

# User Handbook for Pedestrian Countdown at Traffic Signals (PCaTS)

Document no.  
**667/HB/52500/000**

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Security classification	Unrestricted	Page	1 of 35
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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 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 Handbooks associated with this equipment.
- (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 or 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 movement. If using a ladder near a carriageway ensure that the work area is properly signed and coned..
- (10) Any personnel working on site must wear the appropriate protective clothing with high visibility jackets and safety boots as a minimum.

Security classification	Unrestricted	Page	2 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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## 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.

Security classification	Unrestricted	Page	3 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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**MAINTENANCE PROVISION (MP)**

**Product Reference**

Pedestrian Countdown at Traffic Signals – 667/1/52500/ETC.

**Installation and Commissioning**

Methods of installation, configuration and commissioning are described in this handbook.

**Spares and Maintenance**

The PCaTS system elements are designed for ‘return to base’ repair.

**Modifications**

There are no approved modifications for this product.

**Warning**



Use of components other than those indicated within this document or modifications or enhancements that have not been authorised by Siemens will invalidate Type Approval of this product.

**Informative**



In the UK PCATS are only legislated for installation with Farsided Pedestrian signals with a fixed blackout period.



PCATS is designed to countdown “fixed periods” any period which it is intended to countdown that varies by more than 0.5 seconds (in the UK version), and by more than the selected “Max variation” period in the Non UK / Export version, will cause the countdown to blank and re-learn the period, it will not re-start countdowns until it has seen the period that it is intended to countdown, fixed for two consecutive periods.

Security classification	Unrestricted	Page	4 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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## CONTENTS:

<b>1</b>	<b>Introduction</b>	<b>7</b>
1.1	Purpose & Scope	7
1.2	Document Specific Abbreviations and Definitions	7
1.3	References	8
<b>2</b>	<b>General description</b>	<b>9</b>
2.1	The PCaTS Unit	9
2.2	Basic operation	10
2.3	Identification Label	10
2.4	Interfaces	10
2.4.1	External Interface	10
2.4.2	Internal (system) Interfaces	11
2.5	Product Options	12
2.6	Standard PSU Options	12
2.7	Family Tree	13
2.8	Export (Non UK) PCATS	14
<b>3</b>	<b>General Specifications</b>	<b>15</b>
3.1	Electrical Specifications	15
3.1.1	Operating Voltage	15
3.1.2	Monitoring Voltage Ranges	15
3.1.3	Power Consumption (08 Displayed in Bright mode)	15
3.2	Optical Performance	16
3.3	Mechanical Specifications	16
3.3.1	Weight	16
3.3.2	Dimensions	16
3.4	Environmental Specifications	16
3.4.1	Operating Temperature	16
3.4.2	Environmental Rating	16
3.4.3	Vibration	16
3.5	EMC Specifications	16
3.6	Approvals and Highways Specifications	17
3.7	Environmental Directives	17
3.8	Product Safety	17
<b>4</b>	<b>General Installation Instructions</b>	<b>18</b>
4.1	Introduction	18
4.2	Power Supply Options	18
4.3	Tools Required	19
4.4	Mounting Instructions	19
4.5	TfL Installation	19
4.6	Standard Installation Method	19
4.6.1	Pole Works	19
4.6.2	Final Cabinet Wiring Works	20
4.7	Export (Non UK) PCATS Operation	23
4.7.1	Modes available (Export version)	24
4.7.2	Selection of modes (Export version)	26
<b>5</b>	<b>Commissioning</b>	<b>27</b>
5.1	Introduction	27
5.2	Final Commissioning Procedure	27
<b>6</b>	<b>Maintenance</b>	<b>28</b>
6.1	Routine Maintenance Visits	28
6.2	First Line (Fault Finding)	28
6.2.1	Fault Indicator Table	28
6.2.2	Fault Log	30
6.2.3	Status LEDs and meanings	31

Security classification	Unrestricted	Page	5 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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6.3	First Line (Replacement) .....	32
6.4	Second Line Maintenance .....	32
<b>7</b>	<b>Disposal.....</b>	<b>33</b>
7.1	Under Maintenance Contract.....	33
7.2	End of Life and Scrapping .....	33
<b>8</b>	<b>Part Numbers and Spares List.....</b>	<b>34</b>
8.1	Spares Available for Order .....	34

## FIGURES:

Figure 1	: CAD Model of PCaTS Unit.....	9
Figure 2	: PCaTS Rating Label.....	10
Figure 3	: External Interface Connector .....	10
Figure 4	: PCaTS Flying Lead .....	11
Figure 5	: Outline of PSU Installation Instructions (667/GA/33198/002).....	21
Figure 6	: PCaTS Unit .....	34
Figure 7	: Front Door Assembly (Order No. 667/1/52520/000) .....	35
Figure 8	: Interface Cable Assembly (Order No. 667/1/52535/000) .....	35
Figure 9	: 48VDC PSU Kit (Order No. 667/1/33198/002).....	35
Figure 10	: Hood Kit (Order No. 667/2/33166/000).....	35
Figure 11	: Helios Fixing Kit (Order No. 6674/1/52530/100) .....	35

## TABLES:

Table 1	- Issue History .....	6
Table 2	- Abbreviations and Definitions .....	7
Table 3	- References.....	8
Table 4	- Critical Fault Log.....	29

## CHANGE HISTORY:

Issue	Change Reference	Date
1	First Issued	Oct 2015
2	Information added for the new Export functionality	June 2016

**Table 1 - Issue History**

# 1 Introduction

## 1.1 Purpose & Scope

The UK PCaTS display units are used on 'far sided' pedestrian signal crossings to indicate the remaining duration of the pedestrian blackout period. They are particularly beneficial when the blackout period is long and give pedestrians an exact indication of the number of seconds remaining before the pedestrian red man will appear, allowing them to clear the crossing safely, before vehicles start to encroach on the crossing space.

The Export PCaTS display units can be used on pedestrian or traffic signals. The Export PCaTS allows the user to determine the aspect periods for which countdowns are displayed.

The PCaTS unit is designed and manufactured such that it provides or meets the following;

- Excellent visual performance and enhanced sun phantom immunity
- Plug and Play installation – no configuration required
- Compatible with LV and ELV traffic Signal installations
- Supports signal dimming
- Compatible with Helios and PEEK Elite traffic signal bodies
- Approved to TR2581A.

This handbook provides a general description of the Pedestrian Countdown at Traffic Signals (PCaTS) installation, commissioning, operation and maintenance methods.

