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THE GREEN BOOK

XLEclipse® Trailer

Hybrid Tandem® Trailer

operator's guide

PSL1719 issue 1 rev d

Contents

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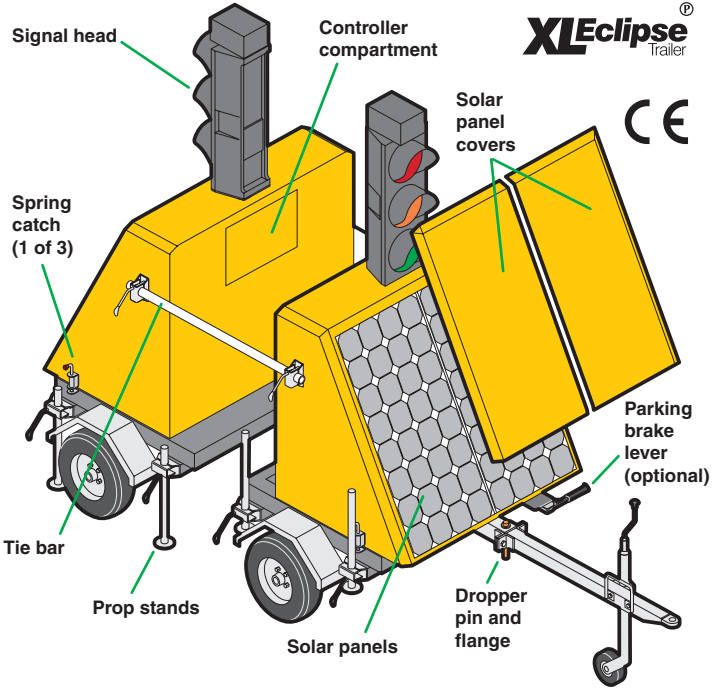
Introduction

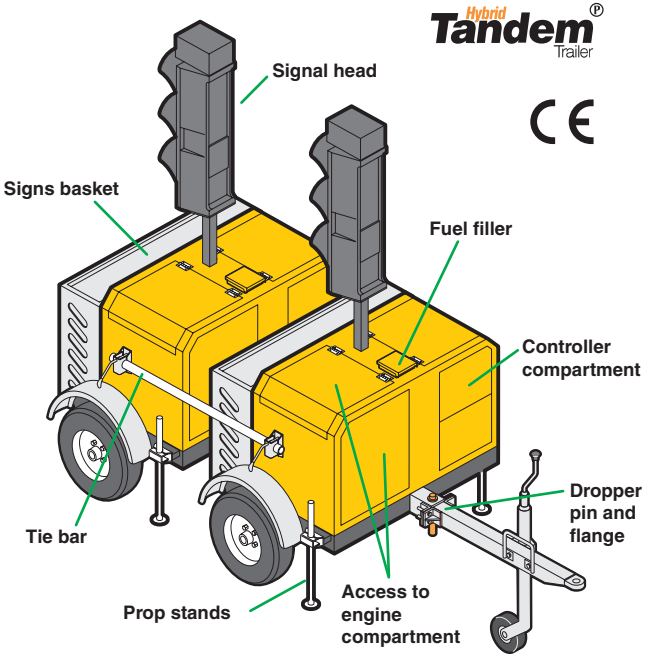
Welcome

Thank you for choosing a greener solution from Pike Signals. Both the Hybrid Tandem and the XL Eclipse are two-part compact trailers which are built to last and are quick to set up.

A combination of high capacity batteries, an efficient power source and a sophisticated power control system promote long run times and ensure minimal environmental impact. That's why these products are covered by our Green Book, reserved only for our most energy efficient systems.

This guide covers the maintenance and use of the trailer pairs as well as the internal power generation unit for the Hybrid Tandem.





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For details about traffic control aspects of the unit, please refer to the set up sheets and user guides specific to the installed control panel:

- **XL 2 Phase** PSL1654 (sheet) or PSL1648 (guide)
- **XL Multiphase** PSL1569 (sheet) or PSL1573 (guide)

Important

This system should be operated and maintained 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.

Maintenance

The Hybrid Tandem and XL Eclipse trailers share the same maintenance schedule covering the running gear of their paired trailer units. In addition:

- The XL Eclipse trailer pairs have bearings to support the rotation of the upper body which must be maintained on a regular basis to ensure easy operation - see **page 7** for details.

  The solar panels of the XL Eclipse trailers are fully self-contained and require no routine maintenance apart from keeping them clean in order to retain their operating efficiency.
- The Hybrid Tandem trailer pairs also have a separate maintenance schedule for their diesel engines that are used to charge the batteries - see **page 8** for details.

Trailer maintenance Hybrid Tandem® Trailer and XL Eclipse® Trailer

Fact: Your trailers will need servicing.

