

EVOLUTION

SERIES

T5 • PT5 • PT4+



This guide covers **Evo T5**,  **MULTI**
PT5 and **PT4+** controllers in their standard dual-channel plus newer
MULTI channel versions. Please see **page 13** for important information.

pike^P
signals ltd.

operator's guide

PSL2021 issue 2 rev a

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Introduction

Welcome

THE **Evo** series from **Pike Signals** delivers a breakthrough in combined vehicle and pedestrian phase control within portable systems. Drawing upon our long history within vehicle control dating back to 1932 and particularly our pioneering work with high-reliability radio-linked computerised systems, the **Evo** series is so named because it represents a natural, yet hard fought evolution to be the best. The best for reliability, the best for flexibility and the best for safety.

Evo series controllers provide great flexibility, adherence to four Highways Agency specifications (TR 2502B, TR2503B, TR 2537A and TR 2538A) and a compact size that allows their use in most **Pike Signals** housings.

The **Evo** series is centred around a range of controllers, which can support up to nine vehicle phases and can operate as master or slave. This means that with a fleet of **Evo** controllers you will be able to configure the equipment in any order, maximising utilisation.

The **Evo** series provides vehicle control, vehicle control with pedestrian facilities and pedestrian only control. Using the **PT5** controller as a Master provides up to five vehicle phases and a pedestrian facility with up to four crossing points.

To ensure that no job is too large for the **Evo** series, the **PT4** expansion controller connects directly to the **PT5** and raises the maximum capabilities of the system to nine vehicle phases and a further four pedestrian crossing points.

Important

This system should be installed and operated only by fully trained and experienced personnel. The junction layout examples given in this document are for guidance only. 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.

Caution

RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE.

DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS.

Further important details about battery disconnection, handling and disposal can be found in the Operator's guide for the signal unit within which the controller is installed.



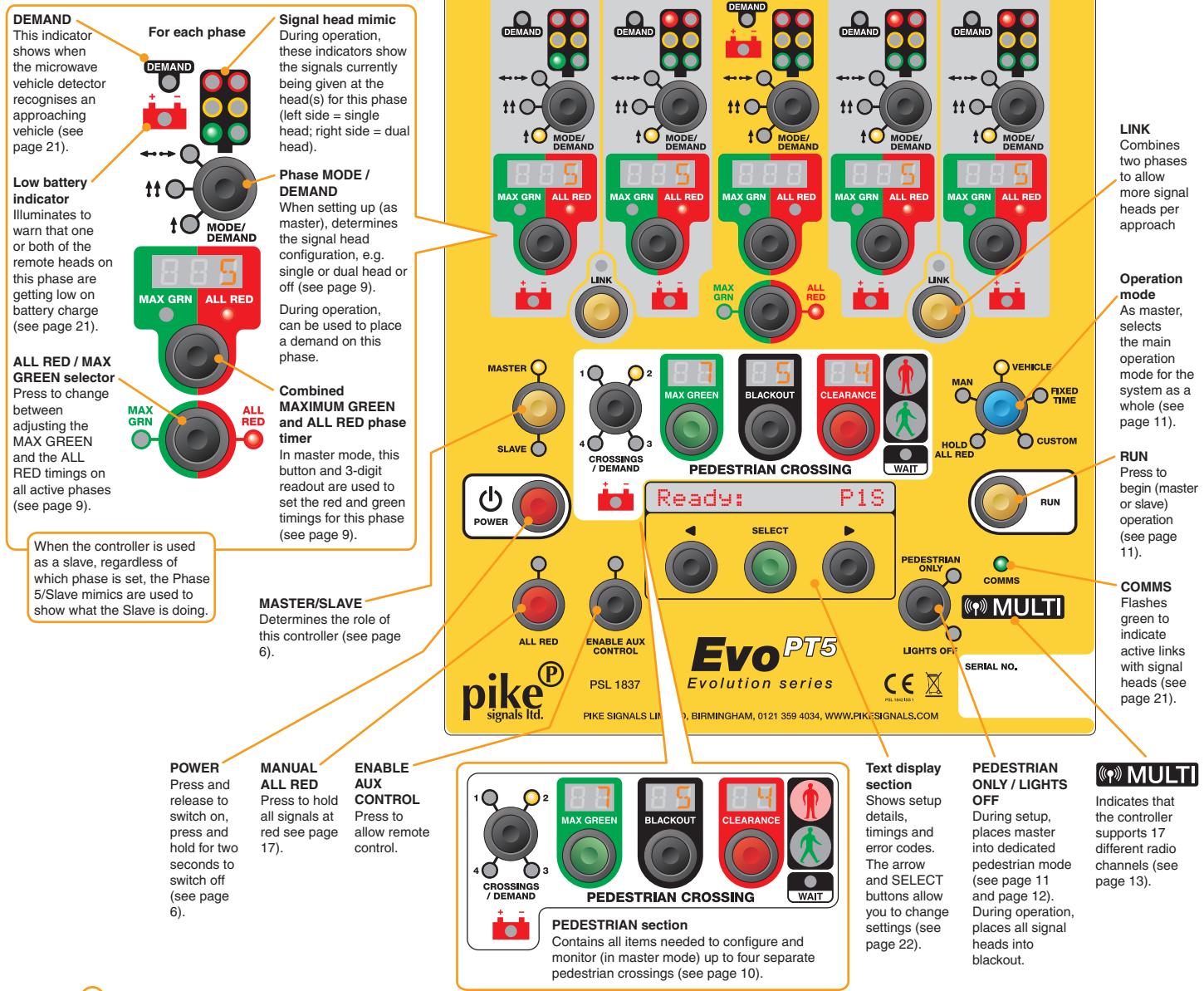
TOPAS

A supplier of TOPAS registered products

Evo panel layouts

Evo controllers are highly compact and yet offer full master and slave capabilities.

For other models, please see the next page ☺



Evo panel layouts (continued)

In addition to the main Evo PT5 controller, the Pike Signals Evo range also offers these other complimentary panels:

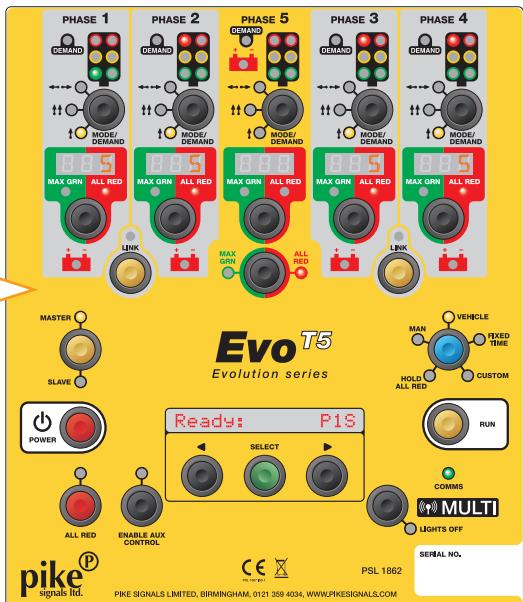
Evo PT4+

The Evo PT4+ companion controller can be linked to any Evo PT5 to add a further four vehicle phases plus another pedestrian phase supporting up to four more crossings.



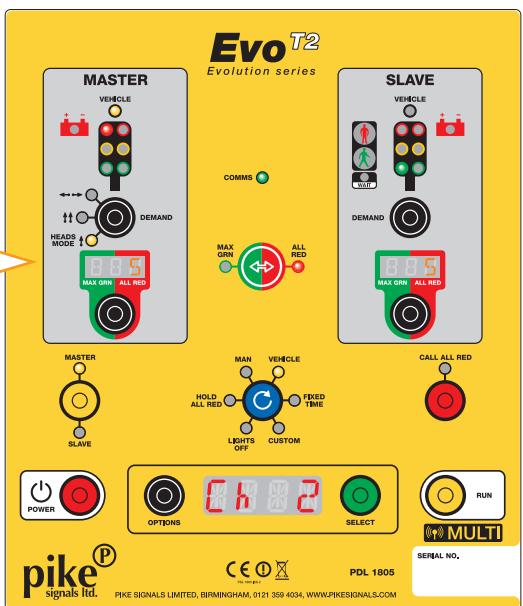
Evo T5

The Evo T5 controller has all of the controls and capabilities of the Evo PT5 shown on the previous page, except for the pedestrian crossing functions.



Evo T2

The Evo T2 controller can operate as a master for two vehicle phases; as a vehicle slave to an Evo T5, or as either a vehicle or a pedestrian slave to an Evo PT5.



Installation

Setting up the signal heads

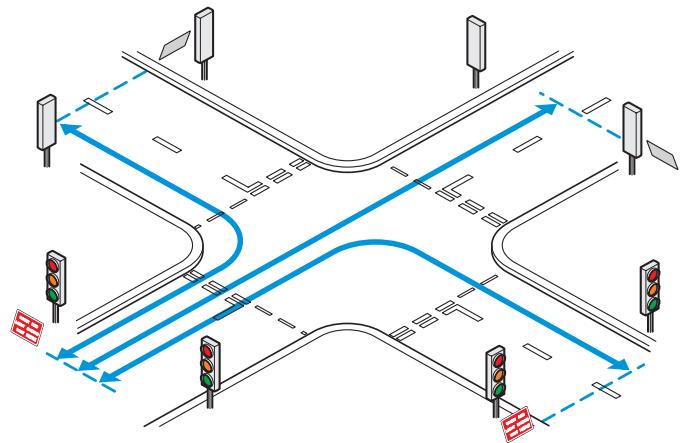
- 1 Set up the signals with the appropriate traffic management scheme for the prevailing roadwork site conditions.

Recommended references

The latest issues of:

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

- 2 For each approach, measure the distance from each **WAIT HERE** sign to the **WAIT HERE** sign furthest away.



- 3 Follow the system setup procedure beginning on **page 6**.

Please see Appendix 1, starting on page 26 for example signal head layouts.

Preparing for operation

This chapter covers all of the actions that you need to carry out when setting up an EVO system. The main stages are:

- Setting all vehicle slaves - [page 7](#)
- Setting all pedestrian slaves - [page 7](#)
- Set up the master - [page 8](#)

Notes

- If you are setting up a dedicated pedestrian crossing, go to page 12.
- Older Pike XL2 slave controllers can be used as part of an EVO layout for vehicle control, however, if you require pedestrian crossings, then only EVO controllers can be used. Once an XL2 controller is introduced, the system operation will automatically revert to an earlier HA Specification requirement which is limited to four vehicle phases and has no provision for pedestrian facilities.
- Every EVO controller can automatically sense which type of signal heads (vehicle and/or pedestrian) and will restrict/allow certain adjustments accordingly. For instance, if an EVO PT5 controller has only a vehicle signal head attached, then no pedestrian slave options will be offered.

* If a tactile indicator on a pedestrian panel is NOT sensed by the controller during startup, the display will first show **NO TACTILE**. Press **SELECT** to acknowledge.



SCAN option

On MULTI controllers at switch on, after scrolling through the first 17 radio channel options, if the controller is in Master mode, you will see a **SCAN** option. If you press **SELECT** to choose this option, the controller will scan the surrounding area and show the first available clear radio channel (takes approx. 20 seconds). You can either press **SELECT** to choose that channel or manually choose a different one. See page 13 for details.

Setting slaves (Vehicle and/or Pedestrian)

1 Press **POWER** to switch on.



The text display will briefly show **PIKE SIGNALS** and then*:



- To choose radio channel **01** (the usual choice), go straight to step **2** below.
- To choose a different radio channel, press **►**. The text display will advance through the available channels (either **1** and **2** for a standard unit or **01** to **17** for a MULTI controller). After **17**, the display may show **SCAN** (see the lower left box) and after that it will show **CABLE**, which is a function reserved for future use - and then it will roll over to channel **01**. See page 13 for details.

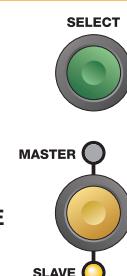
2 Press **SELECT** to fix the chosen radio channel. The display will now show **Radio Tx Power 3**. In normal conditions, press **SELECT** to choose this option.