## 1.2 Document Specific Abbreviations and Definitions

See the TS Engineering Glossary, [see section 1.5 References]

Abbreviation	Explanation
TS	Siemens Traffic Solutions
PCaTS	Pedestrian Countdown at Traffic Signals
ADC	Analogue to Digital Converter
TfL	Transport for London
GSPI	Gemini Serial Peripheral Interface
ICT	In Circuit Test

**Table 2 - Abbreviations and Definitions**

### 1.3 References

No.	Reference	Title	Ver.	Located
1.	QAPROC-01-000	TS Engineering Glossary	Latest	Meridian
2.	667-QP-52500-000	Quality Assurance Plan for PCaTS	Latest	Meridian
3.	TR2581A	Performance Specification for Pedestrian Countdown units for use at Traffic Signals	August 2011	Highways Agency
4.	TfL PCaTS spec	TfL PCaTS procurement specification	V03i	TfL
5.	TfL PCaTS test spec	TfL PCaTS testing schedule	V2.0.0	TfL
6.	GN31	Electrical Design Team guidance Notes PCaTS	Iss 1 V5	TfL
7.	667/CI/52500/ETC	Installation Instructions – PCATS	1	Meridian
8.	667/HQ/52500/000	PCaTS quick start guide	1	Meridian

**Table 3 - References**

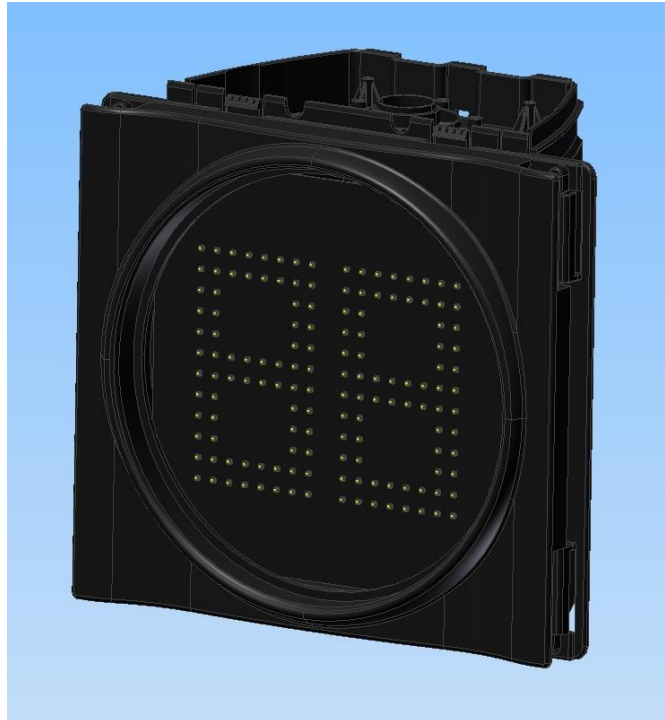


## 2 General description

### 2.1 The PCaTS Unit

The PCaTS unit is a two digit countdown timer that interfaces with far-side pedestrian signals and counts down the blackout time between the Green man going out and the Red man illuminating.

It is designed to be mounted to one side of the Green Man. In most installations it will site to the right of the Green Man.



**Figure 1 : CAD Model of PCaTS Unit**

Note:- This unit can also be configured for export purposes this export version, allows the selection of countdown for different lamp sequence periods i.e. not just black out. In this case references to the Red man or Green man should simply be considered as references to Red and Green aspects.

The main features of this unit are as follows:

- A low cost combined LV & ELV Far-side countdown timer.
- The timing is derived from a self-learning function
- Suitable for use with Siemens Helios and Peek Elite Signals.
- Can be powered from a 48V DC supply or a 24V AC/DC detector supply.
- A single Galvanically isolated fault contact output.
- Clear two digit display using Amber LEDs.
- Fault LEDs visible from outside the unit.
- Red and Green monitored aspects are not loaded so that controller lamp monitoring is not affected. (Galvanically Isolated)
- Minimal configuration required.

Security classification	Unrestricted	Page	9 of 35
Version	2	Status	Issued
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Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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## 2.2 Basic operation

Siemens PCaTS operates during the 'Blackout period' to provide a countdown of the remaining time for safe crossing. The 'Blackout period' is the time between the Greenman extinguishing and the Redman illuminating. PCaTS circuitry constantly monitors the Redman and Greenman signals and automatically learns the time for the blackout period and hence determines the countdown. From power up PCaTS may take up to four pedestrian cycles to learn the blackout period.

Siemens PCaTS also monitors the voltage of the Redman and Greenman inputs to determine whether to display in Bright or Dim mode.

In addition the Siemens PCaTS will automatically detect and operate with either LV or ELV systems without any additional configuration.

## 2.3 Identification Label

Each unit has a identification/rating label affixed to the inside of the unit which identifies the part number, serial number, rating and where applicable any optional extras.

