PETS-2 Crossing Telephone System

Quickfix Installation Guide

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WARNINGS

HAZARDOUS VOLTAGES

PETS 2 is to be powered from a telecommunications quality dc supply, nominally 24V dc or 50V dc (subject to internal configuration). The 50V dc supply must be treated as a hazard



as it exceeds the levels specified within the 'Low Voltage Directive'. Furthermore, whilst 24V dc supplies are considered to be 'ELV', PETS 2 incorporates a dc-dc converter that produces a 60V dc level, and can additionally generate telephone ringing voltages in the order 120V peak to peak. The circuits within PETS 2 must be treated as hazardous under all

circumstances, and the power supply (mains and battery) should be isolated before removal of equipment covers.

PROTECTIVE EARTH

The PETS 2 equipment must be earthed, but care must be taken to use a 'local' earth for



safety reasons. In most instances the equipment case will be bonded to 'Telecommunications earth' by connecting the 'green/yellow' lead from a tag on the outside of the case to the earth point within the Junction Box'. The earth point within the Junction Box will be bonded to an existing 'Telecommunication earth', or to a dedicated ground spike. In some instances the equipment may be fixed to a signalling frame, where the case

will be bonded by connection of the 'green/yellow' wire to the appropriate earth of the signalling equipment. Under these circumstances the 'Telecommunications Earth' within the Junction Box, and the earth reference to the power supply/ electronics will be kept isolated from the signalling earth.

CAUTIONS

INSTALLATION INSTRUCTIONS

This handbook is supplied with the Signal Box and Crossing PETS 2 equipment, there are



minor differences between these two items and it is important to identify each item before starting the installation. This handbook is intended to cover the installation process only. A competent design authority must undertake a survey of the installation, and shall then provide additional installation instructions relating to the specific configuration, wiring arrangement and location of equipment. A separate PETS 2 'Handbook for Design,

Installation and Maintenance' (WEL part G42279) is available for use by competent designers and maintainers.

TELECOMMUNICATIONS SAFETY



PETS 2 has isolated barriers to BS6301 on each circuit for connection to a transmission system, or to a physical circuit between the Signalbox and



remote location. Within the Junction Box, Block 3 is dedicated to these isolated circuits. The 25 way 'D' connector and its 10 pair cable are also dedicated to these isolated circuits. DO NOT make connections between Block 3 circuits and other circuits of the PETS 2 system.

The Telecommunications safety earth is relevant to the local PETS 2 Telecommunication circuits (Crossing Telephones), the PETS 2 power supplies and electronics. The 'isolated' circuits to remote sites via physical circuits or transmission equipment are always isolated from the local earth (this is to ensure that ground potential differences do not cause circulating currents)

WIRING



Telephone circuits carry low level signals, of a few hundred milli-volts. These circuits are particularly susceptible to external electro-magnetic influences. It is always advisable to avoid routing these cables near to power cables or other potential interference sources. Provision is made within the Junction Box for earthing of the cables, do so at the Junction Box end only. Ensure there is a low impedance path to earth from the Telecommunications Earth

within the Junction Box.

LIGHTNING

A risk of lightning damage exists if the cables are external to a building, and/or the physical



circuit is overhead. If the risk of lightning strike is low then QDF protection magazines should be fitted within the Junction Box, on the circuits at risk. If the risk is high (cables conveyed overhead, or track-side) then separate lightning protection should be installed, using a separate protection unit and a dedicated earth point.

STATIC SENSITIVE PRECAUTIONS



PETS 2 plug in modules use components that are static sensitive. When removing/ fitting plug in cards ensure that an anti-static wrist strap is worn. The strap should be connected to the earth stud provided and marked with the 'Static Sensitive Handling' label.



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1. INTRODUCTION

This handbook is provided to enable the basic installation of PETS 2 Signal Box and PETS 2 Crossing equipment. Basic installation covers the standard installation format - a single Signalbox unit connected to a single Level Crossing unit. A competent design authority must undertake a survey of the site prior to installation, and shall then provide any additional installation instructions relating to the specific configuration, wiring arrangement and location of equipment. A separate PETS 2 'Handbook for Design, Installation and Maintenance' (WEL part G42279) is available for use by competent designers and maintainers.

This equipment conforms to an updated design, and most installers may be familiar with the original PETS equipment. The most significant differences between PETS (original) and PETS 2 are listed, as follows:

- External appearance new colour and styling of front panels
- Front panels use labels, and buttons on the Signal Box unit use the label as a 'membrane' cover.
- External connections are now made through QDF IDC connectors within an external junction box. Connections from the PETS 2 equipment are made through 'D' connectors to 2 metre connecting leads, terminated on the QDF blocks.
- Power supply design accepts higher voltage transient levels and the unit includes EMC filtering.
- Card extractors included and stowed within.
- Card frame removal from case improved.
- Case to wall fixing improved by rear 'bumps'.
- Integration of power supply/ battery charger alarms
- Minor software changes.
- Equipment Alarm 7 segment display and 'Interrogate' button of the Signal Box unit may be replaced by a remote display unit.

2. EQUIPMENT SUPPLIED

The Signal Box unit may be recognised by the four 'CALL' buttons on its front panel, red in colour. The Level crossing unit may be distinguished by the large number of LED apertures on its front panel. There are two line cards supplied with the Level Crossing unit, whereas Signal Box units are supplied with one line card only.

The Junction box supplied with the Signal Box unit includes a pre-wired alarm sounder.

2.1 Signal Box Kit (WEL part A35154)

Upon opening the packaging, the contents should be checked to the following list:



1 off PETS 2 Signal Box unit, with card removal 'pullers' (inside)	
1 off Junction Box, complete with pre-wired connectorised leads.	
1 off Installation Handbook (this book)	
1 off 9 pin female 'D' connector (for the power supply lead)	
1 off Earth lead - M6 ring terminal and 2 metre green/ yellow wire	

2.2 Level Crossing Kit (WEL part A35155)

Upon opening the packaging, the contents should be checked to the following list:

1 off PETS 2 Level Crossing unit, with card removal 'pullers' (inside)	
1 off Junction Box, complete with pre-wired connectorised leads.	
1 off Installation Handbook (this book)	
1 off 9 pin female 'D' connector (for the power supply lead)	
1 off Earth lead - M6 ring terminal and 2 metre green/ yellow wire	

3. ACCESSORIES

The following table provides information on the standard accessories available for use with PETS 2:

WEL Part No.	Signal Box	Crossing	Description			
A33838		Note 2	Line Card - for local telephones. This Line card			
			is identical to the original PETS Line card; and			
			is also used on PETS 2 but within the Level			
			Crossing unit only.			
A35173	Note 1		Line Card - Signalbox PETS2. This item is			
			different to the original due to a modified CALL			
			button arrangement.			
A34566 (new	Note 3	Note 3	Power supply and battery charger, batteries			
version from Q3			not included.			
'98 - A35168)						
A35166	Note 4	NA	Remote Alarm Display Kit			
A35169	Note 5	Note 5	Battery Set (4 off) 6Ahr			
A35170	Note 5	Note 5	Battery Set (4 off) 12Ahr			
A35171	Note 6	Note 6	Battery Set (4 off) 17Ahr			
A35172	Note 7	Note 7	Firmware Upgrade (when applicable)			
G42279	Note 8	Note 8	'Handbook for Design, Installation and			
			Maintenance'			
G42279CD	Note 8	Note 8	CD version of 'Handbook for Design,			

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WEL Part No. Signal Box Crossing		Crossing	Description	
			Installation and Maintenance'	

Note 1 : The Signal Box unit is supplied with one Line Card. Additional line cards may be required in the Signal Box Unit when working in Paired mode.