3 The text display will show the previously used mode, such as **Slave Veh 2S**.

Next

- If the previous mode is appropriate, press **SELECT** and go to step **6**.
- If you need to make changes, go to step **4** opposite.
- If you need to change from master to slave mode, press **MASTER/SLAVE** until the **SLAVE** indicator is lit. Then go to step **4** opposite.



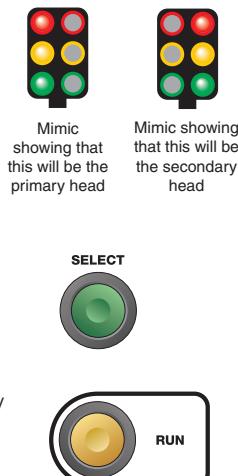
Note: If vehicle and pedestrian heads are both fitted to the same slave controller, you will be prompted to choose the vehicle head designation, followed by the pedestrian head.

...Setting slaves (cont.) - Vehicle

4 Press **◀** or **▶** to scroll through the various vehicle slave signal designations: e.g. **Slave Veh 1S**, **Slave Veh 1D**, **Slave Veh 2S**, **Slave Veh 2D**... See below for an explanation of the designations.

As you scroll through the head designations for the phases, the mimic display for the current phase will show red, amber and green on either the left side or the right side of the mimic, to highlight the **Single** or **Dual** head designations.

5 When the required phase setting is displayed, press **SELECT** to fix it. The text display will show: **Ready**



6 Press **RUN**. This controller is now ready to begin working with the master. The text display will show that it's waiting for the master: **Waiting**

Next

- Repeat this procedure for all vehicle slaves.
- Set all pedestrian slaves - see right
- Set up and run the master - see **page 8**

Vehicle slave designations on the text display

The text display uses the following abbreviations to represent the vehicle head modes:

Slave Veh 1S, **Slave Veh 2S**, **Slave Veh 3S**, etc. - this will either be the **Single** head for the phase (where only one head is used) or otherwise the primary head of a dual head arrangement.

Slave Veh 1D, **Slave Veh 2D**, **Slave Veh 3D**, etc. - this will be the secondary head of a **Dual** head arrangement.

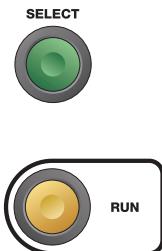
Note: **Phase 1S** is reserved for the signal head that is wired to the master controller, unless being used as a remote. i.e. no head fitted, or if the master is a Ped.

...Setting slaves (cont.) - Pedestrian

4 Press **◀** or **▶** to scroll through the various slave pedestrian signal head designations: e.g. **Slave Ped 1a**, **Slave Ped 1b**, **Slave Ped 2a**... See below for an explanation of the designations.

5 When the required phase setting is displayed, press **SELECT** to fix it. The text display will show: **Ready**

6 Press **RUN**. This controller is now ready to begin working with the master. The text display will show that it's waiting for the master: **Waiting**



Next

- Repeat this procedure for all pedestrian slaves.
- Set all vehicle slaves - see left
- Set up and run the master - see **page 8**

Pedestrian slave designations on the text display

The text display uses the following abbreviations to represent the various pedestrian signal heads:

Slave Ped 1a, **Slave Ped 2a**, **Slave Ped 3a**, etc. - this will be the primary pedestrian signal head in a pair.

Slave Ped 1b, **Slave Ped 2b**, **Slave Ped 3b**, etc. - this will be the secondary pedestrian signal head in a pair.

Note: **Ped 1a** is reserved for a pedestrian master (if the master controller is wired to a pedestrian head).

IMPORTANT: Each pedestrian crossing must be served by a **matched pair** of pedestrian signal heads.

Setting the master

This section covers the following for the master controller:

- Switching on - below.
- Setting vehicle phases - opposite.
- Setting pedestrian crossings - **page 10**.
- Starting operation - **page 11**.

...Setting the master (cont.) - Switching on

1 Press **POWER** to switch on.



The text display will briefly show **PIKE SIGNALS** and then*:



- To choose radio channel **01** (the usual choice), go straight to step **2** below.
- To choose a different radio channel, press **►**.

The text display will advance through the available channels (either **1** and **2** for a standard unit or **01** to **17** for a **MULTI** controller). After **17**, the display may show **SCAN** (see the **SCAN** option box shown right) and after that it will show **CABLE**, which is a function reserved for future use - and then it will roll over to channel **01**. See page 13.

2 Press **SELECT** to fix the chosen radio channel. The display will now show **Radio Tx Power 3**. In normal conditions, press **SELECT** to choose this option.



3 The text display will show the previously used mode, such as: **Ready P18**

Previous settings will also be shown on the various panel indicators.

Note: If you are creating a dedicated pedestrian crossing (i.e. a single vehicle phase that serves only the pedestrian crossing), please use the Pedestrian only method of setup shown on **page 12**.

* If a tactile indicator on a pedestrian panel is NOT sensed by the controller during startup, the display will first show **NO TACTILE**. Press **SELECT** to acknowledge.



SCAN option

On **MULTI** controllers at switch on, after scrolling through the first 17 radio channel options, if the controller is in **Master** mode, you will see a **SCAN** option. If you press **SELECT** to choose this option, the controller will scan the surrounding area and show the first available clear radio channel (takes approx. 20 seconds). You can either press **SELECT** to choose that channel or manually choose a different one. See page 13 for details.

Next

- If the previous setup is appropriate, press **SELECT** and go to **page 11**.
- If you need to alter **vehicle** settings, go to step **4** opposite.
- If you need to alter **pedestrian** settings, go to step **4** on **page 10**.
- If you need to change from slave to master mode, press **MASTER/SLAVE** until the **MASTER** indicator is lit. Then continue with vehicle and/or pedestrian settings (on **pages 9** and **10**, respectively).



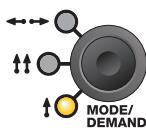
...Setting the master (cont.) - Vehicle phases

For each vehicle phase that you need to use:

4 Repeatedly press **MODE/DEMAND** for the phase until the required setting is illuminated:

- ↑ selects one approach, one head per approach,
- ↑↑ selects one approach, two heads per approach,
- ↔↔ selects two approaches, one head per approach (aka: two opposed heads).

Note: When the ↔↔ option is lit, a further press of **MODE/DEMAND** will switch off that phase.

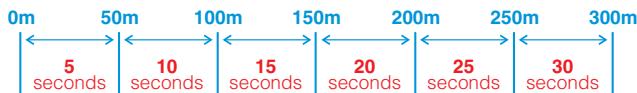


5 Set the All Red time:

Ensure that the **ALL RED** indicator is on. If it is not, press the **MAX GRN ALL RED** button located in the centre of the panel.

Using the measurement taken earlier (from this phase's WAIT HERE sign to the WAIT HERE sign furthest away) and the table shown below, repeatedly press the phase timing button until the appropriate time is shown on the 3-digit readout.

Note: On steep gradients, increase the ALL RED time by 5 seconds for the uphill phase(s).



6 Set the Maximum Green time

Ensure that the **MAX GRN** indicator is on. If it is not, press the **MAX GRN ALL RED** button located in the centre of the panel.



Using the measurement taken earlier (from this phase's WAIT HERE sign to the WAIT HERE sign furthest away) and the table shown below, repeatedly press the button until the appropriate time is shown on the 3-digit readout.



7 If this and the neighbouring phase need to be linked in order to provide more heads per approach, see page 12 for details.

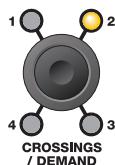
8 Repeat steps **4** to **7** for each active phase and then:

Next

- If you need to alter pedestrian settings, go to [page 10](#).
- To start operation, go to [page 11](#).

...Setting the master (cont.) - Pedestrian

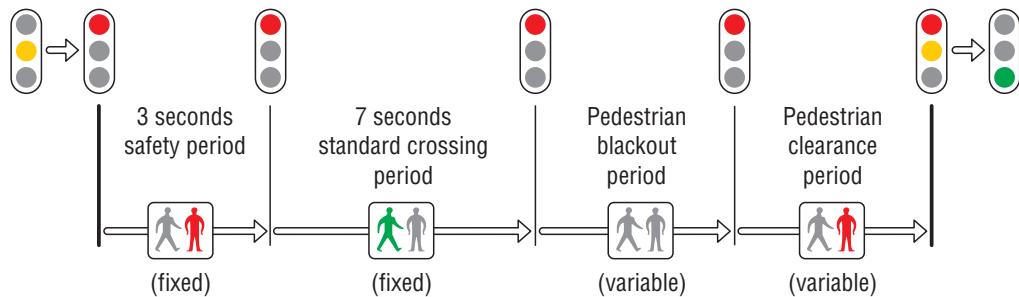
4 Where one or more pedestrian crossings are required, on the master controller press **CROSSINGS/DEMAND** until the indicator for the appropriate number of crossings is lit (1-4). When 4 is lit, a further press of **CROSSINGS/DEMAND** will switch off pedestrian mode.



Note: The timings that you choose in this section will apply to all pedestrian crossings associated with this controller.

Note: To create a dedicated pedestrian crossing (i.e. a single vehicle phase serving the pedestrian crossing only), please use the 'Pedestrian only' setup shown on [page 12](#).

5 Use the timing buttons within the **PEDESTRIAN CROSSING** section to set the appropriate **BLACKOUT** and **CLEARANCE** times as follows:



Choose a **BLACKOUT** period (in seconds) that is sufficient to allow an able bodied pedestrian to walk the whole of the crossing.



The **CLEARANCE** setting allows you to determine an additional safety factor (4 seconds is the usual setting).



The green crossing time is fixed at seven seconds for almost all installations. However, there are special circumstances where this time may need to be adjusted. The pedestrian **MAX GREEN** control allows this to be done on Evo control panels that have been suitably adjusted. This feature is not available on standard Evo controllers.



Next

- If you need to alter vehicle settings, go to [page 9](#).
- To start operation, see right

...Setting the master (cont.) - Starting operation

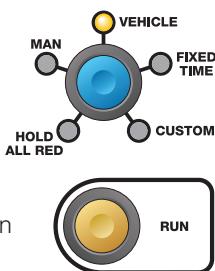
Once the following stages are complete:

- All heads, signs and cones placed in appropriate locations,
- Vehicle slave controllers set,
- Pedestrian slave controllers set (if used),
- Vehicle phase(s) set on the master,
- Pedestrian crossings set (if used) on the master.

...then you should be ready to start operation using the master controller.

To start operation

a On the master controller, press the blue button to choose the appropriate operation mode. For normal operation, this should be set to **VEHICLE**.



b Press **RUN**.

The various signal heads of the installation will now start up in an orderly manner:

- All pedestrian crossings will show red.
- The lowest numbered vehicle phase will show amber and then go to red.
- The next lowest numbered vehicle phase will show amber and then red. This will continue through all enabled vehicle phases until the final one.
- The final vehicle phase will wait for the longest all red time to run and then changes to green.
- Normal operation will commence once the highest numbered vehicle phase has completed its initial cycle.

The vehicle phase and pedestrian mimics will show what each of the signal heads are currently displaying.

Note: When the controller is used as a slave, regardless of which phase is set, the Phase 5/ Slave mimics are used to show Slave operation.

The vehicle **DEMAND** and pedestrian **WAIT** mimics will show how requests are being made to the controller by road users and pedestrians, respectively.



Performing a test start

With the standard set up procedure, the system does not come into full operation until you press the **RUN** button. It's at that point you discover whether all the slaves are properly responding. In some situations, particularly where the Evo installation is about to replace a large set of fixed signals, it is important to confirm that all units are correctly co-operating before the fixed signals are switched off. By performing a test start, the Evo master will begin running as normal, however, it will inform all heads to not show any signals.

To initiate a test start

- 1 Before starting operation (as described left), press the **PEDESTRIAN ONLY/ LIGHTS OFF** button until the **LIGHTS OFF** indicator illuminates.
- 2 Proceed with the usual start up, as described left.
If there are any problems, these will be reported on the master text display.
If everything is OK, although the lights don't sequence and the mimics do not illuminate, you will see the display timer counting through its phases.
- 3 When you are confident that all is OK, either press the **LIGHTS OFF** button to take the system into normal start up signal sequence; or press and hold the **POWER** button to halt the system and switch off (if actual operation will occur later on).



