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NE190 CONTROL PANEL



When fitted, NE190 control panel is used to control the use of the leisure, and when available, the tow vehicle engine battery, along with the internal water pump. The panel also provides information on the status of the supplies available, including fresh water tank levels when a water tank is fitted.

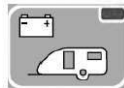
The control panel features an LED display which presents information via three characters, along with LED indicators to show when circuits are in use and if a 230v supply is present. Each time a button on panel is used the LED character display will illuminate, along with the relevant LED indicators - after 30 seconds of control panel inactivity, (i.e. no button presses), the character display will extinguish, and the LED indicators will dim down to a lower intensity, to reduce glare.

CONTROL PANEL BUTTONS

Battery selection buttons

The 12v system will operate from the battery charger, with no batteries in circuit. When the battery charger is switched on, power will be available to the control panel, and to the appliances and lighting in the caravan.

Either the leisure battery, or the vehicle battery in the tow vehicle, can be put 'in circuit' using the battery select buttons. When a battery is in circuit it will be discharged by lights or other 12v appliances which are switched on, but that battery will then also be able to receive charge from the battery charger, when that charger is operating.

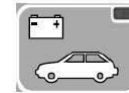


To put the leisure battery in circuit, first ensure that a leisure battery is present and correctly connected. Pressing the leisure battery button indicated above will then place the battery in circuit, and the LED indicator in the corner of the button will illuminate to confirm the selection. Pressing the leisure battery button again takes the battery back out of circuit.

The control panel monitors the voltage of the leisure battery, and if that voltage falls below 10.0volts for more than 2 minutes, then the

system will automatically take the battery out of circuit. This is to protect the battery from complete discharge. It is likely in this situation that the charger will not be operating, and so, without power, the system will switch off.

When preparing for a journey, which requires 12v fridge operation, place the leisure battery in circuit. In this way a supply is available to set the fridge for 12v operation. The control panel should be left in this state during the journey. When the tow vehicle engine is started, all the appliances and lights will be isolated, except for the fridge, and charge from the alternator will also be directed to the leisure battery.



To put the tow vehicle engine battery in circuit, first connect the tow vehicle to the caravan via the 13-pin towing connection. Pressing the vehicle battery button will then place the tow vehicle engine battery in circuit, and pressing the button again will take the battery back out of circuit.

Please note that this battery should only be used in emergencies, as discharging this battery will mean that the engine of the tow vehicle will not start. As with the leisure battery, the system will monitor the voltage of the tow vehicle battery when it is in circuit, and take the

battery out of circuit if that voltage is low. The threshold for taking the vehicle battery out of circuit is 10.5volts.

Pump Button



Pressing this button will turn the internal pump on, and the LED next to the button will illuminate to confirm this. If the LED is a constant light, the pump is on but not currently pumping water. If the LED is flashing, the pump is actually operating, i.e. attempting to pump water.

Tick (display) Button



The 'tick' button on the panel can be used to illuminate the LED's without changing any settings.

LED Displays

At the upper left corner of the control panel a graphic representing a mains plug is present. The LED indicator adjacent to this will illuminate when a 230v supply is present. (The signal to determine this is generated by the battery

charger and so relies on the charger being operational)

The character display is capable of showing the charger output or battery voltage present, and, if fitted, the fresh water tank level.

If not already displayed, press the tick / display button to illuminate the character display. A voltage will be shown, which will reflect whether the charger is ON and if a battery is in circuit in the following ways:

If the charger is operation and no batteries are in circuit, the voltage displayed will be the output voltage of the charger

If the charger is off, and a battery is in circuit, the display will show the voltage of that battery

If the charger is operational, and a battery is in circuit, then the display will show the resulting voltage of the battery charger charging the battery which is in circuit.

If a water tank with level sensor is fitted, and a voltage is being displayed on the control panel, a further press of the tick button will change the display to show the amount of water in the fresh tank. This will be shown in the following format:

0-4

The fresh water tank is empty, or at least the level is below ¼ (25%)

1-4

The fresh water tank is approximately ¼ full (25%)

2-4

The fresh water tank is approximately ½ full (50%)

3-4

The fresh water tank is approximately ¾ full (75%)

4-4

The fresh water tank is full



Electrics

Service Items

The control panel can display error messages in certain cases when a problem arises, as follows:



OVERLOAD PUMP – The pump is drawing a current higher than expected, and as a precaution the power to the pump has been disconnected. Contact your dealer for assistance.

Please note – As the pump is monitored, if the pump is replaced, the same type should be used as a replacement.



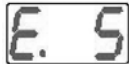
OVERVOLTAGE – The charger is supplying too high a voltage, and the batteries and appliances / 12v circuits have been disconnected to protect them: Contact your dealer for assistance. In the meantime it may be possible to re-start the system using the leisure or vehicle charger only (i.e. with the charger OFF)



NO CONNECTION – There is a problem with the harness or connections between the control panel and its associated fusebox. Contact your dealer for assistance.



LOW BATTERY – The system cannot operate because the voltages of all available supplies are below 9.0volts. Check all supplies and/or recharge batteries as appropriate.



TANK LEADS PROBLEM – Only if a water tank with level sensor is fitted. There is a problem with the harnessing or connections between the fusebox and the water level sensor. Please contact your dealer for assistance.

NE183/NE225 CONTROL PANEL



When fitted, the above control panels are used, with their associated fusebox installations, to energise and isolate all of the 12v circuits in the caravan, with useful information displayed on the panel's central LCD screen.

The most common functions are controlled directly by the buttons on the centre and left of the control panels. In addition, the buttons on the right of the control panels can be used to adjust control panel settings, and are used in conjunction with menus on the control panel's display.

