

SELECTRONIC SINE WAVE INVERTER

SE12 - 24 Volt Operating Manual



Serial No _____ Purchase Date _____




Note - Your 2 Year Warranty can only be valid once your warranty card is completed and returned to Selectronic Australia



**SELECTRONIC
AUSTRALIA**

SE12-24 Volt Owners Manual

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Introduction

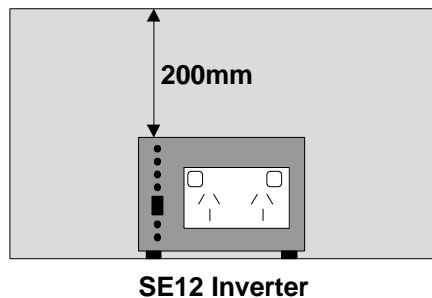
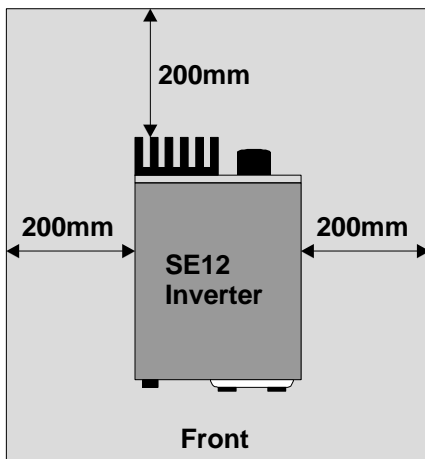
Thank you for choosing to purchase the Selectronic SE12 TRUE SINE WAVE inverter. Many hours of Research and Development have gone into the SE12 to ensure this inverter provides you with many years of reliable service

Warranty Card

It is imperative that you complete your warranty card NOW. Your SE12 is covered by a TWO year warranty; this warranty is in addition to your rights under the trade practices act of your state or territory.

Returning you completed warranty card will enable us to register your warranty and avoid any possible delays should service be required. If you have any comments about our product that will not fit on the warranty card please feel free to drop us a line. Yes, constructive criticism will also be welcome.

Installation



Please leave a clearance of 200mm on all sides and top of the Inverter. The SE12 must be installed in a dry, cool, dust-free environment. It is recommended that the inverter be placed as far from any radio receivers as possible.

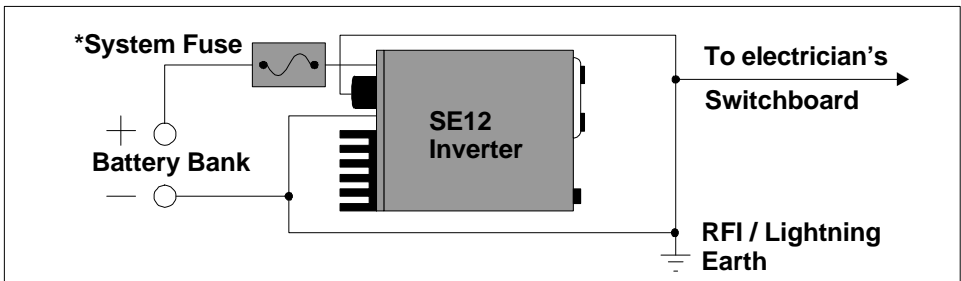


Large amounts of DC current can be drawn by your SE12, *care must be taken.*

Fixed Installation



All fixed installation battery connections must be securely bolted, using stainless steel nuts and bolts. To protect the connection from corrosion smear a small amount of Vaseline or similar over the joint. Never place batteries directly onto a concrete floor, place timber or similar material beneath the batteries.



* A system fuse (of at least 50 Amps) should be placed before the battery. An HRC motor start type is recommended. (See your system designer for details).

Warning

As a matter of safety, Selectronic strongly recommend that all fixed installations be designed and installed by appropriately qualified person. The Solar Energy Industries Association in your state or territory can provide names of accredited system designers and installers.

The output voltage from an inverter is as lethal as mains electricity.

All AC wiring **MUST** be carried out by an accredited electrician and must conform to AS3000 and/or any relevant local standards.



