment.

Ensure that the junction area is coned and signed as necessary to warn motorists and pedestrians of any dangers and to help protect the personnel working on the site.

Personnel should also ensure the safety of pedestrians, especially children, who may come into contact with parts of the signal poles.

MAINTENANCE PROVISION (MP)

Product Reference

Heimdall Above Ground Detector.

Installation and Commissioning

Methods of Installation are described in this handbook. In addition, there is also a series of documents written specifically for installation engineers who do not need all the information contained in this document. These documents are listed here:

667/HB/31900/300	Standard Vehicle Approach Detector (MVD) Installation Instructions
667/HB/31900/310	Single Lane Vehicle Approach Detector Installation Instructions
667/HB/31900/320	Selectable Speed Vehicle Approach Detector Installation Instructions
667/HB/31900/330	Stop Line Detector Installation Instructions
667/HB/31900/340	SCOOT and MOVA Detector Installation Instructions
667/HB/31900/350	On Crossing Detector Installation Instructions
667/HB/31900/360	Kerbside Detector Installation Instructions
667/HB/31900/365	Kerbside Volumetric Detector Installation Instructions

Table 1-1 – Installation Documents

Spares and Maintenance

The Heimdall Above Ground Detector unit is designed for 'return to base' repair - there are no user serviceable parts contained within the enclosure. In the case of a faulty device, replace the unit, ensuring product settings (DIP switches, see section 4.8) and orientation (see section 4.7.1) are identical to those on the original unit.

Modifications

There are no approved modifications for this product.

Warning

Use of components other than those permitted above or modifications or enhancements that have not been authorised by Siemens Mobility, Traffic Solutions will invalidate Type Approval of this product.

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FIGURES

TABLES

1 INTRODUCTION

1.1 Purpose

This handbook gives a general description and specification for the Heimdall series of above ground detectors. It outlines the general procedures for installation, commissioning and maintenance.

Detailed installation instructions can be found in this document and in addition, the appropriate installation guides (reference section 0).

1.2 Related Documents

667/HE/20661/000	General Installation Principles
667/HE/20662/000	Signals and Poles (for reference only)
667/HE/20663/000	Detectors and Cable Terminations
667/HE/20664/000	Installation and Testing
667/HE/20665/000	General Installation Guide for Above Ground Detectors
667/HB/30875/000	SieCom Handbook

1.3 Definitions

AGD	Above Ground Detector
CRC	Cyclic Redundancy Check
CR/LF	Carriage Return/Line Feed
DIP	Dual In-Line Package
DFM	Detector fault Monitor
EEPROM	Electrically Erasable and Programmable Memory
HA	Highways Agency
LED	Light Emitting Diode
MP	Maintenance Provisions
PCB	Printed Circuit Board
PDA	Personal Digital Assistant
PLL	Phase-locked Loop
RF	Radio Frequency
SCOOT	Split Cycle Offset Optimisation Technique
SieCOM	Siemens Intelligent Traffic Signal Communications Terminal
SiTOS	Siemens Traffic Communications Protocol
VA	Vehicle Actuated

1.4 Issue History

1	Release
2	TS004728
3	TS005346
4	TS005346
5	TS006334

6	TS006388
7	TS006649
8	TS007322
9	TS007394
10	TS007704
11	TS007670

2 GENERAL DETECTOR INFORMATION

2.1 The Heimdall Detector

The Heimdall series of above ground detectors incorporates 'state of the art' radar antenna designs, tailored to the specific requirement of a range of detector operations. The range includes On Crossing, Kerbside, a range of Vehicle Approach, SCOOT & MOVA and Stop Line Data detectors.

The detector is housed in a low profile enclosure to minimise 'eye clutter'.

Figure 1 – Heimdall Detector

2.2 Identification Label

Each detector has an identification label affixed to the back of the unit, which identifies the detector type, part number, any optional extras and serial number.

Figure 2 – Example (SCOOT) Detector Product Label

Figure 3

Figure 4

2.3 Interface

The Heimdall detector has three main interfaces.

LED

An LED indicator is mounted on the side of the detector which gives a visual indication of the detector status. The LED will be ON for the detect state.

The LED indicator is built into the side access door, which may be fitted so that it either faces forwards (towards on-coming traffic) or backwards (away from on-coming traffic) dependant on detector type - see section 5.

Interface Cable – UK variant only

Detectors are supplied with a standard interface cable fitted with a Bulgin Buccaneer connector – see section 4.5.

Configuration DIP Switches

All detectors are fitted with configuration DIP switches.

Refer to the detailed detector specification (section 5) and commissioning section (section 6) for detailed explanation of these configuration facilities.

2.4 Product Options

There are several additional interface options available. These are identified as follows;

SiTOS Serial Interface

The SiTOS interface provides a facility to transfer detailed detector status / information to a controller equipped to use the SiTOS (serial) communication protocol. Section 4.9 should be referenced when installing detectors equipped with this option.

Siemens Wireless Link

A wireless add-on can be included with allows the Heimdall detector to be configured wirelessly using the Siemens SieCom facility.

Section 7.2 should be referenced for further information.

Second Isolated Relay Output

A second, isolated, detector output may be added for an additional detector status output. The second detector output may for example, be used to identify a fault condition.

3 General Specifications

3.1 Electrical Specifications

3.1.1 Operating Voltage

24V AC ± 20% (48 to 63 Hz)

or

10.8V to 28.8V DC

3.1.2 Detection Solid State Relay(s)

Voltage free output.

On Impedance 25ohms (typical), 35 ohms (maximum).

Open Circuit maintained up to 350V peak.

3.1.3 Operating Current

Detailed current requirements are dependent on detector type, and this information may be found in the appropriate detector specification section (reference section 5).

3.1.4 Radio Frequency Transmission Specifications

Detector Variant	Frequency of Operation	Detection Technique	Max EIRP[1] (dBmW)
Standard VA	24.15 – 24.25	CW	17.8
Single Lane VA	24.15 - 24.25	CW	18.6
Speed	24.15 - 24.25	CW	17.8
On Crossing	13.4 – 14.0	CW	10.2

Table 3-1 : Transmission Specifications for CW applications

Detector Variant	Frequency of Operation	Detection Technique	Sweep Rate[2] (MHz/mS)	Max EIRP (dBmW)
Stopline	24.05 – 24.25	FMCW	13.17	18.0
SCOOT	24.05 - 24.25	FMCW	13.17	18.0
Kerbside	13.4 - 14.0	FMCW/CW	9.26	8.1

Table 3-2 : Transmission Specifications for FMCW applications

[1] Measurement conditions: T_{min}:0ºC, T_{max}:55ºC, U_{min}:19.2V, U_{max}:28.8V

[2] Sweep from F_L to F_H

3.2 Mechanical Specifications

3.2.1 Weight

0.6Kg (without bracket(s))

3.2.2 Dimensions

150mm x 135mm x 90mm (h x w x d) - to the bottom of mounting foot.

3.3 Environmental Specifications

3.3.1 Operating Temperature

Lower limit -40^{0}C (-25^{0}C with wireless module).

Upper limit +75^{0}C.

3.3.2 Environmental Rating

IP56.

3.3.3 Vibration

EN 60068-2-64 Test Fh.

3.4 EMC Specifications

The Heimdall Detectors have been designed and tested against the following specifications:

EN50293	Electromagnetic compatibility. Road traffic signal systems. Product standard.
EN300 440	Electromagnetic compatibility and Radio spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range.

3.5 Highways Agency (HA) Specifications

The Heimdall Detectors have been designed and tested against the following HA specifications:

TR2130	Environmental Tests for Motorway Communications. Equipment and Portable and permanent Traffic Control Equipment.
TR2205	Performance Specification for Above Ground Vehicle Detector Systems for use at Permanent Traffic Signal Installations.
TR2206A	Performance Specification for Above Ground On-Crossing Pedestrian Detection Systems.
TR2207A	Performance Specification for Kerbside Detection Systems for use with Nearside Signals and Demand Units.
667/BH/31900/040	Heimdall Above Ground SCOOT and MOVA Specification.

3.6 Manufacturing Specifications

The Heimdall Detectors have been designed and evaluated against the following specifications:

2002/95/EC	RoHS Directive.
2002/96/EC	WEEE Directive.

3.7 Product Safety

The Heimdall Detectors have been designed and tested against the following specification:

EN60950	Product Safety

4 GENERAL INSTALLATION INSTRUCTIONS

4.1 General Introduction

This section outlines the general information required when installing a Heimdall Above Ground detector.

4.2 Tools Required

As well as a standard Installers tool kit, the following are required when installing and maintaining the Heimdall Detector:

- 1.5mm Allen key – for side access door and lid.
- T-8 Torx driver – alternative tool for side access door and lid.
- 13mm Socket spanner – for angular adjustment and installation of detector.
- Small flat bladed screwdriver – for DIP switch adjustment.

4.3 Order of Installation

The recommended order in which installation should take place is as follows:

(1) Read the Safety Warning on page 2 of this Handbook.

(2) Unpack items from packaging (reference section 4.4).

(3) Set configuration DIP switches (in most cases the detectors will be supplied ready to fit, if it is required change these settings then consult appropriate detector requirements in section 5).

(4) Fit Detector to appropriate mounting structure (refer to appropriate detector requirements – reference section 5).

(5) Perform initial Detector Alignment (refer to appropriate detector requirements – reference section 5).

(6) Connect detector to bulkhead mating connector.

(7) Final commissioning (section 6).

4.4 Detector Packaging

Heimdall Detectors are supplied individually in a packing box. The label on the side of the box details the detector type and part number.

Each detector box contains the following:

(1) Heimdall Detector with the interface lead attached;

(2) A mating connection lead which will (typically) be installed within the traffic signal enclosure;

(3) Gasket, grommets and fixing screws for the mating connector installation;

(4) Optional labels detailing the Heimdall Wireless Link access addresses.

(5) Quick Installation Guide

Figure 5 – Heimdall Detector

Figure 6 – Mating Cable and Fixing Kit

4.4.1 Export Variant

The export variant is normally shipped without the interface cable or the mating connection lead.

4.5 Electrical Connections – UK Variant

4.5.1 General

All Heimdall detectors are equipped with a captive lead and standard 9 pin 'Buccaneer' connector (see Figure 7).

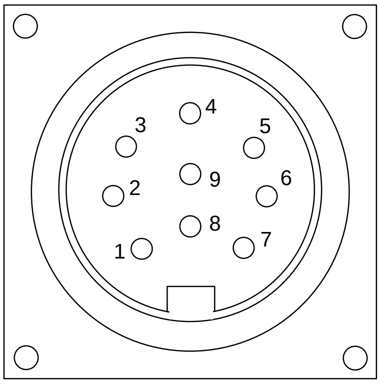


Figure 7 – Buccaneer Bulkhead Connector (Front View)

The wires from this connector should be terminated in accordance with the details shown in sections below.

Note 1: Particular attention should be paid to the correct termination of the power supply wires. The RED wire should be used for the POSITIVE AC/DC supply feed and the Black wire for the NEGATIVE supply return.

Note 2: When installing this detector with a 24 AC source, please ensure the 24 AC source is derived from an earthed secondary transformer (as used in standard traffic installations).

Note 3: When using 24 AC supply, only use battery powered interface equipment (e.g. laptop, PDA). Do not connect mains powered/connected interface equipment to the Heimdall series of detectors, as this will cause the detector's fuse to fail.

Note 4: When installing this detector with a Siemens ELV controller or a Siemens ELV controller additional supply, please ensure the RED wire of the interface cable is connected to the POSITIVE (common) connector, the BLACK wire is connected to the NEGATIVE (-24VDC) source and the GREEN (screen), if included, is connected to the POSITIVE (common) connector.

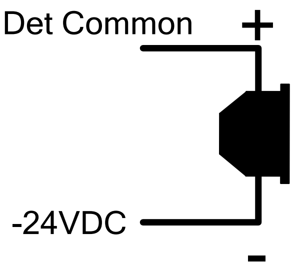


Figure 8 – ELV Detector Power Connections

The pin out for the connector is as specified in the Highways Agency Specifications: TR2505 and is detailed in the following tables.

The Heimdall detector provides additional facilities using the spare connections within the 9 way connector. These are all outlined in the tables below (Table 4-1, Table 4-2 and Table 4-4).

4.5.2 Standard Output Cable

Applicable to Standard and Wireless Variants (667/1/31900**/xx0 and /xx2).**

Connector Pin Number	Comment	Colour Code
1	**Detector Supply (Positive) AC/DC**	**Red**
2	**Detector Supply (Negative) AC/DC**	**Black**
3	**Screen**	**Green**
4	**Detector O/P #1 and 2 (Common)**	**White**
5	**Detector O/P #1 (Normally Open)***	**Yellow**
6	**Detector O/P #1 (Normally Closed)***	**Blue**
7	**Not Used**	**Violet**
8	**Not Used**	**Orange**
9	**Not Used**	**Brown**

Note: * This signal condition refers to the state when the detector is un-powered (detect state).

Table 4-1 – Standard Output Cable Configuration

4.5.3 SiTOS Output Cable

Applicable to SiTOS variant (667/1/31900**/xx1).**

Connector Pin Number	Comment	Colour Code
1	Detector Supply (Positive) AC/DC	Red
2	Detector Supply (Negative) AC/DC	Black
3	Screen/ RS485 Ground	Green
4	Detector O/P #1 and 2 (Common)	White
5	Detector O/P #1 (Normally Open)*	Yellow
6	Detector O/P #1 (Normally Closed)*	Blue
7	Detector O/P #2 (Normally Open)*	Violet
8	SiTOS RS485 (Terminal A)	Orange
9	SiTOS RS485 (Terminal B)	Brown

Note: * This signal condition refers to the state when the detector is un-powered (detect state).

Table 4-2 – Standard Output Cable Configuration

Cable also applicable to Kerbside Volumetric Variant (667/1/31900**/xx5).**

Connector Pin Number	Comment	Colour Code
1	Detector Supply (Positive) AC/DC	Red
2	Detector Supply (Negative) AC/DC	Black
3	Screen	Green
4	Volumetric Detector Common	White
5	Volumetric Indicator lsb (Closed for Low, Open for High*)	Yellow
6	Kerbside Detect (Normally Closed)*	Blue
7	Volumetric Indicator msb (Closed for Low, Open for High*)	Violet
8	Not Used	Orange
9	Not Used	Brown

Note: * This signal condition refers to the state when the detector is un-powered (detect state).

Table 4-3 – Output Cable Configuration for Kerbside Volumetric Analysis

4.5.4 Isolated Second Output Cable

Applicable to Second Output Variants (667/1/31900**/xx3 and /xx4).**

Connector Pin Number	Comment	Colour Code
1	**Detector Supply (Positive) AC/DC**	**Red**
2	**Detector Supply (Negative) AC/DC**	**Black**
3	**Screen**	**Green**
4	**Detector O/P #1 (Common)**	**White**
5	**Detector O/P #1 (Normally Open)***	**Yellow**
6	**Detector O/P #1 (Normally Closed)***	**Blue**
7	**Detector O/P #2 (Common)**	**Violet**
8	**Detector O/P #2 (Normally Open)***	**Orange**
9	**Detector O/P #2 (Normally Closed)***	**Brown**

Note: * This signal condition refers to the state when the detector is un-powered (detect state).

Table 4-4 – Output Cable Configuration with Isolated Second Detector O/P

Cable also applicable to Kerbside Volumetric Variant (667/1/31900**/xx5),** see Table 4-3**.**

4.6 Electrical Connections: Export Variant

4.6.1 General

The export variants of the Heimdall detectors are not supplied with the captive lead and standard 9 pin ‘Buccaneer’ connector. Instead the interfacing with the Heimdall detector is via the supplied ‘internal’ interface wiring block connector as shown in Figure 9.

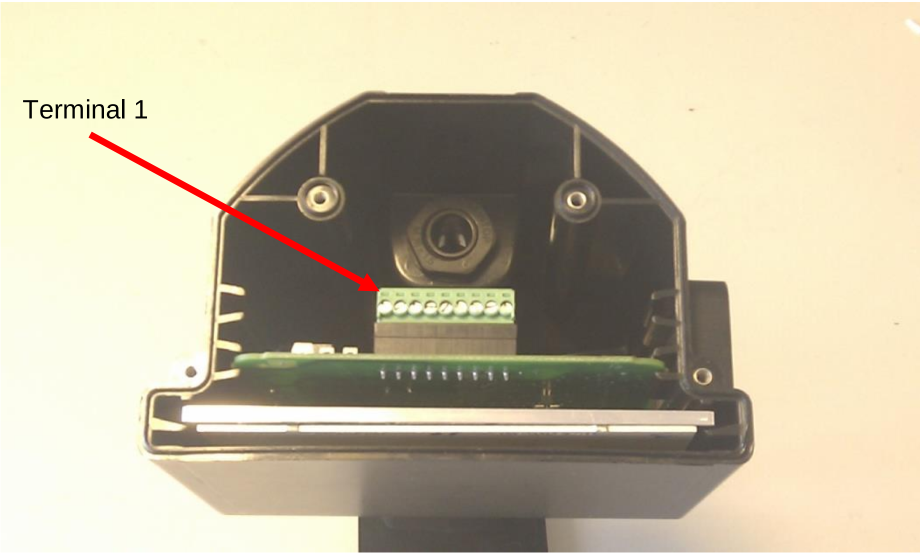


Figure 9 : Internal Interface Connector

To access the connector, the four fixing screws on the lid must be undone. Care should be taken when removing the fixing screws as they are captive and are held by a sealing grommet. Destruction of the grommet may reduce the IP rating of the Siemens product.

This connector should be terminated in accordance with the details shown in sections below.

Note 1: Particular attention should be paid to the correct termination of the power supply wires. Terminal 1 should be used for the POSITIVE AC/DC supply feed and Terminal 2 for the NEGATIVE supply return.

Note 2: When installing this detector with a 24 AC source, please ensure the 24 AC source is derived from an earthed secondary transformer (as used in standard traffic installations).

Note 3: When using 24 AC supply, only use battery powered interface equipment (e.g. laptop, PDA). Do not connect mains powered/connected equipment to the Heimdall series of detectors, as this will cause the detectors to fail.

Note 4: When installing this detector with a Siemens ELV controller or a Siemens ELV controller additional supply, please ensure the RED wire of the interface cable is connected to the POSITIVE (common) connector, the BLACK wire is connected to the NEGATIVE (-24VDC) source and the GREEN (screen) is connected to the POSITIVE (common) connector.

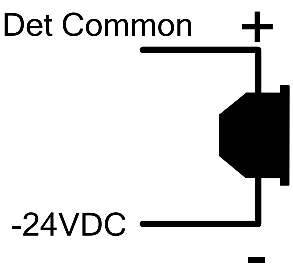


Figure 10 : ELV Detector Power Connections

4.6.2 Standard Variants

Applicable to export variants (667/1/31900**/1x0 and /1x2).**

Terminal Number	Comment	Normal Wiring Colour Code
1	Detector Supply (Positive) AC/DC	Red
2	Detector Supply (Negative) AC/DC	Black
3	Detector O/P #1 (Normally Closed)*	Blue
4	Detector O/P #1 and 2 (Common)	White
5	Detector O/P #1 (Normally Open)*	Yellow
6	Not Connected	Not Used
7	Not Connected	Not Used
8	Not Connected	Not Used
9	Not Connected	Not Used

Note: * This signal condition refers to the state when the detector is un-powered (detect state).

