

ABELTRONICS COACH-901

Instruction Manual



ABELTRONICS – Custom Electronic Systems

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This manual is available online in full at <http://www.abeltronics.co.uk/coach-901>.

1 - Overview

1.1 - Introduction

The Coach has been equipped with a custom-designed and manufactured system to allow the integration of 240V British mains with the existing American 120V system. It has been specifically designed for the coach and is intended to be as user-friendly and easy to use as possible. We have called this system, broadly, COACH-901.

The COACH-901 system is spread around the coach to accommodate the various systems involved. Firstly, the hook-up locker, which is on the off-side of the vehicle behind the front wheel. This is where shoreline power for the coach is taken. Secondly, the inverter/control system (formerly the hook-up locker) is situated in the near-side rear-most locker. This locker contains all the control electronics, the 240V inverters, the 120V inverter/charger, the main fuse board (consumer unit), and the dual voltage transformer. Access to this locker only needs to be gained if one of the circuit breakers has tripped in the event of a fault. Thirdly, the COACH-901 Control Panel is situated in the internal locker above the door next to the “connect/disconnect” panel. This panel indicates the condition and state of the mains voltages present on the coach, the 240V load in amps, and also allows manual override of the inverters if required. Finally, the COACH-901 system includes an “autoconnect” module that automatically “connects” the coach if the on-board inverter/charger is charging. Previously, if the generator was running, for example, and the Xantrex inverter/charger was set to charge, no current would be applied to the batteries if the coach was “disconnected”. This could potentially have catastrophic consequences for any low-voltage systems connected at the time as the output from the inverter/charger is not smoothed DC. This was an error on the part of Mandalay. The autoconnect module solves this problem by “connecting” the coach, as if the connect switch were pressed, as soon as the inverter/charger tries to charge. The autoconnect module is situated behind the connect/disconnect panel. Details regarding the use of these functions can be found in the following pages.

1.2 - Functional Description

The COACH-901 is fully automatic and will derive all the necessary power for the coach from whatever power source is available – the generator, hook-up or the inverters. No user-intervention is required for normal use; however a brief understanding of the functional operation may be required to deal with the idiosyncrasies of some mains appliances. Bear in mind that the American mains standard is 120V AC at a frequency of 60Hz. Conversely, British mains is 240V AC at 50Hz.

1.2.1 - Hook-up

When the shoreline cable is plugged in to a hook-up mains socket, mains power for the coach is derived from the shoreline. The 120V mains is derived from the 240V through the transformer. Since the mains frequency of the shoreline is 50Hz, the 120V mains will be 50Hz rather than the American standard of 60Hz. This may cause problems with some American appliances such as the microwave oven where the timer may not function properly – it may run very slightly slow. If there are problems running American appliances from 120V 50Hz, start the generator. All the power to the coach will then be taken from the generator. In order to charge the coach batteries from the shoreline, the existing Xantrex inverter/charger will need to be switched to “charge”. It should do this automatically, but if not, ensure the charge light is active on the Xantrex control panel. Press the “charge” button if the light is off.

1.2.2 - Generator

The on-board diesel generator will supply power to the coach in the absence of a shoreline power source. The generator generates power at 120V 60Hz – the American mains standard. This power supplies the 120V system, and the transformer steps up the voltage for the 240V system. Because the frequency is now 60Hz, the 240V system will also be 60Hz, and not 50Hz which is the British standard. This may cause problems with some 240V appliances, such as clock-radios and anything with a motor inside. Both will run slightly faster. To allow 50Hz operation, the 240V inverters can be manually switched on with the button on the COACH-901 Control Panel. In this case, the generator will still supply the 120V system, but the 240V mains will now be derived from the inverters at 50Hz. It is recommended that you do not run appliances over 1000W for an extended period in this instance due to the significant drain the inverters will place on the batteries. Please see the notes on the inverters in this document for more information. As with the hook-up supply, to enable charging of the batteries, the Xantrex inverter/charger should be set to “charge”.