Electrician's Note

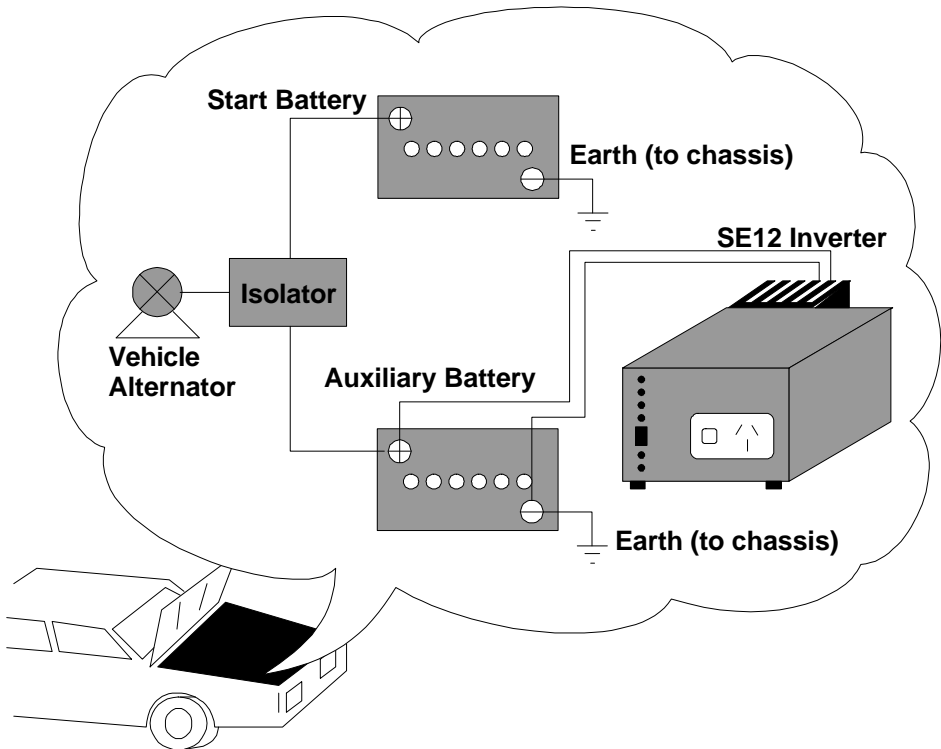
- All earth's AC and DC should be bonded
- RFI/Lightning Earth stake should be within 3m of the inverter
- The SE12 is suitable for connection to MEN wiring
- Any AC changeover switch must be a 'break before make' type

Portable Use

By using optional battery clips, the SE12 can be connected directly to a vehicle battery. When using Alligator clips ensure they have a tight grip around the battery post. Wherever possible battery connections should be bolted.



Do not use alligator clips in a moving vehicle



By incorporating an auxiliary battery in the manner above, the starting battery should remain charged for vehicle starting (see your auto electrician). The SE12 has sufficient battery cable length to allow it to sit underneath the vehicle whilst in use. If the ground is wet, place the SE12 on a waterproof liner.

Batteries and Connections

Batteries are the key to maximum performance from your SE12, if a battery is too small or not fully charged it may result in de-rated performance from your SE12.

Battery ratings

Batteries can be rated in one of two ways:

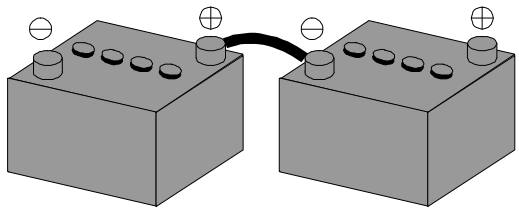
1. CCA = Cold Cranking Ability. This is the amount of power or current that a battery can deliver for a short period, typically a few seconds. This how a car battery would normally be rated.
2. Ah = Ampere Hours. This is the maximum amount of energy that can be stored in a battery; this figure will generally be stated at a particular hour rate. This is how a deep cycle or storage battery would normally be rated.



100Ah @100hr, this means that when this battery is discharged over a period of 100 hours, the battery has a capacity of 100Ah. This in theory means 1 Amp for 100 hours, although this would in practice result in a totally discharged battery that may not then recover.