Undetected faults caused by lack of proper servicing are the major cause of breakdown or accidents involving trailers. Faulty lights, brakes and worn tyres being the most common. Make sure your trailer is serviced correctly.

Don't risk a brush with the law, maintain regular checks.

With the lack of a mileage recorder it can be difficult to assess when you need to service your trailers. If you intend to tow the trailers behind the same vehicle, then you could use the mileage recorder on the towing vehicle. However, if the trailers are to be towed by several vehicles it would he worth recording the mileage by asking the drivers concerned, and thereby keeping an accurate mileage.

Trailer maintenance schedule

First Service - 500 Miles or 2 Weeks

1. Check wheel bearing adjustment.
2. Check coupling fixing bolts.
3. Check wheel nuts, and tyre pressures.

Every 6,000 Miles or 6 Months

1. Check wheel bearing adjustment.
2. Check coupling fixing bolts.
3. Check wheel nuts, tyre pressures and condition.

Every 12,000 Miles or Annually

1. Check wheel bearing adjustment.
2. Re-grease wheel bearings with good quality lithium-based grease.
3. Check coupling for wear.
4. Check wheel nuts, tyre pressures and condition.

Details about the correct procedures are provided next.

Wheel bearings

Each trailer is fitted with taper roller bearings. If these are properly maintained, they will give trouble-free service. It is vital that the first service is carried out to ensure that these bearings are checked and adjusted if necessary, as initial bedding-in can increase the end float measurement during this period.

To check and adjust a wheel bearing

1 Chock the wheels on the opposite side from the one you are working on.

Note: It is advisable to loosen the nuts of the wheel(s) that are going to remove prior to jacking up the trailer.

2 Jack up the side that you are working on, making sure that the jacks are positioned under the axles and that the trailer is secure should the jack fail.

3 Remove the wheel and trim (if fitted), and prise off the grease cap. Ensure that all items are placed on a clean surface to prevent dirt contaminating the grease.

4 Carefully remove the split pin (you may need to use again).

5 Tighten the axle nut to pre-compress (10nm max. torque) and then back off the nut until the hub spins freely without any noticeable end float. This is usually approximately one or two castellations on the axle nut.

6 Insert a new split pin of the correct size through the castellated nut and the hole in the shaft. Bend the legs of the split pin around the nut to prevent it from coming out. Use the original split pin only if it is not damaged.

7 Pack the bearing with an uncontaminated good quality lithium-based grease that has a high melting point.

8 Replace the grease cap.

9 Replace the wheel and secure with the wheel nuts removed earlier. Tighten the wheel nuts using a torque wrench to 110Nm (75lbs/ft) and refit the trim (if fitted).

Wheel nuts

The wheel nuts must be checked for tightness after the first 25 miles of travel and again after 500 miles. Thereafter, they should be inspected at regular service intervals. The recommended torque settings should be applied using a torque wrench. Air driven nut runners should be avoided.

- M12 x 1.5 studs: 110Nm (75lbs/ft)

Jockey wheel

The telescopic jockey wheel has been pre-packed with grease and should only require periodical attention. This can be accomplished by winding out the inner section which can then be cleaned and re-greased.

IMPORTANT: The jockey wheel must be fully retracted before attempting to tow the trailer.

Towing eye

Check the towing eye regularly for signs of wear or damage. Check the fixings for tightness and general condition. Replace any worn items as necessary.

Suspension

The trailer is fitted with independent suspension units. The suspension units need no maintenance except for washing off any build-up of road dirt. Overloading of the trailers will cause damage to the suspension units.

Tyres

The trailers are fitted with 10" wheels with 145 x 10 radial tyres. The recommended tyre pressures are:

- Speeds below 62mph (100 kph) 32 psi
- Speeds above 62mph (100 kph) 35 psi

The same regulations apply to the tyres fitted to trailers as they do to any other vehicle. Ensure that the tread wear does not exceed legal limits.

Safety cable

Check the safety cable regularly for fraying or wear. Replace as necessary.

Trailer electrical system

The trailer is wired to international standards and is designed to accept the normal 12 volt DC supply from the towing vehicle. Make certain when connecting the trailer plug to the towing vehicle socket that both are dry and free from dirt.

To help protect the electrical contacts of the plug and socket from corrosion (and to promote good connections), occasionally spray them both with WD40 or a similar product.

Useful trailer information

Gross Vehicle Weight (GVW)

This is the maximum weight permitted for the complete trailer, including the load.

UnLaden Weight (ULW)

This is the weight of the trailer pair without any load.

Payload

This is the difference between the GVW and the ULW. This equates to the maximum load the trailers are legally entitled to carry.