When the control panel is being used, a backlight is present for the LCD display, and LED's will illuminate next to buttons as appropriate (see details below). After a period of inactivity, the LCD backlight will switch off, and the intensity of the LED's will reduce, to avoid night-time glare.

Control panel button operations



Control panel ON / OFF

This button is the ON / OFF button for the control panel.

When the control panel is turned on using this button, the system will check for an available power source, from the leisure battery, charger, or if connected, tow vehicle battery. The system can run from the charger alone if no batteries are present.

When the control panel is OFF, power consumption is reduced to an absolute minimum.

Battery Selection



It is possible to manually select which battery is connected to the 12v circuits within the caravan. When a battery is in circuit, it can be discharged by any 12v appliances or lights which are switched on, but can also receive charge from the battery charger, when that charger is operating.



Pressing this button will put the leisure battery in circuit, and this will be confirmed by illumination of the LED next to the button.

Pressing the button again would take the battery back out of circuit.

The control panel monitors the voltage of the leisure battery, and if that voltage falls below 10.0volts for more than 2 minutes, then the system will automatically take the battery out of circuit. This is to protect the battery from complete discharge. It is likely in this situation that the charger will not be operating, and so, without power, the system will switch off.

When preparing for a journey, the leisure battery should be selected to enable the subsequent setting of the controls on the fridge - The control panel should then be left in this state during the journey. When the tow vehicle engine is started, all the appliances and lights will be isolated, except for the fridge, and charge from the alternator will also be directed to the leisure battery.



Pressing this button will put the tow vehicle engine battery in circuit, when the tow vehicle is connected via the 13-pin towing connection. As with the leisure battery and LED will



Electrics

illuminate next to the button to confirm that the battery is in circuit

As with the leisure battery, the system will monitor the voltage of the tow vehicle battery when it is in circuit, and take the battery out of circuit if that voltage is low. The threshold for taking the vehicle battery out of circuit is 10.5volts.

Pump operations

Depending on the specification of the caravan, one or two water pumps will be fitted, and this button is the ON / OFF button for the supply to those pumps.



Pressing this button will turn the internal pump on, and the LED next to the button will illuminate to confirm this. If the LED is a constant light, the pump is on but not currently pumping water. If the LED is flashing, the pump is actually operating, i.e. attempting to pump water.



As with the NE183-T56, p pressing this button will turn the internal pump on, and the LED

next to the button will illuminate to confirm this. If the LED is a constant light, the pump is on but not currently pumping water. If the LED is flashing, the pump is actually operating, i.e. attempting to pump water.

In addition, the tank fill system will be working in the background. The tank fill system monitors the water level in the internal / under floor fresh water tank – If that level is below ½ (50%), then the external pump and the tank fill solenoid will be switched on, and the external pump will run to fill the internal tank. The external pump will continue to run until either the water level in the fresh tank reaches full (100%), or, a time limit of 15 minutes is reached.

The time limit is in place as the water level in the external container is not monitored – if after 15 minutes the external pump is still running, it is assumed that the external container will be empty, and so the external pump is switched off to protect it from damage. Once the external container is replenished, pressing the pump button on the control panel twice, to switch the pump OFF and then ON, will re-start the tank fill system.

Lighting Controls



Two groups of 12v lights are controlled directly from these buttons on the control panels – pressing one of the buttons will turn that group of lights on; pressing the button again will turn that group of lights off.

Which group of lights is controlled by which button, is dependant upon the model of caravan.

LCD Display and Display / Menu Controls

The LCD screen will initially display the following information:

Internal temperature (Small figure shown on degrees centigrade)

Whether mains is present - this is determined by the operation of the battery charger, and is shown as a lighting flash symbol

The current time and date

Whether the alarm has been set (shown as a bell symbol)

The information displayed on the screen can be changed:

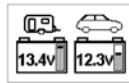


Pressing this button momentarily will change the information displayed on the control panel, and will acknowledge any warning messages displayed on the control panels display.

When pressing the button to show different information, the display will cycle between the following 'pages':



If a water tank is fitted, the above page will be displayed showing the amount of water present in the fresh water tank. This will be in the format 0, 1/4, 1/2, 3/4, FULL. If no further buttons are pressed, this screen will be displayed for 30 seconds, and the display will then return to the clock page.



On this page the voltages of the leisure battery, if present, and the vehicle battery, if the tow vehicle is connected at the tow bar, will be shown. If neither battery is available, the screen will instead show the voltage as generated by the charger.

Control panel settings



If the above button is pressed and held for a few seconds, the control panel will enter a settings menu. Once in the settings menu, the buttons on the right of the control panel are used to navigate the menu:



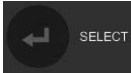
These buttons allow scrolling up and down a list of settings that can be adjusted, or, if a setting is being adjusted, increase or decrease the value of that setting.



This 'cancel' button is used to exit the adjustment of a setting and save that adjustment.



Electrics



This 'return' button makes a setting available for adjustment.

A typical sequence, to adjust a setting would be:

1. With the control panel on and the clock page visible, press and hold the 'tick' or 'display' button (central on panel)
2. The panel now enters the settings menu. Pressing the UP and DOWN buttons on the right hand side of the control panel scroll's through various settings that can be adjusted.
3. Locate the page of settings which requires changes, (for instance the time) and press the RETURN button on the bottom right hand side of the control panel.
4. The panel will now enter the 'page' of settings, and text on that page will flash.
5. Pressing the UP or DOWN buttons on the right of the panel will now adjust the value of the text which is flashing – in the

example of the time the numbers shown will increase or decrease depending which button is pressed.