Note 2 : The Level crossing unit is supplied with two line cards; additional cards will be required for paired mode or when four telephones have to be provided at a particular crossing.

Note 3 : This is a wall mounted power supply and charger with integral shelves for the batteries. The size of battery, and the number of PETS 2 units attached to each charger will be determined by system design for the appropriate backup period. From Q3 1998 an upgraded version of the charger will be available, providing enhanced monitoring and integration with the PETS 2 equipment. The original Power Supply and Charger can be used to power PETS 2.

Note 4 : The Remote Alarm Display Kit may be fitted at the Signalbox end and comprises a small plastic enclosure with a seven segment display and 'Interrogate' button. This small enclosure is to be fixed onto a wall or concentrator. The kit includes a ribbon connector assembly, to be installed between the internal CPU and termination cards. Also supplied is a 15 metre lead wired to the Remote Alarm Display. The other end of the cable is to be terminated in the PETS 2 Junction Box.

Note 5 : Battery sets of 6Ahr or 12Ahr for use with the original and new version Power Supply and Battery Charger.

Note 6 : The 17Ahr battery option is available with the new Power Supply and Battery Charger, only.

Note 7 : Please check with WEL Sales Office before ordering. When firmware upgrades are available, this code number relates to a single EPROM - the same EPROM is used within the Signal Box and the Level Crossing units.

Note 8 : This handbook is intended for System Designers and Maintainers and covers a wide range of topics not covered by this handbook. The document is available ring bound or on CD in Adobe Acrobat .PDF format.

4. OUTLINE DESCRIPTION

This is not a detailed description of the PETS 2 equipment, merely an outline account aimed at describing the features relevant to installation. Installers who are familiar with the original PETS equipment should read section 4.1 carefully.



The design of PETS 2 equipment is almost identical at the Signal Box and Level Crossing ends. The major difference is the front panel arrangement. The Level Crossing Unit has a metal front panel with formed edges fitting over the case. A label covers all of the front panel apertures, and the arrangement (in conjunction with an internal rubber seal) ensures that the case is sealed to IP55. The Signal Box unit has a front panel fitting to the internal case edges. The front panel is a label membrane laminated to an aluminium back plate. The Signal Box unit is not sealed to IP55; and other sealing arrangements, normally associated with the Level crossing Unit, are omitted.

4.1 PETS 2 - Enhancements

The following list of bullet points should be noted by readers already familiar with the installation of the original PETS equipment:

- Cable terminations are no longer to terminal blocks within. All terminations are available through connectors on the side of PETS 2. A separate Junction Box complete with prewired leads is supplied; QDF IDC connectors are used throughout.
- The equipment case has improved wall fixing, with 'bumps' to allow for irregular wall surfaces and to recess the fixing screw head.
- The Euroframe is easier to remove from the case.
- The auxiliary 12V dc supply is now independently fused.
- Card pullers are provided with each unit and are stowed behind the front panel.
- A stud for an 'Anti-static wrist strap' is now provided behind each front panel.
- The firmware has been revised to incorporate some improvements and some new features.
- Barrier signalling on Line 1 has been re-allocated to bi-directional signalling of a mains/ charger fail alarm.
- Barrier Signalling Inputs and Outputs are no longer 'volt free'. To simplify the wiring these circuits are referenced to the secondary supply (+12V & 0V) of PETS 2.
- Front panels have been totally re-styled
- Earthing and EMC arrangements have been improved.
- Power supply has upgraded components allowing operation with higher input voltage surges and transients.
- CPU card has been modified to allow remote seven segment display and maintain the display within the Signal Box Unit.
- Front panel master alarms (previously referenced as Alarm 1 & Alarm 2) are now termed Minor and Major. Positions on the front panel have been transposed.
- Firmware is different between new and old PETS equipment; but original PETS firmware is also available with the new features.



4.2 Signal Box Unit



Figure 1 - Photograph of Signalbox Unit

The Signal Box unit is designed for wall mounting, although it may sometimes be adapted for rack mounting. The casing of Signal Box and Level Crossing units are identical, but the front panel arrangements are entirely different.

On the Signal Box units, the front panel comprises a membrane / label front laminated onto a 4mm aluminium plate. This is fitted 'inside' the case edges, allowing the panel to be recessed more than the Level crossing arrangement. This recessing enables the buttons (on the cards within) to be activated through the front membrane. This presents a smooth, wipe clean front panel, with the advantage of having 'real' push buttons. Unused button locations are protected by a supporting disk behind the membrane, at each unused location (Lines 2,3 & 4 on a standard Signal Box Unit).

4.2.1 Item 1 - Connection Plate

Shown in the photograph (Fig. 1) without connectors and Connector Retention bracket. All of the connections to PETS are made through plug/ socket 'D' type connectors to the left hand side of the unit. On the Signal Box unit, these connectors are not environmentally sealed. However, the connector arrangements are novel as their right angle shells are used



to direct the cables to the wall. Right angle connector cannot use the more conventional screw lock arrangement, and these connectors (all three) are retained in place by means of a Connector Retention bracket. The connectors have the following functions:

- 1. 9 pin 'D' connector power supply input and mains/charger alarm.
- 2. 25 pin 'D' connector isolated telecommunications interfaces, i.e. transmission circuits.
- 3. 50 pin 'D' connector all other PETS circuits, e.g. crossing telephones, etc.

Connectors 2 & 3 above are pre-wired to a Junction Box.

4.2.2 Item 2 - Connector Retention bracket

The photograph (Fig. 1) does not show this bracket. This bracket fits onto the Connector Plate using the middle two screws, the upper screw is identified in the photograph. This retention bracket has a series of forms to apply pressure at the rear of each 'D' connector shell. As the bracket is fixed into position, by tightening the two fixing screws, the 'D' connectors become locked and fully mated.

4.2.3 Item 3 - Frame retention bolts

Shown in the photograph (Fig. 1) are the two left side retention bolts. The entire inner card frame is removable from the outer casing. The two M6 hexagonal bolt heads at each side secure the frame within the case. These bolts must not be removed unless the procedure described in section 5.4 is followed.