Table 4-5 – Standard Output Terminal Block Configuration

4.6.3 SiTOS variants

Applicable to SiTOS variant (667/1/31900**/1x1).**

Terminal Number	Comment	Normal Wiring Colour Code
1	Detector Supply (Positive) AC/DC	Red
2	Detector Supply (Negative) AC/DC	Black
3	Detector O/P #1 (Normally Closed)*	Blue
4	Detector O/P #1 and 2 (Common)	White
5	Detector O/P #1 (Normally Open)*	Yellow
6	Detector O/P #2 (Normally Open)*	Violet
7	SiTOS RS485 (Terminal A)	Orange
8	SiTOS RS485 (Terminal B)	Brown
9	RS485 Common	Green

Note: * This signal condition refers to the state when the detector is un-powered (detect state).

Table 4-6 – SiTOS Terminal Block Configuration

4.6.4 Isolated Second Output variants

Applicable to Second Output Variants (667/1/31900**/xx3 and /xx4).**

Terminal Number	Comment	Colour Code
1	**Detector Supply (Positive) AC/DC**	**Red**
2	**Detector Supply (Negative) AC/DC**	**Black**
3	**Detector O/P #1 (Normally Closed)***	**Blue**
4	**Detector O/P #1 (Common)**	**White**
5	**Detector O/P #1 (Normally Open)***	**Yellow**
6	**Detector O/P #2 (Normally Open)***	**Violet**
7	**SiTOS RS485 (Terminal A)**	**Orange**
8	**SiTOS RS485 (Terminal B)**	**Brown**
9	**RS485 Common**	**Green**
10	**Detector O/P #2 (Common)**	**Pink**
11	**Detector O/P #3 (Normally Closed)***	**Turquoise**

Note: * This signal condition refers to the state when the detector is un-powered (detect state).

Table 4-7 – Isolated Second Output Terminal Block Configuration

4.6.5 Kerbside Volumetric Analysis variant

Applicable to Kerbside Volumetric Variant (667/1/31900**/1x5).**

Terminal Number	Comment	Colour Code
1	**Detector Supply (Positive) AC/DC**	**Red**
2	**Detector Supply (Negative) AC/DC**	**Black**
3	**Kerbside Detect (Normally Closed)***	**Blue**
4	**Volumetric Detector Common**	**White**
5	**Volumetric Indicator lsb (Closed for Low, Open for High*)**	**Yellow**
6	**Volumetric Indicator msb (Closed for Low, Open for High*)**	**Violet**
7	**Not Connected**	**Not Used**
8	**Not Connected**	**Not Used**
9	**Not Connected**	**Not Used**
10	**Linked to Terminal Number 3**	**Not Used**
11	**Not Connected**	**Not Used**

Note: * This signal condition refers to the state when the detector is un-powered (detect state).

Table 4-8 – Kerbside Volumetric Terminal Block Configuration

4.7 Alignment Features

The Heimdall detectors have two built-on features which help with alignment - angle markings and ‘gun-sight’.

4.7.1 Angle Markings

The Heimdall detector mounting-base has a series of markings which denote 5 degree angle steps. An installer may use these as an aid to alignment, with regards to detector angle.

The Heimdall detector body has an arrow which lines up with one of several notches that are moulded onto the mounting-base (see Figure 11). To make the setting easier, every third notch is larger (major) than the intervening (minor) notches.

With the arrow lined up with the first major notch (the one nearest to the rear of the detector) the angle of the detector is zero (horizontal). The next two minor notches are 5 degrees and 10 degrees from horizontal (detector tilted forwards). The next major notch will align the detector to 15 degrees from the horizontal.

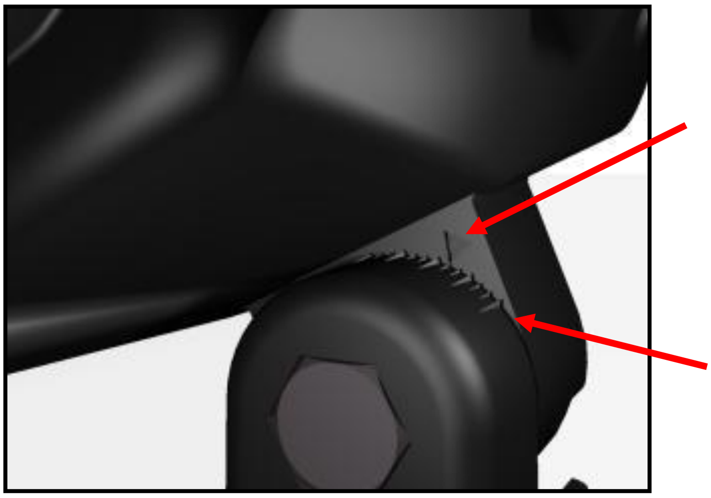


Figure 11 – Angle Notches on Heimdall Detector

It should be noted that these angles are all in relation to the mounting surface of the detector which is not necessarily the same as that of the road surface.

4.7.2 ‘Gun-Sight’

‘Gun-sight features are moulded onto the detector case lid, which an installer may use to help align the detector. The detector specifications (reference section 5.0) will each indicate the appropriate aiming point depending on detector type.

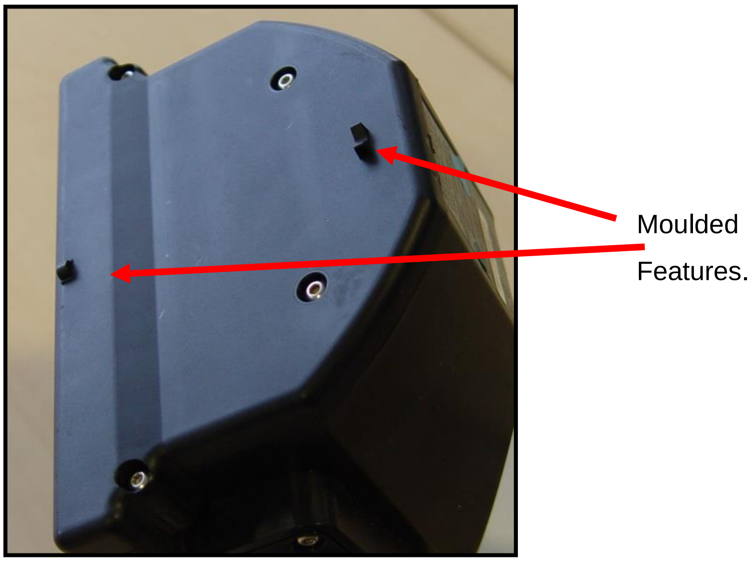


Figure 12 – ‘Gun Sight’ Features on Heimdall Detector

4.8 General Detector Configuration Facilities

4.8.1 DIP Switches

All Heimdall detectors are equipped with switches that enable the unit to be installed, for the majority of applications, without the need for any special terminal (handset) equipment.

Access to these switches is gained by removal of the side access door. This comes with a 'built-in' retention mechanism to prevent it falling to the ground when removed from the body. Before removal, make a note of the cover's orientation and ensure it is replaced the same way round (refer to appropriate detector specification (section 5) for orientation).

The switches on the PCB nearest the front of the detector (Digital Processor Board) control the basic functions of the detector and are described in more detail in the appropriate sections (5.x) of this handbook. This switch is referred to, throughout this document, as the 'Detector Configuration DIP Switch'.

The switches provided on the PCB nearest the rear of the detector (Special I/O Board) control the operation of the Siemens Serial Interface (SiTOS). This switch is referred to, throughout this document, as the 'SITOS Interface board DIP Switch'.

For applications that require communication with a SiTOS enabled controller (or any SiTOS enabled master communications device)[1], this will require the SiTOS enabled detector to be enabled for SiTOS communications. The Detector Configuration DIP switch 8 is used to control this mode of working.

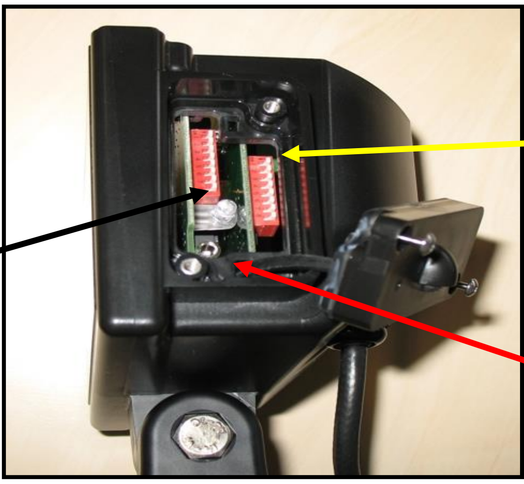


Figure 13 – Heimdall Detector (View with Side Access Door removed)

Figure 13 shows all DIP switch setting in the OFF ('0') position.

[1] The SiTOS facility requires a particular variant of the Heimdall detector. See Section 0

4.8.2 Terminal Interface

All Heimdall detectors are equipped with a terminal interface that will enable the unit to be configured with a terminal interface. The use of a terminal interface cable is required.

Access to the terminal interface is gained by removal of the side access door. This comes with a ‘built-in’ retention mechanism to prevent it falling to the ground when removed from the body. Before removal, make a note of the cover’s orientation and ensure it is replaced the same way round (refer to appropriate detector specification (section 5) for orientation).

4.8.3 Priority of configuration

Since the detector can be configured using the DIP switches, terminal interface and/or the SiTOS there is a hierarchy which is defined as follows;

If the Digital Processor board dip switch SW8 is set to ‘0’ –

- DIP switches SW1 to SW7 have full control of the detector configuration settings.
- The terminal handset has no write access, with the exceptions where the DIP switch settings allows for terminal settings to be applied. However the user Terminal will have full read access.
- SiTOS has no write or read access.

If the Digital Processor board dip switch SW8 is set to ‘1’ –

- SiTOS has full configuration with both read and write access.
- The settings of dip switches SW1 to SW7 are ignored.
- User Terminal will normally not have any write access.

The exception is the command SME=249 (override command). This has the effect of temporarily disabling SiTOS access and allowing the terminal to have full write access to the configuration setting. The temporary period will terminate after 20 minutes of terminal inactivity.

If SW8 is set to 1, but a SiTOS is not connected, then the (wireless) user terminal will have full write and read access. The situation occurs since an unconnected SiTOS will not overwrite the setting applied by the terminal handset.

4.9 Heimdall Serial Communications Installation (SiTOS)

The Heimdall Detector can be equipped with a serial communications facility to enable the detector status, configuration parameters and vehicle data (if appropriate) to be requested by a SiTOS enabled host controller (equipment).

This facility utilises the industry standard RS485 two wire serial communication technique. A number of detectors can be attached to a common pair of wires and can be interrogated on an individual basis. To achieve this it is necessary to assign a unique address to each detector on the common pair using the dual-in-line switch located on the special serial interface card (see Table 4-9 for details).

Hello

SiTOS DIP Switch Number							
1	2	3	4	5	6	7	8
Line Termination 0 = Disabled 1 = Enabled	Not Used		(SW4 = MS bit, SW8 = LS bit) Detector Address: 0,0,0,0,0 = Address 0 (00h) 0,0,0,0,1 = Address 1 (01h) : 1,1,1,1,1 = Address 31 (1Fh)				

Table 4-9 – Serial Communication (SiTOS) Configuration Switches

Note: Some DIP switches may be marked with ON/OFF. For the purposes of definition, OFF is equal to 0 and ON is equal to 1.

Each detector address should be set in accordance with the installation information supplied with the host equipment. This will also define when the ‘Line Termination’ switch (SW 1) should be used.

5 TECHNICAL DETAILS

5.1 Standard Vehicle Approach Detector (MVD)

5.1.1 Performance Details

Operating Range[1]:	<5 m to ~100 m from the Stop Line.
Lane Width:	Approximately 7.0 m.
Vehicle Approach Speed:	4km/h (2.5 mph) to greater than 112 km/h (70 mph)
Detection Presence Time:	Not applicable.
Detector Location:	Can be located on either the 'nearside' primary signal pole or the 'off-side' primary signal pole.
Detector Mounting Height:	3.3 m to 4.0 m
Accuracy:	Not applicable.
LED Orientation:	Facing Backwards (reference section 2.3)

5.1.2 Part Number

667/1/31900/00X

Where X is;

0	Basic Detector
1	Basic Detector with RS485 (SiTOS) Serial Interface[2]
2	Basic Detector with Wireless Link Interface[3]
3	Basic Detector with a Second Solid-State Relay Output[4]
4	Basic Detector with both a Wireless Link and a Second Solid-State Relay Output[5]

Table 5-1 – Heimdall Standard VA Detector Part Number Options

[1] Full range not available and limits are alignment dependant. Standard alignment range is 10 m to 35 m from the Stop Line.

[2] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[3] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[4] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[5] This option is non-standard. Please refer to Siemens Poole for further ordering information.

5.1.3 Operating Current

The overall operating current will depend whether any additional facilities are provided. Table 5-2 below lists the typical current requirements:

24 VAC Supply	143 mA
24 VDC Supply	113 mA

Table 5-2 – Standard VA Detector Operating Current

Note: When power is first applied to the detector the following surge currents are drawn from the supply:

DC Supply: 3.2 A (max) for < 2 ms when the supply is 29 VDC.

AC Supply: 4.2 A (max) for < 2 ms when the supply is 29 VAC.

If the detector has additional facilities fitted then the currents listed in Table 5-3 below should be added to those shown in Table 5-2.

Additional Facility	24 VAC	24 VDC
Siemens SiTOS Serial Interface (connected)	6 mA	5 mA
Siemens Wireless Interface (connected)	11 mA	10 mA

Table 5-3 – Additional Facilities Operating Current

Refer to Section 10 for details on power and cable length calculations.

5.1.4 Detector Installation Instructions

5.1.4.1 Detector Position

The detector should normally (first choice) be located on the nearside primary signal pole (position #1 – ref. Figure 14 below). Alternatively the detector may be fitted on alternative poles (positions 2 and 3 – ref. Figure 14 below) if circumstances dictate. The following factors may influence position:

- Line of sight obstruction such as signs, trees etc.
- More than two lanes on approach - one required on nearside pole and one on offside.
- Road layout permits better aim from offside pole.
- Cabling requirements.

Please ensure the installation location of the detector is clear from obstructions, such as signs, trees etc. such that there is a clear line of sight from the detector to the road. Failure to adhere to this recommendation will reduce detector performance.

5.1.4.2 Detector Height

The detector may be mounted at any height between 3.3 m and 4 m.

5.1.4.3 Detector Angle

The initial installation angle will change depending on the installation height and road surface angle. For the standard 10 m to 35 m range, as a guide, the angle may be pre-set to:

- 25 degrees from horizontal

5.1.4.4 Detector Alignment - Default

The detector uses a movement detection algorithm. Thus, the detector is aimed towards oncoming traffic and towards the centre of the centre of the carriageway, at a position approximately 25 metres from the associated ‘stop line’, as shown in Figure 14 below.

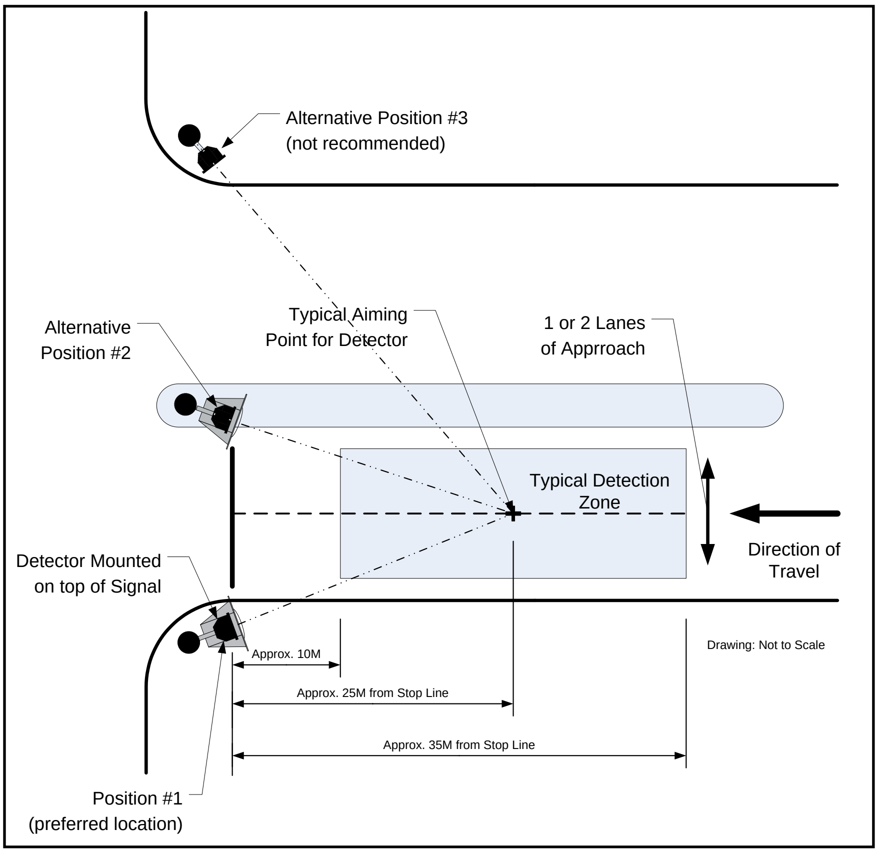


Figure 14 – Standard VA Detector Installation – Plan View

5.1.4.5 Detector Range - Default

The detector uses a movement detection algorithm. The range is typically set by the appropriate angle and installation height. If the user requires a significant reduction in the detection range (sensitivity), the detector configuration may be adjusted using DIP switch 6 (reference Table 5-4 below). Alternatively the terminal command RGE could be used (reference section 7.7.4). The default setting is set for maximum sensitivity.

5.1.4.6 Detector Fault Monitor (DFM)

The detector has a fault monitor function. In the default mode, the detector will generate a fault output (equivalent to a permanent detect) if the detector has not registered an activation for a period of twenty hours.

This duration can be adjusted to a user defined value by setting DIP Switch 7 to ‘1’ (On) and then using the terminal command DFM (reference section 7.7.4).

5.1.5 Side Access Configuration Dip Switch Settings

Note: Default settings are with all DIP switches set to '0'/ OFF.

Configuration DIP Switch Number							
1	2	3	4	5	6	7	8
Detection Direction 0,0 = Detects vehicles moving towards unit (default) 0,1 = Detects vehicles moving away from unit 1,0 = Detects vehicles moving in both directions (single O/P) 1,1 = Detects vehicles moving in both directions (dual O/P)[1]		Detector LED 0,0 = Normal Detector O/P 0,1 = Permanently Off 1,0 = Detector O/P for 20 minutes after power applied 1,1 = Normal Detector O/P		Detection Threshold 0 = 8.5 km/h 1 = 4 km/h	Detection Range 0 = Full 1 = Reduced	DFM 0 = Default monitor time (20 hours inactivity) 1 = 'fault monitor time' is set by the Engineer's Terminal	Remote Configuration 0 = Disabled 1 = Enabled

Note: Some DIP switches may be marked with ON/OFF. For the purposes of definition, OFF is equal to 0 and ON is equal to 1.

Table 5-4 – Standard VA Detector Configuration Switch Settings

Refer to section 5.6 for detailed information regarding final commissioning.

[1] This option requires a special I/O board to be fitted. In this dual output mode, detector o/p 1 will detect vehicles moving towards the unit and detector o/p 2 will detect vehicles moving away.

