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HELIOS

GENERAL

HANDBOOK

THIS DOCUMENT IS ELECTRONICALLY HELD AND APPROVED

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2	TS001135	09/09/2002
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10	TS002832	28/09/2005
11	TS003362	09/08/2006
12	TS003948	11/09/2007
13	TS004269	23/01/2008
14	TS004932/4597	19/03/2009
15	TS004957	03/07/2009
16	TS005436	13/04/2010
17	TS005846	07/12/2010
18	TS005953	11/02/2011

SAFETY WARNING

HEALTH AND SAFETY AT WORK

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:

(i) 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 the equipment. All work shall be performed in accordance with the Electricity at Work Regulations 1989.

(ii) 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:

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

(b) The equipment must be disconnected/isolated from the incoming power supply before removing any protective covers or working on any part from which the protective covers have been removed.

(c) **Mains voltages are present in LED and LED (NLM) aspects.** Before any maintenance work is carried out, the mains supply to the aspect must be isolated/switched off.

(d) **WARNING –** the earth connections within the CLS with LMF signal head are 'daisy-chained' from the Red to Amber and then Green LMF Unit. When removing either a Red or Amber LMF unit the aspects below will not be earthed and therefore should not be touched if the controller is powered on. Ensure that the Earth connections are reconnected after any remedial work has been carried out.

(e) **WARNING –** the CLS (ELV) aspects must **only** be connected to ELV controllers or else irreparable damage will be caused to the CLS unit.

(f) These signals heads must only be connected to a signal controller that provides a readily accessible disconnect device (e.g. double pole isolator, controller switch or master switch), to allow the signal heads to be isolated.

(g) All equipment of conductive material installed in these signal heads must be bonded to earth e.g. transformers, tactile power supplies etc, unless double insulated or access to it is restricted to use of a tool.

(h) Where Siemens signal head transformers are used a fuse not exceeding 16 amps must protect the wiring at the controller.

(i) Only trained / competent persons should work on this equipment. This includes persons who are employed to change bulbs. All wiring has basic insulation and should be regarded as hazardous, i.e. hazardous voltages are accessible if the insulation is damaged.

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

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

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

(m) 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 and signed.

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

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.

Whilst repairing signals which are in an "all-out" condition, care must be taken to ensure that no spurious signals are lit during testing which could mislead drivers or pedestrians. Particular care is required where pedestrian audible devices are installed, to ensure that no false indications are given during, for example, cable testing. Personnel should also ensure the safety of pedestrians, especially children, who may come into contact with parts of the signal poles.

Warning:-

Helios CLS signals are designed and proven to work with the monitoring and signal switching circuits of Siemens Traffic Solutions controller products. Siemens are unable to guarantee their operation with third party supplied traffic control products, and cannot accept liability in this respect.

In particular the Lamp Monitor Facility (LMF), fitted to monitor the operation of individual signals and remove the signal load (switch off) under fault conditions, may operate inadvertently and extinguish the signal due to the nature of supplies / lamp switching circuits of third party controllers.

MAINTENANCE PROVISION (MP)

1. Product Reference

Helios Traffic Signals

2. Specifications

The Modular traffic signals are designed to meet the following specifications:

EN12368

H.A. TR2206 Draft 1

BS 7987:2000 (HD 638)

3. Installation and Commissioning

Methods of Installation and Commissioning are detailed in the Siemens Traffic Controls document:

667/HB/30000/000 Helios General Handbook

4. Spares and Maintenance

All maintenance and repairs should be carried out in accordance with the Siemens Traffic Controls documents:

667/HB/30000/000 Helios General Handbook

5. Modifications

There are no approved modifications, with the exception of those listed in the following Siemens Traffic Controls Document:

667/HB/30000/000 Helios General Handbook

6. Warning

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

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FIGURES

1. INTRODUCTION

1.1 Purpose

This handbook gives a general description and specification of the CLS with LMF, CLS (NLM), CLS (ELV), LED, LED (NLM), LED TRAM Indicator (ELV) and Tungsten Halogen versions of the Helios Signal Head and the procedures for their installation, commissioning and maintenance.

1.2 Scope

This handbook is written for the Helios Signal Head and is made up of the sections listed below:

	Safety Warning
	Maintenance Provision (MP)
Section 1	Introduction
Section 2	Signals and Poles
Section 3	Commissioning
Section 4	Maintenance
Appendix A	Drawings
Appendix B	Spares List
	Index

1.3 Related Documents

667/HE/20661/000 - General 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 - Above Ground Detectors

1.4 Definitions

AGD	Above Ground Detector
CET	Cable Earth Terminal
CLS	Central Light Source
ELV	Extra Low Voltage
HI	High Intensity
IEE	Institute of Electrical Engineers
LED	Light Emitting Diode
LMF	Lamp Monitoring Facility
LSLS	Low Voltage / Serial Lamp Switch
LV	Low Voltage
MVD	Microwave Vehicle Detector
NLM	Non Lamp Monitored
PBU	Push Button Unit
PI	Periodic Inspections
RAG	Red Amber Green (3-Aspect signal head)

S/S	Stainless steel
STC	Siemens Traffic Controls
STS	Site to Scale (drawing)

1.5 Tools Required

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

Pozidriv™ screwdriver no. 2 or 3, 13 mm and 17 mm spanners or sockets and an 8 mm Allen key are necessary to install and adjust the lanterns.

Where side boxes are to be fitted, a 19 mm drill bit is needed to fit the conduit.

Where a solar cell is to be fitted, a 20 mm drill bit is needed.

1.6 Signal Specification

		230 V	
		50 Hz	
Model	667/1/30200/ETC	Tungsten Halogen -	0.23 A per optical unit
	667/1/30198/001	Red LED -	0.105 A per optical unit
	667/1/30198/002	Amber LED -	0.121 A per optical unit
	667/1/30198/003	Green LED -	0.09 A per optical unit
	667/1/30198/004	Up Arrow Green LED -	0.06 A per optical unit
	667/1/30198/005	L/R Arrow Green LED -	0.08 A per optical unit
	667/1/30200/907	Red (NLM) LED -	0.102A per optical unit
	667/1/30200/908	Amber (NLM) LED -	0.117A per optical unit
	667/1/30200/906	Green (NLM) LED -	0.103A per optical unit

Power Consumption (LED Signals)	**Bright (230v)**	**Dim (160v)**
Red Aspect	24 watts	6 watts
Amber Aspect	28 watts	7 watts
Green Aspect	20 watts	5 watts
Green Arrow	16 watts	4 watts

Power Consumption (NLM – LED)	**Bright (230v)**	**Dim (160v)**
Red Aspect	24 watts	7 watts
Amber Aspect	28 watts	8 watts
Green Aspect	24 watts	7 watts

Power Consumption (CLS + LMF)	Bright (230v)	Dim (160v)
Red Aspect	28 watts	12 watts
Amber Aspect	28 watts	12 watts
Green Aspect	28 watts	13 watts

Power Consumption (CLS – NLM)	Bright (230v)	Dim (160v)
Red Aspect	13 watts	3 watts
Amber Aspect	13 watts	3 watts
Green Aspect	16 watts	4 watts

NOTE – CLS with LMF must not have a Dim or Bright voltage between 180V and 200V.

NOTE – CLS with LMF only supports 160V Dimming.

Power Consumption (CLS – ELV)	Bright (48v)	Dim (27.5v)
Red Aspect	11 watts	3 watts
Amber Aspect	11 watts	3 watts
Green Aspect	11 watts	3 watts

Power Consumption (ELV- TRAM Indicator)			
(Always on)	Centre Dot	11 watts	3 watts
	All other states	11 watts	3 watts

Reference EN12368 -

Performance level class	A3.2
Luminous intensity distribution	M
Phantom class	5
Symbol class	S1
Impact resistance	IR2/IR3
Ingress protection	IP55
Environmental class	A/B

Power Consumption – Reg Sign (LV)	Current	Power
Measured at 230 volts	320mA	75 Watts

Power Consumption – LED Reg Sign (ELV)

Measure at 48 volts		7 Watts

Power Consumption – LED Reg Sign (LV)

Measure at 230VAC		8 Watts

Power Consumption – LED Wait Box

Measured at 48 volts	100mA	4.8 Watts

Power Consumption – Nearside Signal and Demand Unit

Measured at 48 volts – Red Man/Cycle/Equestrian	300mA	16 Watts
Measured at 48 volts – Green Man/Cycle/Equestrian	300mA	16 Watts
Measured at 48 volts – Call Accept	100mA	6 Watts

1.7 Weights and Dimensions (Signal Heads)

a) Weights

Note: Except where otherwise mentioned, lantern weight includes doors, moulded hoods and brackets.

3 Aspect 200mm lantern	15 Kg
3 Aspect 200mm lantern (doors removed)	9 Kg
2 Aspect 200mm lantern	11 Kg
1 Aspect regulatory sign	3 Kg
1 Aspect regulatory sign (door removed)	2.25 Kg
1 Aspect TRAM indicator (fully equipped)	9.5 Kg
Pedestrian push button	3.6 Kg
4.0m Pole	68 Kg
Pair of mounting brackets	3.2 Kg

b) Dimensions (including backing boards)

3 in line	1116 mm H x 468 mm W
4 in line	1450 mm H x 468 mm W
3 in line and side box	1116 mm H x 841 mm W
3 in line and side boxes at each side	1116 mm H x 1214 mm W

2. SIGNALS AND POLES

2.1 General

The Helios range of traffic signals has been developed to give optimum clarity, reliability and longevity with a pleasing appearance.

It incorporates newly developed lens form and masking patterns, which ensure that the signal is extremely clear and easy to see in all conditions.

There are tungsten halogen and LED aspects, which may be mixed in one signal head. For example, the traffic signal at a pedestrian crossing could have red and amber halogen aspects with a green LED aspect, since the green would be on most of the time.
CLS with LMF, CLS (NLM) and LED (NLM) aspects should NOT be mixed in a signal head with tungsten halogen and LED aspects as the visible switching on and off of a CLS with LMF, CLS (NLM) and LED (NLM) aspect is instantaneous. The CLS (NLM) and LED (NLM) is not compatible with the STC Controller lamp monitoring and should be driven from a separate output if the tungsten halogen lamps, CLS with LMF and/or LED are required to be monitored.
NLM LED signals can be monitored with the Retrofit LV controllers but the current capability for Halogen signals is reduced.

CLS (ELV) aspects should **ONLY** be connected to the Siemens ST900 (ELV) controller as the supply voltage to an aspect is 48v. The CLS (ELV) is only compatible with the lamp monitoring facility of the ST900 (ELV) controller, with each aspect having a visible switching on and off which is instantaneous.
NOTE – The CLS (ELV) does **not** utilise a LMF Unit as the lamp monitoring function is performed by the ST900's (ELV) LSLS PCB.

Within the ELV HELIOS family are LED regulatory signs and a TRAM indicator

The design incorporates a sacrificial cap that is designed to break on impact, absorbing part of the force and protecting the signal head from major damage.

Figure 1 – Helios front view

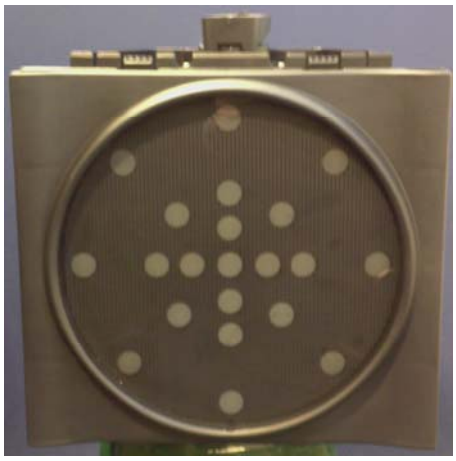


Figure 2 – Helios TRAM indicator front view

The basic three-aspect lantern assembly is constructed on a modular principle. Each aspect is self-contained and consists of one of the following:

Halogen Option
A high intensity tungsten halogen lamp and lamp-holder fitted into a reflector assembly, a red, amber or green coloured lens and a lamp transformer fitted with sufficient cable on its input to reach the pole cap wherever the lantern is mounted on the pole.

LED Option

An LED board is fitted behind a clear lens and connected to a PSU/inductor assembly for each aspect. The LEDs are linked in a number of strings around the board, connected so that if a string fails it does not leave a dark area. The inductor continually measures the output current of the board and if that should fall below 80%, the fuse blows and a fault is sent to the controller.

LED (NLM) Option

An LED board is fitted behind a clear lens and connected to a dual winding transformer. The LEDs are linked in a number of strings around the board, connected so that if a string fails it does not leave a dark area. This option does not allow any Lamp Monitoring.

CLS with LMF Option

The Central Light Source (CLS) is fitted behind a clear lens and is connected to the Lamp Monitoring Facility assembly for each aspect. The CLS Unit is a sealed unit that contain a number of high intensity LEDs. There are three different types of CLS units, a Red, an Amber and a Green. The LMF unit measures the output current of the CLS unit and if that should fall below 80%, the fuse blows and a fault is detected by the controller. The LMF unit is connected to the controller phase output.

CLS (NLM) OPTION

The Central Light Source (CLS) is fitted behind a clear lens and is connected directly to the controller phase output. The CLS Unit is a sealed unit that contain a number of high intensity LEDs. There are three different types of CLS units, a Red, an Amber and a Green. This option may be monitored by the ST800, 900 700 and 750 retrofit controller facilities .

CLS (ELV) OPTION

The Central Light Source (CLS) is fitted behind a clear lens and is connected directly to the ST900 (ELV) controller phase output. The output from the ST900 (ELV) controller is 48v (bright) with the controller capable of performing Lamp Monitoring of each aspect The CLS Unit is a sealed unit that contains a number of high intensity LEDs. There are three different types of CLS units, a Red, Amber and a Green.

WARNING – The CLS (ELV) OPTION CAN ONLY BE USED WITH THE SIEMENS ST900 (ELV) CONTROLLER.

ELV TRAM indicator OPTION

This ELV Helios unit is designed specifically for use with light rail and TRAMS. The Light colour is white and the aspects take the form of a bar of discrete lights. The central dot is normally constantly illuminated to indicate the optic as on. The same LED driver is used so the profile for monitoring purposes is the same as other ELV HELIOS optical units. If the unit becomes faulty no attempt should be made to replace individual drivers within the optic, the whole sub assembly must be replaced. More information see Appendix E

Helios all types

The aspects are “clipped” to each other. Holes in the mouldings provide a passage between aspects for the cables. Each moulding contains drill-start indentations to allow for cable conduit, AGD detector sockets, solar cell, etc.

Figure 3 – Helios side view

The door to each aspect is fixed by two sliding clips on either side, enabling left or right opening and easy removal of the door. As an anti-vandal measure, screws may hold the door clips shut.

Hoods and their fittings will also be supplied but need to be attached to the doors prior to installation. Helios has its own moulded hood but may use most existing louvred and tunnelled hoods, although some may need to be drilled.

If a green arrow, box sign aspect or four-aspect lantern assembly is specified, the extra module or modules required can be added to the basic signal head in combinations as shown in section 2.6. Fittings to secure each module to the basic lantern will be supplied with each single aspect.

The halogen, CLS with LMF, CLS (NLM) and CLS (ELV) green arrow may have a green arrow mask placed in a number of positions in 22.5° increments. The LED and LED (NLM) options can have up (ahead) or left and right green arrows PCB's fitted as standard (these utilise sub equipment green LED PCBs) along with a green arrow mask, but to have a green arrow in any other position, a fully equipped green LED PCB assembly is required along with a green arrow mask.

The ELV TRAM indicator uses the same housing as other units within the HELIOS family and can be clipped onto standard aspects or used stand alone as required. There is no room inside the housing however to fit any ancillary equipment. The information below is therefore not applicable to the TRAM indicator module.

Various items may be added to the basic unit. They are assembled to bosses moulded into the box. These are:

- Tactile unit power supplies from Radix and Sedgwell
- Additional 50 VA transformers for AGD drive, low voltage wait, etc.
- Additional terminal blocks, e.g. STCL controller terminal, HI pole cap terminal and MD 12-way brown blocks.
- Audio drive kit.

Fixing positions for these items are shown in Figure .

Positions for fitting overhead detector sockets are provided in recesses – three to each side. These recesses may also be used for the side box mounted cable conduit. See Figure and Figure .

Solar cell bosses are located on the top of the module.

Helios modular signals are compatible with existing pole drillings.

Note: Fibre optic arrows cannot be fitted to Helios signs. The new type of lens and mask renders fibre optics unnecessary and the 200 mm arrow takes the place of the old fibre optic.

2.1.1 Installation at a new site

Where there are no existing signals to be replaced, it is possible to specify the combination of modules required and have them delivered in a largely pre-assembled state.

This method is suitable where the STS drawing is available.

2.1.2 Upgrading an existing site

Helios signals are a significant improvement on the “Mellor” and “HITS” type of signals. Due to the visual differences, it is not recommended that different types be mixed on the same signal pole.

Sub-assemblies are available to expand a signal head, e.g. to add a side box. It is important to ensure that the correct backing boards (e.g. four-in-line), hoods and brackets are called for.

2.2 Helios Signals

2.2.1 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 (section 2.2.3)
3. Install pole Ł (section 2.3)
4. Add mounting kit to pole (section 2.3)
5. Wire pole Ł (section 2.3.5 or 2.3.6)
6. Fit extension arm(s) ø (section 2.5.1)
7. Remove doors (section 2.6.3)
8. Adjust green arrow mask ø (section 2.6.4)
9. Complete four-in-line assembly ø (section 2.6.7)
10. Connect side boxes to main signal head ø (sections 2.7 and 2.7.1)
11. Attach mandatory arrow lens to door ø (section 2.7.2)
12. Attach terminal blocks and/or bridge rectifier ø (sections 2.13 and 2.15)
13. Attach cable gland (section 2.16)
14. Attach hoods to doors (section 2.17)
15. Fit solar cell ø (section 2.18)
16. Fit pedestrian push button ø (section 2.19)
17. Fit tactile power supply ø (section 2.29)
18. Attach reflective tape ø (section 2.30.1)
19. Fit backing boards (section 2.30)
20. Fit AGD ø (section 2.31)
21. Fit signal head to pole (section 2.33)
22. Adjust angles of tilt and rotation (section 2.33.1)
23. Connect wiring between pole and signal head (section 2.33.2)
24. Fit pole cap (section 2.33.2)
25. Fit bulbs ¿ and doors (sections 2.33.3 and 2.33.4)

Ł = New installations only
Ø = Optional, depending on specification
¿ = Halogen only

2.2.2 Torque Settings

The recommended torque settings are as follows:

Plas-Tech 25 screws – 0.8 Nm (These are factory set and should not need adjusting, setting or testing).

M10 screws and bolts – 20 Nm

As signal heads rely on the security of their mounting fixings these fixings must be torqued up and the recommended procedure for this is found in appendix D.

2.2.3 Signal Head packaging

Helios modular signals are supplied boxed in two forms:

The three aspect box can contain a one-, two- or three-aspect head with attached brackets with the backing boards loose in the box. Hoods and other fixings are supplied in a separate box. Backing boards for a four in line assembly are attached to the outside of the box.

Figure , Figure , Figure and Figure show typical “as delivered” internal layouts for three-aspect heads.

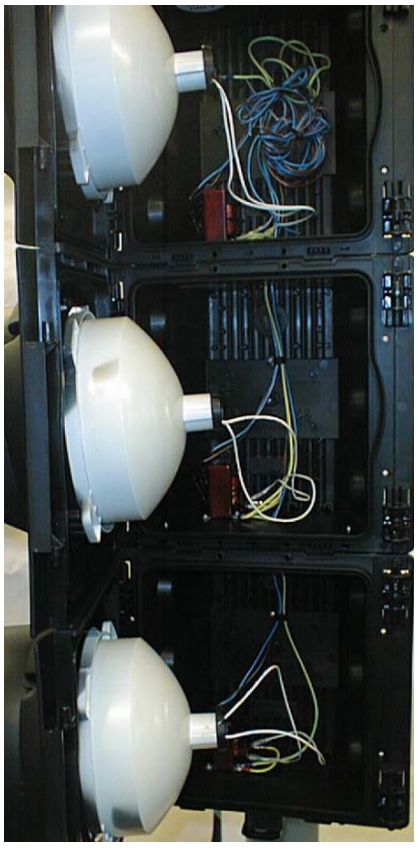


Figure 4 – Three Aspect Halogen Internal Fitting

Figure 5 – Three Aspect LED Internal Fitting

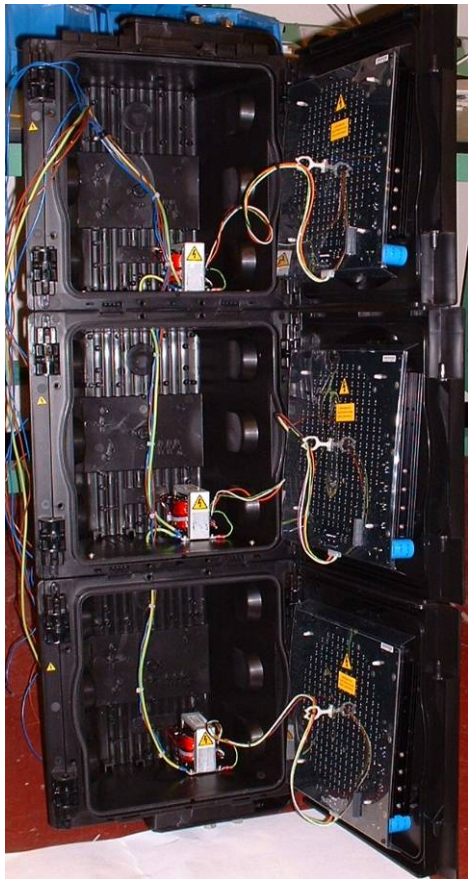


Figure 6 – Three Aspect LED (NLM) Internal Fitting

Figure 7 – Three Aspect CLS with LMF Internal Fitting

The single aspect box will contain a single module with its side box mounting kit or the four-in-line fixing kit, and all the hoods and fixings for the assembly.

All these elements should be assembled on the ground prior to fixing to the pole.

Lanterns are assembled in accordance with the requirements of the STS for primary and secondary signals.

Assembly and attachment of side boxes are described in section 2.7.

2.2.4 Optical Units

Helios only has 200 mm aspects with the exception of some regulatory signs that may be notionally 300 mm (actual size approximately 270 mm). The Mellor lens is **not** interchangeable with the Helios lens.

200 mm Aspects for Vehicle, Pedestrian and Green Arrow Signals

Halogen

A pre-focused 12 V 50 W Tungsten Halogen lamp is mounted in a parabolic reflector fitted behind a specially designed medium wide-angle lens of self-coloured acrylic material. Rear access is provided to the lamp holder to facilitate

lamp changing without exposing the reflector to the elements and possible surface damage.

The lens is screened with a specially designed mask, to reduce the phantom effect.

The lamp voltage is derived from a small step-down transformer, one per signal aspect mounted in the lamp body.

LED and LED (NLM)

The 247 pre-focussed LEDs on the standard red, amber and green aspects are mounted on a PCB that is held at a set distance from a specially designed medium wide angle lens made of clear acrylic material. The LEDs have the correct colour wavelength, intensity and viewing angle to achieve the specified colour, brightness and medium wide beam.

The lens is screened with a specially designed mask to reduce the phantom effect.

Rear access is provided to the PCB to allow it to be replaced easily. Note that mains voltages are present in LED aspects and the supply to the aspect must be isolated or switched off before any work is carried out.

The supply voltages to the LED PCB are derived from a small switch mode PSU mounted in the aspect case and powered from the respective controller output.

The supply voltages to the LED (NLM) PCB are derived from a dual winding transformer mounted in the aspect case and powered from the respective controller 230v phase output.

CLS with LMF and CLS (NLM)

A pre-focussed CLS unit is held in position at a set distance from a specially designed medium wide angle lens made of clear acrylic material. The CLS is a sealed unit which is available in Red, Amber and Green and is designed to achieve the specified colour and brightness output.

The lens is screened with a specially designed mask to reduce the phantom effect.

The 230v supply voltage for the CLS with LMF is derived from the LMF unit. The LMF unit monitors the load current of the CLS unit and is powered from the respective controllers 230v phase output.

The 230v supply voltage for the CLS (NLM) is derived from the respective controller 230v phase output.

CLS (ELV)

A pre-focussed CLS (ELV) unit is held in position at a set distance from a specially designed medium wide angle lens made of clear acrylic material. The CLS (ELV) is a sealed unit which is available in Red, Amber and Green and is designed to achieve the specified colour and brightness output.

The lens is screened with a specially designed mask to reduce the phantom effect.

The 48v supply voltage for the CLS (ELV) is derived from the ST900 (ELV) controller phase outputs. The ST900 (ELV) controller phase driver PCBs (LSLS – Low Voltage / Serial Lamp Switch) monitor the load current of the CLS (ELV) unit.

ii. Regulatory Signs

LV Regulatory Signs

Two 230 mm (9") 6 W fluorescent tubes are mounted in front of a metal reflector. The tubes are connected in such a way as to provide protection against total signal failure.

The lens is formed from a flat acrylic sheet upon which any of the mandatory signs may be printed in full colour. Most regulatory signs are delivered with the lenses fitted into the door of the module using a mastic bead sealant. Mandatory arrow signs come as a kit with separate sealant to allow fitting on site to customer requirements.

ELV Regulatory Signs

Two 6 LED arrays are mounted onto a plate along with a control module and connection terminal block. This ELV Module (667/1/33510/000) is then mounted into a body using 3 off M4 x 10mm Plastech 25 pan head pozi screws. The required door/lens is fitted to the body.

The lens is formed from a flat acrylic sheet upon which any of the mandatory signs may be printed in full colour. Most regulatory signs are delivered with the lenses fitted into the door of the module using a mastic bead sealant. Mandatory arrow signs come as a kit with separate sealant to allow fitting on site to customer requirements.

2.3 Assembling and Terminating a Signal Pole

2.3.1 Pole Types

General -	PVC-covered Poles	667/2/01459/ETC
	Galvanised Poles	667/2/03686/ETC
	Cranked Pole	667/2/30230/000-001
		667/2/30231/000-001
	Formed Pole	667/2/28107/001-003

NOTE – If the Pole is a Formed or Cranked Type or the Pole has an Extension Arm fitted, an Anti-Rotate Rod must be fitted to the Pole (See Figure).

Part Number for Anti-Rotate Rod – 667/2/10094/000

2.3.2 Pole Selection

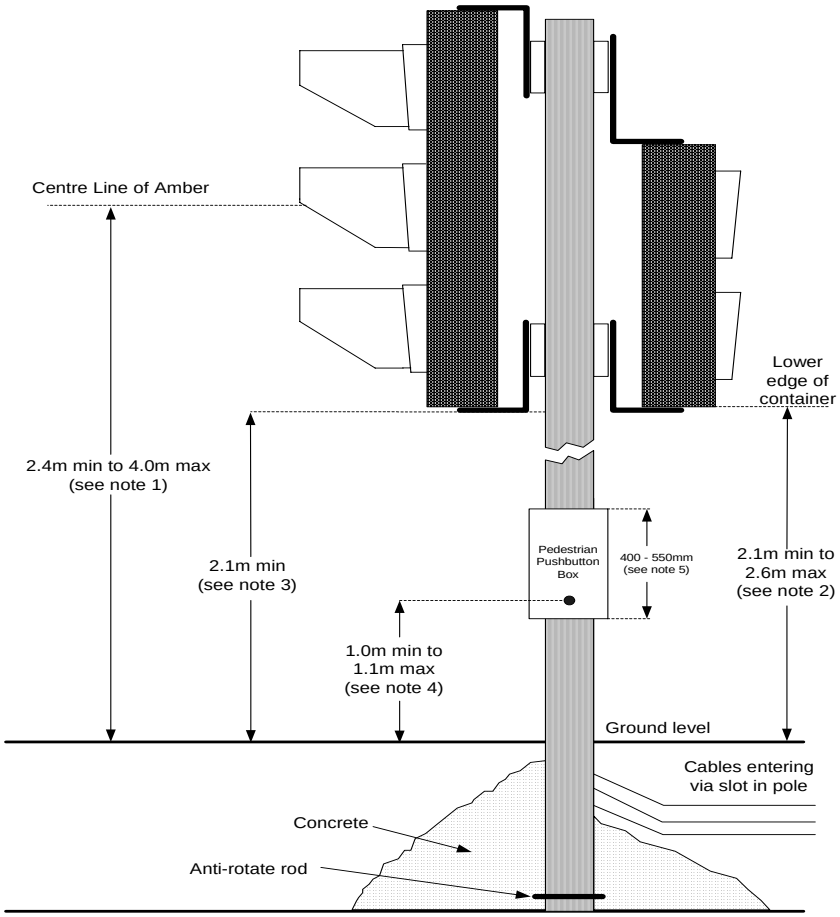


Figure 8 – Typical Signal Pole Assembly showing heights for compliance with Traffic Signs Regulations

Notes:

1. The dimensions on this drawing show the limits allowed where 'Light signals for control of vehicular traffic at road junctions, at places where the headroom is permanently reduced or at places where pedestrians cross the road (other than Pelican crossings)'. [See Traffic Signs Regulations 1994 and Schedule 8.]
2. The dimensions on this drawing show the limits allowed for 'Light signals for pedestrians and animal crossings'. [See Traffic Signs Regulations 1994 and Schedule 8.] [For cycle crossings see LTN 1/98.]
3. SAFETY NOTE!

   Signals that are installed where pedestrians may cross the road must have no part of the signal head installation less than 2.1 m above ground level. Where cyclists may be expected to use the crossing, this dimension is 2.3 m. See section 2.3.3 for information on using cranked and formed poles at Toucan crossings.
4. The height from the centre of the push button to the footway level. [see

LTN 1-98]. This dimension applies if the push button is a single housing or a separate housing Demand/Display unit.

5. The height dimension of the pushbutton unit applies to a single housing or separate housing Demand/Display unit [see TR2181C].

The following information is provided to enable pole length requirements and planting depths to be determined. This assumes a 667/2/01459/ETC pole and a 3-aspect signal. Confirm dimensions using appropriate or latest drawings.

Note that a 3.75 m pole will only be used for amber centres below about 2.6 m.

Example 1 - Obtaining heights to amber centre line with nominal pole lengths by varying planting depth. m)

- 4000 - 2800 - 505 = Planting depth in mm = 695 mm.

Note – see FIGURE and FIGURE for dimensions

Example 2 - Using common pole lengths and a planting depth of 700 mm, the centre of the amber would be:

Pole Length (m)	Planting Depth (mm)	Amber centre line
4	700	~2.80 m
5	700	~3.80 m
5.5	700	~4.30 m
6	700	~4.80 m

Example 3 - To obtain the pole length required for a given centre of the amber, green or the clearance height:

- Pole length required = (Height to amber C/L + 505 mm + planting depth)
- Pole length required = (Height to green C/L+ 835 mm + planting depth)
- Pole length required = (Clearance Height + 1065 mm + planting depth)

Therefore, if the height of the green C/L is to be 2.5 m, the pole needs to be at least 2.5 m + 0.84 m + 0.61 m = 3.95 m.

Note – see FIGURE and FIGURE for dimensions

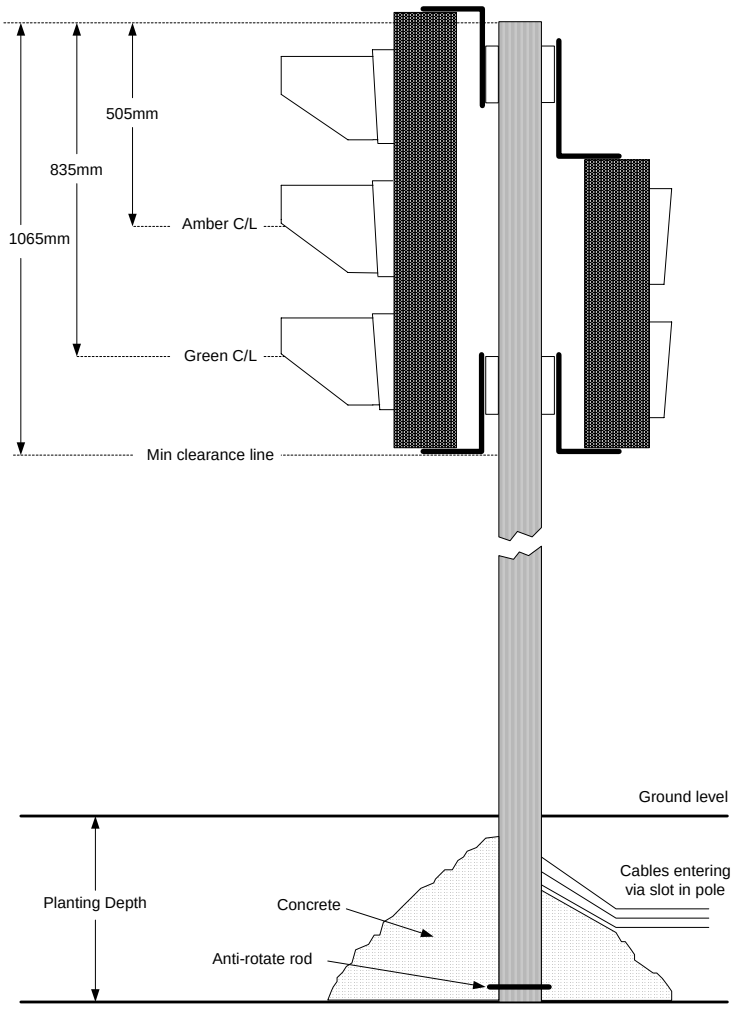


Figure 9 – Signal Pole Assembly showing useful dimensions for Pole Selection and planting depth

Note - The planting depth must be a minimum of 610 mm to cover the cable entry slot. Install under direction from the Civil Engineer, dependent on the ground conditions.