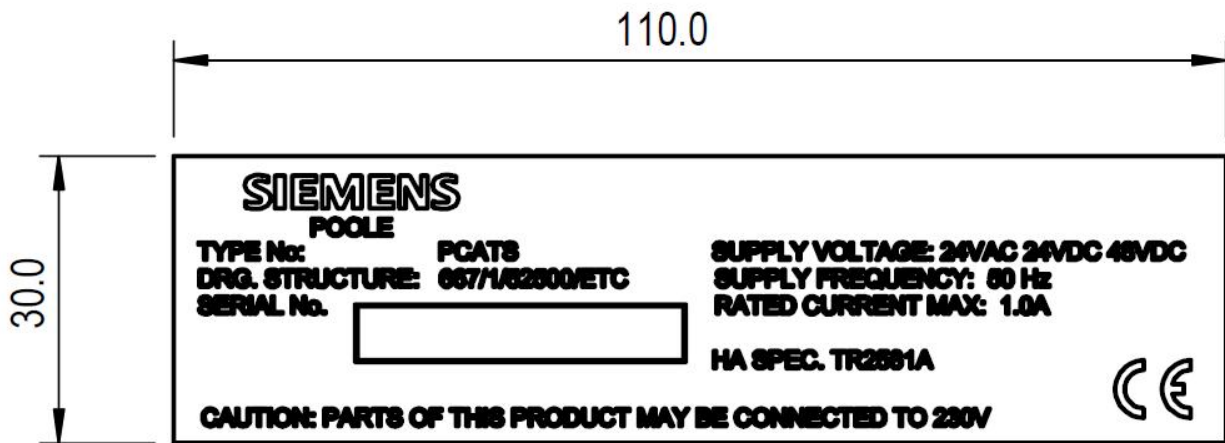


Figure 2 : PCaTS Rating Label

## 2.4 Interfaces

### 2.4.1 External Interface

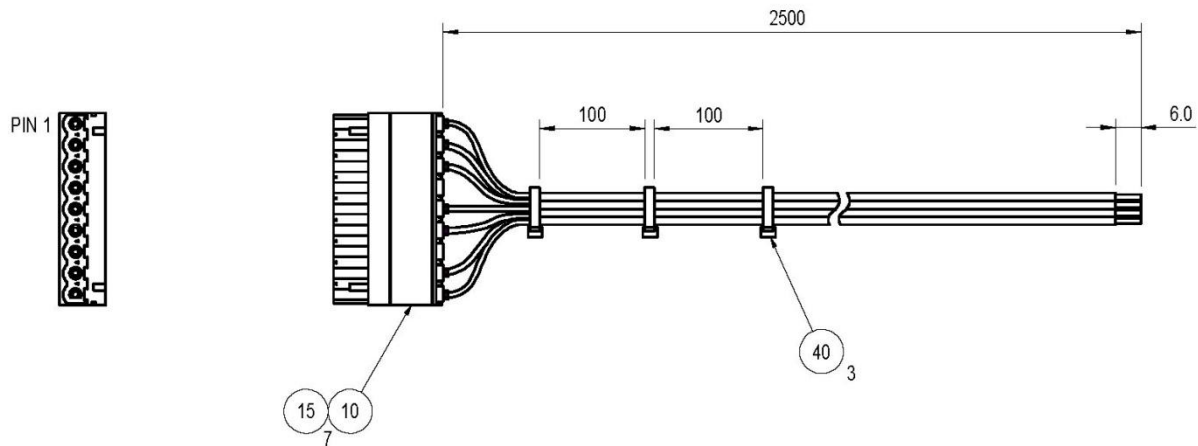
There is a single external connector interface made available.

WIRING INFORMATION		
COLOUR	PIN	DESCRIPTION
BROWN	1	RED MAN I/P
GREY	2	GREEN MAN I/P
BLUE	3	COMMON
N/C	4	N/C
WHITE	5	FAULT - NORMALLY OPEN
YELLOW	6	FAULT - COMMON
N/C	7	FAULT - NORMALLY CLOSED
RED	8	24V AC2
BLACK	9	24V AC1

Figure 3 : External Interface Connector

Security classification	Unrestricted	Page	10 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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This interface is normally provided via a flying connection lead. Additionally, there is a visual fault indicator, which are positioned above the main digits. This enables the faults to be identified from street side without the need of additional debugging equipment nor with the need for unit disassembly.



**Figure 4 : PCaTS Flying Lead**

## 2.4.2 Internal (system) Interfaces

The PCaTS unit has the following internal system interfaces for the purpose of debugging and or firmware updates.

1. CPU JTAG – 20 pin DIL 0.1” open header
2. Debug port (logic level) – 6 pin SIL “ open header

These facilities are currently not used by the field.

Security classification	Unrestricted	Page	11 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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## 2.5 Product Options

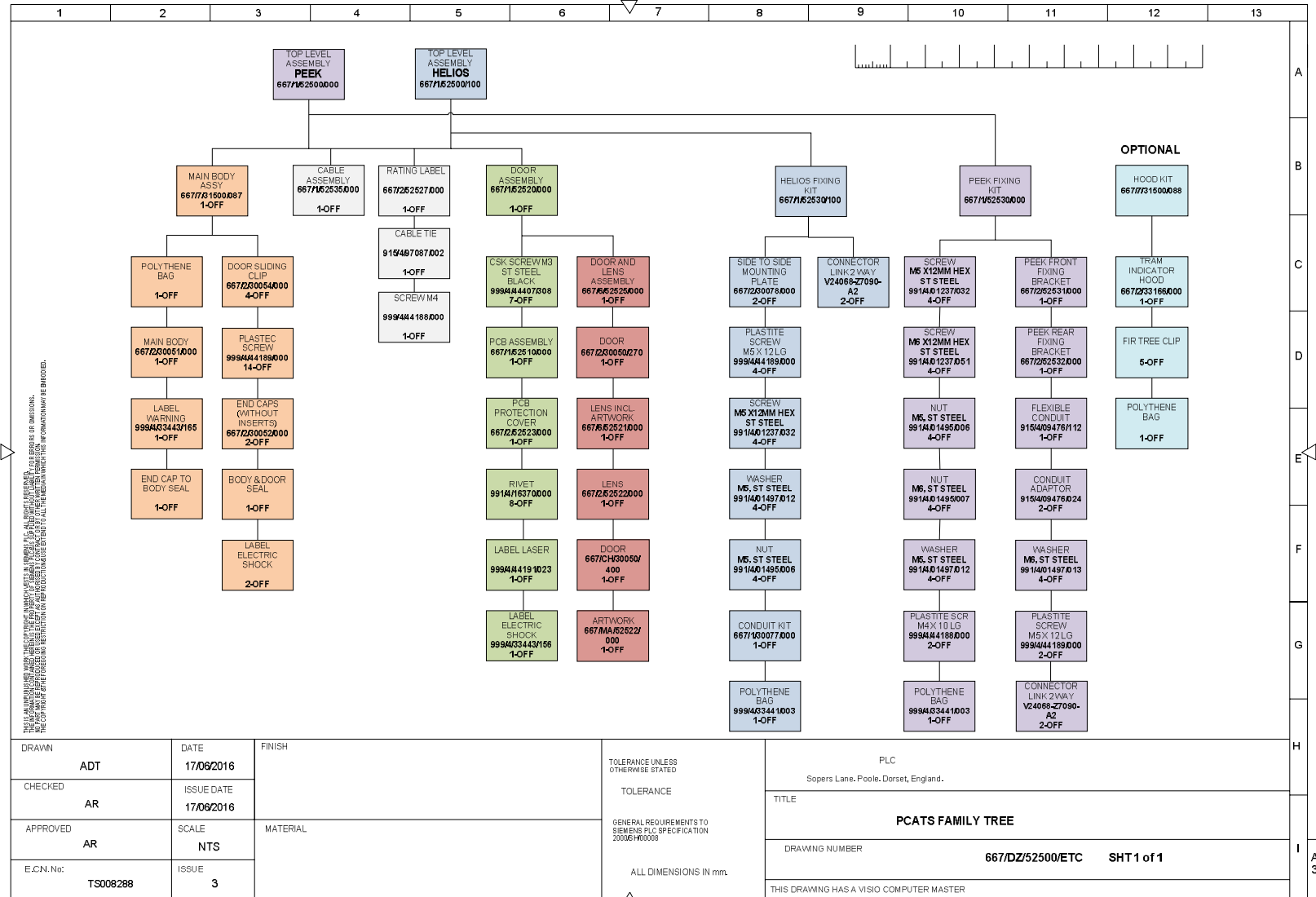
There are several product variants available, depending on site requirements. These are listed as;

Product Name	Part Number
PCATS Unit (Helios)	667/1/52500/100
PCATS Unit (Peek Elite)	667/1/52500/000

## 2.6 Standard PSU Options

Product Name	Part Number
PCATS 48V DC supply kit (TfL Installation)	TBD
TfL No Dimming Kit	667/CF/31670/000
PCATS 48V DC Supply 150W PSU KIT	667/1/33198/002
24V AC supply 160VA (LV)	667/1/20292/006
24V DC supply 160VA (ELV)	667/1/33074/000

## 2.7 Family Tree



Security classification	Unrestricted	Page	13 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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## 2.8 Export (Non UK) PCATS

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The UK version of PCATS hardware only allows the countdown of the blackout period in a UK far-sided pedestrian signal sequence. An Export (Non UK) configuration of the hardware allows the selection of alternative lamp sequences that can have countdown applied to the periods that they consist of.