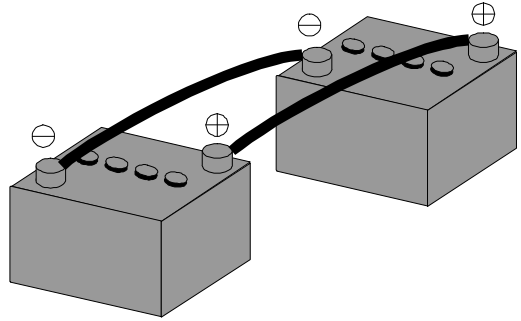
To achieve maximum performance from your SE12 you must have a battery capable of delivering 85 Amps for a short period whilst maintaining at least 21 volts. To provide a 24 volt supply to your SE12 you will need to join more than one battery together in series.

- Where batteries are joined in *series*, add the voltage of each battery.



The capacity will equal the capacity of the smallest battery. 2 x 12 Volt 100 Ah batteries connected in series would have a total capacity of 24 Volts – 100 Ah.

- Where batteries are joined in *parallel*, add the capacities together, the voltage will remain the same as each batteries voltage.



2 x 12 Volt 100 Ah batteries connected in parallel would have a capacity of 12 Volts–200 Ah. This would not suit your 24 Volt SE12.



Only use identical batteries when joining batteries together.

How long will my battery last

To work out how long your battery will last follow this basic guide.



This guide presumes commencing with a fully charged battery.