6. Once the number or status of the flashing text is as required, press the RETURN key on the panel. A different item of text will now flash, which can be adjusted in the same way (using the UP or DOWN buttons).
7. Once all the items on the page have been adjusted, when the RETURN key is pressed the changes will be saved and the display will return to the settings menu.
8. At this point the UP or DOWN keys can be used to select another page of settings to adjust, or, the CANCEL key (immediately above the RETURN key, carrying a 'C' symbol) can be pressed which will return the display to the clock page.

The menu system allows adjustment of the following settings:

- Time and date
- Adjustment / setting of an alarm clock (which sounds for 30 seconds)
- Enabling / disabling of a fresh water tank alarm. When this alarm is enabled, and a water tank is fitted, the alarm will sound when the water level is zero, and the water tank level display will be shown on the LCD panel. Pressing the tick/display button will acknowledge this alarm.

- Battery voltage alarms. This sounds an alarm ahead of the low battery cut off feature described earlier. When this alarm sounds, the voltage display is shown on the LCD panel.
- Enabling / disabling of an audible beep each time a control panel button is pressed.
- Adjustment of the brightness level of the LED's adjacent to the control panel buttons. This controls the reduced intensity which the LED's default too when no control panel buttons have been pressed. A set of concentric circles will be displayed, with more circles representing a higher intensity.

Service Items

The control panel is fitted with a Lithium 3v CR2032 button-type battery, which is used to maintain clock and other control panel settings. This battery can be accessed by removing the trim piece from the perimeter of the control panel, releasing the screws fixing the panel to the furniture and looking at the rear of the panel. Also on the rear of a panel is a contrast adjustment facility, which adjusts the contrast of the LCD display.

The following messages may appear on the LCD panel if there is a fault:

NO CONNECT – There is a problem with the harness or connections between the control

panel and its associated fusebox. Contact your dealer for assistance.

OVERLOAD PUMP – The pump is drawing a current higher than expected, and as a precaution the power to the pump has been disconnected. Contact your dealer for assistance.

Please note – As the pump is monitored, if the pump is replaced, the same type should be used as a replacement.

OVERVOLTAGE – The charger is supplying too high a voltage, and the batteries and appliances / 12v circuits have been disconnected to protect them: contact your dealer for assistance. In the meantime it may be possible to re-start the system using the leisure or vehicle charger only (i.e. with the charger OFF)

EC400 POWER CONTROL SYSTEM

1. INTRODUCTION

This section of the handbook will guide you through the operation of the electrical system.

Further technical details are contained in section 3 or in the supporting technical manual available from www.sargentltd.co.uk

For the safe operation of all electrical equipment within your Leisure Vehicle it is important that you read and fully understand these instructions. If you are unsure of any point please contact your dealer / distributor for advice before use.

The system has a number of key components that you will need to be familiar with before attempting to use the system, these are:

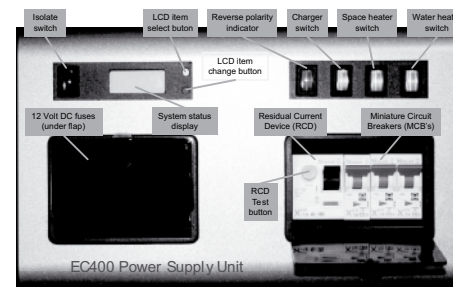
- The Power Supply Unit (PSU) - a combined mains consumer unit, 12V controller and intelligent charger unit located in the bed box.
- The Control Panel (CP) - a remotely located user control panel used to turn circuits on and off and to display battery and water tank information. This panel is uses simple straightforward controls and reliable data communication to the PSU.

- Road Light Fuse Box - This small unit is located in the front offside bed box. The unit houses fuses for the road lighting circuits and supplies from the tow vehicle, and also has connectors for the optional alarm system and Automatic Trailer Control (ATC) unit.

2. USING THE SYSTEM

2.1 Power Supply Unit - Component Layout

The PSU is located in the front offside bed box area.



2.2 Activating the System

The EC400 system has a shutdown feature that can be used when the vehicle is in storage. This allows the leisure electronics to be turned off when not required to save battery power. When in the off state the alarm and tracking system supplies are still active, all other supplies are turned off.

Electrics

Before using the system please ensure the system 'Isolate' switch is in the on position (button in).

2.3 Connecting to the Mains 230V supply and Safety checks

For your safety it is IMPORTANT that you follow these connections instructions each time your Leisure Vehicle is connected to a mains supply. This section assumes that the system is complete and that a Leisure battery has been installed (see 3.4).

A) Ensure suitability of the Mains Supply.

Your Leisure Vehicle should only be connected to an approved supply that meets the requirements of BS7671 or relevant harmonised standards. In most cases the site warden will hold information regarding suitability of supply. If using a generator you also need to comply with the requirements / instructions supplied with the generator. Please note that some electronic generators may not be compatible with your leisure system. Further generator operational information is contained elsewhere in this manual.

B) Switch the PSU internal Power Converter OFF.

Locate the green 'Charger' power switch on the PSU and ensure the switch is in the off position (button out) before connection to the mains supply.

C) **Connect the Hook-up Lead.** Firstly connect the supplied hook-up lead (orange cable with blue connectors) to the Leisure Vehicle and then connect to the mains supply.

D) **Check Residual Current Device operation.** Locate the RCD within the PSU and ensure the RCD is switched on (lever in up position). Press the 'Test' button and confirm that the RCD turns off (lever in down position). Switch the RCD back to the on position (lever in up position). If the test button failed to operate the RCD see section 3.10.