2.3.3 Cranked and Formed Poles at Toucan crossings

Where cranked or formed poles are used at Toucan crossings, the 4.32 m pole is recommended. This has been specially designed to avoid the possibility of cyclists injuring themselves on the bend in the standard length poles.

These poles have a maximum planting depth of 830 mm to adhere to all regulations. The standard minimum planting depth of 610 mm applies.

To allow for a level clearance height of all signals at a Toucan, straight poles are also available in 4.32 m length.

2.3.4 Erecting the Pole

The pole assembly may be completed to the point of having drawn up the cables and fitted at least the pole cap prior to erection, in which case see Section 2.3.5. Alternatively, assembly may follow erection in which case go to Section 2.3.6.

Transport lantern bracket assemblies, pole cap assembly, pole draw rope, ladders and all necessary tools to the first pole location.

The mounting kit (delivered separately) includes a ‘U’ bolt and two M8 bolts that are used to attach pole spacers and then the signal head to the pole.

The ‘U’ bolt is fixed in the lower position; attach a nut loosely to one end (to prevent the bolt being lost inside the pole), feed the other end in through one hole and out of the other. Remove the nut, place the pole spacer over the bolt ends and attach firmly to the pole using plain M8 washers and M8 nuts.

The upper pole spacer is held in place with two M8 bolts, washers and nuts that can be held in place with a hand inside the pole whilst fixing to the pole. These bolts should be securely tightened.

2.3.5 Wiring Pole prior to erection

Each cable can be fed through the base aperture to the top of the pole using the draw rope if necessary to pull the cable up.

Unpack and dismantle the pole cap assembly and fit the terminal block assembly to the pole with the nuts, bolts and washers supplied.

Connect the earth cable from the terminal block assembly to the earth connector in the pole.

Secure all cable(s) to the slots on the terminal block assembly using the CET connector(s) and worm drive hose clip(s). Note that a suitable allowance must be made for the amount of cable at the bottom of the pole.

The pole is now ready for erection. Once this operation is completed, the excavation at the base of the pole may be back-filled.

Note that Lanterns are not terminated until after the cables have been tested.

On completion of all pole top terminations, the tests described in the Installation and Testing Handbook (see section 1.3) are to be completed.

2.3.6 Wiring Pole after erection

Each cable can be fed through the base aperture to the top of the pole using the draw rope if necessary to pull the cable up.

This operation is then repeated for each pole at the intersection.

Unpack and dismantle the pole cap assembly and fit the terminal block assembly to the pole with the nuts, bolts and washers supplied.

Connect the earth cable from the terminal block assembly to the earth connector in the pole.

Secure all cable(s) to the slots on the terminal block assembly using the CET connector(s) and worm drive hose clip(s).

Measure off wires to length, cut, strip, terminate necessary cores to terminal block and terminate two cables cores in earthing block for test purposes as described in Section 2.3.7.

Once this operation is completed, the excavation at the base of the pole may be back-filled.

Note that lanterns are not terminated until after the cables have been tested.

On completion of all pole top terminations, the tests described in the Installation and Testing Handbook (see section 1.3) are to be completed.

2.3.7 Pole Neutral Connections and Terminations (Halogen)

On long neutral runs during Red/Amber, the current can cause large voltage drops. This contravenes the IEE Regulations which only allow a 2.5% voltage drop overall. In addition, the voltage drops can affect the operation of the green voltage monitor and/or lamp monitors. The length of the neutral feeds must not exceed the length shown below. The number of bulbs is the total number of bulbs which can be illuminated at any one time, e.g. phase A and phase AB will both have two bulbs lit during the Red/Amber period. Where two poles are fed on one cable, the length of cable should be taken as the mid-point between the two poles.

The cable inside a pole is approximately 3.25 metres. So, for normal runs, the length of run shown on the STS should be approximately six metres shorter than the maximum allowable length of cable.

Where a cable run exceeds the figures shown, two cores of the cable can be used as the neutral feeds, then the distances shown can be increased by a factor of 1.5.

Number of Lamps Lit	Current	Total Length of Cable	Typical Cable Run on STS
1	0.27	370	364
2	0.54	185	179
3	0.81	123	117
4	1.08	93	87
5	1.35	74	68
6	1.62	62	54
7	1.89	53	43
8	2.16	46	40
9	2.43	41	35
10	2.70	37	31
11	2.97	34	28
12	3.24	31	25
13	3.51	28	22
14	3.78	26	20

Number of Lamps Lit	Current	Total Length of Cable	Typical Cable Run on STS
15	4.05	25	19
16	4.32	23	17
17	4.58	22	16
18	4.86	21	15
19	5.13	19	13
20	5.40	18	12

If there is a danger of neutral connectors being disconnected it is recommended that separate neutrals be used for:

1. Signals and green arrows
2. Wait indicators
3. Box Signs, Solar Cell and MVDs
4. Sonalert on Pelican Controllers.

If more than one armoured cable conductor with the same function needs to be terminated into the post terminal block, they should be connected into one side of the connector. The other side should be left clear for the connection of lantern conductors.

2.3.8 Pole Neutral Connections and Terminations for CLS (ELV)

See 667/DS/20664/048 – Traffic Signal Junction Cabling Design Certification for ELV Systems - Issue 1 (or later).

2.4 Controller Neutral Connection

Neutral kits are available for the ST800 and ST400 controllers. The part numbers are 667/1/27068/000 and 667/1/20679/000 (or /001 with terminal block) respectively. Where these are not available, proceed as described below.

Minimum wire size to be 24/0.2 mm (1.5 sq. mm) and colour to be black for neutrals. Length required approximately 1.5 metres maximum.

Cut lengths of wire 60 mm long and bare each end for 10 mm.

Starting at the appropriate terminal block insert two separate ends into the block and screw down tightly. Take each loose end and loop around to the next position. Continue in this fashion for as many neutral terminal points as are required. Two lengths of wire approximately 250 mm long (with bare ends for 10 mm) can be used to loop around to other terminal block positions.

Terminal blocks may be used for both neutral looping and phase live output looping that may require more than the single screw terminal provided. See Figure . Note that no bare strands should be exposed when the looping is complete. Consult the appropriate controller installation manual for details of the terminal blocks designated for such use.

It is important that all of these connections are checked for tightness during periodic inspections (PI).

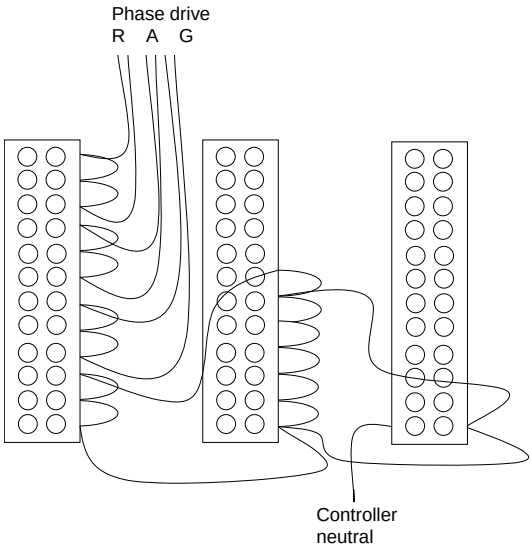


Figure 10 – Wiring of the Neutral Terminal Block

2.5 Helios Bracket Assemblies

There are four types of bracket for Helios:

1. The standard bracket that is used top and bottom on a three aspect case (667/2/30070/003) and the bottom bracket on the four in-line, two in-line and single aspect assemblies.
2. A four in line assembly has a long top bracket (667/2/30070/004) and a standard bottom bracket.
3. A two in line (pedestrian) assembly uses a longer top bracket (667/2/30070/002) fitted as shown in Figure and a standard bottom bracket.
4. A single aspect assembly uses a one aspect top bracket (667/2/30070/001) and a standard bottom bracket.

Three-aspect signal heads are generally delivered with the brackets attached. For a four in line case the long top bracket is attached to the top of the signal head and the bottom bracket is attached to the separately delivered bottom aspect.

2.5.1 Extension Bracket Assembly

Signal heads can be mounted away from the pole using extension arms. To ensure that the arms are mounted the correct way up, the mounting plate on the arm should be examined. It will be apparent that the lip is longer in one direction and the longer lip must be mounted toward the top of the pole.

Make up on the ground by laying out the two horizontal arms and attaching the vertical bar between them using the fixings provided.

Hang the extension bracket on the pole and fix using the nuts provided.

Add bolts and spacers to the extension bracket on which to hang the signal head. All bolts should be securely tightened.

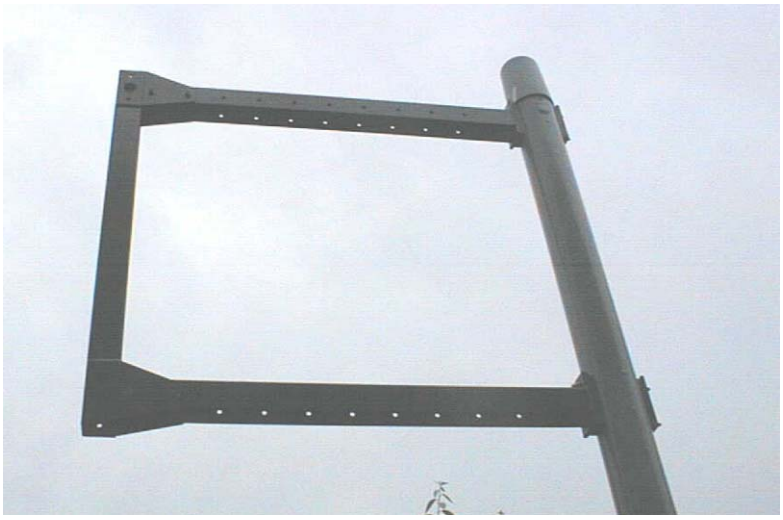


Figure 11 – Extension Bracket

Connections from the signal head to the pole are enabled by the use of a terminal block in the top aspect case.

2.5.2 Side Mounting Bracket

Where signal heads are to be fitted at an angle of rotation greater than 45°, and also need to be tilted, side mounting brackets (part no. 667/1/30200/058) should be installed as shown in Figure 12 to assist in final adjustment. This usually only applies to road traffic signals.

They may also be used to fit an AGD (section 2.31) if required.

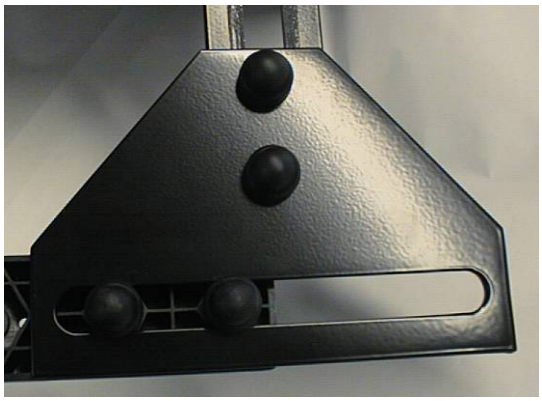


Figure 12 – Side mounting bracket

2.6 Signal Head Arrangement

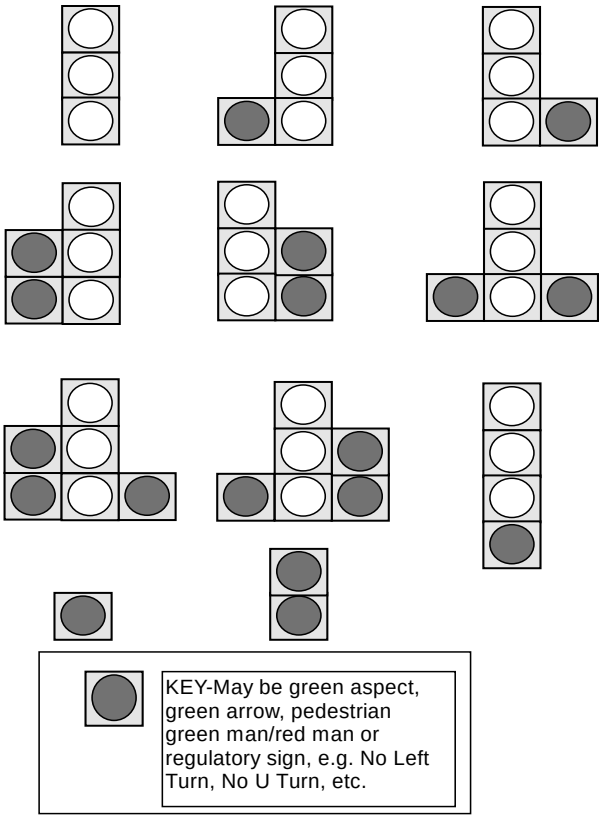


Figure 13 – Example Mounting Arrangements

Figure shows a selection of arrangements, but it is not an exhaustive depiction of what is possible. A maximum of eight modules may be incorporated on one assembly, arranged as a four-aspect lantern assembly with two side boxes on each side.

2.6.1 Sacrificial Caps

Most signal head assemblies are delivered with the sacrificial caps and brackets fully assembled and attached to the signal head. In those cases where the assembly has to be made on site, follow the instructions given below.

Sacrificial cap assemblies are fitted to either end of the main signal head. The assemblies are made up of an end cap, the sacrificial cap, the cap-to-bracket fitting and an 8 mm Allen bolt. They differ only in the design of the cap; one has a smooth lower surface and the other has teeth that engage in the end cap.

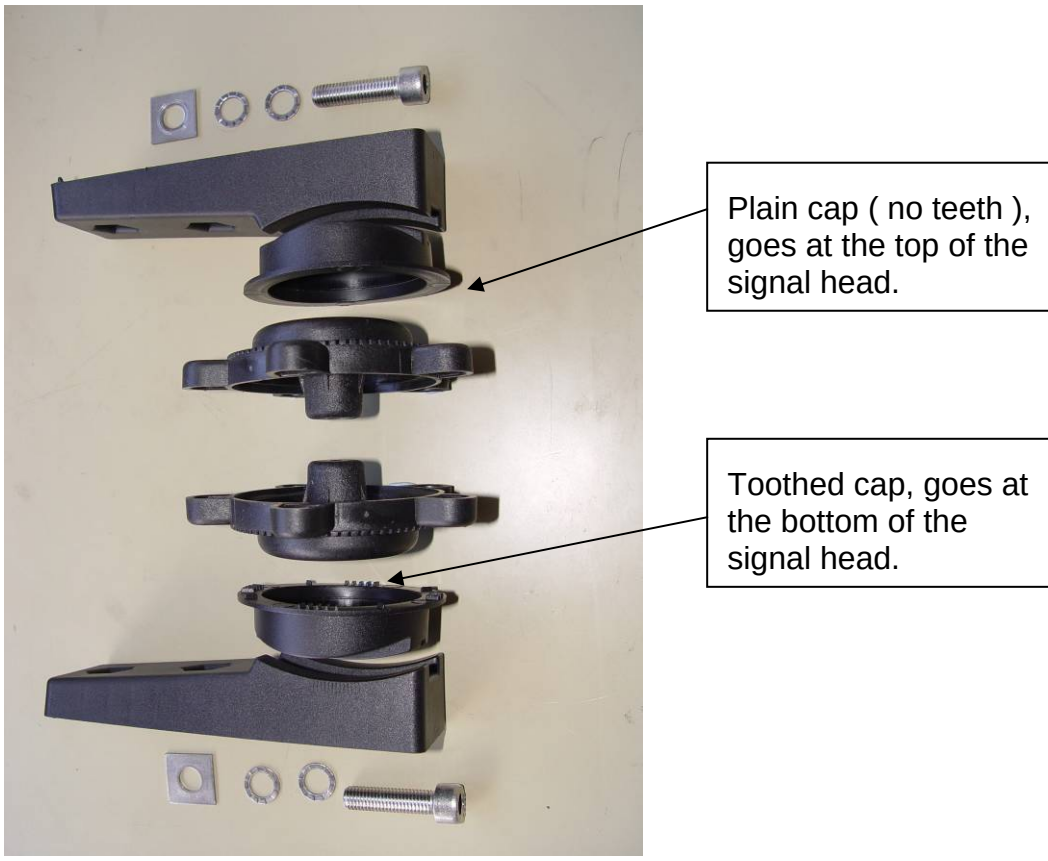


Figure 14 – Sacrificial Cap parts

The sacrificial caps must be fitted correctly. The smooth cap is fitted to the top of the signal head and the toothed cap is fitted to the bottom.

Assemble the parts as follows:

1. Attach one end cap at each end of the signal head using five screws. (The sacrificial cap end cap fixes in a similar position to the end cap fitted to side boxes shown in Figure .)

Note: For a four-in-line the bottom cap should be attached to the fourth module, which will not be attached to the main signal head at this stage of the installation.

2. Attach the smooth sacrificial cap and one bracket fixing to the top end cap.
3. Attach the toothed sacrificial cap and the other bracket fixing to the bottom end cap.
4. The Allen bolts should be loosely screwed into place using the 8 mm Allen key. Adjustment is needed later; see section 2.33.1.

Figure 15 – Sacrificial Cap assembly

2.6.2 Brackets

Most signal head assemblies are delivered to site with the sacrificial caps and brackets ready attached to the signal head. In those cases where the assembly has to be made on site, follow the instructions given below.

The brackets should be attached to the signal head-to-bracket fixings at both ends of the signal head, using the M10 screws and bolts supplied. Do not fully tighten the screws, as adjustment is required later. See section 2.33.1.

2.6.3 Remove Doors

Two sliding clips on either side fix the door to its Aspect. When signal heads and side boxes are delivered, the doors are fitted.

To remove a door, open all four clips and lift the door off. If necessary, use the point of a screwdriver as shown in Figure to push open the door clips. A Teflon-based or similar dry type lubricant may be used to lubricate the clips.

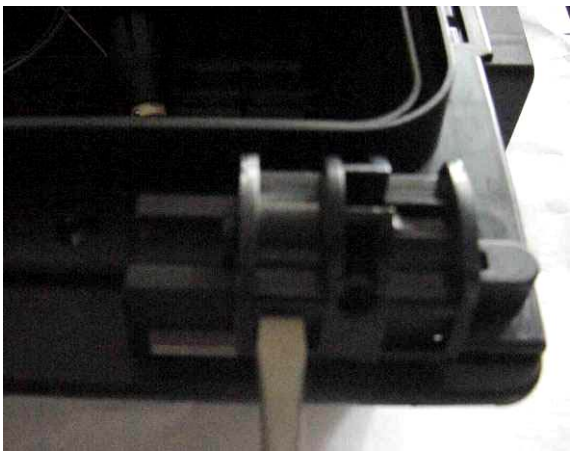


Figure 16 – Using a screwdriver to open the door clip

Leave the lens and reflector in place on the rear of the door and unclip the bulb holder from the rear of the reflector.

Figure shows a door clip in the half-open position with the door sitting above and unconnected. The door 'peg' is held in place by the door clip.

Figure 17 – Door clip detail

2.6.4 Green Arrow (Halogen), CLS with LMF, CLS (NLM) and CLS (ELV)

The green arrow optic includes a metal mask (667/2/30074/101) as shown in Figure . This module is delivered with the mask positioned either vertically (straight ahead) or horizontally for left- or right-turn. The mask has castlations that fit into indentations in the reflector/lens retaining ring enabling it to point in any one of 16 directions, depending on individual site requirements.

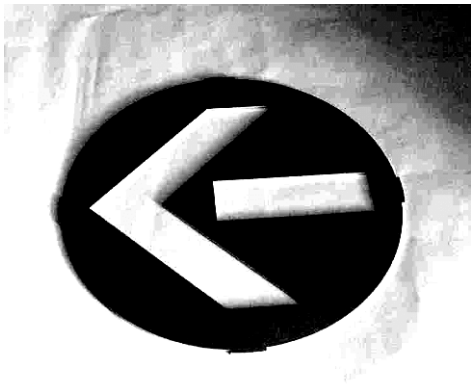


Figure 18 – Green Arrow mask

Any adjustment to the orientation of the green arrow should be carried out with the optic door removed from its aspect and placed on a flat surface to help in positioning the lens seal.

Helios (Halogen)

To alter the position of the mask, unscrew the reflector from the rear of the door and remove it. Tip the mask out from behind the lens (replacing the lens in its original position if necessary) and replace in the position required.

Make sure that the two seals (lens/door and lens/reflector) are in place and screw the reflector back into position. See section 4.2.13 and Figure for details.

CLS with LMF, CLS (NLM) and CLS (ELV)

To alter the position of the mask, remove the CLS unit by –

a) Futurit CLS - Removing the two CLS retaining clips and release it from the remaining clips in the lens retaining ring and then unscrew the lens retaining ring from the rear of the door and remove it.

b) Dialight CLS – Remove the 4 screws holding the unit to the rear of the door.

Tip the mask out from behind the lens and replace it in the position required in the retaining ring.

Replace the lens back in its original position on -

a) Futurit CLS - the retaining ring, and make sure that the lens/door seal is in place. Place the door over the lens, tip the assembly over and screw the retaining ring back into position on the door. Replace the CLS unit into the retaining clips in the lens retaining ring and then replace the retaining clips which hold the CLS in position.

b) Dialight CLS – the CLS unit and make sure that the lens/door seal is in place. Place the door over the lens, tip the assembly over and screw the CLS unit back into position on the door.

2.6.5 Green Arrow (LED and LED (NLM))

There are two variants of the green arrow LED and LED (NLM); up and left/right. If any other direction is needed, the fully populated green LED or LED (NLM) must be used.

The green arrow metal mask (667/2/30074/101) is used with LED and LED (NLM) PCBs to prevent any shadowing from the board electronics, and to hide the superfluous LEDs on the left/right arrow or fully populated PCB.

Any adjustment to the orientation of the green arrow mask should be carried out on a flat surface to help in positioning the lens seal.

To alter the position of the mask, unscrew the retaining ring from the rear of the door and remove it. Tip the mask out from behind the lens and place it in the position required in the retaining ring. Replace the lens back in its original position on the retaining ring, and make sure that the lens/door seal is in place. Place the door over the lens, tip the assembly over and screw the retaining ring back into position on the door.

Secure the door, tightening the anti-vandal screws if supplied.

2.6.6 Equestrian (Halogen, CLS with LMF, CLS (NLM), CLS (ELV), LED and LED (NLM))

Lens are available for displaying equestrian figures. These lens have the equestrian figure ‘silk-screened’ on to them.

a) Red and Green Equestrian Lens for the Halogen Helios options
667/1/30200/399 – Red Equestrian (Lamp) Lens
667/1/30200/398 – Green Equestrian (Lamp) Lens

b) Clear Equestrian Lens for the LED and LED (NLM) Helios options
667/1/30200/397 – Clear Equestrian Lens (LED) Lens.
This lens is used in front of Red and Green LED and LED (NLM) PCB option.

c) Clear Equestrian Lens for the CLS with LMF, CLS (NLM) and CLS (ELV) Helios options -
667/1/31500/397 – Clear Equestrian Lens (LED) Lens.
This lens is used in front of Red and Green CLS with LMF, CLS (NLM) and CLS (ELV) units.

2.6.7 Four in Line

A four in line configuration is delivered with three aspects assembled and the fourth in separate packaging. The bottom bracket will be attached to the fourth aspect.

The fourth aspect should first have the O ring fitted (included with the mounting kit) to seal the join between the boxes. It should then be clipped in place and secured using the two M5 x 45 mm screws supplied in the outer fitting positions (see Figure and Figure).

2.7 Side Boxes

Side boxes are supplied with all the necessary fixings to fit them to the signal head. One metal plate should be screwed vertically between the units; the other fits horizontally for extra support. See Figure and Figure for fixing details. There is a conduit supplied to run the cables through.

The holes for the conduit should be drilled using an 18 mm or 20 mm drill bit in the forward drill start position on the signal head as shown in Figure with a corresponding hole in the side box. Figure shows the conduit fitting from inside an aspect case.

If two side boxes are to be fitted on one side, they should be connected together in the same way as the aspect boxes (see section 2.6.7) before being fitted to the main signal head.

Figure 19 – Side box showing fixing plates and conduit

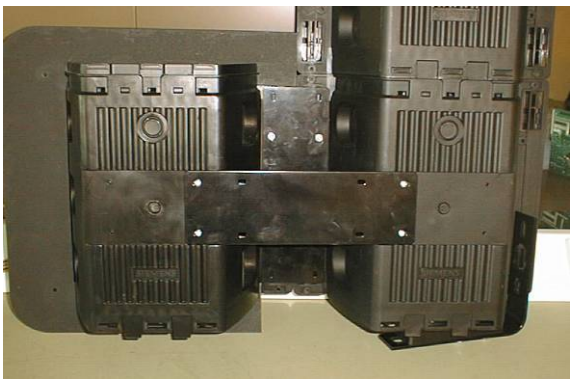


Figure 20 – Side box fitted on right of main signal head

Both ends of any side fittings should have end caps fitted as shown in Figure . There is an O ring supplied to seal the fittings to the body that should be placed in the groove inside the end cap.

Figure 21 – End cap fitted to side box

2.7.1 Wiring Side Boxes

Check that the internal illumination assembly is correctly fitted into each side box. Green arrow and cycle side boxes have internal fittings similar to the main signal head; regulatory signs are fitted as shown in Figure .

Feed the cable through the conduit, up through the main signal head via the cable gland and wire to the top cap.

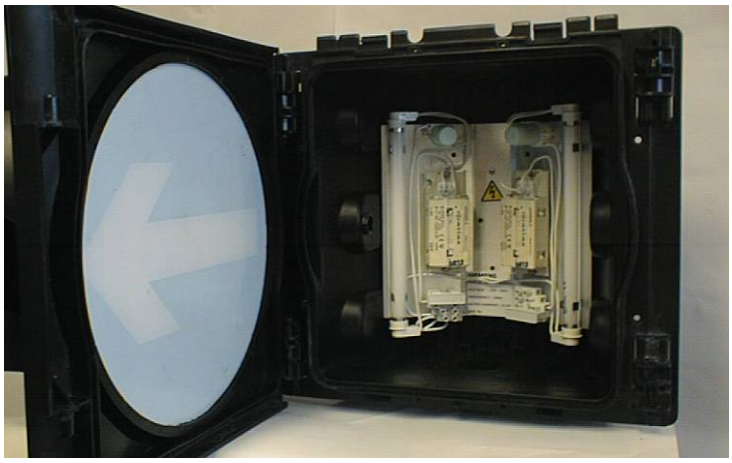


Figure 22 – Regulatory Sign internal fitting

2.7.2 Mandatory Arrow

Where a mandatory arrow sign is to be fitted, it is delivered with the door un-assembled for fitting on site to customer requirements.

The kit consists of the door, a strip of mastic bead sealant and the optic. The arrow should be lined up with one of the 16 points around the door aperture, each of which represents an increment of 22.5°.

Figure 23 – Signal Head with Mandatory Arrow fitted

Clean the door aperture and outside of the lens carefully and ensure that both are completely dry before fitting the lens. Place the strip of sealant around the inside of the door aperture, carefully align the lens and press both parts together.

Remove any surplus seal from the face of the lens.

2.8 Transformers (Halogen)

The transformers will normally be factory fitted before delivery. The usual position is in the bottom right corner of the module, although they may be placed in any of the four corners.

If the transformer is to be fitted in one of the upper positions, four screws are required, one in each corner. For lower position fitting, only two screws are needed to hold the unit to the floor of the case, as the rear of the transformer fits into the retaining slots as shown in Figure .

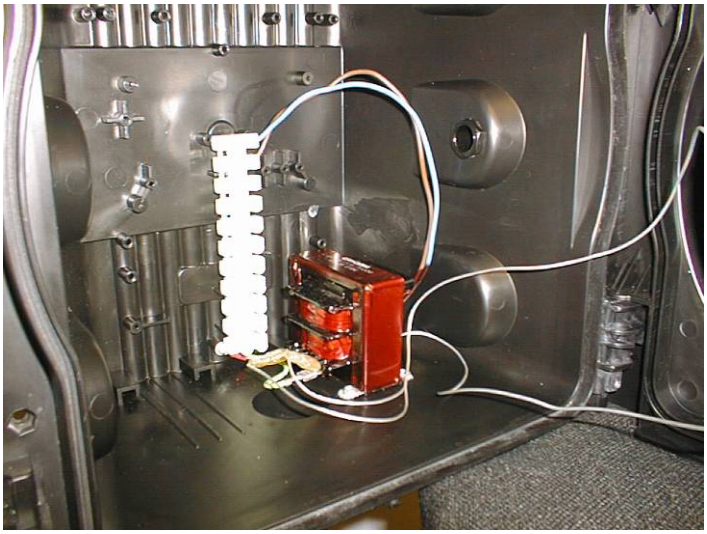


Figure 24 – Transformer fitted to floor of case

2.9 PSUs (LED)

The PSU assembly will normally be factory fitted before delivery. The usual position is centrally near the floor of the case, one in each LED aspect.

The assembly consists of a metal backplate with an inductor tie-wrapped to one side, a metal PSU cover with an earth point and keyhole fixings holding the PSU and associated wiring. The backplate may be fitted with the inductor on either side; the PSU is always fitted with the earth point at the top.

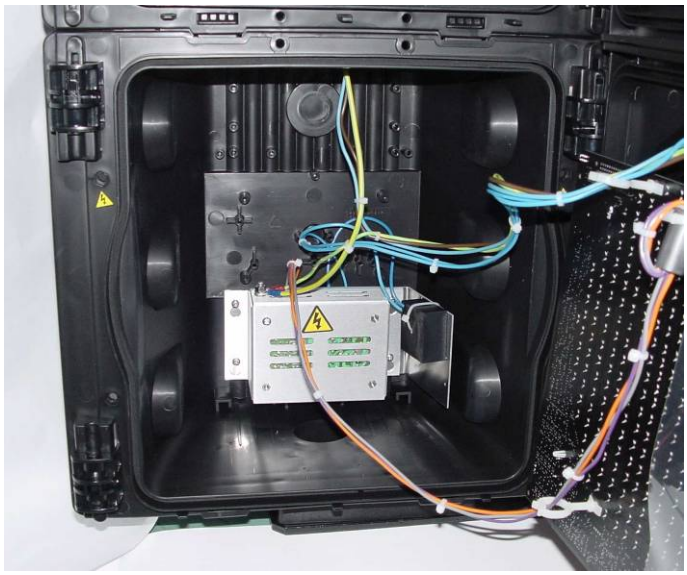


Figure 25 – PSU assembly fitted into case

2.10 Transformers LED (NLM)

The transformers will normally be factory fitted before delivery. The usual position is in the bottom right corner of the module, although they may be placed in any of the four corners.

If the transformer is to be fitted in one of the upper positions, four screws are required, one in each corner. For lower position fitting, only two screws are needed to hold the unit to the floor of the case, as the rear of the transformer fits into the retaining slots.

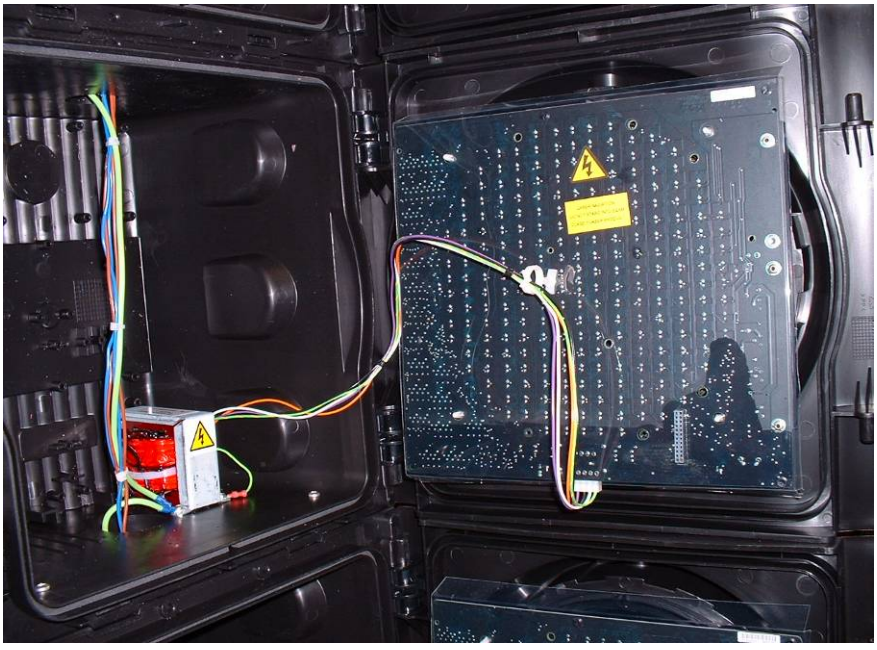


Figure 26– LED (NLM) Transformer Fitted to Aspect

2.11 CLS Unit

The CLS units will normally be factory fitted into the appropriate door before delivery. There are three variants of the CLS unit

a) Red CLS unit - 667/7/28584/100

b) Amber CLS unit - 667/7/28584/101

c) Green CLS unit - 667/7/28584/102

The CLS unit is obtained from 2 manufacturers, Futurit and Dialight.

The Futurit CLS unit is positioned into the lens retaining ring and held in place with two CLS retaining clips (667/2/31501/000). The lens retaining ring and CLS retaining clips are fitted into the door with four screws.

The Dialight CLS unit has the lens retaining ring built into the unit and is fitted to the aspect door with four screws.