Pedestrian only installations

Where the sole reason for an installation is to form a portable pedestrian crossing, i.e. a single vehicle phase serving only the crossing, you are recommended to use the **PEDESTRIAN ONLY** feature of the Evo controller.

This setting maximises traffic efficiency by resting the vehicle phase at green whenever there are no pedestrian demands (normal vehicle operation is to keep all signals at red during quiet periods).

IMPORTANT: The **PEDESTRIAN ONLY** option can only be used when all vehicle phases are running the same signals; such as a single road (or dual carriageway) where all signals operate in the same manner. Layouts where opposing traffic streams would cross, such as shuttle working, crossroads, etc. must NOT be used with the **PEDESTRIAN ONLY** option.

To use Pedestrian only mode

- 1 Position the vehicle and pedestrian signal heads in accordance with Highways Agency regulations and set the slave controllers on each head in the usual manner, as shown on page 6 and page 7.
- 2 On the master controller, press **PEDESTRIAN ONLY**, the adjacent indicator will illuminate.
- 3 Enable all of the phases that will be used and set the master controller as shown on the previous four pages, with the following restrictions:
 - Use the Phase 1 controls to set details for all phases.
 - Use only the  or  modes; it is not possible to use the 'Two opposed heads' mode ( ) in **PEDESTRIAN ONLY** installations.
 - It is possible to use the **LINK** buttons to join vehicle phases in **PEDESTRIAN ONLY** mode, however, all linked signal heads MUST face in the same direction.
- 4 Press **RUN** to begin. Operation will start as follows:
 - All pedestrian crossings will show red.
 - After seven seconds, the vehicle signal heads will go to green.
 - Shortly afterwards, a single pedestrian crossing cycle will occur (i.e. vehicles to red, pedestrians to green, etc.).
 - The system will now rest at 'vehicles on green' until a pedestrian demand is received.

Linking phases

Evo controllers allow you to optionally join phases 1 and 2 as well as (separately) phases 3 and 4 to suit road layouts. When phases are linked, all signal heads associated with both of the phases will act together in the same manner. The extra signal heads can be made to work in opposing directions (as shown in example 6 on page 32) or in the same direction (as shown in example 9 on page 35).

IMPORTANT: It is possible to use the **LINK** buttons to join vehicle phases when using **PEDESTRIAN ONLY** mode, however, all linked signal heads **MUST** face in the same direction. This ensures that the signal failure modes are handled correctly.

To link phases

- 1 Switch on the master controller, as shown on page 8.
- 2 On the master controller, press the **LINK** button that is located just below the two phases that you need to join. The indicator next to the button will illuminate.
- 3 Choose the required settings for the linked phases, as shown on the previous three pages, using the controls as follows:
 - Use the Phase 1 controls to set the Phase 1 + 2 pair.
 - Use the Phase 3 controls to set the Phase 3 + 4 pair.



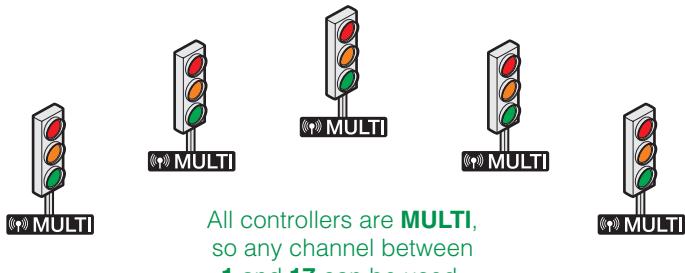
Radio channels

Evo controllers that show the **MULTI** logo on their front panels offer a greatly increased number of radio communication channels (1 to 17). This compares with the first generation (**Standard**) Evo controllers, which provide channels 1 and 2.



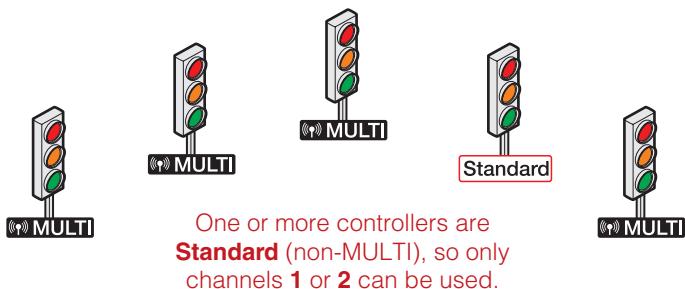
When mixing Multi-channel and standard controllers

If *all* of your Evo controllers are the **MULTI** type, then you can use any of the available 17 channels:



All controllers are **MULTI**, so any channel between **1** and **17** can be used.

However, if your installation contains *any* standard Evo controllers (those that do not have the MULTI logo) then you must choose either channel **1** or channel **2** for all units.



One or more controllers are **Standard** (non-MULTI), so only channels **1** or **2** can be used.

If you choose channels **3** to **17** then the standard controller(s) will not be found and the installation will not run.

IMPORTANT: Obviously, you need to ensure that all controllers within a set are configured to use the same radio channel.

Using the scan option

- 1 Press **POWER** to switch on. The text display will show **Radio Channel xx**, where **xx** is the last channel used.
- 2 Press **►** to advance to channel 17 and then press once more to show **Radio Chan. SCAN**. Press **SELECT**.
Note: The controller must be in Master mode to access the Scan function.
The controller will now scan the radio channels. After roughly 20 seconds, the text display will show the first available clear radio channel that was detected during the scanning process.
- 3 Press **SELECT** to choose the recommended channel, or manually choose a different channel.
- 4 Continue with the usual configuration steps. Don't forget to manually select the same radio channel on all of the other Evo controllers within the set.

Discovering the radio channel during operation

When the system is running, you can check which radio channel is being used as follows:

- 1 During normal operation, on the master controller, press the **SELECT** button. The text display will show the current battery charge.
- 2 Press the **►** button to show the radio channel:
Radio Channel 01
- 3 Press the **SELECT** button to return to the normal display (or wait for 12 seconds and the text display will automatically return).

Transmitter power

Evo controllers that show the MULTI logo on their front panels provide an option, when they are first switched on, to change the transmitter power:

Radio Tx Power 3

The standard power level is **3** and for most installations this should not be changed; simply press **SELECT** during startup to choose the standard option.

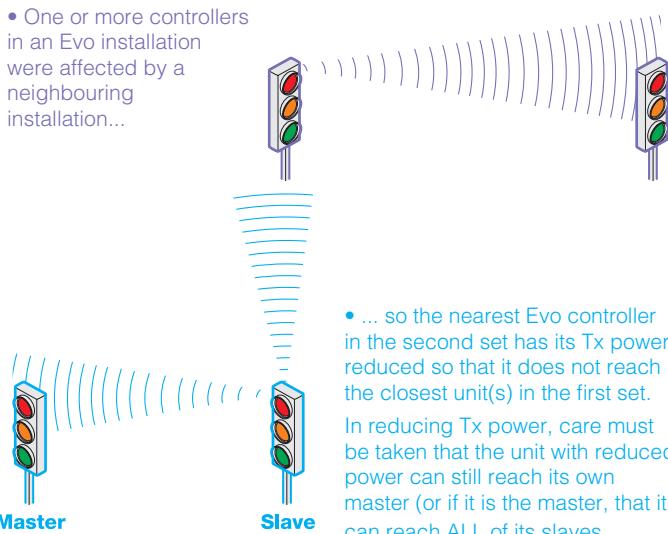
Reducing transmitter power to avoid interference

Reducing transmitter power *may* be a useful option when two (or more) separate Evo installations are placed near to each other and you begin to experience communication issues.

IMPORTANT: You should always try to solve interference issues by changing the radio channels first before attempting to reduce transmitter power. If the Evo controllers in set are all MULTI units, you have the choice of 17 different channels to switch them all to; if not, you have a choice of 2 channels. See page 13 for details.

If changing radio channels does not solve the problem, then you could consider reducing the Tx power in one or more units that are in closest proximity between the affected sets.

- One or more controllers in an Evo installation were affected by a neighbouring installation...



Note: When reducing power in a controller, you must ensure that its transmissions are sufficiently strong to still reach its own master; or if it is the master, that it can reach **ALL** of its slaves.

It is not necessary to change the Tx power level in all Evo units within a set. A change in Tx power affects only the transmission of a controller, it has no effect of the reception of signals by that controller.

As a rough guide, the line of sight transmission distances (when there are no external sources of interference) are as follows:

Tx power level	Power mode	Approx. Tx distance
3 and 2	Standard	300 metres (984 feet)
1 and 0	Low	100 metres (328 feet)

To reduce power on an Evo controller

- 1 Switch on the controller in the usual manner.
- 2 Select the radio channel and press **SELECT**. The display will now show: **Radio Tx Power 3**
- 3 Use the **◀** or **▶** buttons to change the Tx radio power value and press **SELECT**.
- 4 Continue with your configuration in the usual manner.

Note: If the controller is switched off and back on, the Tx power level will be offered at the normal setting of 3.

Operation

Making adjustments

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

Timing adjustments can be made to a phase 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(es) in small steps.

- 1 Ensure that the **ALL RED** indicator is on. If it is not, press the **MAX GRN ALL RED** button located in the centre of the panel.



- 2 Press the phase timing button for the phase that needs to be adjusted to increase the ALL RED time.



- 3 Allow several full vehicle cycles to occur and observe the changes to traffic behaviour.
- 4 Repeat if necessary.

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(es) in small steps.

- 1 Ensure that the **MAX GRN** indicator is on. If it is not, press the **MAX GRN ALL RED** button located in the centre of the panel.



- 2 Press the phase timing button for the phase that needs to be adjusted to increase the MAX GRN time.



- 3 Allow several full vehicle cycles to occur and observe the changes to traffic behaviour.
- 4 Repeat if necessary.

Operation modes

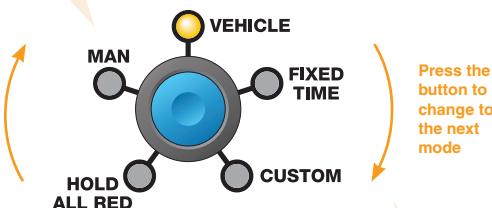
The blue mode switch determines how the system operates.

MANUAL

Phases respond to the control panel DEMAND buttons - the microwave vehicle detectors of the heads are ignored. In this mode, the ALL RED time settings for each phase are used, the minimum green time is set at 12 seconds and the maximum green time is determined by the operator's actions. *Note: It is important to set the correct ALL RED time for each phase in order to prevent green signals being given too soon on opposing phases.*

VEHICLE

All enabled phases use their configured timings and respond to the microwave vehicle detectors on each signal head. This is the most efficient mode of operation and should be used in most situations unless there are special circumstances.



HOLD ALL RED

All signal heads are forced to red and held until the mode is changed.

CUSTOM

Reserved for future use.

FIXED TIME

All enabled phases use only their configured timings - the microwave vehicle detectors of the heads are ignored. This is an inefficient mode of operation as it does not adapt to the prevailing traffic conditions.

Communication failures

The Evo system continually monitors itself to check for any type of failure so that it can take appropriate action:

After a temporary communications loss

Firstly, all signals will show red for 50 seconds. After that period, all signals will switch off (unless the master controller is running in HOLD ALL RED or MANUAL modes, in which case all signals will remain at red). The text display on the master controller will show the following:

Comms Recovery 123

Once the counter reaches 600 (10 minutes), the system will go through an automated restart procedure:

Vehicle only installations

- The lowest numbered vehicle phase will show amber, then red.
- The next lowest numbered vehicle phase will show amber and then red. This will continue through all enabled vehicle phases until the final one.
- The final vehicle phase will show amber then red and wait for the longest set ALL RED time. The lowest numbered vehicle phase will then change to green.
- Normal operation will commence once the highest numbered vehicle phase has completed its initial cycle.

Vehicle plus pedestrian installations

- All pedestrian signals to red.
- Vehicle signals in turn show amber then red.
- All signals are held at red for the longest set ALL RED time.
- All pedestrian signals go through a normal green cycle and then return to red.
- Normal operation continues with the next vehicle phase.