4.2.4 Item 4 - Right hand access plate

The right hand access plate is equipped with a series of 20mm knockouts. This plate is not usually required for standard installations. It has been retained in PETS 2 to allow access to the right hand side of the frame and the motherboard. The right hand side of the case, and this plate, cannot be seen in the photograph (Fig. 1)

4.2.5 Item 5 - Front panel

The front panel has a polyester membrane laminated onto an aluminium backing plate. This Polyester membrane also serves as a label to identify the functions of the PETS 2 Signal Box Unit. The front panel is secured to the internal card frame by means of the four button head Allen Key M4 screws at the front. The following aspects of the front panel are of particular note:

a) CALL buttons - The Signal Box Unit is equipped with a single Line Card, as standard. The remaining CALL buttons allocated to Lines 2,3 & 4 have a blanking plug fitted to the inside of the front panel, thereby preventing movement of the Polyester membrane in the unused locations. The blanking plug will be removed in case of installing additional line cards.



- b) Line Identification window Each Crossing will be geographically identified by a label to be inserted from the top edge of the front panel, between the front Polyester membrane and the aluminium panel. When the front panel is fitted it is not possible to access the opening for this label, hence the label is securely located after installation. The black PVC tape to the rear of the front panel is to prevent the LED's behind from showing through the paper insert labels. This is particularly relevant to Line 1, to prevent illumination if a mains/ charger alarm occurs. When 'Barrier Alarm signalling' is required on Line Cards 2, 3 or 4; puncture a hole in the PVC tape to selectively allow operation of the required LED's. In the photgraph the paper label inserts can be seen behind each window.
- c) Service Provider Identification window an additional window is provided, with access from the right hand edge of the front panel. This window will be used to identify the Service Provider and fault notification telephone number.

Front panel layout is broken into functional sections, and the Fault Codes are identified with a brief explanation to allow the Signaller to give a detailed indication of the fault status when reporting problems. The INTERROGATE (a large lower case 'i' legend) button allows the unit to be interrogated and the seven segment display to cycle through each alarm in the event of multiple alarms. Other LED indicators are visible through the front panel, allowing the general status of PETS 2 to be visible.

4.3 Level Crossing Unit



Figure 2 - Photograph of Level Crossing Unit



The Level Crossing Unit outer case is identical to that of the Signal Box unit. The case was originally intended to be compatible with the space taken by two BR Signalling Relays, although normal practise is to install the unit within an equipment room. PETS 2 retains the environment capability to be installed into a signalling or telecommunications track-side location cabinet. The Level Crossing Unit is sealed to IP55, and internal PCB's (of both units) are conformally coated for added environmental protection. The front panel arrangement of the Level Crossing Unit is entirely different to that of the Signal Box Unit. The Level Crossing Unit is entirely different to that of the Signal Box Unit. The Level Crossing Unit has no front panel operated buttons, and the panel is placed further forward to allow dust & water seal to be made between the front panel and the case. All of the internal indicators are visible through a label fitted to the front panel. Other features are detailed below:

4.3.1 Item 1 - Connection Plate

This is identified at the left side of the photograph (Fig.2). The arrangement of connectors is identical to that of the Signal Box, please refer to 4.2.1. However, the following important differences should be noted:

- a) A foam rubber seal is provided around the 'D' connectors of the Level crossing Unit to maintain the IP55 seal
- b) The Junction box of the Level Crossing Unit is different to that of the Signal Box, for instance there is no alarm sounder in the Level Crossing Unit Junction Box.

NOTE: It is recommended that Silica Gel bags are inserted in the Level Crossing Unit case and inside the Junction Box as a precaution against the effects of condensation.

4.3.2 Item 2 - Connector Retention bracket

The Connector rention bracket is not shown in this photograph (Fig. 2), but it is visible in Fig 5. The bracket fits onto the Connector Plate using the middle two screws. This retention bracket has a series of forms to apply pressure at the rear of each 'D' connector shell. As the bracket is fixed into position, by tightening the two fixing screws, the 'D' connectors become locked and fully mated.

4.3.3 Item 3 - Frame retention bolts

Two of the rention bolts can be seen on the left side, the lower bolt is identified on the photograph (Fig. 2), and this has a special significance as the main earth point for the case. The entire inner card frame is removable from the outer casing. The two M6 hexagonal bolt heads at each side secure the frame within the case. These bolts must not be removed unless following the procedure described in section 5.4



4.3.4 Item 4 - Right hand access plate

Photograph (Fig. 2) does not show the right hand side of the case, consequently Item 4 is not identified. The right hand access plate is equipped with a series of 20mm knockouts. This plate is not usually required for standard installations. It has been retained in PETS 2 to allow access to the right hand side of the frame and the motherboard.

4.3.5 Item 5 - Front panel

On the Level Crossing Unit the front panel takes the form of a metal tray with turned up edges. Around the inside edge a strip of foam rubber sealing material is fitted, when the front panel is fitted the seal is compressed by the edge of the case.

The front panel label allows all of the LED's within to be visible, including the seven segment Fault Code display. It is necessary to remove the front panel, by means of the four fixing screws, to access the 'Interrogate' button to review multiple alarms. Removal of the front panel will reveal the RESET button (immediately beneath the seven segment display). The Interrogate button is beneath the RESET button.



4.4 Inside the case

Figure 3 - Photograph of the Card frame



4.4.1 Item 6 - Transmission Card (A33837)

There is a single Transmission Card in each frame, located to the left hand side. The card is identical at Signalbox and at the Level Crossing.

4.4.2 Item 7 - Line cards (A33838 - Level Crossing), (A35173 - Signalbox)

In the Signalbox unit a single line card is provided in the Line 1 position. The card is electrically identical to those of the Level Crossing, the only difference being the button arrangement for use with the membrane overlay.

In the Level Crossing units, Line1 and Line 2 cards are fitted.

4.4.3 Item 8 - CPU card (A33839 - Level Crossing), (A35176 - Signalbox)

The Signalbox card is electrically identical to those of the Level Crossing, the only difference being the button arrangement for use with the membrane overlay. This card houses the seven segment display and the system firmware. The same version of firmware can be used throughout. DIL switches on the motherboard distinguish the Signalbox and Level Crossing units, additionally establishing whether the hardware is original PETS or PETS 2.

4.4.4 Item 9 - Power Supply & Ringer Card (A33898)

There is a single Power Supply & Ringer Card in each frame, located to the right hand side. The card is identical at Signalbox and at the Level Crossing.

4.4.5 Item 10 - Fuseholder +12V (fused)

Located to the left hand side this fuse protects the external +12V from the frame.

4.4.6 Item 11 - Earth stud for wrist strap

Connection point for wrist straps

4.4.7 Item 12 - Card Pullers

A pair of card pullers are located to the right hand side. This is a convenient stowage location. The large ring is to be pulled by the fore-finger of each hand. The bent end of each puller is located in the upper or lower holes at the front edge of each card. See photograph



(Fig. 3) for the removal technique. NOTE: Power Supply & Ringer cards have a lower hole only, i.e. only one puller to be used on this card.