5.2 Single Lane Vehicle Approach Detector

5.2.1 Performance Details

Operating Range[1]:	<5 m to ~100 m from the Stop Line.
Lane Width:	Approximately 3.5m.
Vehicle Approach Speed:	4km/h (2.5 mph) to greater than 112 km/h (70 mph)
Detection Presence Time:	Not applicable.
Detector Location:	Can be located on either the ‘nearside’ primary signal pole or the ‘off-side’ primary signal pole.
Detector Mounting Height:	3.3m to 4.0m
Accuracy:	Not applicable.
LED Orientation:	Facing Backwards (reference section 2.3)

5.2.2 Part Number

667/1/31900/01X

Where X is;

0	Basic Detector
1	Basic Detector with RS485 (SiTOS) Serial Interface[2]
2	Basic Detector with Wireless Link Interface[3]
3	Basic Detector with a Second Solid-State Relay Output[4]
4	Basic Detector with both a Wireless Link and a Second Solid-State Relay Output[5]

Table 5-5 – Heimdall Single Lane VA Detector Part Number

[1] Full range not available and limits are alignment dependant. Standard alignment range is 10 m to 35 m from the Stop Line.

[2] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[3] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[4] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[5] This option is non-standard. Please refer to Siemens Poole for further ordering information.

5.2.3 Operating Current

The overall operating current will depend whether any additional facilities are provided. Table 5-6 below lists the typical current requirements:

24V AC Supply	143mA
24V DC Supply	113mA

Table 5-6 – Single Lane VA Detector Operating Current

Note: When power is first applied to the detector the following surge currents are drawn from the supply:

DC Supply: 3.2 Amps (max) for < 2ms when the supply is 29V DC.

AC Supply: 4.2 Amps (max) for < 2 ms when the supply is 29V AC.

If the detector has additional facilities fitted then the currents listed in Table 5-7 below should be added to those shown in Table 5-6.

Additional Facility	24 VAC	24 VDC
Siemens SiTOS Serial Interface (connected)	6 mA	5 mA
Siemens Wireless Interface (connected)	11 mA	10 mA

Table 5-7 – Additional Facilities Operating Current

Refer to Section 10 for details on power and cable length calculations.

5.2.4 Detector Installation Instructions

5.2.4.1 Detector Position

The detector should be located on the nearside primary signal pole (detector #1 – Figure 15 below) for the 'nearside lane' and offside primary signal (detector #2 - Figure 15 below) for the 'outside lane'. The following factors may influence position:

- Line of sight obstruction such as signs, trees etc.
- More than two lanes on approach - one required on nearside pole and one on offside.
- Road layout permits better aim from offside pole.
- Cabling requirements.

Please ensure the installation location of the detector is clear from obstructions, such as signs, trees etc. such that there is a clear line of sight from the detector to the road.

Failure to adhere to this recommendation will reduce detector performance.

5.2.4.2 Detector Height

The detector may be mounted at any height between 3.3 and 4m.

5.2.4.3 Detector Angle

The initial installation angle will change depending on the installation height and road surface angle. As a guide the angle may be pre-set to:

25 degrees from horizontal

5.2.4.4 Detector Alignment - Default

The detector uses a movement detection algorithm. Thus, the detector is aimed towards oncoming traffic and towards the centre of the carriageway, at a position approximately 25 metres from the associated ‘stop line’, as shown in Figure 15 below.

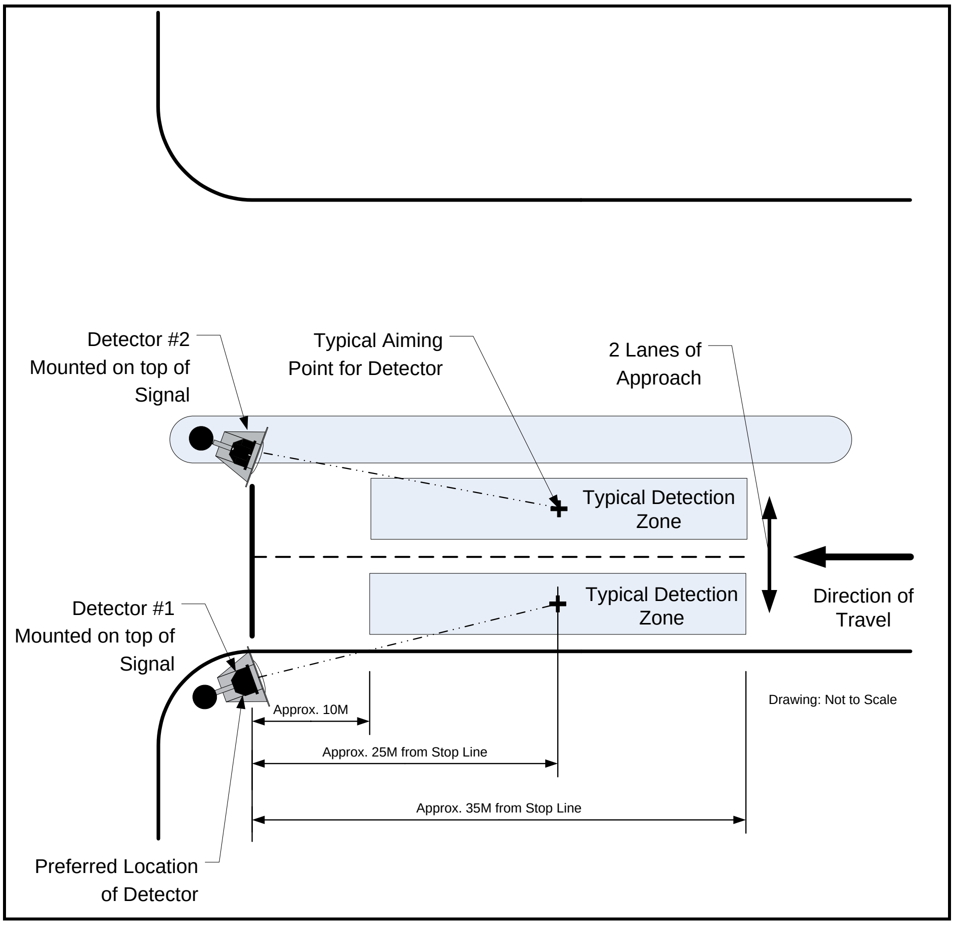


Figure 15 – Single Lane VA Detector Installation – Plan View

5.2.4.5 Detector Range - Default

The detector uses a movement detection algorithm. The range is typically set by the appropriate angle and installation height. If the user requires a significant reduction in the detection range (sensitivity), the detector configuration may be adjusted using DIP switch 6 (reference Table 5-5 below). Alternatively the terminal command RGE could be used (reference section 7.7.4). The default setting is set for maximum sensitivity.

5.2.4.6 Detector Fault Monitor (DFM)

The detector has a fault monitor function. In the default mode, the detector will generate a fault output (equivalent to a permanent detect) if the detector has not registered an activation for a period of twenty hours.

This duration can be adjusted to a user defined value by setting DIP Switch 7 to ‘1’ (On) and then using the terminal command DFM (reference section 7.7.4).

SIEMENS

5.2.5 Side Access Configuration Dip Switch Settings

Note: Default settings are with all DIP switches set to '0'/ OFF.

Configuration DIP Switch Number							
1	2	3	4	5	6	7	8
Detection Direction 0,0 = Detects vehicles moving towards unit (default) 0,1 = Detects vehicles moving away from unit 1,0 = Detects vehicles moving in both directions (single O/P) 1,1 = Detects vehicles moving in both directions (dual O/P)[1]		Detector LED 0,0 = Normal Detector O/P 0,1 = Permanently Off 1,0 = Detector O/P for 20 minutes after power applied 1,1 = Normal Detector O/P		Detection Threshold 0 = 8.5 km/h 1 = 4 km/h	Detection Range 0 = Full 1 = Reduced	DFM 0 = Default monitor time (20 hours inactivity) 1 = 'fault monitor time' is set by the Engineer's Terminal	Remote Configuration 0 = Disabled 1 = Enabled

Note: Some DIP switches may be marked with ON/OFF. For the purposes of definition, OFF is equal to 0 and ON is equal to 1.

Table 5-8 – Single Lane VA Detector Configuration Switch Settings

Refer to section 5.6 for detailed information regarding final commissioning.

[1] This option requires a special I/O board to be fitted. In this dual output mode, detector o/p 1 will detect vehicles moving towards the unit and detector o/p 2 will detect vehicles moving away.

5.3 Selectable Speed Vehicle Approach Detector Installation

5.3.1 Performance Details

Operating Range[1]:	<5 m to ~100 m from the Stop Line.
Lane Width:	Approximately 7.0m.
Vehicle Approach Speed:	8km/h (5 mph) to greater than 112km/h (70 mph)
Speed Threshold Settings:	8km/h (5 mph) to 112km/h (70 mph)2.
Detection Presence Time:	Not applicable.
Detector Location:	Can be located on either the ‘nearside’ primary signal pole or the ‘off-side’ primary signal pole.
Detector Mounting Height:	3.3m to 4.0m
Accuracy:	Not applicable.
LED Orientation:	Facing Backwards (reference section 2.3)

5.3.2 Part Number

667/1/31900/02X

Where X is;

0	Basic Detector
1	Basic Detector with RS485 (SiTOS) Serial Interface[3]
2	Basic Detector with Wireless Link Interface[4]
3	Basic Detector with a Second Solid-State Relay Output[5]
4	Basic Detector with both a Wireless Link and a Second Solid-State Relay Output[6]

Table 5-9 – Heimdall Variable Speed Threshold VA Detector Part Number

[1] Full range not available and limits are alignment dependant. Standard alignment range is 10 m to 35 m from the Stop Line.

[2] Set by DIP switch settings or via serial terminal facility

[3] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[4] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[5] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[6] This option is non-standard. Please refer to Siemens Poole for further ordering information.

5.3.3 Operating Current

The overall operating current will depend whether any additional facilities are provided. Table 5-10 below lists the typical current requirements:

24V AC Supply	143mA
24V DC Supply	113mA

Table 5-10 – Variable Speed Threshold VA Detector Operating Current

Note: When power is first applied to the detector the following surge currents are drawn from the supply:

DC Supply: 3.2 Amps (max) for < 2ms when the supply is 29V DC.

AC Supply: 4.2 Amps (max) for < 2ms when the supply is 29V AC.

If the detector has additional facilities fitted then the currents listed in Table 5-11 below should be added to those shown in Table 5-10.

Additional Facility	24 VAC	24 VDC
Siemens SiTOS Serial Interface (connected)	6 mA	5 mA
Siemens Wireless Interface (connected)	11 mA	10 mA

Table 5-11 – Additional Facilities Operating Current

Refer to Section 10 for details on power and cable length calculations.

5.3.4 Detector Installation Instructions

5.3.4.1 Detector Position

The detector should be located on a suitable mounting pole located alongside the detection zone.

The following factors may influence position:

- Line of sight obstruction such as signs, trees etc.
- More than two lanes on approach - one required on nearside pole and one on offside.
- Road layout permits better aim from offside pole.
- Cabling requirements.

Please ensure the installation location of the detector is clear from obstructions, such as signs, trees etc. such that there is a clear line of sight from the detector to the road.

Failure to adhere to this recommendation will reduce detector performance.

5.3.4.2 Detector Height

The detector may be mounted at any height between 3.3 and 4m.

5.3.4.3 Detector Angle

The initial installation angle will change depending on the installation height and road surface angle. As a guide the angle may be pre-set to:

25 degrees from horizontal

5.3.4.4 Detector Alignment - Default

The detector uses a movement detection algorithm. Thus, the detector is aimed towards oncoming traffic and towards the centre of the centre of the carriageway, at a position approximately 25 metres from the mounting pole position, as shown in Figure 16 below.

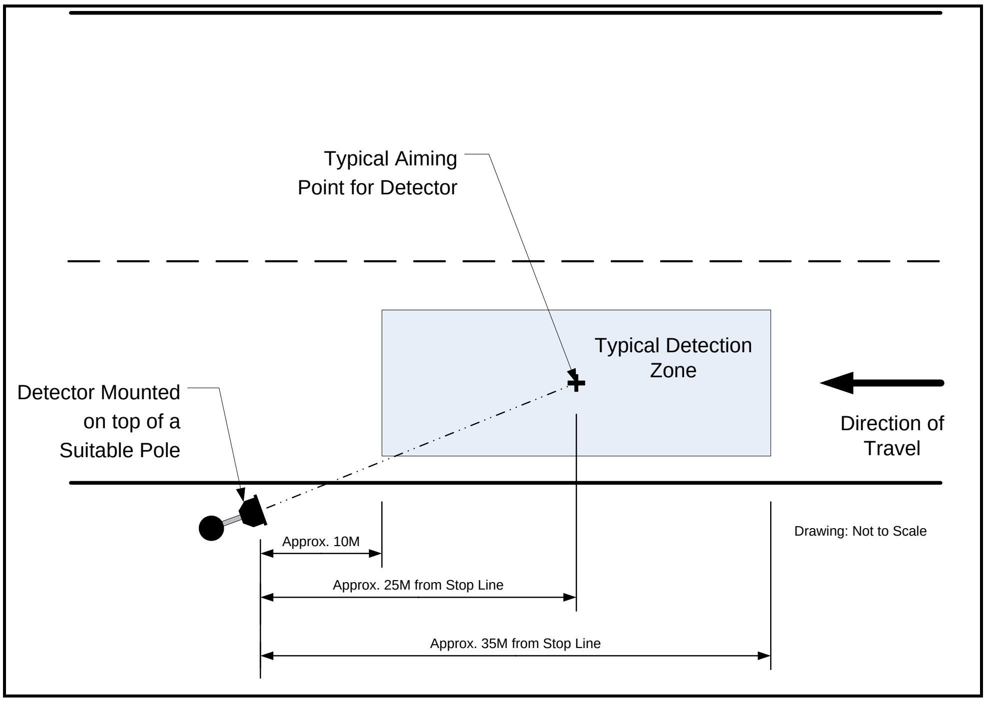


Figure 16 – Variable Speed Threshold VA Detector Installation – Plan View

5.3.4.5 Detector Range - Default

The detector uses a movement detection algorithm. The range is typically set by the appropriate angle and installation height. If the user requires a significant reduction in the detection range (sensitivity), the detector configuration may be adjusted using DIP switch 6 (reference Table 5-5 below). Alternatively the terminal command RGE could be used (reference section 7.7.4). The default setting is set for maximum sensitivity.

5.3.4.6 Detector Fault Monitor (DFM)

The detector has a fault monitor function. In the default mode, the detector will generate a fault output (equivalent to a permanent detect) if the detector has not registered an activation for a period of twenty hours.

This duration can be adjusted to a user defined value by setting DIP Switch 7 to '1' (On) and then using the terminal command DFM (reference section 7.7.4).

5.3.4.7 Output Hold Time

The detector continues to hold the detector output for a default period of 1000mS after actual object detection has ceased. This can be adjusted to an extended and user defined period by setting DIP Switch 5 to '1' (On) and using the terminal command DHT (reference section 7.7.4).

5.3.5 Side Access Configuration Dip Switch Settings

Note: Default settings are with all DIP switches set to '0'/ OFF.

Configuration DIP Switch Number							
1	2	3	4	5	6	7	8
Speed Threshold: km/h (Mph) 0,0,0,0 = 8 (5) 1,0,0,0 = 72 (45) 0,0,0,1 = 16 (10) 1,0,0,1 = 80 (50) 0,0,1,0 = 24 (15) 1,0,1,0 = 89 (55) 0,0,1,1 = 32 (20) 1,0,1,1 = 97 (60) 0,1,0,0 = 40 (25) 1,1,0,0 = 105 (65) 0,1,0,1 = 48 (30) 1,1,0,1 = 113 (70) 0,1,1,0 = 56 (35) 1,1,1,0 = 121 (75) 0,1,1,1 = 64 (40) 1,1,1,1 = Speed set by Eng. Terminal				O/P Hold Time 0 = Standard 'hold time' of 1000mS applies 1 = Terminal applied 'hold time' applies	Detection Range 0 = Full 1 = Reduced	DFM 0 = Default monitor time (20 hours inactivity) 1 = 'fault monitor time' is set by the Engineer's Terminal	Remote Configuration 0 = Disabled 1 = Enabled

Note: Some DIP switches may be marked with ON/OFF. For the purposes of definition, OFF is equal to 0 and ON is equal to 1

Table 5-12 – Variable Speed Threshold VA Detector Configuration Switch Settings

Refer to section 5.6 for detailed information regarding final commissioning.

5.4 Stop Line Presence Detector

5.4.1 Performance Details

Operating Range:	3m from the stop line
Lane Width:	Typically 3.5m
Vehicle Approach Speed:	0 km/h (0 mph) to 112 km/h (70 mph)1
Detection Presence Time:	1 to 30 minutes (default 4 minutes)
Detector Location:	Normally located on the ‘nearside’ road position or alternatively on the ‘off-side’ primary signal pole.
Detector Mounting Height:	3.3m to 4.0m.
Accuracy:	>98% accuracy on vehicle count
LED Orientation:	Facing Backwards (reference section 2.3)

5.4.2 Part Number

667/1/31900/03X

Where X is;

0	Basic Detector
1	Basic Detector with RS485 (SiTOS) Serial Interface[2]
2	Basic Detector with Wireless Link Interface[3]
3	Basic Detector with a Second Solid-State Relay Output[4]
4	Basic Detector with both a Wireless Link and a Second Solid-State Relay Output[5]

Table 5-13 – Heimdall Stop Line Presence Detector Part Number

[1] Subject to configuration (Dip switch #2 –ref Table 5-16)

[2] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[3] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[4] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[5] This option is non-standard. Please refer to Siemens Poole for further ordering information.

5.4.3 Operating Current

The overall operating current will depend whether any additional facilities are provided. Table 5-14 below lists the typical current requirements:

24V AC Supply	143mA
24V DC Supply	113mA

Table 5-14 – Stop Line Presence Detector Operating Current

Note: When power is first applied to the detector the following surge currents are drawn from the supply:

DC Supply: 3.2 Amps (max) for < 2ms when the supply is 29V DC.

AC Supply: 4.2 Amps (max) for < 2ms when the supply is 29V AC.

If the detector has additional facilities fitted then the currents listed in Table 5-15 below should be added to those shown in Table 5-14.

Additional Facility	24 VAC	24 VDC
Siemens SiTOS Serial Interface (connected)	6 mA	5 mA
Siemens Wireless Interface (connected)	11 mA	10 mA

Table 5-15 – Additional Facilities Operating Current

Refer to Section 10 for details on power and cable length calculations.

5.4.4 Detector Installation Instructions

5.4.4.1 Detector Position

The detector should be located on the nearside primary signal pole (detector #1 - Figure 17 below) for the 'nearside lane' and, as an alternative, the offside primary signal (detector #2 - Figure 17 below) for the 'outside lane'.

Please ensure the installation location of the detector is clear from obstructions, such as signs, trees etc. such that there is a clear line of sight from the detector to the road.

Failure to adhere to this recommendation will reduce detector performance.

5.4.4.2 Detector Height

The detector may be mounted at any height between 3.3 and 4m.