Note: During the ten minute recovery period, it is possible for an operator to manually restart the whole system.

After a serious communications loss

Following a serious or sustained loss of communication, the master controller text display will show the following:

Comms Fail

All signals will be instructed to remain off (or at red, if HOLD ALL RED or MANUAL modes are running). The whole system will require corrective action by the operator and a manual restart.

Calling 'hold all red'

The system allows the 'hold all red' mode to be invoked either from the Evo master controller or from any of the remote slave controllers. This is a useful feature for:

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

Calling 'manual hold all red' from a slave Evo controller

To call 'manual hold all red' from a slave

- 1 On a remote slave controller, press **ALL RED**.

The adjacent red indicator will illuminate.

- All signal heads will be returned to red and will stay at red until the state is overridden.
- The text display on the master controller will show **Remote Red Call**.



To resume operation

- 1 On the master controller, press **ALL RED**.

The adjacent red indicator will extinguish.

Calling 'hold all red' from the master controller

To call 'hold all red from the master

- 1 On the master controller, press **ALL RED**.

The adjacent red indicator will illuminate and operation will be affected according to the current mode:

- When running **MANUAL**:
 - Any signals currently at green will wait for a minimum of 12 seconds and then return to red.
 - The **ALL RED** indicator will extinguish and the controller will continue running in Manual mode with all signals at red until a **DEMAND** button is pressed.
- When running **VEHICLE**, **FIXED TIME** or **HOLD ALL RED**:
 - Any signals currently at green will wait for a minimum of 12 seconds and then return to red.
 - The **ALL RED** indicator will then extinguish and the time display will show **Local Red Call**. Operation will remain halted with all signals at red until you restart it:

• **To resume operation:** press **ALL RED**.

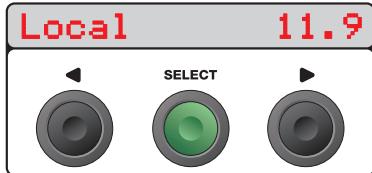


Checking battery charge levels

When the system is operating you can quickly check the exact battery charge levels for the master and all slaves, from the master text display.

To check battery charge levels

- 1 During normal operation, on the master controller, press the **SELECT** button. The text display will show:



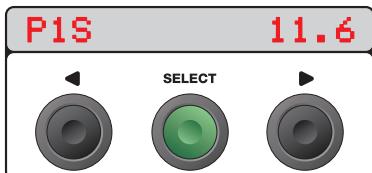
This is the charge level for the master controller's battery.

- 2 Press the ► button to advance to the next display:



This is the current radio channel.

- 3 Press the ► button to advance to the next display:



This is the charge level for the first slave's battery.

With each successive press of the ► button, the text display will show the battery charge levels for each of the slaves.

- 4 When you have finished checking battery levels, press the **SELECT** button to return to the normal display.

Note: You can use this procedure to check a slave battery charge level from the slave controller itself, but it will not be able to report on any other units. The slave unit will report itself as 'Local'.

Resetting the system

Certain failures within the Evo system require the operator to cure/acknowledge the failure and reset the system as a whole. In such cases the system may be held within a special condition or remain operating in a reduced mode.

To reset the system after an error

- 1 Inspect the master controller indicators to trace the problem, page 3 provides descriptions.
- 2 If the problem is traced to one or more signal heads, visit each affected head and check the slave controller(s). Depending on the fault:
 - If possible, rectify the problem and reset the slave controller(s).
 - Try performing a radio frequency scan to determine whether a different channel would provide better operation. See "Using the scan option" on page 13.
or
 - Replace the signal head(s)/controller(s) and follow the set up instructions shown **on pages 6 and 7** to select the correct phase number(s).

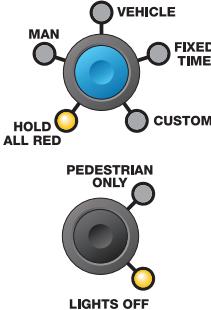
Note: If any slave unit is replaced, the master controller must be powered off and then on again to force it to look for all new slaves.
- 3 When all affected heads have been reset, on the master controller press the **RUN** button to restart operation. Monitor the system operation until you are sure that it is working correctly.

Decommissioning the system

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

To decommission the system

- 1 Ensure that the shuttle lanes are cleared of obstructions (with the exception of the signals heads, cones and related warning signs).
- 2 Change the blue mode selector on the master controller to **HOLD ALL RED**. The master controller will bring any aspects that are currently on green to red using the normal timings.
- 3 Press the **LIGHTS OFF** button to extinguish all signals.



- 4 In turn, go to all approaches, power off each slave controller (press and hold their **POWER** buttons) and face the signal heads away from the traffic.
- 5 If necessary, press and hold the **POWER** button on the master controller to switch it off.
- 6 Remove the signal heads from the carriageways.



Incidents during operation

In accordance with Highways Agency specifications, the Evo master controller and all 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.

Red vehicle/pedestrian signal failures

Red vehicle signal failure in Vehicle plus Ped or Ped-only setups:

- If ALL red vehicle signals fail on an approach*, then the signals on all approaches will immediately return to **ALL RED** for 50 seconds, after which all signals will extinguish and the controller will stop operation.

On the master controller, the text display will show **Stopped** and the mimic indicators representing the failed red signals will flash. See **Resetting the system** on page 18.

Red vehicle signal failure in Vehicle-only setups:

- If ALL red vehicle signals fail on an approach*, then the green signals on all other approaches/phases will be suppressed. In other words, as any other phase begins its sequence, the green signal that should immediately follow the red/amber will be blanked. The signal head with the failed red is the only one that will continue to show green during its active cycle. The green times for all phases will be reduced to 12 seconds.
- If more than one approach has a total red signal failure, all the signal heads will immediately return to **ALL RED** for 50 seconds, after which all signals will extinguish and the controller will stop operation.

On the master controller, the text display will show **Stopped** and the mimic indicators representing the failed red signals will flash. See **Resetting the system** on page 18.

Red pedestrian signal failure:

- If any single red man signal has a failure this is treated as a total approach fail. The signals on all approaches will immediately return to **ALL RED** for 50 seconds, after which all signals will extinguish and the controller will stop operation.

On the master controller, the text display will show **Stopped** and the mimic indicators representing the failed red signals will flash. See **Resetting the system** on page 18.

Green vehicle signal conflicts

When the operation mode is either Vehicle or Fixed Time:

- If opposing phases show green signals simultaneously at any time, then the signals on all approaches will immediately return to **ALL RED** for 50 seconds, after which all signals will extinguish and the controller will stop operation.

On the master controller, the text display will show **Stopped** and the mimic indicators representing the failed green signals will flash. See **Resetting the system** on page 18.

When the operation mode is either Hold All Red or Manual:

- If opposing phases show green signals simultaneously at any time, then all signals immediately change to red (no amber signal) and will remain at red. See **Resetting the system** on page 18.

* When phase linking is used, the duplication of signal heads facing in the same direction permits a slight relaxation of the above rules. Where 2, 3 or 4 signal heads are facing the same approach, the master controller will maintain normal operation until the last remaining head ceases normal operation, whereupon the above procedures will occur.

Error indications

The Evo controller uses its various panel indicators to provide assistance in tracing and solving operational problems.

Mimic indicators (for each phase)

In normal operation these displays mimic the currently active lamps of each signal head with a steady illumination of the appropriate lamp colour. If a lamp fails or a green conflict is detected, the relevant indicator(s) will flash to highlight the location of the problem. The left three indicators of the mimic represent the main (or only) signal head for a phase, the right three indicators represent the second of a dual head arrangement (if used). The **DEMAND** indicator shows when a vehicle is detected by the microwave vehicle detector (on either signal head).



Battery indicators (for each phase)

Note: See also page 18 for details about checking exact charge levels.

During startup, if the voltage of any controller battery is below 11.5v, the text display will show **Low Battery** and the controller will refuse to operate.

During operation, when there are roughly two hours of operational time remaining within a remote signal head battery, the battery indicator will flash and the text display will show **Low Battery**.



When the battery becomes too low for operation, the signal head will go to red for the **MAX RED** time and then switch off, the battery indicator will remain on and the text display will show **Batt Fail**. The corresponding indicator on the Evo master controller will remain on and the text display will show **Batt Fail nn**, where **nn** is the slave number.

If two heads are used within a phase, the low battery state could signify low power at either or both signal heads - the control panel on each signal head will provide further details.

Comms indicator

In normal operation the **COMMS** indicator will show a flashing green light:



Master controller

Flashing green System running correctly.

Off Loss of communication.

On Fault state.

Slave controller

Flashing green System running correctly.

Off Loss of communication.

Text display

The text display at the bottom of the control panel shows a continual count of the elapsed time for the current signal of the active phase. In error situations, this display is used to provide alphanumeric status codes, as follows:



Low Battery	Battery voltage becoming too low.	
Batt Fail	Insufficient battery voltage to continue.	
Red Fault	The red vehicle aspect failed to turn on or off.	
Amber Fault	The amber vehicle aspect failed to turn on or off.	
Green Fault	The green vehicle aspect failed to turn on or off.	
Red Man Fault	The red man pedestrian aspect failed to turn on or off.	
Grn Man Fault	The green man pedestrian aspect failed to turn on or off.	
Wait Fault	The wait aspect failed to turn on or off.	Stopped
Tactile Fault	The tactile aspect failed to turn off.	Green Conflict
Error 010	Invalid configuration data.	Error 020
Error 011	Failed to communicate with configuration plug.	Error 021
Error 012	Incompatible software installed.	Error 022
Error 013	Controller started following a watchdog reset.	Error 023
Comms Recovery nnn	Recovering from comms loss (10 minute period).	Error 024
Comms Fail	Sustained communications fault.	Error 025
Config Error 01	Insufficient battery voltage.	Error 030
Config Error 02	Duplicate serial number.	Error 031
Config Error 03	Invalid operational mode.	Error 032
Config Error 04	Language mismatch.	Error 040
Config Error 05	Software mismatch.	
Config Error 06	Nearside/farside mismatch.	
Config Error 07	Configuration incompatible with XL2 slaves.	Error 041
Config Error 10	Master has unconfigured vehicle head.	
Config Error 11	Master has unconfigured pedestrian head.	
Config Error 12	A slave has unconfigured pedestrian head.	
Config Error 13	A slave has unconfigured vehicle head.	
Config Error 20	No vehicle phases configured.	
Config Error 21	No pedestrian phases configured.	
Config Error 30	Awaiting confirmation of radio channel.	
Config Error 31	Awaiting confirmation of authority mode.	
Config Error 32	Awaiting confirmation of slave identity.	
Config Error 40	No head detected.	
Config Error 50	Engineers terminal interlocking active.	
Config Error 99	Internal error.	
Veh Fail nn	Could not find a slave for phase nn.	
Ped Fail nn	Could not find a slave for pedestrian phase nn.	
Batt Fail nn	Critical battery voltage on slave nn.	
Lamp Fault	The amber or green vehicle aspect failed to turn on or off.	
		System has stopped due to CAT1 fault.
		Green or green man aspect was on unexpectedly.
		Local monitor fault (whilst lamp was on).
		Local monitor fault (whilst lamp was off).
		Local lamp conflict detected on disused head.
		Local lamp conflict detected by CPLD.
		Local CPLD watchdog fault.
		Local front panel fault.
		Master detected invalid broadcast.
		Master detected aspects are not set as requested.
		Master detected invalid response from slave.
		Master has been notified of CAT1 fault on slave.
		Master has been notified of invalid broadcast on slave.

Troubleshooting

Green mimic indicator flashing

A green conflict has been detected. Reset or replace the corresponding signal head, as necessary. See [Resetting the system](#) on page 18.

Red mimic indicator flashing

A red lamp failure has been detected. Check and replace the affected signal lamp or head, as necessary. See [Resetting the system](#) on page 18.

The Comms indicator is not flashing

There is a communication error. See [Error indications](#) on page 21.

The text display is displaying a code

See page 22 for a list of all display codes.

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.

Warranty

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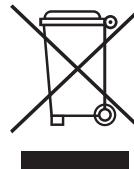
It is a policy of Pike Signals Ltd to seek registered design and/or patent protection for its products.