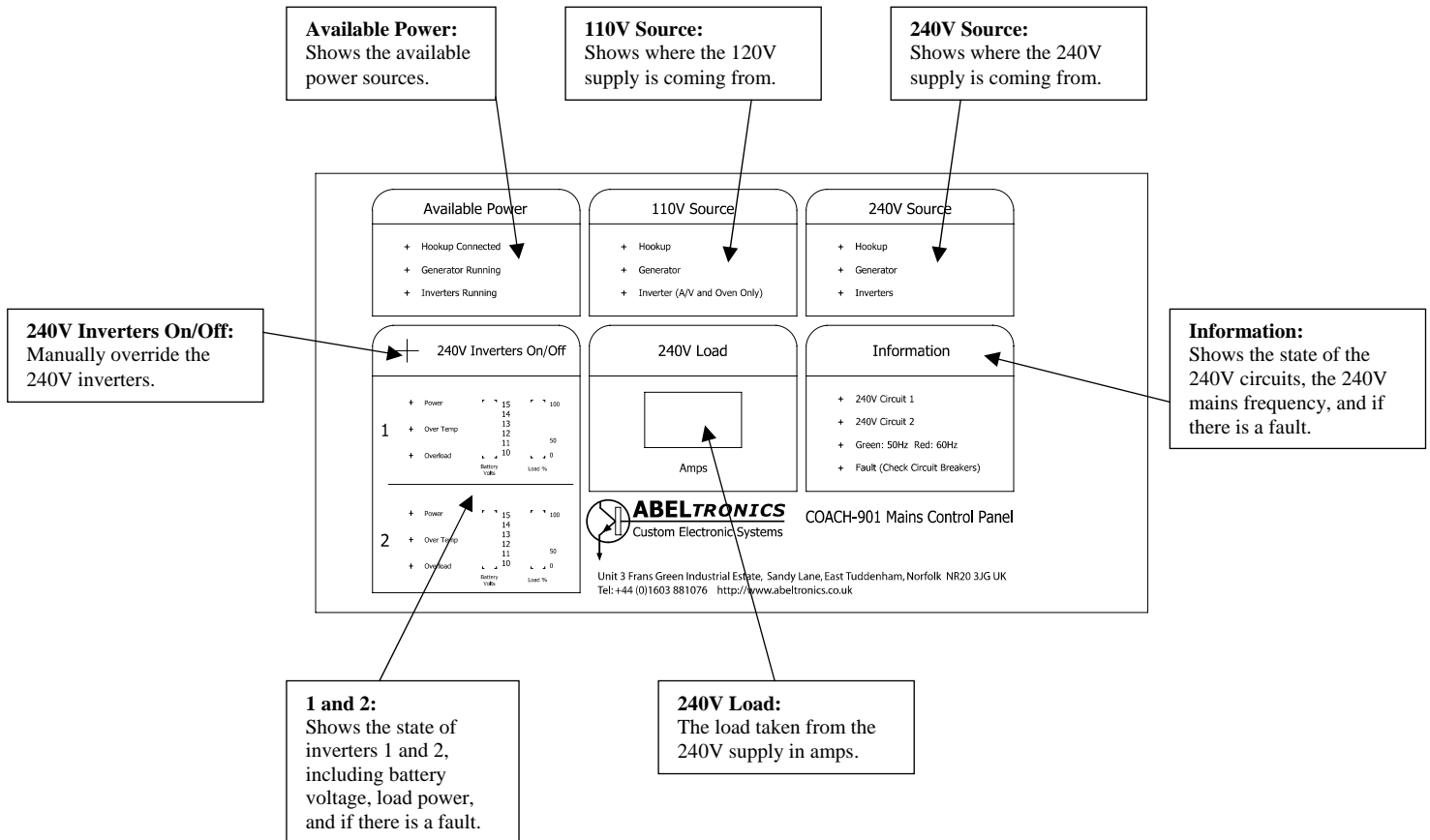
1.2.3 - Inverters

The 240V inverters can be turned on and off at any time with the button on the COACH-901 Control Panel, but only when the coach is “connected”, and disconnecting the coach will force the inverters off. For more information on the 240V inverters, please see the Inverters section in this document.

2 - COACH-901 Systems

2.1 - COACH-901 Control Panel

The Control Panel appears below:



240V Inverters On/Off

This button allows manual control of the inverters, and the button will light up green when it is possible to do this (i.e. when the coach is “connected”). Please see the Inverters section for more information.

Available Power

This section shows what power sources are available to the coach. For example, it may be useful to know if the hook-up is successfully connected, or if the generator is outputting power. If the generator is running, but the “Generator Running” LED fails to light, chances are the main circuit breaker on the generator has tripped and will need to be reset. This can be found on the left-hand side of the generator itself by sliding open the generator drawer. See the Troubleshooting section 4.1.3.

110V Source

(Should read “120V Source”). Shows where the 120V power is coming from, whether from the hook-up (through the transformer), the generator, or the inverter.

240V Source

Shows where the 240V power is coming from, whether from the hook-up, the generator (through the transformer), or the inverters.

Information

This section deals with fault finding. The 240V power is split into two sections: Circuit 1 and Circuit 2. The sockets in the coach are labelled 1 or 2, corresponding to which circuit they are connected to. The Circuit 1 and 2 LEDs indicate whether these circuits are active. They should both light simultaneously. If they do not, there is a fault; either one of the circuit breakers in the rear near-side locker has tripped, or there is a fault with one of the inverters. If there is a fault, the “Fault” LED will light red to indicate that the circuit breakers need to be checked. Finally, the “frequency” LED will glow red for 60Hz or green for 50Hz. This is to allow the diagnosis of any frequency-related problems with appliances.

