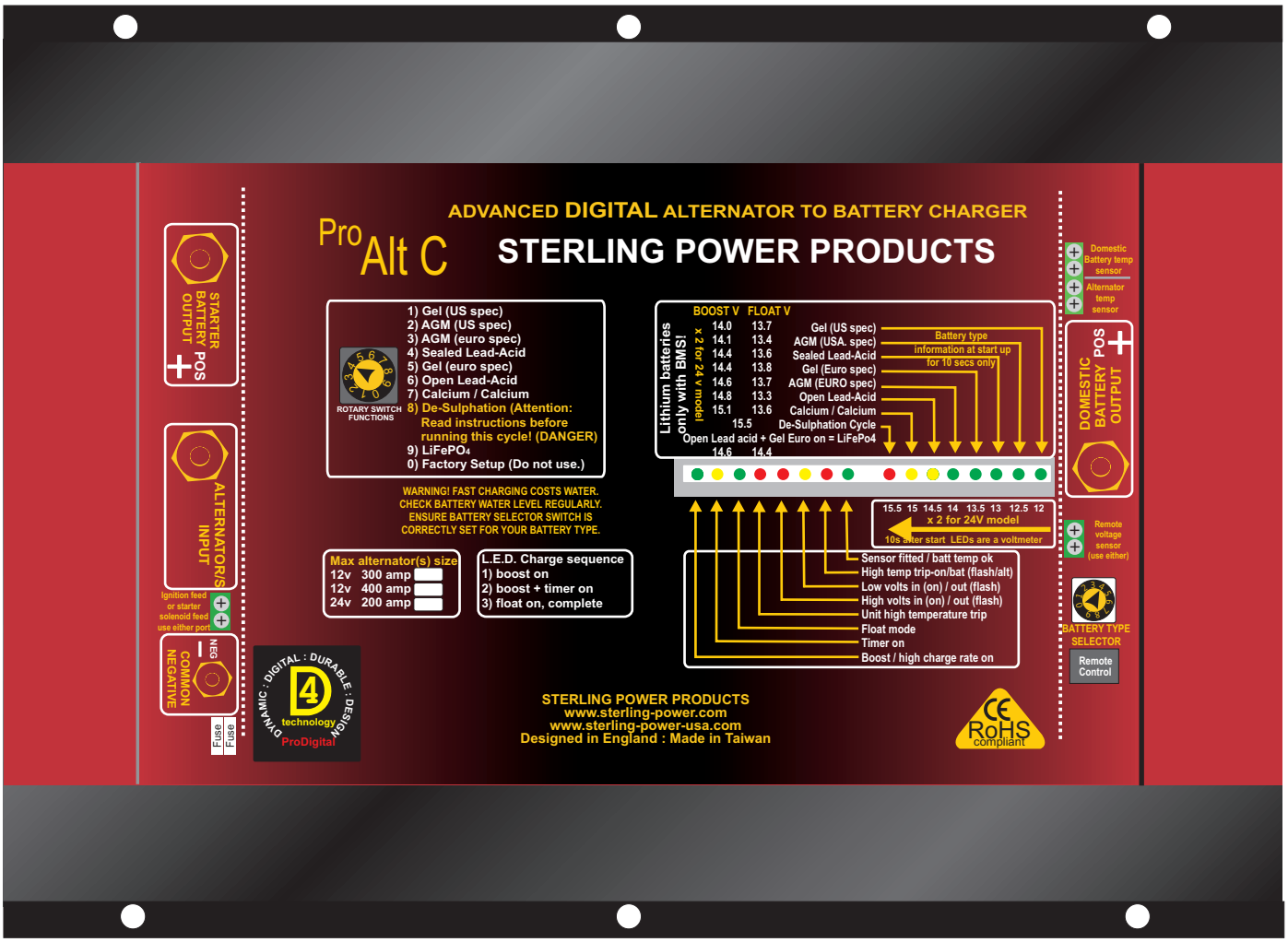
THE QUEEN'S AWARDS FOR ENTERPRISE: INNOVATION 2005

e1

AB12400
AB24200
ABNRC

STERLING
POWER PRODUCTS



Alternator to Battery Charger

12V 300 & 400A
24V 200A

CE RoHS compliant

www.sterling-power.com
www.sterling-power.usa.com

DYNAMIC : DIGITAL : DURABLE : DESIGN
4 technology
ProDigital

Alternator-to-Battery Charger Instructions

Safety Instructions

Before connecting and running your Sterling alternator-to-battery charger, read the complete instructions and all cautionary labels on the unit and on the batteries. Only a correct installation according to these instructions will let you take full advantage of your alternator-to-battery charger.