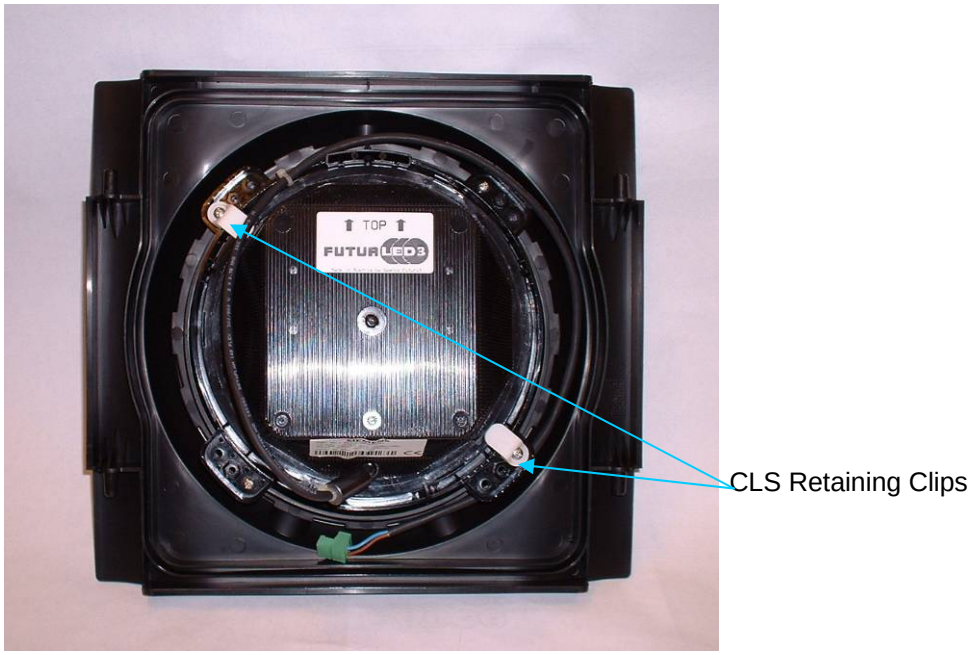


Figure 27 – Futurit CLS Unit

Figure 28 – Dialight CLS Unit

2.12 Lamp Monitoring Unit (LMF)

The LMF units will normally be factory fitted into the appropriate aspect body before delivery. The are two variants of the LMF unit

a) LMF for Red Aspect - 667/1/31180/230R

b) LMF for Amber or Green Aspect - 667/1/31180/230AG

The two pin plug from the CLS unit and the two pin mains socket from the controller output are fitted into the LMF Unit.

Note the Mains Input Wiring is formed so as to prevent any water ingress from the cables dropping in to the LMF Unit.

Note that the Mains wiring to other LMF Units is tied to the LMF chassis with two Pushbutton Ties which prevents any heat from the LMF unit from damaging any of the cable forms.

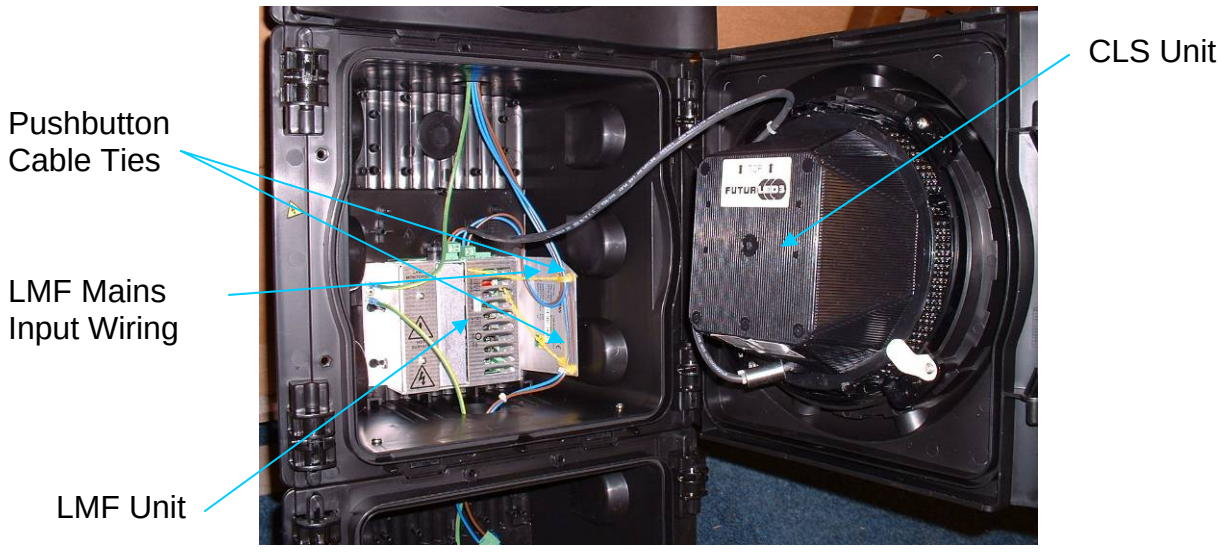


Figure 29 - CLS with LMF

2.13 ELV TRAM Indicator

The TRAM indicator should only be replaced as a complete module. The maintenance spares should always be fully equipped modules but the originally supplied equipment may be sub equipped. The TRAM indicator uses the same LED driver module as other Helios ELV optics so is compatible with the ST900ELV lamp monitoring. Care should be taken when removing the and refitting the unit to not tram the multi-way cable and not to unscrew fixings that hold the module together.

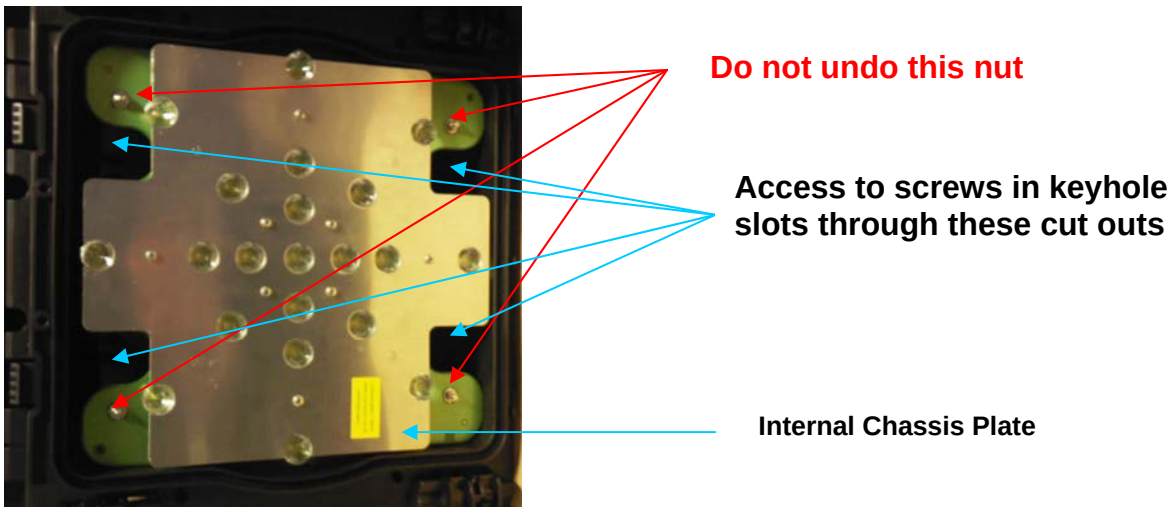


Figure 30 – TRAM Indicator with door open

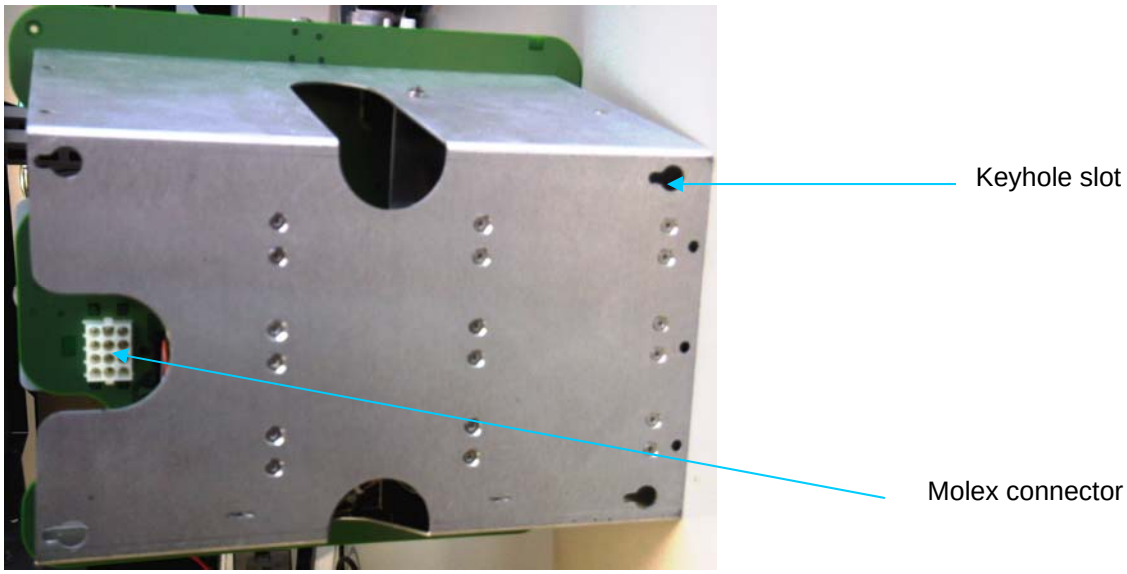


Figure 31 – TRAM Indicator rear view showing Keyhole slots

To remove the Tram indicator from its housing:

The Tram indicator is a complete module and must be replaced as a complete assembly. The LED and power supply assembly is fitted into a standard Helios aspect box. This assembly remains in the rear part of the box when the door/lens assembly is opened. ***Care must be exercised whilst the door lens assembly is open as the LED "dots" are extremely bright and may dazzle the viewer.***

The assembly is kept in the rear part of the box by screws attaching it to the rear of the box. A screwdriver with a 150mm crosshead blade is required to reach the screws. To aid replacement the fixings are located in keyhole slots. Once the screws are slackened a few turns the assembly can be lifted and withdrawn from the box. Once the assembly is clear of the box the 12 way Molex connector can be unplugged. The Molex connector is a tight fit and there are release leavers that must be squeezed to enable the connector to part. It is essential that the operative is stable with both hands free when attempting this operation. Re-fitting is the reverse of removal. The operative must ensure that the cable does not become trapped when refitting the assembly. The entire assembly can then be returned for repair. Although there are 3 variants of the TRAM indicator module only the fully equipped version will be kept as a spare. The faulty unit will be upgraded to the fully equipped version as part of the repair process. Dismantling of the indicator module must not be attempted. Under no circumstances should the 4 nuts on the front of the module be undone as this will result in the module falling apart. This could result in short circuits and the signals extinguishing. It could also result in damage to the LED's and the driver modules.

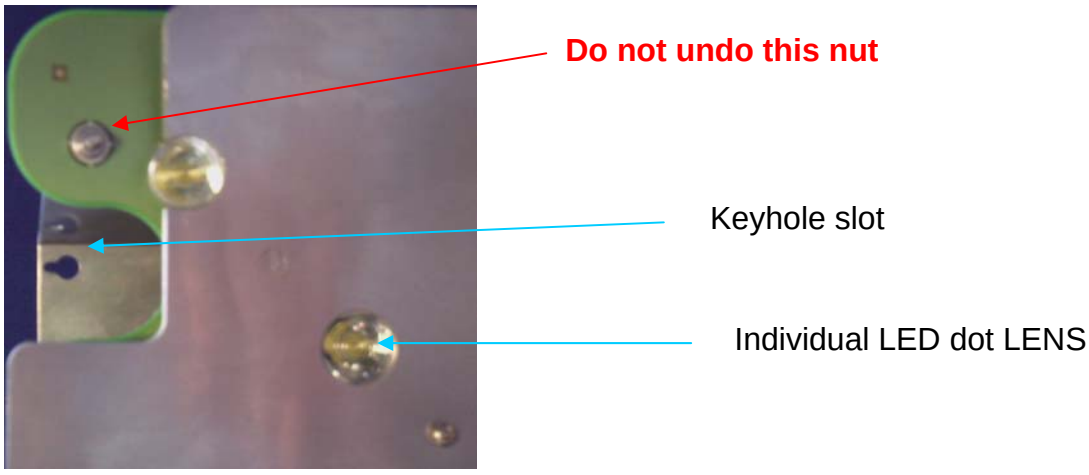


Figure 32 – TRAM Indicator showing keyhole slot from the front

2.14 Terminal Blocks

Fixing positions have been provided for terminal blocks, which are generally only fitted in aspects where an extension bracket has been used. Figure shows a terminal block fitted in one of the positions provided and Figure gives all the possible fixing positions.

2.15 Bridge Rectifier

See Figure and Figure for the fixing position.

Note: if the cable P-clip is fitted in this position, either fit the bridge to another unused pillar position or move the P-clip.

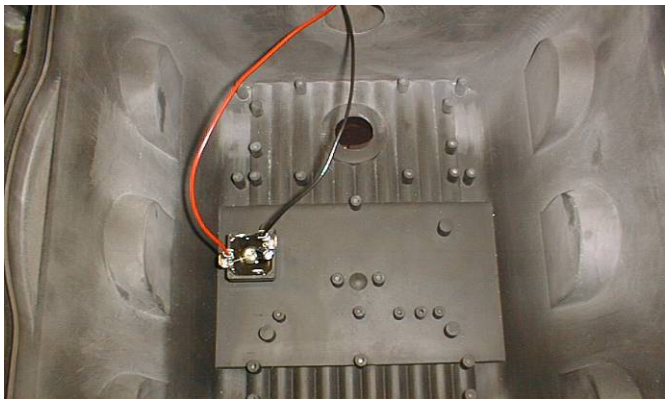


Figure 33 – Bridge Rectifier

2.16 Cable Gland

The cable gland is normally fitted in the knockout on the back of the top (red) aspect, but it may be fitted where required, with the following provisos:

1. For a four-in-line assembly the gland must be fitted to the second box.
2. Side mounted signals may have the cable gland fitted in one of the three recesses in the side of the module.
3. Pedestrian signals may have the cable gland fitted in any position to reduce the length of the conduit.

Wherever the gland is fitted, consideration should be given to the length of the transformer/PSU wires and the amount of conduit tubing between the signal head and the pole. A long length of tubing is unsightly and should be avoided wherever possible.

To fit the conduit tubing, screw the conduit adapter into the cable gland. Feed the locking ring onto the conduit tube and push the tubing firmly onto the end of the adapter. Seal in place with the locking ring. Note that the tubing does not form part of the signal head assembly, but should be kept in quantity by installers and cut to fit as required.

2.17 Hoods

The signal is normally supplied with Helios moulded primary or secondary hoods, but will also accommodate a wide range of hoods used with the previous Mellor style signals if required, including most louvred and tunnelled hoods.

The new moulded hood is fitted with insertion slots for accurate positioning and is attached using fir-tree clips. See Figure for details. The clips are just pushed in to hold the hood in place.

Figure 34 – Standard Hood fitting

The moulded hoods may be fitted straight or turned up to 90° without modification. If, for any reason, a hood needs to be attached at more than 90° to the vertical, new holes will need to be drilled in the hood. Also, hoods used on previous signals may need on site drilling to fit Helios. See section 2.17.1 for details.

Figure 35 – Angled Hood fitting

An optional Pedestrian Aspect Hood is available. This hood is supplied with predrilled fixing holes but is of a non formed construction. The hood is fitted to the aspect using fir-tree clips.

2.17.1 Drilling Hoods

To fit hoods that do not have fixing holes that align with those on the Helios door, including louvred and tunnel hoods, the fitting positions have to be drilled using a 6 mm drill bit. A moulded hood fitted at more than 90° also needs to be drilled.

Correctly position the hood to be drilled on the Helios door and then mark the appropriate positions that require drilling. Remove the hood from the door and drill the marked fixing hole positions.

Where metal hoods (which may be heavy) have been drilled, 5 mm bolts, metal rivets or taptite screws may be more appropriate fixings than the plastic fir-tree clips.

2.18 Solar Cell

A solar cell is fitted when the customer requires the signals on the intersection to be dimmed at night.

It is mounted on the top of a 3-aspect case, as shown in Figure where it will receive a non-interrupted northern light.

Figure 36 – Solar Cell

The solar cell used is a Royce Thompson Electric Ltd type RTE/P5 (55 Lux) (STCL part number 506/4/97891/000) or equivalent, which plugs into a Rotaloc Socket. The cell is mounted on the top of the 3-aspect case, through a 20 mm diameter hole, drilled using one of the two central guide indents on top of the case. Around the central indent are eight other drill start points, four of which should be used to secure the solar cell to the case, pointing north, using nuts and bolts and the “cork” washer. See Figure .

The three terminals on the socket are connected as follows:

Socket terminal L – Live

Socket terminal N – Neutral

Socket terminal Lo – to Controller dim input

Each terminal is wired to the terminal block mounted on the top of the pole by 24/0.2 mm wire using the following colours:

Line – Brown

Neutral – Blue

Load – White

The solar switch is connected to its socket by locating the terminals in their slots and pushing down, then twisting the unit clockwise when looking down on the socket. This twist completes the circuit and, if not done correctly, the solar switch will not function.

During daylight the solar switch should give the signal bright condition. To test it, cover the unit for approximately one minute and check that the signals go to the dim condition. Uncovering the unit should then result in the signals going to the bright condition after approximately one minute.

2.19 Pedestrian Push Button (Mk 1)

There are two variants of push button units currently in use in the United Kingdom:

Standard push button with no Sonalert (667/1/01478/000) (2 man)

Pelican push button fitted with Sonalert (667/1/01478/001) (3 man)

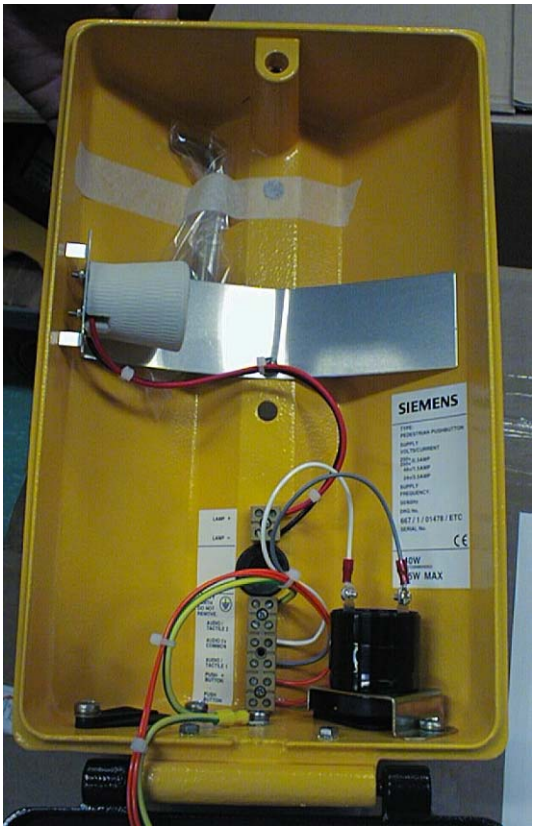


Figure 37 – Pedestrian push button unit

2.19.1 Optional Wiring Kits for Pedestrian Pushbutton (Mk 1)

The pedestrian push button unit comes complete with its fixing kit. Two optional wiring kits (667/1/26942/000) and (998/4/88324/000) are available for connection to the terminal block inside the PBU provided.

The connections to these wires are as follows:

Wire Colour for 667/1/26942/000	Wire Colour for 998/4/88324/000	Signal Name
Green/Yellow	Green/Yellow	Earth
Orange	Orange	Push button 1
Orange	White	Push button 2
Red	Red	Aud. Signal +
Black	Black	Aud. Signal -
Blue	Blue	Wait Ind N
Brown	Brown	Wait Ind. L
Violet *1	Green*2	Tactile motor +
Yellow *1	Yellow*2	Tactile motor -

The wires within the Pedestrian push button should be arranged and cable tied so that the wiring cannot touch the push button micro-switch housing.

Each wire is 4 metres long and connects to the terminal block in the pole cap assembly.

(*1 NOTE – If the Optional Audible Supply Kit (667/1/27006/000) is fitted wire

Violet to Audio 2 and **Yellow** to Aud. Signal –)

(*2 NOTE – If the Optional Audible Supply Kit (998/4/88324/000) is fitted, wire

Green to Audio 2 and **Yellow** to Aud. Signal –)

(Ensure that the wiring at the controller is to 667/GA/27006/000 Sht 2 Issue 3))

The unit fastens to the pole using the ‘U’ bolt provided.

When installing a pushbutton box, the centre of the pushbutton should be between 1.0m – 1.1m above the footway level.

2.20 L.E.D. Wait Box (Mk 1)

There are four variants of the 48 Volt L.E.D. Wait Box available for use in the United Kingdom. These are –

Pedestrian Pushbutton Unit without Audible/No Lamp Monitoring - 667/1/30210/000

Pelican Pushbutton Unit with Audible/No Lamp Monitoring – 667/1/30210/011

Pelican Pushbutton Unit without Audible/No Lamp Monitoring – 667/1/30210/001

Toucan Pushbutton Unit without Audible/No Lamp Monitoring – 667/1/30210/002

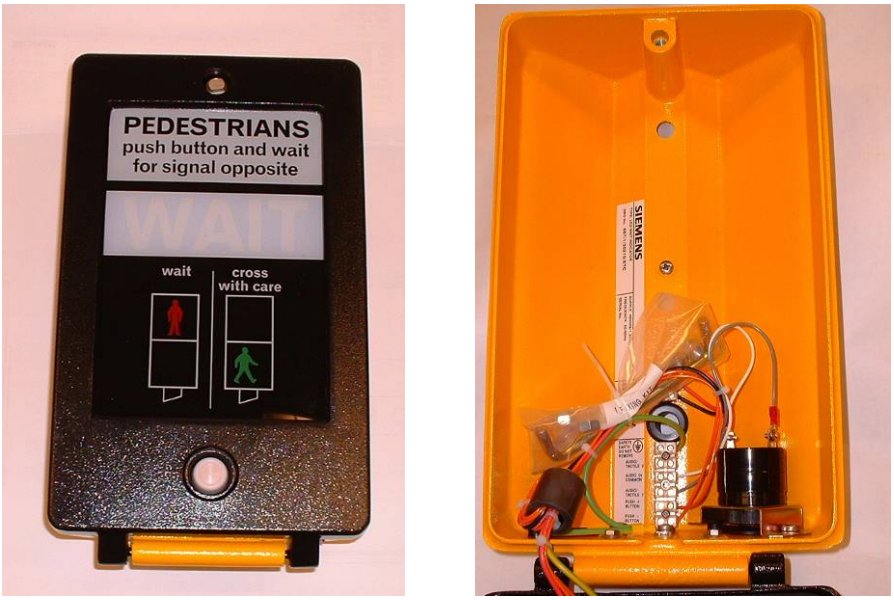


Figure 38 – LED Wait Box

The L.E.D. Wait Box comes complete with its fixing kit.

The unit fastens to the pole using the 'U' bolt provided.

When installing a pushbutton box, the centre of the pushbutton should be between 1.0m – 1.1m above the footway level.

2.20.1 Optional Wiring Kits for L.E.D. Wait Box (Mk 1)

Two wiring kits (667/1/26942/000) and (998/4/88324/000) are available for connection to the terminal block inside the LED Wait Box to the terminal block in the pole cap assembly. (Note that each wire is 4 metres long).

The connections to these wires are as follows:

Wire Colour for 667/1/26942/000	Wire Colour for 998/4/88324/000	Signal Name
Green/Yellow	Green/Yellow	Earth
Orange	Orange	Push button 1
Orange	White	Push button 2
Red	Red	Aud. Signal +
Black	Black	Aud. Signal -

Blue	Blue	Wait Ind N
Brown	Brown	Wait Ind. L
Violet *1	Green*2	Tactile motor +
Yellow *1	Yellow*2	Tactile motor -

(*1 NOTE – If the Optional Audible Supply Kit (667/1/27006/000) is fitted, wire **Violet** to Audio 2 and **Yellow** to Audio 0v Common)

(*2 NOTE – If the Optional Audible Supply Kit (998/4/88324/000) is fitted, wire **Green** to Audio 2 and **Yellow** to Audio 0v Common)

(Ensure that the wiring at the controller is to 667/GA/27006/000 Sht 2 Issue 3))

Optional Radix Tactile Equipment (667/7/17390/000) is available for all variants of L.E.D. Wait Box.

2.20.2 L.E.D. Wait Box Doors (Mk 1)

All variants come with a Door Assembly which contains the following items

a) A PCB which contains all the display LEDs arranged to display the 'WAIT' output and the LED control circuitry. (667/1/30211/000)

b) A vandal resistant pushbutton. This button has no moving parts and is touch sensitive. (667/1/30210/505)

c) A polycarbonate front panel, the type which is dependant on the LED Wait Box variant. (see 667/2/26302/ETC)

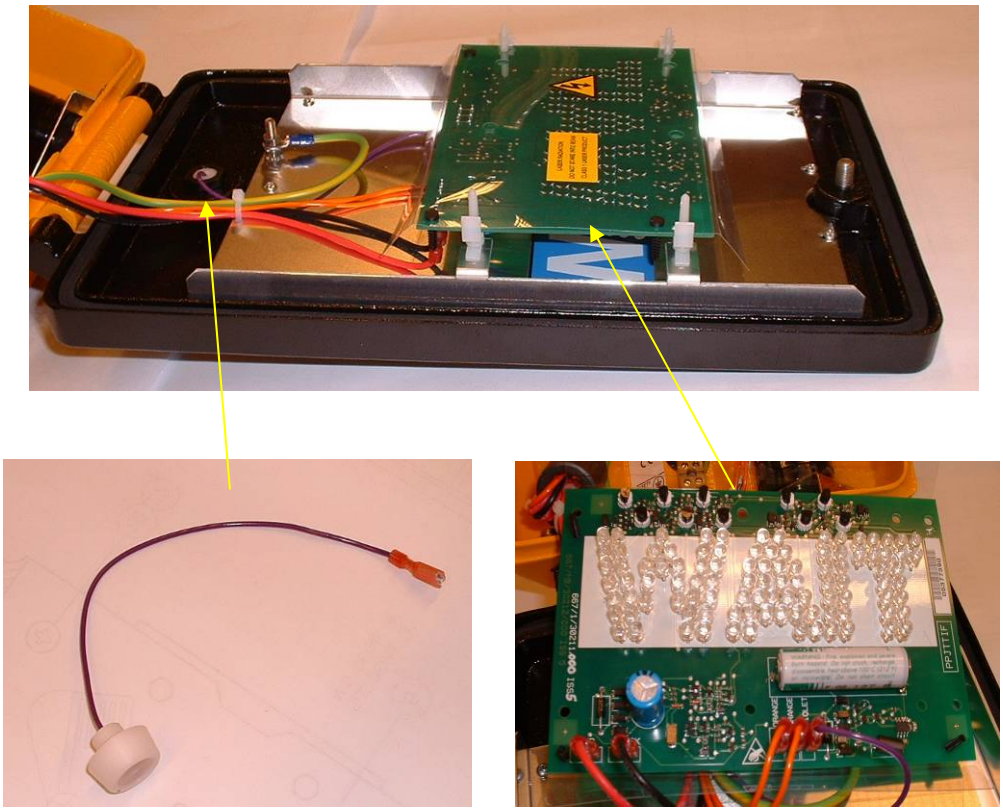
The following Door Assemblies are available –

Pedestrian Door – (667/1/30210/200)

Pelican Door – (667/1/30210/205)

Toucan Door – (667/1/30210/210)

Equestrian Door – (667/1/30210/215)



Pushbutton Assembly **'WAIT' PCB Assembly**

Figure 39 – LED Wait Box Door Assembly (Mk 1)

2.21 Nearside Signal and Demand Unit (Mk 1)

There are three variants of the Nearside Signal and Demand Unit, which are dual housed, for use in UK Puffin, Toucan and Equestrian Crossing applications.

The Nearside Signal is illuminated using either Red or Green LEDs, whilst the Demand unit uses a Touch Sensitive switch around which is illuminated by Red LEDs when a Demand is registered.

The UK Variants are –

Puffin Nearside Signal and Demand Unit – 667/1/30670/000

Toucan Nearside Signal and Demand Unit – 667/1/30670/001

Equestrian Nearside Signal and Demand Unit – 667/1/30670/002

Each Nearside Signal Unit and Demand Unit comes complete with its fixing kit.

Each unit fastens to the Signal Pole using the 'U' bolt provided.

When installing the Nearside Signal and Demand Unit the following must be observed –

a) Centre of the Demand Unit Push button must be 1.0m – 1.1m above the footway level.

b) The distance between the bottom edge on the Demand Unit and the top edge of the Nearside Signal Unit must be less than 550mm, but remember to leave sufficient room between the two units to allow the removal of the Nearside Unit Door.

Optional Audible Supply Kits (667/1/27006/000) and Optional Radix Tactile Equipment (667/7/17390/048) are available and will normally be fitted into the Demand Unit.

Figure 40- Toucan Nearside Signal and Demand Unit

2.21.1 Nearside Signal Unit (Mk 1)

The three variants of Nearside Signal come with a door assembly which contain the following items –

a) a PCB which contains all the Display Red LEDs arranged to illuminate either the Red Man (Puffin), Red Man and Red Cycle(Toucan) or a Red Horse (Equestrian).

b) a PCB which contains all the Display Green LEDs arranged to illuminate either the Green Man (Puffin), Green Man and Green Cycle (Toucan) or a Green Horse (Equestrian).

c) a front panel, the type which is dependant on the Nearside Signal
667/2/30690/000 – Puffin
667/2/30690/001 – Toucan
667/2/30690/002 – Equestrian

The following are the Nearside units that are available –

Puffin Signal Unit	- 667/1/30675/000
Toucan Signal Unit	- 667/1/30675/001
Equestrian Signal Unit	- 667/1/30675/002

The following are the Door Assemblies that are available –

Puffin Door	- 667/1/30686/000
Toucan Door	- 667/1/30686/001
Equestrian Door	- 667/1/30686/002

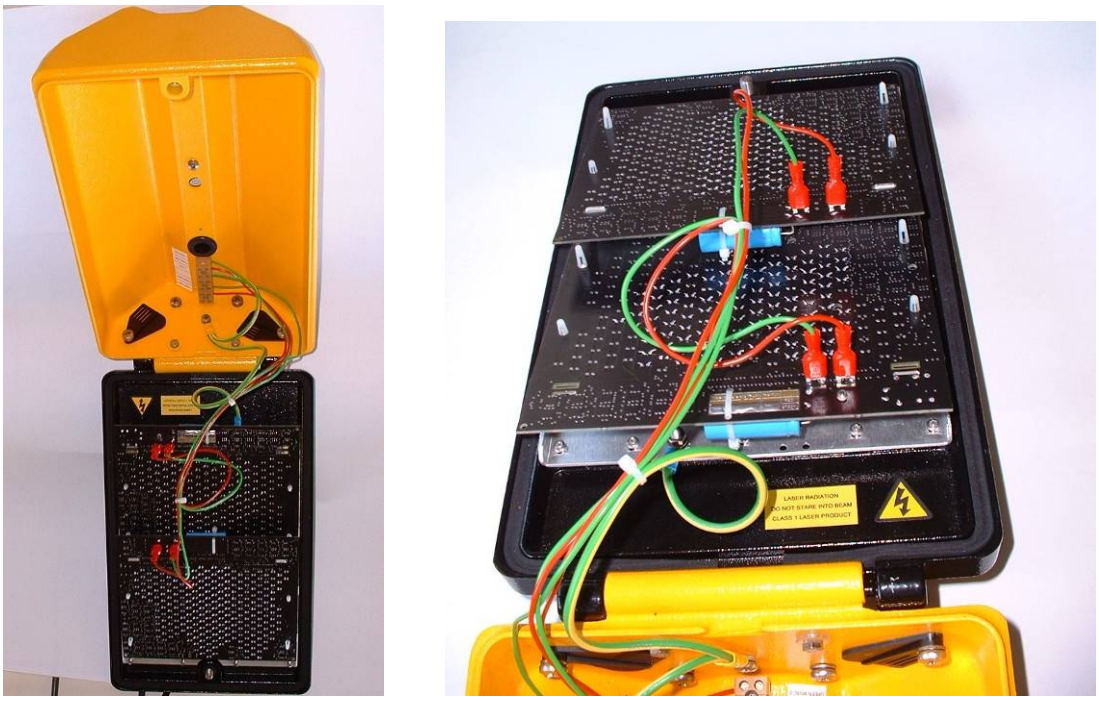


Figure 41 - Nearside Signal - Shows the Two PCBs (Mk 1)

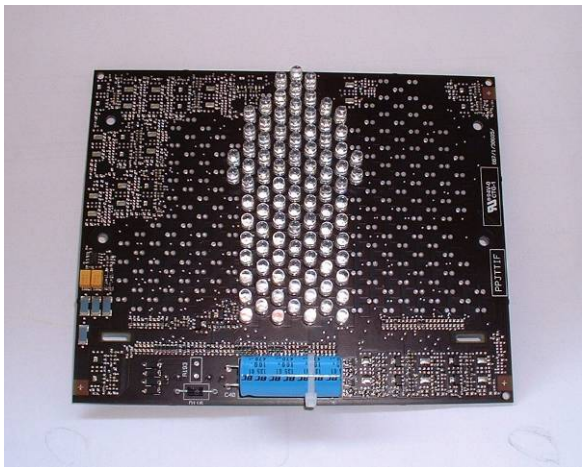


Figure 42 - Red Man PCB from Puffin Nearside Unit (Mk 1)

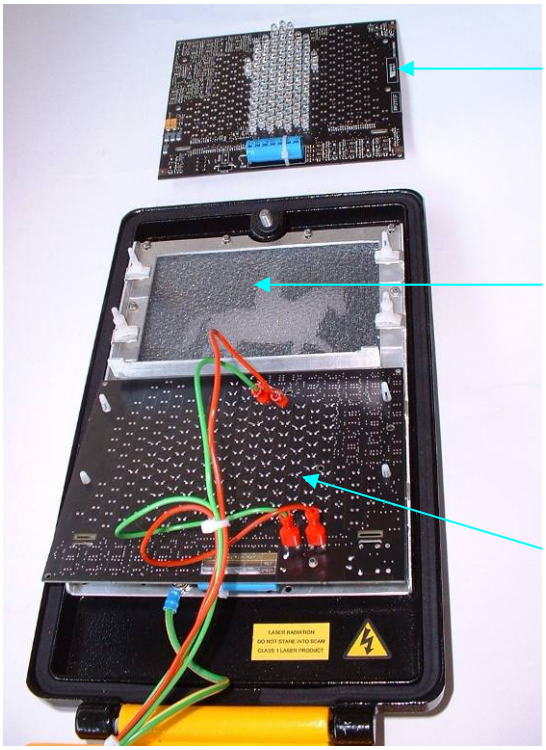


Figure 43 - Nearside Signal Shown with Red Man/Cycle/Equestrian PCB Removed (Mk 1)

The Following PCB variants are available for the Nearside Signal –

1) Green Puffin - 667/1/30695/001
2) Red Puffin - 667/1/30695/002
3) Green Toucan - 667/1/30695/003
4) Red Toucan - 667/1/30695/004
5) Green Equestrian - 667/1/30695/005
6) Red Equestrian - 667/1/30695/006

2.21.2 Demand Unit (Mk 1)

The Demand Unit (667/1/30675/100) comes with a Door (667/1/30685/000) that contains the following –

a) a PCB which contains all the LEDs arranged in a circle around the push button which illuminate when a Pedestrian Demand is Registered (667/1/30680/000).

b) A vandal resistant pushbutton. This button has no moving parts and is touch sensitive (667/1/30210/505).

c) A polycarbonate front panel (667/2/30676/000).