Towing speeds

On motorways 60mph, dual carriageways 60mph, other roads 50mph provided no lower limit is in force and the total weight of the vehicle, trailers and load (GVW or 'train weight') is less than 7.5 tonnes. You are not allowed in the third lane of the motorway when towing under any circumstance.

Turntable bearing maintenance XL Eclipse® Trailer only

In order to assure trouble-free and smooth rotation of the upper canopy of each XL Eclipse, the turntable bearings require inspection and greasing on a regular basis.

Main turntable bearing

For normal use, this bearing should be greased **every two months** with a **general purpose grease** using a standard grease gun.

To access the grease nipples

1. Open the rear doors of the upper canopy to gain access to the inner compartment.
2. Locate the grease nipples located on the floor of the compartment, between the batteries.
3. Apply grease using a standard grease gun to each of the nipples.

Cup bearings

Each XL Eclipse unit has four cup bearings which help to support the outer reaches of the rotating upper canopy as it turns. The cup bearings used will be one of two types: Steel ball or Nylon ball. The latter (Nylon) type does not require greasing; for steel ball types, please adhere to the details given below.

Steel ball type cup bearings should be cleaned and greased **every two months** with a **graphite-type grease**.

To grease steel cup bearings

1. Unlock and rotate the upper canopy so that each cup bearing in turn is exposed.

   IMPORTANT: Ensure that the upper canopy cannot rotate unsupervised while maintaining the bearings - if necessary, ask a colleague to prevent further rotation while you work.
2. Clean the steel ball with a dry cloth, rotating the ball as you do so.
3. Apply a smear of graphite-type grease to the entire ball.
4. Rotate the upper canopy to gain access to the next cup bearing and repeat steps 2 and 3.

Diesel engine maintenance Hybrid Tandem® Trailer only

Each Hybrid Tandem trailer houses a Kubota OC60 engine linked to a flywheel generator to charge the storage batteries. The batteries then supply power to the signal controller and heads via the smart energy control panel.

This guide outlines various features which are particular to the Pike implementation of the engine. For all other engine maintenance features, please consult the accompanying Kubota OC60 Operator's Manual.

Diesel engine maintenance schedule

Because the engine is run at 2000rpm, well below it's usual capability, the recommended Pike maintenance schedule differs from the one given in the Kubota OC60 Operator's Manual.

Please use the following maintenance schedule:

Daily

1 Check the crankcase oil.
2 Check and replenish the fuel tank.
3 Check rubber hoses and clamp bands.

100 hours after initial operation

1 Change the crankcase oil.
2 Clean the exhaust tail pipe.

Before every 500 hours

1 Change the crankcase oil.
2 Clean the air filter.
3 Clean the fuel filter.

IMPORTANT: Accurate service records must be maintained to uphold the engine manufacturer's warranty.

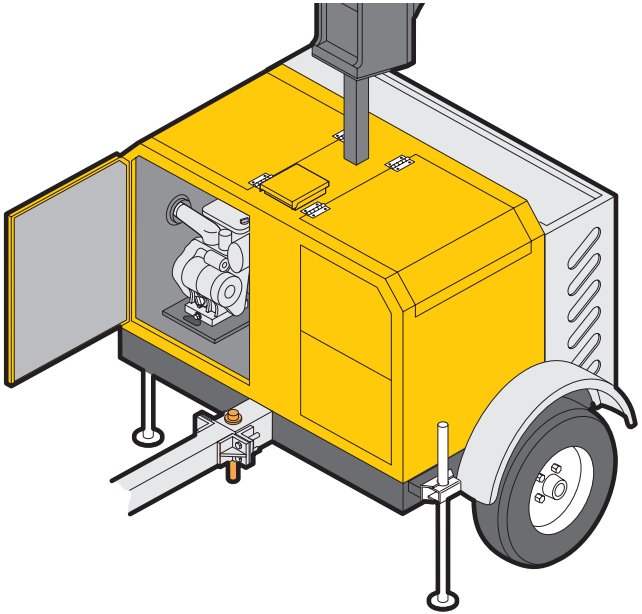
Accessing the engine

There are two main ways to gain access to the engine, from above or from the front, depending on what needs to be done:

Engine compartment front panel

Provides access to the oil filler and drain plug.