240V Load

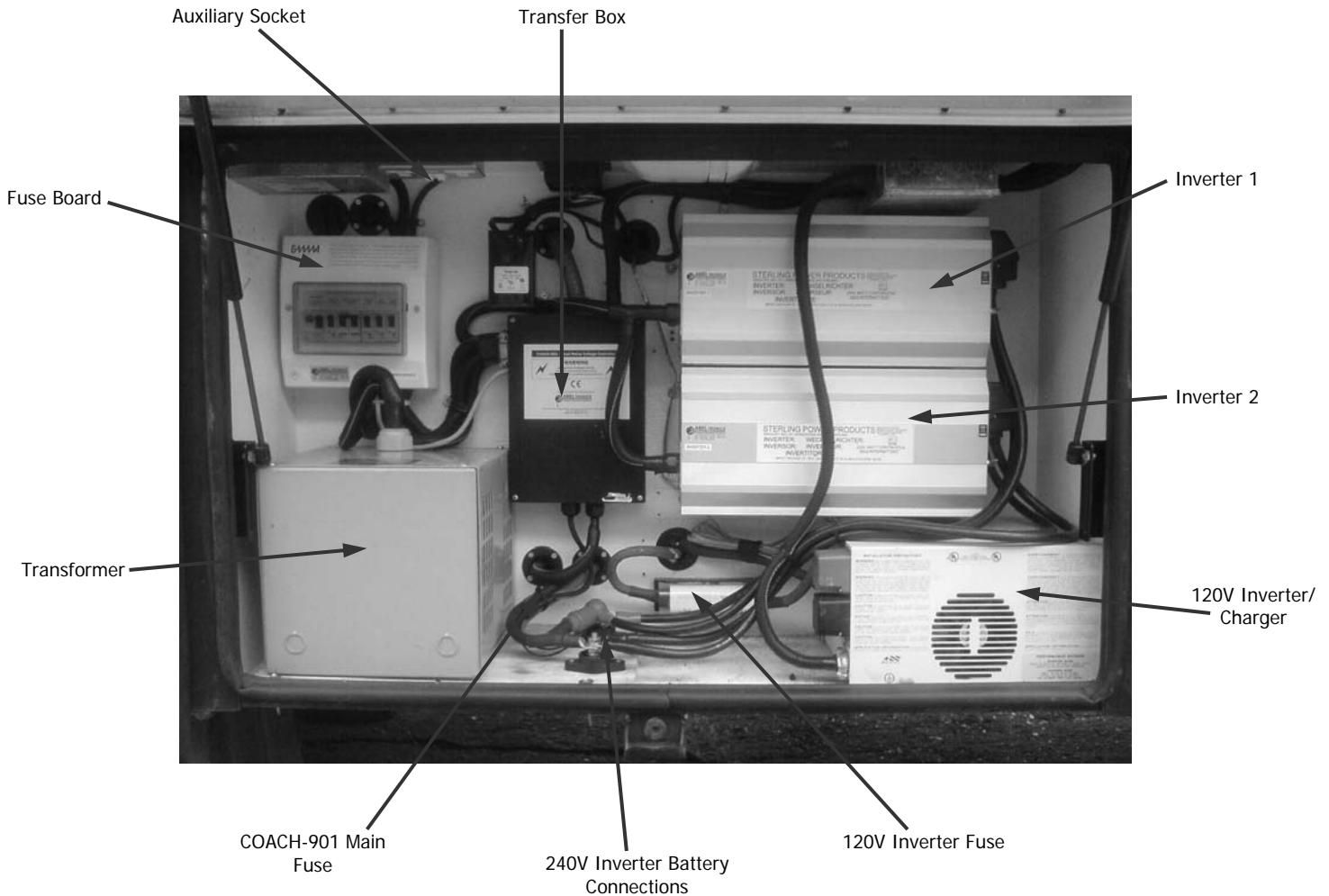
This section displays the total load of the 240V circuits 1 and 2. This display is in true-RMS amperes, and accurate to 0.2 amp. The total amount of power (in Watts) consumed by the appliances can be found by multiplying the load by 240. The total 240V load should not exceed 32A. If it does, one of the circuit breakers in the rear locker may trip. This display is useful mainly when running appliances from the inverters. The amount of current draw from the batteries is approximately 25 times the load current in amperes, when running from the inverters. So for a 10A draw at 240V, the current taken from the batteries is approximately 250A. It is for this reason that the inverters should be used sparingly. See the Inverter section for more information.

1 and 2

There are two inverters onboard the coach, one for each 240V circuit, and these displays show information regarding the inverters. The “Power” LEDs show that the respective inverter is operating, whereas “Over Temp” and “Overload” indicate an over temperature or overloaded condition, respectively. The “Battery Volts” bar graph indicates the condition of the batteries. If the voltage falls below about 10V, or rises above about 16V, the inverters will automatically cut out. The “Load %” bar graph indicates the load consumed by the appliances connected to the inverters; 100% load is 2500W, or about 11A. See the Inverter section for more information.

2.2 - COACH-901 Rear Locker

The Rear Locker of the coach is shown below. This locker contains the necessary control electronics for the COACH-901:



Fuse Board (Consumer Unit)

This consumer unit is a standard device found in properly wired domestic premises, and it conforms to all the relevant IEEE wiring regulations as stated in Part 16 of the IEEE wiring rules. The consumer unit contains all the circuit breakers (MCBs) for the 240V mains, and the function of each is explained below. From left to right:

RCD – the RCD (Residual Current Device) protects the coach hook-up from earth faults. If an earth fault develops in any appliance connected to the coach, and if the coach is running from the hook-up, the RCD will trip and prevent current leakage to earth. If the RCD trips, disconnect each appliance in the coach in turn and reset the RCD until it does not trip. The last appliance you disconnected is the faulty appliance and should be checked. The RCD should be periodically checked itself to ensure it is functioning. This test should be performed quarterly. Start by plugging the hook-up cable into a 240V outlet, then press the button marked “T” on the RCD. The RCD should trip, and can then be reset. If it fails to trip, refer the coach to ABELtronics for replacement of the RCD.

32A MCB – This MCB is the main hook-up circuit breaker. It protects the shoreline cable itself in the unlikely event of a serious fault with the coach electrics.

Double-Pole Isolator – This switch isolates the 240V side of the transformer and is intended for testing purposes only. It is not a fuse or circuit breaker.

50A MCB – This MCB isolates and fuses the 120V side of the transformer. Very occasionally this MCB may trip if a large load is present on the 240V mains and the generator is started. If this MCB trips, the “Fault” LED on the COACH-901 control panel will glow red; and the MCB must be reset.