E) **Check Miniature Circuit Breakers.** Locate the MCB's within the PSU (adjacent to the RCD) and ensure they are all in the on (up) position. If any MCB's fail to 'latch' in the on position see section 3.10.

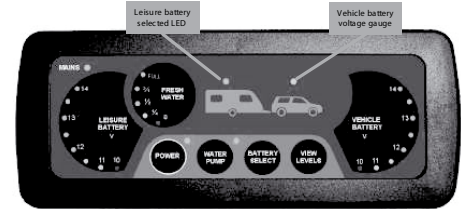
F) **Turn the PSU ON.** Locate the black 'Isolation' button and ensure it is in the on position (press button in). Locate the green 'Charger' switch on the PSU and turn to the on position (press button in). The charger switch will illuminate when turned on.

G) **Check correct Polarity.** Locate the 'Reverse polarity' indicator on the PSU and ensure that the indicator is NOT illuminated. If the indicator is illuminated see section 3.10.

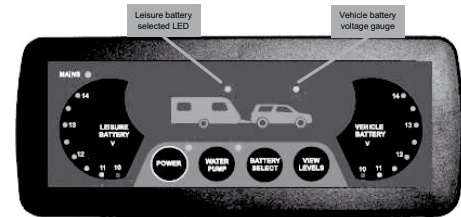
H) **Check operation of equipment.** It is now safe to operate the 12v and 230v equipment.

2.4 Control Panel - Component Layout

Depending on your type of vehicle the control panel will vary in specification. Not all features are present in all vehicles. Please refer to the following diagrams to identify your control panel.



EC446 Caravan Control Panel



EC441 Caravan Control Panel

2.5 Control Panel Operation

- **Power Button.** Press the power button to turn the leisure power on. Press the button again to turn the power off. The adjacent LED will illuminate when the power is on, and also the voltage of the selected battery will be displayed on the voltage gauge.
- **Pump Button.** With the power on, press the pump button to turn the water pump on. Press the button again to turn the pump off. The adjacent LED will illuminate when the pump is on, and also the level of the water tank will be displayed on the water gauge. Depending on the model of PSU, the pump button will control the internal or external pump and the tank fill feature.
- **View Levels.** To display the battery voltage levels and the water tank levels on the control panel gauges, press the levels button. The display will remain illuminated for 10 seconds.
- **Battery Select.** By default, the leisure battery is selected as the power source if no mains supply is present, or as the battery to be charged when the mains supply is available. To change the selected battery, press the battery select button. The selected battery is indicated by an LED adjacent to the caravan or car logo (for caravans) or the LED situated in the centre of the leisure and vehicle battery gauges

2.6 Operation while driving

The EC400 system is designed to shutdown parts of the system while the engine is running. This is to meet Electro Magnetic Compatibility (EMC) regulations and to ensure the safe operation of the caravan.

Please ensure the system isolation switch on the PSU is in the on (button in) position before driving (see 2.2). This will ensure the electronic system is active and will therefore be able to control the charging process, supply the refrigerator and monitor other system circuits.

3. SYSTEM TECHNICAL INFORMATION

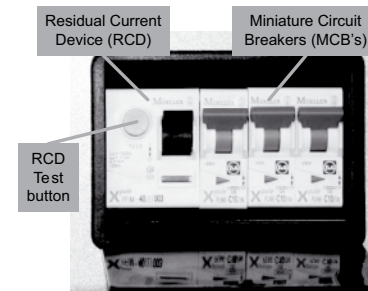
The following section provides further technical information relating to the electrical system. You can also access the supporting technical manual from www.sargentltd.co.uk

3.1 Residual Current Device & Miniature Circuit Breakers

The Residual Current Device (RCD) is basically provided to protect the user from lethal electric shock. The RCD will turn off (trip) if the current flowing in the live conductor does not fully return down the neutral conductor, i.e. some current is passing through a person down to earth or through a faulty appliance.

To ensure the RCD is working correctly, the test button should be operated each time the vehicle is connected to the mains supply (see section 2.3)

The Miniature Circuit Breakers (MCB's) operate in a similar way to traditional fuses and are provided to protect the wiring installation from overload or short circuit. If an overload occurs the MCB will switch off the supply. If this occurs you should investigate the cause of the fault before switching the MCB back on.



Electrics

The following table shows the rating and circuit allocation for the three MCB's

MCB	Rating	Output Wire Colour	Description
1	10 Amps	White	230v Sockets
2	10 Amps	White (Yellow for Heater)	Extra 230v Sockets/Space Heater
3	10 Amps	Black (Blue for water heater)	Fridge/Water Heater/12v Charger (internally connected)

3.2 Battery Charger

The PSU incorporates an intelligent three-stage battery charger / power converter.

During stage 1 the battery voltage is increased gradually while the current is limited to start the charging process and protect the battery. At stage 2 the voltage rises to 14.4V to deliver the bulk charge to the battery. When the battery is charged, the voltage is decreased at stage 3 to 13.6V to deliver a float charge to maintain the battery in the fully charged state. The charger can be left switched on continuously as required.

The battery charger / power converter also provides power to the leisure equipment when the mains supply is connected. This module supplies DC to the leisure equipment up to a maximum of 25 Amps (300 Watts), therefore the available power is distributed between the leisure load and the battery, with the leisure load taking priority as per the following example:

Leisure load	Available power for battery charging
5A	20A
10A	15A
15A	10A
20A	5A

Warning!

Under heavy loads the PSU case may become hot. ALWAYS ensure the ventilation slots have a clear flow of air. Do not place combustible materials against / adjacent to the PSU

3.3 Leisure Battery**A) Type / Selection**

For optimum performance and safety it is essential that only a proprietary brand LEISURE battery is used with a typical capacity of 75 to 120 Ah (Ampere / hours). A normal car battery is NOT suitable. This battery should always be connected when the system is in use.