Figure 4 - Card removal technique

IMPORTANT: All cards, except the Power Supply & Ringer Card, have an upper and lower hole at the front allowing both pullers to be used. The Power Supply & Ringer card has a lower hole only and the single puller must be angled to be central - providing an even removal force. Each card is polarised. Ensure that cards are inserted in the correct slot. Forcing a card into the wrong slot may result in damage to the connector pins.

4.4.8 Item 13 - Voltage selection link (refer to section 5.8.1)

Factory set for 50V operation. Item 13 is located on the motherboard, to the right hand side of the Power Supply and Ringer Card.





5. INSTALLATION

The instructions given in this section will assume that the installation is of the most common type; a single AHB crossing with just one telephone either side of the line, and a single PETS Signal Box Unit, manually controlled. It is assumed that the installation has been surveyed by a competent and trained technician, and that the installer has been given any additional or contrary instructions along with the equipment and this manual.

Before attending site produce the paper labels for insertion within the windows of the Signalbox Unit. To receive the latest version of the label pro-forma in WORD 6 format, send an e-mail request to :

wel.eng@dial.pipex.com [please give your name and company - we will also send update bulletins by return]

5.1 Installation tools

The following tools will be required:

- 1. Montdragon (formerly ADC) QDF IDC tool.
- 2. 10mm ring spanner
- 3. 2mm Allen Key
- 4. Soldering Iron (15watt fine tip, recommended), and self fluxed solder.
- 5. Screwdrivers, flat blade various sizes.
- 6. Scissors (for labels)
- 7. Wire cutters
- 8. Pen knife

5.2 Unpacking the equipment

Check the external packing labels before proceeding to distinguish the Signal Box Unit from the Level Crossing Unit. Use a small pen knife to open the carton sealing tape, do not cut into the carton more than 5mm, to avoid damage to the equipment within. Remove the contents.

The packing carton is made of cardboard and may be re-cycled.

5.3 Preparation

Decide where the unit is to be installed, normally this will be onto a wall. The Signal Box Unit must be installed in a clean and dry location, away from windows that may be left open, and away from sources of steam or condensation. From the Junction Box, 2 metre cables with connectors at the ends are to be mated with the PETS unit, into the left hand side connector plate. The cables are normally kept in place within trunking or by cable clips.

5.4 Wall fixing

It is necessary to disassemble the PETS 2 unit, the procedure is identical for Signal Box and for the Level Crossing Units:



- a) Remove the front panel by undoing the four M4 fixing screws on the front panel, using the 2mm Allen key. Keep the screws and washers together, washers are essential to prevent damage to the Level Crossing front panel membrane/ label. The front panel will just lift off (the Signal Box unit may require gentle prising to remove the front panel from the inner edges of the case). An earth lead will be attached to the Level Crossing front panel and its push fit spade can be pulled away from the tag of the panel.
- b) Remove the Card Pullers from their stowage location on the right hand side.





A) Remove all eight M3 slotted head screws (and their washers) from the left hand Connection Plate and the Connector Retention bracket. This plate may be lifted away from the 'D' connectors. **IMPORTANT: THIS** PLATE MUST BE **REMOVED BEFORE** ATTEMPTING TO PULL THE CARD FRAME FROM THE

CASE. DO NOT UNDO THE FRONT FOUR M6 SLOTTED SCREWS .

b) Loosen the four M6 hexagonal head bolts (two each side of the case), using the 10mm ring spanner. Remove the lower bolts each side, then support the frame with one hand whilst removing the two upper bolts. Pull the frame (still attached to the left and right brackets) out of the case. Remove the remaining earth tag, at the rear of the case, to allow the frame to be separated from the case. Carefully stow all of the removed items.







a) The case is now free of electronic parts. Hold the case in the desired installation position, making sure it is level. IMPORTANT - THE REAR FIXING HOLES ARE NOT SYMETRICAL. THE WIDELEY SPACED HOLES SHOULD BE TOWARDS THE TOP. THE EARTH TAG TO THE RIGHT. Mark the four fixing positions through the holes (in the centre of the back panel 'bumps'). Use the appropriate wall most fixing method, e.g. drill and plug for

masonry/ brick, make a pilot hole for wood and bolt/ or drill and tap for metal. When installing the Level Crossing Unit in damp locations a rubber washer will be required either at the back or directly under the screw head (a steel washer is recommended between the screw head and the rubber washer); this arrangement is needed to prevent water ingress through the fixing holes. IMPORTANT - CHECK TO ENSURE THE SCREW HEAD PROTRUDES NO MORE THAN 4mm ABOVE THE BACK PANEL OF THE CASE.

a) It may be useful to temporarily fix with just two screws whilst trunking is fitted down the left hand side. The cables from each connector exit towards the wall; by fitting the Connection locations Plate the may identified. be Plastic trunking is recommended. with an end cap fitted to top of the the trunking, the trunking cover can be modified



with cable cutters to create an entry point for each of the cables.

- b) Check to ensure the case is installed level and is firmly fixed to the wall, the fixing screws should be fully tightened.
- c) Peel of the pieces of black PVC tape from the inside base of the case. Each piece should be placed centrally over the wall fixing screw head. This will ensure the wall fixing is sealed and is a precautionary measure to prevent contact with the rear of the frame motherboard (when re-installed).
- d) Fit the Junction Box to the wall. Its position may be determined by the trunking and the 2 metre cable length. At this stage a temporary fix is recommended.



- e) If the left hand Connector Plate has been temporarily fitted remove it now!
- f) Install the frame back into the case (now fixed to the wall). Re-fit the internal earth tag. Loose fit the M6 hexagonal bolts (starting with the top ones), fit the bottom left hand bolt but this will be kept loose for now. Support the frame with one hand whilst re-assembling. Make sure the frame is correctly positioned and tighten the three hexagonal bolts (excluding the lower left side bolt - the earth bolt). Refer to section 5.5 before continuing.



a) Re-fit the Connection Plate. making sure to keep the rubber gasket between the plate and the outside of the case. NOTE -THIS GASKET IS A NECESSARY THE PART OF SIGNAL BOX UNIT SINCE IT **ESTABLISHES** DISTANCE THE BETWEEN CONNECTOR PLATE AND

CONNECTOR PCB. THE THICK FOAM RUBBER GASKET INSIDE THE CONNECTOR PLATE WELL, IS ONLY USED ON THE LEVEL CROSSING UNIT. Fit six M3 screws and washers exclude the middle two required by the Connector Retention bracket.

- b) Refer to section 5.8.1 and wire the 9 pin 'D' connector onto an appropriate length of 0.6mm telephone cable, to reach the power supply unit. NOTE: 0.5/0.6mm
- a) Install each connector and position the cables in a gentle bend to the cable trunking, or position into cable clips on the wall. Making sure that the connectors are fully mated and aligned. Now fit the Connector Retention bracket and its fixing screws. Tighten the screws.
- b) Now that the cables are positioned correctly in the trunking (or clipped to the wall), Junction Box the can be properly fixed to the wall.