16A MCBs 1 and 2 – These MCBs isolate and fuse the 240V circuits 1 and 2 respectively. These MCBs will trip if there is too much current drawn from the 240V sockets, and will need to be reset for continued operation.

If any of the MCBs (or the RCD) fails to reset after tripping, disconnect all the appliances in the coach in turn until the MCB/RCD in question resets.

Transformer

This device converts the voltages between 120V and 240V depending where the main coach supply is coming from; either the hook-up or the generator. It is maintenance-free and should not be tampered with. A slight buzzing may be heard from the transformer while operating. This is normal.

Transfer Box

The transfer box contains all the circuitry for switching between the supplies. Like the transformer, it is maintenance-free and will not need to be interfered with.

Inverters 1 and 2

These are the 240V inverters for circuits 1 and 2 respectively. See the Inverter section for more information.

120V Inverter/Charger

This is the 120V Xantrex inverter/charger. It is controlled from the Xantrex control panel on the “connect/disconnect” board at the front of the coach above the door. It generates power from the batteries when a 120V supply is absent (inverting), and it also charges the batteries when a 120V supply is available (charging).

240V Inverter Battery Connections

These are the connections for the 240V inverters to the batteries. These terminals are connected DIRECTLY to the batteries in the coach, and must not be tampered with. Under no circumstances must these connections be shorted together, or to the coach chassis, as SEVERE damage will result.

120V Inverter Fuse

This fuse is for the Xantrex 120V inverter. It is a 300A industrial fuse, and is connected directly to the batteries. As with the 240V inverter battery connections, these connections must not be shorted to anything, or SEVERE damage will result.

COACH-901 Main Fuse

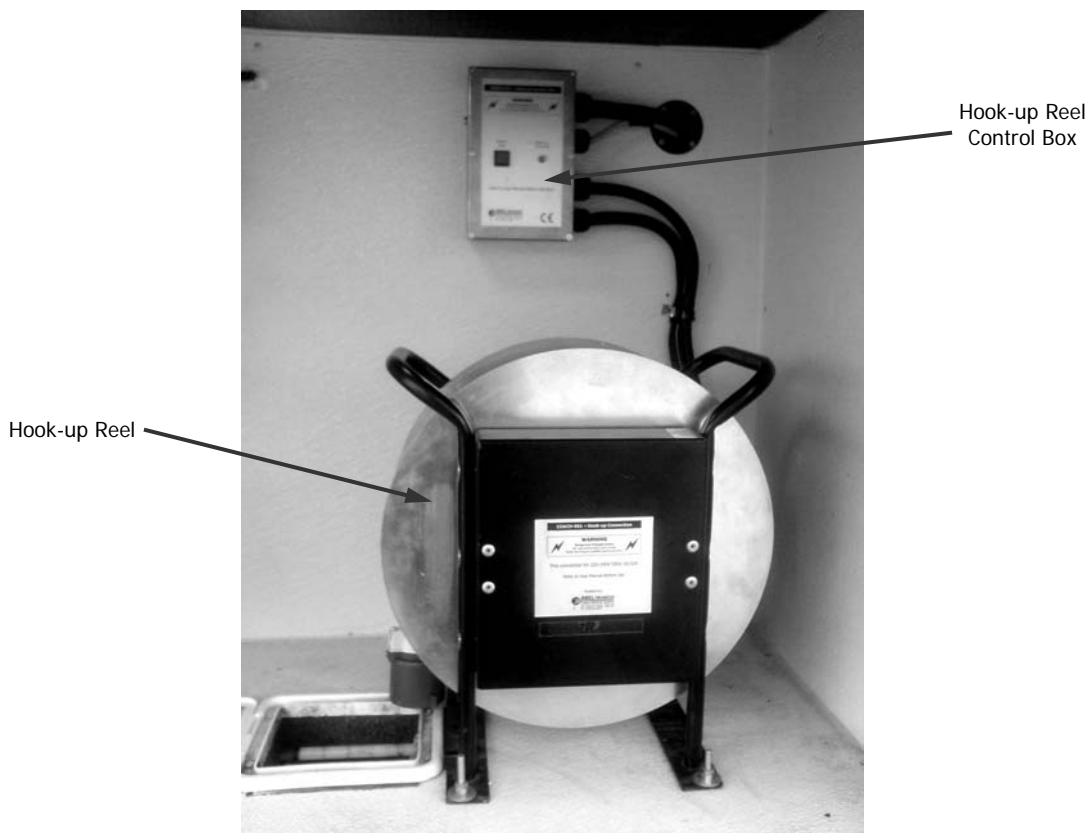
This is the main fuse for the COACH-901 circuitry. It is a standard automotive blade fuse, rated at 3A.

Auxiliary Socket

The rear locker contains an auxiliary socket for general use. It is connected to 240V circuit 1.

2.3 - COACH-901 Hook-up Locker

The hook-up locker of the coach is shown below. Formerly, this was a storage locker, but has been converted to the hook-up locker due to restrictions in space in the rear locker:



The hook-up reel is equipped with approximately 20m of flexible rubber cable, the end of which is terminated with a 32A 2P+E 230V free plug. An adaptor is provided to allow the coach to be connected to 16A hook-up sockets. The hook-up should only be connected to a suitably fused and protected 240V AC 50Hz supply. The hook-up reel is electrically retractable by pressing and holding the “Retract Reel” switch. A port is provided in the floor of the hook-up locker to allow the hook-up to be used with the locker door securely closed. The orange lamp on the COACH-901 Hook-up Junction Box shows when there is power to the hook-up.