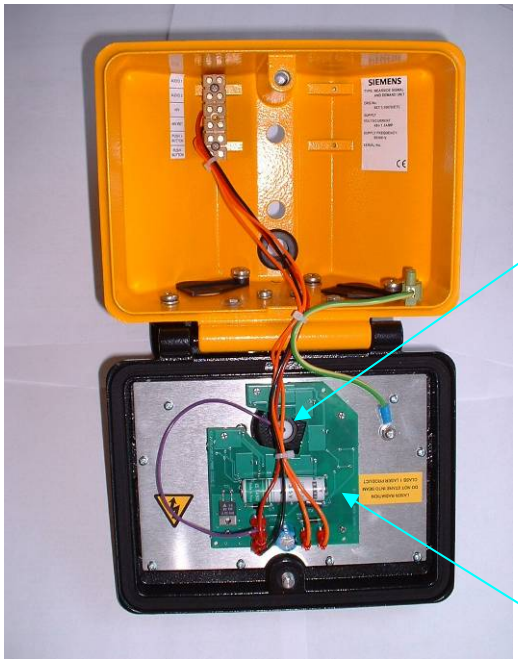


Figure 44 - Demand Unit

2.21.3 Optional Wiring Kits for Nearside Signal Unit and Demand Unit (Mk 1)

Two wiring kits (667/1/26942/000) and (998/4/88324/000) are available for connection to the terminal block/s inside the Nearside Signal Unit and Demand Unit to the terminal blocks in the pole cap assembly. (Note that each wire is 4 metres long).

Note – a second terminal block requires fitting into the Demand Unit at the Right Hand Side of the Unit if 2 optional Audible Supply Kits (667/1/27006/000) are fitted.

The connections for these wires are as follows –

Wire Colour for 667/1/26942/000	Wire Colour for 667/4/88324/000	Signal Name Connection - Nearside Unit	Signal Name Connection - Demand Unit
Green/Yellow	Green/Yellow	TB1.6 – Earth	Earth Connector TB2

Orange	Orange	-	TB1.5 - Push Button +
Orange	White	-	TB1.6 - Push Button -
Red	Red	TB1.1 - RED 48VAC1	TB1.3 - Audio 1 *1
Black	Black	TB1.2 - RED 40VAC2	TB1.4 - Audio 2 *1
Blue	Blue	TB1.4 - GREEN 48VAC2	TB1.2 - 48v RET
Brown	Brown	TB1.3 - GREEN 48VAC1	TB1.1 - 48v
Violet	Green	-	Wire Direct to Tactile Motor + *1
Yellow	Yellow	-	Wire Direct to Tactile Motor - *1

*1 NOTE – If the Optional Audio Kit (667/1/27006/000) is fitted wire as follows –

a) When using wiring kit 667/1/26942/000

i) Fit an extra terminal block TB2 (703/4/98500/016) to the Right Hand side Terminal Block position using screws 999/4/03302/012

ii) Wire Red to TB3.1 (Audio 1)
Wire Black to TB3.2 (Audio Sig -)
Wire Yellow to TB3.2 (Audio Sig -)
Wire Violet to TB3.3 (Audio 2)

b) When using wiring kit 998/4/88324/000

i) Fit an extra terminal block TB2 (703/4/98500/016) to the Right Hand side Terminal Block position using screws 999/4/03302/012

ii) Wire Red to TB3.1 (Audio 1)
Wire Black to TB3.2 (Audio Sig -)
Wire Yellow to TB3.2 (Audio Sig -)
Wire Green to TB3.3 (Audio 2)

(Ensure that the wiring at the controller is to 667/GA/27006/000 Sht2 Issue 3)

2.22 Nearside Mk2 Range of units

The next sections detail the new Nearside Mk2 range of Wait Indicator, Nearside Demand and Nearside Signal housings. These provide a new contemporary design that is both aesthetically pleasing and able to provide product configuration that meet all of the latest customer needs & requirements whilst reducing manufacturing costs.

2.23 Nearside Mk2/Pedestrian Wait Mk2 Pole drilling positions

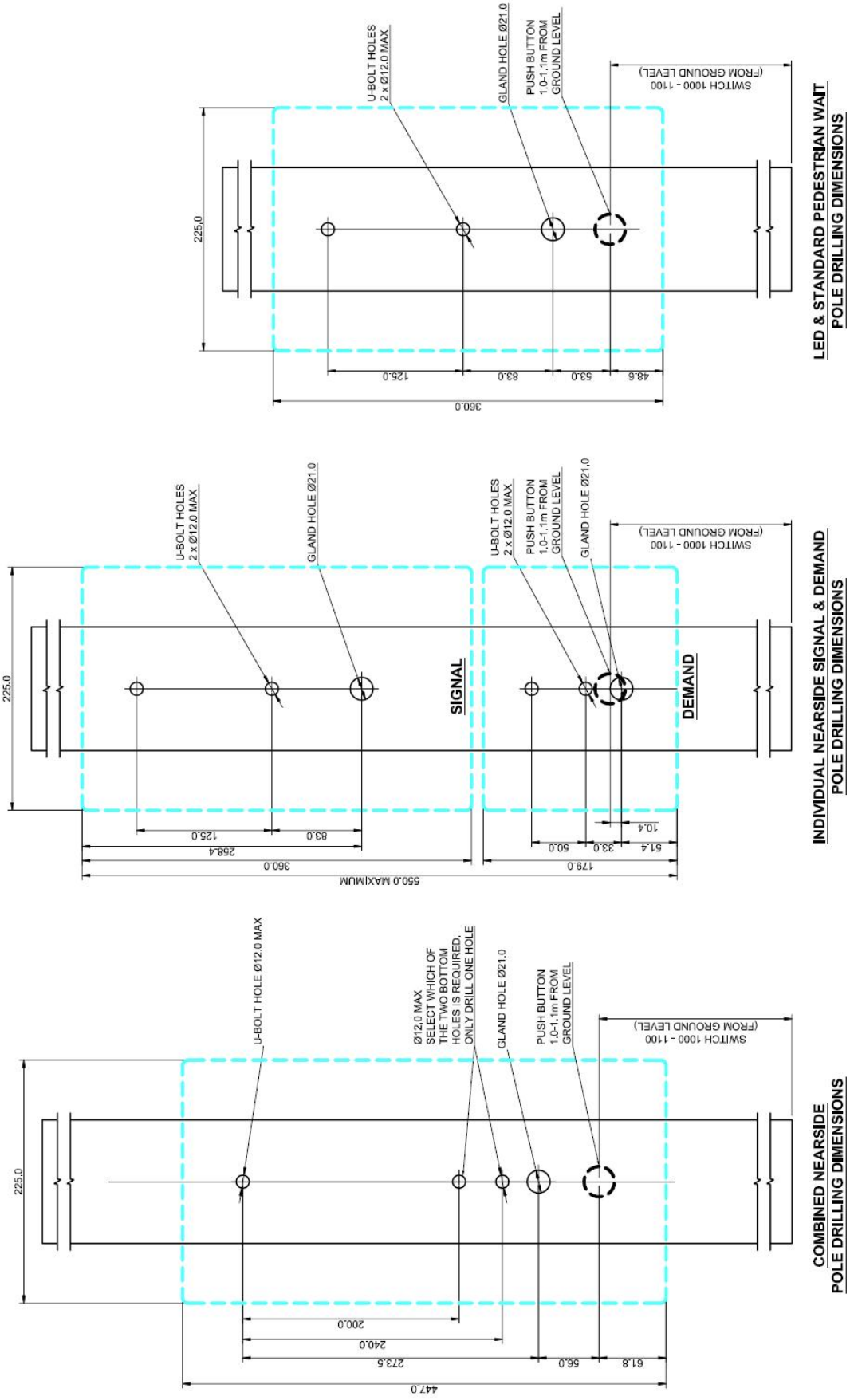


Figure 45: Drilling guide for Nearside and Pedestrian WAIT range

2.24 Installation of Nearside and WAIT Mk2 fixing kits to pole

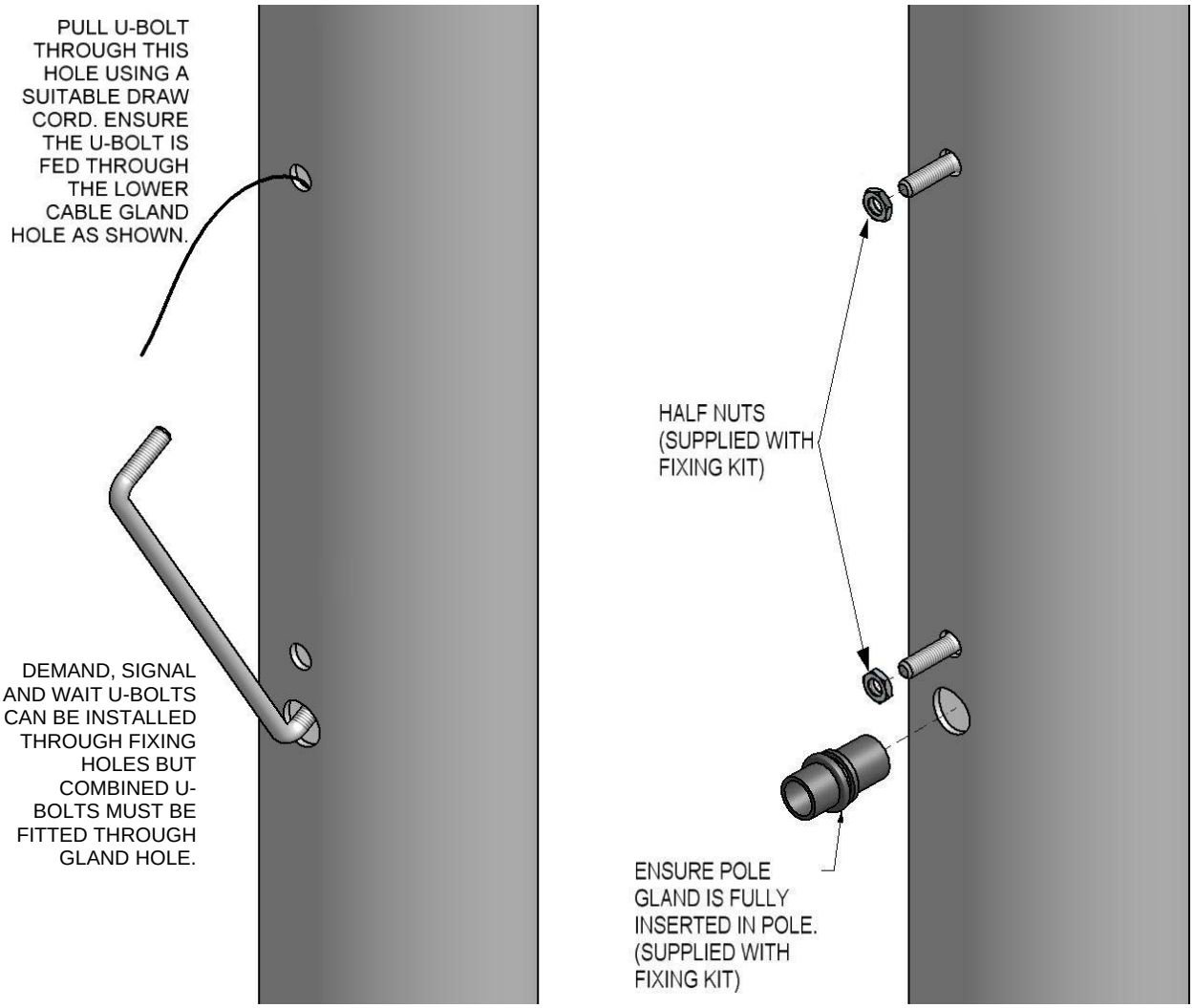


Figure 46: U-bolt and cable gland installation (Mk2)

2.25 Installation of WAIT, Demand, Signal and Combined Mk2 units to pole

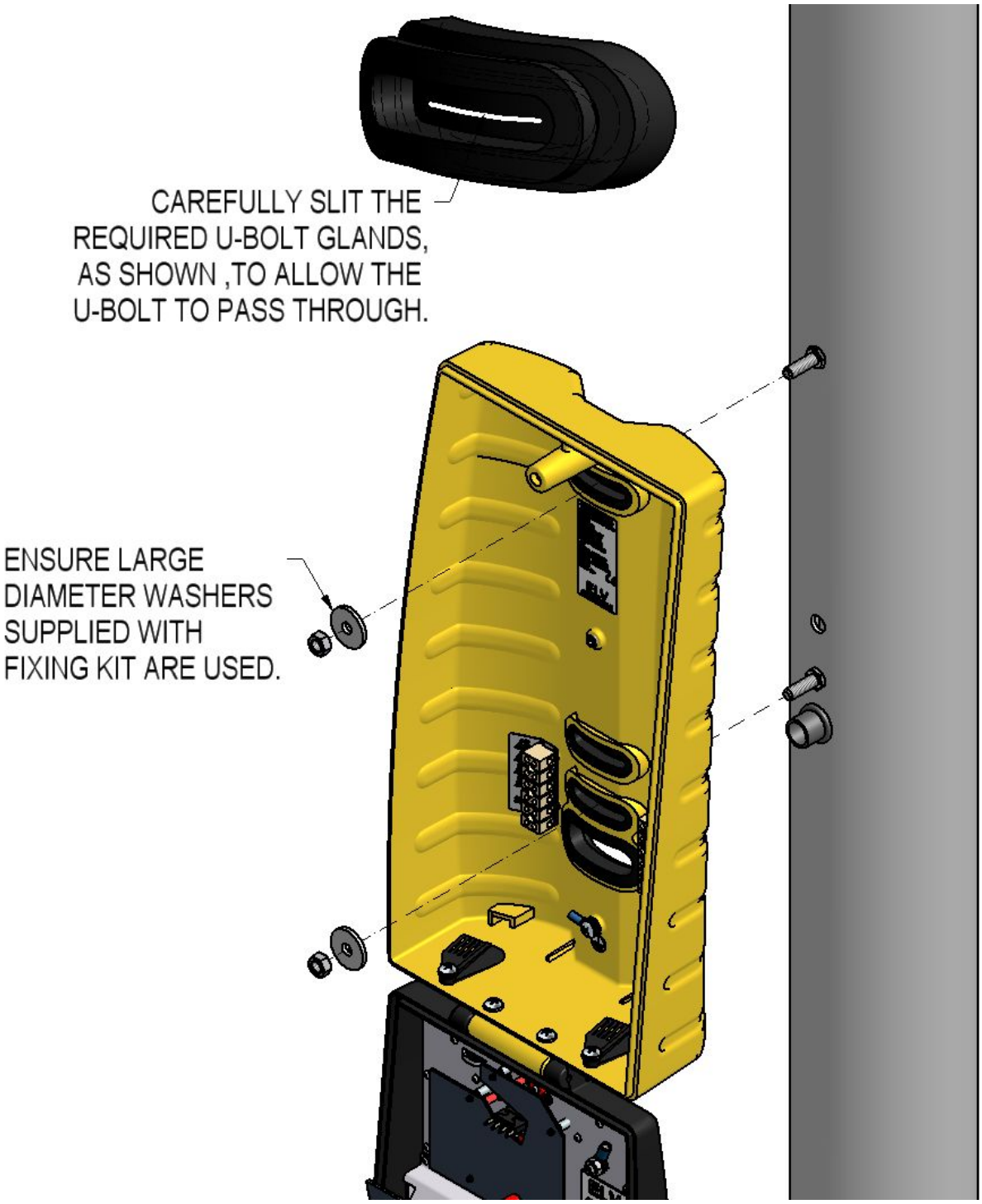


Figure 47: Mounting of Nearside/Pedestrian WAIT units to Pole.

Typical to all assemblies, Combined unit shown.

2.26 Standard Wait Mk2 Indicator Units

Figure 48 - Standard Wait Mk2 Indicator unit

There are four main variants of Standard Wait Indicator units (with Mechanical Switch) available for use in the United Kingdom:

Pedestrian WAIT push button without Audio (667/1/33603/010)

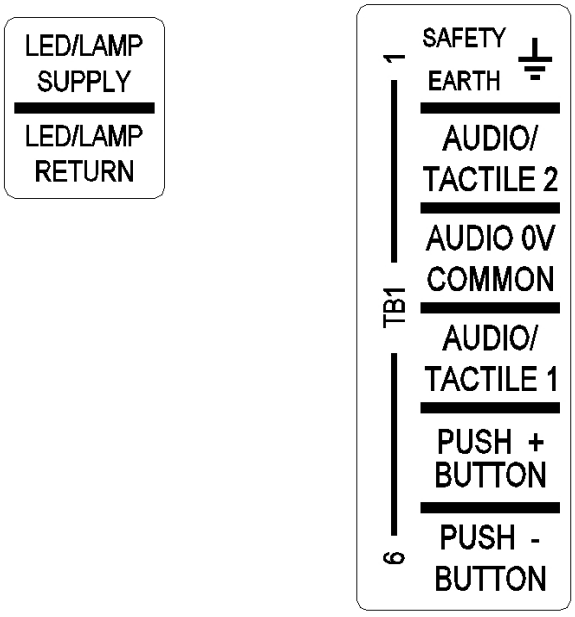
Pelican WAIT push button without Audio (667/1/33603/011)

Equestrian WAIT push button without Audio (667/1/33603/012)

Toucan WAIT push button without Audio (667/1/33603/013)

2.26.1 Terminal Block Layout for STD Wait Mk2 Indicator units

Shown below are the diagrams of the terminal block assembly used within both of the Nearside Mk2 STD Wait Indicator units



NEARSIDE MK2 WAIT

2.27 LED Wait Mk2 Indicator Units

There are four variants of the 48 Volt L.E.D. Wait Box (with Mechanical switch) available for use in the United Kingdom. These are –

Pedestrian Pushbutton Unit without Audible - 667/1/33602/010

Pelican Pushbutton Unit without Audible - 667/1/33602/011

Toucan Pushbutton Unit without Audible - 667/1/33602/012

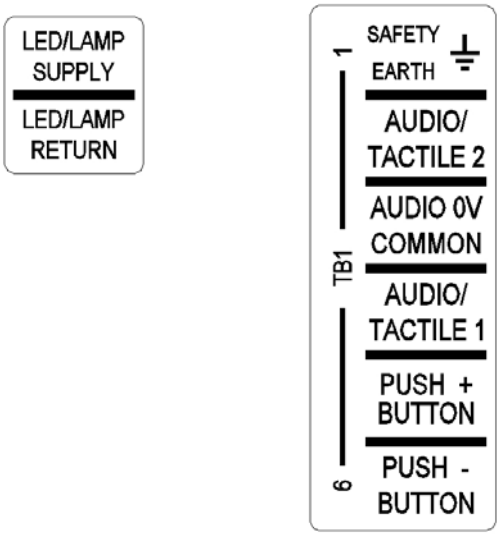
Equestrian Pushbutton Unit without Audible - 667/1/33602/013

Figure 49 - LED Mk2 Wait Box

The L.E.D. Wait Box comes complete with its fixing kit. The unit fastens to the pole using the 'U' bolt provided. When installing a pushbutton box, the centre of the pushbutton should be between 1.0m – 1.1m above the footway level.

2.27.1 Terminal Block Layout for LED Wait Mk2 Indicator units

Shown below are the diagrams of the terminal block assembly used within both of the Nearside Mk2 LED Wait Indicator units



NEARSIDE MK2 WAIT

2.28 Nearside Mk2 Signal and Demand Units

With the new Nearside Mk 2 range there is now a choice between having separate Nearside Signal and Demand units and having a Nearside Combined Unit. The following sections detail the new housing and part numbers for each option.

2.28.1 Nearside Mk2 Signal Unit

There are three variants of the Nearside Signal Unit, which are dual housed with the Nearside Demand Unit, for use in UK Puffin, Toucan and Equestrian Crossing applications. The Nearside Signal is illuminated using either Red or Green LEDs. A Narrow Field of View (NFOV) option is also available on these assemblies.

The UK Variants are –

Puffin Nearside Signal Unit	– 667/1/33605/000
Toucan Nearside Signal Unit	– 667/1/33605/001
Equestrian Nearside Signal Unit	– 667/1/33605/002
Puffin Nearside Signal NFOV Unit	– 667/1/33605/500
Toucan Nearside Signal NFOV Unit	– 667/1/33605/501
Equestrian Nearside Signal NFOV Unit	– 667/1/33605/502

Figure 50 - Nearside Mk2 Signal Unit

Each Nearside Signal Unit and Demand Unit comes complete with its fixing kit. Each unit fastens to the Signal Pole using the 'U' bolt provided.

When installing the Nearside Signal and Demand Unit the following must be observed –

a) Centre of the Demand Unit Push button must be 1.0m – 1.1m above the footway level.

b) The distance between the bottom edge on the Demand Unit and the top edge of the Nearside Signal Unit must be less than 550mm, but remember to leave sufficient room between the two units to allow the removal of the Nearside Unit Door.

The three variants of Nearside Signal come with a door assembly which contain the following items –

a) a PCB which contains all the Display Red LEDs arranged to illuminate either the Red Man (Puffin), Red Man and Red Cycle(Toucan) or a Red Horse (Equestrian).

b) a PCB which contains all the Display Green LEDs arranged to illuminate either the Green Man (Puffin), Green Man and Green Cycle (Toucan) or a Green Horse (Equestrian).

c) a front panel, the type which is dependant on the Nearside Signal
667/2/30690/000 – Puffin

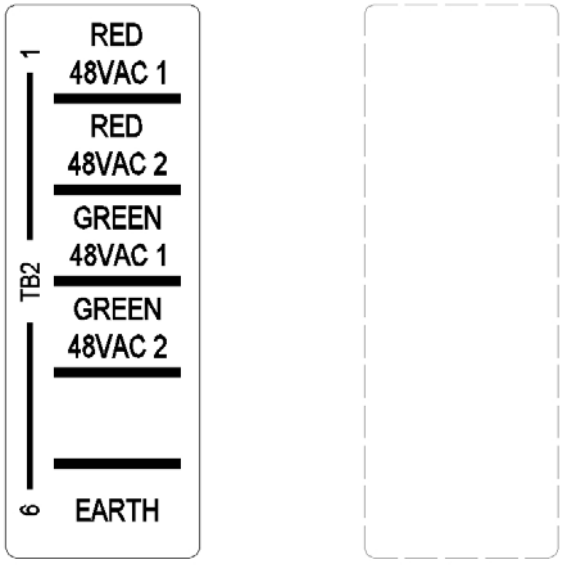
667/2/30690/001 – Toucan
667/2/30690/002 – Equestrian

The following are the Door Assemblies that are available –

Puffin Door Assembly	- 667/1/33661/000
Toucan Door Assembly	- 667/1/33661/001
Equestrian Door Assembly	- 667/1/33661/002
Puffin Door NFOV Assembly	- 667/1/33661/500
Toucan Door NFOV Assembly	- 667/1/33661/501
Equestrian Door NFOV Assembly	- 667/1/33661/502

2.28.2 Terminal Block Layout for Nearside Signal units

Shown below are the diagrams of the terminal block assembly used within the Nearside Mk2 Signal units



NEARSIDE MK2 SIGNAL

2.28.3 Nearside Mk2 Demand Unit

There is currently one variant of the Nearside Demand Unit, which are dual housed with the Nearside Signal Unit, for use in UK Puffin, Toucan and Equestrian Crossing applications. The Nearside Demand unit uses a Mechanical switch around which is illuminated by Red LEDs when a Demand is registered.

The UK Variants, with mechanical switch are –

Nearside Demand Unit – 667/1/33606/010

The Demand Unit comes with a door assembly that contains the following –

a) A PCB which contains all the red LEDs arranged in a circle around the push button which illuminate when a Pedestrian Demand is Registered

b) A vandal resistant Stainless Steel switch

c) A polycarbonate front panel (667/6/33652/000).

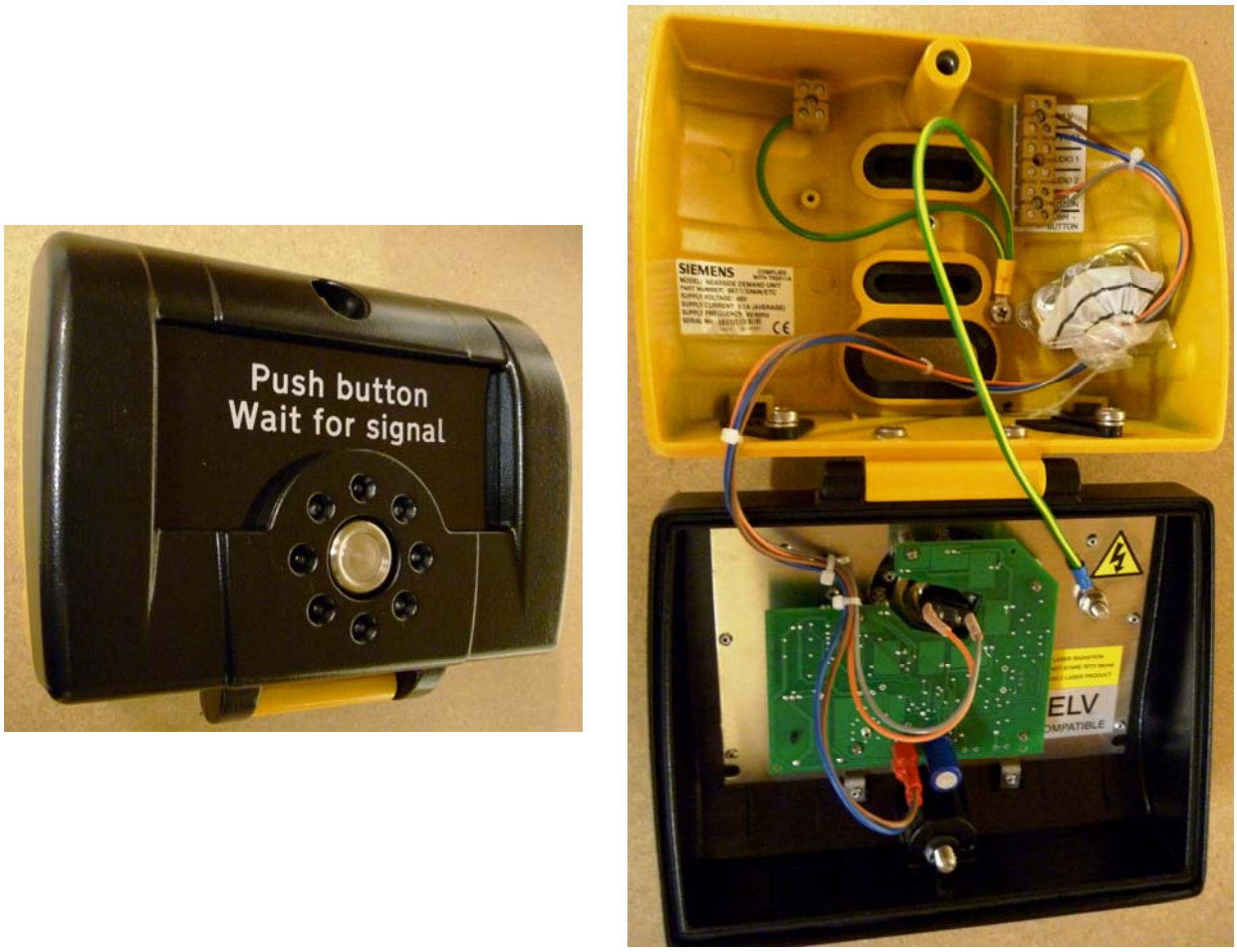
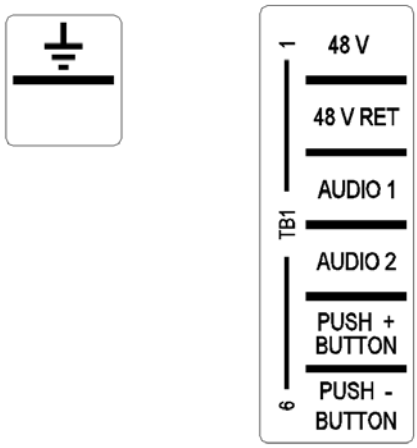


Figure 51 - Nearside Mk2 Demand Unit

Optional Audible Supply Kits (667/1/27006/000) and Optional Radix Tactile Equipment (667/7/17390/048) are available and can only be fitted into the Demand Unit.

2.28.4 Terminal Block Layout for Nearside Demand units

Shown below are the diagrams of the terminal block assembly used within the Nearside Mk2 Demand units



NEARSIDE MK2 DEMAND

2.28.5 Nearside Mk2 Combined Unit

There are three variants of the Nearside Combined Unit, which are single housed, for use in UK Puffin, Toucan and Equestrian Crossing applications. A Narrow Field of View (NFOV) option is also available on these assemblies.

The UK Variants, with mechanical switch are –

Puffin Nearside Combined Unit	– 667/1/33601/010
Toucan Nearside Combined Unit	– 667/1/33601/011
Equestrian Nearside Combined Unit	– 667/1/33601/012
Puffin Nearside Combined NFOV Unit	– 667/1/33601/510
Toucan Nearside Combined NFOV Unit	– 667/1/33601/511
Equestrian Nearside Combined NFOV Unit	– 667/1/33601/512

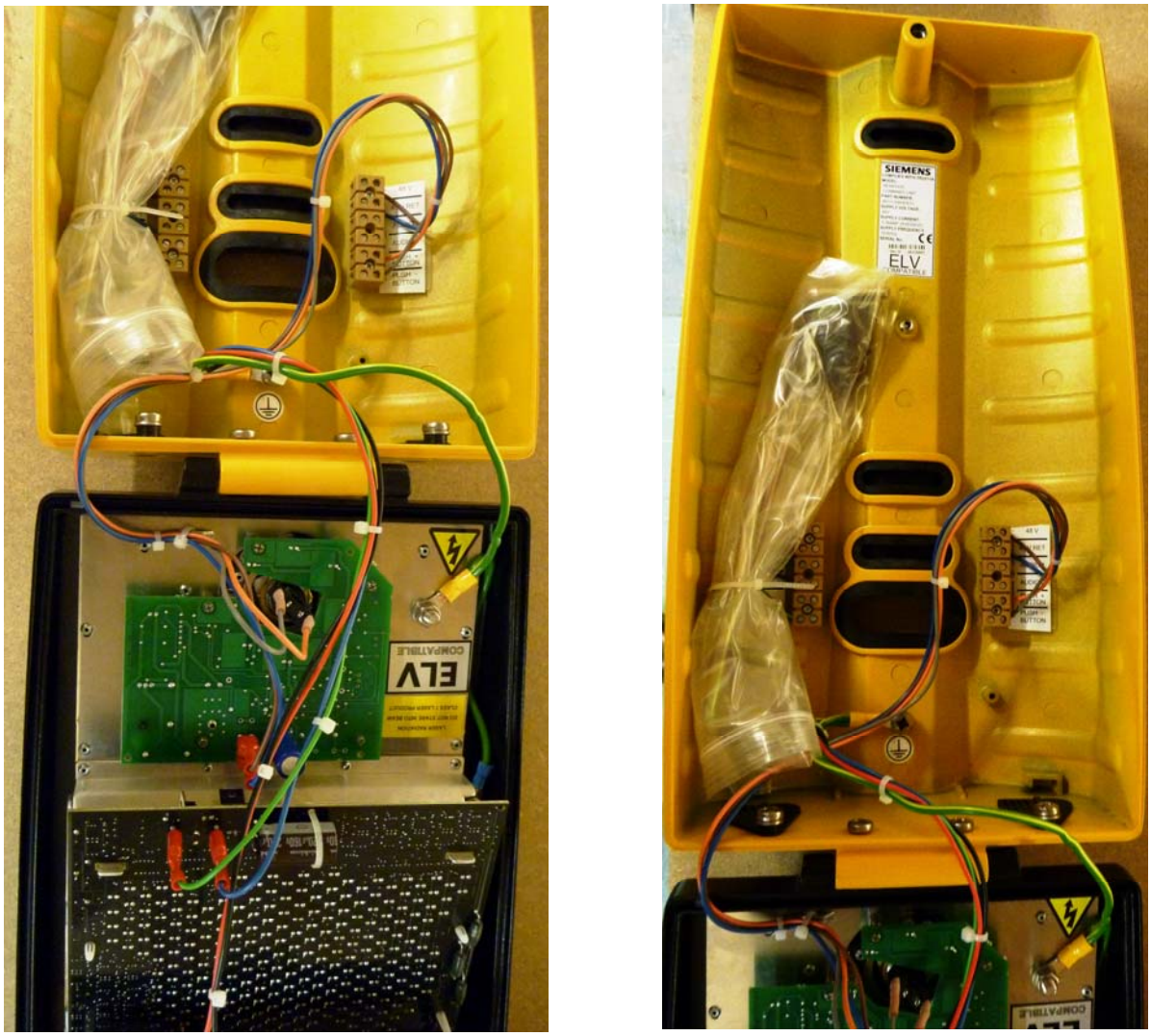


Figure 52 - Nearside Mk2 Combined Unit

Each Nearside Combined Unit comes complete with a fixing kit. Each unit fastens to the Signal Pole using the 'U' bolt provided.

