

ORANGE BOOK



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Introduction

Welcome

Thank you for choosing the XL controllers and signal heads. Using sophisticated radio links and integral failsafe measures, the XL controllers allow you to quickly and safely install junction control without the complication of cables.

Each XL controller presents a panel with a clear, uncluttered and logical layout. This allows you to quickly apply settings and then to easily monitor every aspect of the system in operation.

The XL controllers are fully type approved to Highways Agency specification TR0111 (as well as TR2502A-AP16 when used as XL Multiphase slaves) and are manufactured in the UK in accordance with ISO 9001 Quality Assurance procedures.

Note: Up to eight XL controllers/heads can be used as slaves in conjunction with the Pike XL Multiphase controller. This guide, however, deals only with two-way operation of the XL controllers. For multiphase operation, please refer to the XL Multiphase operator's guide (PSL 1573).

Important

This system should be installed and operated only by fully trained and experienced personnel. Always consult your supervisor if you are in any doubt about correct procedures or if you are concerned about safety. Equipment must only be repaired by Pike Signals Ltd or authorised repair agents.



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XL control panel layout

Each XL control panel can be located either at the rear of the head or within the head's base unit.

For maximum flexibility, every XL control panel can operate as a master or a slave, as determined by you. All configuration is achieved using the three blue buttons and the display screen.





Installation

The XL controllers can be used in two main modes of operation:

- **Two phase** One signal head at either end of a shuttle lane, with one head/controller acting as the master and the other operating as the slave.
- Multiphase Up to eight XL signal heads all acting as slaves to an XL Multiphase controller. For further details of this type of operation, please refer to the XL Multiphase operator's guide (PSL 1573).

Setting up the heads and controllers

1 Set up all signal heads, cones and signs according to Highways Agency regulations.

Required reading

- 'The use of vehicle actuated portable traffic signals' (the 'Pink Book') ISBN: 0115507817
- 'Safety at street works and road works' (the 'Maroon Book') ISBN: 0115519580
- 'Traffic signs regulations and general directions' (TSRGD) Chapter 8 ISBN: 0110429427

2 Measure the distance between the two WAIT HERE signs.





3 On the SLAVE XL controller:





4 On the MASTER XL controller:



When the required mode is displayed, press \rightarrow to proceed.





Operation

During operation

During two phase operation, the controllers and their heads will run according to the selected mode. Additionally, you can use the control panels to influence the displayed signals.

For details about multiphase operation, please refer to the XL Multiphase operator's guide (PSL 1573).

Manual demand

In VEHICLE DETECT MODE and MANUAL MODE, you can press either demand button on the master controller to request green on an approach. In MANUAL MODE, the demand buttons are the sole method used to control traffic flows.

Note: On the slave controller, only the demand button affecting the slave head will operate.

Hold all red

You can invoke the hold all red mode from the master controller. This is a useful feature for:

- Occasional heavy plant crossings,
- · When the works involve temporarily blocking the shuttle lane, or
- When traffic needs to be stopped due to an accident or incident within the works area.

To hold all red

- On the master controller, press the 🥨 🌮 button.
- All signal heads will return to red and will remain there until the state is overridden.
- On the master controller, press \rightarrow to resume running.

Making adjustments

When the system is running, you should continue to monitor the build up of traffic on both approaches. If regular patterns of significant traffic queues are emerging on either approach, consider making careful adjustments to alleviate the problem.

Timing adjustments can be made at any time. The effects of timing changes will be incorporated during the next full cycle of operation for each phase.

Note

Introduce timing changes in small steps and one at a time. Observe the results before making any further changes.

Slow moving vehicles not clearing the works

If there are large numbers of slow moving vehicles which have difficulty in clearing the works before the signals have changed, increase the **ALL RED** settings for the affected approach by five seconds.

Vehicles taking more than one green period to clear the works

If substantial queues begin to form and vehicles regularly take more than one green period to get through the works, increase the **MAXIMUM GREEN** settings for the affected approach by five seconds.



Changing timings

Timing changes may only be made at the master controller. However, if required, you can easily swap the controllers so that the slave becomes the master - see page 10 for details.