Take the total rating of the appliance being run

1	light globe	25watts
1	20 inch TV	67watts
1	VCR	30watts

Total load =122watts

Divide this figure (122) by 20 to know the approximate DC current draw
=6.1Amps

To convert this to Ampere hours, multiply by the number of hours used -

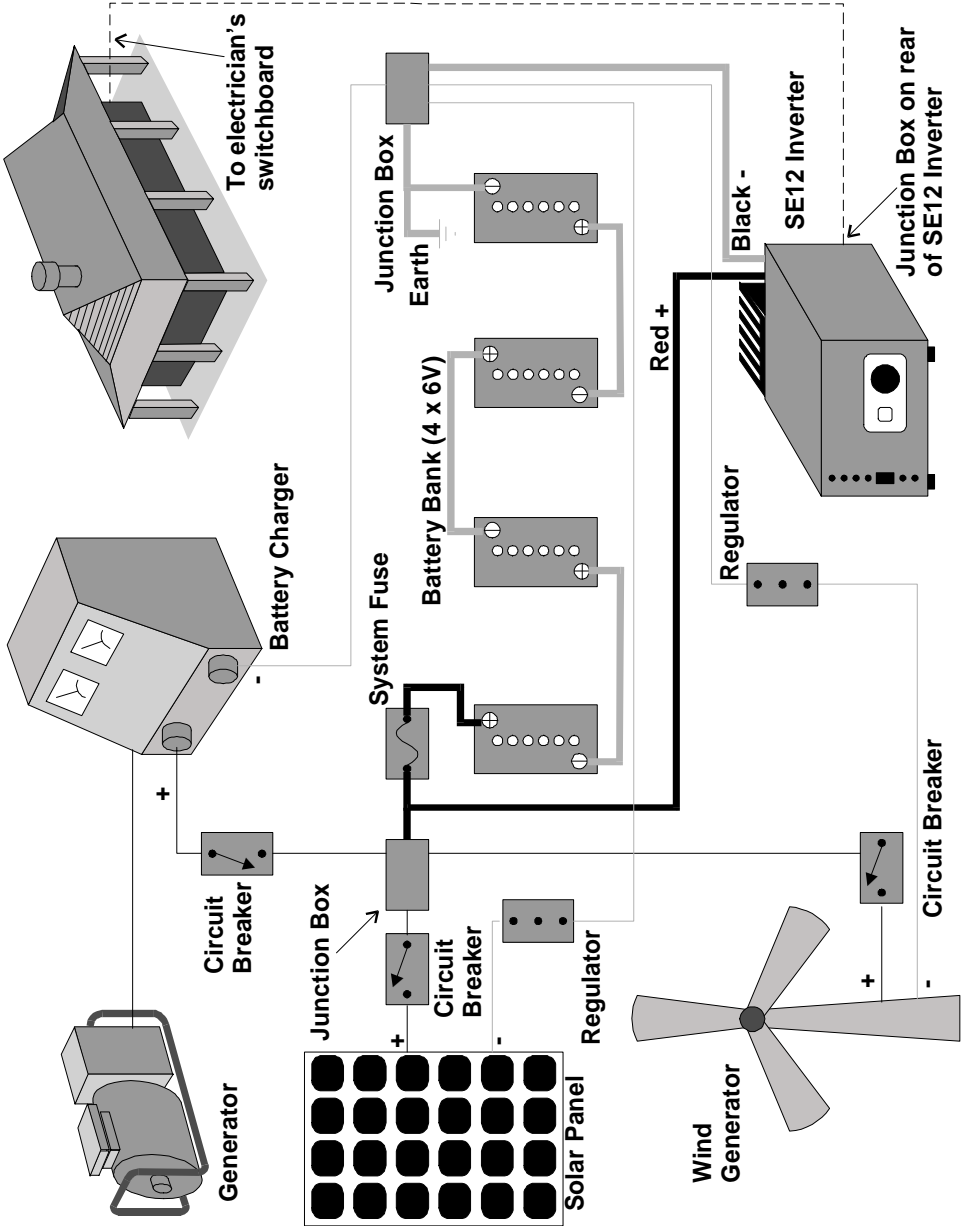
Say 1 hour =6.1Ah

So if we have a 100Ah battery, then with the above example we should have 100 minus 6.1 = 93.9 Ah remaining in the battery.



As a general guide never discharge a battery below 50%. The deeper a battery is discharged on a regular basis, the less life you can expect from the battery. See you battery specifications for full details.

RAPS System Wiring Diagram



System Wiring

Your SE12 may form part of a complete power system, If this is the case, the diagram on page 6 may give you a guide. See your designer / installer for full details.



Electrician's Note

- All earth's AC and DC should be bonded
- An Earth stake should be within 3m of the inverter
- The SE10 is suitable for connection to MEN wiring

Warning

As a matter of safety, Selectronic strongly recommend that all fixed installations be designed and installed by appropriately qualified person. The Solar Energy Industries Association in your state or territory can provide names of accredited system designers and installers.

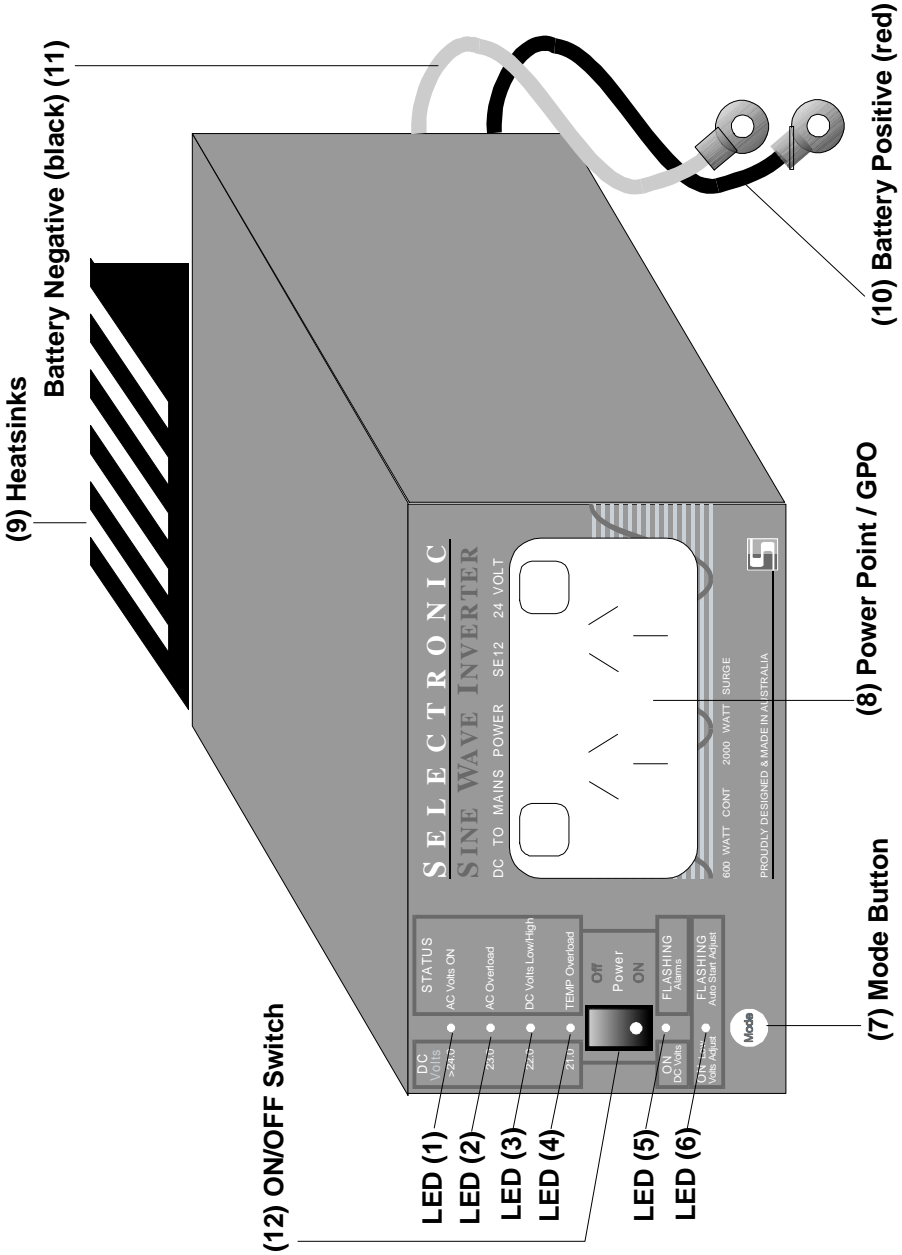
The output voltage from an inverter is as lethal as mains electricity.