5.4.4.3 Detector Angle

The initial installation angle will change depending on the installation height. As a guide these are listed as:

45 degrees from horizontal

5.4.4.4 Detector Alignment

The detectors should be 'aimed' at a position approximately 1.5 metres from the associated 'stop line', toward oncoming traffic, as shown in Figure 17 below.

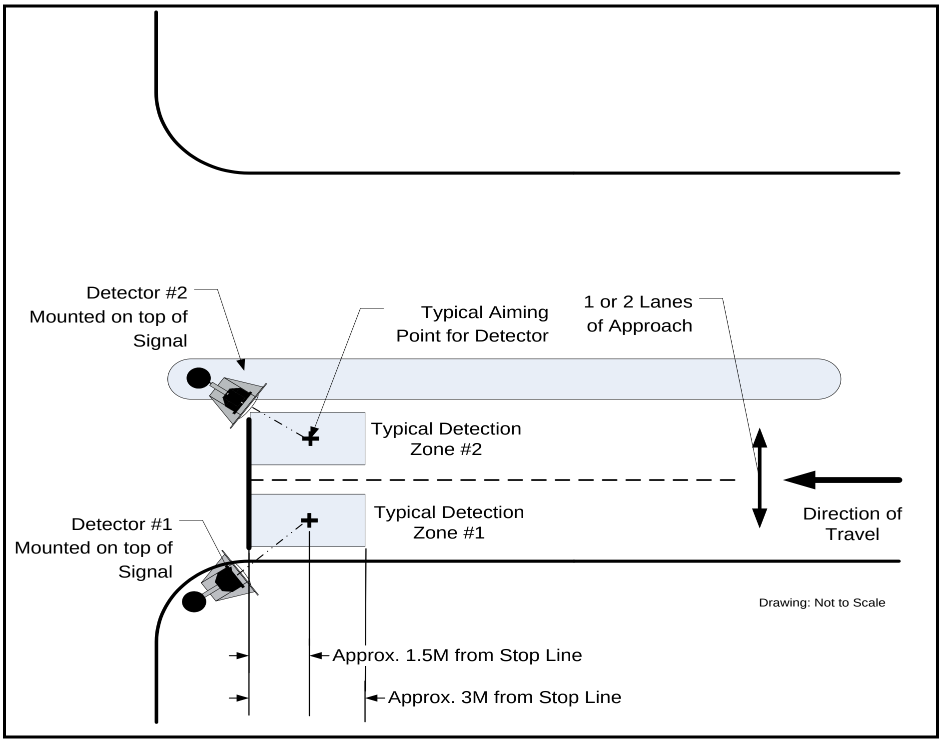


Figure 17 – Stop Line Detector Installation – Plan View

5.4.4.5 Maximum Presence Time

The maximum presence time attribute defines the period of continuous detection before the detector tunes the stationary object and detection returns to normal. The default setting is for a period of 4 minutes. However if adjustment is required, DIP switch 5 can set the maximum presence time to 30 minutes. Alternatively, if a user defined value is required, the terminal command MPT can be set to the user defined variable (reference section 7.7.4).

5.4.4.6 Detection Method

The default setting for the detector is such that both static and moving vehicles are detected. However, the user may modify the detector so that moving vehicles are filtered from the detection output. This setting can be modified using DIP switch 5 or by using the terminal command MVA (reference section 7.7.4).

5.4.4.7 Detector Fault Monitor (DFM)

The detector has a fault monitor function. In the default mode, the detector will generate a fault output (equivalent to a permanent detect) if the detector has not registered an activation for a period of twenty hours.

This duration can be adjusted to a user defined value by setting DIP Switch 7 to '1' (On) and then using the terminal command DFM (reference section 7.7.4).

5.4.5 Side Access Configuration Dip Switch Settings

Note: Default settings are with all DIP switches set to ‘0’/ OFF.

Configuration DIP Switch Number							
1	2	3	4	5	6	7	8
Not Used		Detector LED 0,0 = Normal Detector O/P 0,1 = Permanently Off 1,0 = Detector O/P for 20 minutes after power applied 1,1 = Normal Detector O/P		Maximum Presence Time 0=4 minutes (Default) 1= 30 minutes	Detection Method 0 = Static + Movement Detection (Default) 1= Static Detection Only	DFM 0 = Default monitor time (20 hours inactivity) 1 = ‘fault monitor time’ is set by the Engineer’s Terminal	Remote Configuration 0 = Disabled 1 = Enabled

Note: Some DIP switches may be marked with ON/OFF. For the purposes of definition, OFF is equal to 0 and ON is equal to 1.

Table 5-16 – Stop Line Presence Detector Configuration Switch Settings

Refer to section 5.6 for detailed information regarding final commissioning.

5.5 SCOOT and MOVA Detector

5.5.1 Performance Details

Operating Range:	Not applicable.
Lane Width:	Replicates the function of a normal single lane SCOOT or a MOVA 'in' loop.
Vehicle Approach Speed:	0 km/h (0 mph) to 112 km/h (70 mph)
Detection Presence Time:	1 to 30 minutes (4 minutes default)
Detector Location:	Normally located on the 'nearside' road position.
Detector Mounting Height:	3.3m to 8.0m[1].
Accuracy:	98% accuracy on vehicle count
LED Orientation	Facing Backwards (reference section 2.3)

5.5.2 Part Number

667/1/31900/04X

Where X is;

0	Basic Detector
1	Basic Detector with RS485 (SiTOS) Serial Interface[2]
2	Basic Detector with Wireless Link Interface[3]
3	Basic Detector with a Second Solid-State Relay Output[4]
4	Basic Detector with both a Wireless Link and a Second Solid-State Relay Output[5]

Table 5-17 – Heimdall SCOOT and MOVA Detector Part Number

[1] Actual SCOOT 'footprint' will be dependant on the mounting height.

[2] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[3] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[4] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[5] This option is non-standard. Please refer to Siemens Poole for further ordering information.

5.5.3 Operating Current

The overall operating current will depend whether any additional facilities are provided. below lists the typical current requirements:

24V AC Supply	143mA
24V DC Supply	113mA

Table 5-18 – Detector Operating Current

Note: When power is first applied to the detector the following surge currents are drawn from the supply:

DC Supply: 3.2 Amps (max) for < 2 ms when the supply is 29V DC.

AC Supply: 4.2 Amps (max) for < 2 ms when the supply is 29V AC.

If the detector has additional facilities fitted then the currents listed in Table 5-19 below should be added to that shown in .

Additional Facility	24 VAC	24 VDC
Siemens SiTOS Serial Interface (connected)	6 mA	5 mA
Siemens Wireless Interface (connected)	11 mA	10 mA

Table 5-19 – Additional Facilities Operating Current

Refer to Section 10 for details on power and cable length calculations.

5.5.4 Detector Installation Instructions

5.5.4.1 Detector Position

The detector should be located on a suitable mounting pole located alongside the detection zone.

Please ensure the installation location of the detector is clear from obstructions, such as signs, trees etc. such that there is a clear line of sight from the detector to the road.

Failure to adhere to this recommendation will reduce detector performance.

5.5.4.2 Detector Height

The detector should be located on a suitable mounting pole located alongside the detection zone. The detector may be mounted at any height between 3.4 and 8m, with the 4m height considered optimum. Ensure that the appropriate height range has been selected, using the appropriate DIP switches, as detailed in section 5.5.5 or using the appropriate terminal command DMH.

The equivalent loop length, along direction of travel, will vary depending on installation height, thus:

4m – equivalent loop size 1.8m

6m – equivalent loop size 2.3m

8m – equivalent loop size 2.7m

The factory default is for installation heights ~4.0m.

5.5.4.3 Detector Angle

The initial installation angle will change depending on the installation height. As a guide these are listed as:

4m – 50 degrees from horizontal

6m – 75 degrees from horizontal

8m – 85 degrees from horizontal

Reference section 4.7.1 for instructions on how to pre-set mounting angle

5.5.4.4 Detector Angle for Second Lane Detection

The initial installation angle will change depending on the installation height. In order to maintain a reasonable line-of-sight it is expected that second lane detection will require at least 6m installation height as a minimum. As a guide these are listed as:

6m – 50 degrees from horizontal

8m – 75 degrees from horizontal

Reference section 4.7.1 for instructions on how to pre-set mounting angle

5.5.4.5 Detector Alignment - Default

The detector default setup uses a static detection algorithm. The detector is aimed perpendicular to the traffic flow and just below the centre of the carriageway, as shown in Figure 18 below. To use this installation method, ensure DIP switch 6 is set to ‘0’, or using the appropriate terminal command ‘DAA’ is set to ‘0’[1]. This is factory default.

For optimum performance, it is recommended that this alignment is used.

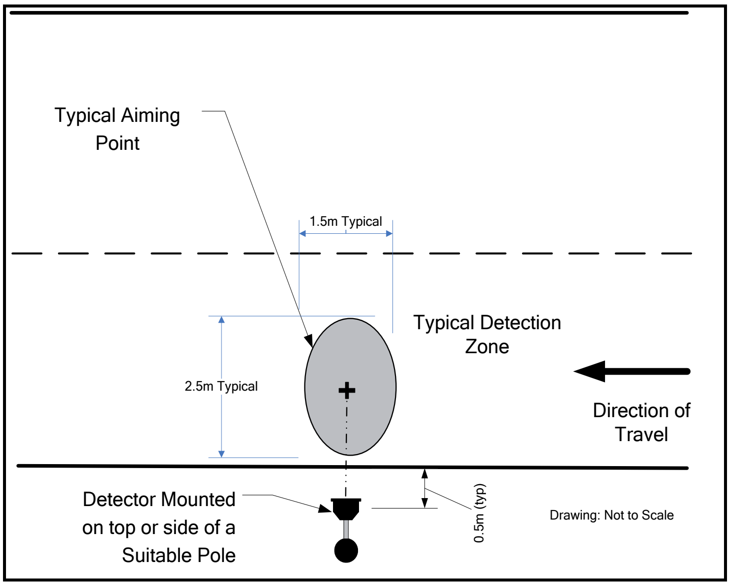


Figure 18 – SCOOT and MOVA Detector Installation – Plan View (4m installation – Static Algorithm)

[1] **Please read section 4.8 carefully to fully comprehend configuration priority**

5.5.4.6 Detector Alignment – Optional

With this optional method, the detector uses a combined ‘movement and static’ detection algorithm. In this case the detector is aimed slightly towards oncoming traffic and towards the centre of the centre of the carriageway, as shown in Figure 19 below.

To use this installation method, use configuration DIP switch 6 (set to ‘1’), or using the appropriate terminal command ‘DAA’ set to ‘1’, to activate the combined ‘movement and static’ detection algorithm[1].

For optimum performance, this alignment is not recommended. However, this alignment can be used where the users would prefer to limit detection to vehicles moving towards the detector and a drop in detection performance is acceptable. This may also be of use on installations, for example, with very narrow lanes.

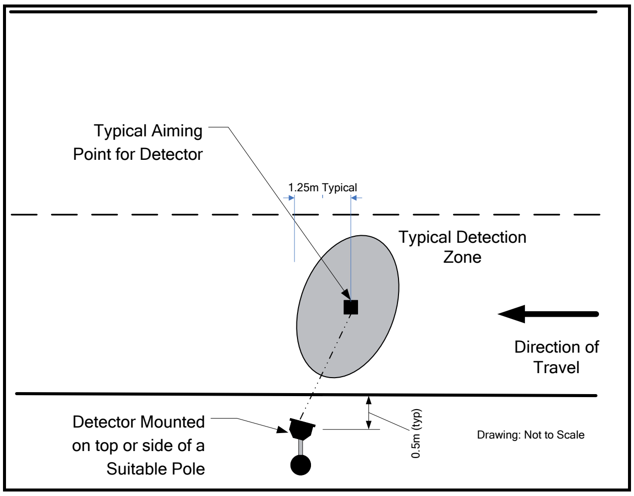


Figure 19 – SCOOT and MOVA Detector Installation – Plan View (4m installation – Static and Movement Algorithm)

[1] **Please read section 4.8 carefully to fully comprehend configuration priority**

5.5.4.7 Detector Alignment – Second Lane Detection (default)

The detector default setup uses a static detection algorithm. The detector is aimed perpendicular to the traffic flow and just below the centre of the carriageway, as shown in Figure 18 below. To use this installation method, ensure DIP switch 6 is set to '0', or using the appropriate terminal command 'DAA' is set to '0'[1]. This is factory default.

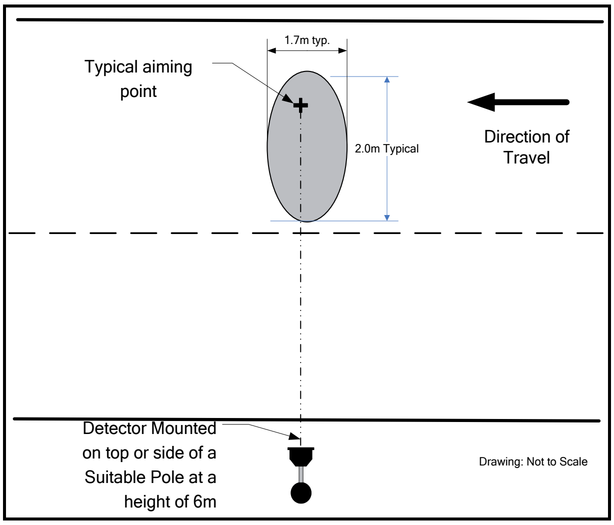


Figure 20 : SCOOT and MOVA Detector Installation – Second Lane Plan View (6m installation – Static Algorithm)

5.5.4.8 Maximum Presence Time

The maximum presence time attribute defines the period of continuous detection before the detector tunes the stationary object and detection returns to normal. The default setting is for a period of 4 minutes. However if adjustment is required, DIP switch 5 can set the maximum presence time to 30 minutes. Alternatively, if a user defined value is required, the terminal command MPT can be set to the user defined variable (reference section 7.7.4).

5.5.4.9 Detector Fault Monitor (DFM)

The detector has a fault monitor function. In the default mode, the detector will generate a fault output (equivalent to a permanent detect) if the detector has not registered an activation for a period of twenty hours.

This duration can be adjusted to a user defined value by setting DIP Switch 7 to '1' (On) and then using the terminal command DFM (reference section 7.7.4).

[1] **Please read section 4.8 carefully to fully comprehend configuration priority**

5.5.5 Side Access Configuration Dip Switch Settings

Note: Default settings are with all DIP switches set to ‘0’/ OFF.

Configuration DIP Switch Number							
1	2	3	4	5	6	7	8
Detector Height 0,0 = < 4.5 m 0,1 = 4.5m to 6.5m 1,0 = > 6.5m 1,1 = As per 0,0		Detector LED 0,0 = Normal Detector O/P 0,1 = Permanently Off 1,0 = Detector O/P for 20 minutes after power applied 1,1 = Normal Detector O/P		Maximum Presence Time 0=4 minutes (Default) 1= 30 minutes	Detection Alignment 0 = Perpendicular (static only) 1 = Angled (static + movement)	DFM 0 = Default monitor time (20 hours inactivity) 1 = ‘fault monitor time’ is set by the Engineer’s Terminal	Remote Configuration 0 = Disabled 1 = Enabled

Note: Some DIP switches may be marked with ON/OFF. For the purposes of definition, OFF is equal to 0 and ON is equal to 1.

Table 5-20 – SCOOT and MOVA Detector Configuration Switch Settings

Refer to section 6 for detailed information regarding final commissioning.

5.6 On Crossing Pedestrian Detector

5.6.1 Performance Details

Operating Range[1]:	4m to 12m.
Crossing Width:	2.4m to 4m.
Crossing Length:	Detection system can be adjusted to accommodate crossing lengths between 4m to 12m.
Detector Locations:	A typical system will comprise two Heimdall detectors located on opposite sides of the crossing.
Detection Presence Time:	Not applicable.
Detector Mounting Height:	3.3m to 4.0m.
Accuracy:	Not applicable.
LED Orientation:	Facing forwards (reference section 2.3).

5.6.2 Part Number

667/1/31900/05X

Where X is;

0	Basic Detector
1	Basic Detector with RS485 (SiTOS) Serial Interface[2]
2	Basic Detector with Wireless Link Interface[3]
3	Basic Detector with a Second Solid-State Relay Output[4]
4	Basic Detector with both a Wireless Link and a Second Solid-State Relay Output[5]

Table 5-21 – Heimdall On Crossing Pedestrian Detector Part Number

[1] Standard Alignment

[2] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[3] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[4] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[5] This option is non-standard. Please refer to Siemens Poole for further ordering information.

5.6.3 Operating Current

The overall operating current will depend whether any additional facilities are provided. Table 5-22 below lists the typical current requirements:

24 VAC Supply	167 mA
24 VDC Supply	131 mA

Table 5-22 – Pedestrian On Crossing Detector Operating Current

Note: When power is first applied to the detector the following surge currents are drawn from the supply:

DC Supply: 3.2 Amps (max) for < 2 ms when the supply is 29 VDC.

AC Supply: 4.2 Amps (max) for < 2 ms when the supply is 29 VAC.

If the detector has additional facilities fitted then the currents listed in Table 5-23 below should be added to those shown in Table 5-22.

Additional Facility	24 VAC	24 VDC
Siemens SiTOS Serial Interface (connected)	6 mA	5 mA
Siemens Wireless Interface (connected)	11 mA	10 mA

Table 5-23 – Additional Facilities Operating Current

Refer to Section 10 for details on power and cable length calculations.

5.6.4 Detector Installation Instructions

5.6.4.1 Detector Position

Each detector must be aimed at the opposite kerb as shown in Figure 24 below.

There must be no obstruction between the front face of the detector and the detection zone, i.e. no obstruction by backing boards or signal aspects. Failure to adhere to this recommendation will reduce detector performance.

The detector should normally (first choice) be located on the offside primary signal pole (ref. Figure 24). Alternatively the detector may be fitted on other poles if circumstances dictate. The following factors may influence position:

- Line of sight obstruction such as signs, trees etc.
- Road layout permits better aim from offside pole.
- Cabling requirements.

If the detector is installed alongside a Heimdall kerbside detector, using the standard Kerbside Mounting Bracket, it can be installed on one of the mounting holes halfway along its length. This is only recommended for thin crossings as the bracket can part mask wider installations. If this is the case a kerbside extension bracket can be used to move the on crossing detector to a better position.

If there is no Kerbside detector (Kerbside Mounting Bracket) fitted or if circumstances dictate, the On Crossing detector should be mounted on a standard Signal Head bracket.

The user should reference Table 9-1 - p107 for part numbers.

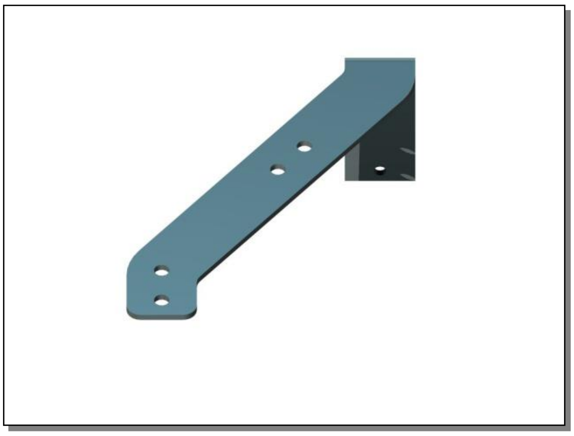


Figure 21 : Heimdall Kerbside Mounting Bracket

Figure 22 : Heimdall Kerbside Extension Bracket

5.6.4.2 Detector Height

The detector may be mounted at any height between 3.3 and 4m.