To change timings during operation



. RED - MASTER

THEN ENTER → €

0-2-5-10-15-20-25-30

SCROLL 1

While running, the master will display this screen. On the master controller, press to place all signals at red and adjust the timings.

2

40-50





In each screen, use $\bigvee \triangle$ to highlight the required time period (based upon the tables shown on page 7) and press $\rightarrow \leftarrow$ to proceed to the next screen.

3 VEHCL MODE SELECTED RED MR 05s GN MR 15s RED SL 05s GN SL 15s →← TO RUN ↑ TO ALTER

The screen will display a preview of the current mode and all timings.

If the settings are correct, press to begin running.

If any timings need to be changed, press (see step **h** on page 7).



Changing modes

Mode changes may only be made at the master controller. However, if required, you can easily swap the controllers so that the slave becomes the master - see this page for details.

To change modes during operation

1	RUNN	ING	VEH	ICL	E	
	RED	MR I	05s	GN	MR 1	5s
	RED	SL	05s	GN	SL 1	5s
	MHN	÷÷	LIME	ST	MUDE	÷

While running, the master will display this screen. Press to place all signals at red and adjust the mode.



Use V A to change between the following five options (shown on the top line):

EXIT TO MENU When selected, allows you to adjust the radio channel, master/slave assignments and timings, if necessary.

VEHICLE DETECT MODE Controllers use their configured timings and respond to the microwave vehicle detectors. This is the most efficient mode of operation and should be used in all situations unless there are special circumstances.

FIXED TIME MODE Controllers use only their configured timings and ignore traffic demands. This is an inefficient mode which does not adapt to the prevailing traffic conditions.

ALL RED MODE Both signal heads are forced to red.

MANUAL MODE Controllers respond to the control panel demand buttons. The configured ALL RED timings are used and the minimum green time is set to 12 seconds.

3 VEHCL MODE SELECTED RED MR 05s GN MR 15s RED SL 05s GN SL 15s ↔ TO RUN ↑ TO ALTER When the required option is displayed, press → ← to proceed. Depending on the option you may see this preview screen. Press → ← to run.

Swapping the master and slave

All XL controllers are capable of running as either master or slave. It is even possible to swap their assignments during operation. This provides you with the convenience to quickly alter settings from either end of the works.

To swap the master and slave

SLAVE XXXXX CONFIGURED OK RUNNING...VEHICLE ENTER ++ TO CHANGE While running, the slave will display this screen. On the slave controller, press to place all signals at red and take the system offline.

Press A to swap the slave and

2 SLAVE MODE CHAN ■ OFFLINE SCROLL ↑ FOR CONTROL ENTER → TO CHANGE

3 VEHICLE DETECT MODE SCROLL ↑↓ FOR MORE ENTER →+ TO SELECT master assignments. During the swap over, the slave will inherit the current timings and mode.

As the slave becomes the new master, its screen will confirm the current operation mode.

If necessary, use \checkmark \land to change between the four operation modes (see page 6 for details). When the required mode is displayed, press \checkmark to proceed.

VEHCL MODE SELECTED RED MR 05s GN MR 15s RED SL 05s GN SL 15s ↔ TO RUN ↑ TO ALTER

4

The screen will show a preview of the current mode and all timings.

If the settings are correct, press to begin running.



Decommissioning the system

When the portable traffic signals are no longer required, please follow this procedure to decommission their use:

- 1 Ensure that the shuttle lane is cleared of obstructions (with the exception of the signal heads, their cones and related warning signs).
- 2 On the master controller, press the 🥨 🎾 button.
- 3 At each approach, face the signal head away from the traffic and then switch off the related controller.
- 4 Remove each signal head from the carriageway.
- 5 Carefully remove all cones, then the signs, all in accordance with the recommended procedures given in the guide "Safety at street works and road works" ISBN: 0115519580.

Incidents during operation

In accordance with Highways Agency specification TR0111, the XL controllers and associated signal heads monitor themselves continually for faults or unexpected incidents during operation. The system as a whole adheres to a defined set of responses for particular failures, as discussed here.