Wall fixing is now complete.

5.5 Safety Earth





The lower left hand M6 hexagonal bolt is to be used for earthing the case. An earth label is fixed to the case at the side of this bolt. This bolt was fitted with a crinkle washer, and this washer is essential for integrity of the earth connection.

At this stage it is important to determine the system earthing policy. The case earth is intended for the safety of the user and must be connected to the same earth point as the surrounding electrical equipment. This will generally be the same point as the telecommunications earth point within the Junction Box, and the green /yellow wire along with the earth bond connection will be made together. In some instances, the case may be fixed to a signalling frame and the integrity of earthing on the frame must not be affected. Under these circumstances the PETS 2 unit (case) will be bonded to the local safety earth of the signalling equipment, and telecommunications earth will be kept isolated.

The hexagonal bolt and ring terminal are fitted with the following items and order:

M6 bolt - split washer plain washer - ring terminal - crinkle washer - case

The green/ yellow wire is to be threaded through the Connector retention bracket and then into the trunking.

In most applications the

green/ yellow wire will be terminated to the earth point in the Junction Box.

The 'Telecommunications Earth' inside the Junction Box will be terminated to an appropriate earth point in accordance with normal telecommunications practise.

5.6 Configuration

This handbook will not describe the various configurations that are possible; in this section the factory set configuration will be described. Any changes to configuration should be detailed in the Installation Method Statement to be provided by the System design Authority. Both units are factory configured to the most common applications, factory set configurations are summarised over:





5.6.1 Signal Box Unit

- a) Operating mode is ALL CALL this means that Line 1 of the Signal Box Unit is mapped to Lines 1, 2, 3 & 4 of the Level Crossing Unit (Lines 3 & 4 are not normally equipped on the Level Crossing Unit).
- b) Call Signalling Relay contact this controls a remote call sounder and is set to operate continuously.
- c) Line circuit type this is set to operate with a control telephone on Line 1
- d) Software the Signal Box unit is obviously configured to operate with Signal Box software.
- e) Signal Box Location the unit is factory set as the terminating Signal Box, i.e. not as an intermediate as part of a block switching scheme.
- f) Transmission circuits set for four wire operation
- g) Data Update Intrude tone is applied and manual operation of the INTERROGATE button is required to update status.

5.6.2 Level crossing Unit

- a) Intrusion tone on I/O change set to disabled (NB In the original PETS this function was enabled. The previous use of I/O was for barrier signalling. Now that the I/O is used for equipment alarms it is not imperative that the Signaller is alerted during a call).
- b) Second Caller when a second telephone is operated (paired or solo), the second caller will receive ring tone until the Signaller answer that call.
- c) Each of the equipped line cards are configured for 2 wire Loop Disconnect calling.
- d) Transmission circuit set to four wire operation



5.7 Front panels

After re-installing the card frame into the case; fitting the Connection Plate, connectors and Connector Retention bracket, the front panels may be replaced.

5.7.1 Signalbox front panel



Figure 5 - Signalbox Unit showing label inserts

The panel is to be labelled with the following information:

- 1. Maintainer contact information for fault reporting by the Signaller.
- 2. Location (in terminology used by the Signaller) of each Level Crossing supported by the unit.
- 3. Identification of unused Line circuits (labelled 'Not Equipped')

A Word 6 document file is available with the labels already formatted and sized. This file is available upon request by return of e-mail. Please request along with your name, position, company and phone number to the following address:

wel.eng@dial.pipex.com

Simply open the file in Word 6 and enter the correct details in the pre-formatted areas. Print onto good quality Laser/ inkjet paper and cut-out the labels using scissors and the black outline borders as a guide. Insert the labels into the 'pockets' at the top and right



hand edges of the Signalbox front panel. The 'window' should be centrally positioned around the label.

The Signalbox front panel does not require a separate earth wire since it makes continuous metallic contact with the card frame.

Buttons on the Line cards for the CALL function, and on the CPU card for the INTERROGATE function, are equipped with a screw on cap. The shaft of the push button switch is threaded, and the round cap is also threaded. The height may be varied by threading the cap onto the push button. This is factory adjusted and sealed. The cap is adjusted so that is pushes the membrane slightly forward, it should be possible to 'feel' the cap pressing from behind central to the CALL button membrane area. The CALL button should have a tactile feel, a 'click' should be felt. The cap is screwed up or down to adjust this action. IMPORTANT - THE THREAD IS SEALED AT FACTORY. IF THE SEAL IS BROKEN - TOO MUCH ADJUSTMENT OUT WILL CAUSE THE MEMBRANE TO PERMANENTLY OPERATE THE BUTTON, TOO LITTLE AND IT MAY NOT BE POSSIBLE TO OPERATE THE BUTTON.

The panel is fixed by four M4 Allen key button head screws.

5.7.2 Level Crossing Unit front panel

An earth tag is provided on this panel, ensure that it is reconnected when the panel is fitted.

This panel has a foam rubber gasket seal around its inside edge. The panel is fixed by four M4 Allen key button head screws, ensure that washers are used under the screw heads to avoid distortion of the label.



Figure 6 - Level crossing

Unit (front panel earth tag)



5.8 Wiring

The Junction boxes at each end have similar wiring, the following tables summarise the situation:



Figure 7 - Internal layout - Junction Box



BLOCK 1 - the lower block, nearest the earth bar (pair1 to the left)

Pair	Signalbox	Level Crossing	Description	
1a	Anode	NA -Note 1	Remote Alarm Display - 7 segment display	
	com.			
1b	cathode D	NA	Remote Alarm Display - 7 segment display	
2a	cathode C	NA	Remote Alarm Display - 7 segment display	
2b	cathode G	NA	Remote Alarm Display - 7 segment display	
3a	cathode B	NA	Remote Alarm Display - 7 segment display	
3b	cathode E	NA	Remote Alarm Display - 7 segment display	
4a	cathode F	NA	Remote Alarm Display - 7 segment display	
4b	cathode A	NA	Remote Alarm Display - 7 segment display	
5a	Button a	NA	Remote Alarm Display - Interrogate button contact, normally open.	
5b	Button b	NA	Remote Alarm Display - Interrogate button contact, normally open.	
6a	Input 1 &	Input 1 &	Line 1 control input. Connect to 0V to enable, shared	
	Mains/	Mains/ charger	with power supply and charger alarm. This input is	
	charger	alarm	forced to 0V by a parallel connected opto-transistor	
	alarm		when a mains/ charger alarm is activated.	
6b	Input 2	Input 2	Line 2 control input (Line 2 card is required for this to	
			function). Connect this input to 0V to become active.	
/a	Input 3	Input 3 Line 3 control input (Line 3 card is required for this to		
76		function). Connect this input to UV to become active.		
70	input 4	Input 4	Line 4 control input (Line 4 card is required for this to	
80	121/	12)/ fuend	+12V fused Use this terminal for a local auxiliary supply. This	
oa	fuend	+12V Tused, Use this terminal for a local auxiliary supply. This		
	$100 \text{m}\Delta$		Note: the output relay can be commoned to 0V by	
	limit		altering a link on the termination PCB	
8b	0V	0V	Use this 0V to activate Inputs 2 to 4	
9a	Output 1	Output 1	This output is allocated to the mains/ charger alarm	
0u	Capaci	Calpar	from the distant site, and is configured to provide	
			+12V fused on this terminal in the event of mains/	
			charger alarm arriving from the other site.	
9b	Output 2	Output 2	Line 2 control output, will become +12V when Input 2	
	·	•	at the other site is connected to 0V. Line 2 cards	
			must be fitted at each site.	
10a	Output 3	Output 3	Line 3 control output, will become +12V when Input 3	
			at the other site is connected to 0V. Line 3 cards	
			must be fitted at each site.	
10b	Output 4	Output 4	Line 4 control output, will become +12V when Input 4	
			at the other site is connected to 0V. Line 4 cards	
			must be fitted at each site.	