5.6.4.3 Detector Angle

The initial installation angle will change depending on the installation height and road surface angle. However, the detector is aimed towards oncoming pedestrians, at the centre line of the on crossing area and towards the far side of the carriageway, as shown in Figure 24 below.

As a starting point the mounting angle may be pre-set to:

- 25 degrees from horizontal for a 12 m crossing

Arrow pointing to 25 degrees

(One Large & Two Small Notches)

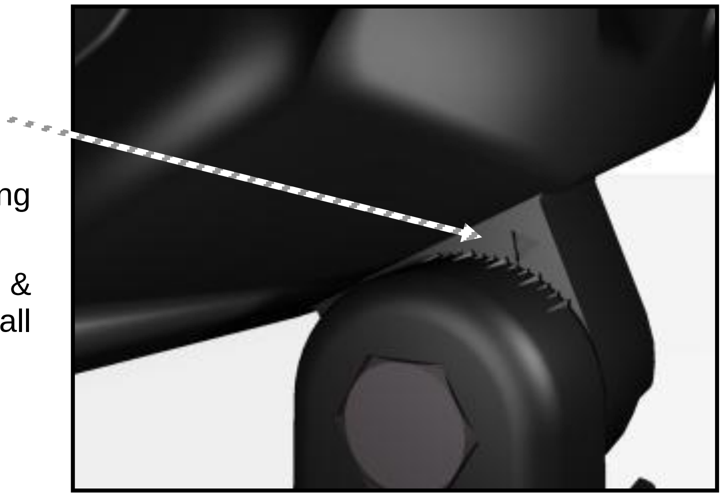


Figure 23 : Heimdall set to 25 degrees from horizontal

5.6.4.4 Detector Alignment - default

The detector uses a movement detection algorithm. Thus, the detector is aimed towards oncoming pedestrians, at the centre line of the on crossing area and towards the far side of the carriageway, as shown in Figure 24 below.

5.6.4.5 Detector Range – default

The detector uses a movement detection algorithm. Thus, the detector is aimed towards oncoming pedestrians, at the right of the centre line of the on crossing area and towards the far side of the carriageway.

If user requires increased detection sensitivity of pedestrians moving away from the detector, the detector configuration may be adjusted using DIP switch 6 (reference Table 5-24 below). Alternatively the terminal command SEN could be used (reference section 7.7.4).

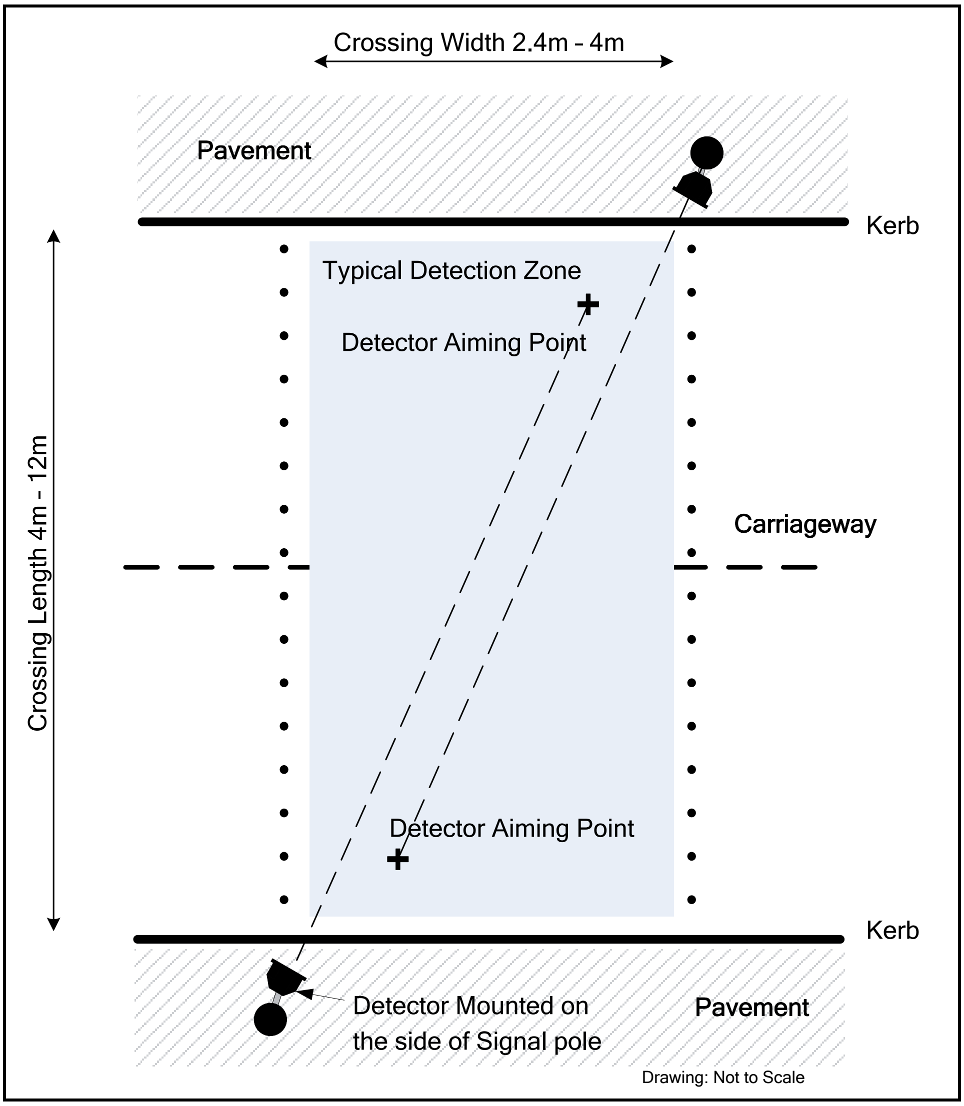


Figure 24 – Pedestrian On Crossing Detector Installation – Plan View

5.6.4.6 Detection Fault Monitor

The detector has a fault monitor function. In the default mode, the detector will generate a fault output (equivalent to a permanent detect) if the detector has not registered an activation for a period of twenty hours.

This duration can be adjusted to a user defined value by setting DIP Switch 7 to ‘1’ (On) and then using the terminal command DFM (reference section 7.7.4).

5.6.4.7 Detector Hold Time

The detector continues to hold the detector output for a default period of 600mS after actual object detection has ceased. This can be adjusted to an extended period of 2000mS by setting DIP Switch 5 to ‘1’ (On).

5.6.4.8 Installation and Commissioning Guide

Once the detector has been installed the crossing coverage must be tested, this is done by walking towards the detector.

For ease of use when testing with only one person the ‘Inline Installation Assistance Cable’, can be used to allow the detect LED to be more visible. The user should reference Table 9-1 - p107 for part numbers.

(1) From a standing position several feet back from the kerb, walk along each dotted white line either side of the crossing towards the detector.

(2) The detector should start to detect as you step off of the kerb until you get near to the opposite side in both cases. If this is not the case re-align detector and start perform step (1) again.

(3) Again from a standing point several feet back from the kerb, walk the centre of the crossing towards the detector.

(4) The detector will probably pick you up before you leave the kerb, this is perfectly normal, and should detect almost all the way across.

(5) Repeat these steps for the opposite detector to ensure the whole crossing is covered.

5.6.5 Side Access Configuration Dip Switch Settings

Note: Default settings are with all DIP switches set to ‘0’/ OFF.

Configuration DIP Switch Number							
1	2	3	4	5	6	7	8
Detection Direction 0,0 = Detects pedestrians moving in both directions (default) 0,1 = Detects pedestrians moving away from unit only 1,0 = Detects pedestrians moving towards unit only 1,1 = As per 0,0		Detector LED 0,0 = Normal Detector O/P 0,1 = Permanently Off 1,0 = Detector O/P for 20 minutes after power applied 1,1 = Normal Detector O/P		Detector Hold Time 0 = 600mS 1 = 2000mS	Detection Sensitivity 0 = Normal 1 = High	DFM 0 = Default monitor time (20 hours inactivity) 1 = ‘fault monitor time’ is set by the Engineer’s Terminal	Remote Configuration 0 = Disabled 1 = Enabled

Note: Some DIP switches may be marked with ON/OFF. For the purposes of definition, OFF is equal to 0 and ON is equal to 1.

Table 5-24 – Pedestrian On Crossing Configuration Switch Settings

Refer to section 6 for detailed information regarding final commissioning.

5.7 Kerbside Pedestrian Detector

5.7.1 Performance Details

Operating Range:	Detection system can be adjusted to accommodate crossing widths up to 4m[1].
Zone Width:	Basic detection zone width is 1.6m, with a width of 2.4m close to the mounting pole.
Zone Length:	Approximately 2.5m (can be extended to 4.5m by setting)
Detector Locations:	A typical system will comprise of a single Heimdall detector located on a pole just to one side of the push button.
Detection Presence Time:	Not applicable.
Detector Mounting Height:	3.3m to 4.0m.
Accuracy:	Not applicable.
LED Orientation:	Facing forwards (reference section 2.3)

5.7.2 Part Number

667/1/31900/06X

Where X is;

0	Basic Detector
1	Basic Detector with RS485 (SiTOS) Serial Interface[2]
2	Basic Detector with Wireless Link Interface[3]
3	Basic Detector with a Second Solid-State Relay Output[4]
4	Basic Detector with both a Wireless Link and a Second Solid-State Relay Output[5]
5	Basic Detector configured for Volumetric Analysis[6]

Table 5-25 – Heimdall Kerbside Pedestrian Detector Part Number

[1] Assumed that the mounting pole is 0.5m away from the crossing area

[2] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[3] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[4] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[5] This option is non-standard. Please refer to Siemens Poole for further ordering information.

[6] This option is non-standard. Please refer to Siemens Poole for further ordering information.

5.7.3 Operating Current

The overall operating current will depend whether any additional facilities are provided. Table 5-26 below lists the typical current requirements:

24V AC Supply	167mA
24V DC Supply	131mA

Table 5-26 – Pedestrian Kerbside Detector Operating Current

Note: When power is first applied to the detector the following surge currents are drawn from the supply:

DC Supply: 3.2 Amps (max) for < 2ms when the supply is 29V DC.

AC Supply: 4.2 Amps (max) for < 2ms when the supply is 29V AC.

If the detector has additional facilities fitted then the currents listed in Table 5-27 below should be added to those shown in Table 5-26.

Additional Facility	24 VAC	24 VDC
Siemens SiTOS Serial Interface (connected)	6 mA	5 mA
Siemens Wireless Interface (connected)	11 mA	10 mA

Table 5-27 – Additional Facilities Operating Current

Refer to Section 10 for details on power and cable length calculations.

5.7.4 Detector Installation Instructions

Note: There must be no obstruction between the front face of the detector and the detection zone, i.e. no obstruction by backing boards, signal aspects or foliage. Foliage such as trees and bushes that are within the detection zone, will mean there is a risk of false detects and possibly Permanent or no detect situations

Failure to adhere to these recommendations will reduce detector performance

5.7.4.1 Standard Detector Installation - Recommended

The standard traffic pole with the head mounted to one side is a suitable installation scenario, where the aspect (traffic light) is mounted to one side of the detector location and therefore provides for a clear view of the expected detection area.

In this situation the Kerbside should be mounted with the standard Kerbside mounting bracket, which ensures the correct mounting distance in front of the nearside. The user should reference Table 9-1 - p107 for part numbers.

Use of this bracket assumes that the pole has been installed with its mounting holes in parallel to the kerb; if this is not the case then please see section 5.7.4.3.

Figure 25, below, illustrates the recommended detector and aspect configuration for all new site installations that require a Heimdall detector Kerbside.

Figure 25 : Standard Pole configuration with Kerbside on Standard Bracket

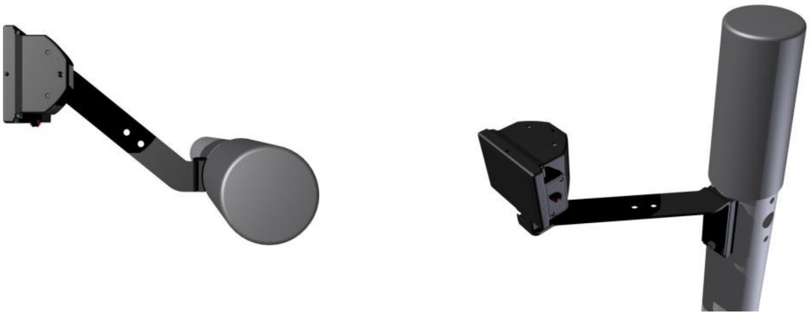


Figure 26 : Heimdall Kerbside Mounting Bracket Detail

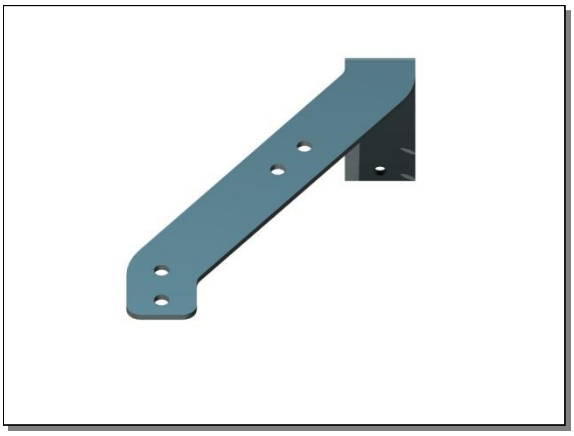


Figure 27 : Heimdall Kerbside Mounting Bracket

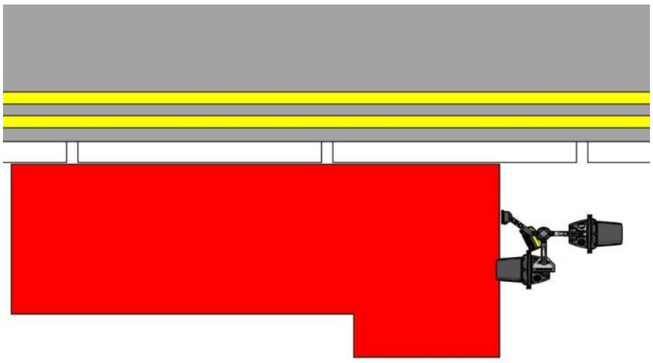


Figure 28 : Kerbside Installation Detail

5.7.4.2 Cranked Pole Installation- Recommended

The Heimdall Kerbside detector can also be installed on a cranked pole. This installation is also suitable as it ensures the detector has a clear view of the detection area. The Heimdall Kerbside extension bracket can be used in this scenario. The installer should reference Table 9-1- p107 for support equipment part numbers.

Figure 29 : Cranked Pole Kerbside Installation and Bracket Detail

5.7.4.3 General Detector Installation – Non-Ideal

It is recommended that the standard installation and cranked pole installation is used. However, if the user requires the general installation details are provided.

The Kerbside detector should be aligned downwards, to cover the area of the kerb adjacent to the crossing. The normal detector angle (pre-set at factory) is 60 degrees. The detector must be mounted so that there is no obstruction between the detector and the detection zone. Failure to adhere to this recommendation can reduce detector performance.

If the mounting pole has a near-side attached, the Kerbside detector should be mounted such that it is at least 7cm away from the side of the nearside and at least 9cm in front. See Figure 30 below.

This is normally achieved by using a standard Kerbside mounting bracket, but the extension bracket may also assist in meeting the mounting requirements. There are several mounting positions available on the standard Kerbside Mounting Bracket for the Kerbside Extension Bracket, two bolts must be used to secure the two together in all instances.

Failure to meet these mounting requirements may mean the detector will operate non-optimally and therefore performance specifications are not valid.

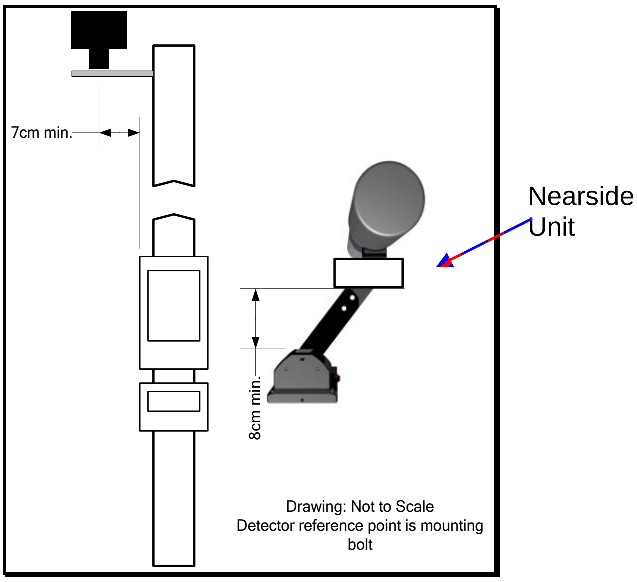


Figure 30 : Kerbside Detector Mounting Details

The optimum position for the detector is 0.75m from the edge of the carriageway. However, distances between 0.5m and 1m can be accommodated.

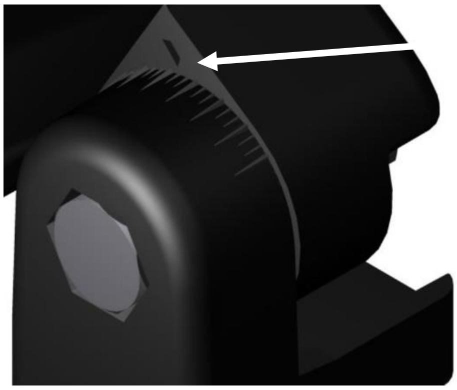
It should be aligned parallel to the kerb edge and face downwards to the aiming point as shown in Figure 32 below.

5.7.4.4 Detector Height

The detector can be mounted at any height between 3.3m and 4m.

5.7.4.5 Detector Alignment – Default

The detector is aimed at an angle of 60 degrees from the horizontal, as shown in Figure 32 below. Adjustment of this angle is not recommended and will impact on detection performance.



Arrow pointing to 60 degrees

(Four Large Notches)

Figure 31 : Angle Notches in Heimdall Detector

The detector should point along the line of the kerb from its installed position; this should allow detection up to and over the kerb.

At the closest point to the detector the zone is wider to take in the tactile paving, while the thinner end of the detection zone stretches out to the end of the zone (Maximum 4m). This can be altered using the DIP switch 6 under the side access panel, OFF is Long zone (default) while ON shortens the end part of the zone for thinner crossings.

In Figure 32 the zone is shown with the wider part nearest the detector extending into the road. This would pick up vehicles though the Heimdall software filters these out. This filter has the side effect of making the near zone smaller, DIP switch 1 can be switched to 1 to disable this filter in situations where the vehicle filter is not required and a wider near zone is desirable.