All AC wiring **MUST** be carried out by an accredited electrician and must conform to AS3000 and/or any relevant local standards.

Getting Started Quickly

If you want to get powered up quickly here are the 11 simple steps.

1. Familiarise yourself with the details in the first 6 pages on this manual.
2. Unpack the SE12 from the packaging.
3. Check unit for any damage that may have resulted during transport, if any damage is evident report this to your supplier immediately.
4. Make sure the SE12 ON/OFF switch (12) is in the off position.
5. Connect battery positive wire (red) (10) to battery positive or battery fuse.
6. Connect battery neg. wire (black) (11) to battery negative or battery fuse.
7. Plug a 230 - 240V appliance into inverter front power point (8) but do not switch on.
8. Turn ON/OFF switch (12) to ON.
9. After 3 seconds LED (1) will begin to flash. If no LEDs light, check for correct connection to battery.
10. Turn power point (8) on
11. You're away.



Operation

Six LEDs are provided on the front panel to indicate a number of parameters, and allow adjustment of some of these parameters.

LED (5) and (6) tells you what LED (1) – (4) is displaying as indicated on the front panel of the SE10. Pressing Mode Button (7) will change the information being displayed.

STATUS indicators LED (5) (green) flashing

When power is first applied LED (1) and (5) should flash.

When LED (5) (green) is flashing, this indicates the LED (1) – (4) is showing the inverters STATUS, as per written notation to the right of the LEDs. In this mode there are no adjustments to be made.

LED (1) Flashing indicated the SE12 is in Auto Start mode, this indicates that no power is being drawn from the inverter so it has gone to SLEEP to save power. If no power is used within 12 minutes, the LED (1) will flash at a slower rate therefore saving more power.

LED (1) Stays ON, the inverter has been commanded to provide power to the load (e.g. a light switch has been turned on) so it has gone from SLEEP mode to ON. Once the load has been removed (e.g. the light switch is turned off) the inverter will wait 10 seconds and return to SLEEP mode.



It is good practice to have your SE12 in SLEEP mode as often as possible. When the SE12 is in SLEEP mode it uses 0.055 amps from the battery, when the inverter is in the ON mode it uses at least 0.35 amps from the battery.

The amount of power required to go from SLEEP to ON is adjustable and is described on page 11.

LED (2) AC Overload should normally remain OFF. If the inverter shuts down due to too much AC load being drawn from it then LED (2) will come ON. The SE12 will remain in this condition for 2 minutes after the AC load has been decreased to a safe level.

- If the inverter remains in this condition after two minutes, switch (12) should be turned OFF and then back ON.
- When switch (12) is turned OFF any adjustments made to the factory settings will be lost.

LED (3) *DC Volts Low / High* should normally remain OFF. If the inverter shuts down because the battery volts are too high then this LED (3) will come ON. It will remain ON until normal battery volts are restored.