When installing the Nearside Combined Unit the following must be observed –

a) Centre of the Demand Push button must be 1.0m – 1.1m above the footway level.

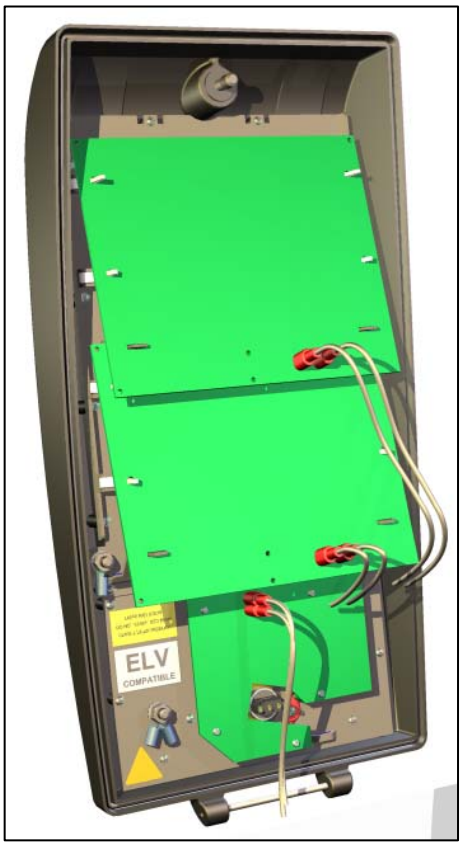


Figure 53 - Nearside Mk2 Combined Unit - Shows the Three PCBs

The three variants of Nearside Combined Signal come with a door assembly which contains the following items –

a) a PCB which contains all the Display Red LEDs arranged to illuminate either the Red Man (Puffin), Red Man and Red Cycle(Toucan) or a Red Horse (Equestrian).

b) a PCB which contains all the Display Green LEDs arranged to illuminate either the Green Man (Puffin), Green Man and Green Cycle (Toucan) or a Green Horse (Equestrian).

c) a PCB which contains all the Red LEDs arranged in a circle around the push button which illuminate when a Pedestrian Demand is Registered

d) a front panel, the type which is dependant on the Nearside Signal

667/2/33651/000 – Puffin
667/2/33651/001 – Toucan
667/2/33651/002 – Equestrian

e) A vandal resistant Stainless Steel switch

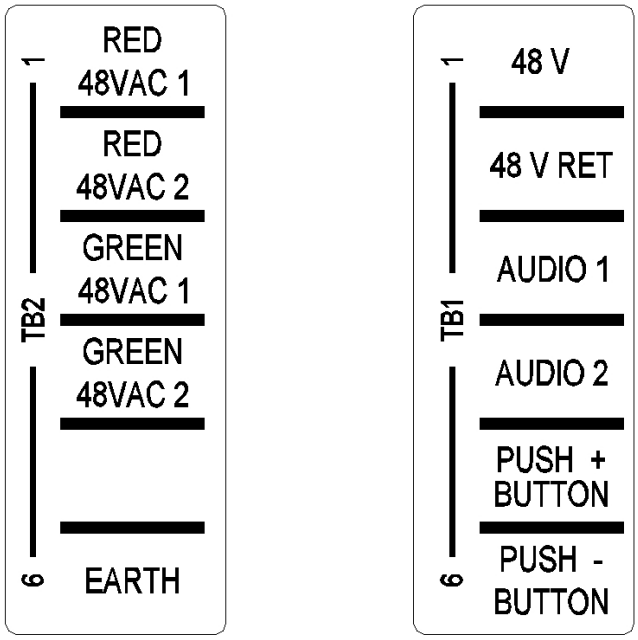
The following are the Door Assemblies that are available –

Puffin Door (Mechanical Switch)	- 667/1/33662/010
Toucan Door (Mechanical Switch)	- 667/1/33662/011
Equestrian Door (Mechanical Switch)	- 667/1/33662/012

Puffin Door NFOV (Mechanical Switch)	- 667/1/33662/510
Toucan Door NFOV (Mechanical Switch)	- 667/1/33662/511
Equestrian Door NFOV (Mechanical Switch)	- 667/1/33662/512

2.28.6 Terminal Block Layout for Nearside Combined units

Shown below are the diagrams of the terminal block assembly used within the Nearside Mk2 Combined units



NEARSIDE MK2 COMBINED

2.29 Radix/Sedgwell Power Supply for Tactile

It is recommended that, where used, this unit be fitted in the amber aspect case, in the upper position as shown in Figure , otherwise the halogen reflector will stop the door closing.

Move the cables connecting the transformers and fit the power supply to the case as shown using the mounting positions shown in Figure .

NOTE – There are two variants of the Radix Tactile Unit.

667/7/17390/000 (Radix type - CU100) – 230v operation – this requires the power supply unit to be fitted as described above.

667/7/17390/048 (Radix type - ITE200) – 48v operation – this unit is totally self-contained and is powered directly from the 48v Green Man output.

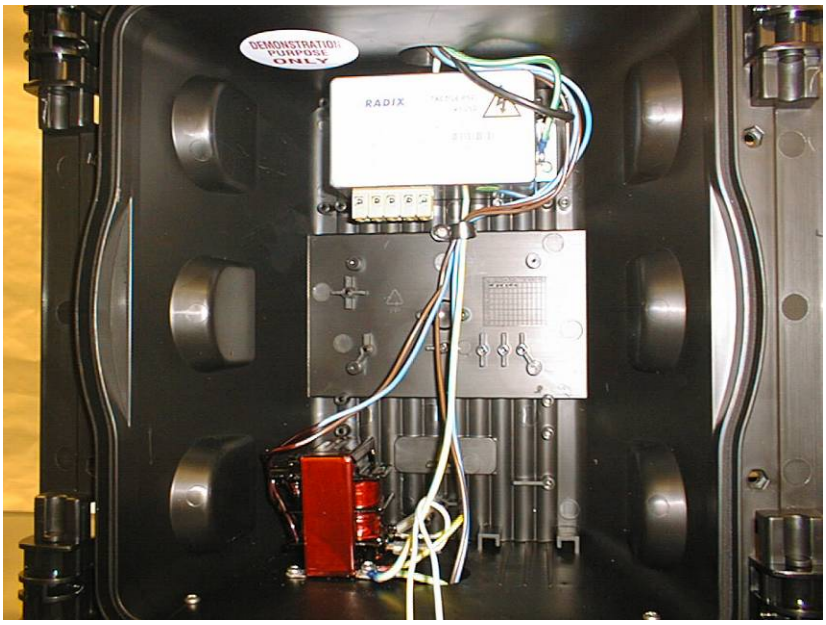


Figure 54 – Radix power supply

This equipment comes with its own fitting instructions.

Note that Sedgwell may include rivnuts; remove them for best fixing to Helios.

2.30 Backing Boards

Where specified, these are delivered with the main packaging for the signal head. Where side boxes form part of the installation, these should be assembled before fitting backing boards. See section 2.7 for details.

The boards fit into place behind the front face of the case, and attach using the positions and fixings as shown in Figure .

Figure 55 – Backing board fixings

2.30.1 Reflective Tape

Some installations require the use of reflective tape over the backing boards. Backing boards with the tape already fitted are available.

If retro fitted reflective tape is required then this glues into position before fitting the boards as described in section 2.30. Ensure the surfaces are clean and dry. Using the glue supplied take the roll of tape and stick it over the existing ink border, in accordance with the Supplier's instructions, trimming it to follow the rounded corners of the backing boards.

2.31 Above Ground Detector (AGD)

An AGD can be mounted in the slot on the top bracket as shown in Figure . Alternatively, a side mounting bracket (section 2.5.2) may be fitted on top of the head to bracket fixings. This bracket then provides a slot and two holes that may be used to fix the AGD.

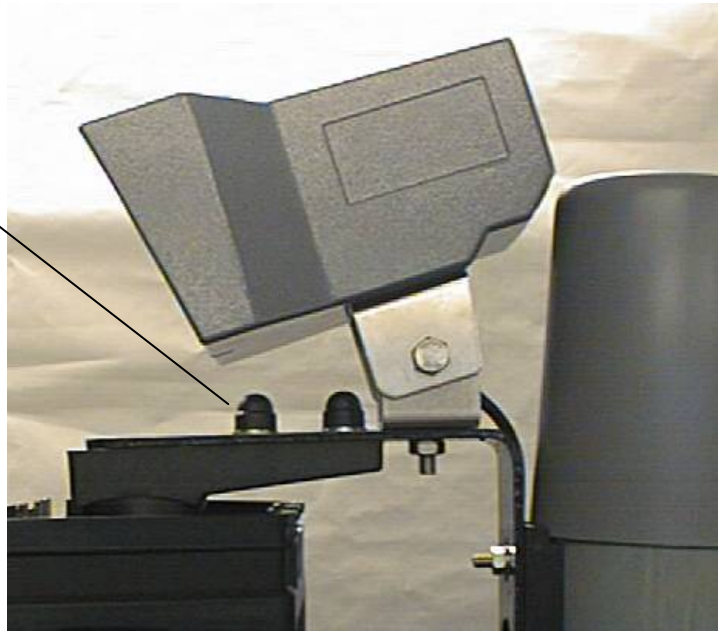


Figure 56 – AGD fitted to signal head bracket

The AGD connector cable is generally fitted to the topmost indent on the red Aspect (either side). The hole should be drilled using the rear drill start point.

Connect the cable in accordance with the Supplier's instructions. See the Above Ground Detector handbook (see section 1.3) for further details.

2.32 Bleep and Sweep Unit

The Bleep and Sweep Unit, which is fitted into a Helios Signal Head, has been developed by Sedgewall Communications Ltd. for use as a Pedestrian Crossing Alarm. It has a sound that is quite distinctive from other traffic noises and has the ability to adjust its volume according to ambient noise levels such that in busy city streets it will be much louder than for example, in quiet residential area. This means that during off peak hours when traffic volume is low, the disruption to local residents is kept to a minimum.

The Bleep and Sweep Unit is to be fitted into Bleep and Sweep Signal Heads during site installation. (See Figure , Figure and Figure).

The following are the Signal Head options for Bleep and Sweep –

667/1/30200/840 – Red Man/Green Man/Bleep & Sweep – STD (halogen)

667/1/30200/890 – Red Man/Green Man/Bleep & Sweep – LED

667/1/30200/990 – Red Man/Green Man/Bleep & Sweep – LED (NLM)

667/1/31500/890 – Red Man/Green Man/Bleep & Sweep – CLS + LMF

667/1/31500/990 - Red Man/Green Man/Bleep & Sweep – CLS (NLM)

Part Number for Sedgewall Bleep and Sweep Unit – 11TGR-212000-0-0

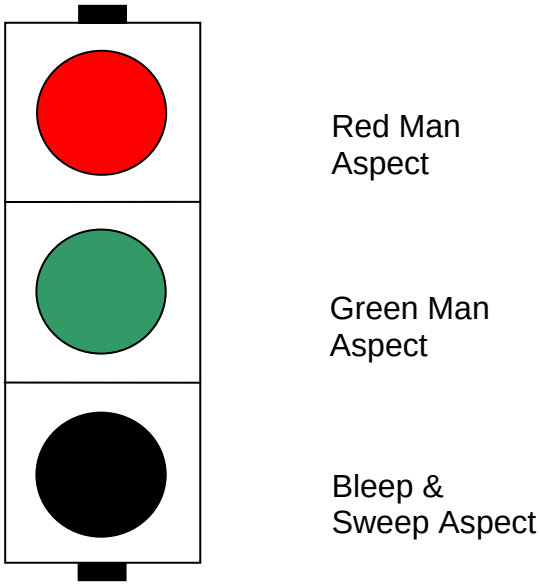


Figure 57 – Bleep and Sweep Signal Head Arrangement

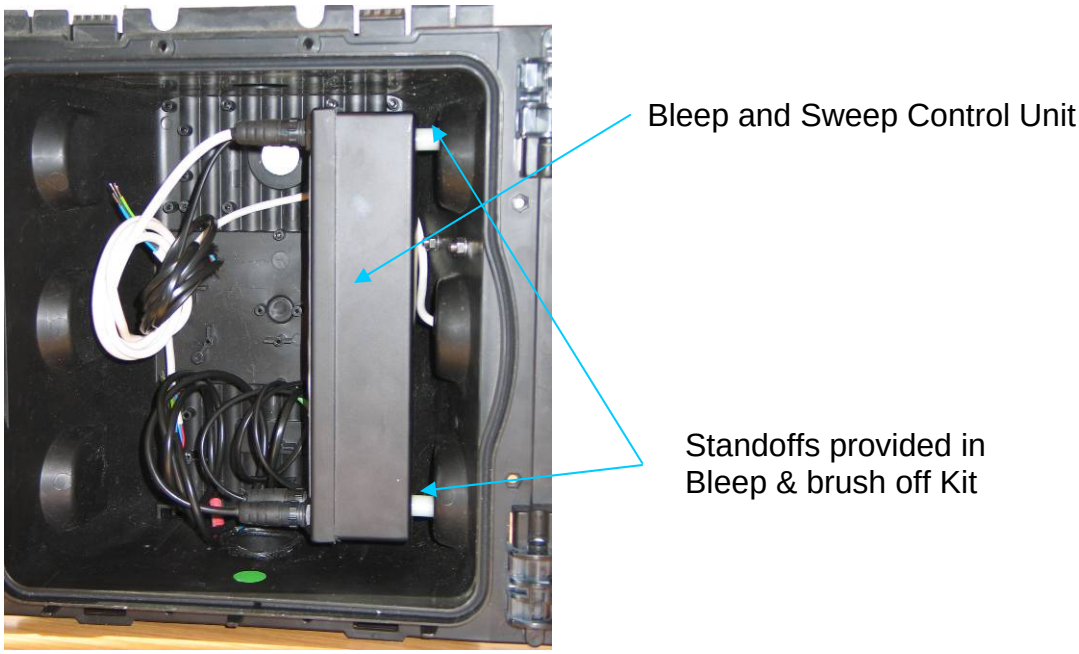


Figure 58 – Bleep & Sweep Unit Mounted in Signal Aspect

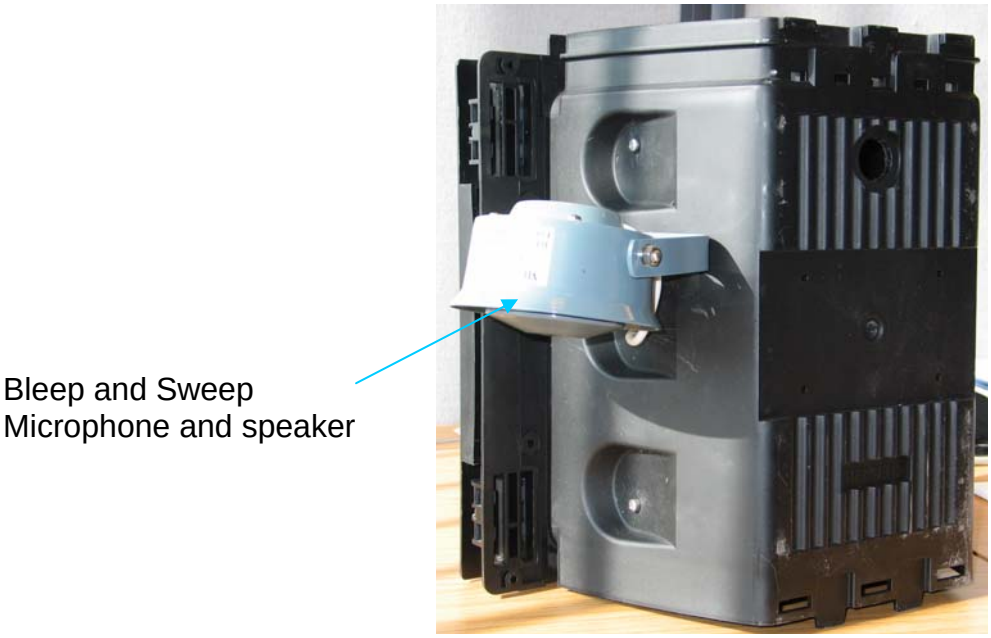


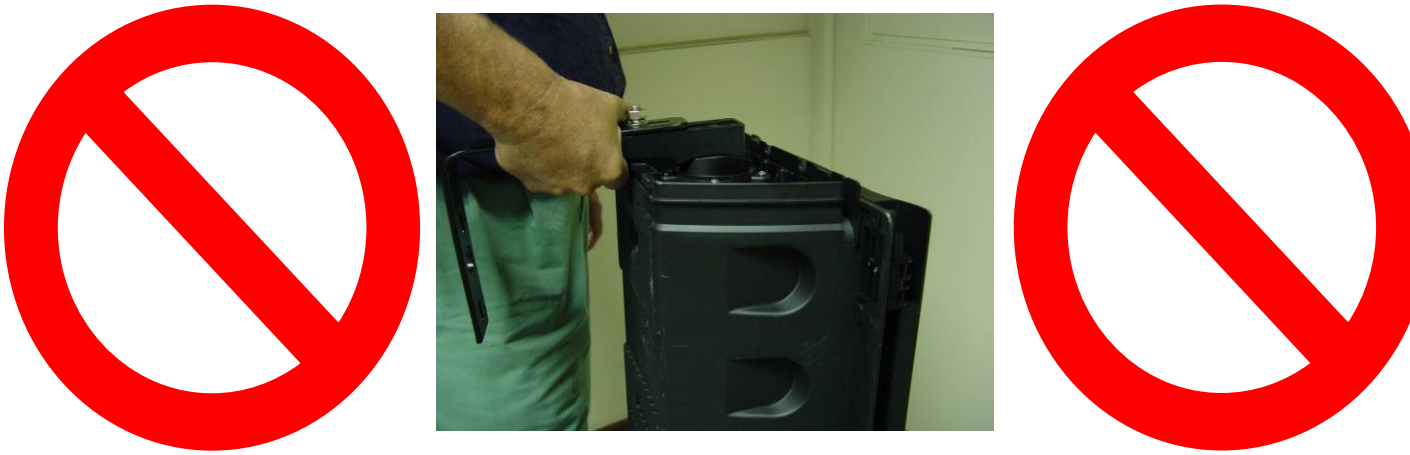
Figure 59 - Bleep and Sweep Microphone and Speaker Mounting

2.33 Fitting Signal Head to Pole

This section describes the recommended method of installing the assembled signal head onto the pole.

To carry the signal head with any attached side boxes safely, remove all doors and place a hand inside the top module.

Do not carry the signal head by the top bracket.



Hang the signal head on the pole mountings. Do up the two nuts and large bright washers and spring washers securely to hold the top bracket to the pole, aligning the cable entry points on the bracket and pole spacer. Then attach the bottom bracket with nuts and washers loosely, leaving it at its lowest extent.

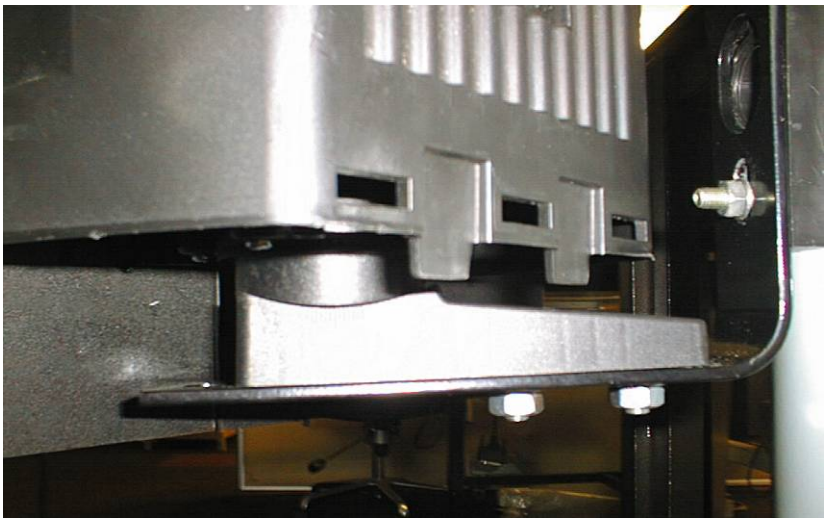


Figure 60 – Bottom bracket fitted

2.33.1 Adjusting Tilt and Rotation

Once the signal head has been fitted to the pole, the angles of tilt and rotation (see Figure and Figure) need to be adjusted before finally tightening the Allen bolts and hex screws. Helios may be tilted up to 6° from the upright and rotated up to 90°. Note that it is not possible to tilt a signal head that is rotated over 45° without the use of side mounting brackets (section 2.5.2).

Adjust the distance between the pole and the signal head and the angle of tilt by sliding the signal head over the brackets. Fully tighten the top and bottom hex nuts to the required torque setting (see Appendix D for tightening procedure). Fit the nut caps provided over the top and bottom nuts (shown in Figure) to stop reflections and to give weather protection.

The toothed sacrificial cap is designed so that in an impact, the teeth will break and allow the signal head to swing, absorbing part of the force and minimising damage to the signal head.

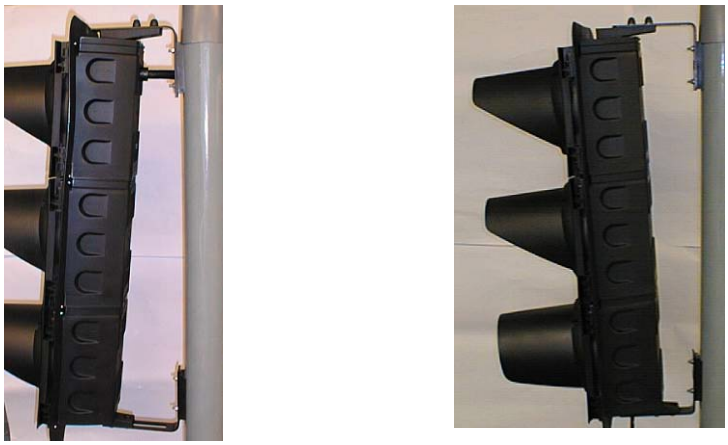


Figure 61 – Angles of Tilt

Figure 62 – Angle of Rotation

Make sure that the Allen bolts are loose enough so that the toothed sacrificial cap on the bottom bracket is **not** engaged before rotating the signal head. Adjust as required, tighten the Allen bolts top, bottom to the required torque setting (refer to Appendix D for tightening procedure),

Note: As a final adjustment the nuts holding the bottom bracket to the pole should be loosened slightly, the signal head and bracket pushed up as far as possible and the nuts re-tightened securely.

Fit nut caps over the four pole mounting nuts to stop reflections. If the bolt protrudes too far to allow the nut caps to fit over the nuts, add the extra washers provided in the pole mounting kit. Remove and replace the nuts one at a time so that the mounting brackets are not disturbed from their final positions.

2.33.2 Signal Head to Pole Connection

Adjust the amount of conduit tube to ensure there is sufficient to project into the pole.

Pass the conduit and cables through the cable entry point in the pole and draw the cables up through the top of the pole.

Generally, red and green ident sleeves identify the wires, but where this is not apparent see the following note for a way of identifying the appropriate leads, or tug gently on a wire to find its origin.

Note: Wires from all transformers are the same length. Therefore when wires come out of the signal head, on a three aspect halogen, the longest leads will be from the red aspect, the next longest from the amber aspect and the shortest from the green aspect.

Take care when making connections to the top connector that the cables will not be crushed or damaged by the pole cap screw. If there could be a problem, put extra insulation around the connections.

Once the connections have been made, screw the pole cap onto the terminal block assembly, ensuring that the thread is engaged. Do not overtighten.

Figure 63 – Pole Cap fitted

2.33.3 Fit Bulbs (Halogen)

Note that bulbs are not delivered with the signal head assembly; they are kept by STCL Services department.

Fit a tungsten halogen bulb into each of the bulb holders using the sleeve in which the bulb is supplied to push the bulb into place. It should not be touched with the fingers. Before fitting the bulb holder into the reflector, ensure that the bulb is positioned with its filament vertical and at right angles to the bulb holder. Fit the bulb holder into place in the reflector. Lugs on the bulb holder fit into channels at the rear of the reflector and clip into place.

2.33.4 Fit Doors

Making sure they are the **right way up** fit each door over its correct module and slide the clips into place to hold the door. If necessary, use the point of a screwdriver as shown in Figure to help close the door clip.

Where specified, screw the door clips in place with an anti-vandal screw. Figure shows the screw position in the middle of the clip. Screws may be fitted to all door clips, although the door will be secure if two are used on diagonally opposite sides of the door.

Figure 64 – Door Clip closed

3. COMMISSIONING

Adjust the angles of tilt, rotation and arrow directions to customer satisfaction.

In the absence of alternative instructions from the customer, the primary signals should be focussed to 40 m from the stop line and secondary signals should be focussed to the centre of the stop line.

Inspect every aspect before power is applied and check that all aspect components are correctly seated, aligned and firmly fixed (particularly transformers, PSUs, LED PCBs, CLS Units, LMF Units and OEM equipment) and CLS (ELV) units are **only** connected to a ST900 (ELV) Controller.

Note 1

The CLS (ELV) signal head is identified by a label marked 'ELV' on the bottom surface of the signal head along with a label marked 'ELV' on

each CLS unit used in each aspect.

Note 2

The ELV compliant Nearside units are clearly marked with ELV labels inside the case.

The p.c.b. assemblies within must only be replaced with ELV compliant assemblies. The visual identification of these assemblies is described in the Appendix C - Visual Identification of ELV Compatible PCB's.

3.1 Nearside Monitoring

The following p.c.b. assemblies are compatible with Nearside monitoring facilities of an ELV controller. These versions include slight modifications to the circuitry which allow fully monitorable operation with an ELV controller. Visual identification of compatible circuit boards is described in appendix C.

Nearside Signal ELV Compatible PCB Assemblies

667/1/30695/001	Issue 9 and above.
667/1/30695/002	Issue 9 and above.
667/1/30695/003	Issue 9 and above.
667/1/30695/004	Issue 10 and above.
667/1/30695/005	Issue 9 and above.
667/1/30695/006	Issue 10 and above.

Nearside Wait ELV Compatible PCB Assemblies

667/1/30211/001	Issue 4 and above.

Nearside Demand ELV Compatible PCB Assemblies

667/1/30680/001	Issue 3 and above.

4. MAINTENANCE

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

4.1 Routine Maintenance Visits

Warning: Mains voltages are present in LED and LED (NLM) aspects. The mains supply to the signal head must be disconnected/switched off before working on an LED or LED (NLM) aspect.

The interval between visits depends on local conditions but typically would be every six months. Routine maintenance consists of the following:

The outside of the signal head should be cleaned. The lens should only be cleaned using a proprietary window cleaner. The rest of the signal head may be cleaned with water.

The front and rear drainage slots in the top box should be cleared on each routine visit.

The drainage slot between the door and body of each aspect should be cleared on each routine visit. Check that the seal between the body and door has its drainage slot in the centre of the bottom of the body (especially on earlier models).

The fixings, particularly for the hoods and backing boards, should be checked, tightened where required and replaced if necessary.

The securing screws for the Helios end caps may become loose if the head has been struck by a vehicle but not rendered in-operative. It is therefore recommended that the screws and main securing bolt are checked for tightness. If either can be rotated more than ¼ turn then the procedure for tightening under “Sacrifical Caps” should be employed.

Bulbs, LED or LED (NLM) boards (and fluorescent tubes if fitted) should be inspected and replaced if necessary.

Check that the CLS unit (Futurit Type) is seated correctly and the ‘pip’ at the top of the CLS unit is aligned correctly within the Retaining Ring (See Section 4.2.8.)

Teflon based or similar dry type lubricant may be used to lubricate the door clips if necessary.

4.2 First Line Maintenance

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

Wherever possible when carrying out maintenance, remove the affected part and work on the ground. When a door is removed and replaced, make sure it is the **right way up** when refitting.

Note: Where anti-vandal screws are fitted to the door clips, it is not necessary to remove them completely before opening the door. Partially unscrew them

so that the head is level with the outer edge of the clip. This should enable the clip to slide without the door hitting the screw.

4.2.1 Bulb Replacement (Halogen)

Where a bulb is to be replaced, the door may be opened from either side and the bulb holder removed by gently squeezing the bulb holder clips. Pull the bulb free of the bulb holder and push the new bulb into place.

When fitting the new bulb make sure that it is not touched with the fingers as this shortens the life of the bulb and can affect its performance. If the signal is not to be disconnected during this operation, it is recommended that stout leather gloves be worn to protect the hands from the heat of a lit bulb.

Ensure that the bulb is positioned with its filament vertical and at right angles to the bulb holder.

Replace the bulb holder; lugs on the bulb holder fit into the channels at the rear of the reflector and clip into place. Secure the door, tightening any anti-vandal screws.

4.2.2 Bulb Holder Replacement (Halogen)

See the note in section 4.2 regarding anti-vandal screws. Open the door from either side and remove the bulb holder by gently squeezing the bulb holder clips. Undo the wire that connects the bulb to the transformer. Place the new bulb holder into the rear of the reflector and reconnect the wire to the transformer.

Secure the door, tightening any anti-vandal screws.

4.2.3 Transformer Replacement (Halogen)

Warning: Mains voltages are present. The mains supply to the signal head must be disconnected/switched off before working on a Halogen Signal Aspect transformer.

See the note in section 4.2 regarding anti-vandal screws. Open the door from either side and disconnect the bulb holder leads and the Earth lead from the aspect transformer. Remove the door if necessary for ease of working, placing it safely on the ground.

Either of the following procedures may now be used.

Disconnect the transformer mains input from the top of the Signal Pole and feed the cables back to the transformer that is to be replaced.
Remove the two screws that are holding the transformer to the bottom of the Aspect and extract the transformer from the aspect.
Fitting the new transformer is the reverse operation to that of removing it.

Or

Cut the mains leads to the transformer as close as possible to the transformer. Remove and retain the two screws that are holding the transformer to the bottom of the Aspect and extract the transformer from the aspect.

Fit the new transformer into the same position as the one removed using the retained screws. Cut the new transformer mains input leads about 25 – 30 cm from the transformer. Using 2 off Red Butt Crimps (703/4/97182/000 - TAG INLINE SPLICE 0.5-1.5MM2 RED) and a calibrated crimping tool, crimp these two leads using standard techniques, to the leads that come from the pole top ensuring that colours are matched.

Replace the door on the aspect box and re-connect the bulb holder leads and the Earth lead to the transformer. Secure the door, tightening any anti-vandal screws (if fitted).

4.2.4 LED or LED (NLM) PCB Replacement

Warning: Mains voltages are present. The mains supply to the signal head must be disconnected/switched off before working on an LED aspect.

Warning: Anti-static precautions must be taken when handling LED and LED (NLM) PCB Assemblies.

See the note in section 4.2 regarding anti-vandal screws. Undo the door clips on one side and open the door.

Unclip the cable connector from the LED or LED (NLM) board and remove the cables from the plastic cable clips on the rear of the board. Remove the door assembly from the module and work on the ground.

The LED and LED (NLM) PCB is held in place with four plastic spacers with fir-tree clips. These should be squeezed to release the clip mechanism and the board lifted off the door assembly.

Remove the clear plastic safety guard and its retaining clips from the board and fit it onto the new PCB. Remove the plastic cable clips from the board and refit onto the new PCB. Push down firmly until they clip into place. Both these can be seen in Figure .

Clip the new PCB into place on the door assembly.

Replace the door on the aspect box and replace the cable connector. Clip the cables back into place on the rear of the PCB using the cable clips. Make sure that the clear plastic guard tucks over the cable connector before closing the door.

Secure the door, tightening the anti-vandal screws if supplied.

NOTE – LED and LED (NLM) PCBs are <u>NOT</u> interchangeable.