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.

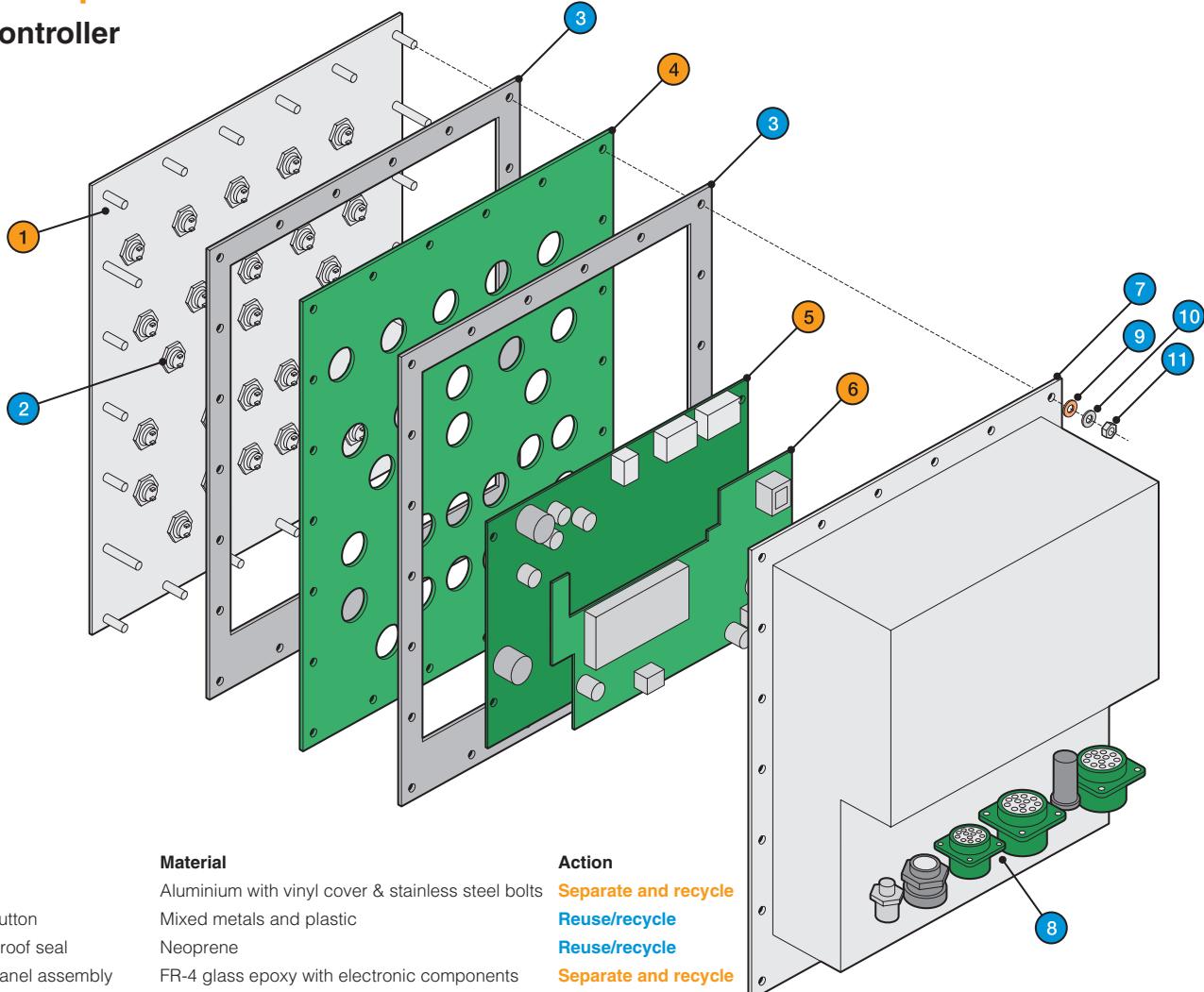
Pike Signals Limited is committed to meeting or exceeding environmental standards in the production of all products and is engaged in a comprehensive, company-wide effort towards full compliance with the EU WEEE Directive.



Documentation by: www.ctxd.com

End of life disposal

Pike Evo controller



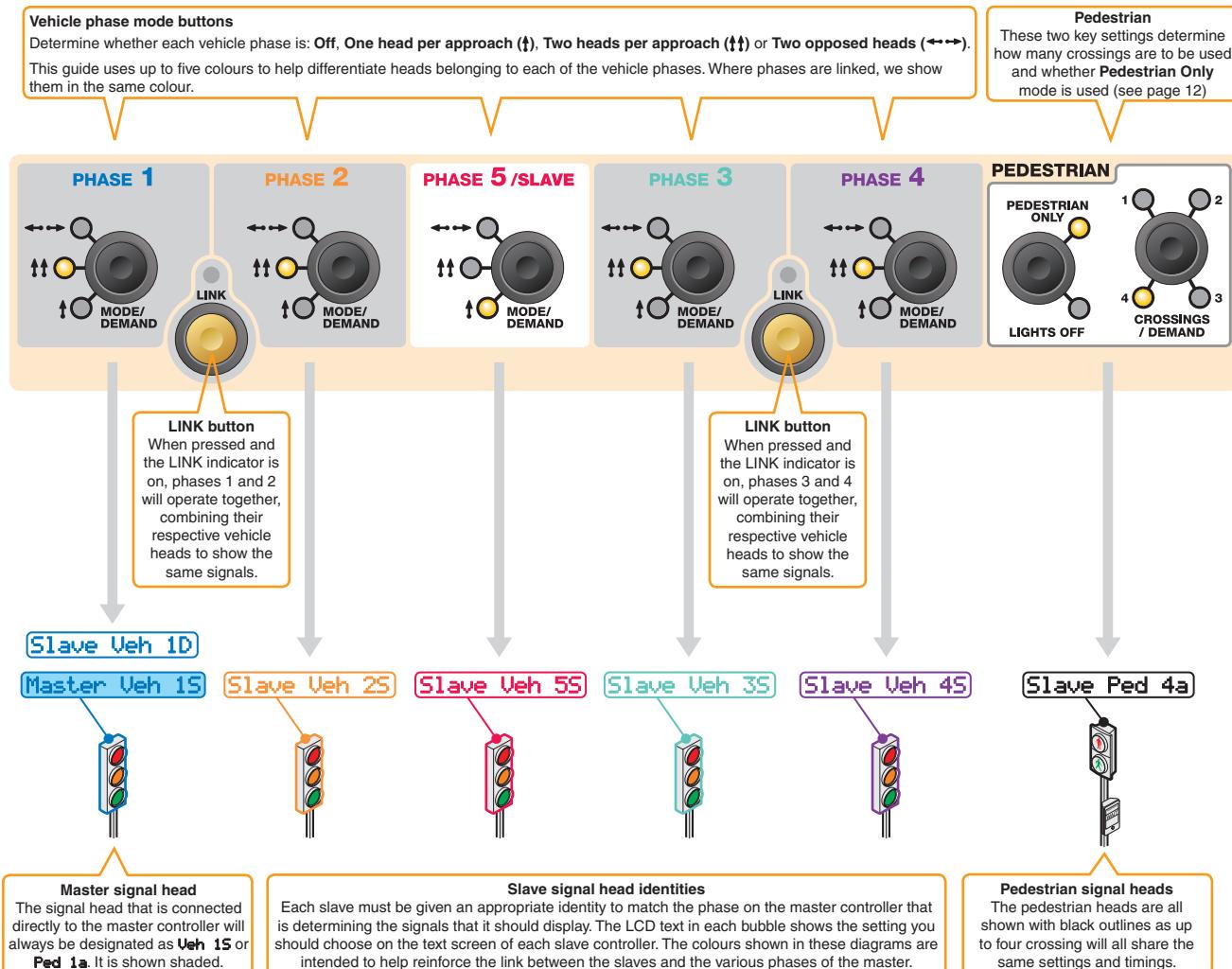
Item	Qty	Item
1	1	Fascia
2	27	Push button
3	2	Waterproof seal
4	1	Front panel assembly
5	1	Main controller board
6	1	Communications board
7	1	Rear cover
8	6	Connectors & fuse holder
9	22	Fibre washer
10	22	Washer
11	22	Nyloc nut

Action
Separate and recycle
Reuse/recycle
Reuse/recycle
Separate and recycle
Separate and recycle
Separate and recycle
Reuse/recycle

Appendix 1: Phase set up examples

This section provides various examples of typical traffic control scenarios. Each example shows how to set the vehicle phase and pedestrian modes on the Evo master controller and also the corresponding phase numbering for each slave signal head so that they are all addressed correctly and uniquely within the installation.

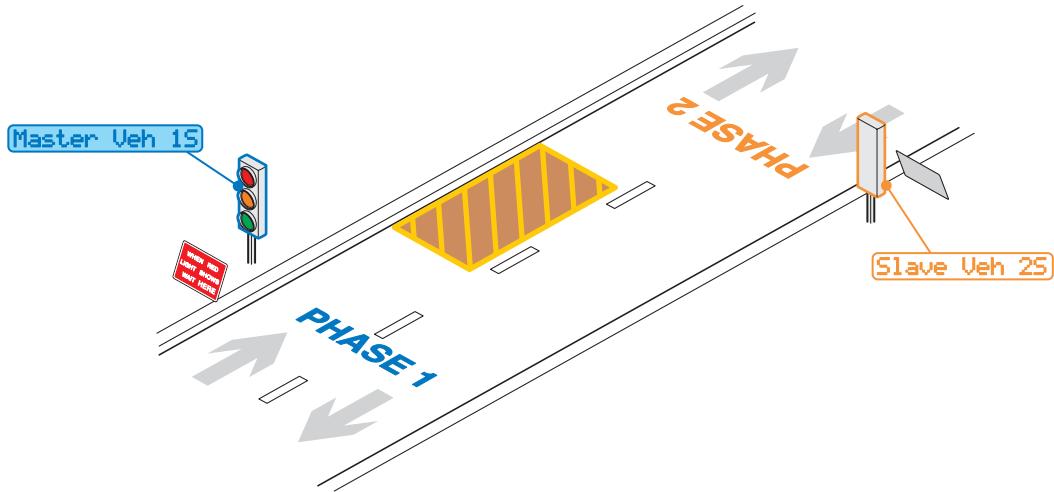
This page offers an explanation of the conventions used within this section. The row of controls shown at the foot of each example are not exactly as they appear on the controller, however, they should provide reasonable visual cues as to how each mode should be set. Of course, other button presses (timings, etc.) are required to produce a working layout.



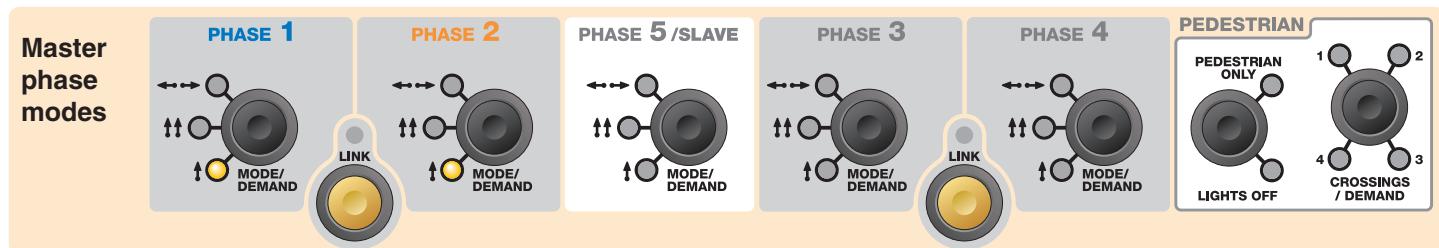
Example 1: Basic shuttle working

2 vehicle phases, 2 approaches, 1 head per approach

This example shows a carriageway controlled by two single-approach phases, each with one signal head.



Note: All junction layout examples given in this document are meant for rough guidance only. Please refer to Highways Agency specifications for actual signal, sign and cone placements for any particular junction types.