BLOCK 2 - the middle block (pair1 to the left)

Pair	Signalbox	Level Crossing	Description		
1a	0V	0V	This is the same 0V as provided on Block 1		
1b	+12V	+12V fused,	This is the same +12V fused as provided on Block 1.		
	fused,	Tuuma limit	ine fuse for this circuit is located on the left hand		
	limit		side pracket, peneath the anti-static wrist strap		
2a	Call O/P a	NA - function is	Volt free relay contact. Operates during an incoming		
24		available, but it	call ring, either continuous through the period of		
		is unlikely to be	ringing or in sympathy with ring cadence. This relay		
		used at the	would normally switch 50V dc to operate a remote		
		crossing.	sounder.		
2b	Call O/P b	NA	Volt free relay contact, other side of 2a.		
3a	Alarm 1	Alarm 1 O/P a	MINOR alarm (non - urgent) volt free contact		
	O/P a		(normally open)		
36	Alarm 1	Alarm 1 O/P b	MINOR alarm (non - urgent) volt free contact		
10			(normally open)		
4a		Alann 2 U/P a	MAJOR alarm (urgent) volt free contact (normally		
4h	O/Fa Alarm 2	Alarm $2 O/P h$	MA IOR alarm (urgent) volt free contact (normally		
	O/P b		open). Wired to the sounder in the Signalbox JB.		
5a	Block	NA	Opto-isolated input +ve side. Apply 12V to 58V to		
	switch-out		activate Block Switch (box closed/ transfer to distant).		
	input +ve				
5b	Block	NA	Opto-isolated input -ve side. This input is isolated and		
	SWITCH-OUT		It may be activated by a voltage from the signalling		
	input -ve		Alternatively wet the onto using the 01// ±121/ fused		
			through a volt free contact of the Block Switch		
6a	ETH	ETH	Telecommunications safety earth. Local telephone		
			circuit cable screens, or earth connection when using		
			Earth Recall.		
6b	ETH	ETH	As above		
7a	Line 4 + #	Line 4 + #	short this leg to ETH for Earth Recall (ELR)		
7b	Line 4 - #	Line 4 - #			
8a	Line 3 + #	Line 3 + #	short this leg to ETH for Earth Recall (ELR)		
8b	Line 3 - #	Line 3 - #			
9a	Line 2 + #	Line 2 +	short this leg to ETH for Earth Recall (ELR)		
9b	Line 2 - #	Line 2 -			
10a	Line 1 +	Line 1 +	SB control telephone. Short this leg to ETH for (ELR)		
10b	Line 1 -	Line 1 -	SB control telephone		



= these line circuits are not equipped on standard units.

BLOCK 3 - the upper block (pair1 to the left) NOTE: CONNECTIONS TO THIS BLOCK ARE ISOLATED FROM THE REST OF THE SYSTEM - DO NOT JUMPER FROM BLOCK 3 TO THE OTHER BLOCKS.

Pair	Signa	lbox	Level Crossing		Description	
1a	NC		NC		Spare	
1b	NC		NC		Spare	
2a	NC		NC		Spare	
2b	NC		NC		Spare	
3a	T4	(P)	NA		Block switching 4 wire (intermediate SB only)	
3b	T4	(O)	NA		Block switching 4 wire (intermediate SB only)	
4a	T4	(N)	T4	(N)	Four wire transmission Rx cct. Leg a	
4b	T4	(M)	T4	(M)	Four wire transmission Rx cct. Leg b	
5a	Т3	(L)	NA		Block switching 4 wire (intermediate SB only)	
5b	Т3	(K)	NA		Block switching 4 wire (intermediate SB only)	
6a	Т3	(J)	Т3	(J)	Four wire transmission Tx cct. Leg a	
6b	Т3	(I)	T3	(I)	Four wire transmission Tx cct. Leg b	
7a	NA		NA		T2 relay 'normally closed' contact	
7b	NA		NA		T2 relay 'normally closed'contact	
8a	T2	(F)	NA		Block switching 2 wire (intermediate SB only)	
8b	T2	(E)	NA		Block switching 2 wire (intermediate SB only)	
9a	T1	(D)	NA		Block switching 2 wire (intermediate SB only)	
9b	T1	(C)	NA		Block switching 2 wire (intermediate SB only)	
10a	T1	(B)	T1	(B)	Two wire transmission cct. leg a	
10b	T1	(A)	T1	(A)	Two wire transmission cct. leg b	

5.8.1 Power supply

Power supply wiring descriptions are common to both Signal Box and level Crossing units. Power supply connections are through the 9 pin (male) 'D' connector on the left hand side of the case. The 'D' connector wiring is in accordance with the following table:

Pin	Function	Wire/ colour
1	Battery/ supply -ve (negative) -24V to 55V dc nominal	0.5mm/ 0.6mm, Pair 1a
2	NC	
3	NC	
4	NC	
5	Battery/ supply +ve	0.5mm/ 0.6mm, Pair 1b
6	Battery/ supply -ve -24V to 55V dc nominal	0.5mm/ 0.6mm, Pair 2a
7	Alarm -	0.5mm/ 0.6mm, Pair 3b
8	Alarm +	0.5mm/ 0.6mm, Pair 3a
9	Battery/ supply +ve	0.5mm/ 0.6mm, Pair 2b



Note 1: NC = Not Connected

Note 2: Pairs 1 & 2 are paralleled to provide adequate current rating, both pairs must be used.