The PSU is configured to work with standard lead acid leisure batteries, and in most cases is also compatible with the latest range of Absorbed Glass Matt (AGM) batteries. Before fitting non-standard batteries please check that the charging profile described in 3.2 is suitable for the type of battery by referring to the battery documentation or battery manufacturer.

Some vehicle installations can cater for two leisure batteries connected in parallel. In these cases it is recommended that two identical batteries are used.

The battery feed is fitted with an inline fuse between the battery and the electrical harness, and is usually located immediately outside the

battery compartment or within 500mm of the battery. The maximum rating of this fuse is 20A per battery.

B) Installation & Removal

Always disconnect the 230v mains supply and turn the PSU green charger switch to the off position (button out) before removing or installing the battery.

When connecting the battery, ensure that the correct polarity is observed (black is negative [-] and red is positive [+]) and that the terminals are securely fastened. Crocodile clips must not be used.

Warning!

Explosive gases may be present at the battery. Take care to prevent flames and sparks in the vicinity of the battery and do not smoke.

C) Operation / Servicing

Under normal circumstances it should not be necessary to remove the battery other than for routine inspection of the terminals and “topping up” of the battery fluid where applicable. Please see instructions supplied with the battery.

Note: Do not over discharge the battery. One of the most common causes of battery failure is when the battery is discharged below the recommended level of approximately 10v.

Discharging a battery below this figure can cause permanent damage to one or more of the cells within the battery.

To prevent over discharge, the EC400 system incorporates a battery protect circuit that warns the users and then disconnects the batteries when they fall below set values.

If the power is turned on and the leisure battery level falls below 9V a warning beep will be heard and the leisure battery gauge 10V LED will flash. To cancel the warning, press the levels button.

If the power is turned on and the vehicle battery level falls below 10.9V a warning beep will be heard and the vehicle battery gauge 10V LED will flash. To cancel the warning, press the levels button.

These warnings will not be repeated unless the power switch is turned off and on again. This is to ensure the warning does not become a nuisance.



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Battery	Voltage cut off	Action after cut off	Notes
Vehicle	10.9v	Battery selection is changed from Vehicle battery to Leisure battery. If the leisure battery is below 9v then a further warning will occur (see below).	This cut off level is designed to protect the vehicle battery from over discharge. The 10.9v level ensures there is sufficient power in the battery to run the vehicle electronics and start the vehicle. This cut off only applies to power drawn from the battery by the leisure equipment; it will not protect the battery if you leave vehicle circuits switched on, such as the road lights.
Leisure	9v	Power is turned off	This is an emergency cut off level to protect the battery from severe damage. You should not rely on this cut off level during normal operation, but manage your power consumption to a discharge level of 10v. This cut off only applies to power drawn from the battery by the leisure equipment that is controlled by the control panel power switch; it will not protect the battery from discharge by permanently connected equipment.

3.4 12 Volt DC Fuses

Warning!

When replacing fuses always replace a fuse with the correct value. NEVER replace with a higher value / rating as this could damage the wiring harness. If a replacement fuse 'blows' do not keep replacing the fuse as you could damage the wiring harness. Please investigate the fault and contact your dealer.

The following table shows the fuse allocation for the 15 fuses fitted to the PSU. Please note that fuses are dependant on PSU versions, so not all fuses may be present.

Fuse	Rating	Fuse Colour	Description
1	20 Amps	Yellow	(Not used for caravan installations)
2	15 Amps	Blue	(Not used for caravan installations)
3	7.5 Amps	Brown	(Not used for caravan installations)
4	15 Amps	Blue	(Not used for caravan installations)
5	10 Amps	Red	Fans
6	10 Amps	Red	12v sockets
7	10 Amps	Red	Front Internal Lights
8	10 Amps	Red	Water Pumps
9	15 Amps	Blue	(Not used for caravan installations)
10	10 Amps	Red	(Not used for caravan installations)
11	10 Amps	Red	Auxilliary Supplies
12	5 Amps	Tan	Electronics
13	5 Amps	Tan	Ignitions
14	10 Amps	Red	Rear Internal Lights
15	25 Amps	Clear	Charger (fitted internally to PSU)

The following table shows details of the fuse(s) located at the Leisure battery. See also 3.4A

Fuse	Rating	Fuse Colour	Description
Battery 1	20 Amps	Yellow	Fuse remotely located near battery
Battery 2	20 Amps	Yellow	Fuse remotely located near battery 2 (where fitted)

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The following table shows details of the fuse(s) located at the Road Light fuse box (caravans only)

Fuse	Rating	Fuse Colour	Description
1	20 Amps	Yellow	Fridge supply
2	5 Amps	Tan	Left hand tail lights
3	5 Amps	Tan	Right hand indicators
4	5 Amps	Tan	Fog lights
5			Spare location
6	20 Amps	Yellow	Car battery supply
7	5 Amps	Tan	Right hand tail lights
8	5 Amps	Tan	Left hand indicators
9	7.5 Amps	Brown	Stop lights
10	5 Amps	Tan	Reverse lights

3.5 System Status and Configuration display

On the EC445 PSU, the unit contains an LCD display and two control buttons that allow the tank fill system to be turned on / off and allows system information to be viewed.

Press the top yellow 'select' button to change the item being viewed. Press the bottom red 'change' button to change the setting.

Both buttons work on a continuous loop, so if you want to return to an item or setting keep pressing the button until the required item is reached.