The hook-up is designed to be plugged into a 32A outlet, although an adaptor is provided to allow the hook-up to be used with a 16A outlet. Consequently, when powered from a 16A socket, the Hook-up MCB may trip. This is primarily due to the large surge current required for the transformer, and resetting of the hook-up MCB may be required a few times. If the 120V water heater is on, the hook-up MCB may continually trip when the hook-up is initially connected. Turn the water heater off with the switch above the door. Turn it back on again once the hook-up has been successfully connected and no MCBs trip. A similar problem may be encountered if the engine block heater is on. Turn this off with the switch on the control panel to the left of the driver’s seat.



3 - Inverters

3.1 - Introduction

The coach has been equipped with two 240V modified-sine 2500W inverters that will provide high reliability and long service. There are, however, a few points that must be borne in mind when using inverters of any type. A detailed description of the functional operation of the inverter system follows. It is important to read this section for long-term reliability of the inverters.

As stated previously, two inverters are installed in the coach – one for 240V circuit 1, the other for 240V circuit 2. This is to allow a diverse range of appliances to be run from the 240V mains in the absence of the generator or hook-up supply. 240V circuit 1 is mainly used for the sockets on the off-side of the coach, and for the audio/visual system at the front, next to the television. 240V circuit 2 is mainly used for the sockets down the near-side of the coach, and in the kitchen and the bedroom. The sockets are labelled accordingly. This arrangement was chosen to allow even distribution of power around the coach. If, for example, a kettle was being used in the kitchen on 240V circuit 2, the other inverter can be used for the entertainment system in the front of the coach. If all the power were to come from one inverter, it may overload and go into shutdown.

The output of each inverter is a “modified-sine” (quasi-sine) wave, meaning it is a *close approximation* to a “proper” sine wave obtained from the domestic mains. Because of this, there are some appliances that must NOT be run from inverters of this type. Such appliances include:

- Small battery operated appliances, such as certain torches, razors, nightlights and electric toothbrushes.
- Certain battery chargers used for power tools. These chargers will have a label stating that dangerous voltages are present at the battery terminals.
- Appliances with variable-speed thyristor-controlled motors, such as washing machines, may not operate correctly from the inverters.

It is mainly chargers for battery powered appliances that are affected, for the small batteries in these appliances may be damaged if used with the inverters. As a rule, anything that plugs *directly* into the mains to charge batteries, such as electric toothbrushes and electric razors, should not be used with the inverters. If you need to use these appliances, use them with the generator running or on hook-up. Any appliance that plugs into the mains via a plug-in power adaptor, such as mobile phone chargers, should be fine to use with the inverters.

3.2 - Operation

The inverters are rated at 2500W continuous output, 5000W intermittent. The intermittent rating is intended for starting surges of certain appliances with motors or other large inductive loads. It is, however, recommended that the inverters are not used at this power level continuously because doing so will cause thermal stress to the components inside the inverter and may result in early failure. A continuous rating of 1500W is more realistic. Boiling a 2000W kettle for two to three minutes will be fine, but running an electric fire for hours continuously will almost certainly reduce the working life of the inverter significantly. Bear in mind also that the current drawn from the batteries is approximately 25 times that drawn by the load. As stated previously, a load of 10A at 240V will draw 250A from the batteries. If both the inverters are loaded at 10A, a total of 500A will be drawn from the batteries, and they will be flat within a matter of minutes. Use the “240V Load” ammeter on the COACH-901 Control Panel to determine if there is too much load.

3.2.1 - Starting Surges

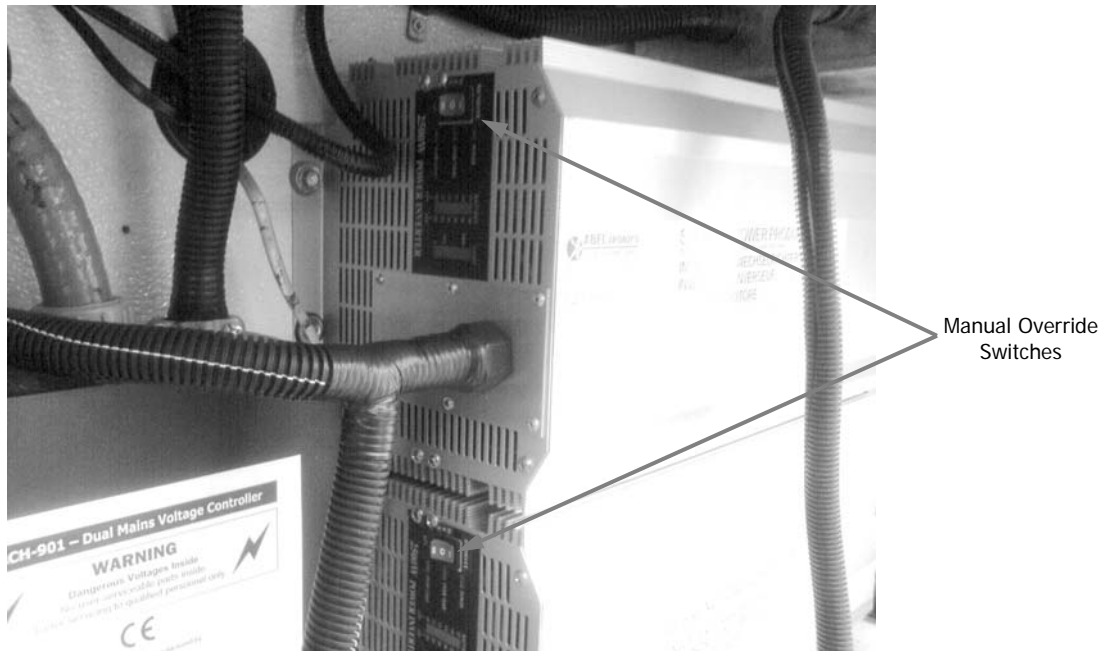
The inverters should not be activated when there is a heavy load over 600W plugged into any of the sockets. For example, if using a vacuum cleaner onboard the coach, it should be switched off before starting the inverters. Leave appliances that draw over 600W of load (such as vacuum cleaners, hair dryers, kettles, and so on) switched off for approximately 20-30 seconds after the inverters have started, and then switch them on one at a time. This will ensure long-term reliability – the inverters are protected against overload and over-temperature, but it is not advisable to stress their limits. There is no need to switch off smaller appliances such as the A/V system, desk lamps, or mobile phone chargers when starting the inverters, they will quite happily start up with these loads connected. Only switch off larger appliances. As a guide, if the ammeter on the COACH-901 control panel reads over 2.5A (equivalent to 600W), switch off some appliances until the current is less than this before manually starting the inverters.