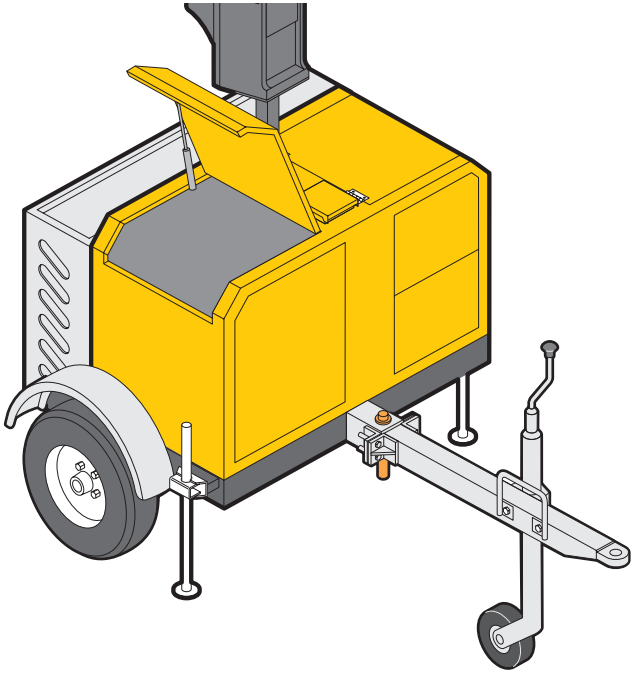
- Twist the two door locks on the left hand front panel door and open to reveal the front side of the engine.



Engine compartment top panel

Provides access to the rear of the engine and the speed adjuster.

1 Release the catch that secures the engine compartment top panel and raise the panel. A gas strut ensures that the panel remains open.



Oil

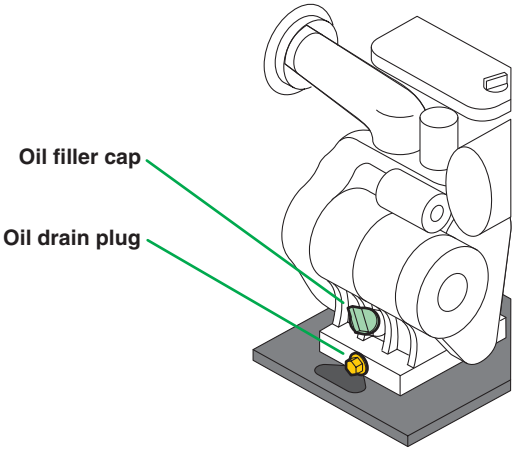
As with any combustion engine, use of the correct oil and a close adherence to the specified oil change schedule is vital to a long and reliable operational life. The oil strainer should be cleaned at every oil change.

To change the crankcase oil

1 Ensure that the trailer is level.

2 Run the engine until it is warm, then shut it off and remove the key from the ignition.

3 Place a suitable sized container below the oil drain pipe located underneath the trailer, below the engine compartment.



4 Use a 13mm spanner to remove the oil drain plug.

5 Remove the oil filler cap to allow the oil to drain out more freely.

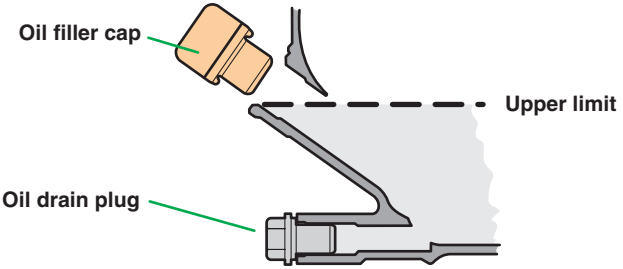
6 When all of the old oil has been removed, remove and clean the oil strainer as discussed in 'To clean the oil strainer'.

7 Once the oil strainer has been cleaned, replace it and the drain plug into their respective holes and tighten.

8 Use only **SAE 10W API CC** or **10/40W API CC**

*Note: It is very important that **CC** specification oil is used in order to keep coking to an absolute minimum (caused by continual running at a constant engine speed).*

Carefully pour new oil into the oil filler until the level reaches just below the lip of the filler port (the **Upper Limit**).



9 Replace the oil filler cap and finger tighten.

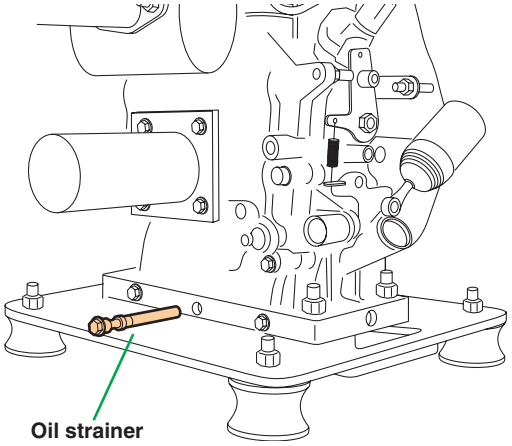
10 Ensure that the oil change is logged in the service record.

To clean the oil strainer

Note: The oil strainer uses three internal magnets to attract and retain metal fragments present within the crankcase oil. There's a limit to the quantity of fragments that can be retained and thus it is important to clean the strainer at every oil change.

1 Ensure that the engine is immobilised and that the oil has been removed, as discussed in 'To change the crankcase oil'.