For the hardware configuration details and the variety of countdown modes available in this version please see section 4.7 for full details of this version.

Security classification	Unrestricted	Page	14 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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## 3 General Specifications

### 3.1 Electrical Specifications

#### 3.1.1 Operating Voltage

48VDC  $\pm 20\%$

24VAC/DC  $\pm 20\%$

#### 3.1.2 Monitoring Voltage Ranges

Auto selected range (This is the range that the PCATS will assume it is monitoring)	PCATS Definatly dim range	PCATS May be in either state Dim or Bright (Depending on tolerances)	PCATS Definatly bright range
ELV (If all measurements are less than 60V)	14 - 33	33 - 38	38 – 60
LV (If any measurements are greater than 76.5V)	76.5 - 175	175 - 194	194 - 276

#### 3.1.3 Power Consumption (08 Displayed in Bright mode)

48VDC; power consumed 14W<sup>1</sup>

48VDC; power consumed 14W(using TfL supply kit 667/1/33198/000)

24VAC; power consumed 11W<sup>2</sup>

<sup>1</sup> Measurements are made with at least two units running and the result halved accordingly.

<sup>2</sup> Measurement made at secondary side (as per Elexon methodology). Customers should then add 10% for consideration of the 'shared' transformer.

Security classification	Unrestricted	Page	15 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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## 3.2 Optical Performance

Diameter: **290 mm**

Colour: **Yellow, BS EN 12966-1**

Luminance: **200 cd min**

Viewing angle: **40 deg minimum**

Automatic dimming to input voltages defined in TR 2523 and CLC TS5059

Can be operated with a hood to restrict viewing angle

## 3.3 Mechanical Specifications

### 3.3.1 Weight

3.2 Kg

### 3.3.2 Dimensions

374mm (W) x 358mm (H) x 203mm (D)

## 3.4 Environmental Specifications

### 3.4.1 Operating Temperature

The PCaTS unit has been designed and tested to the following specifications:

Lower Limit -25<sup>0</sup>C

Upper Limit +70<sup>0</sup>C

Operating Humidity Range Up to 95% non-condensing

### 3.4.2 Environmental Rating

The PCaTS unit has been designed and tested to the following specifications:

IP55

### 3.4.3 Vibration

The PCaTS unit has been designed and tested to the following specifications:

EN 60068-2-64 : **Test Fh, class AM2**

## 3.5 EMC Specifications

The PCaTS unit has been designed and tested to the following specifications:

EN50293:2001      Electromagnetic compatibility. Road traffic signal  
Class B              systems. Product standard.

In order to meet directive

2004/108/EC      Relating to Electromagnetic Compatibility

Security classification	Unrestricted	Page	16 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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## 3.6 Approvals and Highways Specifications

- Highway Agency Approved to TR2581A
- CE Marked
- RoHS Compliant

## 3.7 Environmental Directives

The PCaTS unit has been designed in accordance to the following directives:

2011/65/EU	RoHS Directive
2012/19/EU	WEEE Directive

## 3.8 Product Safety

The PCaTS unit has been designed and tested to the following specifications:

EN60950            Product Safety

In order to meet directive

2006/95/EC        Relating to Electrical Equipment designed for use  
within certain voltage limits

Security classification	Unrestricted	Page	17 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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## 4 General Installation Instructions

### 4.1 Introduction

The PCaTS unit is self contained and requires only 7 cores for connection:

Brown – Red Pedestrian Signal input

Green –Green Pedestrian Signal input

Blue - for signals neutral line (common)

Red – for Input supply (48v DC, 24V AC/DC)

Black – Input supply return

White – Monitoring Feedback Line (Normally Open)

Yellow – Monitoring Line Return

Connections from the PCaTS unit are made at the Pole Cap terminal block(s) via the PCaTS Flying lead.

The PCaTS unit is designed to sit side-by-side with the Green Man in the same configuration as a Toucan signal. Where possible the unit should be positioned to the right of the Green Man.



**Note :** All installation works shall be carried out with the signals off.

### 4.2 Power Supply Options

There are four main power supply options:

- 48V DC TfL configuration. This is detailed in the TfL document GN31.
- The Siemens PCaTS 48V DC (667/1/33198/002).
- 24V AC Supply (LV)
- 24V DC Supply (ELV)

When powered from a 48V supply PCaTS meets the class B4 (300mS) holdup time as defined in TR2581A. When powered from a 24V AC/DC supply PCaTS the class B2 (100mS) holdup time.

When powered and configured for the TfL option the power to PCaTS is interlocked to the switched sign phase (See GN31 for details).

When powered from the Siemens PCaTS 48V DC supply the power to PCaTS is enabled via controller special conditioning in accordance to a valid lamp supply.

When powered from the 24V AC or DC supplies there is no specific provision for disconnection of the supply should a lamp supply failure occur. In the rare event of the lamp supply failing during the pedestrian countdown period, PCaTS may continue its countdown. This isn't necessarily considered unsafe as the vehicular phases will be at Red immediately preceding the lamp supply failure i.e. traffic will be stopped, and vehicles must only proceed at caution if the signals are then extinguished.

Security classification	Unrestricted	Page	18 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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## 4.3 Tools Required

No special tools are required. Refer to the Helios handbook 667-HB-30000-000 for standard tools.

## 4.4 Mounting Instructions

The reader is to refer to 667/CI/525/ETC for mounting instructions. The reader is to note the mounting options depending on whether this is to mount to a Peek Elite or Siemens Helios traffic head.

## 4.5 TfL Installation

The reader is to refer to the TfL PCaTS installation and design guide documents;

Documents No.	Title	Issue
GN31	Electrical Design Team guidance Notes PCaTS	Iss 1 V5
Tlxx	The Retrofit Installation of Pedestrian Countdown at Traffic Signals	Final 2a

## 4.6 Standard Installation Method

### 4.6.1 Pole Works

The Signal Contractor should consider the requirements for Traffic Management for each pole install including the requirement to close a lane if required.