Lamp failures

Lamp failures detected on the master head will be reported only on the master controller screen.

Lamp failures detected on the slave head will be reported on both the slave and master controller screens.

In all cases, lamps failures will not stop operation. The controllers and heads will continue to operate.

Note: Lamp failures are detected only during the periods that each lamp should be lit.

Note: Lamp failure monitoring may not be required in certain countries and accordingly may not be activated.

RED F	AIL	TH)	IS S	SIDE
	05s	GN	MR	15s
AMBER F	AIL	TH)	IS S	SIDE
	05s	GN	MR	15s
GREEN F RED MR RED SL MAN ++	AIL 05s 05s TIME	OTH GN GN ST	HERS MR SL MOD	5IDE 15s 15s 15s €↓

SLAVE XXXXX III RED FAIL THIS SIDE	
SLAVE XXXXX III AMBER FAIL THIS SIDE	
SLAVE XXXXXX ■ GREEN FAIL THIS SIDE RUNNINGVEHICLE ENTER →← TO CHANGE	-III- 1 - 1



Green signal conflict

If opposing approaches show green signals simultaneously at any time, all signals will change directly to red (no amber signal) and will remain at red until the system is manually restarted. The screens of both controllers will state where the problem was discovered and the green mimic signals of both controllers will flash for the affected head.



To restart the system

- 1 Locate and remedy the cause of the failure.
- 2 On the master controller, press \bigcirc to restart operation.
- 3 Continue to monitor the signals for correct operation.

Communication interruption or failure

Communication interruptions or failures can occur for a number of reasons, such as: external interference, transmission halt (Comms timeout) due to errors or, in unusual cases, a controller failure. In cases such as interference, the effects may be short lived and the controllers will automatically recover. If interference problems persist, then try switching the master and slave to the other radio channel. In all cases of communication loss, the signals will automatically revert to red and remain at red until the problem is solved.

General communication interruptions

Breaks in communication are represented by screens such as the following:

****	CO	1MS 1	FIME	TUOE	•
RED	MR	05s	GN	MR	15s
RED	SL	05s	GN	SL	15s
MAN	÷÷	TIME	ES↑	MOD)E↓ j



This could be due to interference or a detected problem (not necessarily related to communications) that has caused the master to cease transmission.

Radio unit fault

If a specific radio fault is detected within a controller, a screen such as this will be displayed: !! ERROR !! RADIO UNIT FAULTY SCROLL ↑↓ TO RETRY ENTER →← TO CANCEL

In all cases, check the radio signal indicator on each controller. During normal operation, it flashes green, however, when communication problems exist, it flashes red.



Slave error

During the setup procedure or when making configuration changes, it may not be possible for the master controller to locate the slave unit. This may be because the slave has not been activated, has been incorrectly setup or has suffered a failure. In such cases the master will show the following:

!! ERROR !!
NO SLAVES FOUND
SCROLL 14 TO RETRY
ENTER ++ TO CANCEL

Check that the slave is correctly configured and has been activated to wait for the master signal, before re-configuring the master. Then press v or on the master to retry. If the problem persists, try an alternative slave unit.

Multiple slaves

If there are two or more slaves operating in the same area and using the same radio channel, the master will display:

SLAVES	DETECTED:	
XXXXXX		
	SCROLL ↑↓	
ENTER -	++ TO SELEC	Γ

The screen will show the serial numbers of the detected slaves. If another set of XL controllers are operating in the vicinity, you will need to change one of the sets to the alternative radio channel.

Note: For identification purposes, each controller has its serial number printed on the label in the lower right corner of its panel. These serial numbers equate to the ones shown in the above screen.