The Signal Box and Level Crossing Units are factory configured for 50V operation (to be used with the PETS Power Supply & Battery Charger). Operation at 50V or 24V is determined by a changeable link at the lower right hand side of the back-plane motherboard, just above the screw terminals. The link is set as follows:

Link position	Voltage range (dc)	
A-B	20V to 35V	
B-C	35V to 58V	



Figure 8 - Power Supply voltage selector (applicable to SB & LC Units)

The Alarm circuit is an opto-isolated input that may be used with a voltage in the range 20V to 58V. When the input is powered, an alarm indication is raised. This input is intended for use with the PETS Power Supply and Battery Charger, and wiring instructions will accompany that unit since differences will be found between the original charger and the new model.



The 'D' connector is a solder bucket type. A small soldering iron is required to make these connections. The pin number are moulded into the plastic adjacent to each pin - look close as the number are very small.

5.8.2 Local telephone wiring (Level Crossing)

Local telephones are the crossing telephones (similar to signal Post telephones) or the Equipment Room Control Telephone. Two different types of interface may be used, a brief explanation of each is given in the following sections 5.8.2.1 & 5.8.2.2

Local telephone wiring connections are made onto QDF Block 2, pairs 7 to 10. When Earth Recall operation is used, an earth is available on both legs of pair 6 of the QDF Block 2. Please refer to Figure 7 for the layout of the QDF Blocks.

Earth Recall (ELR) is signalled by connecting ETH to Leg a (+ve) of the telephone line pair. However, ELR will not be used normally and the units are factory configured for Loop Disconnect calling. Loop Disconnect calling is preferrable as this method will operate over a single pair (ETH is not required by the telephone).

NOTE: Signal Post telephones designed for use at level crossings will normally incorporate a 'bell' capacitor, and normal installation practise will allow the circuit to be wired directly to the telephone. If 'domestic' type telephones are used in the equipment room, then a BT Master LJU is to be used to interface the telephone with the PETS2 line circuit.

IMPORTANT NOTE: If overhead circuits are to be used, or if circuits operate parallel to electrified lines, then protection magazines should be added to the QDF line circuits. In cases of high risk of lightning or induced transient, then a separate transient suppresser/ lightning arrestor should be connected to the circuit, with its own safety earth.

5.8.2.1 Loop Disconnect Calling

NOTE: The line circuits are configured to this mode at factory.

This is the normal interface to be used on Crossing Telephones. This interface has the advantage of being 2 wire (one pair). The 'protocol' is probably unique to PETS and has three phases:

- 1. Quiescent Phase (telephone handset on hook) a current of approx. 5mA flows in the pair, and through a loop in the telephone handset
- 2. Off Hook Phase current increase to >15mA
- 3. Calling Phase current reduces from >15mA to zero for a defined period.

If the current remains at zero for more than 30 seconds, an alarm is logged; indicating the possibility of an open circuit pair or vandalised handset.



Polarity is not important with this protocol. However, it is necessary to ensure that the telephone is correctly wired and a 'leakage current' resistor has to be fitted to the telephone.

5.8.2.2 Earth Recall

NOTE: The unit will require re-configuration to operate in this mode - seek instruction from the System Design Authority.

This is a possible calling mode for a control telephone (in the level crossing equipment room) connected to its own line card. Telephone line Leg a (+ve) is shorted to Earth (telecommunications earth) to signal a call. This mode supports the monitoring of leakage current, hence a resistor must be fitted across the line pair - normal inside the master LJU of that telephone.

5.8.2.3 Master Line Jack socket for control telephone

Control telephones at the Signalbox and Level Crossing will normally be connected through a standard master LJU. If ELR calling is required, then the polarity of wiring is important and the socket should be polarity tested using a Linesman's Telephone.

If an ABSENT switch is installed in the Signalbox, it will be necessary to wire the Control telephone line through a normally closed contact of the ABSENT switch, to ensure that the telephone does not ring when the box is closed. Some arrangement with automatic announcers will require the ABSENT switch to divert the line to the announcer unit.

5.8.3 Transmission Circuits

The Signalbox Unit and Level Crossing Unit have to be connected together via a transmission medium. This medium may be physical (copper) or by means of a multiplexor (D & I Mux, PCM link etc.). PETS2 may be configured for a 2 wire (one pair; bi-directional) or a 4 wire (two pair; go & return, Tx/ Rx) circuit. If the facility is available, choose a 4 wire interface since this will provide better transmission performance and will be easier to fault find if there are transmission difficulties. Use a 2 wire interface on physical circuits where pairs are in short supply. Seek expert advise for the modifications required to allow 2 wire operation. This handbook assumes that the installation will use factory default configuration of 4 wire operation. In this mode, the pair labelled T3 are the transmit circuit, i.e. audio is transmitted out on T3. The circuit labelled T4 is the receive circuit. Transmit of the Signalbox is connected to receive of the Level Crossing. Phasing of the pair is not important, but it is good practise to maintain phasing. The transmission circuits should be connected as follows:

Signalbox JB	Crossing JB	Cable Colour (mark up)
(T3-Tx) Block 3, pair 6a	(T4-Rx) Block 3, pair 4a	
(T3-Tx) Block 3, pair 6b	(T4-Rx) Block 3, pair 4b	
(T4-Rx) Block 3, pair 4a	(T3-Tx) Block 3, pair 6a	
(T4-Rx) Block 3, pair 4b	(T3-Tx) Block 3, pair 6b	



The simple arrangement above is the most common form of installation. A more complex arrangement would be detailed by the System design Authority if 'Block Switching' is required.

5.8.4 Miscellaneous Wiring

The functions of each circuit are detailed in the table of section 5.6 The hardware of Signalbox and level crossing Units is identical and some circuits are redundant, particularly at the Level crossing end. This section will briefly summarise some of the possible alternative functions, but will not detail the installation method since this will be provided by the System Design Authority if required:

- 2 wire operation a dedicated transmission circuit pair (T2) is allocated to operation over a since pair. PETS incorporates an electronic hybrid based upon 600R operation.
- Block switching a Level Crossing unit may be controlled by different Signalboxes (at different times). Circuit T2 is used for switching the transmission circuit under control of the Block Switch of an Intermediate Signalbox. A dc control circuit is provided to allow for an input signal from a common 'Block Switch' in the Signalbox.
- Alarm Outputs Major and minor alarm outputs are available on volt free contacts for connection to automatic fault reporting systems (SCADA).
- External Call Sounder In some instances the Signalbox equipment may be remote from the Signaller and require a separate call sounder. volt free relay contacts are provided for this purpose.
- Command, control and monitoring sometimes it is necessary to transmit low priority alarms between Signalbox and crossing. PETS2 allocates Line 1 at each end for bidirectional signalling power supply and charger failure alarms. Three additional signalling circuits are available if a full compliment of Line cards are equipped at each end. These I/O circuits are pre-wired to the QDF blocks in each Junction Box.
- Remote Alarm Display this new product for use with the Signalbox Unit may be wired into the QDF connections of Block 1, allowing alarms to be remotely viewed and acknowledged.