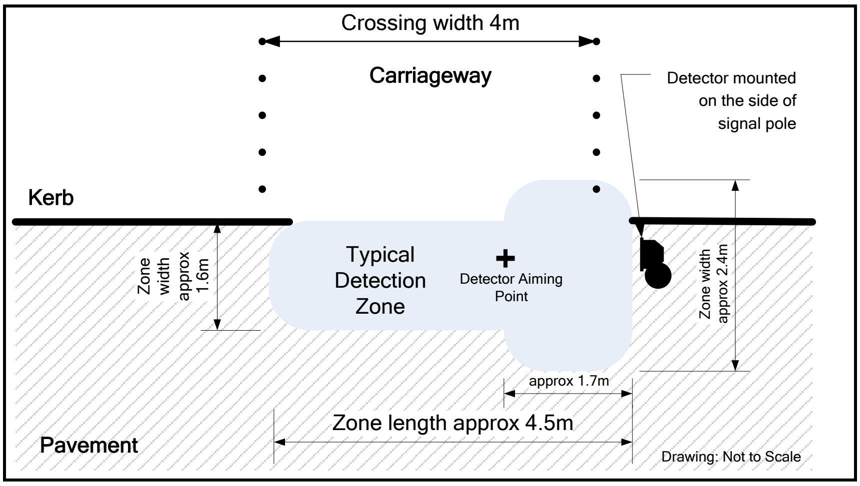


Figure 32 – Pedestrian Kerbside Detector Installation – Plan View

5.7.4.6 Detection Length

In standard installations, the detector is normally set such that detection can occur at distances up to 4.5m from the mounting pole. The will be adequate for most crossing widths. However, some crossing widths are significantly shorter. DIP switch 6, can be used to reduce the detection range to a region of approximately 2.5m from the mounting pole.

5.7.4.7 Vehicle Detection

The detector uses various detection algorithms to eliminate false detection due to vehicles. If the detector is to be installed in locations where vehicle detection is not considered an issue, the detection can have its detection sensitivity increased slightly by using DIP switch 1. It should be noted that the recommended setting will be with the vehicle detection algorithm activated (DIP Sw1 OFF).

5.7.4.8 Detector Fault Monitor (DFM)

The detector has a fault monitor function. In the default mode, the detector will generate a fault output (equivalent to a permanent detect) if the detector has not registered an activation for a period of twenty hours.

This duration can be adjusted to a user defined value by setting DIP Switch 7 to ‘1’ (On) and then using the terminal command DFM (reference section 7.7.4).

5.7.4.9 Site Calibration

The Kerbside Detector needs to be calibrated to the background noise for each site before it can work to its optimum performance. This calibration needs to be carried out for any changes of the detectors orientation or other changes to street furniture on the pole or in the zone.

The Kerbside will store the calibration information in flash memory so in event of the detector losing power it will have the same background information on power up. This background information will be updated during long periods of inactivity in the zone (at least 10 minutes) and would normally occur over night.

Once installed and aligned the following steps need to be carried out for the initial site calibration:

(1) In order to allow for single person installation, or where there is no switch to turn off the detector supply from the controller; connect the 'Inline Installation Assistance Cable' (see section 9.1 of the manual).

(2) Remove the side door and toggle switch 5 (off – on – off), replace side door (detect LED will be flashing)

(3) Move all equipment (Ladders etc.) away from zone and pole.

(4) Ensure that the zone is clear of pedestrians and that no vehicles are passing (Use of push buttons to stop traffic is recommended).

(5) Cycle the power to the detector using the 'Inline Installation Assistance Cable' or by other means if not used.

(6) Calibration will take approx. 10s, during which time both the detect LED and the output LED on the 'Inline Installation Assistance Cable' will flash several times.

(7) If the zone has been empty during this time the detectors calibration will be complete and the Zone needs to be tested.

Note: When using the Inline Installation Assistance Cable the LED will not work properly if the unused core for the detector relay is attached to ground in the pole top termination. This must be "Floating", wired in to a terminal on its own to allow the LED to operate.

5.7.4.10 Commissioning Steps

When the site calibration is complete the zone needs to be tested to ensure coverage and detection is acceptable. If the zone testing is not acceptable the detector will need to be re-aligned and recalibrated before testing again.

(1) If you are using the 'Inline Installation Assistance Cable', position it so you can view the LED from anywhere in the zone. If you have a second person to assist, ensure that they are positioned outside the detection zone.

(2) Standing sideways to the detector (facing the road) move along the kerb stopping on every other tactile paving slab for approx. 10s ensuring that the detector holds. Brief moments of non- detect are quite normal but the detector should predominantly hold on while you are in the zone.

(3) Do the same next to the push button and at various points in the expected zone.

(4) When you're happy with the performance of the detector, remove the 'Inline Installation Assistance Cable' if fitted and plug the detector back in. The detector will use the previously calibrated values when it starts back up.

(5) In cases where the detector is not performing as required, check alignment and make adjustments before performing the Site calibration and zone testing again.

In cases where the detector does not hold people in the zone, or where there are places in the zone which do not appear to detect; re-alignment of the detector will be required. On a "Standard Installation" where the standard Kerbside Mounting Bracket has been used, it may require repositioning using a Kerbside Extension Bracket. See section 5.7.4.3 for details of non- standard installations and check the distances from the nearside unit.

Where the zone edge along the kerb has poor performance then the detector can be angled in toward the road to fill this area in.

If a Basic Detector configured for Volumetric Analysis is being commissioned, the Volumetric Analysis output can be observed by comparing the output from the Handset Command 'VOD' (reference section 7.7.1) with the following table, with reference to the number of pedestrians remaining in the expected zone. Note that areas in grey indicate an acceptable variation in occupancy level for a given number of pedestrians.

Number of Pedestrians	Occupancy Level	VOD Reported Value
None	NONE	0
1, 2, 3	LOW	1
4, 5, 6	LOW or MEDIUM	1 or 2
7, 8, 9	MEDIUM	2
10, 11, 12	MEDIUM or HIGH	2 or 3
>= 13	HIGH	3

Table 5-28 – Pedestrian Zone Occupancies

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5.7.5 Side Access Configuration Dip Switch Settings

Note: Default settings are with all DIP switches set to ‘0’/ OFF.

Configuration DIP Switch Number							
1	2	3	4	5	6	7	8
Vehicle Filter 0 = Enabled 1 = Disabled	Not Used	Detector LED 0,0 = Normal Detector O/P 0,1 = Permanently Off 1,0 = Detector O/P for 20 minutes after power applied 1,1 = Normal Detector O/P		Recalibration Toggle switch (0-1-0).	Detection Length 0 = Normal 1 = Reduced Controls the effective range of the detector.	DFM 0 = Default monitor time (20 hours inactivity) 1 = ‘fault monitor time’ is set by the Engineer’s Terminal	Remote Configuration 0 = Disabled 1 = Enabled

Note: Some DIP switches may be marked with ON/OFF. For the purposes of definition, OFF is equal to 0 and ON is equal to 1.

Table 5-29 – Pedestrian Kerbside Detector Configuration Switch Settings

Refer to section 6 for detailed information regarding final commissioning.

6 COMMISSIONING

6.1 General Installation Check

The detector should have been installed as detailed in Section 4 and Section 5, which include the appropriate adjustments for the tilt / alignment to the specific point on the road surface or crossing area.

Before applying power to the Detector, ensure that the following checks are undertaken:

- Detector power leads are connected to the correct terminals within the pole;
- The correct detector relay outputs are used. For a standard detector (UK Variant) these are usually **blue and white** (i.e. closed for detect);
- The detector basic configuration dual-in-line switch located on the Digital PCB has been set correctly (refer to the sections specific to the detector).

Note: In most instances the default setting, all off (0), will be the correct setting, unless special circumstances apply. See the specific installation instructions for each particular detector to determine the correct setting.

- The Serial Communications interface terminations (if required) are connected to the appropriate signal leads within the pole;
- The Serial Communications interface Address Switch (if applicable) has been set to the correct address for that particular communications line to the associated controller (see Controller Configuration documentation).
- The wireless interface MAC address label (if supplied) is stored in a suitable location (e.g. the nearest traffic controller cabinet).

6.2 Final Commissioning Procedures

Power is applied to the unit and the operation of the detector observed by looking at the output from the indicator LED which is visible on the side door. If necessary, adjustment can be made to the alignment by:

(1) ‘Slackening off’ the mounting nut slightly,

(2) Making the minor adjustment whilst, at the same time, observing the detector operation by looking at the LED;

(3) Re-tighten the mounting nut.

The controller’s input status should then be checked to ensure the detector signal is connected as required.

Ensure the detector configuration access door is replaced correctly. Refer to appropriate detector specification (reference 5).

7 HANDSET INTERFACE

7.1 Terminal (Emulator) and a Cable Serial Interface

Either a PC or a PDA, in conjunction with appropriate terminal software[1], may be used as a terminal.

The terminal (either PC or PDA) should be connected to the Serial Interface connector on the detector using a suitable serial interface cable (667/1/31962/000).

The Detector communicates at 19200 baud using 8 data bits with **no** parity bit, **one** stop bit (8,N,1) and no 'Flow Control'.

When the Terminal is connected and the '***return***', '***enter***' or '***CR/LF***' key pressed a number of times '***SIEMENS***' should be displayed together with a prompt character ***'>'*** indicating that the terminal has been recognised and is awaiting a user commend.

The user command tables can be found in section 7.7.

7.2 Siecom and a Wireless / Cable Serial Interface

The Heimdall detector can be accessed by a wireless device using the SIEMENS Siecom Terminal application (part number 667/1/30875/000).

The following instructions assume the Siecom software has been installed on a PC or PDA, as required. For detailed Siecom installation details please refer to the Siecom users Handbook (reference section 0).

It is recommended that the appropriate Heimdall detector Equipment Definition File (EDF - 667/YK/31977/001) has been installed in order to enable access to all appropriate handset commands.

[1] Example terminal software for PC would be Hyperterm and for a PDA ZTerm.

7.2.1 Managing Sites

Prior to attempting communication with the on-site equipment, you need to create and select a 'site' definition file, using the Siecom software. A site will normally be associated with each detector location.

A ‘site’ definition file contains information on the communication method, wireless address (where appropriate), equipment type, communication settings, and any additional useful reminder information.

7.2.1.1 Site Definition File Creation

To create a new site definition file, select **Site ➔ New** from the menu. A blank site properties window is displayed allowing the site information to be entered.

Site Definition File Selection

To select an existing site definition file select **Site ➔ Open** from the menu. A file browsing window will be displayed to allow the site file to be selected. Once the file has been selected a prompt will be displayed asking if you want to connect to the site. If you are opening the site to make configuration changes or just to view the settings select the ‘No’ button. If you want to connect to the equipment select the ‘Yes’ button, see section on Site Connection 7.2.2

7.2.1.2 Saving Site Definition File Changes

To save select the menu Site ➔ Save.

7.2.1.3 Cloning a Site Definition File

It is possible to clone a site by opening an existing site definition file, changing the address and specific information and selecting **Site ➔ Save As...**

7.2.1.4 Site Definition File Properties

Info Tab:

Site Id
This is the unique site reference identifier and will be used as the default file name for the site definition file. This can also be used in scripts.

Name
A user friendly name for the site which can also be used in scripts.

Description
This gives the user information regarding equipment configuration, location, etc.

Settings Tab:

Primary Equipment File
Allows an equipment file to be specified. The primary file is configured for the equipment, whose handset port, Siecom will be connected to. In this case the Heimdall Equipment Definition file would be used. All sites must have a correctly configured primary file as this contains the information on how to talk to the specific type of equipment. When the equipment file is changed a prompt will ask if you want to use the default communication settings for the equipment. Under normal circumstances 'YES' should be selected, as this will remove the need for manual input of some of the communications settings referenced below.

Comms Tab:

Connection Type
Set the connection tab to indicate 'wireless' for wireless connections or 'direct' for cabled connection.

Address (not required for 'direct' connections)

Since the connection type is wireless then the (MAC) address of the Heimdall unit must be used. The wireless Heimdall MAC address is in the format 00:04:3E:25:XX:XX where X is a hexadecimal digit in uppercase. This address will normally be found supplied with the unit and should be stored safely (e.g. in the nearest controller cabinet). **If the MAC address has been misplaced, the unit will need to be returned to Siemens for MAC address recovery.**

The following settings are those loaded from a specified equipment file, if selected.

Baud Rate
The baud rate should be set to 19200 for correct Heimdall communications.

Data Bits
Number of data bits should be set to **8**.

Stop Bits
Number of stop bits for each byte should be set to **1**.

Parity
Type of check bit used to validate the byte should be set to **None**.

Click the OK button to close the properties window. At this point any changes are not saved. To save, select Site ➔ Save.

7.2.2 Site Connection

Once a site file has been successfully opened it is possible to connect to the equipment by selecting **Site → Connect** from the menu. For wireless connections this can take a number of seconds especially if the Bluetooth is switched off, and also depending on the current environmental conditions. It is recommended to start at a close distance for the first connection to ensure range is not an issue. Generally once the connection is established the range can be increased to a point beyond that at which an initial connection could be achieved.

If the correct EDF has been installed, a successful wireless connection will be indicated by '***SIEMENS***' together with a ***'>'*** being displayed.

If repeated connections fail, then a SOFT reset of the Pocket PC may be required.

7.2.3 Site Disconnection

Once the equipment connection is no longer required, select **Site → Disconnect** to close down the connection to the equipment.

7.3 Access Levels

This section describes how to use the terminal to view and modify data within the Detector.

There are two levels of access as follows:

Level 1 (R)	Read Only
Level 2	Modify/Initialise data items.

Access Level 1 (R)

No special access codes are required for *Access Level 1* as it is 'Read Only' and does not change any detector data/configurations etc.

Access Level 2

To enable *Access Level 2* access, enter the appropriate **'SME'** numeric code, as described in Section 7.7.2.

Level 2 access will remain enabled for approximately 20 minutes or until the terminal is unplugged or the wireless link has been disconnected. Entering the security code again will give another 20 minutes of level 2 access.

7.4 Command Format

All operator commands start with a three character command code (mnemonic) indicating the parameter to be monitored or changed. See Section 7.7 for a full list of commands.

This mnemonic is normally an abbreviation of the associated parameter making them easier to remember, for example, entering the mnemonic '**DOS**' displays the **D**etector **O**utput **S**tatus on the User Terminal.

Following the mnemonic may be one or two indexes before the required information is displayed.

For example;

SPT

After the mnemonic and the indexes (if any), the detector will display the current value of the parameter. A colon '**:**' is used to separate this from the mnemonic and indexes.

Therefore, to view the current value of the Detector **Sp**eed **T**hreshold the following command would be entered and then the result would be displayed:

Keystrokes	Display
SPT↵	SPT:50

i.e. Speed Threshold is 50 km/h

To modify the value, the full command can be entered followed by an equal sign '=' and the new value required.

Note: Write access may need to be entered first before data can be modified; see page 86, and most commands have configurable range limits to limit the range of values that can be entered.

Keystrokes	Display
SPT=60↵	SPT:60

Once the required parameter is being displayed, the value can be modified by simply entering '=' and the new value, without needing to re-enter the mnemonic and the indexes:

Keystrokes	Display
SPT↵	SPT:60
=	SPT=
55	SPT=55
↵	SPT:55

Once a command has been entered and the result is being displayed, the '**+**' and '**-**' keys can be used to display the information for the next or previous index:

Keystrokes	Display	Comment on Detected Vehicle
VCL 0↵	VCL 0:56	Vehicle Speed was 56 km/h
+	VCL 1:7	Vehicle Length was 7m
+	VCL 2:5	Vehicle Classification was 1 (truck)
-	VCL 1:7	Vehicle Length was 7m

7.5 Terminal Error Codes

If the command entered contains an error, the command is re-displayed up to the point at which the error was detected and then one of the following error codes is displayed.

For example, entering the following command results in the error message shown:

Keystrokes	Display
SPT=160↵	SPT=160*R

Table 7-1 below, lists all of the terminal error codes.

Error Code	Name	Description
*A	Access Level	Access level for this command has not been enabled.
*B	System Busy	The terminal system is still busy storing the data from the previous command into checksum protected memory.
*C	Not Configured	The facility to which the command relates is not available on this Detector.
*D	Mismatch	Detector firmware and type mismatch.
*F	Fixed Index	The + and - keys are not applicable to current command.
*I	Inaccessible	The facility to which the command relates is not accessible, i.e. Detector not configured to provide the facility or communications has with the host has failed.
*M	Mnemonic Not Recognised	The three-character command mnemonic is not recognised.
*N	Needless Index	An index (+ or -) has been added to a command without an index.
*O	Index Out of Range	The index (+ or -) entered is Out of Range for the current command.
*P	Premature End Of Line	The command line contains insufficient data, i.e. additional index or value input required.
*R	Range Error	The preceding value is out of range; i.e. is outside of the limits defined for that command.
*S	Syntax Error	Invalid character detected at the point immediately preceding the asterisk.
*U	Upload Only	The detector is in 'Firmware Upload Mode'. Only commands 'SME' and 'LNF' are recognised.
*V	Invalid Current Address	An '=', '+' or '-' operation has been attempted but no valid terminal command is currently being displayed.
*W	Write Protected	Modification of the information specified in preceding command not permitted. The information is read only.

Table 7-1 – Terminal Error Codes

7.6 Terminal Displays

In addition to the ‘static’ displays described so far, the detector may be continuously updating some outputs.

For example, entering ‘**SPD’** displays the current speed of the vehicle being detected:

Keystrokes	Display	Comment
SPD↲	`SPD:45`	First vehicle
	`SPD:40`	Second vehicle
	`SPD:33`	Third vehicle
	`...`	...

Although not clear from the above diagram, the new display will appear on the same line as the original, thus overwriting the old display, and not on the following line as the diagram may imply.

Note: Functions that have data changes which occur more often than once a second may not be accurately reflected on the terminal display. For example, if ‘DOS’ is used to display detector activations, then very short activations (<200mS) may not appear on the terminal display.

7.6.1 SieCom Implementation

The user may find they are using the Siemens SieCom interface connection with either a cable connection or a wireless link. In both cases, if a continuous updated is required the command **‘POLL’**[1] must precede the updateable command.

For example**; ‘POLL DOS’** will provide a continuous updated display of the detector output condition.

[1] This is a function of the Siecom terminal interface not the detector unit. If terminal connection is made via a normal terminal unit (e.g. hyperterminal), then the ‘POLL’ command will not be required.