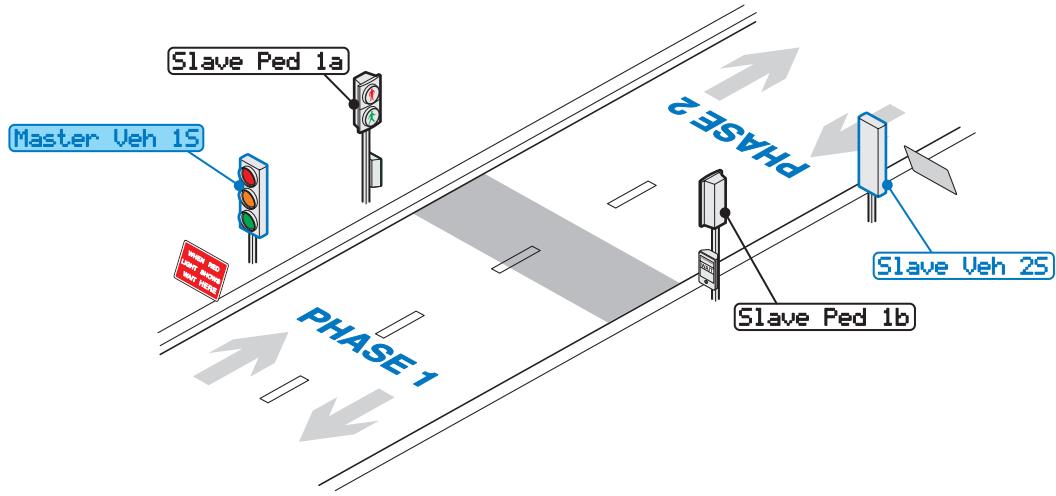


Example 2: Standalone pedestrian crossing

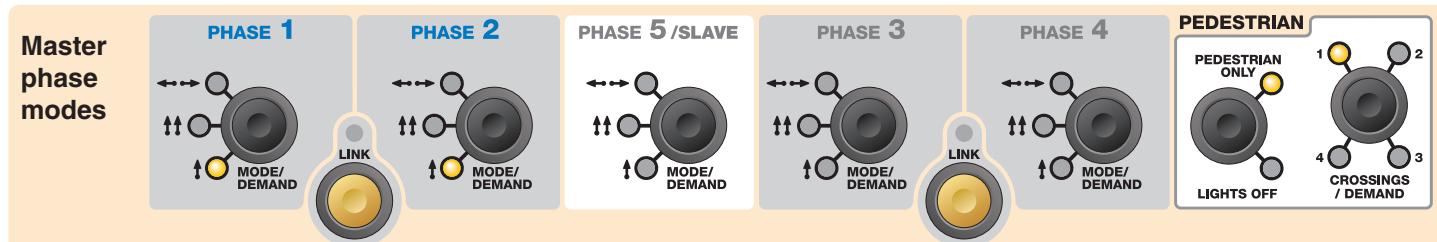
2 vehicle phases, 2 approaches, 1 head per approach with single pedestrian crossing

This example shows a basic pedestrian crossing and uses the **PEDESTRIAN ONLY** mode to use the most appropriate settings.

Note: When the PEDESTRIAN ONLY mode is invoked, all active phases operate as one.



Note: All junction layout examples given in this document are meant for rough guidance only. Please refer to Highways Agency specifications for actual signal, sign and cone placements for any particular junction types.

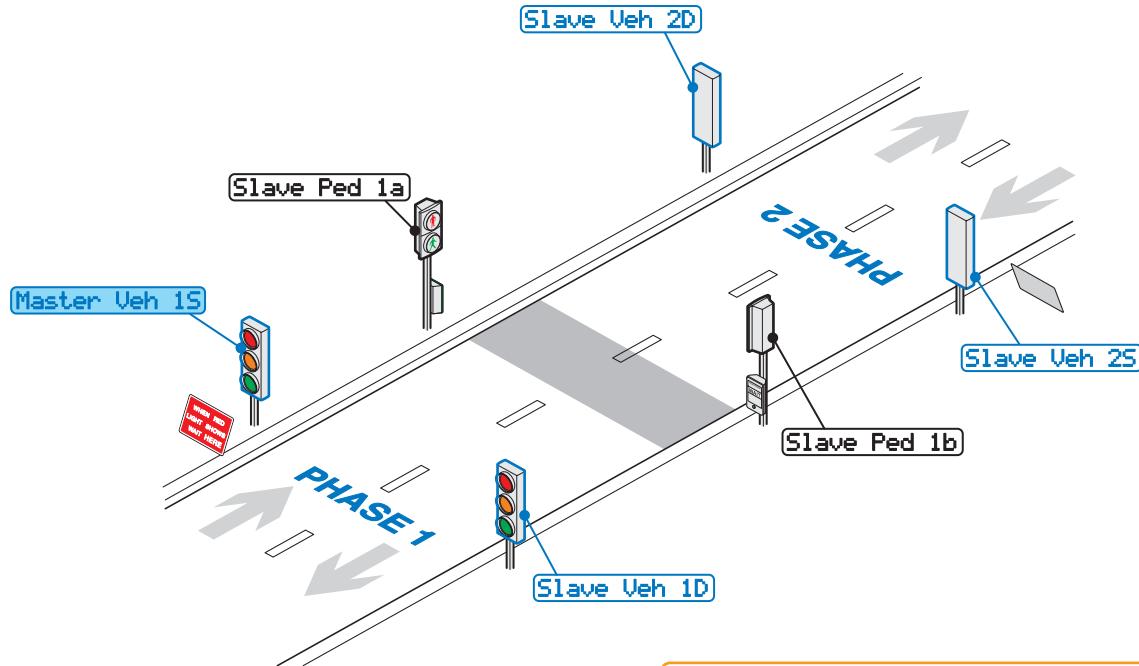


Example 3: Standalone pedestrian crossing with two vehicle heads per approach

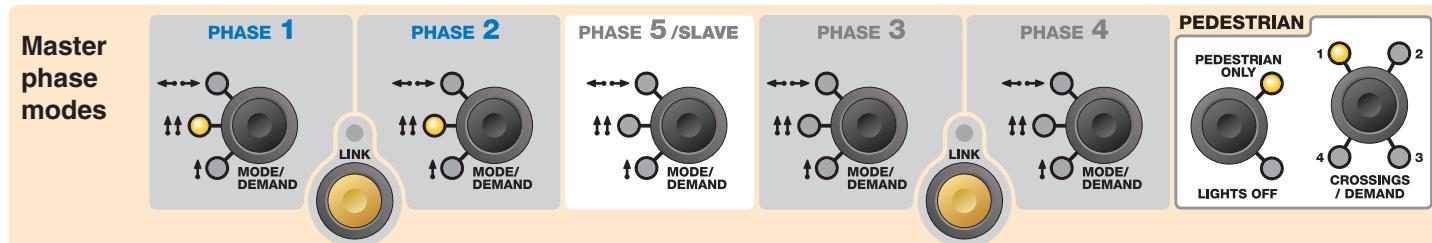
2 vehicle phases, 2 approaches, 2 heads per approach with single pedestrian crossing

This example shows a pedestrian crossing that might be used on a faster road with extra vehicle signals for added visibility and uses the **PEDESTRIAN ONLY** mode to use the most appropriate settings.

Note: When the PEDESTRIAN ONLY mode is invoked, all active phases operate as one.



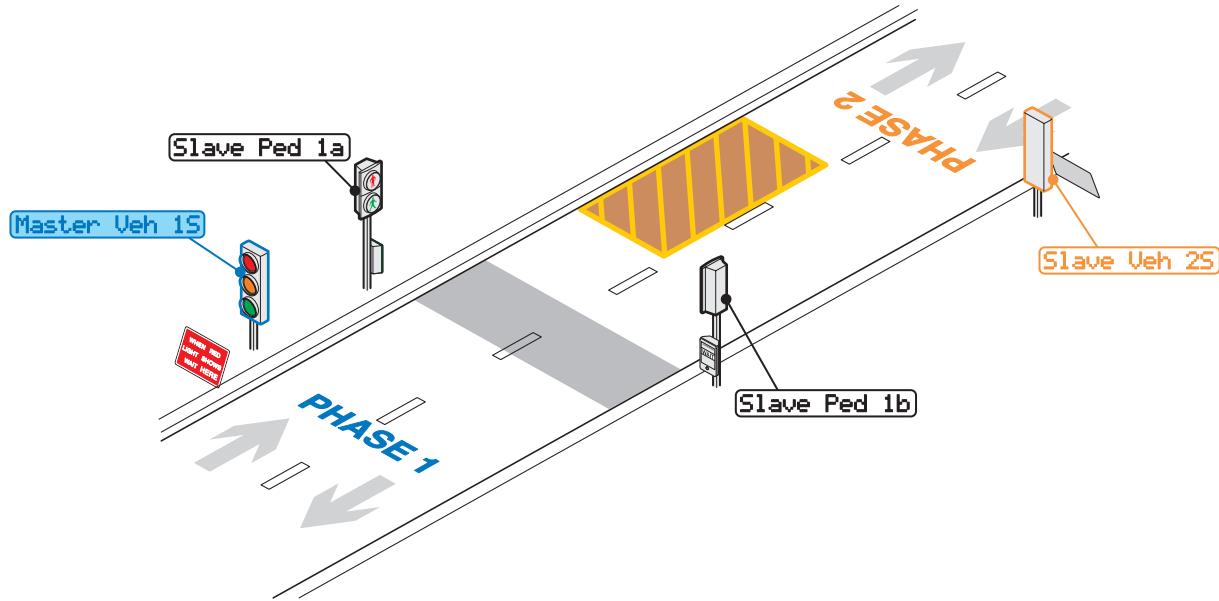
Note: All junction layout examples given in this document are meant for rough guidance only. Please refer to Highways Agency specifications for actual signal, sign and cone placements for any particular junction types.



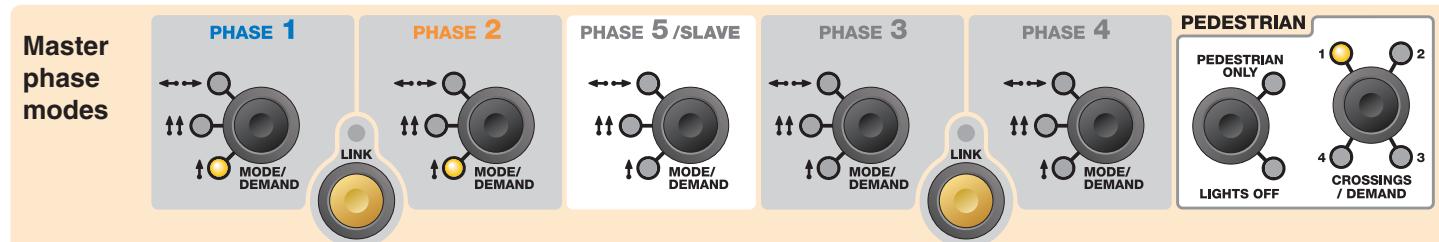
Example 4: Shuttle working plus pedestrian crossing

2 vehicle phases, 2 approaches, 1 head per approach with single pedestrian crossing

This example shows a pedestrian crossing combined with shuttle working.



Note: All junction layout examples given in this document are meant for rough guidance only. Please refer to Highways Agency specifications for actual signal, sign and cone placements for any particular junction types.