Whilst pole works are being undertaken the associated pedestrian crossing should be closed to allow safe working. The following steps should be followed for each pole/PCaTS unit

#### Box Sign Housing

The PCaTS unit is supplied with with the bracket kit for either the Peek Elite or Siemens Helios traffic heads. In accordance with the DfT's approval of Pedestrian Countdown, the housing must be installed alongside the Green Man aspect, preferably to the right (same as a toucan configuration).

#### Fly-Lead

The PCaTS unit comes with a 2.5m fly-lead with a 7-core free wire at one end. The fly-lead needs to be routed from the PCaTS housing through the Green Man and then Red Man housings, out of the Kopex and into the pole cap for termination. All terminations to the PCaTS fly-lead are made at the pole top terminal connection blocks.

1. The PCaTS units will be supplied fitted to the door. Fit the PCaTS door assembly to the back housing.
2. Connect the fly-lead connector to the PCaTS PCB.
3. Feed the free end of the fly-lead through the interconnecting tube to the Green pedestrian signal enclosure, then through the Red pedestrian signal enclosure exiting through the Kopex to the pole top.
4. Pull through sufficient slack to enable the cable to reach the pole cap terminal blocks.
5. Secure the fly-lead to the pole cap assembly using cable ties to provide strain relief.

Security classification	Unrestricted	Page	19 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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6. Connect the Brown wire to the Redman pole top terminal connection.
7. Connect the Grey wire to the Greenman pole top terminal connection.
8. Connect the Blue wire to a suitable common return at the pole top terminal block.
9. If PCaTS is to be powered from a DC power option, connect the Red wire to the positive connection of the incoming supply DC supply and the Black wire to the common return.
10. If PCaTS is to be powered from the 24V AC power option, connect the Red wire to either of the 24V AC power connections and the Black wire to the other 24V AC power connection.
11. Connect the White wire to the Fault input pole top terminal connection.
12. Connect the Yellow wire to the return for the Fault input at the pole top terminal connection.

## 4.6.2 Final Cabinet Wiring Works

Once the Cabinet Equipment and PCaTS units are installed the final stage is to connect the incoming cores for the power and fault monitoring lines.

### Fault Monitoring Lines

If fault monitoring of the PCaTS units is required, the two fault monitoring wires (Normally Open and Fault common) from each PCaTS unit are to be connected to the relevant controller inputs as detailed in the controller configuration specification. Please note that for retrofit applications it may be necessary to re-configure the controller.

It is desirable to connect each PCaTS fault output to an individual controller input, but where this is not possible due to insufficient inputs being available, it is possible to daisy-chain fault outputs to a single controller input. However this will limit the controller's ability to determine which of the PCaTS units is at fault.

### Power Supply Siemens 48V DC

The power supply for the PCaTS unit is 48VDC (Order No. 667/1/33198/002) and should be supplied and installed on DIN rail. Reference 667/GA/33198/002 for detailed installation details.

For each cable run there will be two incoming power lines (ELV cores) which are the 48VDC supply cores. These DC cores should be appropriately terminated in the PCaTS Power supply terminal block and the 0v cores in the standard 0v terminal blocks, taking care to ensure polarity is preserved.



This supply method will require the use of additional controller configuration in order to provide the PSU 'inhibit' functionality.

The 'inhibit' PSU function also requires an external 24V DC source (which is typically provided by the controller PSU) and connection of the specified controller output to the Grey/White inhibit wire (see 667/GA/33198/002).

Note: The PSU will not function without the above provisions.

Security classification	Unrestricted	Page	20 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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### **Power Supply 24V AC (LV Controller)**

This supply option is to use a detector transformer kit (PCaTS 24V AC supply - 667/1/20292/006).

For each cable run there will be two incoming power lines (ELV cores) which are the 24VAC supply cores as provided by the detector transformer. These cores should be appropriately terminated in the PCaTS Power supply terminal block. Polarity is not important.



**Note:** This power supply method does not provide for an inhibit function. Therefore the installer and customer should be made aware, that on the rare condition of lamp supply failure coinciding with the PCaTS countdown, PCaTS will continue to display until its current countdown expires. Thereafter the further countdowns are prevented until normal system operation is restored.

### **Power Supply 24V DC (ELV Controller)**

This supply option is to use a detector transformer kit (PCaTS 24V DC supply - 667667/1/33074/000).

For each cable run there will be two incoming power lines (ELV cores) which are the 24VDC supply cores as provided by the detector transformer. These cores should be appropriately terminated in the PCaTS Power supply terminal block and the 0v cores in the standard 0v terminal blocks, taking care to ensure polarity is preserved.



**Note:** This power supply method does not provide for an inhibit function. Therefore the installer and customer should be made aware, that on the rare condition of lamp supply failure coinciding with the PCaTS countdown, PCaTS will continue to display until its current countdown expires. Thereafter the further countdowns are prevented until normal system operation is restored.

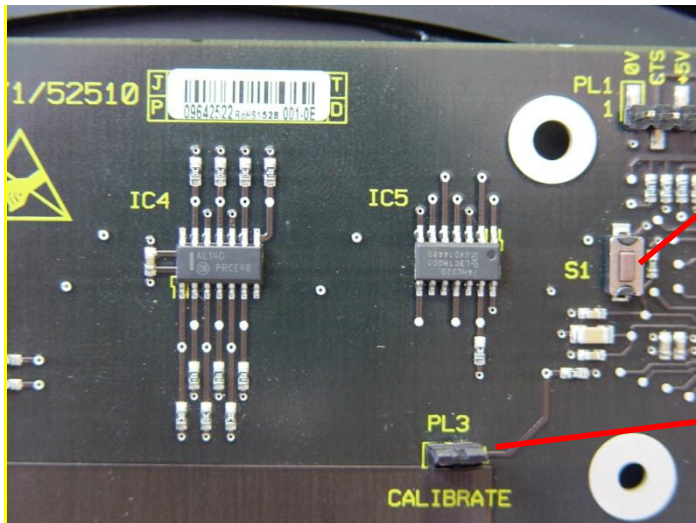
### **Power Supply 48V DC TfL Installations**

When powered and configured for the TfL option the power to PCaTS is interlocked to the switched sign phase (See section 4.5 for TfL reference documents).

Security classification	Unrestricted	Page	22 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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## 4.7 Export (Non UK) PCaTS Operation

The Export version consist of Software version 667/TZ/52515/000 Issue 2 or greater, and a link fitted to PL3 (marked "calibrate"), on the back of the PCB.