Low battery

Every XL controller continually monitors its own battery condition and provides charge level information via the battery symbol in the top right corner of the display:

Above 12.7 volts
12.7 volts
12.5 volts
12.15 volts

When the battery level reaches 11.5 volts, the low battery warning indicator will begin to flash, accompanied by the following screens:







As the battery level reaches 10.5 volts, the low battery warning indicator will be lit, accompanied by the following screens:

*** LOW BATTERY ***	**** LOW BATTERY ***
SIDE MASTER	SIDE SLAVE
REPLACE BATTERY	REPLACE BATTERY
ENTER →+ TO RESTART	RESTART AT MASTER

At 10.5 volts, the controller will automatically shut down to protect the battery from damage. Additionally, if the XL unit is switched on and the battery is below 11.5 volts, the following message will be displayed:





Troubleshooting

Green mimic indicator flashing

Either a green conflict or a green lamp failure (see below) has been detected - check the screen for details. Reset or replace the corresponding lamp or signal head, as necessary. See **Green signal conflict** on page 12.

Red/amber/green mimic indicator flashing

A lamp failure has been detected - check the screen for details. Check and replace the affected signal lamp or head, as necessary. See **Resetting the system** on page **11**. Operation will continue despite the lamp failure.

The major fault indicator is flashing red

A problem has been detected within the controller. Replace the controller/signal head as soon as possible and return the unit for repair.



Battery symbol flashing

The indicated signal head has roughly two hours or less of operation remaining before it must shut down. Check the control panel of the affected signal head and replace its battery.

Battery symbol on

The indicated signal head has shut down due to insufficient battery power. Change the battery of the affected signal head.



Controller fails to power up

A fuse may have blown within the controller. See 'Fuse replacement' for details.

Fuse replacement

Each XL head has two fuses located inside the casing, behind the yellow aspect. Both fuses are standard $1\frac{1}{4}$ " (31mm) types.

To change a fuse

- 1 Make alternative traffic control arrangements, if necessary, and then switch off the affected XL controller.
- 2 On the yellow aspect, remove the hinge pin and open the aspect rim. Remove the two cross-headed screws above and below the yellow LED plate. Carefully lift the yellow LED plate out from the signal head.



- 3 Use a flat blade screwdriver to unscrew the appropriate fuse and inspect it visually (with a meter, if necessary). If the fuse is blown, replace it with an identically rated fuse.
- 4 Place the control panel back into signal head and replace the four screws.



Further information

Control panel rear connections



Specifications

- Type approved to Highways Agency specifications TR0111 and TR2502A-AP16. Copies of the approval authorisations can be provided upon request.
- Manufactured in the United Kingdom in accordance with ISO 9001 Quality Assurance procedures.

Power requirements

- Operating range: 10.5Vdc to 14.5Vdc
- System shuts down at 10.5Vdc to protect the supply batteries.
- Use only deep cycle batteries or those recommended by Pike Signals.

Warranty

The XL Multiphase Controller is guaranteed against failure subject to fair wear and tear, correct operation and return to our works carriage paid. We undertake to repair or replace this equipment free of charge providing:

- It has been maintained in good condition and operated with due care, and
- Any failures are directly traceable to faulty material or workmanship.

However, we cannot entertain any claims for labour or other expenditure in connection therewith. Items or components subject to another manufacturer's guarantee are subject to the terms of that guarantee only.

Any warranty given is void if seals on equipment are subsequently found to have been broken without prior permission by Pike Signals Limited.

Any item of equipment repaired by Pike Signals Limited is guaranteed from failure for three months from the date of repair, provided that the item has been subjected to fair usage and regular maintenance.

Disclaimers

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It is a policy of Pike Signals Ltd to seek registered design and/or patent protection for its products.

Environmental information

EU directive 2002/95/EC on the Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

It is Pike Signals Limited's desire to meet customer requirements with respect to the RoHS initiative. We are actively working to achieve the important objective of making our products compliant with the EU RoHS directive (and similar initiatives) through efficient product design that reduces unnecessary waste; the use of recyclable materials throughout, and a transfer to lead-free components and solder.

EU directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE)



Pike Signals Limited is focussed on developing a compliance program for the European Union ("EU") Directive on Waste Electrical and Electronic Equipment, Directive 2002/96/EC. Under the EU WEEE Directive, manufacturers of covered

electronic equipment are obligated to take back such products at the end of their useful life.

Pike Signals Limited is committed to meeting or exceeding environmental standards in the production of all products and is engaged in a comprehensive, company-wide effort towards full compliance with the EU WEEE Directive.







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