3.6 Water Pump Operation

- On EC440 PSU's the control panel pump button operates the internal water pump drawing water from the outside (external) tank.
- On the EC445 PSU the system incorporates an automatic tank fill feature. When turned on this will automatically fill the inboard water tank from the external tank or filler hose (if attached). To enable tank fill, select 'TANKFILL' on the PSU system display using the top yellow button, and then press the bottom red button to change the setting to 'ON'. To change to external pump only

operation select 'OFF' with the red button.

The tank fill procedure uses a number of parameters to control the operation, but basically operates as follows:

If the internal tank is less than 50% full then the external pump runs to fill the inboard tank (or the filler hose is used if attached). When the tank is full (100%) the external pump is switched off. This process is repeated as required.

To ensure the external pump is not damaged if the external tank runs dry, the pump runs for a maximum of 15 minutes. This period is adjustable from the PSU

system display if required, to match your external tank capacity.

If this 15-minute run time is reached the tank fill feature is temporarily disabled to protect the pump. To re-enable the tank fill operation, after refilling your external tank, turn the control panel pump switch off then on again.

The water tanks (fresh & waste) incorporate a level warning feature to warn the user when the fresh water level drops below 25% or when the waste water level reaches 100%.

If the water pump power is turned on and the fresh water level drops to below 25% a warning beep will be heard and the fresh gauge empty LED will flash. To cancel the warning, press the levels button.

If the water pump power is turned on and the waste water level rises to full (100%) a warning beep will be heard and the waste gauge full LED will flash. To cancel the warning, press the levels button.

These warnings will not be repeated unless the water pump power switch is turned off and on again. This is to ensure the warning does not become a nuisance.



Electrics

3.8 Common Fault Table

Fault	Possible Cause		Proposed Fix
No 230 volt output from PSU	Connecting lead between the site and Leisure Vehicle not connected		Check and connect lead as per 2.3C
	RCD switched off		Reset RCD as per 2.3D
	RCD not operating correctly		Check supply polarity; if the RCD continues to fail contact your Dealer as there is probably an equipment or wiring fault.
	MCB switched off		Reset MCB by switching OFF (down position) then back ON (up position), if the MCB continues to fail contact your Dealer as there is probably an equipment or wiring fault.
	No or deficient supply from site		Contact site Warden for assistance
	Other fault		Contact your Dealer
Reverse Polarity light is illuminated on PSU	Mains Supply reversed?	The reverse polarity light is designed to illuminate when the Live and Neutral supply has been reversed / crossed over. If the light illuminates there is a problem with the site supply or the cable connecting the supply to your vehicle. The light is designed to work on UK electrical supplies (where the neutral conductor is connected to earth at the sub station). If you are using your vehicle outside the UK this light may illuminate when no fault exists. In these cases consult the site warden for advise.	
	Generator being used	‘The Reverse Polarity warning light is on when using my Generator’. This is a normal side effect when using some types of generator. Instead of connecting the neutral conductor to earth, some generators centre tap the earth connection making both neutral and live conductors 110v above earth. This 110v difference causes the neon polarity indicator to illuminate. In most cases it is still safe to use the generator, but please consult the generator handbook for further information.	

Fault	Possible Cause	Proposed Fix
Control Panel Problems	Control Panel has no display	Check batteries and fuses, turn PSU isolate switch and charger switch on and ensure mains supply is connected. Check control panel connecting lead at PSU and behind Control Panel Contact your Dealer
	12v Power turns off	Battery protect feature has operated to protect the Vehicle battery and or the Leisure battery. See 3.4C Engine has been started, all equipment has been disconnected to meet EMC requirements. See 2.6
	Control Panel locked / erratic function	Observe control panel handling instructions Control panel software may have crashed. Reboot control panel by turning off the PSU isolate switch. Wait 30 seconds then turn the switch back on.



Electrics

Fault	Possible Cause	Proposed Fix
No 12 volt output from PSU	No 230v supply	Check all above
	Charger not switched on	Turn charger switch on, switch will illuminate
	Battery not connected and / or charged	Install charged battery as per 3.4
	Power button on control panel not switched to on	Turn power on at control panel
	Battery flat / Battery fuse blown	Recharge battery, check fuses, check charging voltage is present at battery
	Fuse blown	Check all fuses are intact and the correct value fuse is installed as per fuse table
	Equipment switched off / unplugged	Check equipment is switched on and connected to the 12v supply
	PSU overheated / auto shutdown operated	Reduce load on system. Allow PSU to cool down. PSU will automatically restart when cool.
	Other fault	Contact your Dealer
Pump not working	Fuse blown	Replace fuse with correct value as per fuse table.
	Pump turned off	Turn pump on by pressing the pump button at the control panel.
	Setting incorrect	Both the internal and external pump feeds are controlled from the control panel. To alter the setting of the pump switch see section 3.8 Ensure the setting matches your desired requirement.

3.9 Contact details

Sargent Electrical Services Limited provide a technical help line during office hours. Please contact 01482 678981 if you require technical help. For out of hour support please refer to the tech support section of the Sargent web site www.sargentltd.co.uk

THETFORD BATTERY BOX

The Thetford Battery Box is intended to accommodate an auxiliary battery in your caravan. The Battery Box has a CE socket to connect to a 230 V power supply. Inside the Battery Box there is the option to fit several sockets and outlets.