2 Access the engine compartment from the front panel and use a 13mm spanner to remove the oil strainer.



3 Clean all traces of oil and fragments from the oil strainer using a suitable solvent.

4 Replace the oil strainer into its hole and tighten using the 13mm spanner.

Decoking the engine and exhaust

Due to the constant 2000 rpm engine speed used during normal operation, there is a tendency for the engine and exhaust to occasionally suffer from carbon deposits (coking). If left unchecked, coking will significantly degrade engine performance and efficiency. The use of CC grade crankcase oil will help with the prevention of coking, however, from time to time it will be necessary to temporarily increase engine revs in order to clear carbon deposits.

Coking symptoms

The most obvious sign of engine coking is an increase of smoke in the exhaust gases and increasing engine vibrations.

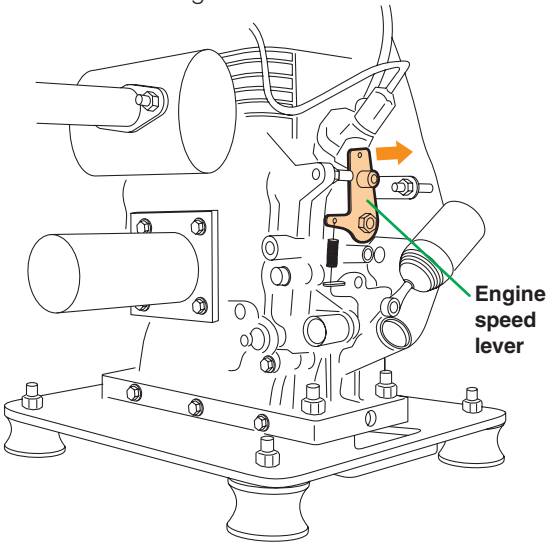
To decoke the engine and exhaust

1 Open the engine compartment top panel. See 'Accessing the engine' for details.

2 With the trailer positioned outdoors, start the engine in the usual manner.

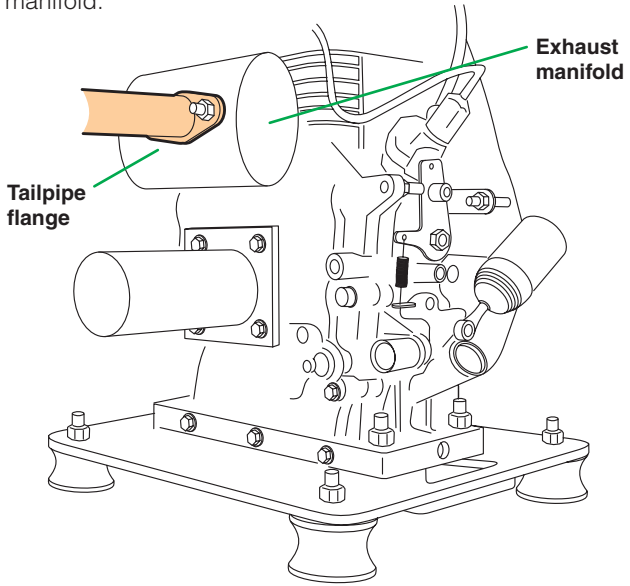
3 Push the engine speed lever over to the right in order to increase the revs. Keep the engine revs high until the exhaust gases begin to run clear.

4 Return the engine speed lever to its usual position and then power down the engine.



5 You now need to remove the carbon deposits from the exhaust tail pipe. However, you will need to leave time for the engine and manifold to cool down.

6 When the engine is cool, use a 13mm spanner to remove the two bolts that secure the tailpipe flange to the exhaust manifold.



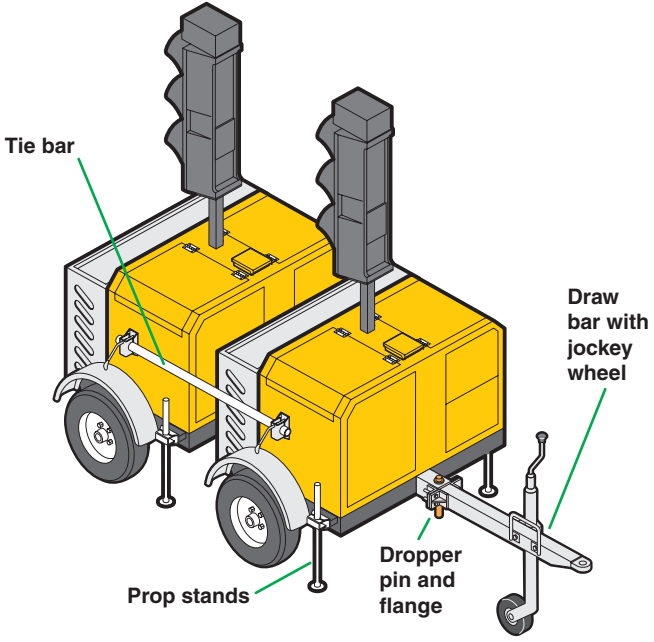
7 Remove the tailpipe and tip out the carbon deposits into a suitable container. It may be necessary to gently tap the tailpipe to remove any remaining deposits.