7.7 Detector Terminal Handset Commands

7.7.1 Status Commands

	DESCRIPTION AND REMARKS	
DOS	DOS <Digital Output, 0 to 1>:<Status, 0 to 1> Status ‘0’= Inactive, ‘1’= ‘Active’. DOS is updated every 200mS and indicates detector states.	R
SPD	SPD:<Vehicle Speed> The speed of the current detected vehicle is displayed (km/h). **Note: Vehicle Approach, Selectable Speed and Stop Line Detectors Only**	R
VCL	VCL <Vehicle Classification, 0 to 2>:<Data> **VCL 0:**<Speed (km/h)> **VCL 1:**<Occupancy (length in metres) > **VCL 2:**<Classification, n> where n: 0=Not Relevant, 1=Car, 2=Truck, 3=Unclassified	R
VOD	VOD: <Volumetric Density Level>. VOD is updated every 200mS and indicates Pedestrian Occupancy Level, 0 = NONE, 1 = LOW, 2 = MEDIUM, 3 = HIGH **N.B. Applicable to Kerbside Detectors configured for Volumetric Analysis only.**	R

Table 7-2 – Status Commands

7.7.2 Test and Access Facilities

	DESCRIPTION AND REMARKS	
DEF	DEF:<Reset Configurations to **Def**ault, 0 to 1> **DEF=0** Normal operation (default) **DEF=1** Set the configuration values to the 'factory default' setting.	2
LED	LED:<**LED** Operation, 0 to 1> **LED=0:** LED display is as per the IND command (default) **LED=1:** LED flashes for 10 minutes to confirm Bluetooth connection. The LED will return to normal operation after ten minutes (LED: 0).	2
OHC	OHC:<**O**perating **H**ours **C**ounter, yy:ddd:hh> yy = years (00…99) ddd = days (000…364) hh = hours (00…23) OHC is an internal command that shows the time elapsed since the very first start-up or the last initialisation of the EEPROM data. The value of OHC is updated regularly in the EEPROM and survives a power cycle.	R
SME	**SME=249** Access enable code for 'Level 2'. **Notes** 1) This is the only command that can be written whilst the detector is under SiTOS control. 2) The SiTOS control is applied by using DIP switch 8 on the Digital Processor card. (I.e. Left hand card when viewed through the access door). 3) Detailed clarification can be found in section 7.3 4) Timeout i.e. SME:0 after '20' minutes of inactivity.	-
SOS	SOS:<**S**ource **o**f **S**ettings, 0 to 2> **SOS:0** Configuration DIP Switches (SW8=0, Remote Configuration disabled) **SOS:1** SiTOS (SW8=1, Remote Configuration enabled, 'SME=x', x != 249) **SOS:2** Handset Terminal (SW8=1, Remote Configuration enabled; 'SME=249') SOS is an internal command that helps to figure out which source is currently entitled to deliver configuration settings (Configuration DIP switches, SiTOS, Handset Terminal).	R

	DESCRIPTION AND REMARKS	
STE	STE:<**S**elf **Te**st Sequence, 1,2,4 or 5> **STE=1:** Basic test sequence, with manual intervention and checks. **STE=2:** Basic test sequence together with a SiTOS serial interface check. **STE=4:** Basic Tests together with tests of dual-in-line switches on Digital pcb. **STE=5:** Basic test sequence together with a SiTOS serial interface check and tests of dual-in-line switches on both PCBs**.** Self Test Facility – Reference Production Self Test Facilities Section 7.7.2.	2

Table 7-3 – Test and Access Facilities

7.7.3 Identities and Issue States

	DESCRIPTION AND REMARKS	
ADD	ADD:<SiTOS Detector **Add**ress, 0 to 31>	R
DET	DET:<**De**tector **T**ype, 0 to 7> 0 = Standard VA Approach 1 = Single Lane VA Approach 2 = Selectable Speed 3 = Stop Line 4 = SCOOT 5 = On Crossing 6 = Kerbside 7 = Traffic Data	R
BLR	BLR:<**B**oot**L**oader **R**evision, vx.yy.zzz> Example: v1.02.010 x = <main version number> (0…15 decimal) yy = <sub version number> (0…15 decimal) zzz = <build version number> (0…255 decimal)	R
PIC	PIC: <**P**rogram **I**dentity **C**ode> The Program Identity Code consists of a Part Number 'n' and a Firmware Issue Number 'vx.yy.zzz'. Example: 31900 v1.02.010 x = <main version number> (0…15 decimal) yy = <sub version number> (0…15 decimal) zzz = <build version number> (0…255 decimal)	R

Table 7-4 – Detector Identities and Issue State

7.7.4 Facilities / Equipment Configured

	DESCRIPTION AND REMARKS	
DFO	DFO:<**D**etector **F**ault **O**utput Setting, 0 to 1> **DFO=0:** Second Relay or Solid State output provides the same indication as the first (default) **DFO=1:** Second Relay or Solid State output provides the function of a 'Fault Output' indication. (See also the DFM command) **Note: If set, 'DIR 3' Command takes priority.**	2
DAA	DAA:<**D**etector **A**lignment **A**lgorithm, 0 to 1> **DAA=0:** Perpendicular to traffic flow **DAA=1:** Toward Traffic Flow **Note: Applicable to SCOOT Detector only**	2
DFM	DFM:<**D**etector **F**ault **M**onitor Period, xx:yy> xx = 0 to 23 (Monitor period in hours – default is 0) yy = 0 to 59 (Monitor period in minutes – default is 0) The default setting of 0:0 indicates that the facility is disabled. **Note: 'Hours' and 'Minutes' are separated by a colon (i.e. DFM=10:30, sets the DFM time to 10 hours and 30 minutes).**	2
DHT	DHT:<**D**etector **H**old **T**ime, 0 to 4000> Number of milliseconds after detector activation before the detector output is permitted to return to the 'non-active' state. Default is 600 mS. **N.B. Applicable to Pedestrian On Crossing Detectors only.**	2
DIR	DIR:<Target **Dir**ection, 0 to 3> **DIR=0:** Detects vehicles moving towards unit (single o/p)* (default) **DIR=1:** Detects vehicles moving away from unit (single o/p)* **DIR=2:** Detects vehicles moving in both directions (single o/p)* **DIR=3:** Detects vehicles moving in both directions (dual o/p)** * Output 1. ** Output 1 for vehicles moving towards unit, Output 2 for vehicles moving away from unit. **Note: Applicable to Standard and Single Lane Vehicle Detectors only.**	2

	DESCRIPTION AND REMARKS	
DMH	DMH:<**D**etector **M**ounting **H**eight, 0 to 2> **DMH=0:** Mounting Height #1 (<4.5m) (default) **DMH=1:** Mounting Height #2 (4.5 to 6.5m), **DMH=2:** Mounting Height #3 (>6.5m) **Note: Applicable to SCOOT Detector only**	2
IND	IND:<Detector Output **Ind**ication, 0 to 2> **IND=0** LED indicates detector output (default) **IND=1** LED permanently off **IND=2** LED indicates detector output for 20 minutes after power applied.	2
LST	LST:<**L**ow **S**peed **T**hreshold, 0 to 1> **LST=0:** 8.5 Km/h (default) **LST=1:** 4.0 Km/h **N.B. Applicable to both Standard and Single Lane Vehicle Detectors**	2
MPT	MPT:<**M**aximum **P**resence **T**ime, x,y> x,y is the time in minutes and seconds after which the detector will return to the 'in-active' state even though the vehicle may still be present. (x – time in minutes, 0 to 255; y – time in seconds, 0 to 59). Default is x= 5, y = 0. i.e. 5 minutes recovery time. **N.B. Applicable to SCOOT and Stop Line Detectors only.**	2
MVA	MVA:<**M**oving **V**ehicle **A**lgorithm, 0 to 1> **MVA=0:** Movement and Static Detection Algorithm **MVA=1:** Static Detection Algorithm (default) **N.B. Applicable to Stop Line Detectors only.**	2
RGE	RGE:<Detection **R**an**ge**, 0 to 1> **RGE=0:** Full Range (default) **RGE=1:** Reduced Range **N.B. Applicable to Standard and Single Lane Vehicle Detectors only.**	2
SDA	SDA:<**S**peed **D**etector De**a**ctivation Period, 0 to 5000> Number of milliseconds after detector activation before the detector output is permitted to return to the 'active' state. Default is 0 mS. **N.B. Applicable to Speed Detectors only.**	2

	DESCRIPTION AND REMARKS	
SEN	SEN:<**Sen**sitivity, 0 to 1> **SEN=0:** Low sensitivity (default) **SEN=1:** High sensitivity **Note: Pedestrian On-Crossing and Pedestrian Kerbside Detectors Only**	2
SPH	SPH:<Detector Output Hold Period, 0 to 5000> Number of milliseconds for which the detector will remain active after the target vehicle has passed through the detection zone. Default is 600 mS. **Note: Vehicle Approach, Selectable Speed and Stop Line Detectors Only**	2
SPT	SPT:<Speed Detector Speed Threshold, 8 to 150> Speed threshold in km/h before any target vehicles are sensed. Default is 48 km/h. **N.B. Applicable to Speed Detectors only.**	2
VEH	VEH:<**Veh**icle Filter, 0 to 1> **VEH=0:** Filter enabled (default) **VEH=1:** Filter disabled **N.B. Applicable to Pedestrian Kerbside Detectors only.**	2

Table 7-5 – Detector Facilities / Equipment Configured

7.7.5 Fault Log Commands

The fault log is described in more detail in Section 8.4.

	DESCRIPTION AND REMARKS	
FFS	FFS <Fault Flag 0 to 63>:<Value 0 or 255> <Mnemonic> View the fault log flags using the **F**ault **F**lag **S**can which only shows each fault flag status (0=inactive, 255=active) followed by a short fault mnemonic to help identify it.	R
FDS	FDS <Fault Flag 0 to 63>:<Value 0 or 255> <Mnemonic> View the fault log flags using the **F**ault **D**ata **S**can. Entering FDS <ret> will display the first active fault flag. If there are no active faults, FDS scrolls through each fault flag in turn.	R
FLD	FLD <Fault Log Index 0 to 31>:<Fault Flag 0 to 63> <Value 10 Bytes of data> View the **F**ault **L**og **D**ata associated with a particular fault. Each displayed value can be up to 10 Bytes in length.	R
FLG	FLG <Fault Log Index 0 to 31>:<Fault Flag 0 to 63> <Runtime Period (yy:ddd:hh)> This is the historic fault log. Use the '+' (plus) and '-' (minus) keys to navigate forwards and backwards in the log.	R
NFI	NFI:<**N**ext **F**ault Log **I**ndex 0 to 31> NFI is an internal command that helps to see the index of the next fault log array entry that will be used in case a new fault is to be stored. The value of NFI is stored in the EEPROM and survives a power cycle.	R
RFL	RFL:<**R**eset **F**ault **L**og, 0 to 1> Used to reset the fault log using 'RFL=1'. Response will be 'RFL:0'. Clears all the entries in the Fault Log arrays FFS and FLD. Does not affect the FLG entries.	2

Table 7-6 – Fault Log Commands

8 MAINTENANCE

Before starting any maintenance work, read the Safety Warning on page 2 of this Handbook.

8.1 Routine Maintenance Visits

The interval between visits depends on local conditions but may consist of the following:

- check the detector securing bolt to ensure it has not worked loose,
- re-align the detector if necessary,
- ensure the configuration access door is properly retained and seated,
- clean the LED indicator lens with a soft cloth to remove dirt and grime,
- check the connection lead for any damage.

8.2 First Line Maintenance

First line maintenance will be achieved on a modular replacement basis.

Check which type of detector is fitted, make a note of its alignment to the installation and only replace with a similar part. When carrying out detector maintenance or replacement, wherever possible, remove the suspect item from its mounting position and work on the ground.

Ensure the replacement detector configuration switches are set to the same positions as the original unit.

Read the accompanying installation information to see if the detector requires any additional special configuration using the terminal interface.

Install and re-align the detector to the previously noted position.

8.3 Second Line Maintenance

All faulty units should be returned for repair to the following address.

Siemens Mobility, Traffic Solutions
Sopers Lane
Poole
Dorset
BH17 7ER

8.4 Fault Log

8.4.1 Introduction

The detector's fault log holds all the faults that are currently active.

When the detector finds a fault, it sets the associated fault flag (normally to the non-zero value of 255) and may also set additional fault log data bytes.

In addition to the above fault log, which holds the currently active faults, the detector also contains an historic rolling log which records the elapsed time (in years, days and hours) that various events occurred since the unit was first powered-up. This will provide an approximate indication of the time and date that the event may have occurred.

8.4.2 Viewing the Fault Log

To display the currently active fault flags, enter 'FFS↵ or FDS↵', and for the fault data, enter 'FLD↵'.

The '+' and '-' keys can then be used to scroll through the active faults.

The FFS command provides a listing of all the possible detector faults with an indication if the fault is active or not. The '+' and '-' keys can be used to step through this array.

The FDS command provides a selective view of the Fault Log, only presenting faults that are currently active. Again the '+' and '-' keys can be used to step through this display.

8.4.3 Clearing the Fault Log

Entering 'RFL=1' will reset the fault log of any active faults that are able to be cleared.

Note: The historic rolling log is not cleared by entering RFL=1. However there will be an entry in the historic log indicating that the RFL command has been invoked.

This command should only be used after each fault log entry has been investigated.

After the RFL command has been invoked the output will indicate 'RFL: 0'. This indicated that all fault status flags have been set to zero (0). However, if the LED is not extinguished, then the fault(s) may not have cleared. Further investigation may be required to ascertain if a fault is still active.

8.4.4 Historic Rolling Log

The Heimdall detector contains a ‘rolling’ historic log that records the elapsed time when various events occurred. This elapsed time is defined as the period of time after the detector was initially installed and is presented as:

Years: Days: Hours

To display the log entries, the terminal command ‘FLG’ is used. See the ‘FLG’ command for further details on operation (reference section 7.7).

A time stamped entry is added to the log when:

- the power is switched off and back on,
- when any fault is set, e.g. ‘FFS 11 DFMT:255’
- when any fault is cleared (RFL=1)

Note: The historic log is not cleared when a new detector configuration is loaded.

To view the historic rolling log, enter the command ‘FLG↵’, and the most recent entry is displayed. Use the ‘+’ and ‘-’ keys to scroll (move) through the historic log.

If the ‘+’ key is then used then a more recent entry is displayed. If the ‘-’ key is used, then the user may scroll through the log in the reverse direction.

To move directly to the most recent entry press <SPACE>.

If the power is cycled (switched off and back on), or the handset is disconnected, then the next time that ‘FLG↵’ is entered, the most recent entry will be displayed.

The table below details the description of each possible fault flag and historic log entry.

Fault Log Index	Description	Mnemonic	Category	No. of Fault Data Bytes	Description / Data Bytes	Further Comments / Byte Parameters
0	Front End Mismatch	FRMS	Hardware	2	Wrong RF Front End. Byte 0: Detector Type Byte 1: Front End Type	Byte 0: 4 = SCOOT and MOVA Byte 1: 7 = Unsupported type
1	NF Signal Fault	NFSG	Hardware	0	I or Q channel LF signal out of range.	
2	PLL Unlocked	PLLU	Hardware	0	RF PLL is unlocked.	
3	HV Power Fault	HVPW	Hardware	0	RF front end supply voltage out of range.	
4 to 9	Reserved for future use.					
10	Cycle Time Fault	CYCT	Software	0	Measurement cycle not finished within expected time.	
11	DFM Timeout	DFMT	Software	0	No valid detection within specified DFM time.	

Fault Log Index	Description	Mnemonic	Category	No. of Fault Data Bytes	Description / Data Bytes	Further Comments / Byte Parameters
12	EEPROM Fault	EEPF	Software	2	Engineering data.	Byte 0: Function ID Error Range 0 : writeChunkHeader() 1...4 1 : writeConfigurationDataChunk() 1...3 2 : writeFaultLogDataChunk() 1...3 3 : writeFaultLogFlagStatusChunk() 1...3 4 : writeAllChunks() 1...3 5 : recalculateChunkCrc() 1...3 6 : updateConfigurationDataChunk() 1...3 7 : setDetectorType() 1...2 8 : resetFaultFlag() 1 9 : findChunk() 1...6 10 : readFaultLogEntry() 1 11 : readFaultLogFlagStatus() 1 Byte 1: Error code returned by function
13	EEPROM Invalid Configuration	CONF	Software	1	Engineering data.	Configuration Data Chunk read from EEPROM is invalid Byte 0: Error code returned by readConfigurationDataChunk() CRC failure occurred on Configuration Data Chunk in EEPROM Parameter: Error code returned by the function that reads the Configuration Data Chunk out of the EEPROM.

Fault Log Index	Description	Mnemonic	Category	No. of Fault Data Bytes	Description / Data Bytes	Further Comments / Byte Parameters
14	EEPROM Invalid Fault Data	FLTD	Software	0	Fault Log Data is invalid.	CRC failure occurred on Fault Data Chunk in EEPROM
15	Detector Type Error	DETT	Software	0	Detector Type read from EEPROM is invalid.	All three locations in EEPROM storing the Detector Type showed CRC failures. Detector goes into Detector Type Input Mode. This should occur at production time only.
16	Soft Error	SOFT	Software	0	An undetermined firmware error occurred	The external watchdog has not been reset (kicked) in time (1.6 sec).
17	Boot Loader Error	BTLD	Software	2	Boot Loader CRC failed Byte 0: Boot Loader Version low byte. Byte 1: Boot Loader Version high byte.	The F/W checks the integrity of the Boot Loader during initialisation. This fault can be registered only if the Boot Loader at least managed to positively check and start the F/W. If this fault occurs the Boot Loader has to be reprogrammed as soon as possible! Parameters: Current revision of the Boot Loader Firmware (in Flash Section A).
18-22	Reserved for future use					
23	Latest Power Up	LPRU	Info	0	Power Up indication. This information code is used to log when the last power cycle occurred.	In order to be able to monitor power-ups this information fault code has been introduced. The time stamp of this information fault code indicates the time of the last power-up with respect to the “operating hours counter”. Since this is provided for information only, the status flag of this fault will always remain cleared.

Fault Log Index	Description	Mnemonic	Category	No. of Fault Data Bytes	Description / Data Bytes	Further Comments / Byte Parameters
24	Fault Status Flag(s) Cleared	FSFC	Info	0	Fault status flag(s) cleared. This information code is used to log when the ‘reset fault log’ (RFL) was used.	Since this is provided for information only, the status flag of this fault will always remain cleared.
25	Terminal Framing Error	TRFR	Software	2	Framing error on serial handset port: Byte 0: number of Handset Framing Errors (low byte) Byte 1: number of Handset Framing Errors (high byte)	The DSP built-in UART detected a framing error on the serial input line Terminal_RX, SCIRXDA (GPIO28). Parameters: Current value of terminal framing error counter
26	SiTOS Framing Error	STFR	Software	2	Framing error on SiTOS port: Byte 0: number of SiTOS Framing Errors (low byte) Byte 1: number of SiTOS Framing Errors (high byte)	The DSP built-in UART detected a framing error on the serial input line RS485_RX, SCIRXDB (GPIO23). Parameters: Current value of SiTOS framing error counter
27	SiTOS Parity Error	STPR	Software	2	Parity error on SiTOS port: Byte 0: number of SiTOS Parity Errors (low byte) Byte 1: number of SiTOS Parity Errors (high byte)	The DSP built-in UART detected a parity error (odd number of ‘1’ bits, including parity bit) on the serial input line RS485_RX, SCIRXDB (GPIO23). Parameters: Current value of SiTOS parity error counter

Fault Log Index	Description	Mnemonic	Category	No. of Fault Data Bytes	Description / Data Bytes	Further Comments / Byte Parameters
28	Signal Interference	SGIN	Warning	0	Radar signal is corrupted.	
29	Background Invalid	BGIN	Warning	0	No valid ground tracking signal available	SCOOT/MOVA/TASS.
30	Firmware Update Started	FWST	Info	3	New firmware upload started: Byte 0: Firmware Revision (old) Byte 1: Protocol Comms Version Issue (old) Byte 2: Protocol Comms Version Sub Issue (old)	Parameters: Previous (old) firmware revision
31	Firmware Update Finished	FWFN	Info	3	A new firmware has been loaded into the flash memory Byte 0: Firmware Revision (new) Byte 1: Protocol Comms Version Issue (old) Byte 2: Protocol Comms Version Sub Issue (old)	Parameters: New firmware revision
32-63	Reserved for Future Use					

Table 8-1 – Fault Log Index

9 PART NUMBERS

Listed below are the part numbers for the Siemens Heimdall Above Ground Detector to be used as spares. See the warning on page 4 regarding the use of parts other than those listed.