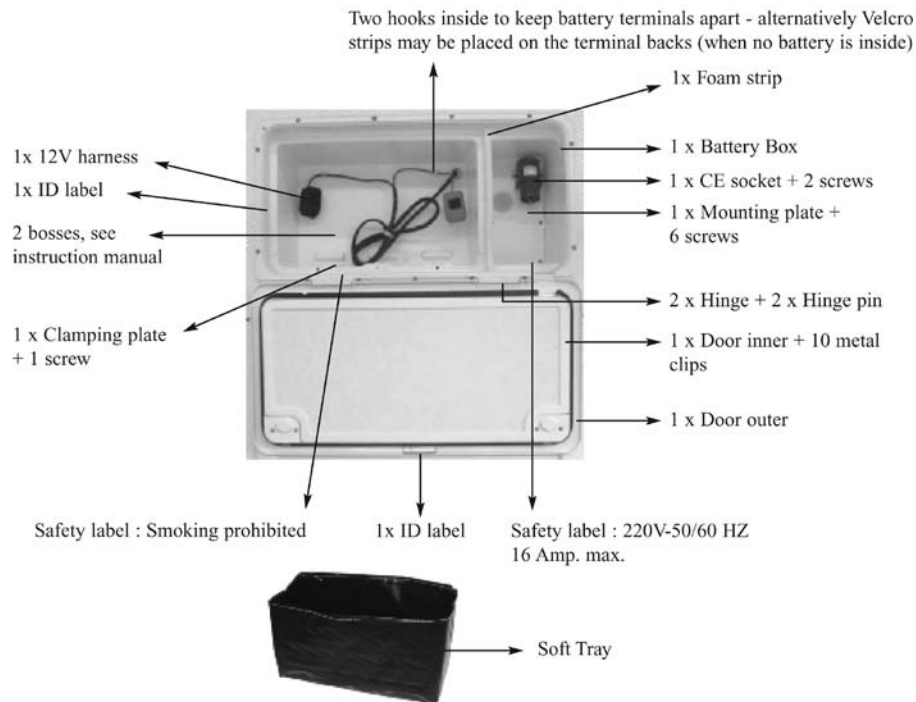
Precautions and safety instructions

- Use caution when mounting the battery, as batteries contain acid liquids which can cause severe injuries and damage when handled incorrectly. Refer to the instructions on the battery.
- Use protective clothing and glasses when handling a leaking battery, and avoid direct contact to the skin, eyes and respiratory organ.

Should a battery leakage occur, please act according to the instructions supplied by the manufacturer of the battery. Act with caution as caustic substances are present in the battery.

- No smoking is allowed in the area of the Battery Box.
- Before removing a battery you should always check for spillages by touching the Soft Tray on the outside surface and sensing for any liquid spills. If you think that liquid has been spilt, you should ensure that the Soft Tray and battery are lifted together so that spillages will not occur.

Instruction



Electrics

Warning!

- Use precaution when mounting the battery, as batteries contain acid liquids which can cause severe injuries and damage when handled incorrectly. Refer to the instructions on the battery.
 - No smoking is allowed in the area of the Battery Box!
 - Please note that the CE socket has a max of 16 amp.
 - The Thetford Battery Box is designed for use with foot mounted batteries. These are recognisable by the rim around the bottom edge of the battery. This rim will locate against the back wall of the Battery Box and the angle metal bracket, which is screwed into place when the battery is fitted. The depth of the battery including rim should be between 173mm and 175mm.
 - This product meets the latest version of the EN 1648 part 1 and 2 standard.
- Before placing the battery inside the Battery Box, the battery should be placed into the Soft Tray and rested on the ground adjacent to the Battery Box. Carefully connect the electrical wires (the red cable attaches to the + pole and the black cable to the - pole of the battery).

Note! Incorrect connection of the cables will cause a short circuit with potential hazardous consequences.

After mounting the terminals, lift the battery together with the Soft Tray into the middle of the Battery Box compartment. Push the Soft Tray with battery to the back of the Battery Box, into the safeguard bulge. If necessary shift the Soft Tray to the right or left until the battery is in place in the safety area (see photo 1).

The battery is located in the compartment by the manual clamping plate. This has to be screwed to the front of the box (screw is enclosed in package).

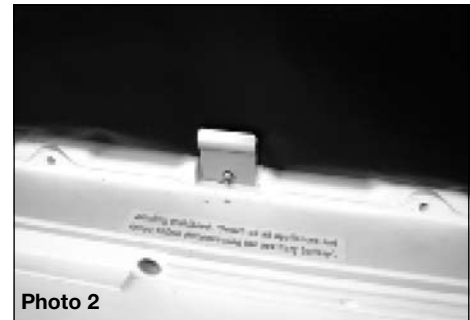
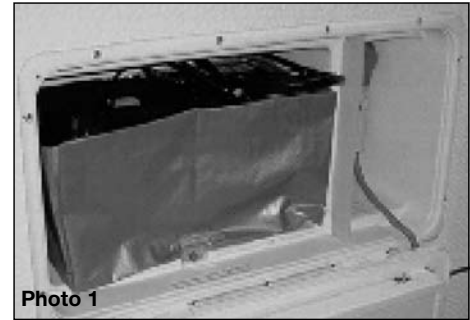
Please ensure that the Soft Tray is pulled up tightly (to remove creases) before the plate is tightened. The rounded edge of the clamp prevents damage to the Soft Tray. Do not apply extreme force to the screw.

When disassembling, follow this procedure in reversed order. Note! Always check the Soft Tray for acid first! If found, take safety precautions (such as protecting clothing, body and especially the eyes). In case of contact with acid, immediately rinse with plenty of water. Follow regulations concerning these chemicals.

Tip! Generally, car workshop employees are familiar with this matter.

When attaching the 220/230 volts cable on the CE socket, the maximum recommended

thickness of the cable is 10 mm. When closing the door, the attached cable is to be fed through the slot at the bottom right of the door.