8 Refit the tailpipe and secure it using the two bolts removed earlier.

Preparations for towing

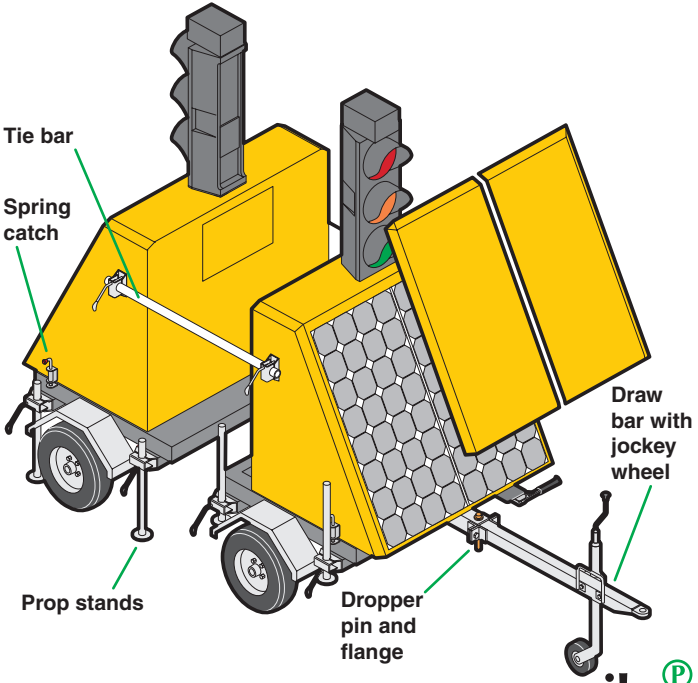
Follow these steps to ensure that the trailers are safe for towing:

1 Re-fit any removed draw bars. On the rear trailer, ensure that the dropper pin is in place. If flange plates are fitted to the draw bars, ensure that they are correctly bolted and tightened.



Extra XL Eclipse step: Unlock and rotate the main body so that the solar panels face in the same direction as the signal head. Install the solar panel covers and fasten correctly.

On each trailer, also ensure that the three spring catches are all engaged.



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2 On the front trailer, lower the jockey wheel and then raise and lock the prop stands. Release the parking brake, if fitted, and move the trailer to the rear half.

3 Back the front half onto the rear drawbar using the jockey wheel for height adjustment. The rear drawbar eye hitch should align with the front draw bar dropper pin hole. Fit the dropper pin and secure.

4 On the rear trailer, raise and lock the prop stands.

5 Fit the tie bars to each side of the trailers and ensure they are securely fastened. On the rear trailer, release the parking brake, if fitted.

6 Attach to the towing vehicle, ensure that the breakaway safety cable is correctly connected to vehicle tow bar assembly.

7 Re-connect the light board and check for correct operation.

Notes

- When connected to your towing vehicle, your trailer should stand in a level position. If this is not the case, you will in most cases be able to alter the height of your towing hitch.
- Vehicles whose rear axle is more than 1.5m from the towing ball (lorries with long body overhangs, etc.) can cause excessive forces to be applied to the trailer coupling and drawbar. These excessive forces can cause fatigue and damage even when the trailer is used within its stated load capacity.

Dropping off the trailers

1 Tow the pair of trailers to the first location.
Note: If the ground is not level, take extra care when installing equipment.

2 Lower and secure the prop stands on the rear trailer only.

3 If fitted, apply the parking brake on the rear trailer only.

4 Remove the tie bars on each side and store them safely.

5 Remove the front dropper pin and store it safely.

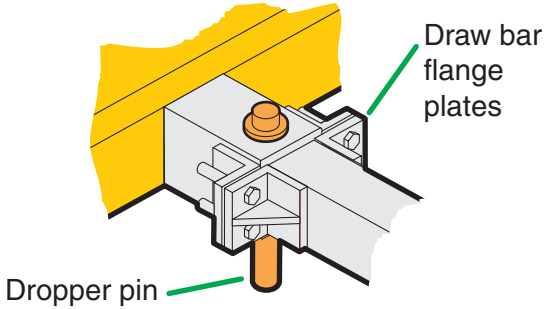
6 Disconnect the lightboard and carefully stow the cable (or remove the board).

7 Gently tow the front trailer away to the next location and then repeat steps 2 and 3.

Note: On the XL Eclipse, always ensure that the solar panel covers are in place before towing.