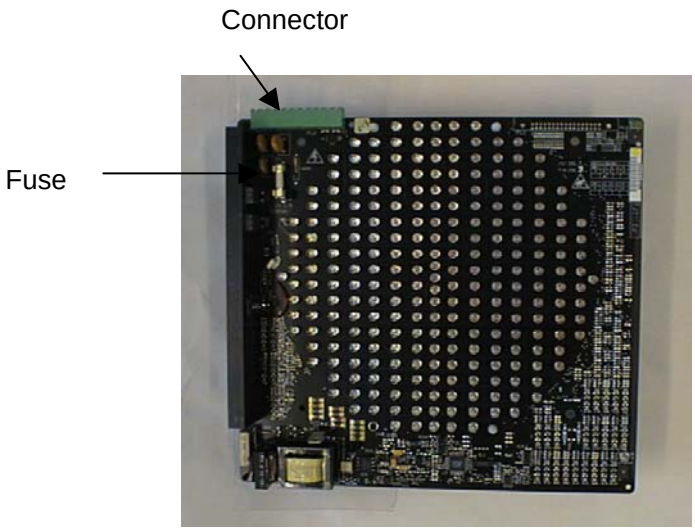


Figure 65 – LED PCB front

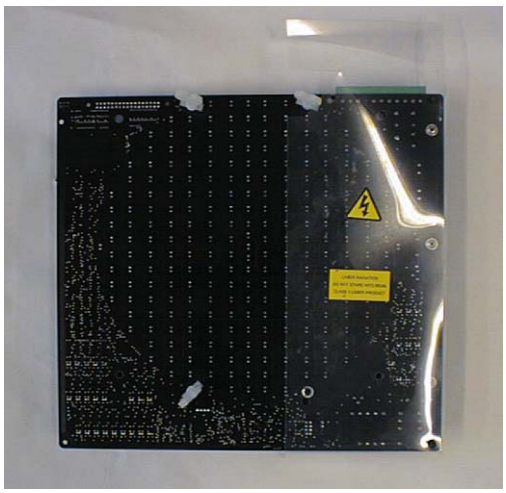


Figure 66 – LED PCB rear

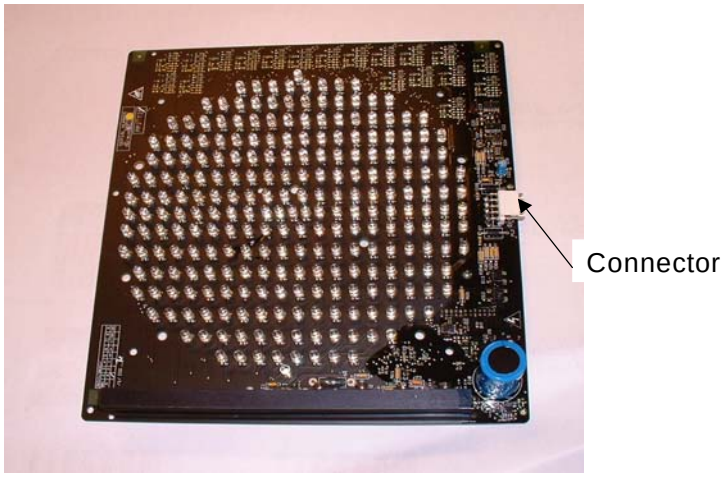


Figure 67 – LED (NLM) PCB front

4.2.5 PCB Fuse Replacement (LED)

Warning: Mains voltages are present. The mains supply to the signal head must be disconnected/switched off before working on an LED aspect.

Warning: Anti-static precautions must be taken when handling LED PCB Assemblies.

See the note in section 4.2 regarding anti-vandal screws. Undo the door clips on one side and open the door.

Unclip the cable connector from the LED board and remove the cables from the plastic cable clips on the rear of the board. Remove the door assembly from the module and work on the ground.

The LED PCB is held in place with four plastic spacers with fir-tree clips. These should be squeezed to release the clip mechanism and the board lifted off the door assembly.

See Figure for the position of the fuse. Remove it and replace with one of a similar size and rating (see APPENDIX B for the part number).

Clip the PCB back into place on the door assembly.

Replace the door on the aspect box and refit the cable connector. Clip the cables back into place on the rear of the PCB using the cable clips. Make sure that the plastic safety guard tucks over the cable connector before closing the door.

Secure the door, tightening the anti-vandal screws if supplied.

4.2.6 PSU Replacement (Linear - LED)

Warning: Mains voltages are present. The mains supply to the signal head must be disconnected/switched off before working on an LED aspect.

Warning: The Earth connections are daisy-chained from the red, to the amber and then to green. This means if either the red or amber PSU's are removed the aspects below will not be earthed.

See the note in section 4.2 regarding anti-vandal screws. Undo the door clips on one side and open the door.

Disconnect the 2 white molex connectors from the PSU (see Figure). Remove the earth wires from the earth stud on the PSU case. Cut the cable tie holding the Inductor to the PSU chassis. Loosen the 3 screws holding the PSU chassis to the backplate and lift out the PSU chassis.

Fitting the new PSU is the reverse operation to that of removing it, ensuring that the inductor is re-tied to the PSU chassis.

Secure the door, tightening the anti-vandal screws if supplied.

NOTE – for replacement of the Switch Mode PSU with the Linear PSU see document QAPROC-42-800-220.

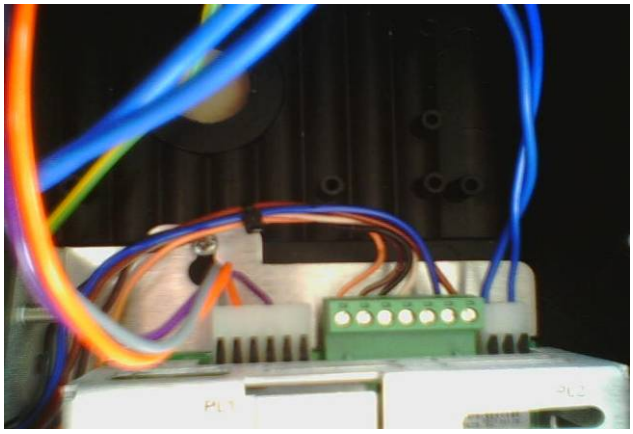


Figure 68 – PSU White Molex Connectors

4.2.7 Transformer Replacement – LED (NLM)

Warning: Mains voltages are present. The mains supply to the signal head must be disconnected/switched off before working on an LED (NLM) aspect.

Either of the following procedures may now be used.

Disconnect the transformer mains input from the top of the Signal Pole and feed the cables back to the transformer that is to be replaced. Disconnect the transformer connection from the LED (NLM) PCB. Remove the Earth lead connection from the transformer.
Remove the two screws that are holding the transformer from the bottom of the Aspect and extract the transformer from the aspect.
Fitting the new transformer is the reverse operation to that of removing it.

Or

Disconnect the transformer connection from the LED (NLM) PCB. Remove the Earth lead connection from the transformer.
Cut the mains leads to the transformer as close as possible to the transformer. Remove and retain the two screws that are holding the transformer to the bottom of the Aspect and extract the transformer from the aspect.

Fit the new transformer into the same position as the one removed using the retained screws. Cut the new transformer mains input leads about 25 – 30 cm from the transformer. Using 2 off Red Butt Crimps (703/4/97182/000 - TAG INLINE SPLICE 0.5-1.5MM2 RED) and a calibrated crimping tool, crimp these two leads using standard techniques, to the leads that come from the pole top ensuring that colours are matched. Reconnect the transformer connection to the LED (NLM) PCB and the Earth lead.

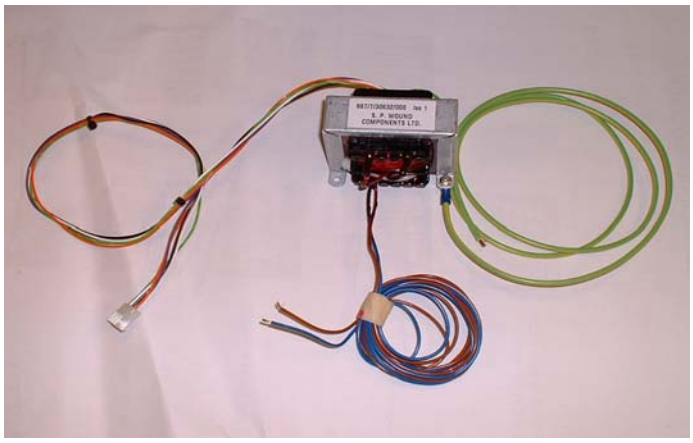


Figure 69 – LED (NLM) Transformer

4.2.8 CLS Unit (Futurit Type) Replacement

Disconnect the power lead of the CLS unit for the LMF unit by removing PL1 from the LMF unit or disconnecting PL1 of the CLS unit from SKT1 of the Mains power cable of a CLS (NLM) aspect.

Remove the two screws holding the CLS Retaining Clip in position and remove the CLS retaining clips.

Remove the CLS unit from the retaining ring by unclipping it from the four retaining clip of the retaining ring.

Fitting a new CLS unit is the reverse operation to that of removing it, ensuring that the locating ‘pip’ on the top of the CLS unit is engaged in the slot at the top of the retaining ring.

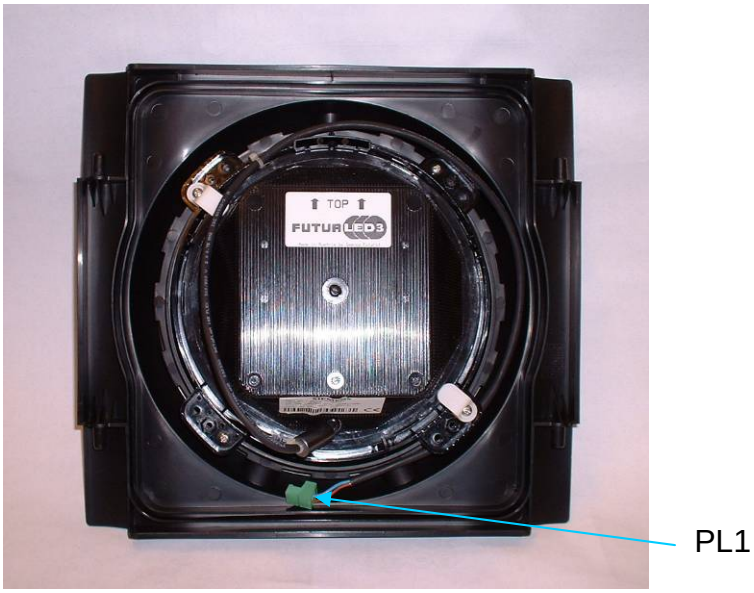


Figure 70 – CLS Unit fitted into door

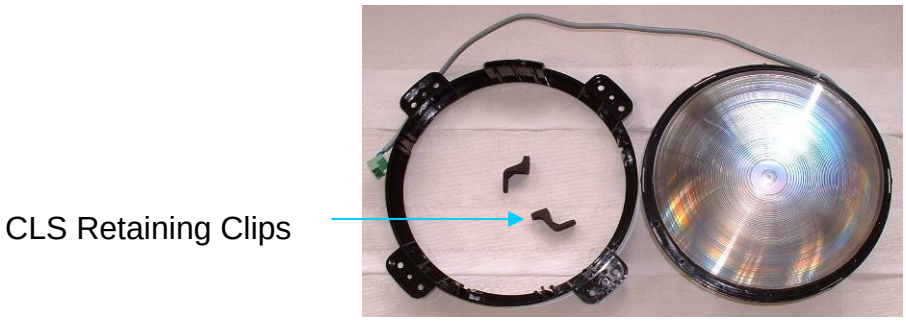


Figure 71 – Futurit CLS Unit, Retaining Ring and retaining Clips

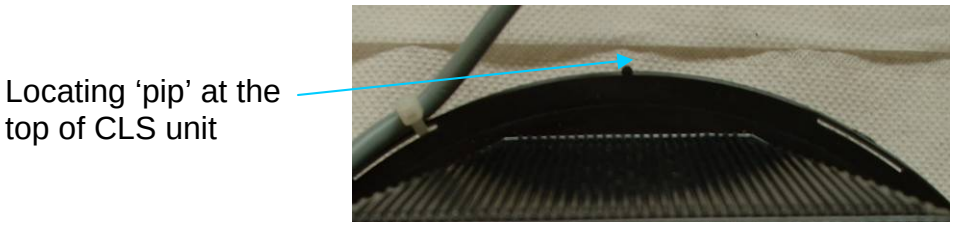


Figure 72 – ‘Pip’ at the top of the Futurit CLS Unit

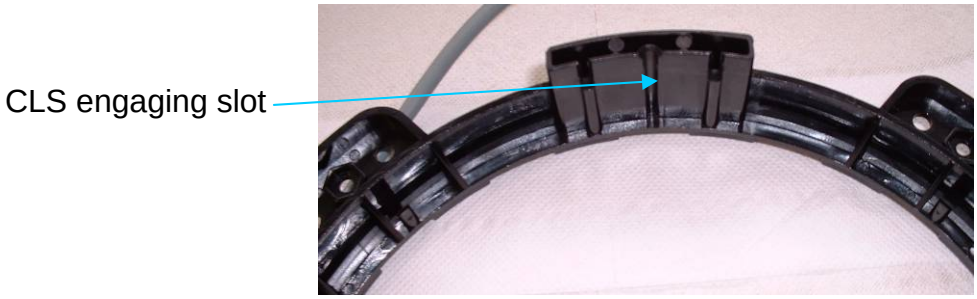


Figure 73 – Futurit CLS engaging slot

4.2.9 CLS Unit (Dialight Type) Replacement

See the note in section 4.2 regarding anti-vandal screws. Undo the door clips on one side, open the door and remove the cable connector PL1 from the LMF unit (this removes the phase power from the LMF Unit) and then remove the cable connector of the CLS unit from the LMF Unit (SKT1) (if CLS with LMF), **or** disconnect plug to the mains input lead if CLS (NLM) or CLS (ELV). Remove the door assembly from the module and work on the ground.

Remove the 4 screws that holds the CLS Unit to the door.

Fit the lens on to the CLS unit ensuring that the lens is positioned correctly. Fit the seal around the new lens and place the door over the lens and seal. Holding the door, lens and CLS unit, turn the assembly over and replace the 4 screws holding the CLS unit to the aspect door.

NOTE – ENSURE THAT THE CORRECT REPLACEMENT CLS TYPE i.e. CLS (LV) or CLS (ELV) IS USED.

Figure 74 – Dialight CLS Unit

CLS (ELV) units are identified by the label displayed in Figure below.

SIEMENS
PART NO. : 667/7/28586/100
COLOUR : RED
VOLTAGE (BRIGHT/DIM) : 48V/27.5V
POWER (BRIGHT/DIM) : 12W/4W
ce
MODEL TYPE : **ELV**

Figure 75 - ELV CLS LABEL

4.2.10 LMF Fuse Replacement

Remove power to the LMF unit by removing the connector in PL1 of the LMF unit. Remove the fuse by unscrewing the fuse cap from the fuse holder. Replace the fuse (518/4/97068/000 – Ceramic 20 x 5 1A 240v) in the fuse cap and screw the cap back into the fuse holder.

Note – care needs to be exercised when removing the fuse as it is possible to drop and trap the fuse between the LMF PCB and the rear metal panel of the LMF unit

Figure 76 – Top view of a LMF unit

4.2.11 LMF Unit Replacement

WARNING – the earth connections within the CLS with LMF signal head is 'daisy-chained' from the Red to Amber and then Green LMF Unit. When removing either a Red or Amber LMF unit the aspects below will not be earthed and therefore should not be touched if the controller is powered on.

Remove power to the LMF unit by removing the connector in PL1 of the LMF unit. Remove the connector from the CLS unit connected to the LMF unit SKT1. Disconnect the earth cables by pulling the spade connectors from the earth terminals. Remove the cable loom from the two Pushbutton ties (915/4/10307/000). The LMF unit can now be removed by loosening the four retaining screws and sliding the unit to the right.
Fitting the new LMF Unit is the reverse operation to that of removing it.

If the replacement LMF Unit is a Spares Unit (667/1/31180/230SP), it may be used as a replacement for either a Red LMF Unit or an Amber/Green LMF Unit. The LMF Spares Unit comes as a kit containing an LMF Unit and an LMF Spares Kit which allows it to be configured for either LMF Unit type.
If the LMF Unit is to be used to replace a Red LMF Unit all that is required is the Red 230V Identification Label (667/2/31190/000) to be added to the Unit. The Unit is now ready for fitting.
If the LMF Unit is to be used to replace an Amber or Green LMF Unit an internal jumper is required to be fitted. First remove the Unit's cover by removing the 2 off M3 x 10mm screws. Place the Jumper (508/4/21405/001) between pins 6 and 8 of PL2 as identified in Figure . Replace the LMF Unit's cover and screws and add the Amber/Green 230v Identification Label (667/2/31190/001). The Unit is now ready for fitting.

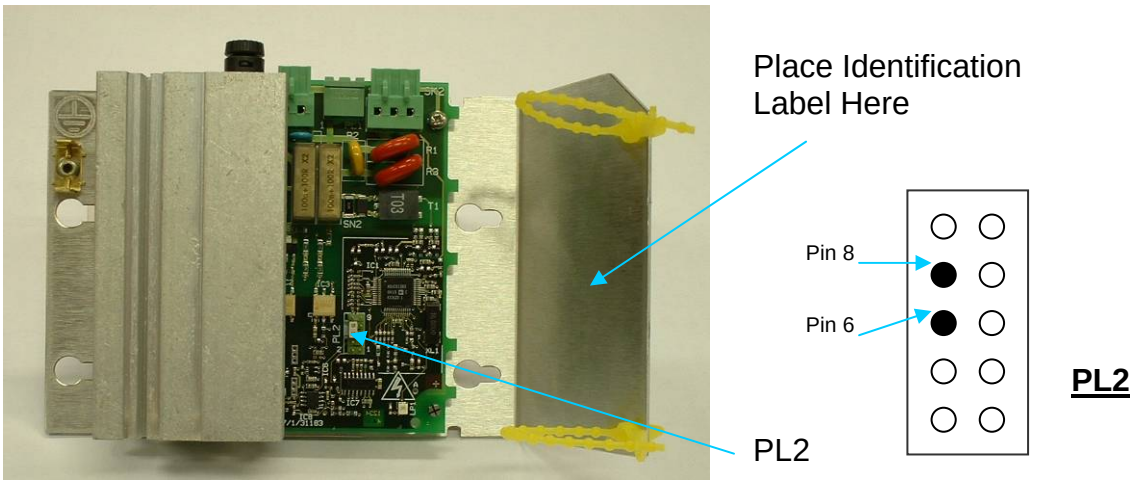


Figure 77 - LMF with Cover Removed

Note the forming of the power cable into PL1 of the LMF unit. This prevents any water ingress down this cable from dropping into the LMF unit.

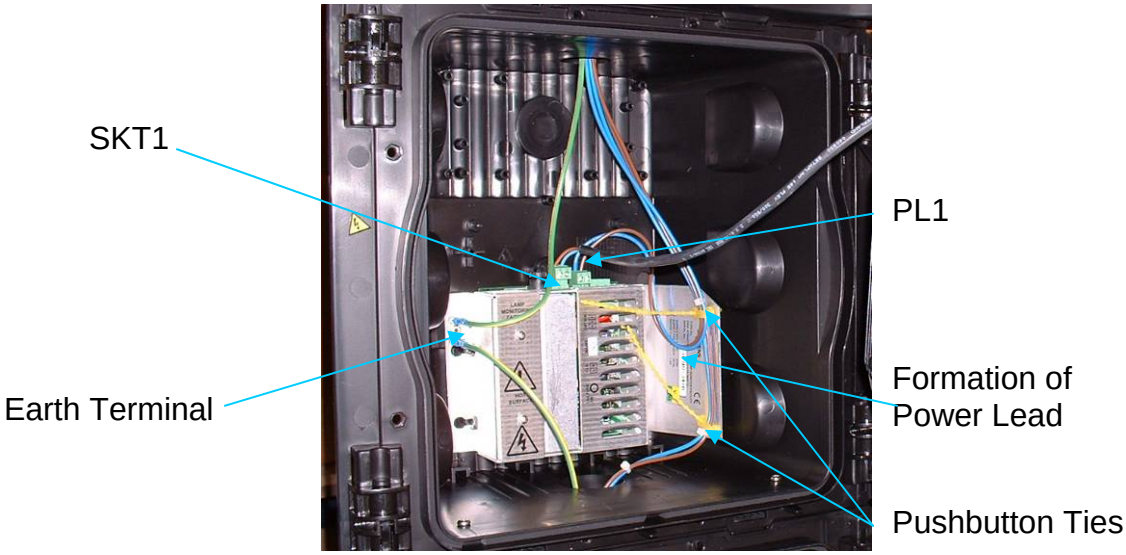


Figure 78 – LMF unit within a signal aspect

4.2.12 Tube Replacement

See the note in section 4.2 regarding anti-vandal screws. Open the door from either side and remove the fluorescent tube(s) to be replaced. Replace with a tube of similar size (230 mm) and wattage (6 W) and refit the door. Tighten any anti-vandal screws.

4.2.13 Aspect Door Replacement (Halogen)

Normally a door/lens assembly is replaced complete. When the appropriate variant is not available, any undamaged lens, reflector and hood may be re-used.

See the note in section 4.2 regarding anti-vandal screws. Undo the door clips on one side, open the door and remove the halogen lamp holder from the reflector. Undo the remaining door clips and remove the door from the module and work on the ground.

If the existing hood is to be re-used, remove it as described in section 4.2.18 and retain it for re-use. Otherwise, fit the new hood as described in section 2.17.

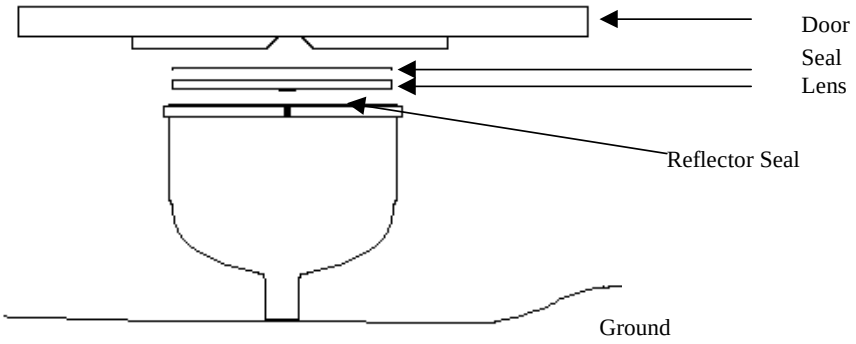


Figure 79 – Door assembly (Halogen)

When bringing the door assembly together, place them as shown in Figure , noting the orientation of lens and reflector as described in section 4.2.19. Holding the reflector and door together, flip the assembly over so that the door is face down on the ground and insert the four screws.

Note: The lens to door seal can be very difficult to align once removed. Therefore, this procedure should be avoided wherever possible. Figure and Figure show the seals correctly fitted.

Figure 80 – Lens with seal in place

Figure 81 – Reflector with seal in place

Secure the door, tightening the anti-vandal screws if supplied.

4.2.14 Aspect Door Assembly Replacement (LED and LED (NLM))

Warning: Mains voltages are present. The mains supply to the signal head must be disconnected/switched off before working on an LED or LED (NLM) aspect.

Warning: Anti-static precautions must be taken when handling LED and LED (NLM) PCB Assemblies.

Normally a door/lens assembly is replaced complete. When the appropriate variant is not available, any undamaged lens, PCB and hood of the correct variant may be re-used.

See the note in section 4.2 regarding anti-vandal screws. Undo the door clips on one side, open the door and remove the cable connector from the PCB. Remove the cables from the harness clips on the LED or LED (NLM) board. Remove the door assembly from the module and work on the ground.

If the existing hood is to be re-used, remove it as described in section 4.2.18 and retain it for re-use. Otherwise, fit a new hood as described in section 2.17.

Remove the LED or LED (NLM) PCB by releasing the four fir-tree clips holding it onto the door and store it carefully.

Reattach the LED or LED (NLM) PCB to the new door by clipping the board onto the fir tree clips. Replace the new door assembly onto the case and reconnect the cables, clipping them into place as shown in Figure .

NOTE – LED and LED (NLM) PCBs are <u>NOT</u> interchangeable.

When bringing the door assembly together, note the orientation of lens and lens holder as described in section 4.2.19. Holding the lens holder and door together, flip the assembly over so that the door is face down and insert the four screws.

Note: The lens to door seal can be very difficult to align once removed. Therefore, this procedure should be avoided wherever possible. Figure *shows the seal correctly fitted.*

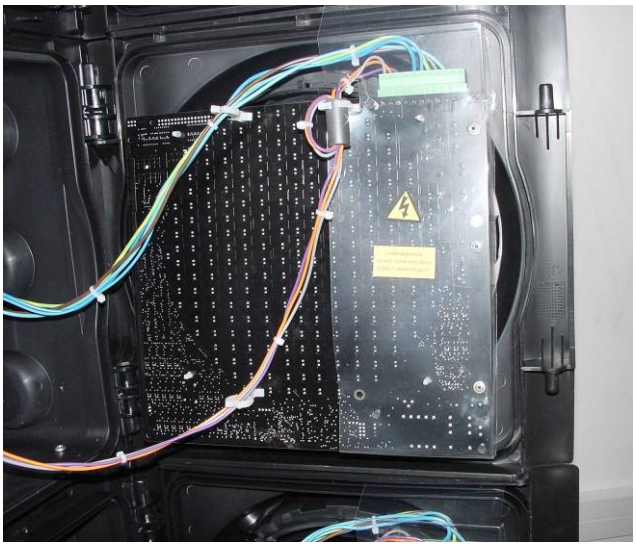


Figure 82 – LED Aspect Door

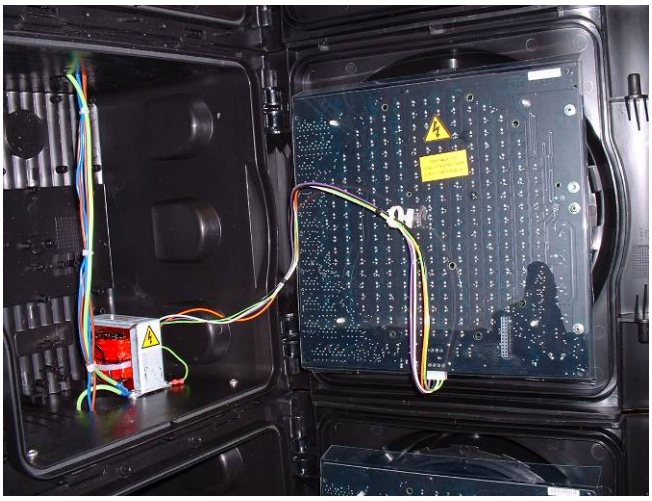


Figure 83 – LED (NLM) Aspect Door

Secure the door, tightening the anti-vandal screws if supplied. If necessary, re-attach the hood.

4.2.15 CLS with LMF, CLS (NLM), and CLS (ELV) Door Replacement

Normally a door/lens assembly is replaced complete. When the appropriate variant is not available, any undamaged lens, CLS unit and hood of the correct variant may be re-used.

See the note in section 4.2 regarding anti-vandal screws. Undo the door clips on one side, open the door and remove the cable connector PL1 from the LMF unit (this removes the phase power from the LMF Unit) and then remove the cable connector of the CLS unit from the LMF Unit (SKT1) (if CLS with LMF), **or** disconnect plug to the mains input lead if CLS (NLM) or CLS (ELV). Remove the door assembly from the module and work on the ground.

If the existing hood is to be re-used, remove it as described in section 4.2.18 and retain it for re-use. Otherwise, fit a new hood as described in section 2.17.

Fit the replacement door back on to the aspect body, connecting the lead from the CLS unit to either SKT1 on the LMF unit and then the phase power connector to PL1 (CLS with LMF) or the mains input plug if CLS (NLM) or CLS (ELV). Secure the door, tightening the anti-vandal screws if supplied. If necessary, re-attach the hood.

NOTE – Ensure that the correct type of door i.e. LV or ELV is used as the replacement.

Figure 84 – CLS Aspect Door

4.2.16 Regulatory Sign Door Replacement

Replacing any regulatory sign door except mandatory arrow simply involves removing the old door and replacing it with a new one.

To replace a mandatory arrow door, follow the additional fitting instructions in section 2.7.2. Alternatively, it may be possible to remove a broken mandatory arrow lens and replace the sealant and lens without having to replace the door.

Secure the door, tightening the anti-vandal screws if supplied.

4.2.17 Door Clip Replacement

See the note in section 4.2 regarding anti-vandal screws. To remove a door clip, hook the point of a screwdriver behind the retaining pip on the front of the door clip that holds it on the module and lift so that it will slide off. The replacement door clip will just slide into place and be held by the pip.

Note that the upper door clips should have the retaining pip pointing up and the lower door clips should have it pointing down.

4.2.18 Hood Replacement

To replace a moulded hood, clip off the protruding lengths of the fir-tree clips inside the hood rim (Figure) to make it easier to remove the clips.

Figure 85 – Fir-tree clips

Remove the hood by pulling it away from the door and replace with the new hood. Hold in place using the five fir-tree clips provided.

To replace another type of hood remove the fixings, which could be fir-tree clips, bolts or rivets and remove the hood. Replace with any compatible hood, if necessary drilling as described in section 2.17.1.

4.2.19 Lens or Reflector Replacement (Halogen)

Note: As the lens to door seal is difficult to align once removed, this procedure should not be carried out on site. A complete replacement door assembly should be fitted as described in section 4.2.13 and the lens replacement done at the depot.

A damaged lens should only be replaced with one displaying the correct aspect. Part numbers are given in APPENDIX B.

Undo the door (loosening the anti-vandal screws as described in section 4.2 if fitted) and unclip the bulb holder from the rear of the reflector. Tuck the bulb holder securely in the module and remove the door from the front of the module.

Unscrew the reflector from the door and remove the lens. Replace the lens or reflector as required.

A small lug on the rear of the lens fits into a cut-out on the front of the reflector. It is vital to ensure that the lens fits snugly into the reflector and cannot turn.

Replace the lens/reflector onto the door, making sure that the two seals are in place (see Figure to Figure) and the small tag on the outside of the reflector is pointing upward. Do up the four screws that hold the reflector/lens to the door.

When correctly fitted the “arrow” pattern on the masking should point upwards, thus: 

Replace one side of the door and refit the bulb holder into the reflector. Do up the other door clips (and any anti-vandal screws).

4.2.20 Lens Replacement (LED or LED (NLM))

Warning: Mains voltages are present. The mains supply to the signal head must be disconnected/switched off before working on an LED or LED (NLM) aspect.

Warning: Anti-static precautions must be taken when handling LED or LED (NLM) PCB Assemblies.

Note: As the lens to door seal is difficult to align once removed, this procedure should not be carried out on site. A complete replacement door assembly should be fitted as described in section 4.2.14 and the lens replacement done at the depot.

Remove the door and work on the ground.

Detach the LED or LED (NLM) PCB from the door by squeezing the fir-tree clips on the plastic pillars. Unscrew the lens retaining ring; tip out the lens and keep the seal to use again, unless it also needs replacing.

Fit the seal around the new lens and place the door over the lens and seal, aligning them very carefully. When correctly fitted the pattern on the masking should point downwards, thus: 

Holding them together, tip the door/lens over, replace the lens retaining ring and check that the small tag on the outside of the retaining ring is pointing upward. Do up the four screws that hold the retaining ring/lens to the door. Note that there is no need for a seal between the the lens and the lens retaining ring.

Refit the LED or LED (NLM) PCB onto the clips, replace one side of the door, refit the cable connector and clip the cables into place on the back of the PCB (see Figure and Figure). Make sure that the clear plastic shield covers the cable connector to give protection from the mains voltage present.

Do up the other door clips (and any anti-vandal screws).

4.2.21 Lens Replacement (CLS with LMF, CLS (NLM) or CLS (ELV))

Note: As the lens to door seal is difficult to align once removed, this procedure should not be carried out on site. A complete replacement door assembly should be fitted as described in section 4.2.15 and the lens replacement done at the depot.

A damaged lens should only be replaced with one displaying the correct aspect. Part numbers are given in APPENDIX B.

Undo the door (loosening the anti-vandal screws as described in section 4.2 if fitted) and unplug the lead from the phase power input PL1 to LMF unit and then the CLS Unit to the LMF unit (SKT1 – CLS with LMF) or the Mains Input cable on a CLS (NLM) or CLS (ELV) and remove the door from the front of the module.

Working on the ground –

a) if the CLS unit type is a Futurit, remove the two screws holding the two CLS Retaining Clips and the two remaining screws holding the Lens Retaining Ring the front door.

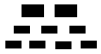
b) If the CLS unit type is Dialight, remove the 4 screws holding the unit to the front door.

Replace the lens as required.

Fit the new lens as follows –

a) if the CLS unit is a Futurit type, fit the lens retaining ring ensuring the small lug on the rear of the lens fits into a cut-out on the front of the lens retaining ring. It is vital to ensure that the lens fits snugly into the Lens Retaining Ring and cannot turn. Fit the seal around the new lens and place the door over the lens and seal. Holding the door, lens and lens retaining ring in place turn the assembly over and replace the two screws that hold the Lens retaining ring to the aspect door. Fit the CLS unit and the two CLS retaining clips. (Refer to Section 4.2.8 for CLS replacement procedure)

b) If the CLS unit is a Dialight type, fit the lens on to the CLS unit ensuring that the lens is positioned correctly. Fit the seal around the new lens and place the door over the lens and seal. Holding the door, lens and CLS unit, turn the assembly over and replace the 4 screws holding the CLS unit to the aspect door.

When the lens is correctly fitted the “arrow” pattern on the masking should point upwards, thus: 

Replace one side of the door into the aspect body and refit the CLS unit lead. Close the door and do up the other door clips (and any anti-vandal screws).

4.2.22 Sacrificial Cap Replacement

Note: Where the sacrificial cap is being replaced following an impact, inspect the entire signal head carefully for associated damage.

To replace the sacrificial cap assembly, remove the single hex cap bolt in the bottom bracket, then slacken the lower bracket to pole fixings. Swing the signal out just enough to give access to the broken sacrificial cap.

Remove and replace the toothed sacrificial cap and refit the Allen bolt loosely. Re-align the signal head (section 2.33.1) and re-tighten all bolts and screws.

4.2.23 Sacrifical Caps – Screw Tightening Procedure

It is possible for the Allen screws to become loosened after a collision with the signal head. If the screws are found to be loose, then it is recommended that they are removed and replaced using the procedure in - Helios Signal Head Screw Fixing Procedure

If it is found not possible to secure the cap screws, then the cap should be replaced as described in the previous section.

4.2.24 Modular Unit Replacement

Warning: Mains voltages are present. The mains supply to the signal head must be disconnected/switched off before working on an LED aspect.

Where a modular unit has been damaged, the head has to be removed. Proceed as follows:

Remove the pole cap, disconnect wiring to the signal head and feed cables back through the cable entry point in the pole.

Remove the nuts holding first the bottom bracket and then the top bracket. Lift the entire signal head free of the pole fittings and lower to the ground.

When the signal head has been removed, slacken the hex bolts holding the sacrificial caps in place and then loosen the two screws at each end that hold the brackets to the signal head.

The faulty unit may then be changed by removing the internal wiring, removing any side boxes attached to the damaged module, removing the internal inter-module screws and unclipping the units. Do this by lifting the two tabs holding the fronts of the units and applying force on the back of the module.