- If the inverter shuts down due to not enough battery volts, then LED (3) will flash.
- LED (3) will continue to flash until the battery volts have risen sufficiently. In this case, charge the battery by starting the vehicle or using a battery charger.

The low voltage point that the inverter will cut out is adjustable to suit your particular battery, see page 12 for details of this adjustment.

LED (4) *Temperature Overload* should normally remain OFF. If the inverter shuts down due to internal components getting too hot, then this LED (4) will come ON. It will remain ON until the temperature has lowered to a safe level; the inverter will then come back ON.

- If this LED (4) is coming on regularly, either reduce the amount of load on the inverter or try to move the inverter to a cooler location.

DC Volts ON, LED (5) (green) ON

Pressing the Mode button (7) will change the information being displayed by LEDs (1) – (4). Press the Mode button once, the green LED (5) will be ON. This will turn LEDs (1) – (4) into a battery voltmeter. The voltage of your battery will be indicated by the figures to the left of LEDs (1) – (4). If all LEDs are ON then the battery voltage is greater than 24 Volt.

The LEDs will turn OFF one by one as the battery voltage drops. When the battery voltage is below 21 volts, LED (4) will flash.

To return to Status, quickly press the mode button (7) once.

How to make use of a Voltmeter



Batteries vary enormously in size capacity and quality and can be severely affected by age. By keeping an eye on the voltmeter it will give you a guide to the amount of charge in your battery. Where possible, you should keep your battery volts above 24 volts at all times. If you are using a large load for a short time, the battery volts will probably drop below 24 volts. This is normal and OK as long as the battery volts return to 24 volts when the load is turned off.

Auto Start Adjust LED (6) (red) Flashing

It is sometimes necessary to adjust the auto start sensitivity to overcome what is called “Phantom Loads”. A phantom load is a load that tricks the inverter into thinking it should be ON instead of in SLEEP mode.

The wiring of a house or a portable stereo system in standby are good examples of a phantom load. These loads serve no purpose but yet can increase battery drain by bringing the inverter ON. Hold the Mode button (7) down until LED (6) begins to flash, (approximately 1 second) indicating you are ready to adjust this setting. The SE12 will leave the factory with a setting of 4 watts. Now press the Mode button (7) until the desired value is sought. LEDs (1) – (4) will return to either Status or Voltmeter after 20 seconds.

Indicator	Setting
LED (1) ON	16 watts
LED (2) ON	12 watts
LED (3) ON	8 watts
LED (4) ON	4 watts
ALL LEDs ON	Inverter will remain ON at all times. This could be used if a fax machine or VCR is required to stay on at all times. Be aware that this will use more power from your battery.

Low Volts Adjust LED (6) (red) ON

To avoid total discharging of your battery the SE12 shuts down at a pre-set low voltage. As all batteries are different, so too is the minimum voltage they should be discharged to. The SE12 will leave the factory with a setting of **22.0 volts**, change this setting if required.

Hold the Mode button (7) down until LED (6) comes ON, (approximately 2 seconds) indicating you are ready to adjust this setting. Now press the Mode button (7) until the desired value is sought. LEDs (1) – (4) will return to either Status or Voltmeter after 20 seconds.

Indicator	Setting
LED (1) ON	23.0 volts
LED (2) ON	22.0 volts
LED (3) ON	21.0 volts
LED (4) ON	20.0 volts

Maintenance

Inverter

Periodic maintenance of your SE12 inverter involves little more than checking for any obstructions to the black cooling heatsink at the rear of the inverter. The heatsink must be cleared of any accumulated foreign matter that may have lodged itself between the fins since the last maintenance check, e.g. insect nests. Also verify that airflow around the inverter has not become restricted, particularly on the right hand side where the fan draws in air through the louvres.

Batteries

1. Every week, carry out a thorough visual inspection of all battery wiring, taking particular note of the condition of inter-connections between cells. This maintenance should be carried out in conjunction with the battery manufacturers recommended maintenance.

Safety Hint



When working on batteries of such high capacity it is essential that you wear protective clothing, some form of eye protection and rubber-soled work boots. Please regard your batteries with a great deal of caution, and if in any doubt, entrust this work to your supplier / installer.