Removing and refitting the draw bars

If the trailers will be left in place for some time, it is advisable to remove the draw bars. This procedure should only be carried out by a suitably qualified operative.



Note: Earlier models use flange plates with two bolts instead of the four shown above.

Snaking

The trailer uses a superior suspension system to maximise towing stability, however, snaking cannot be ruled out.

Snaking is the effect when the trailer starts to sway from side to side. This is caused by several factors, the most common being:

- Excessive trailer weight to towing vehicle weight.
- Excessive speed.
- Blustery cross winds.
- Insufficient nose load on the coupling head.
- Excessive nose load on the coupling head.

Dealing with snaking

Although alarming when it happens to you for the first time, the correct response to snaking is to stay calm.

Steadily reduce speed, until the oscillation dampens naturally. If you attempt to hasten the process by heavy braking, this will merely intensify the effect.

Snaking is more likely to occur when travelling downhill. It can also occur whilst on a level road, but will rarely occur whilst travelling uphill.

If you intend to frequently carry full payloads at high speeds on motorways, we recommend that you fit a stabiliser. This will help to minimise the effects of snaking.

Towing speeds

- Motorways 60 mph
- Dual carriageways 60 mph
- Other roads 50 mph
  (Provided no lower limit is in force and the total weight of the vehicle, trailer and load is less than 7.5 tonnes.)

  Note: Vehicles towing trailers are not allowed in the third lane of the motorway under any circumstances.

Turning

When turning with a trailer, the overall length of the towing vehicle and the trailer effectively lengthens your overall wheel base. Consequently, it is necessary to compensate by slightly widening your turning circle to avoid curbing.

Reversing

Like any other skill, you will become an expert at reversing the trailer once you have practiced. Firstly, recommend that maximum use is made of your wing mirrors. These will enable you to detect the movement of the trailer with ease when reversing. Find a quiet area to practice the reversing skill; an industrial estate on a Sunday or during the evening is an ideal place to do this.

1. Begin with the trailer and towing vehicle in a straight line.
2. Move slowly backwards, gradually applying opposite wheel lock to the direction of the turn.
3. When your trailer is moving on the correct curve, transfer to normal steering lock and follow the trailer around the curve.
4. If you lose control whilst reversing, there is only one movement to make: Stop and then pull forward. If you continue to reverse, you will jackknife the trailer.

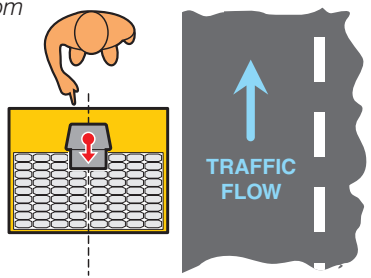
Operation

Setting up each trailer XLEclipse® Trailer only

1 Position and setup the signal heads in accordance with the publications: ‘Safety at Street works and Road Works – a code of practice’ and ‘An Introduction to the Use of Portable Vehicular Signals’ (Pink Book).

IMPORTANT: Ensure that you remain facing the traffic when configuring the unit.

view from above

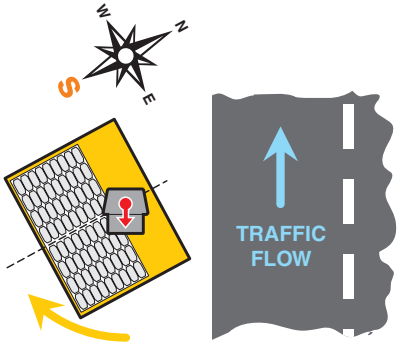


2 Determine the direction of due south.

3 Pull up and lock off each of the three spring catches. They are located on either side and also at the rear of the main body.

Spring Catch x 3
To lock off: Lift and turn to the side.

4 Carefully rotate the body of the unit so that the solar cells face due south to ensure maximum efficiency. Ensure that the prop stands do not obstruct canopy rotation.



5 Engage the rear spring catch to lock the body into place.

Note: For the protection of the solar panels, you are recommended to fit the solar panel covers at the end of each day.