It is recommended that the screws (4.8 mm x 45 mm self-tapping) used to hold the modules together are not replaced in their original position more than 10 times. Each module has four small indents provided at the front (Figure and Figure in Appendix A), so that when a new module has been clipped into place, previously unused screw positions may be used if required.

Re-connect the wiring between the modules and instal the signal head on the pole as described in section 2.33.

Note that it will be necessary to re-align the signal head as described in section 2.33.1.

Figure 86 – Separated Modules

4.3 Second Line Maintenance

It is recommended that undamaged parts be reused where possible.

The following parts should be returned to Poole when replaced on site:

- Regulatory sign lamp mounting plate
- LED or LED (NLM) PCB door assembly
- PSU
- LMF Assembly
- CLS Units (LV and ELV)
- Tram indicator (complete module)

APPENDIX A – DRAWINGS

The drawings given in this appendix are reproduced from 667/2/28968/000 sheets 1 to 3 issue 1 and are intended to assist with installation and maintenance. They show fitting positions for the various components and the fixings to be used.

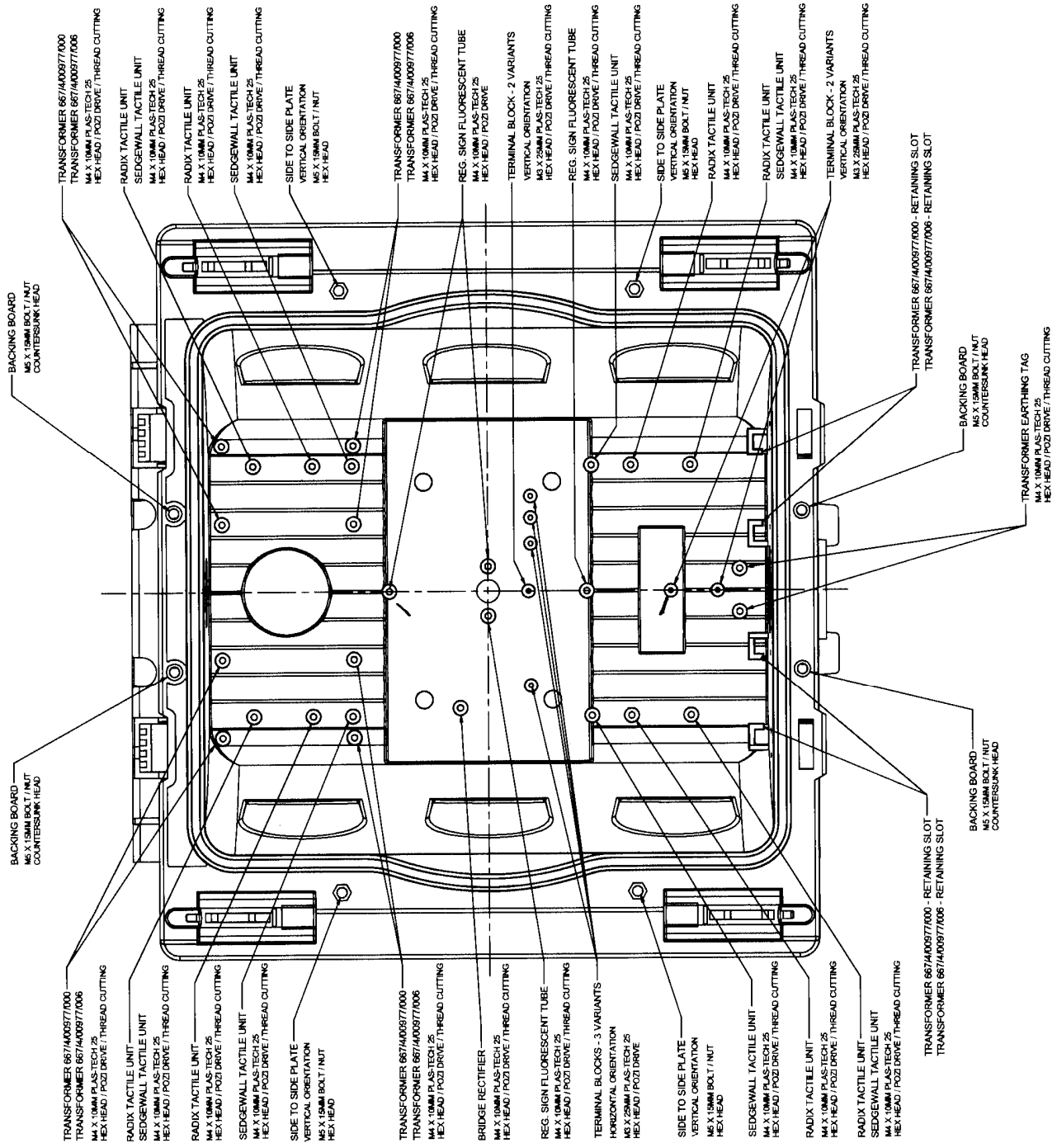


Figure 87 – Front View

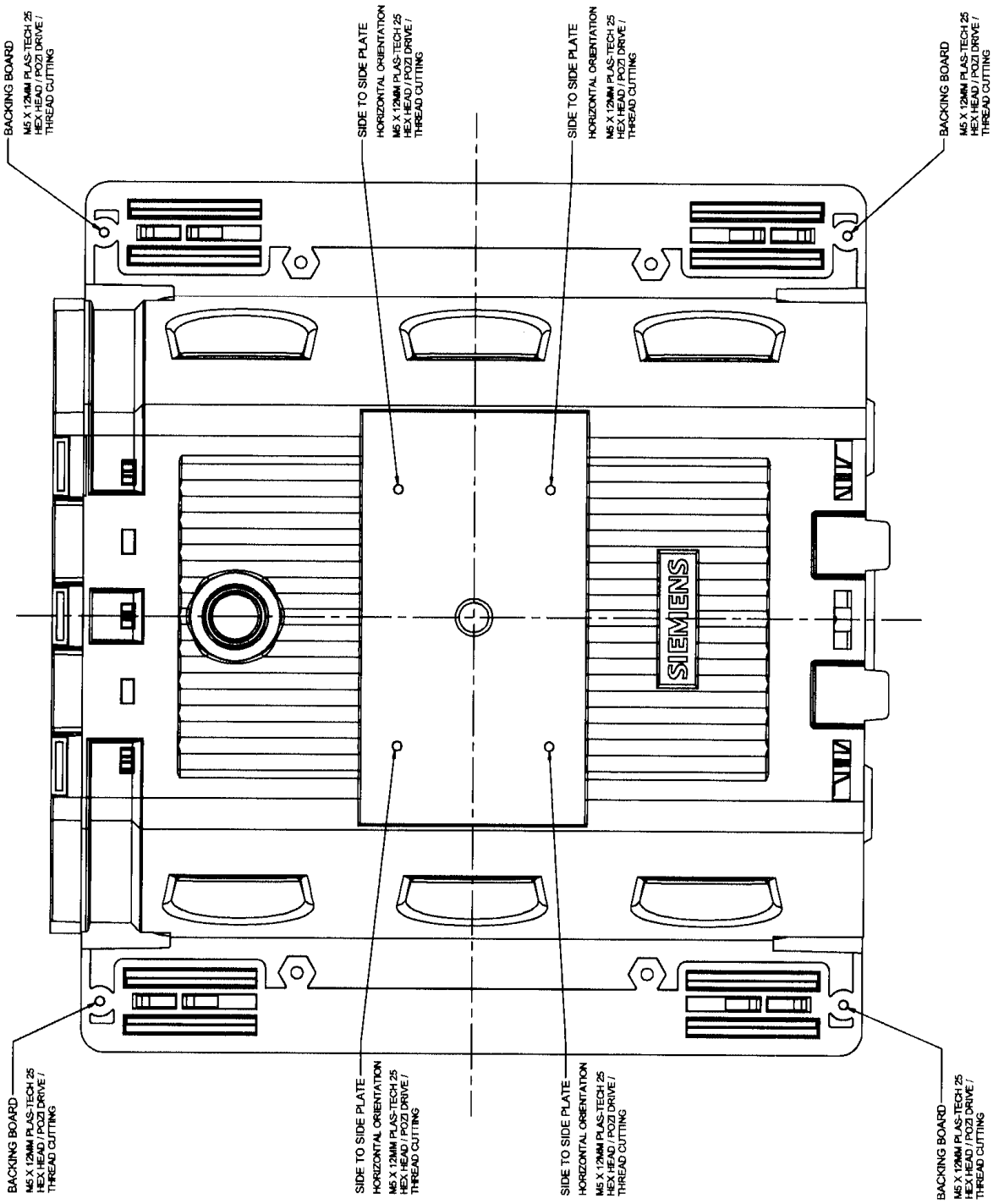


Figure 88 – Rear View

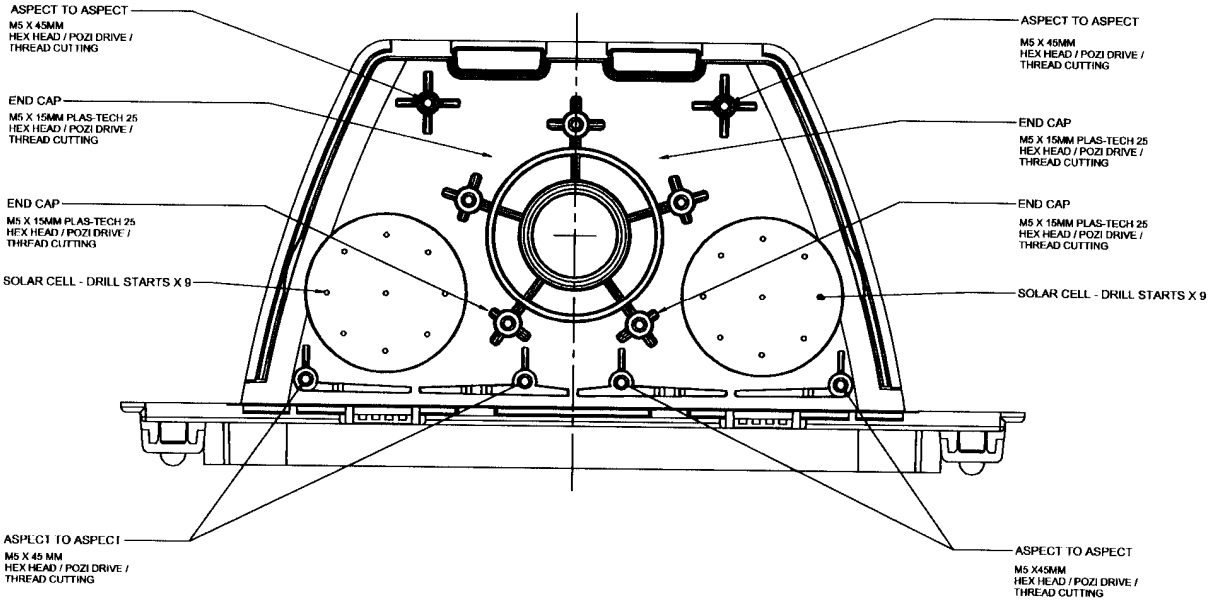


Figure 89 – Top View

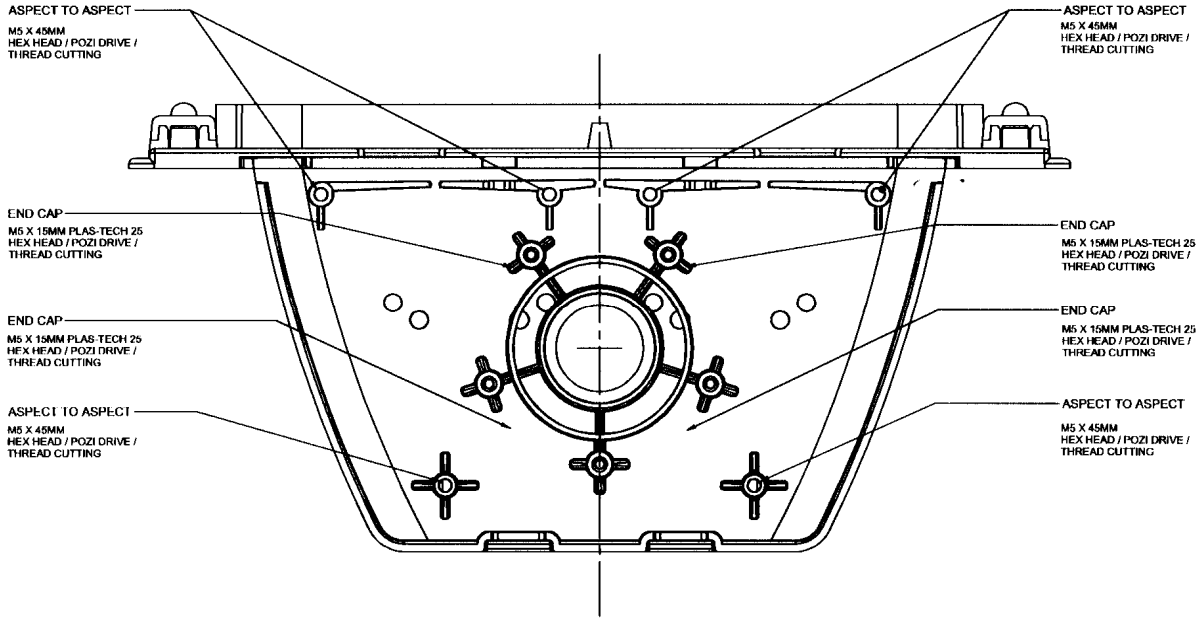


Figure 90 – Underside View

APPENDIX B – SPARES LIST

Listed below are the part numbers for approved Spares for the Helios signal head and associated equipment.

See the warning on page 4 regarding the use of parts other than those listed.

Part Number	Description	Hal. only	LED only	CLS (ELV)	CLS only
667/1/30198/001	Red LED PCB		6		
667/1/30198/002	Amber LED PCB		6		
667/1/30198/003	Green LED PCB		6		
667/1/30198/004	Up Green Arrow LED PCB		6		
667/1/30198/005	Left/Right Green Arrow LED PCB		6		
518/4/90302/010	LED PCB 2 A slow blow 250 V Fuse		6		
667/1/30321/001	Red LED (NLM) PCB		6		
667/1/30321/002	Amber LED (NLM) PCB		6		
667/1/30321/003	Green LED (NLM) PCB		6		
667/1/30321/004	Up Green Arrow LED (NLM) PCB		6		
667/1/30321/005	Left/Right Green Arrow LED (NLM) PCB		6		
667/7/28584/100	CLS Red Assembly (LV)				6
667/7/28584/101	CLS Amber Assembly (LV)				6
667/7/28584/102	CLS Green Assembly (LV)				6
667/7/28586/100	CLS Red Assembly (ELV)			6	
667/7/28586/101	CLS Amber Assembly (ELV)			6	
667/7/28586/102	CLS Green Assembly (ELV)			6	
667/1/33157/006	ELV Tram Indicator 6 phase Module			6	
667/1/31500/432	Tram Lens assembly without hood			6	
667/1/31500/434	Tram Lens assembly with demand indicator without hood			6	
667/1/33159/000	Tram Cable loom assembly			6	
667/1/33170/000	Tram demand indicator cable loom assembly			6	
667/1/31180/230SP	LMF Assembly 230v - Spares Use as Red or Amber/Green				6
517/4/92787/000	50 W Tungsten Halogen Lamp	6			
667/1/30200/500	Lamp Holder with ceramic socket, wires and screws	6			
667/2/30050/200	Enhanced Optic Door				
667/2/30056/200	Enhanced Optic Reflector	6			
667/2/30054/000	Door sliding clips				
667/2/30200/200	200 mm Red Lens	6			

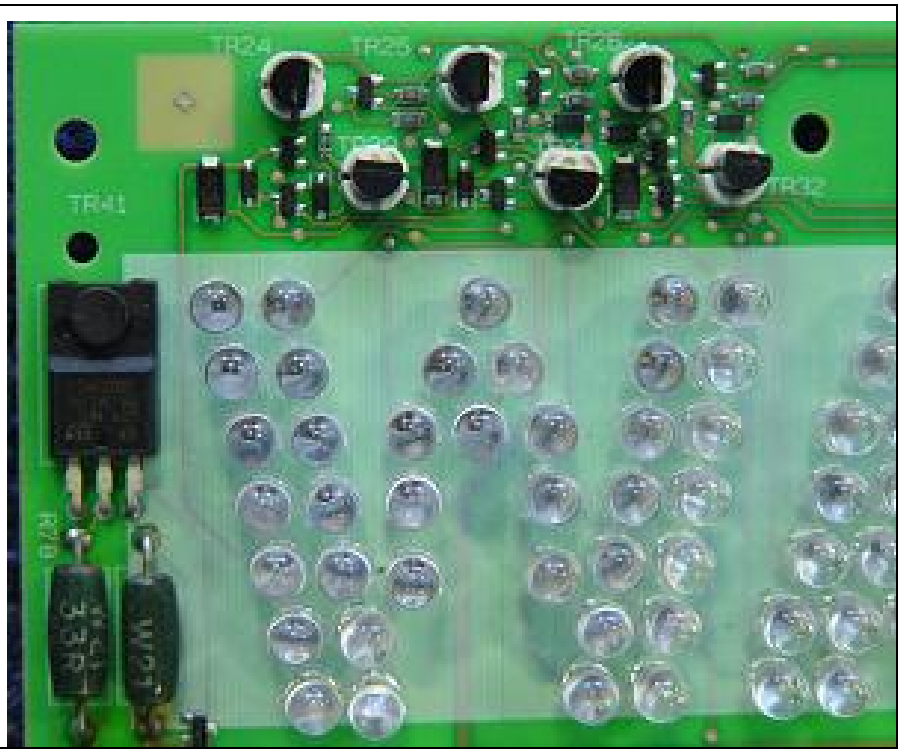
Part Number	Description	Hal. only	LED only	CLS (ELV)	CLS only
667/2/30200/201	200 mm Amber Lens	6			
667/2/30200/202	200 mm Green Lens	6			
667/1/30200/300	200 mm Clear Lens		6		
667/1/31500/300	200mm Clear Lens for CLS			6	6
667/1/30200/310	Lens Retaining Ring		6		6
667/2/31501/000	CLS Retaining Clip				6
667/1/30200/400	200 mm Red Standing Man Lens	6			
667/1/30200/402	200 mm Green Walking Man Lens	6			
667/1/30200/403	200 mm Amber Cycle Lens	6			
667/1/30200/404	200 mm Green Cycle Lens	6			
667/1/30200/405	Red Standing Man Lens LED		6		
667/1/30200/406	Green Walking Man Lens LED		6		
667/1/30200/407	Amber Cycle Lens LED		6		
667/1/30200/408	Green Cycle Lens LED		6		
667/1/30200/409	Amber Man LED		6		
667/2/30074/101	Arrow Mask matt black finish				
667/1/30200/399	Red Equestrian (Lamp) Lens	6			
667/1/30200/398	Green Equestrian (Lamp) Lens	6			
667/1/30200/397	Clear Equestrian (LED) Lens		6		
667/1/31500/396	200mm Bus (CLS) Lens			6	6
667/1/31500/397	200mm Red Equestrian (CLS) Lens			6	6
667/1/31500/405	200mm Red Man (CLS) Lens			6	6
667/1/31500/406	200mm Green Man (CLS) Lens			6	6
667/1/31500/407	200mm Amber Cycle (CLS) Lens			6	6
667/1/31500/408	200mm Green (CLS) Lens			6	6
667/1/31500/409	200mm Amber Man Standing (CLS) Lens			6	6
667/2/30052/002	Sacrificial toothed Cap				
667/2/30052/004	Sacrificial smooth Cap				
667/1/30200/104	Bracket to head fixing kit				
667/2/30070/001	1 aspect bracket				
667/2/30070/002	2 aspect bracket				
667/2/30070/003	3 aspect bracket				
667/2/30070/004	4 aspect bracket				
667/1/02442/ETC	Extension bracket				
667/1/30200/806	Single Body Four In-line (no doors)				
667/1/30200/805	Single Body Side Mounted (no door)				
667/1/30200/808	Single body Four In-line Reg Sign (no doors)				

Part Number	Description	Hal. only	LED only	CLS (ELV)	CLS only
667/1/30200/807	Single Body Side Mounted Reg Sign (no doors)				
667/1/30200/058	Side mounting and AGD bracket				
667/4/00977/000	Transformer	6			
667/1/30194/001	Linear PSU Assembly		6		
667/7/30632/000	Transformer for LED (NLM)		6		
667/1/02293/001	Regulatory Sign – Internal illumination assembly				
667/1/30200/411	NRT Reg Sign & Door				
667/1/30200/412	NLT Reg Sign & Door				
667/1/30200/413	Except Buses Reg Sign & Door				
667/1/30200/414	Mandatory Arrow Reg Sign & Door				
667/1/30200/415	NUT Reg Sign & Door				
667/1/30200/416	No Entry Reg Sign & Door				
667/1/30200/417	Mandatory Cycle Reg Sign & Door				
667/1/30200/418	Buses Only Reg Sign & Door				
667/1/30200/419	Cycles Only Reg Sign & Door				
667/1/30200/420	Taxis Only Reg Sign & Door				
667/1/30200/421	Except Cycles Reg Sign & Door				
667/1/30200/422	Except Buses & Taxis Reg Sign & Door				
667/1/30200/423	Except Buses Cycle & Access Reg Sign & Door				
667/1/30200/424	NUT Reg Sign & Door (for export)				
667/1/30200/425	Except Trams Reg Sign & Door				
667/1/30200/426	Except Buses and Cycles (Text) & Door				
667/1/30200/427	Except Buses, Taxis and Cycles (Text) & Door				
667/1/30200/428	Except Service Vehicles (Text) & Door				
667/1/30200/429	Mandatory Bus Only (Graphic) & Door				
667/1/30200/430	Except Mobility Scooters (Text) & Door				
667/1/30200/040	Primary hood kits				
667/1/30200/041	Secondary hood kits				
667/1/30200/061	Ped hood kits				
667/1/30200/042	2 in line backing boards				
667/1/30200/043	3 in line backing boards				
667/1/30200/044	4 in line backing boards				
667/1/30200/045	1 at side backing boards				
667/1/30200/046	2 at side backing boards				
667/1/30077/000	Main body to side box conduit kit				
667/2/30078/000	Side to side mounting plate				

Part Number	Description	Hal. only	LED only	CLS (ELV)	CLS only
999/4/44188/000	M4 x 10 mm S/S screws Pan head Pozidriv PLAS-TECH 25 Screws to fix transformer/PSU assembly.				
999/4/44189/000	S/S hex head Pozidriv M5 x 12 mm screws for fixing - 1. Backing board 2. End cap 3. Reflector/lens holder to door.				
Seal (Black expanded EPD foam 7 mm x 5 mm x 1110 mm)	Seal between body and door				
Seal (Black expanded EPD foam 4 mm x 4 mm x 220 mm)	Seal end cap to body				
Seal (Black neoprene ring 5 mm dia x 140 mm)	Seal between bodies				
Seal (Black neoprene ring 3 mm dia x 659 mm)	Seal between lens and reflector	6			
Seal (Black neoprene ring 3 mm dia x 669 mm)	Seal between lens and door				
S/S self tap screw pan head M5 x 45 mm	To fix front edge of one body to next				
M5 x 15mm S/S Hex head bolt	To secure Side to Side plate to front edges of two main bodies				
M5 Nut S/S	Used with M5 x 15 mm bolts				
M5 Washer S/S	Used with M5 x 15 mm bolts				
M5 x 12 mm S/S screws PLAS-TECH 25	To secure Side to Side plate across back of two main bodies				
S/S screws PLAS-TECH 25 3 mm x 10 mm pan head Pozi	Fixing lamp socket to lamp holder	6			
HEYCO 066 6013	Fir-tree clips 14.98 long (fixing hood to aspect door)				
518/4/98068/000	Fuse Ceramic 20 x 5 1A 240v				6
667/2/10094/000	Anti-Rotate Rod for Signal Poles				
999/4/44316/000	Washer Nordlock M10 Stainless Steel A4				
667/2/22895/000	Square Washer Stainless Steel (used in conjunction with Nordlock above				

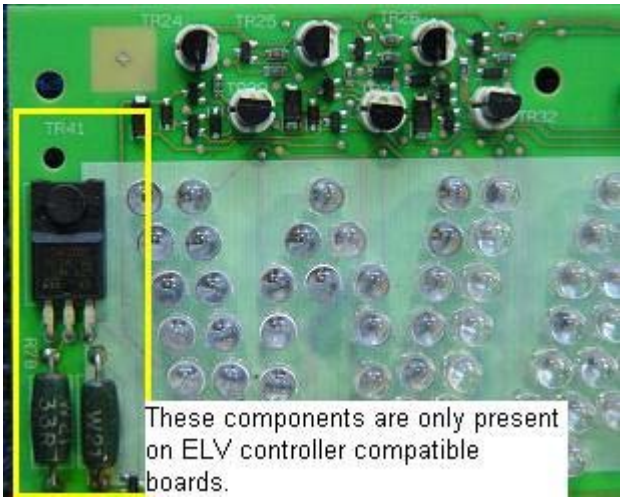
Part Number	Description	Hal. only	LED only	CLS (ELV)	CLS only
667/1/31505/000	Helios Fixing Upgrade kit (used on earlier versions of signals refer to Appendix D four guidance on determining signal version)				

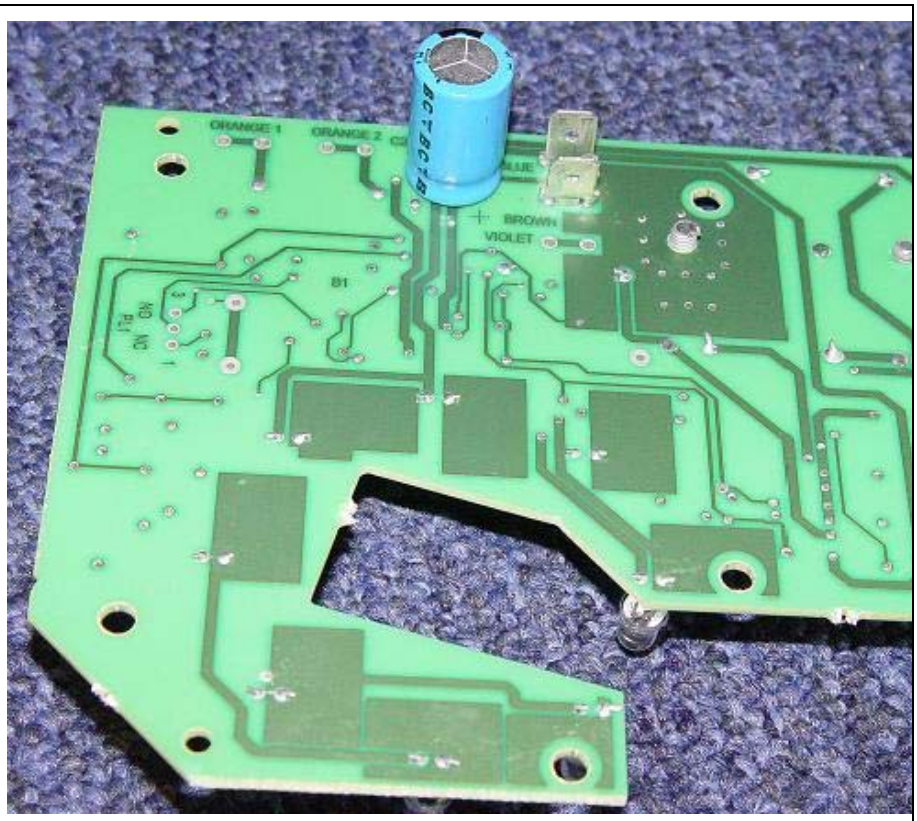
APPENDIX C - Visual Identification of ELV Compatible PCB's

LED WAIT Identification: Components to left hand side of "W" as shown in this photograph indicate that the unit is ELV compliant	

PCB Assembly Issue 667/1/30211 Issue 4onwards.

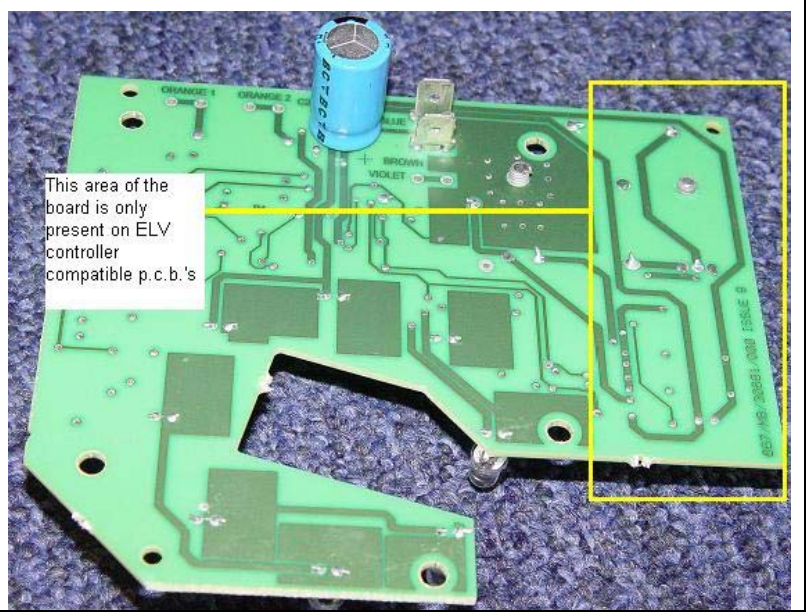
The issue number is the last two digits on the serial number label.

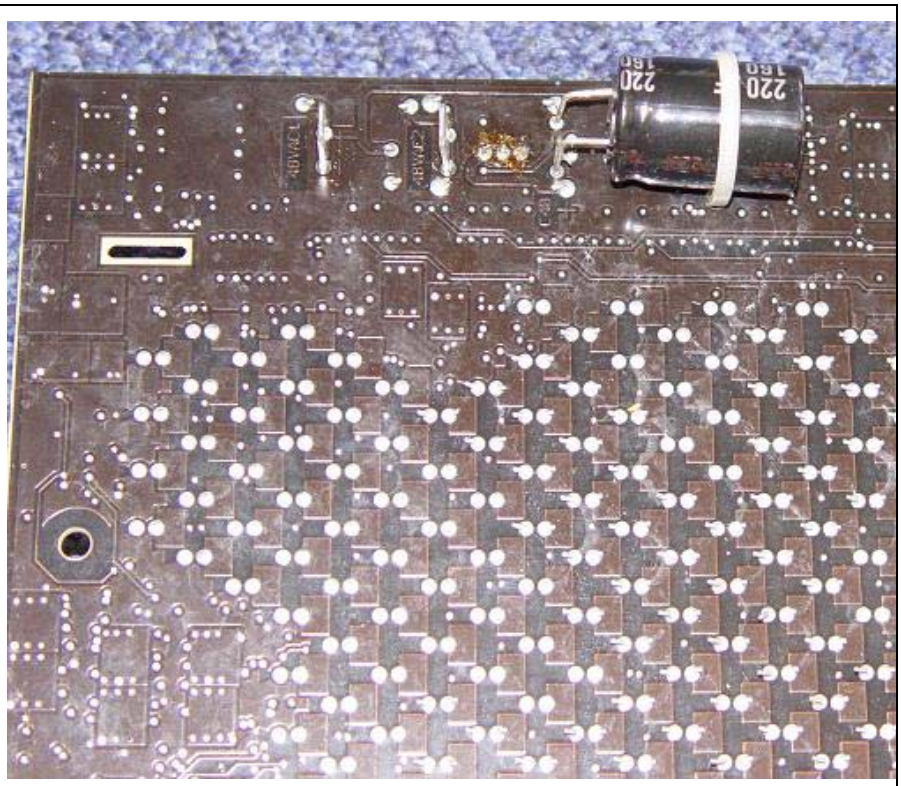


CALL DEMAND Identification: Additional capacitor on the rear of the p.c.b. Indicates that this board is ELV compliant.	

PCB Assembly Number 667/1/30680 Issue 3 onwards.

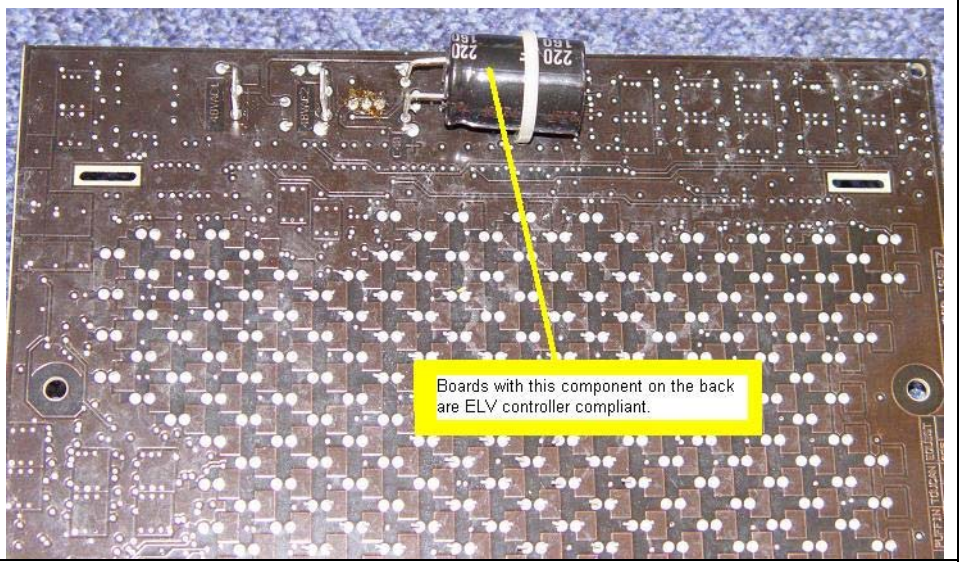
The issue number is the last two digits on the serial number label.