2. Check that the stainless steel inter-connecting bolts are tight and have no corrosion. If corrosion is evident, carefully follow the following procedure.
 - Disconnect the system battery fuse before working on the battery bank.
 - Unbolt the stainless steel bolts and nuts of any corroded connections and thoroughly clean the joint with a wire brush or file, taking extreme care not to short circuit any battery cells with any tools.
 - Re-assemble and smear a small amount of Vaseline or similar grease over the surface of the joint to slow down any future corrosion.

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3. Once a fortnight or as directed in your battery manufacturer, check the specific gravity (SG) of each battery cell using a hydrometer, to ensure that all cells are performing correctly and are properly charged. Any serious imbalance should be reported to your system designer in case remedial action needs to be taken.

Solar Modules

- Periodically check for a build up of dust or any other foreign matter.

Wind Generator

- As wind generators are mechanical devices that are subject to weather variances, proper maintenance is essential for reliable service.
- Carefully follow the manufacturers maintenance guidelines; if unsure contact your supplier.

Handy Hints



It is very important that you become familiar with the functioning of your inverter. From a distance, it is not always easy to know what if the inverter is On or in Sleep mode. An easy way to determine this is to plug a small child's night-light (neon type) into a power point that is easily visible, or replace this power point with a safety type with a neon indicator. This will indicate the inverter's operation by flashing when the inverter is in SLEEP mode and remaining ON when the inverter is brought ON by a load.

Radio Frequency Interference

For many years, Radio Frequency Interference (RFI) has been an annoying problem for owners of Inverters. RFI in a domestic situation can cause noise on an AM radio receiver. The degree of interference can vary dramatically from site to site. Below are a few suggestions to help reduce the effects of RFI in your installation. It is not essential that you follow these guidelines, however, they will give you the best chance of reducing any RFI, particularly on AM radio.

It is recommended that the power system including the inverter be housed at least 10 metres from the home.

Ensure a good earth stake is placed as close to the inverter as possible. This earth stake should be in a moist area and should be connected to the inverter earth, see page 2 for wiring details.

Avoid running DC cables into the home, if at all possible. If this cannot be avoided, run DC and AC in separate conduits separated by as much distance as practicable. All DC wiring should also be kept as short as possible.

Connect battery negative to earth.

AM radios should be powered from their own self-contained batteries and kept as far away as possible from AC or DC wiring within walls. Make sure that your AM radio has maximum signal strength. This will help your radio to reject any unwanted noise being produced by your inverter, regulator, controllers or DC lighting. If possible, try moving the radio around to improve the signal strength or use an external aerial. Some of today's building materials such as steel roofs and foil insulation may form a barrier to incoming radio signals. If an external aerial is required, it should be on the outside of the home, mounted as high as practicable and as far from the inverter as possible. Connection from the aerial to the radio should be via a low loss coaxial cable.



Please note the aerial must be an AM RADIO type; a TV aerial will not work.

Fault Finding

No indicators ON when power is first applied

When first connected, if the SE12 shows no indicators the battery connections may be reversed. Check that the red battery wire (10) is connected to the battery positive, and the black battery wire (11) is connected to the battery negative. Remember there is a 3 second delay before power is available after switch ON.

Inverter stays ON when no appliance is being used

This can be a common problem known as a “Phantom Load”, but can be easily overcome. Some appliances will need to be switched off at the power point as they may still represent a small load despite being switched off at the appliance.

Check again to make sure that there are no appliances left ON, the sequentially switch off appliances at the wall and by watching your night light (as described in Handy Hint, check to see if the SE12 returns to pulsing (SLEEP) mode after a 10 second delay. Once you have found the offending appliance, increase the sensitivity of the “Auto Start” (see page 11) until the inverter turns OFF. Once this is done re check that small loads will still bring the inverter ON when required.

Inverter shuts down during the middle of the day, and comes back ON late in the afternoon

This is more than likely caused by high battery volts during peak charging times from Solar Panels. Battery volts should never exceed 34 volts. If this is the case, have your Solar Regulator checked.

Warning

As a matter of safety, Selectronic strongly recommend that all fixed installations be designed and installed by appropriately qualified person. The Solar Energy Industries Association in your state or territory can provide names of accredited system designers and installers.

The output voltage from an inverter is as lethal as mains electricity.

All AC wiring **MUST** be carried out by an accredited electrician and must conform to AS3000 and/or any relevant local standards.