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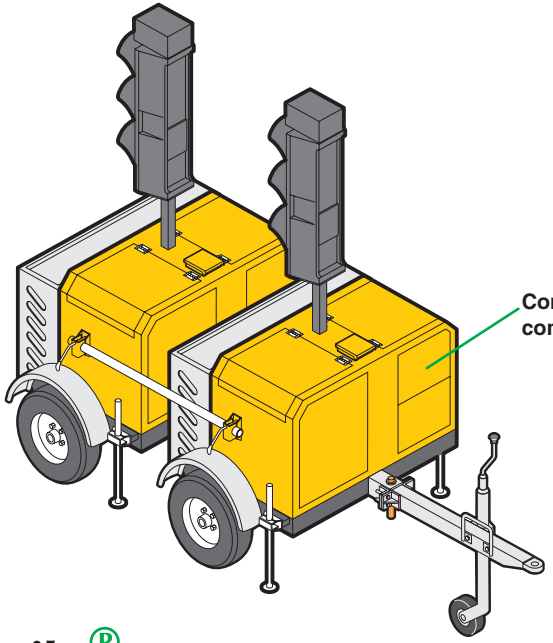
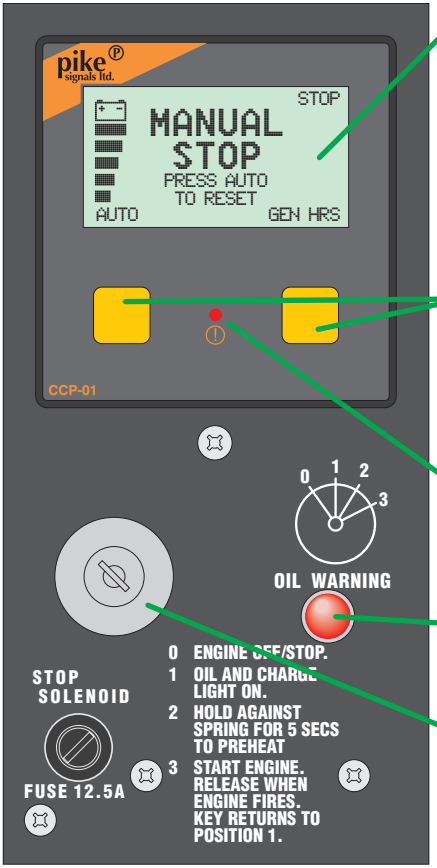
Using the power control system Hybrid Tandem® Trailer only

The Hybrid Tandem trailers each contain an intelligent power control system which continually monitors the condition of the installed storage batteries. When required, the control system will automatically start the diesel engine and monitor the charging progress - the engine is cut as soon as the batteries reach the appropriate charge level. This approach provides long leave times and also minimises environmental impact by greatly reducing the periods for which the engine is running.





Information screen Central area shows primary information. Top right corner shows additional information. The lower corners show what will happen if you press either of the yellow soft buttons.

Soft buttons - The current function for each button is listed in the lower left and right corners of the screen.

Fault indicator - Lights when an error occurs. A buzzer will also sound.

Oil warning indicator - Lights when the engine oil level is critically low.

Keyswitch - Secondary method to control engine operation. In automatic mode, leave the key at position **0**.

Starting operation

1 At rest, the screen will display:

2 Press the AUTO soft button (the yellow button on the left, directly below the AUTO prompt on the display). The unit will change into automatic mode and the screen will display:

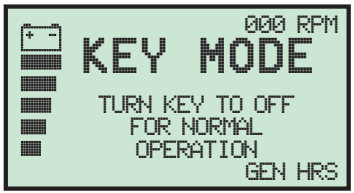
When the engine is running in automatic mode, the screen will show the battery charge level, the engine speed and also indicate the soft button options to manually STOP the engine or view the GEN HRS (see right).

Depending on the charge condition of the battery, the unit will either start the engine immediately or wait until charge falls to a preset level.

You do not need to make any further adjustments for normal operation.

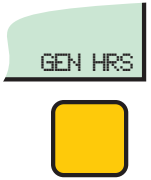
Key mode

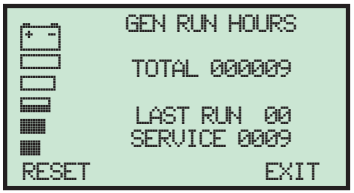
If the key is used to override the automatic system, the screen will display this information:



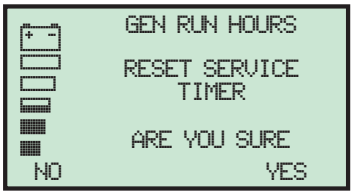
GEN HRS option

In most modes, the right soft button allows you to view the total running time and running hours since last service for the generator engine.





When selected, you can then choose to **RESET** the service timer:



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Warranty

These products 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.

For further information, please contact Pike Signals either by email (enquiries@pikesignals.com) or telephone (0121 359 4034).

Disposal of waste oil

Consider the environment, dispose of properly. Always observe Control of Substances Hazardous to Health (COSHH) regulations. Telephone 0800 66 33 66 to find the location of your nearest oil bank.

Disposal of batteries

The disposal of waste automotive batteries in landfill and by incineration is banned. You can request a free collection of batteries from any producer who currently supplies new batteries, or contact Pike Signals either by email (enquiries@pikesignals.com) or telephone (0121 359 4034).

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pike signals ltd.

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