NEARSIDE ASPECT Identification: Capacitor on the rear of the board indicates that this board is ELV compliant.	

PCB Assembly Number 667/1/30695 Issue 9 onwards.

The issue number is the last two digits on the serial number label.



APPENDIX D - Helios Signal Head Screw Fixing Procedure

D.1 Introduction

The tightening of the single fixing between the bracket and the signal end caps is of crucial importance to the security of the signal and in the following appendix we cover four specific topics associated with this.

1) The correct method of tightening the bolts / end-cap fixings: These parts can be damaged by over tightening or vehicle impact. Even if the damage is not immediately apparent it may reduce the life expectancy of the signal heads. If the parts are not assembled with sufficient torque then the head may become loose breaking the mountings and potentially even fall off the post.
2) Inspection of signal head fittings: It is an essential of part of any periodic inspection to check the fixings that secure the signal to the pole and more specifically the fixings that secure the brackets to the signal head and in these sections we describe the recommendations for doing this.
3) The different types of fixings that have been used: As part of continuous improvement processes later signal products have updated parts in this area and care needs to be taken to ensure the correct bolt is used with the correct fittings. In the following sections we will inform you on how to identify compatible parts.
4) Where upgrades are recommended: We also recommend upgrades to existing installations under specific circumstances and in the following sections we will outline when and how this should be done.

Tools and Consumables Required

1. 8 to 60 Newton metres torque wrench (calibrated) (Halfords item code 200238-0)
2. 8mm 3/8” drive hex bit (Halfords item code 168039-0)
3. Thule 6 metre securing straps (Halfords item code 144139-0)

D.2 Tightening Procedure

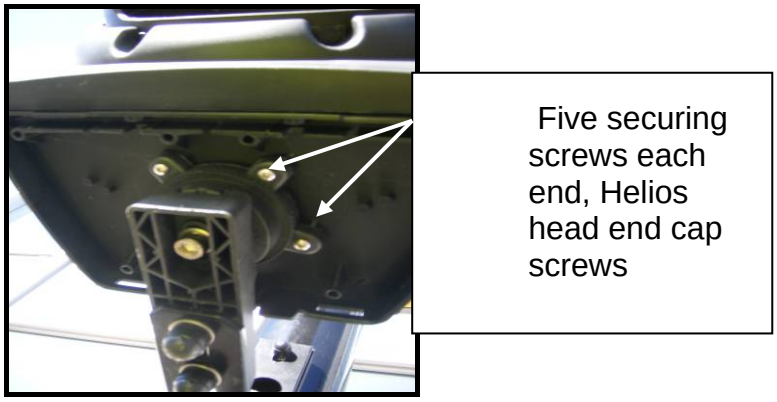
Refer to drawing number 667/GL/30200/000 (which can be found later in this section)

Ensure that the mating parts of the sacrificial bracket are joined (i.e. toothed parts engaged) and the whole bracket has engaged in its position correctly. Tighten the securing bolt using a torque wrench set to 20 Newton Metres.

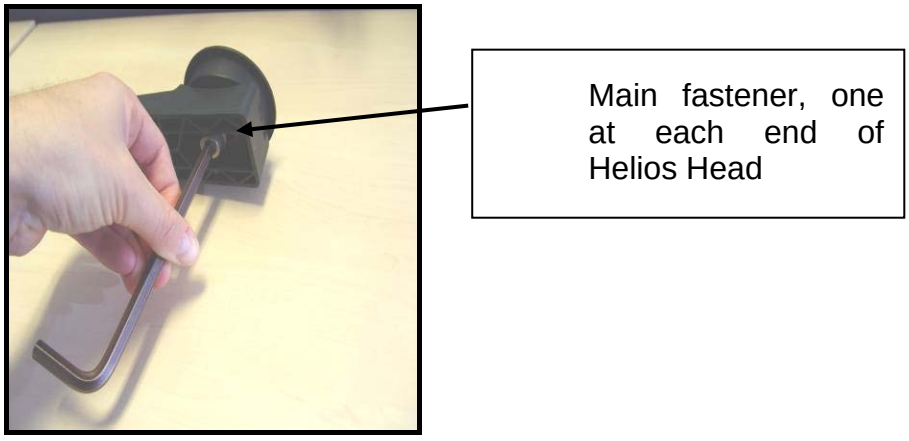
NB If they are excessively loose or turn continuously (fail to tighten) then the cap will need replacing.

D.3 Inspection Procedure

With reference to the figure immediately below, inspect the end cap fasteners on both ends of the Helios head. Determine if the securing screws are tight. The screw should be seated firmly in position, securing the bracket/head correctly. There should be no evidence that the screws have been over tightened, for example the threads should not have been stripped out of the screw hole. If screws found to be loose tighten appropriately and annotate on a Periodic Inspection report sheet.



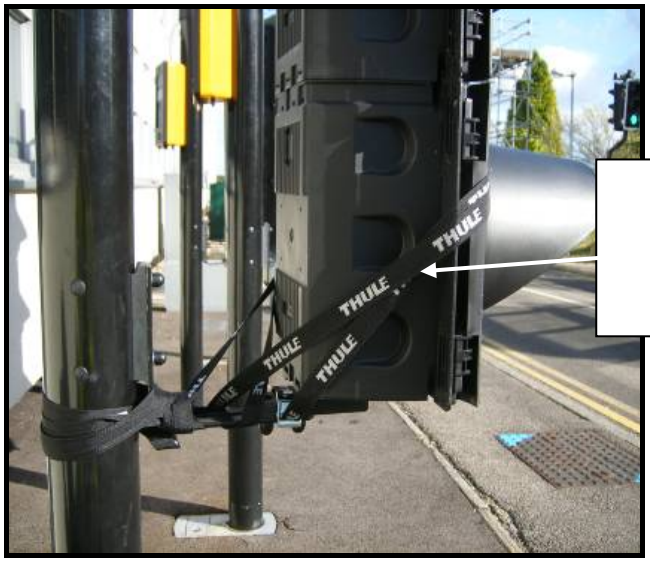
2. Inspect the Helios head main fasteners (see below). Determine if the fasteners are loose or if spring washers are fitted. If spring washers are fitted complete procedure detailed below (see also section D.5 Upgrades). If spring washers are not fitted check tightness of screw bolt using torque wrench set to 20NM, if there is a requirement for tightening, annotate this requirement on a Periodic Inspection report.



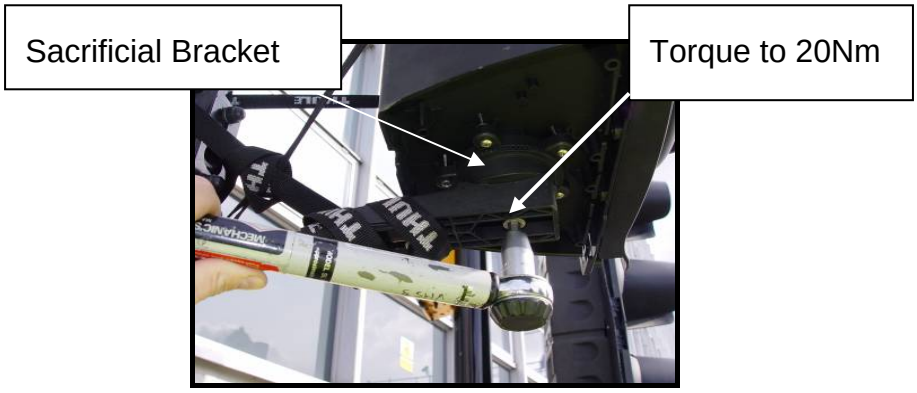
Important Note, Where / If necessary the main fasteners should be removed or replaced using the recommended process / method noted below.

1. Replacement of Main bolts and or washers.

   a. Secure the signal head bracket which requires the fasteners replaced, using a 6 metre Thule securing strap, as shown in the figures immediately below for the appropriate brackets (top and bottom).



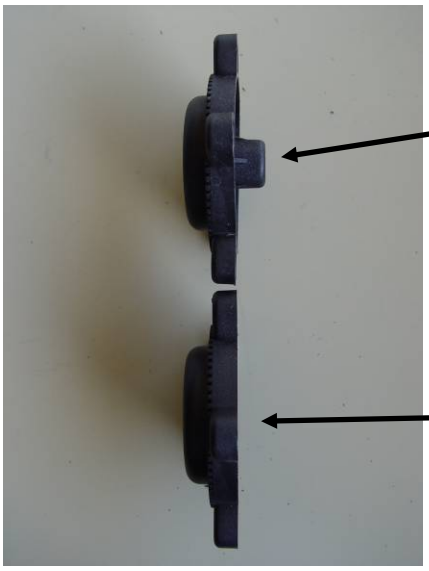
b. Replace the bolt, and washer with items appropriate to the type of end cap in use (see section D.4 for details). Ensure that the mating parts of the sacrificial bracket are joined and the whole bracket has engaged in its position correctly. Tighten the securing bolt using a torque wrench set to 20 Newton Metres.



c. Remove the 6 metre Thule securing straps. Make a general inspection of the signal head to ensure that it is secure.

D.4 Different Fixings In the field

As a process of continuous improvement designs change and where possible compatibility is maintained between old and new parts, however when this is not possible, the compatibility issues that you must consider are noted in the documentation. What follows is a description of the two types of end cap that you may come across on product in the field, how to identify which are which and the compatibility issues that must be considered.



Currently supplied end cap with longer boss, with which a longer bolt is used

End Caps viewed from inside t

Previously supplied end cap with shorter boss for which a shorter bolt is required.

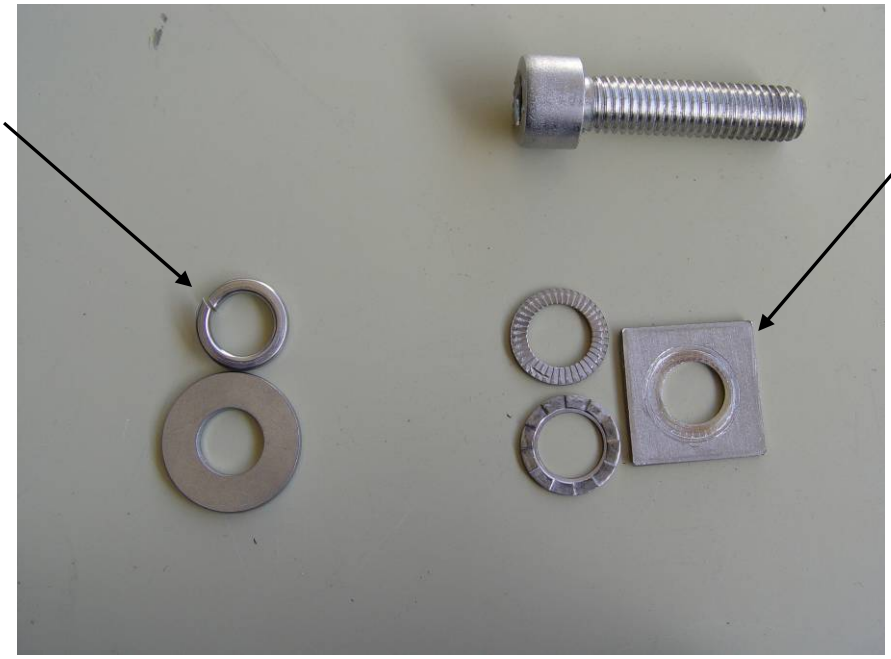
For the shorter bossed end cap use a 32mm bolt (part number 999/4/44333/532 or kit 667/1/31505/000, which includes nordlock washers). To aid identification of the correct 32mm length bolt (as supplied by Siemens) is coloured black.

For the longer bossed end cap use a 40mm bolt (part number 999/4/44333/040).

The only washers that are now recommended for use on the signal head end fixings are a Nordlock washer (which consists of two parts) and this must also be combined with a square washer.

The following are two different views of a Nordlock washer pair, it should be noted that the two surfaces with the larger serrations are the two surfaces that should be mated together when the washer is assembled.

The combination of a plain washer, and spring washer, is no longer recommended and should be upgraded. Please refer to the following section.

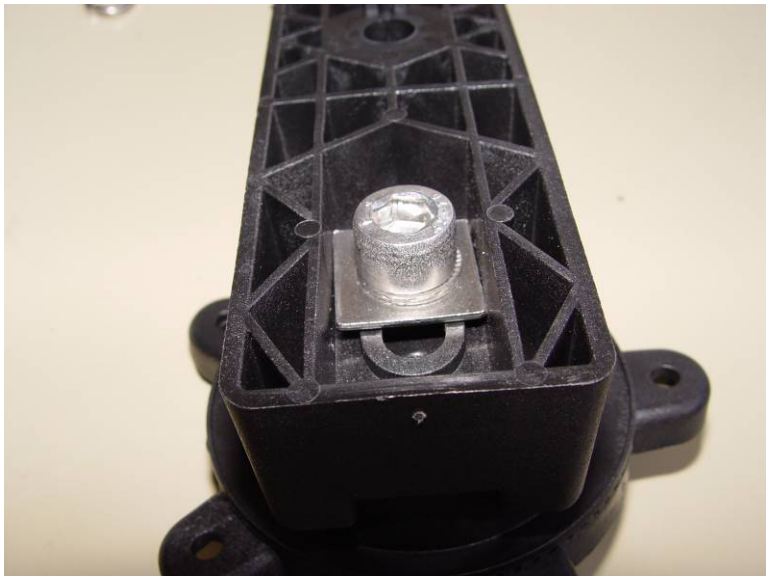


The fixing curre shipped is a Nordlock wash and a square washer. Howev other earlier fix may be found i field using plair washers, and / combination of internal or exte serrated shake washers or spr washers.

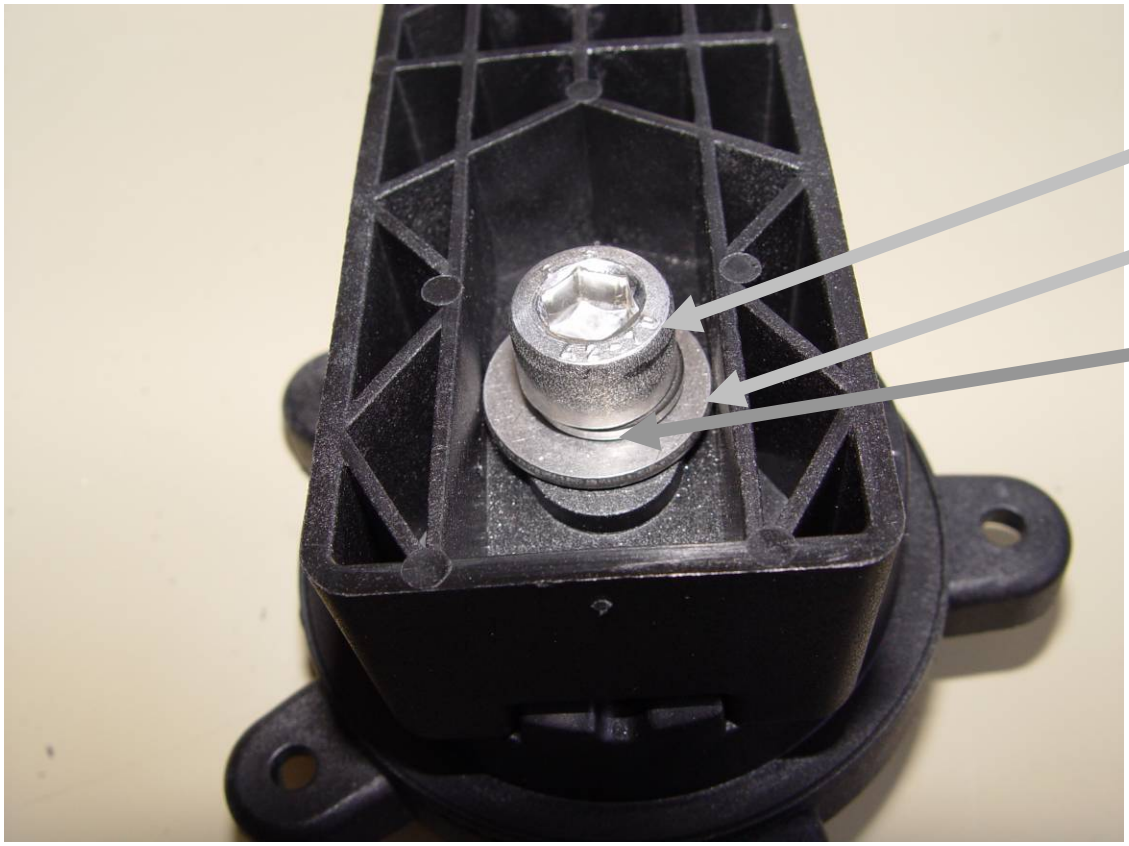
D.5 Upgrades Recommended

If the fixing present is not a Nordlock then upgrading to Nordlock should be considered, and the upgrade to Nordlock is recommended where either the washer combination includes a spring washer or where after having been tightened and torqued to the recommended 20 Nm a second inspection within 6 months has shown the fixing to have loosened again.

To determine if the present fixing has a spring washer, check as follows. Examine the fixings if a square washer can be seen then it will be Nordlock.



If a plain rounder washer can be seen then a spring washer may also be included (generally with the external or internal serrated washers, the serrations will be visible). Below you will see a plain and spring washer combination, and it is this combination that we at present recommend upgrading to Nordlock washers (using the method as described in section D.2 to remove and replace the bolts and washers)



Determining If a Sp
is fitted:

In this picture you c

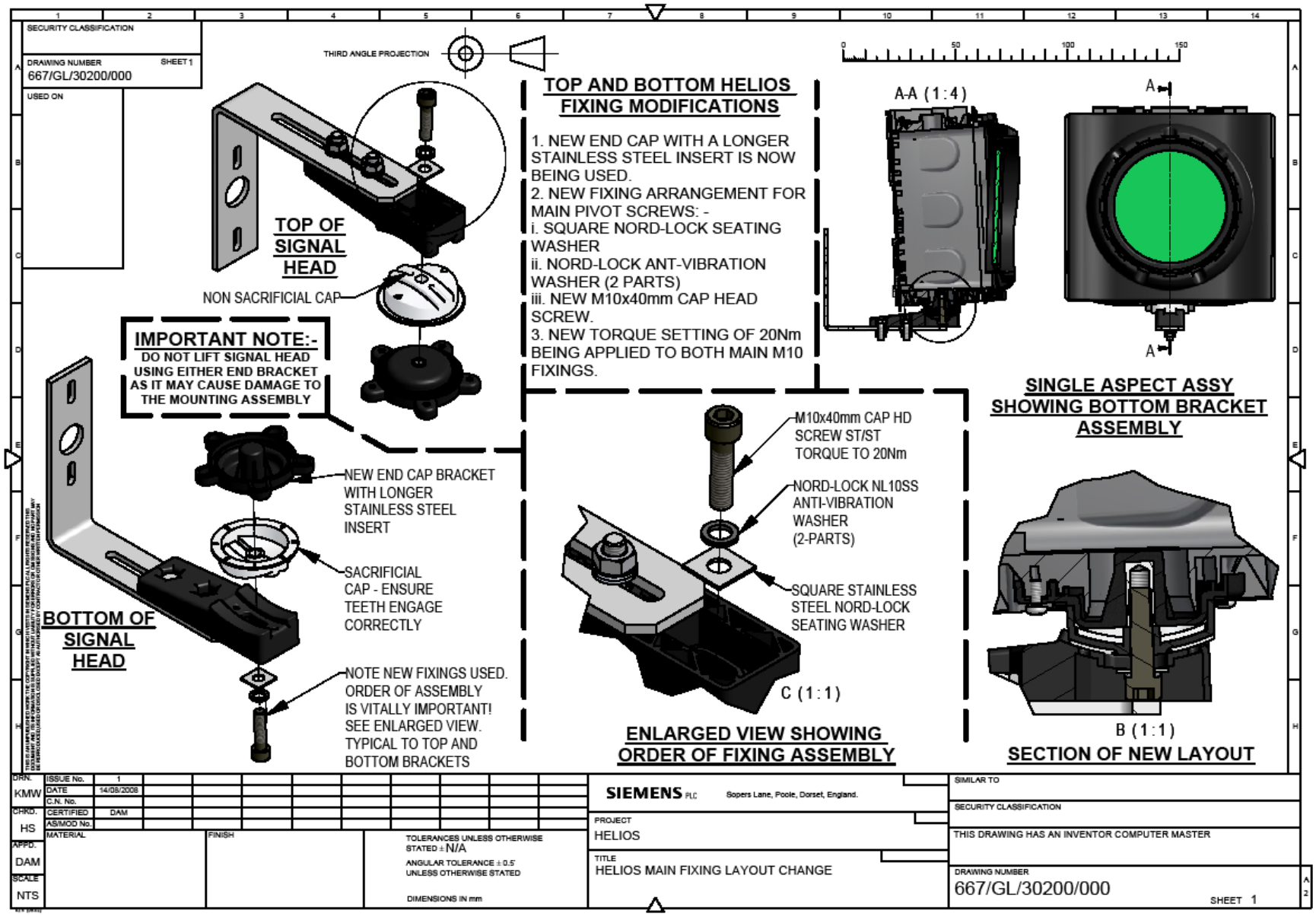
1) The bolt hea

2) The plain wa

3) Another sma
diameter wa
between wh
signs of beir
i.e. it is smo
appearance
spring wash
should be re
using the No
replacement
667/1/31505
are other sh
washers tha
fitted both in
external toot
serrated. at
there is no
recommend
replace thes

Note / Warning

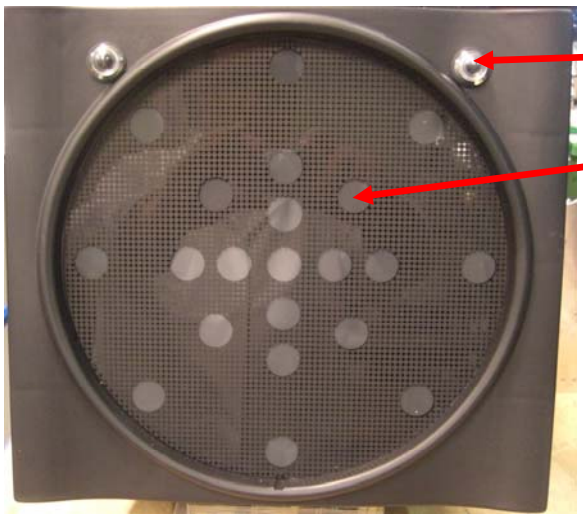
Due to a difference in boss lengths on end caps between those signals shipped with Nordlocks already fitted (see section D.4 on compatibility of fixings). The upgrade kit as noted above must be used on the older signals as it included the correct length bolt. The correct bolt length for the shorter boss is 32mm and in the replacement kit these a coloured black to assist in identifying the correct ones to use.


SECURITY CLASSIFICATION
DRAWING NUMBER 667/GL/30200/000
SHEET 1
USED ON
THIRD ANGLE PROJECTION
TOP AND BOTTOM HELIOS FIXING MODIFICATIONS
1. NEW END CAP WITH A LONGER STAINLESS STEEL INSERT IS NOW BEING USED.
2. NEW FIXING ARRANGEMENT FOR MAIN PIVOT SCREWS: -
i. SQUARE NORD-LOCK SEATING WASHER
ii. NORD-LOCK ANT-VIBRATION WASHER (2 PARTS)
iii. NEW M10x40mm CAP HEAD SCREW.
3. NEW TORQUE SETTING OF 20Nm BEING APPLIED TO BOTH MAIN M10 FIXINGS.
A-A (1:4)
A
A
SINGLE ASPECT ASSY SHOWING BOTTOM BRACKET ASSEMBLY
TOP OF SIGNAL HEAD
NON SACRIFICIAL CAP
IMPORTANT NOTE:-
DO NOT LIFT SIGNAL HEAD USING EITHER END BRACKET AS IT MAY CAUSE DAMAGE TO THE MOUNTING ASSEMBLY
NEW END CAP BRACKET WITH LONGER STAINLESS STEEL INSERT
SACRIFICIAL CAP - ENSURE TEETH ENGAGE CORRECTLY
BOTTOM OF SIGNAL HEAD
NOTE NEW FIXINGS USED. ORDER OF ASSEMBLY IS VITALLY IMPORTANT! SEE ENLARGED VIEW. TYPICAL TO TOP AND BOTTOM BRACKETS
M10x40mm CAP HD SCREW ST/ST TORQUE TO 20Nm
NORD-LOCK NL10SS ANTI-VIBRATION WASHER (2-PARTS)
SQUARE STAINLESS STEEL NORD-LOCK SEATING WASHER
C (1:1)
ENLARGED VIEW SHOWING ORDER OF FIXING ASSEMBLY
B (1:1)
SECTION OF NEW LAYOUT
DRN. KMW
ISSUE No. 1
DATE 14/08/2008
C.N. No.
CHKD. HS
CERTIFIED DAM
AS/MOD No.
APPD. DAM
SCALE NTS
MATERIAL
FINISH
TOLERANCES UNLESS OTHERWISE STATED ± N/A
ANGULAR TOLERANCE ± 0.5° UNLESS OTHERWISE STATED
DIMENSIONS IN mm
SIEMENS PLC Sopers Lane, Poole, Dorset, England.
PROJECT HELIOS
TITLE HELIOS MAIN FIXING LAYOUT CHANGE
SIMILAR TO
SECURITY CLASSIFICATION
THIS DRAWING HAS AN INVENTOR COMPUTER MASTER
DRAWING NUMBER 667/GL/30200/000
SHEET 1
A2

Appendix E- TRAM Indicator Cable connections and Aspects

The Tram indicator unit is similar to the Regulatory Signs as the main optical assembly remains in the Lantern when the door assembly is opened.

The appearance of the Tram indicator is shown below.



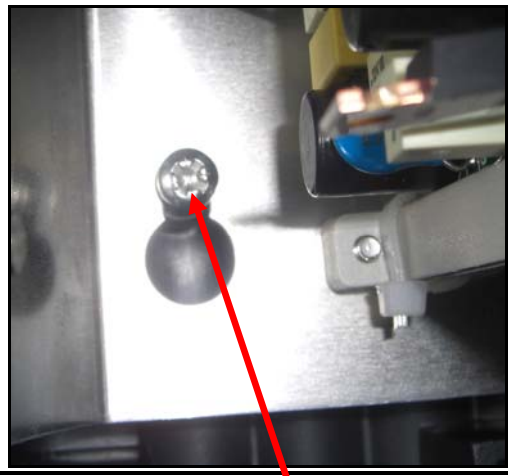
Optional demand indicator

Tram indicator door assembly showing dots

Warning! When the Door assembly is open and the unit powered, the dots will be very bright, do NOT look directly into them.

To remove the optical assembly from the body a long pozidrive screwdriver is required.

Suitable tool:- Buck and Hickman 215093 - 250mm long shaft and a PZ2 tip.



STOP

Do not under any circumstances undo these nuts (One of four shown).

Access Area for screws at the rear of the body. These allow removal of the optic assembly from the body.

Screw at rear of unit in Keyhole slot.

To remove the indicator undo the 4 screws in the back of the body, through the slots provided, by giving them 2 turns anticlockwise with the long handled pozidrive screwdriver. The whole assembly should then be pushed upwards in the keyhole slots until the assembly can be partially withdrawn.

The multi-way cable must now be unplugged (and the optional demand indicator cable if fitted) so that the unit can be totally withdrawn from the body. The multi-way connector is a tight fit and the operative must be stable and secure prior to attempting removal. With the Tram indicator removed there will be full access to the back of the assembly body. This will enable access to the cable entry gland position for both installation and maintenance.

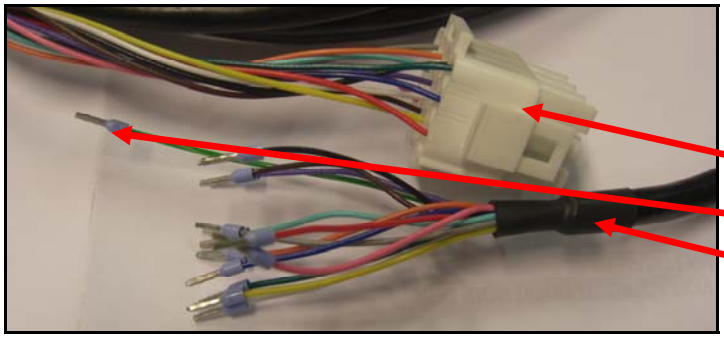
The optical assembly must NOT be further dismantled and care should be taken not to damage the unit or to get any contaminants on the lenses.

The optic has a multi-way cable that needs to be terminated (usually to the pole cap assembly) in the normal way. The Cable Colour code is shown in Table 1 below. It should be noted that not all aspects (dots) are used in every installation and the controller specification should be studied to enable the correct aspects to be connected. Unused connections should be terminated in spare terminal block positions to prevent accidental contact with other wiring.

Table 1

Wiring Table For Helios ELV Tram Indicator cable 667/1/33159/000			
Connector Pin number PL1	Wire Colour		Wire Colour at Free end
1	Red		Aspect B Stop / Give way (Prepare to Stop)
2	Blue		Aspect B Return
3	Green		Aspect A Stop
4	Yellow		Aspect A Return
5	White		Aspect C Proceed Ahead
6	Black		Aspect C Return
7	Brown		Aspect F Central Dot (signal on)
8	Violet		Aspect F Return
9	Orange		Aspect E Diagonal Left
10	Pink		Aspect E Return
11	Turquoise		Aspect D Diagonal Right
12	Grey		Aspect D Return
No Pin	Green/Yellow		Screen connect to Earth point

This cable is supplied at a standard length of 3.5 metres. To maintain the screening connection and the cable terminating crimp pins this cable must not be shortened. Spare cable should be “lost” inside the pole or inside the assembly body.

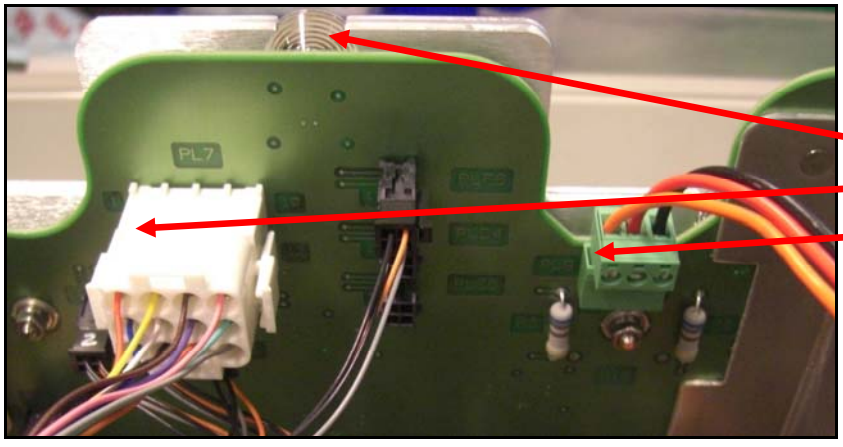


Tram indicator cable. Colour code shown in Table 1 above.

Multi way plug

Termination crimp pins

Screen sleeve

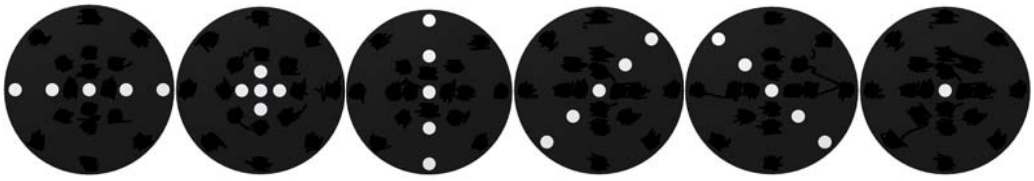


Rear view of “dot” Lens.

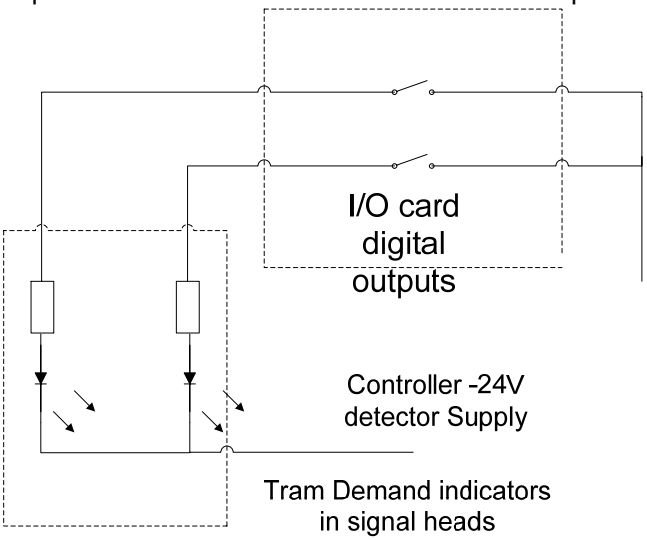
Multi-way Tram indicator plug

Optional demand indicator plug

Below is a representation of the Aspects. It should be noted that Aspect F is normally always lit whilst the optic is in use. Thus it is shown lit in all the diagrams.



Where more than 3 aspects are driven special conditioning and drives for the Tram Aspects will be required. In these circumstances the controller Specification and Special instructions must be consulted.



Controller detector supply Common

Connection	Colour
Common -Ve	Black
Demand 1 +	Red
Demand 2 +	Orange

General arrangement for demand Indicators used on Helios ELV Tram signal heads. Caution must be taken to ensure the **correct polarity** is observed. The Demand indicators must be driven from the **-24V** detector supply on an ELV controller.

ELV TRAM indicator 6 aspect internal assembly	667/1/33157/006
TRAM Lens /Door without hood	667/1/31500/432
TRAM Lens /Door with Demand indicator without hood	667/1/31500/434
ELV TRAM Dem Cable	667/1/33170/000
Cable Loom Assembly	667/1/33159/000

Part numbers for Tram indicator assemblies

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