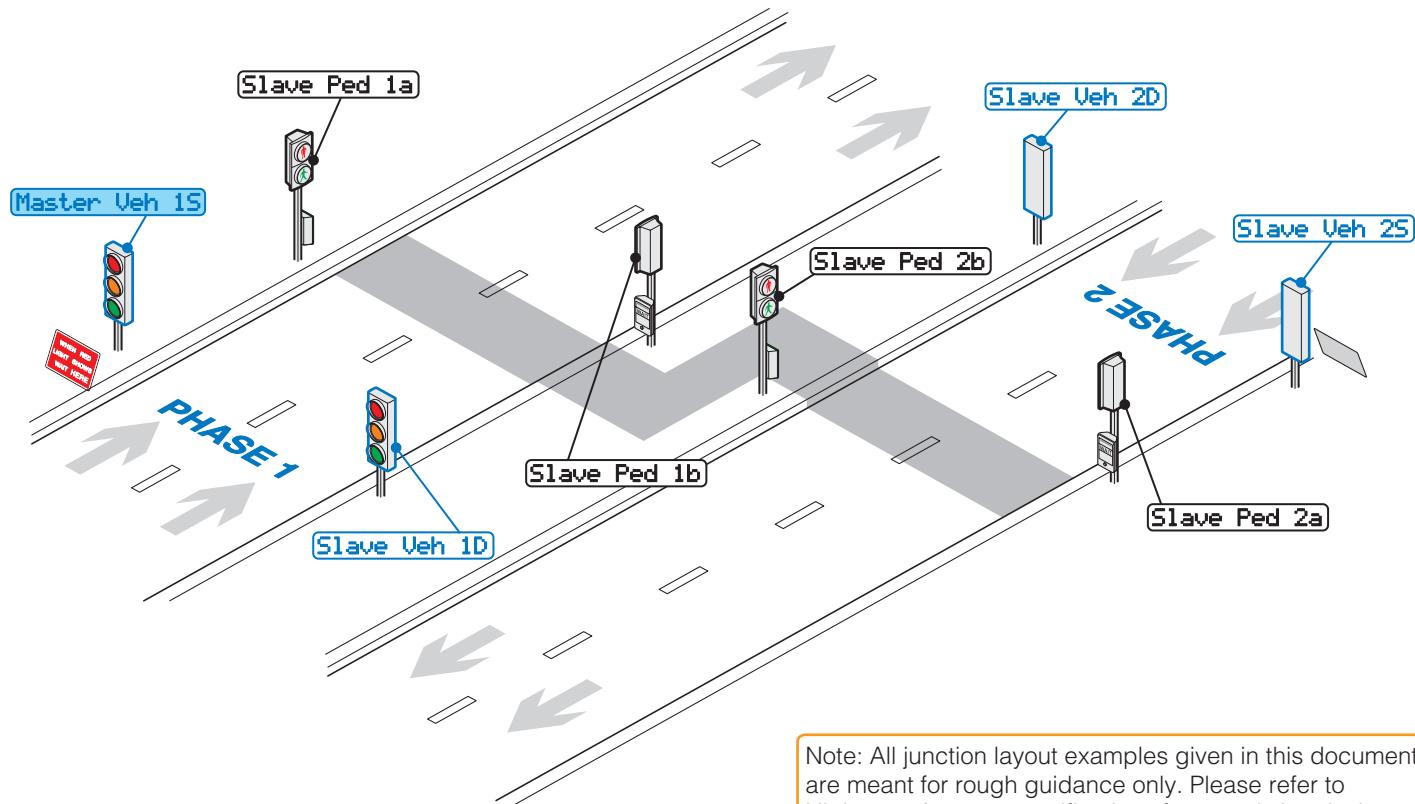


Example 5: Combined carriageway plus pedestrian crossings

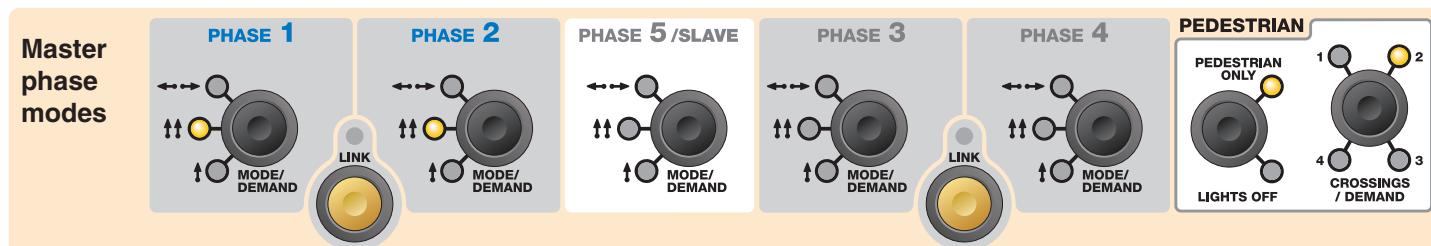
This example shows two linked pedestrian crossings that are staggered across two carriageways.

The layout uses the **PEDESTRIAN ONLY** mode to use the most appropriate settings.

Note: When the PEDESTRIAN ONLY mode is invoked, all active phases operate as one.



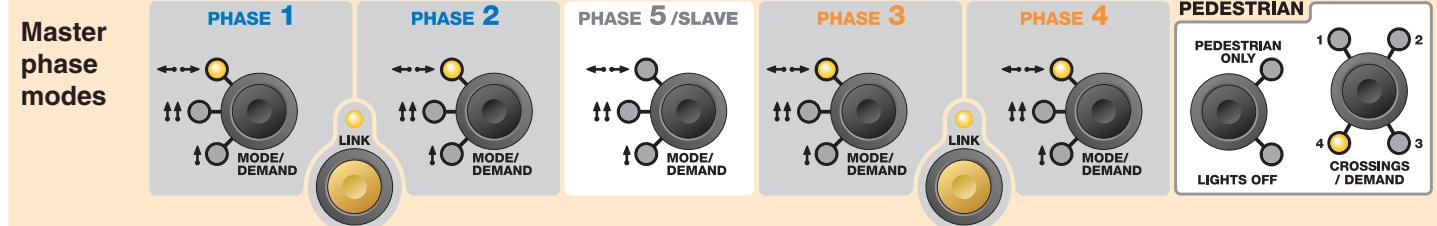
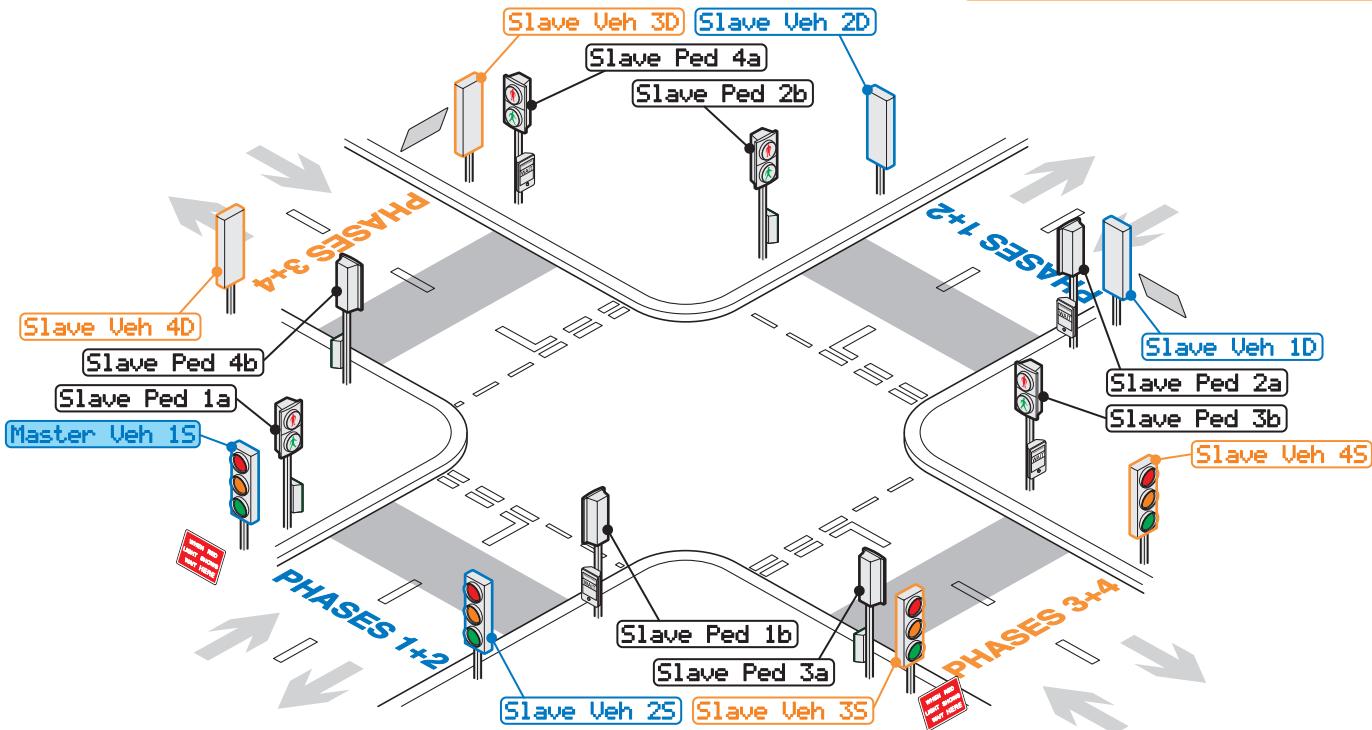
Note: All junction layout examples given in this document are meant for rough guidance only. Please refer to Highways Agency specifications for actual signal, sign and cone placements for any particular junction types.



Example 6: Two-way crossroad plus pedestrian crossings

This example shows a crossroad with two vehicle (linked) phases and four pedestrian crossings.

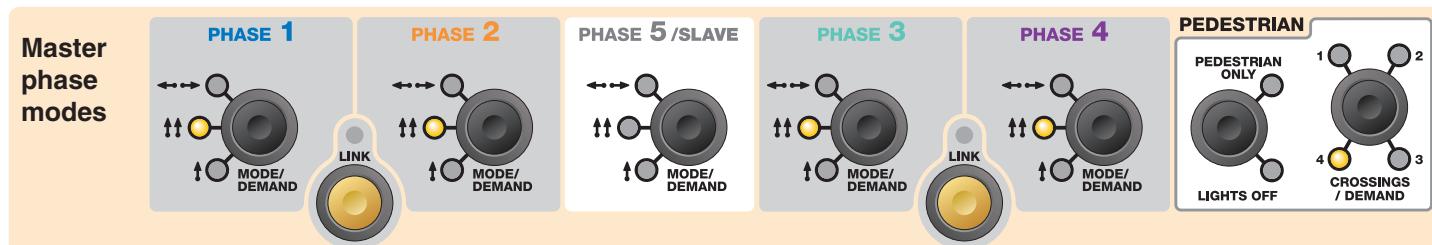
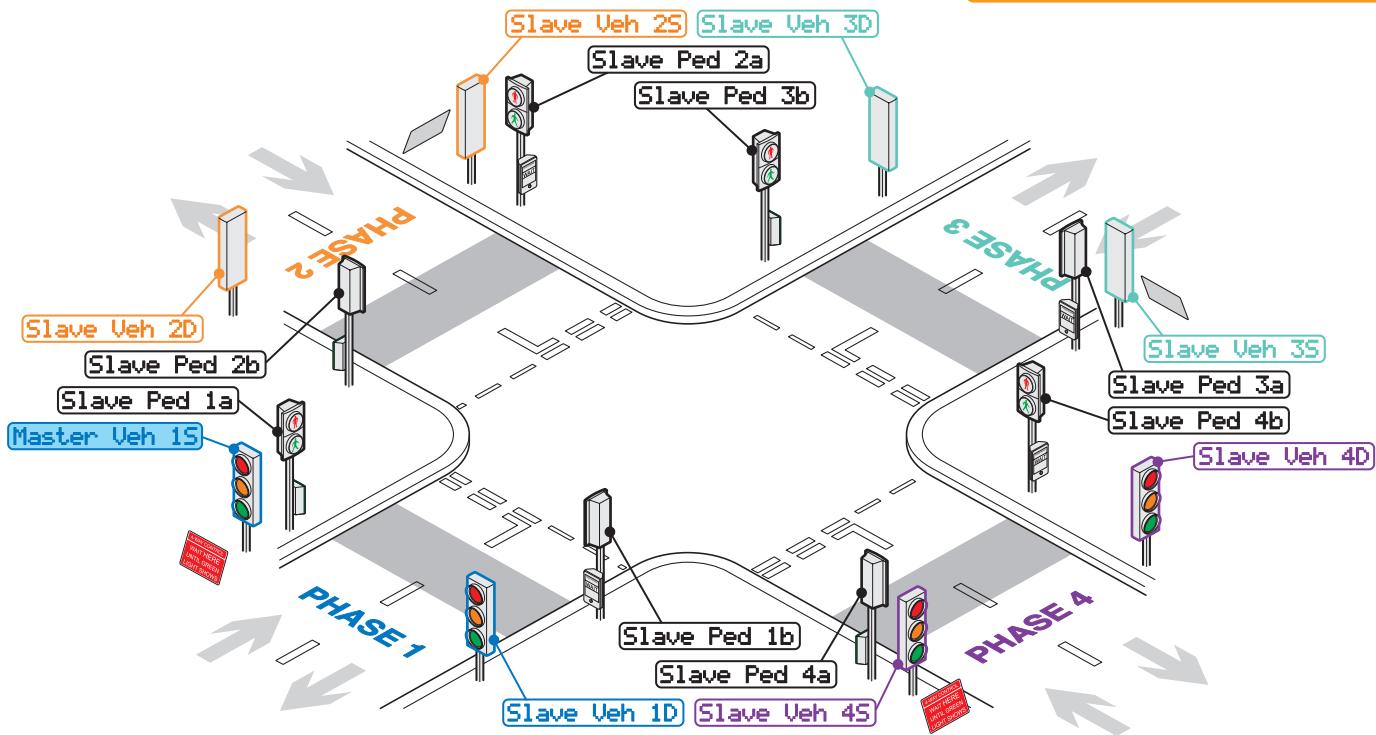
Note: All junction layout examples given in this document are meant for rough guidance only. Please refer to Highways Agency specifications for actual signal, sign and cone placements for any particular junction types.