Product Warranty Conditions

Selectronic Australia Pty Ltd warrants your SE12 inverter to be free from defects in materials and workmanship under normal use and service, for an initial period of two (2) years.

This warranty is applicable only from the date of original purchase. All parts will be replaced or repaired free of charge within this period. Travelling time for field service personnel is not covered under this warranty. If no authorised field service personnel are available, the unit shall be returned to any authorised service centres, this must be done at the owner's cost. There will be no charge for the return of the inverter. Repairs carried out by unauthorised service centres will not be covered under warranty.

In the event of unauthorised exporting, Selectronic reserve the right to refuse warranty claims outside Australia or New Zealand.

The provision of this warranty shall not apply if the unit has been subject to misuse, neglect, act's of God, accidental damage or has been used for a purpose for which it is not designed.

Charges to the point of purchase and the cost of any repairs resulting from damages occurring during this freighting will be borne by the owner. Any alterations or repairs by unauthorised parties will void your warranty.

To ensure fast efficient handling of any warranty claims, please complete and return your reply paid warranty card within 30 days from date of purchase.

SE12 24 Volt Specifications

Inverter Type Microprocessor control circuit with PWM full bridge power stage. True sine wave AC output

Current draw from Battery	
Condition	Amperage
Auto Start SLEEP mode (average)	0.055 Amps
Inverter ON, with no Load	0.35 Amps
Maximum Continuous Load (700 Watt)	35.0 Amps
Half hour rating (900 Watt)	45.0 Amps
Surge rating (2000 Watt)	100 Amps

Inverter Power Ratings @ 25° C	
Condition	Total Appliance Rating
Continuous	700 Watt
Half hour rating	900 Watt
Surge rating (5 seconds)	2000 Watt

Auto Start	
Type	Pulsing AC
Minimum Load to Start	4 watts – 16 watts user adjustable
Response Time Normal Pulse Mode	1 second maximum
Power Save Mode	1.5 seconds maximum

Battery Voltage Range	Voltage
Low DC Volts Cut Out–10 second delay	20 – 23 volts user adjustable
Low DC Volts Cut In	24 volt
High DC Volts Cut Out–Instantaneous	34 volts

Inverter Efficiency @ 12 volts	
40 watts	77% efficiency
100 watts	85% efficiency
200 watts	90% efficiency
400 watts	88% efficiency
700 watts	84% efficiency

Battery Cables	
Length	1.5 metres
Diameter	13mm ²
Lug	8mm hole

Miscellaneous Specifications	
Reverse Polarity Protection	Full Electronic Protection
Output Voltage Accuracy 0-700 watts	± 4% @ 24 volt input
Output Frequency	50Hz ± 0.01%
Total Harmonic Distortion	<4%
Operating Temperature Range	-10° C to 50° C
Transformer Type	Toroidal
Cooling Method	Convection
Power Point	Twin 10 Amp
Weight	9.0 kg
Shipping Weight	9.6 kg
Chassis Material	Zinc Coated Steel
Chassis Coating	Powder Coated
Size	225W x 160H x 310mm D

Selectronic Authorised Service Network

If service is required, contact your supplier or return your inverter in its original carton with proof of purchase to any of the following service centres.

Selectronic Australia Pty Ltd

25 Holloway Drive
Bayswater
Victoria 3153
Australia
Ph: 03 9762 4822
Fax: 03 9762 9646
service@selectronic.com.au

Rainbow Power Company

1 Alternative Way
Nimbin
NSW 2480
Australia
Ph: 02 6689 1430
Fax: 02 6689 1109

Burley TV Service

278 Edmondson Ave.
Austral
NSW 2171
Australia
Ph: 02 9606-0279

Amelec Marine Sales

16 Parkinson Lane
O'Connor
WA 6163
Australia
Ph: 08 9331 3100
Fax: 08 9331 5150
amelec@tpgi.com.au

RF Analysis

Harness Cask Road
Dorrigo
NSW 2453
Australia
Ph: 02 6657 8003
Fax: 02 6657 8002

Reid Technology Ltd

3-5 Auburn Street
Takapuna
North Shore City
Auckland NZ
Ph: 9 489-8100
Fax: 9 489-8585
ps@reidtechnology.co.nz

Notes:



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