3.2.2 - Maintenance

Very little maintenance is required for normal operation of the inverters. However, the inverters are internally cooled with a fan that circulates air inside. Periodically check the fan grille for dust and dirt as this will impede the air flow and prevent cooling. Also, as with all electronic appliances and circuitry, ensure the inverters and the transfer box do not come into contact with excessive water, moisture and oil, as this will destabilise their operation.

3.2.3 - Manual Override

Each inverter is equipped with a manual override switch on the left-hand side of the inverter casing. The switch selects between “REMOTE”, “OFF” and “ON”. For the vast majority of applications, the switch should be set to “REMOTE” – this is the setting necessary to control the inverters from the COACH-901 Control Panel. “Off” will disable the inverter, not allowing it to be turned on with the COACH-901 panel. This may be useful to prevent certain users from turning the inverters on, or to only allow one of the 240V circuits to operate. “ON” will permanently turn the inverter on. This setting should be avoided, as it is easy to forget the inverter is on, and, over time, the batteries will flatten; although it is in place in case there is a fault with the COACH-901 circuitry. If you suspect erratic operation with one or both of the inverters, check these switches. They may have been knocked by somebody accessing the rear locker. The picture below shows the location of the manual override switches:



3.2.4 - Inverter Audible Alarm

The inverters contain an audible buzzer that will sound if the inverter is exposed to a fault condition. A fault condition can be over-temperature, overload, or battery voltage too low. The audible buzzer is too quiet to be heard inside the coach, but this buzzer aids fault diagnosis when working inside the rear locker.

Finally, bear in mind the following point when using inverters and any electronic equipment: They are bullet-proof, but not bomb-proof.

3.3 - Inverter Specifications

Parameter	Value
Output Power	1500W Continuous, 2500W Short-term, 5000W Surge
Input Voltage	10 - 16V DC
Output Voltage	240V AC 50Hz
Output Waveform	Modified-sine (sometimes called “Quasi-sine”)
Standby Current	Less than 700mA
Efficiency	85 - 90%
High Battery Voltage Shutdown	16V
Battery Low Alarm	10.5V
Battery Low Shutdown	10V
Thermal Protection Shutdown	60°C
Cooling	Fan starts at 40°C
Protection	Output Short, Input voltage high/low, Overload, Over temperature

4 - Troubleshooting – If Things Go Wrong

4.1 - Introduction

We hope you never have to refer to this section – the COACH-901 has been designed to the highest standards of reliability and usability. However, there may be times where a minor fault or idiosyncrasy develops, and it will be useful to know how to amend the fault. A series of procedures follows showing problems that may occur and the solutions to them. As a last resort, if the solutions given fail to solve the problem, contact ABELtronics.

4.1.1 - General

This procedure should be followed first in the event you suspect a fault, or if the “Fault” LED glows on the Control Panel. Check all the MCBs, the RCD and the isolator in the rear locker of the coach. All the breakers in the consumer unit should be set; i.e. the lever on each breaker should be in the “up” position; set them all if any are in the “down” position. If this does not solve the problem, proceed with the following sections.

4.1.2 - Hook-up Connected, But No Power

1. Check if the “Hook-up Connected” LED on the Control Panel is alight. If so, proceed to step 5.
2. Verify the hook-up socket is outputting power by checking the orange “hook-up connected” lamp in the hook-up locker. If it is not outputting power, contact the supplier of the hook-up, or try another hook-up socket.
3. Check the condition of the hook-up plug and adaptor if used. Fix if necessary.
4. Check the main hook-up circuit breaker. This is the circuit breaker that fuses the hook-up socket itself.
5. Double-check all the breakers in the consumer unit are set.
6. If you are sure the hook-up is outputting power and all the MCBs and the RCD are set, start the generator. The “Generator Running” LED should light, and power should be applied to the coach. If there is still no power, proceed to the next section – 4.1.3.

4.1.3 - Generator Running, But No Power

1. Check if the “Generator Running” LED on the Control Panel is alight. If so, proceed to step 3.
2. Check the 30A circuit breaker on the left-hand side of the generator itself. Access to this can be gained by sliding open the generator drawer.
3. Follow the same procedure as outlined in the section 4.1.2, step 5 above.
4. If there is still no power, contact ABELtronics.