Example 7: Four-way crossroad plus pedestrian crossings

This example shows a crossroad with controlled by four vehicle phases with four pedestrian crossings.

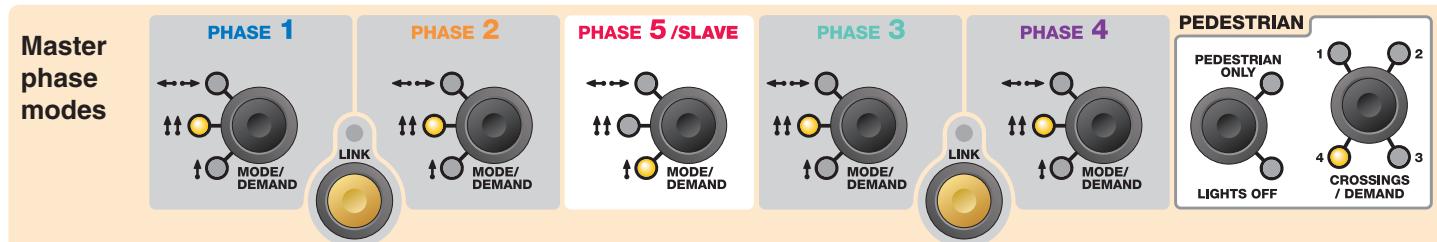
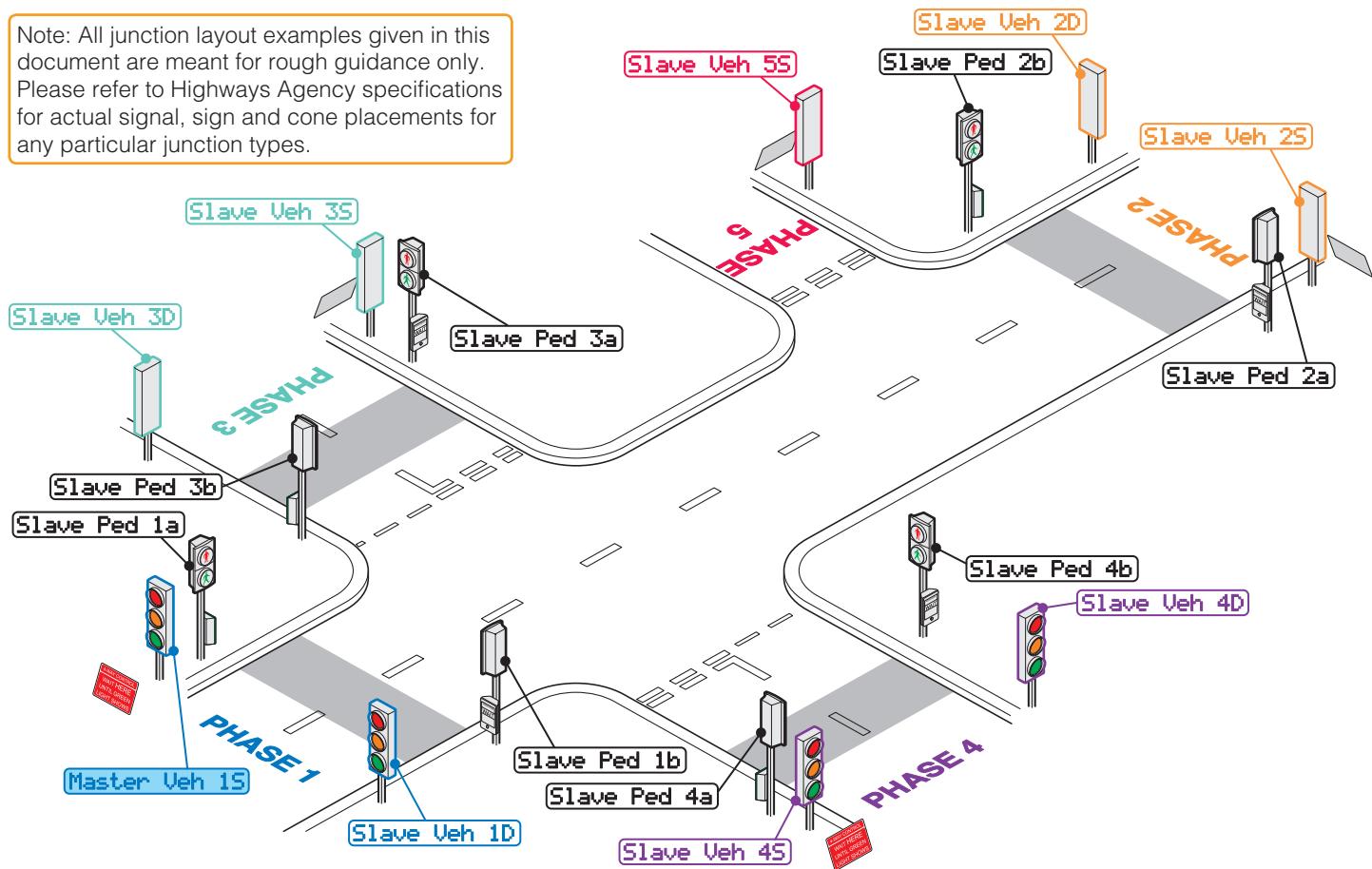
Note: All junction layout examples given in this document are meant for rough guidance only. Please refer to Highways Agency specifications for actual signal, sign and cone placements for any particular junction types.



Example 8: Five-way staggered junction plus pedestrian crossings

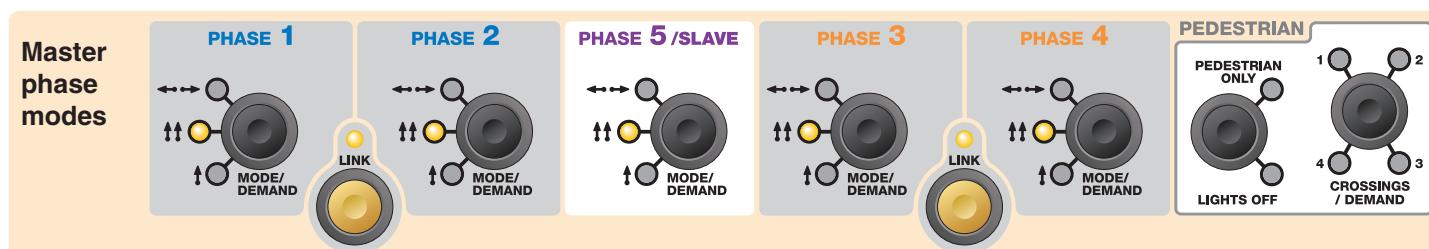
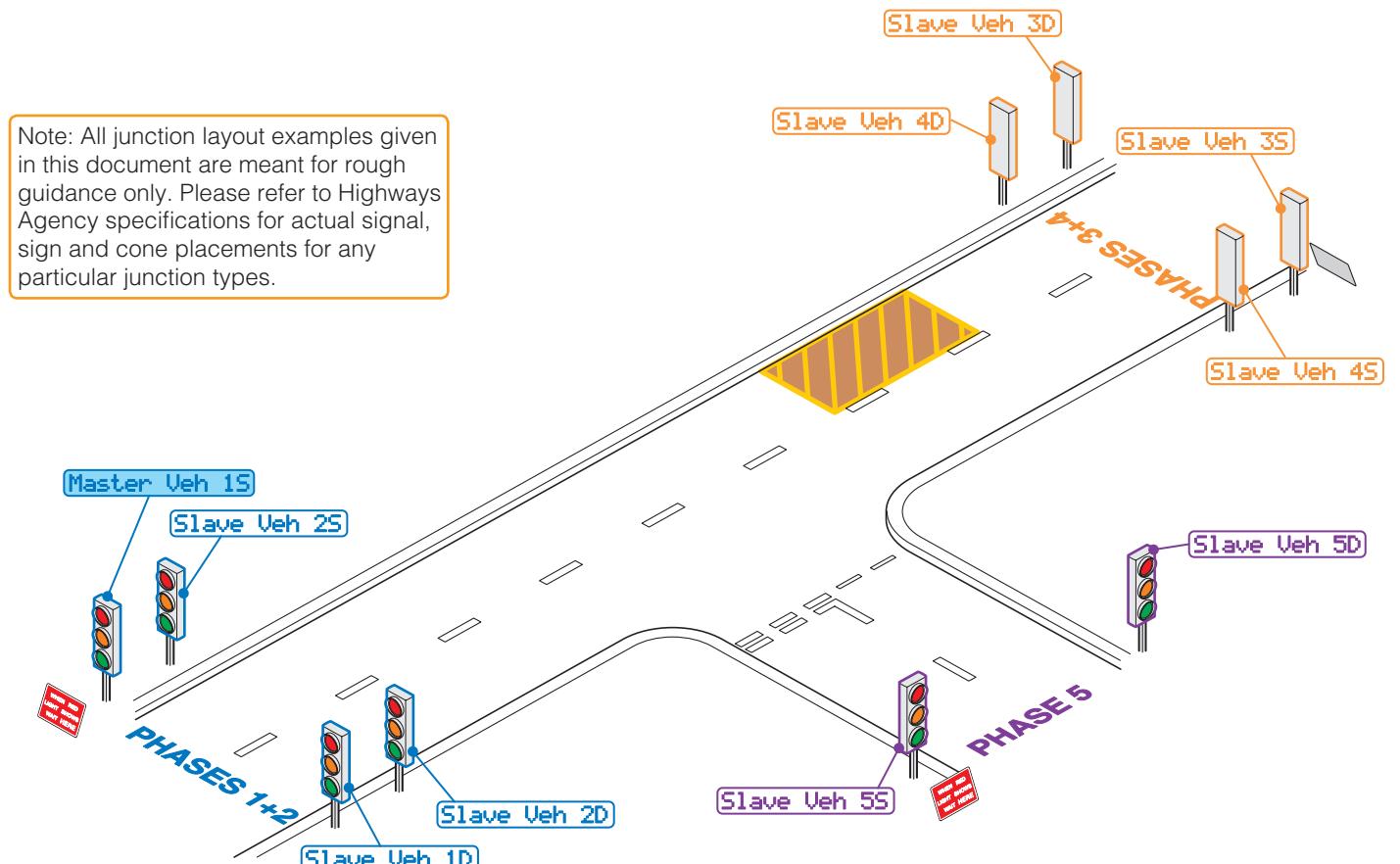
This example shows a major junction controlled using all five vehicle phases as well as four pedestrian crossings.

Note: All junction layout examples given in this document are meant for rough guidance only. Please refer to Highways Agency specifications for actual signal, sign and cone placements for any particular junction types.



Example 9: Fast carriageway with side road

This example shows the control of shuttle working on a fast carriageway with a side road.





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