6. TECHNICAL DATA

6.1 Mechanical details

DIMENSIONS (Level Crossing model) :

width (including connectors)	-	252 mm
width (case only)	-	324 mm
height (case only)	-	160 mm
depth (including wall stand-o	off)	- 210 mm

Note: Signalbox unit is slightly smaller due to different front panel arrangement)

WEIGHT: 5.3 Kg.

COLOUR : RAL7032

6.2 Electrical

POWER SUPPLY: 20V dc to 58V dc, in two ranges

CURRENT: 0.425A @ 24V dc / 0.25A @ 50V dc

AUXILIARY 12V SUPPLY: maximum load current 0.1A - fused @ 0.1A

OPTO INPUTS: operating range 12V dc to 58V dc

RELAY OUTPUT RATING: 100V dc @ 0.3A, 30V dc @ 1A

6.3 Telephony

6.3.1 Telephone Circuits

REN RATING: maximum of REN = 2 per line

MAX. LOOP RESISTANCE: 1000R

MATCHING Z: 600R

LOOP LEAKAGE (QUIESCENT): 6mA nominal {>2mA, <8mA}

LOOP TRIP: >15mA

6.3.2 Transmission

MATCHING Z: 600R



AVERAGE LINE LEVEL: -13dB(m)

ISOLATION: 3.5KV ac rms. (to BS6301)

RETURN LOSS: >15dB (ref. 600R) 300Hz to 3.4KHz

BALANCE RETURN LOSS: >65dB to earth

MAXIMUM TRANSMISSION PATH ATTENUATION: 20dB resistive to guarantee DTMF operation, but gain compensation is recommended if the loss is >10dB, to maintain satisfactory speech performance.

6.4 Environmental

OPERATING TEMPERATURE : -20°C to 50°C

STORAGE TEMPERATURE : -25° to 70°C

ENCLOSURE PROTECTION : BS54520, IP55 (Level Crossing Unit only, and its Junction Box should be protected from dripping water)

EMC EMISSIONS - EN 55022

EMC SUSCEPTIBILITY - EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6,



Appendix A Cable Schedule - 'D' connectors to Junction Box QDF's

Control & Alarm Connection Lead (20 pair)

From	Colour	То	
Block 1, 1a	WHITE – Blue	50 way D pin 2	
- 1, 1b	BLUE – White	- 1	
- 1, 2a	WHITE – Orange	- 18	
- 1, 2b	ORANGE – White	- 34	
- 1, 3a	WHITE – Green	- 35	
- 1, 3b	GREEN – White	- 36	
- 1, 4a	WHITE – Brown	- 37	
- 1, 4b	BROWN – White	- 38	
- 1, 5a	WHITE – Grey	- 3	
- 1, 5b	GREY – White	- 19	
- 1, 6a	RED – Blue	- 47	
- 1, 6b	BLUE – Red	- 45	
- 1, 7a	RED – Orange	- 43	
- 1, 7b	ORANGE – Red	- 41	
- 1, 8a	Not connected to D	See jumpers below	
	connector	2	
- 1, 8b	Not connected to D	See jumpers below	
	connector		
- 1, 9a	RED – Brown	- 48	
- 1, 9b	BROWN – Red	- 46	
- 1, 0a	RED – Grey	- 44	
- 1, 0b	GREY – Red	- 42	
- 2, 1a	BLACK – Blue	- 39	
- 2, 1b	BLUE – Black	- 40	
- 2, 2a	BLACK – Orange	- 49	
- 2, 2b	ORANGE – Black	- 50	
- 2, 3a	BLACK – Green	- 16	
- 2, 3b	GREEN – Black	- 14	
- 2, 4a	BLACK – Brown	- 33	
- 2, 4b	BROWN – Black	- 15	
- 2, 5a	BLACK – Grey	- 13	
- 2, 5b	GREY – Black	- 12	
- 2, 6a	YELLOW – Blue	- 17	
- 2, 6b	Not connected to D	See jumpers below	
	connector		
- 2, 7a	YELLOW – Orange	- 4	
- 2, 7b	ORANGE – Yellow	- 5	
- 2, 8a	YELLOW – Green	- 6	

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From	Colour	То	
- 2, 8b	GREEN – Yellow	-	7
- 2, 9a	YELLOW – Brown	-	8
- 2, 9b	BROWN – Yellow	-	9
- 2, 0a	YELLOW – Grey	-	10
- 2, 0b	GREY – Yellow	-	11

Jumpers

From	Colour	То
Block 2, 1a	GREEN – Red	Block 1, 8b
Block 2, 1b	RED – Green	Block 1, 8a
Block 2, 6a	BLUE - Yellow	Earth post
Block 2, 6a	BLUE - Yellow	Block 2, 6b
Block 2, 4a	WHITE – Blue	Block 1, 8a

Telecommunications Connection Lead (10 pair)

From	Colour	То	
Block 3, 1a	Not connected to D	Spare	
	connector		
- 3, 1b	Not connected to D	Spare	
	connector		
- 3, 2a	Not connected to D	Spare	
	connector		
- 3, 2b	Not connected to D	Spare	
	connector		
- 3, 3a	WHITE – Green	25 way D pin 14	
- 3, 3b	GREEN – White	- 15	
- 3, 4a	WHITE – Brown	- 1	
- 3, 4b	BROWN – White	- 2	
- 3, 5a	WHITE – Grey	- 6	
- 3, 5b	GREY – White	- 4	
- 3, 6a	RED – Blue	- 3	
- 3, 6b	BLUE – Red	- 5	
- 3, 7a	RED – Orange	- 13	
- 3, 7b	ORANGE – Red	- 25	
- 3, 8a	RED – Green	- 11	
- 3, 8b	GREEN – Red	- 12	
- 3, 9a	RED – Brown	- 10	
- 3, 9b	BROWN – Red	- 8	



PETS-2 Crossing Telephone System QUICKFIX INSTALLATION HANDBOOK

From	Colour		То
- 3, 0a	RED – Grey	-	7
- 3, 0b	GREY – Red	-	9

Sounder Wiring – Black to Block 1, 8b Red & White to Block 2, 4b





Appendix B

Alter the text within the boxes as required. Print this sheet on a Laser or Inkjet with accurate size mapping, use good quality paper. Cut out the labels around the border edge using scissors, cut accurately to the edge. Slide into the edge aperture of the front panel, if the size is correct it should slide in easily and the white paper should fill the window area, some alignment may be needed. The 'Pull Tab' part will stick out from the front panel edge. Fold this part to the inside so as to trap this tab when the front panel is re-fitted. Assembly can be made easier by Sello-taping the Pull Tab to the rear of the front panel. The 'Pull Tab' will be needed to remove the label in the future.

Black PVC tape covers the apertures behind the Line Card windows. If Barrier Alarm Signalling is to be used, drafting film is recommended to allow the required LED's to show through. Puncture the black PVC tape as required, keep Line 1 blacked out since the Line 1 LED's may operate with mains/ charger failure.

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