Press and hold this button on power up to enter mode selection (see section 4.7.2). Once in mode selection, momentarily release, to step to next mode.

Link permanently fitted here will configure the hardware to enable Export mode selections. (If firmware > Issue 1).



It is recommended that Export PCaTS configured for blackout countdowns are powered from 48Vdc as detailed in Section 4.6.2, and special conditioning is added to the Controller to ensure the PCaTS power is inhibited when the other junction aspects are extinguished or in a fault state.

Security classification	Unrestricted	Page	23 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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### 4.7.1 Modes available (Export version)

The Non UK / Export PCATS hardware configuration, allows the selection of alternative lamp sequences that can have countdown applied. This variant of PCATS can be configured to run one of the following countdown modes.

Mode ID	Countdown on these Aspect periods	Supported aspect sequences <sup>*4</sup>	Aspect sequences <sup>*4</sup> not supported	Max Countdown variation before re-learn <sup>*5</sup>	Max countdown duration <sup>*1</sup>
01	Both Red (Red/Amber included <sup>*6</sup> ) & Green (default)	A,B,C,D,E,F,G,H,J,K	L,M	0.5s	99s
02	Red <sup>*6</sup>	A,B,C,D,E,F,G,H,I,J,K	L,M	0.5s	99s
03	Green	A,B,C,D,E,F,G,H,J,K	L,M	0.5s	99s
04	Flashing green	H,I	J,K,M	0.5s	99s
05	Green/ Flashing green combined	H	-	0.5s	99s
06	Red <sup>*6</sup> & Green & Flashing green	H	-	0.5s	99s
07	Red <sup>*6</sup> & Green/Flashing green combined	H	-	0.5s	99s
08	Blackout (between Green & Red)	G	-	0.5s	99s
09	Both Red <sup>*6</sup> & Green	A,B,C,D,E,F,G,H,J,K	L,M	1.5s	99s
10	Red <sup>(*6)</sup>	A,B,C,D,E,F,G,H,I,J,K	L,M	1.5s	99s
11	Green	A,B,C,D,E,F,G,H,J,K	L,M	1.5s	99s
12	Flashing green	H,I	J,K,M	1.5s	99s
13	Green/ Flashing green combined	H	-	1.5s	99s
14	Red <sup>*6</sup> & Green & Flashing green	H	-	1.5s	99s
15	Red <sup>*6</sup> & Green/Flashing green combined	H	-	1.5s	99s
16	Blackout (between Green & Red)	G	-	1.5s	99s

**Note \*1** – Export PCATS will accept any aspect period duration that it learns, as valid (where as the UK version will only countdown times of 30.7s seconds or less). With the EXPORT PCATS, if the countdown period is greater than 99s the PCATS will blank initially and countdown the last 99 seconds of the period (i.e. Red man period measured at 120s, PCATS blanks for first 21s and countdowns last 99s).

Security classification	Unrestricted	Page	24 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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**Note \*2** – In some lamp sequences there are periods where two aspects / lamps are on (eg read amber starting period). As PCATS only monitors the Red and Green aspects any periods of bi colour will be included in the timing period for the monitored colour, as follows.

The duration of a period of Red/Amber will be added to the countdown of the Red period.  
The duration of a period of Green/Amber will be added to the countdown of the Green period.

**Note \*3** – In some lamp sequences there are flashing aspect periods and in order to determine the appearance and duration of these correctly limitations have been placed on the “ON” and “OFF” periods as noted below. Flashing periods with ON and/or OFF periods outside of those allowed may cause errors.

	MIN (ms)	MAX (ms)
<b>ON</b>	none	650 (includes ON 100ms filter)
<b>OFF</b>	none	1000 (includes 300ms signal dip filter)

**Note \*4** – The following list shows all possible aspect sequences. The PCATS unit supports the majority of these sequences.

<b>Aspect Sequences fully supported</b>	
A	Red->Green
B	Red->Red/Amber->Green
C	Red->Red/Amber->Green->Amber
D	Red->Green->Amber
E	Red->Amber->Green
F	Red->Amber->Green->Amber
G	Red->Green->Blackout
H	Red->Green->Flashing Green
I	Red->Flashing Green
<b>Aspect Sequences partially supported</b>	
J	Red->Green->Flashing Green->Amber
K	Red->Red/Amber->Green->Flashing Green->Amber
<b>Aspect Sequences not supported</b>	
L	Red->Green->Flashing Red
M	Red->Flashing Green->Flashing Red

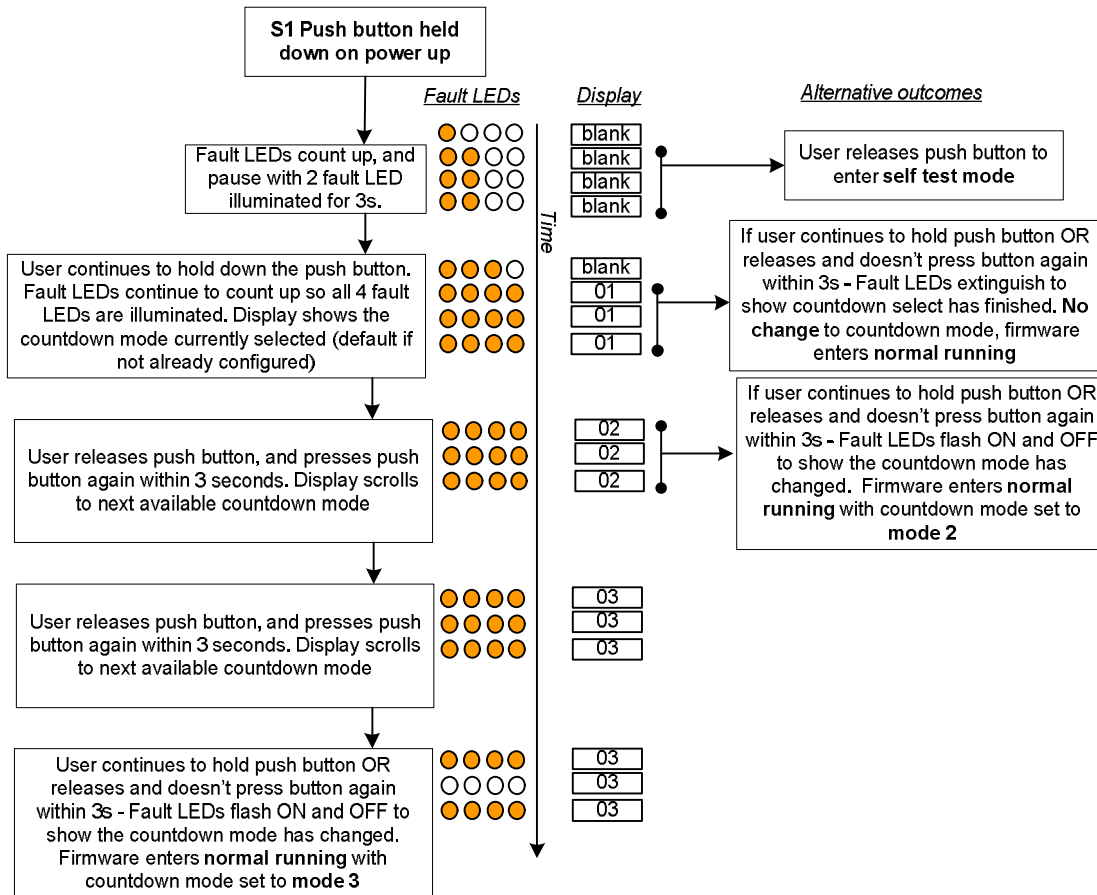
**Note \*5** – If a mode is selected which includes two or more aspect periods requiring countdowns, each individual countdowns validity is decided solely from its own state. E.g. for countdown mode 01, a countdown could be displayed for a valid red aspect period, even if the green aspect has just changed and is being re-learnt (re-learnt means PCATS display blanked while aspect period duration is measured and confirmed).