General Precautions Always install the unit in a dry, cool and well-ventilated place. Any contact with water and heavy humidity has to be avoided. Do not cover the fans to prevent the unit from overheating. Make sure all cables have the appropriate size and are in good condition. Do not run the unit with cables that are damaged or otherwise inappropriate.

Precautions against Gas Explosions The alternator-to-battery charger contains electrical components which may produce sparks in event of failure. In order to avoid the risk of fire or explosion, do not install the unit in rooms containing batteries or highly inflammable materials or in any place requiring explosion-proof equipment. This includes any room with petrol, gas or diesel driven engines or with tanks or piping used for any such substance. Before starting to install the charger please ensure that there is sufficient ventilation. In order to prevent the formation of explosive gases make sure that the batteries have not been charged for at least 4 hours prior to installation.

Precautions when Handling Batteries Someone should be within earshot, i.e. close enough to come to your aid when working near a lead-acid battery. Have plenty of water and soap nearby in case battery acid comes in contact with skin, clothes or eyes. Wear complete eye protection and protective clothing. Avoid touching the eyes while working with a battery.

If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters the eye(s), flood eye(s) with running cold water for at least 10 minutes and seek medical attention immediately.

Never smoke or allow a spark or flame in the vicinity of a battery or the engine.

Work with extra caution to reduce the risk of dropping a metal tool onto a battery. It may create sparks or short-circuit the battery or other electrical parts that may cause an explosion.

Remove all personal metal items such as rings, bracelets, necklaces, watches and jewellery when working near a battery. A battery can produce a short-circuit current high enough to weld a ring or any other metal which will lead to serious burns.

Never charge a frozen battery.

General Overview

The Sterling alternator-to-battery charger is a fully automatic, electronic multi-stage split-charge system which charges two banks of batteries from one or more alternators. It combines an advanced split charge diode system with a powerful voltage amplifier. The unit has one input to connect to one or more alternators and two outputs to charge two different battery banks.

The output marked “starter battery” is a straight channel through a diode; this is the channel that is connected to the boat / vehicle engine system. In order to avoid any conflicts with an electronic engine management system, there is no boost function on this channel.

The output marked “domestic battery” comprises an intelligent, software-controlled boost function which charges the domestic battery bank up to five times faster and much more efficiently than a standard alternator could do. In addition, the batteries will take in up to 50% more charge current, allowing you to utilize their full capacity.

While the alternator-to-battery charger greatly improves the charging of the domestic battery bank, the starter battery has always priority, ensuring that the engine can be started at any time. Under no circumstances will the system allow the starter battery to drop below 13V.

Additional functions protect your electrical system and your batteries from possible faults such as overcharging or over temperature caused by the alternator to battery charger. Any fault on the system will be indicated by a number of LEDs or on the optional remote control unit.

How it works

In order to maximise the alternator(s) output current, the alternator-to-battery charger pulls the alternator output voltage down to about 13.3V. Then this low voltage is amplified to a higher voltage suitable for effective battery charging, i.e. 14.1V to 14.8V. The unit’s intelligent software automatically calculates the optimum charge cycle and absorption time. When the batteries have been fully charged, the voltage is reduced to float voltage (appr. 13.5V to 13.8V) if possible, depending on the output voltage of the alternator.

Product Characteristics

Easy installation: It could not be easier. For the basic system only 4 connections are required: one from the alternator(s), one to each battery bank and one to the common negative. Apart from the additional negative connection most of these cables will be on board anyway.

Advanced charging technology: Intelligent, software-controlled, 4 step charging of the domestic battery including temperature compensation.

No interference with engine electronics: Because the system does not increase the voltage of the starter battery there is no risk of problems with the electronic engine management system.

No work on the alternator required: Absolutely no changes to the alternator are required. As a result no warranty conflicts can arise.

Suitable for multiple alternators: Unlike other systems the alternator-to-battery charger can be used simultaneously on more than one alternator, saving even more installation work and money.

Starter battery priority: The system ensures that the starter battery is always kept in operational condition.

Intelligent fault protection: The unit comprises multiple safety features and fault indicators. Even in the unlikely event of a complete failure, the unit will still work as a split charge diode.

Enhanced installation options: The unit comes with temperature sensors for the battery and the alternator. It can be enhanced by an optional remote control.

Basic Installation

Important: These guidelines refer to the connections that have to be made for the correct installation of the Sterling Alternator-to-Battery Charger. On an existing system you may also be required to remove some of the original connections that were used to charge the batteries prior to the installation of the unit.

Install the unit in a cool and well-ventilated position close to the alternator(s). Also, the installation point has to be dry and free from heavy condensation since the unit is not waterproof. Do not fit it in a closed box as this might lead to overheating of the unit and reduced performance.

The unit has three temperature-controlled fans. Therefore they will run more often when the unit is installed in a place with a high ambient temperature.