4.1.4 - 240V Inverters Fail to Start

1. Ensure the coach is “connected”. If so, the “240V Inverters On/Off” switch on the Control Panel will light up green.
2. Ensure the manual override switches on the inverter casing are set to “REMOTE”.
3. Check all the MCBs in the consumer unit.
4. Check the COACH-901 Main Fuse.

4.1.5 - 240V Inverters Running, But No Power to Circuits 1 and 2

1. Ensure the inverters are running. Check the “Power” LED on the Control Panel for each inverter. If they are alight, the inverters are running. If not, press the “240V Inverters On/Off” button. If the “Power” LEDs still fail to light, proceed to the next step.
2. If either the “Overload” or “Over-Temp” LEDs light, switch off the inverters immediately, and do not use them for at least 30 minutes. Restart the inverters after this time. If either of the fault LEDs lights up immediately, there is a fault with the respective inverter. Use the manual override switch on the inverters themselves to switch OFF the faulty inverter. Contact ABELtronics, the inverter will need to be repaired.
3. If all seems well with the inverters, double-check all the breakers in the consumer unit as outlined above.
4. If the fault still persists, contact ABELtronics

4.1.6 - Control Panel Fails to Light When It Should

1. The Control Panel will only do something if there is some sort of mains power onboard the coach. For example, if the generator is running, the Control Panel should indicate it.
2. Press the connect switch to “connect” the coach.
3. Start the generator.
4. If nothing appears on the Control Panel, check the COACH-901 main fuse located in the rear locker.
5. Replace it if it has blown. If it blows again upon replacement, contact ABELtronics.

4.1.7 - RCD Trips When I Plug In an Appliance

1. This will only ever happen if the coach is running from the hook-up. If it does happen, the appliance has an earth fault and should be repaired or replaced. If you are unsure of which appliance has caused the problem, follow this procedure.
2. Disconnect each appliance in the coach in turn and reset the RCD until it does not trip. The last appliance you disconnected is the faulty appliance and should be checked. See the “Fuse Board (Consumer Unit)” section on page 6 for more information.

4.1.8 - The Coach Fails to “Connect” or “Autoconnect”

The COACH-901 system, as stated previously, includes an “autoconnect” system designed to prevent power to the coach from being drawn from the inverter/charger when the coach is “disconnected”. The autoconnect module is mounted behind the coach “connect/disconnect” panel above the door. If the coach fails to connect when the “connect” switch is pressed, or if the coach fails to autoconnect, the autoconnect module may have developed a fault. It can, however, be temporarily bypassed. Please follow the procedure below if you suspect a fault with the autoconnect module:

1. Remove the “connect/disconnect” panel above the door inside the coach.
2. Locate the autoconnect module. It is screwed to the wall behind the connect/disconnect panel.
3. The wiring loom that comes out from the autoconnect module is split into sections: One part goes to the coach, the other to the “connect/disconnect” panel itself.
4. Disconnect the plugs from the autoconnect module and plug the “coach” and “connect/disconnect” parts together, bypassing the autoconnect module.
5. The autoconnect module is now bypassed and you should be able to manually connect and disconnect the coach.
6. The COACH-901 system will still be fully operational; however, with the autoconnect module bypassed, the 240V inverters will no longer function. 240V power for the coach can still be obtained from the generator or the hook-up.
7. If the coach still fails to connect, the problem is not with the autoconnect module, but elsewhere in the coach wiring. Contact ABELtronics to arrange repair.

4.1.9 - The Fault is not Listed Here

If the problem is one that is not listed here, check and re-check the consumer unit breakers, the CAOCH-901 main fuse, and ensure the manual override switches on both the inverters are set to “REMOTE”. These are the only user-serviceable parts in the COACH-901 system. If everything appears fine, there is a more serious fault, and it should be investigated. Contact ABELtronics if this is the case.

5 - Known Issues

The COACH-901 system has been specifically designed from scratch for the coach. The electronics contained within the system are complex and sophisticated; necessary to allow the system to be as user-friendly and as automatic as possible. As such, there are a few known issues with the system. These issues are extremely minor and do not affect the functionality of the system. These issues include:

- The “110V Source” section on the Control Panel has been incorrectly engraved. It should read “120V Source”.
- When either the generator is running or the hook-up is connected, and the user chooses to manually override the inverters, the “110V Source” panel indicates that the 120V supply is coming from the inverters. This is incorrect, as the 120V supply is in reality coming from either the generator or the hook-up, depending which is connected. If the “Available Power” section on the Control Panel indicates that either the generator is running, or the hook-up is connected, the 120V supply is derived from either of these, not the inverters as indicated. A very minor, but nevertheless irritating issue that was discovered too late to be corrected.
- When the coach is “disconnected”, some indicators on the Control Panel will remain lit for a few seconds after disconnection. This is normal; it is designed-in to compensate for the delay in the switching process of the transfer box.
- Certain appliances may exhibit erratic behaviour when running from the inverters. Namely, these include any appliance that uses the shape of the mains waveform to determine time. For example, bedside clock radios and possibly microwave ovens may run too fast. This will not, however, cause damage to the appliance. This behaviour is due to the output of the inverter not being a “true” sine wave, but a “modified-sine” wave, and occurs with all inverters and systems of this type. As stated previously, there are certain appliances that should not be run from inverters. See the Inverters section for more information.

6 - Technical Specification

6.1 - Introduction

Included here is the full technical specification for the COACH-901 for reference.