**Note \*6** – All Red aspect period countdowns start when the red aspect comes on and end when red aspect goes off. There any Red/Amber periods will also be included in the red countdown.

## 4.7.2 Selection of modes (Export version)

The push button was previously used to select the self test mode. On the export hardware configuration the user can select either the self test mode or countdown mode using the following push button sequence.

The self test mode can be selected first (after 2 fault LEDs illuminated), because this option is common to both UK and Export variants of the PCATS. For UK variants it is not possible to continue to the countdown select mode, and unit will continue into normal operation if user continues to hold down the push button.



Security classification	Unrestricted	Page	26 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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## 5 Commissioning

### 5.1 Introduction

For general commissioning instructions the reader is to refer to the Helios General Handbook (667/HB/30000/000 – chapter 3).

### 5.2 Final Commissioning Procedure

For final commissioning check, the following procedure should be followed;

1. Ensure that the Traffic Controller is operating correctly.
2. Power on the PCaTS unit.
3. Wait for at least 4 signal cycles, to allow PCaTS to learn the period(s) to countdown.
4. Visually inspect that the PCaTS countdown device is displaying a countdown during and in accordance to the appropriate interval(s).

Note UK Version only counts down Pedestrian blackout periods, the export version will count down the period or periods as selected by the mode operation it has been configured for (See section 4.7)

5. All units connected to count down the same period shall display the same timings and start and end together.

Security classification	Unrestricted	Page	27 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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## 6 Maintenance

### 6.1 Routine Maintenance Visits

Other than visual inspection and cleaning of the Lens there are no specific maintenance operations required.

### 6.2 First Line (Fault Finding)

The PCaTS product has continuous fault monitoring functionality. For the majority of cases, the four fault indicators, visible from the front, provides sufficient information for fault diagnostics.

#### 6.2.1 Fault Indicator Table

Fault	Fault LED bitmap	Criteria	Critical fault?*
Single LED failure	0x01 ○○○●	A single LED has failed (open/short cct) on the PCATS display	NO
Single Segment failure	0x02 ○○●○	>=50% of LEDs failed on one segment per digit	NO
Multiple segment failure	0x03 ○○●●	(a) >=50% of LEDs failed on two or more segments per digit  (b) >20 LED's failed across all segments on single digit	YES
Single segment permanently on	0x04 ○●○○	LED driver failure detected	YES
Failure of unit to switch to 'dim' or 'bright' mode correctly	0x05 ○●○●	Internal microprocessor error detected	NO
Countdown learning timeout	0x06 ○●●○	While learning the aspect period duration - Failed to measure 2 consecutive matching durations during a 60min period	NO
Watchdog failure	0x07 ○●●●	On start-up detect if firmware reset was caused by a watchdog timeout	YES
Internal timing failure	0x08 ●○○○	A comparison of supply frequency and internal clock has identified a persistent timing error.	YES
		Blackout period > 30.7s detected	NO
Hardware error	0x09 ●○○●	<i>No Calibration data</i>  Failure to read in valid input calibration data from EEPROM at start-up	YES

Security classification	Unrestricted	Page	28 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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Fault	Fault LED bitmap	Criteria	Critical fault?*
		<i>Both Aspects detected ON</i> Detected both red/green aspects as being ON at the same time	NO
		<i>V<sub>LED</sub> supply failure</i> Monitored LED supply voltage drops below threshold of 3.0V for >50ms	NO
		<i>5V supply failure</i> The 2V5 reference voltage measured outside 2.5V+/-5% limit for >100ms	YES (the accuracy of the ADC input readings depend on the 5V supply )
		<i>EEPROM failure</i> Failed to read/write fault log entries from/to EEPROM	NO (unit still able to function without reading fault log from EEPROM)
		<i>No Aspects detected</i> No red aspect signal detected for 24hrs after start-up	NO (could be PCATS issue or issue with controller/wiring)
		<i>Unexpected aspect sequence</i> Detected an unexpected aspect sequence	NO
		<i>V<sub>supply</sub> failure</i> Monitored supply voltage has dropped below the threshold for >100ms	NO
Software error	0x0A ●○○○	<i>Display board config fail</i>	YES
		<i>Sign blanked over temp</i>	YES
		<i>Internal software error</i>	YES
		<i>Firmware checksum error</i>	YES
Frequency Range Error	0x0B ●○○●	PCATS is design to operate with both 50Hz and 60Hz signal lamp supplies. On startup the PCATS measures the signal supply frequency and if outside of the range 45Hz – 65Hz this error is raised	YES

**Table 4 – Critical Fault Log**

**Note \*1;**

If a critical fault is detected the PCATS unit enters a shutdown state, permanently blanking the display. The unit has to be power cycled to recover from the shutdown state.

If a non critical fault is detected the fault output is enabled in the same way as with a critical fault, but the PCATS continues displaying countdowns. The unit can recover and clear the non critical fault if the fault does not persist. For units configured for UK operation, if the non critical fault persists for more than 10 minutes this fault is latched and will not clear until the unit is power cycled. The unit will continue to display countdowns, where possible, even if a non critical fault has been latched. For units configured for Export operation non critical faults are never latched - if the fault clears so will the fault Led's and fault output.

## 6.2.2 Fault Log

The PCaTS unit maintains a fault log, in non-volatile memory, for storing critical faults. The fault log is intended for internal use by either engineering or the repair centre, and can be retrieved using a debug command.