Description	Part Number
Standard VA Approach Detector	667/1/31900/00x
Single Lane VA Approach Detector	667/1/31900/01x
Selectable Speed Detector	667/1/31900/02x
Stop Line Detector	667/1/31900/03x
SCOOT Detector	667/1/31900/04x
Pedestrian On Crossing Detector	667/1/31900/05x
Pedestrian Kerbside Detector	667/1/31900/06x
Detector 5Way Bulkhead 1.8m Cable Assy (standard cable)	667/1/31961/100
Detector 5Way Bulkhead 10m Cable Assy (standard cable)	667/1/31961/110
Detector 5Way Bulkhead 5m Cable Assy (standard cable)	667/1/31961/150
Detector 9Way Bulkhead 1.8m Cable Assy (used when SITOS or second isolated output required)	667/1/31961/101
Detector 9Way Bulkhead 10m Cable Assy (used when SITOS or second isolated output required)	667/1/31961/111
Detector 9Way Bulkhead 5m Cable Assy (used when SITOS or second isolated output required)	667/1/31961/151

Table 9-1 – Spare Part Numbers

All the above part numbers provide the complete detector with all connection cables and associated connectors as shown in Figure 5 and Figure 6.

9.1 Additional Part Numbers

The following table lists some additional but useful part numbers:

Description	Part Number
SieCom Terminal Interface	667/1/30875/000
SieCom Equipment Definition File (EDF)	667/YK/31977/001
Siecom Site Definition File (SDF)	667/YK/31977/002
Siecom Quick Key File (QKF)	667/YK/31977/003
Serial Interface Cable (Heimdall)	667/1/31962/000
Helios Side mount & AGD Bracket Assembly (ref. Figure 33)	667/1/30200/058
Heimdall Extension Arm Bracket Assembly (ref. Figure 34)	667/1/31941/000

Heimdall Spacer Bracket Assembly (ref. Figure 35)	667/1/31942/000
Heimdall Kerbside Mounting Bracket Kit (ref. Figure 34)	667/1/31910/000
Heimdall Kerbside Extension Bracket Kit (ref. Figure 35)	6671/31911/000
Heimdall Kerbside Straight Bracket Kit (ref. Figure 36)	667/1/31914/000
Heimdall Inline Installation Assistance Cable	667/1/31912/000

Table 9-2 – Additional Part Numbers

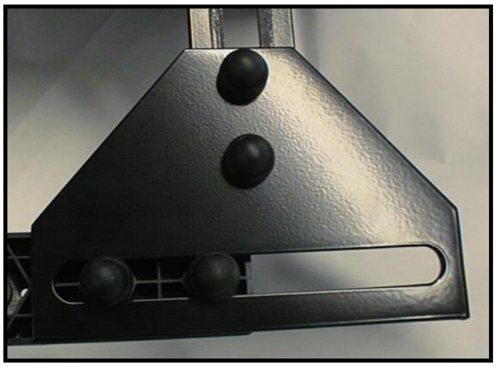

Figure 33 – Helios Side Mount & AGD Bracket Assembly (667/1/30200/058)

Figure 34 – Heimdall Extension Arm Bracket Assembly (667/1/31941/000)

Figure 35 – Heimdall Spacer Bracket Assembly (667/1/31942/000)

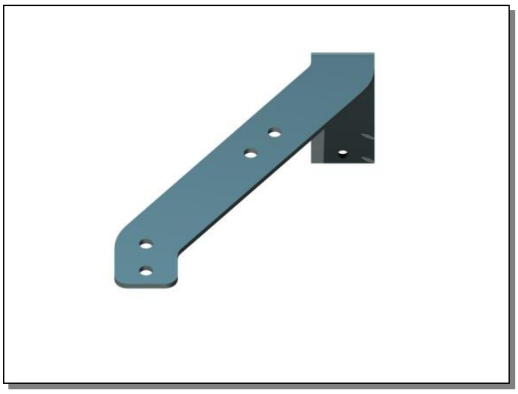

Figure 36 : Heimdall Kerbside Mounting Bracket (667/1/31910/000)

Figure 37 : Heimdall Kerbside Extension Bracket (667/1/31911/000)

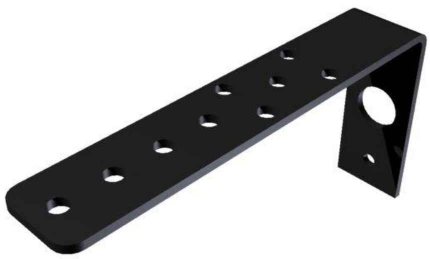

Figure 38 : Heimdall Kerbside Straight Bracket (667/1/31914/000)

10 POWER SUPPLIES AND CABLE REQUIREMENTS

10.1 Heimdall Detector Power Supply Options

The Heimdall detector may be powered by a nominal **24 volts ac or dc** supply and either method may be employed depending upon circumstances.

The Heimdall detector power supply voltage should be within **±20%** of its nominal value, i.e. **19.2v to 28.8v** dc or ac RMS, and should not be more than **29 volts** under any circumstances.

The power supply requirements for the Heimdall detectors are listed in the appropriate detector specification, Section 5.

10.2 Controller Power Supply Options

10.2.1 24V DC Supply

In general Siemens controllers are equipped with a 24 volt dc supply which is available for a small number of detectors. This supply may be used providing there is sufficient spare current capacity.

10.2.2 24V AC Supply – LV (Standard) Traffic Controllers

If the DC controller supply capacity is insufficient then an additional 24v ac voltage supply may be added.

The standard Siemens part numbers of the controller mounted AC Detector Supply kits are:-

Nominal 50 VA, (2 amps):-	667/1/27853/000
Nominal 160 VA, (6.6amps):-	667/1/20292/008

The kit contains a transformer, fusing and termination facilities.

The output of the transformer is nominally 25 volts but it will drop if the mains voltage falls to the legal minimum (207 volts, which is -10% on the standard European voltage of 230v or -13.75% on the standard UK voltage of 240v). Further voltage drops will occur due to the loading of the transformer, the initial tolerance of the transformer and the resistance of the cable.

Section 11, details the appropriate look-up tables for these transformers.

For more eccentric installations or non-standard transformer installation, section 12 details the appropriate method for calculating the appropriate cable lengths.

10.2.3 24 VAC Supply – ST900ELV Traffic Controllers

If the traffic controller is an ELV type and an additional 24v AC supply is required, the controller mounted AC Detector supply kits are;

Nominal 50VA, (2 amps):-	667/1/33075/000
Nominal 160VA, (6.6amps):-	667/1/33074/000

The kit contains a transformer, fusing and termination facilities.

Section 12 details the method for calculating the appropriate cable lengths.

11 PERMITTED CABLE LENGTH ‘LOOK-UP TABLES’

This section assumes that the standard Siemens 24v AC Detector Supply transformer is used.

The standard Siemens part numbers of the controller mounted AC Detector Supply kits are assumed to be as follows.

Nominal 50VA, (2 amps)	667/1/27853/000
Nominal 160VA, (6.6amps)	667/1/20292/008

The following tables are provided to enable a very quick assessment to be made of the suitability of a particular AC supply transformer and the required loading/cable runs.

These tables err on the ‘safe side’ and if particular installations do not fit the scenarios presented then you will have to carry out the detailed calculations described in Section 11.

How to use the tables:

Determine how many other detectors are connected to the particular transformer.

Select the most appropriate table based on ‘point 1’ above. If there is no exact match with the tables given choose the next highest.

Determine how many detectors are to be connected to the cable in question.

Determine the required cable length.

The table can then be viewed to see if standard ‘Serial’ (S) or ‘Parallel’ (P) supply feeds should be used. A ‘Blank’ box is shown for situations which cannot be supported and a re-design is necessary or a more detailed calculation is required, as described in Section 11.

11.1 Cable Type

Throughout these sections it is assumed that the installation has been completed with a supply and return cable of 1 mm^2.

11.2 Detector Lookup Tables Using a 50VA Transformer

		No other Heimdall Detector connected to the transformer						1 other Heimdall Detector connected to the transformer					
		Detectors on Cable						Detectors on Cable					
		1	2	3	4	5	6	1	2	3	4	5	6
Cable Length	50m	S	S	S	S	S	S	S	S	S	S	S	S
	100m	S	S	S	S	P	P	S	S	S	S	P	P
	150m	S	S	S	P	P		S	S	S	P	P	
	200m	S	S	P	P			S	S	P	P		
	250m	S	S	P				S	P	P			

		2 other Heimdall Detectors connected to the transformer						4 other Heimdall Detectors connected to the transformer					
		Detectors on Cable						Detectors on Cable					
		1	2	3	4	5	6	1	2	3	4	5	6
Cable Length	50m	S	S	S	S	S	S	S	S	S	S	S	P
	100m	S	S	S	P	P	P	S	S	S	P	P	
	150m	S	S	P	P			S	S	P	P		
	200m	S	S	P				S	P	P			
	250m	S	P	P				S	P				

		6 other Heimdall Detectors connected to the transformer						8 other Heimdall Detectors connected to the transformer					
		Detectors on Cable						Detectors on Cable					
		1	2	3	4	5	6	1	2	3	4	5	6
Cable Length	50m	S	S	S	S	P	P	S	S	S	S		
	100m	S	S	S	P			S	S	P	P		
	150m	S	S	P				S	P	P			
	200m	S	P					S	P				
	250m	S	P					S	P				

		10 other Heimdall Detectors connected to the transformer						12 other Heimdall Detectors connected to the transformer					
		Detectors on Cable						Detectors on Cable					
		1	2	3	4	5	6	1	2	3	4	5	6
Cable Length	50m	S	S										
	100m	S	S										
	150m	S	P										
	200m	S	P										
	250m	P											

11.3 Detector Lookup Tables Using a 160VA Transformer

		No other Heimdall Detector connected to the transformer						1 other Heimdall Detector connected to the transformer					
		Detectors on Cable						Detectors on Cable					
		1	2	3	4	5	6	1	2	3	4	5	6
Cable Length	50m	S	S	S	S	S	P	S	S	S	S	S	P
	100m	S	S	P	P	P		S	S	P	P	P	
	150m	S	P	P				S	P	P			
	200m	S	P	P				S	P				
	250m	S	P					S	P				

		2 other Heimdall Detectors connected to the transformer						4 other Heimdall Detectors connected to the transformer					
		Detectors on Cable						Detectors on Cable					
		1	2	3	4	5	6	1	2	3	4	5	6
Cable Length	50m	S	S	S	S	S	P	S	S	S	S	P	P
	100m	S	S	P	P	P		S	S	P	P		
	150m	S	P	P				S	P	P			
	200m	S	P					S	P				
	250m	S	P					P	P				

		6 other Heimdall Detectors connected to the transformer						8 other Heimdall Detectors connected to the transformer					
		Detectors on Cable						Detectors on Cable					
		1	2	3	4	5	6	1	2	3	4	5	6
Cable Length	50m	S	S	S	S	P	P	S	S	S	S	P	P
	100m	S	S	P	P			S	S	P	P		
	150m	S	P	P				S	P				
	200m	S	P					S	P				
	250m	S						P					

		10 other Heimdall Detectors connected to the transformer						12 other Heimdall Detectors connected to the transformer					
		Detectors on Cable						Detectors on Cable					
		1	2	3	4	5	6	1	2	3	4	5	6
Cable Length	50m	S	S	S	S	P	P	S	S	S	P	P	P
	100m	S	S	P	P			S	S	P			
	150m	S	P					S	P				
	200m	S	P					S					
	250m	P						P					

12 CALCULATING PERMISSIBLE DETECTOR SUPPLY CABLE LENGTHS

This section can be used to calculate the permissible cable lengths for non-standard installation requirements, for example the ST900 ELV detector supply kits.

12.1 General Considerations

When considering power supply needs for the Heimdall detector, care must be taken to ensure that all power losses are taken into account. This is particularly true for supply feeder runs to each detector.

The following rules must be followed for each installation:

- The minimum allowed voltage at any time on any detector is 19.2 volts
- This voltage applies at the minimum mains voltage of 207 volts (which is -10% on the standard European voltage of 230v or -13.75% on the standard UK voltage of 240v).
- This voltage applies when the transformer is loaded with all the installed detectors volts (if applicable).
- The detector interface cable resistance must be allowed for in calculating the maximum permissible cable lengths.

The following fixed parameters will need to be applied to all calculations:

- The supply and return resistance for a 1 mm2 cable is 0.042 ohms per metre.
- Transformer secondary winding resistance
- Worst case no-load voltage
- Maximum supply current.

For the Siemens supplied 24 AC Detector Transformers the following table can be consulted.

Kit		**160VA LV Supply 667/1/20292/008**	**50VA LV Supply 667/1/27853/000**
Transformer Part Number		667/7/15855/005	667/7/00977/007
Resistance	Rs	0.309 ohms	1.3 ohms
Worst case no-load voltage at 207 volts mains (i.e. 230v -10%)	Vmin	21.26v	23.13v
Maximum current	Imax	6.6 A	2 A

Table 12-1 – Siemens AC Detector Supply Specification

For the Siemens supplied ELV detector power extension kit the following table can be consulted.

Kit		**160VA ELV Supply 667/1/33074/000**	**50VA ELV Supply 667/1/33075/000**
Transformer Part Number		667/7/15855/024	667/7/00977/024
Resistance	Rs	0.309 ohms	1.3 ohms
Worst case no-load voltage at 207 volts mains (i.e. 230v -10%)	Vmin	21.26v	23.13v
Maximum current	Imax	6.6 A	2 A

Table 12-2 – Siemens AC Detector Supply Specification

12.2 Method Outline

The voltage falls by **Rs** in (e.g. in Table 12-1**)** for each amp of current drawn from the transformer. For each individual cable there is a voltage drop down the cable of **0.042 volts** for each go-and-return metre of (1 mm^2) cable. Therefore the current must be calculated for each cable run using the current per detector shown in , Section 3, for each detector (I_s). The total current must then be calculated for all detectors supplied from the transformer. The maximum length of cable can be then calculated.

12.3 Calculating Cable Lengths

12.3.1 24V DC Supply Feed

When the Heimdall Detector is powered from the associated controller's 24V DC supply first calculate the total detector supply load. This must not exceed the limits of that available for this particular installation.

Check that the minimum supply voltage at this load is greater than the detector minimum voltage of 19.2V.

For each detector supply cable calculate:

Maximum cable length = **Vs (min) - 19.2**

total cable current x 0.042

Where: Vs = 24V PSU output voltage negative tolerance.

0.042 = cable resistance in ohms per metre.

If longer cables are required, the arrangements must be revised. For example by using two cable cores in parallel the maximum cable length changes to:

$$\frac{\textbf{Vs (min) - 19.2}}{\textbf{total cable current x 0.021}}$$

12.3.2 24V AC/DC Transformer Supply Feed

In order to use the Siemens Detector transformers it is necessary to perform specific calculations to ensure that the minimum supply voltage to the Heimdall detector is maintained under all circumstances.

To assist the reader quick reference 'look-up tables' are included in Section 11 of this document to provide the answer for installations where the same detector type is connected to the supply cable being considered. If more complicated installations are being considered then the procedures detailed below must be followed.

First calculate the lowest transformer voltage under worst case conditions using the **total** transformer current (i.e. the total supply current for all detectors installed):

V Xmfr (min) = Vs(min) - (Rs x total transformer current in Amps)

Where: V Xmfr (min) = the minimum transformer secondary voltage at full detector load.

Vs (min) = the minimum transformer secondary voltage at no load and minimum mains voltage.

Rs = the transformer secondary winding resistance.

Then subtract the minimum voltage at which the detector will work (19.2 volts). This gives the maximum voltage drop which can be allowed in any cable.

Max allowed voltage drop = V Xmfr (min) - 19.2

The maximum allowable length for each cable can then be calculated:

Maximum cable length = __V Xmfr (min) - 19.2 _

total cable current x 0.042

(0.042 is the cable resistance in ohms per metre)

If longer cables are required, the arrangements must be revised. For example by using two cable cores in parallel the maximum cable length changes to:

_ V Xmfr (min) - 19.2 _

total cable current x 0.021

Running separate cables to each post improves the situation since the calculation applies to each cable, so that each cable will take less current. All loads on each cable must be allowed for including pedestrian crossing detectors and kerbside detectors.

Where the situation is more complicated due to sharing of cables it will be necessary to calculate the voltage at each detector - **This voltage must be at least 19.2 volts**.

The voltage at the end of any single cable is given by subtracting 0.042 x the length of the cable in metres x the current in the cable from the voltage at the start of the cable. This applies to 1 mm^2 cable with a separate return conductor for each run. This is based on the out-and-return resistance of the cable being 0.042 ohms per metre.

The calculations may be worked out using the tabular form shown below:

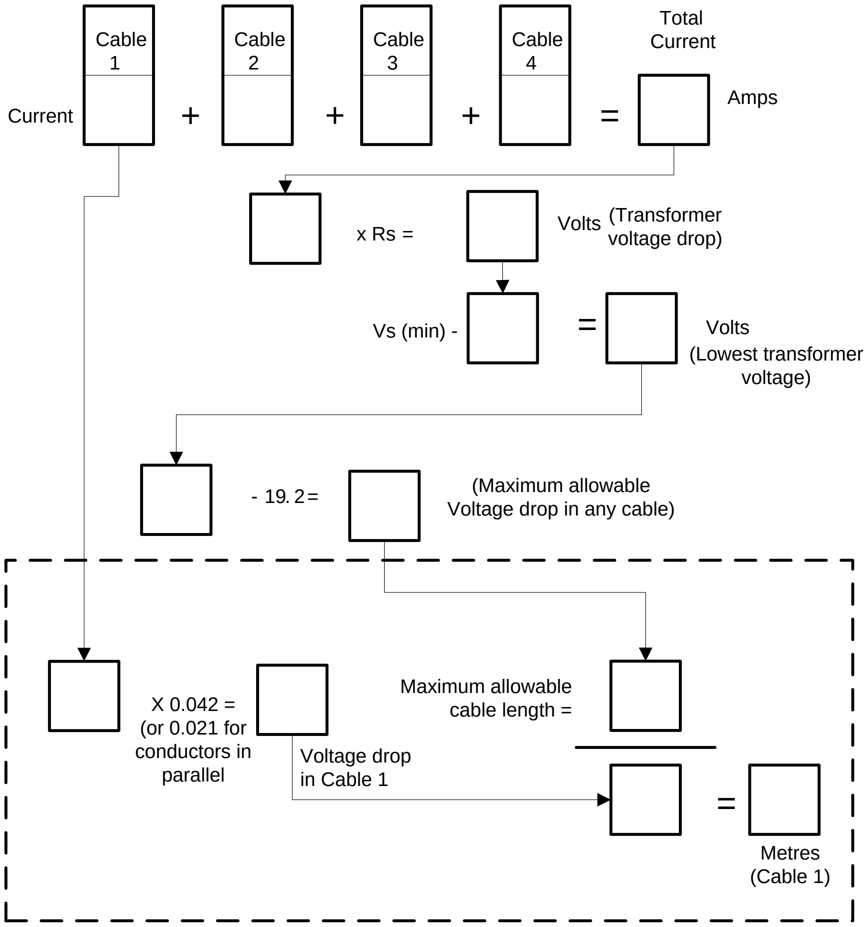

Table 12-3 - Calculation of Maximum Cable Length (Controller-mounted AC supply)

Note: The above chart yields the maximum length of one cable. The calculation within the dashed area must be repeated for the other cables.

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