6.1.1 - Transfer Box

Parameter	Value	Comments
Low-Voltage Supply Voltage Range	9 - 17V DC	
Low-Voltage Supply Fuse	3A	Standard blade type
Quiescent Current	<20mA	
Operating Current	1A max.	
Generator Input Voltage	99 - 175V AC	
Hook-up Input Voltage	180 - 275V AC	
Generator Input Frequency	45 - 75Hz	
Hook-up Input Frequency	45 - 55Hz	
Generator Switching Current	60A max.	At 120V AC
Hook-up Switching Current	50A max.	At 240V AC
Generator Transfer Time	650ms max.	Time required for power to be taken from the generator
Hook-up Transfer Time	120ms max.	Time required for power to be taken from the hook-up
Inverter Transfer Time	50ms max.	
Transient Transfer Current	120A max.	<50ms

6.1.2 - Control Panel

Parameter	Value	Comments
Low-Voltage Supply Voltage Range	9 - 17V DC	Derived from transfer box
Quiescent Current	Nil	
Operating Current	100mA max.	
Ammeter Resolution	0.1A	
Ammeter Accuracy	±0.2A	
Ammeter Properties	True-RMS auto-zero, 3Hz sampling	
Ammeter Range	0.1 - 99.9A	Physical range of ammeter

6.1.3 - Inverters (reproduced from Inverters section for clarity)

Parameter	Value
Output Power	1500W Continuous, 2500W Short-term, 5000W Surge
Input Voltage	10 - 16V DC
Output Voltage	240V AC 50Hz
Output Waveform	Modified Sine (sometimes called "Quasi Sine")
Standby Current	Less than 700mA
Efficiency	85 - 90%
High Battery Voltage Shutdown	16V
Battery Low Alarm	10.5V
Battery Low Shutdown	10V
Thermal Protection Shutdown	60°C
Cooling	Fan starts at 40°C
Protection	Output Short, Input voltage high/low, Overload, Over temperature

7 - Glossary of Terms

A glossary of terms appears below to aid understanding of some of the terminology used in this document.

2P+E	Two phases plus earth. An industrial electrical plug used for high-current connections between a supply and an appliance.	IEEE	Institute of Electrical and Electronic Engineers. Governing body for electrical regulations and practices.
A	Unit of electrical current, the Ampere or Amp .	LED	Light Emitting Diode. In essence, a light.
AC	Alternating Current. A continuously alternating flow of electricity. The number of times the current changes direction per second is the frequency. Compare DC .	mA	Milliampere. One thousandth of an amp .
Amp	See A	MCB	Miniature Circuit Breaker. Similar operation to a fuse , but resettable.
Ampere	See A	Modified-sine	Applied to inverters; a close approximation to a “true” sine wave.
Circuit	A closed loop allowing electricity to flow. The electricity does work along the way, this is power .	Power	Amount of work done by electricity in a circuit , it is the voltage multiplied by current. Measured in Watts .
Consumer Unit	Device containing MCBs , fuses , RCDs or isolators. Used for distribution of mains power.	Quasi-sine	See Modified-sine .
Current	Measure of the number of electrons flowing in a circuit.	True-RMS	True Root Mean Squared. A method in electronics of measuring AC voltage or current very accurately.
DC	Direct Current. A smooth and continuous flow of electrical current. Compare AC .	RCD	Residual Current Device. Will cut the power to a circuit if any current leaks to earth . Used to prevent electric shock in domestic premises, and on the coach.
Earth	A return path for electricity in the event of a fault with an appliance. Often called “Ground”.	Shoreline	See Hook-up .
Fuse	Device used for limiting the current in a circuit . A fuse will permanently interrupt the flow of current of circuit if it exceeds the value of the fuse.	Surge	An instantaneous spike of either voltage, current or power. If not properly dealt with, can be dangerous to appliances or sources of power such as inverters.
Fuse Board	See Consumer Unit	Transformer	Device for converting between AC voltages. A high voltage low current AC signal can be converted to a low voltage high current signal, and vice-versa, very efficiently.
Hook-up	A remote source of power.	V	The Volt. Unit of electrical voltage .
Hz	Hertz. Unit of frequency of Alternating Current.	Voltage	A measure of the amount of force behind electrical current. Measured in Volts.
Inverter	Device used to convert low voltage DC , such as 12V DC , to mains voltage AC , such as 240V AC . An inverter has a high input current, low input voltage, versus low output current, high output voltage.	W	Unit of electrical power, the Watt.

8 - Declaration of Conformity

We, the undersigned, of,

Unit 3 Frans Green Industrial Estate
Sandy Lane
East Tuddenham
Norfolk
NR20 3JG
UK



Hereby declare that the device to which this document pertains, known as “COACH-901”, is compliant with the following EEC CE regulations when used correctly in accordance with the manufacturer’s instructions:

89/36/EEC – Electromagnetic Compatibility (EMC Directive)
73/23/EEC – Low Voltage Directive (LVD)

This product has been self-certified by ABELtronics and is in conformity with the above mentioned EEC regulations to the absolute best of our knowledge when used in accordance with the manufacturer’s instructions. The Technical Data File required for these conformity procedures is maintained at the headquarters of ABELtronics at Unit 3 Frans Green Industrial Estate, Sandy Lane, East Tuddenham, Norfolk, NR20 3JG, UK

Signed in facsimile for, and on behalf of, ABELtronics,

A handwritten signature in black ink, appearing to read 'Lewis Abel'.



Lewis Abel, proprietor, ABELtronics