The fault log is to store the critical fault ID along with a timestamp. The timestamp is the milliseconds since power up (or counter rollover – occurs every 50days). The PCATS unit does not have a RTC, therefore the timestamp simply offers an indication if the logged faults occurred in sequence or directly after power up.

Security classification	Unrestricted	Page	30 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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## 6.2.3 Status LEDs and meanings

PCATS state Firmware 667/TZ/52515/000 Issue 1	PCATS state Firmware 667/TZ/52515/000 Issue 2+	FW Running LED (Green)	Learning LED (Red)
Initialisation (momentary state on power up)	Initialisation (momentary state on power up)	OFF	OFF
Calibration mode (only used in production)	Calibration mode (only used in production)	ON	ON
Calibration finished (only used in production)	Calibration finished (only used in production)	Fast FLASH for 2s (50:50 200ms cycle)	Fast FLASH for 2s (50:50 200ms cycle)
<b>N/A</b>	Countdown mode select enabled / triggered.	Slow FLASH (50:50 400ms cycle)	ON
Start-up (detecting LV ELV)	Start-up (detecting LV ELV)	Slow FLASH (50:50 400ms cycle)	ON
Learning (determine countdown)	Learning (determine countdown)	Slow FLASH (50:50 400ms cycle)	ON
Normal RUNNING	Normal RUNNING	Slow FLASH (50:50 400ms cycle)	OFF
Shutdown	Shutdown	Slow FLASH (50:50 400ms cycle)	Fast FLASH for 2s (50:50 200ms cycle)
Self test	Self test	Slow FLASH (50:50 400ms cycle)	Slow FLASH (50:50 400ms cycle)

## 6.3 First Line (Replacement)

First line maintenance can be achieved replacement of the door assembly. The door assembly includes the entire PCaTS electronic assembly.

Replacement of the power supply components will be on a modular basis.

## 6.4 Second Line Maintenance

It is recommended that undamaged parts are reused where possible.

All other parts must be sent for repair or disposal, details of which, are held in the 'Global Service Support Plan (ref. 667/PA/47200/000) and in the sections below.



**NOTE: Observe Anti Static Precautions at all times.**

Faulty parts being returned must always be sent back in the original packaging if available or in an approved anti-static packaging, along with a fully completed fault label, to;

### Logistics Spares Returns Centre

**Siemens Mobility,**

**Traffic Solutions,**

**Coalfield Way,**

**Ashby Park,**

**Ashby de la Zouch,**

**LE65 1JD**

Any queries should be directed to the Service Logistics Manager on (01530) 258181

Security classification	Unrestricted	Page	32 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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## 7 Disposal

### 7.1 Under Maintenance Contract

All items that have been replaced under a maintenance contract are sent back for replacement. The items will either be sent to the OEM for repair/replacement/disposal.

All Traffic Solutions, Siemens depots operate an **Environmental Management System (EMS)**.

In accordance with its **Environmental Policy** Siemens applies the **Waste Hierarchy** when managing waste, segregating waste into a number of waste streams to optimise the re-use/recycling carried out by the approved waste contractors that take the waste away.

### 7.2 End of Life and Scrapping

End of life items and items involved in RTAs will normally be disposed of locally. In this situation the local depot will dispose of all elements under the local EMS policy.

Security classification	Unrestricted	Page	33 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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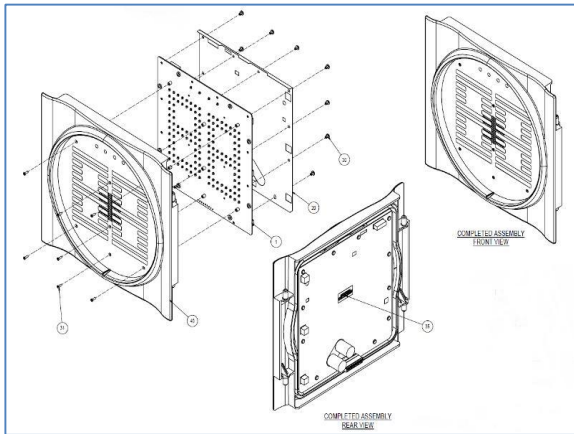
## 8 Part Numbers and Spares List

### 8.1 Spares Available for Order



**Figure 6 : PCaTS Unit**  
**(Peek Elite Order No. 667/1/52500/000,**  
**Siemens Helios Order No. 667/1/52500/100)**

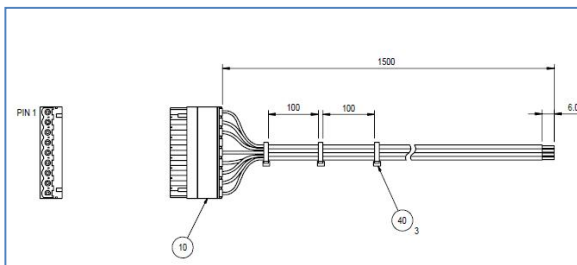
Security classification	Unrestricted	Page	34 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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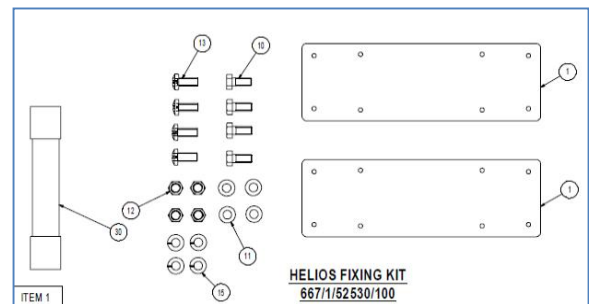
**Figure 7 : Front Door Assembly (Order No. 667/1/52520/000)**



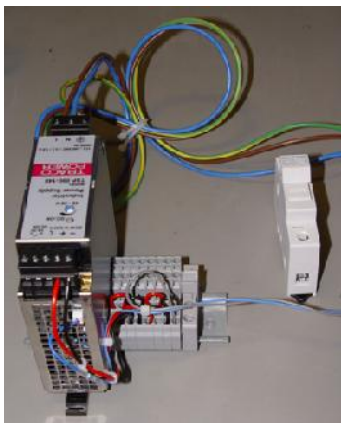
**Figure 10 : Hood Kit (Order No. 667/2/33166/000)**



**Figure 8 : Interface Cable Assembly (Order No. 667/1/52535/000)**



**Figure 11 : Helios Fixing Kit (Order No. 667/1/52530/100)**



**Figure 9 : 48VDC PSU Kit (Order No. 667/1/33198/002)**

Security classification	Unrestricted	Page	35 of 35
Version	2	Status	Issued
Last Editor	Rhodes, Antonio	Date	17 June 2016
Document Name	PCaTS Handbook	Document No.	667/HB/52500/000
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