Cleaning and maintenance

- Use protective clothing and glasses when handling a leaking battery, and avoid direct contact to the skin, eyes and respiratory organ.
- Should a battery leakage occur, please act according to the instructions supplied by the manufacturer of the battery. Act with caution as caustic substances are present in the battery.
- Always remove the battery and the power cable before carrying out any maintenance of the product.
- Before removing the clamps switch off all appliances.
- No smoking is allowed in the area of the Battery Box.
- Use a soft cloth or sponge and a non-acid/abrasive detergent when cleaning the Battery Box and Soft Tray.
- To check if any acid is present in the Soft Tray, simply press it softly. A strong smell from the Soft Tray may also indicate spilled acid. The battery can be filled again with acid collected from the Soft Tray. Always treat spilled battery acid as hazardous waste. Dispose of spilled battery acid according to the local and national regulations.. It is often possible to dispose of acid at petrol stations.

- Before the camping season or extensive travelling, check the Soft Tray for faults and replace if necessary.
- The cleaning of the Battery Box and Soft Tray should only be done after all power sources have been switched off, in order to prevent a hazardous situations.

Thetford warranty

1. The Thetford Battery Box is warranted to the original purchaser for 3 years from the date of purchase.
2. The warranty covers replacement of parts arising from defects and workmanship and from the inability of the Battery Box to perform its intended function.
3. In case of a defect apply to original dealer or Thetford Service Center with proof of purchase.
4. Defects, which in our judgement occurred from misuse, negligence or accident, are not covered by the warranty. In addition, the warranty does not apply if the product is installed or handled improperly, if the product has been altered in any way, has been repaired by unqualified persons, or if the serial number and/or date has been altered or removed.

As the Battery Box is manufactured from

polypropylene, it is resistant to temperatures up to 60 degrees Centigrade. Installing the battery box in a position where it will be exposed to higher temperatures will invalidate the warranty and could lead to an adverse effect on the product.

5. Thetford products considered to be defective may be returned prepaid directly to Thetford. Any items received which are judged by Thetford to be covered under warranty will be dealt with accordingly. Defective products not considered to be covered by warranty will incur repair, handling and return carriage costs.
6. No other warranty is given and no personal representative is authorised to make any warranty or assume liability by words or action under any warranty other than that is contained herein.

BATTERY INSTALLATION

Under normal circumstances it should not be necessary to remove the battery other than for routine inspection of terminals and 'topping up' if required.

WARNING: Explosive gases may be present at the battery. Take care to prevent flames and sparks in the vicinity.



Electrics

Your caravan has been fitted with an in-line fuse between the battery terminal and strip connector. It is recommended that the fuse rating fitted in this location does not exceed 20 amps.

WARNING: Switch off all appliances and lamps before disconnecting the battery.

Smoking is prohibited around the battery compartment.

To preserve the life of your leisure battery and charger please observe the following:

- i) Do not leave all 12V lights powered at the same time as this will drain your leisure battery more rapidly.
- ii) If all 12V lights must be powered together, ensure the battery is 'in-circuit' i.e. selector switch in the 'van' position and that the battery charger is turned on.
- iii) For optimum performance use the transformer/charger unit with a leisure battery attached.

Battery

It is recommended that a good quality rechargeable leisure battery is always in circuit when the system is in use.

A deep cycling heavy duty 12V battery should be purchased to provide power for lights and other electrical appliances.

A proprietary brand leisure battery with a minimum of 85 Amp capacity is recommended.

Note: 85 Amp batteries and above should be checked dimensionally before purchasing, to ensure fitment within the battery compartment, as brands vary in size.

It should be remembered that batteries suitable for the electrical demands of a caravan differ in design from those for use with a car, and whilst the system may operate with a car battery it is strongly recommended that only a leisure type battery, maintained in good condition is used. The battery should be kept topped up at all times if required.

Note: Some models may have more than one 12V socket fitted, the 6 Amps indicated is available from the 12V socket provided no other 12V socket is used at the same time.

SOLAR PANEL CONNECTION POINT

A connection point has been included in the caravan electrical harness to take a 12V supply from an aftermarket solar panel (or similar device), to the caravan leisure battery.

The solar panel must provide a fused and regulated output in order to connect to this point. The connection point can be found inside the caravan adjacent to the battery box, in

close proximity to the battery box fuse. Through the floor close to the battery box is a cable pass through, allowing a pair of wires from an externally located device to pass from exterior to interior to meet the connection point. This cable pass through will be capped both internally and externally with a cable entry gland.

A kit of parts is available from your caravan supplier which provides the mating half of the connection point. (The White rectangular connector found inside the caravan is a two way JST-LR type connector). For further assistance in identifying the connection, wire colours leading to the connector are detailed in the wiring schematic in your caravan service book.

GENERATOR GUIDELINES

- Lack of regular servicing can be the cause of most generator problems, gensets under 2kW are mainly dependent on engine speed for output frequency and voltage, poor or no servicing may cause the engine speed governor to run the genset engine too fast. Therefore frequency and output voltage can rise above the specification of the machine data plate i.e. 230V at 50Hz, this may cause damage to electrical/electronic equipment (such as battery chargers).
- A generator should always be run for a few minutes prior to connection with the

caravan electrics, to allow it to warm up and the output to settle to a steady level.

- The AC output of generators is often derived from an AC alternator, rectified to DC then inverted back to AC. In essence this means the output sinewave may not be very smooth and may not run sophisticated electronics efficiently. Some of the new wave of gensets are more sophisticated in their production of a sinewave output and are more suited to run electronic equipment.
- If in doubt consult your genset dealer or manufacturer for advice.