Before connecting the unit to your alternator(s) make sure that your alternator-to-battery charger is rated for the maximum (combined) output of the alternator(s).

Connect the main alternator(s) output(s) (B+) to the center stud marked ALTERNATOR INPUT. Then simply connect the other studs to the engine battery and to the domestic battery, respectively. Make sure that the cables used can carry the full current of the alternator(s). Choose a cable size that can carry at least twice as much current than required. For example, if you have a 70A alternator, then use a 140A cable to reduce voltage drop in the cable and improve performance.

If you are only going to charge one bank of batteries, then use the “DOMESTIC BATTERY” output only. The “START BATTERY” output can remain unused without affecting the performance of the unit.You can split the boosted domestic battery side by using a Sterling Pro Split R 0.0 volt splitting system or the current limiting VSR.

The unit has a short negative wire which has to be extended and connected directly to the alternator negative (or case) or the common battery neg using a 60A cable.

If you currently have a split charge diode, then the three positive wires are already there. Simply replace the split charge diode with the alternator-to-battery charger and connect the negative wire to the alternator neg or the nearest main common neg.

Important: If your alternator has got its own battery voltage sense wire, then this has to be removed from the battery terminal and should be connected to the alternator’s own B+ output instead. This will prevent contradictory regulation between the alternator and the alternator-to-battery charger.

After installation if the unit does not work when the engine is running , then with the engine running check the voltage at the alt input stud on the product, if its not above 13.3V (x 2 for 24V) then the unit will not work. If it’s 0V then you will need to apply an ignition feed to the product, see next paragraph.

Ignition feed/ Starter solenoid: (4) Some alternators will not fire up without a voltage on their B+ terminal. Because the alternator-to-battery charger contains a split charge diode there will be no voltage feed on the B+ terminal which means that the engine will start but the alternator may not work. If this is the case, then simply connect an ignition feed (from the key switch) which becomes live when the engine is started. this will feed 12V through the unit and fire up the alternator.

Extended Installation

For additional functions and improved performance some extra features can be installed. Note that this extended installation is optional and is not required for the unit to work.

Battery Temperature: Using its ring terminal end, connect one of the enclosed temperature sensors to your domestic battery's negative post. Do not use on the positive battery terminal for this connection! Connect the two small wires on the other end to the small terminals marked "battery temp". Be careful not to damage or alter the temperature sensor in any way! The system will then sense the battery temperature and change the output voltage in accordance with the recommended temperature compensation for the selected battery type. The temp sensor does not need to be used for the unit to work.

Important: All voltages indicated in these instructions refer to an ambient temperature of 20°C. When using a battery temperature sensor these voltages will be different due to temperature compensation.

Alternator Temperature: (10) Using its ring terminal end, connect one of the enclosed temperature sensors to your alternator case or negative stud. Do not use any positive terminal (B+) for this connection! Connect the two small wires on the other end to the small terminals marked "alt temp". Be careful not to damage or alter the temperature sensor in any way! The system will then sense the alternator temperature and will disengage the voltage amplifier if the alternator temperature exceeds 100°C.

Voltage Sensing: (7) The alternator-to-battery charger in its standard configuration senses all voltages directly at the unit. However, in order to compensate a possible voltage drop between the unit and your domestic battery, you can run a simple 0.5mm² wire from the positive stud of your domestic battery to the terminal marked "dom sense".

Multiple Alternators: The alternator-to-battery charger can be used on more than one alternator at the same time. Simply connect all alternator outputs (B+) to the alternator input terminal on the unit. Make sure that your alternator-to-battery charger is rated for the combined maximum output of the alternators.

possible problems encountered. If one alternator is at one voltage (e.g. 14.3V) and another one is set at 14.1V (example) then at some point during the charging cycle the 14.1V alternator (the lower voltage alternator) will produce no current. This may create a beeping / ECU related problem on some new engines. To bypass this problem connect the D+ of both alternators together with a relay.

Remote Control: (5) The remote control kit is an optional extra

The remote control will keep you informed about voltages, currents, temperatures and other operating figures. In the event of a problem, it indicates what the problem is.

Battery Type Selection FIG 7/8

Program the type of your domestic battery into the unit by using the rotary switch (6). The unit has 8 different battery type settings and a de-sulphation setting:

Battery Type Selector (for 24V x voltages by 2)

Switch setting	Boost	Float
0) no boost		
1)Gel USA	14.0	13.7
2)AGM 1	14.1	13.4
3)sealed lead acid	14.4	13.6
4)gel euro	14.4	13.8
5)AGM 2	14.6	13.7
6)open lead acid	14.8	13.3
7)calcuim	15.1	13.6
8)de-sulphation	15.5	4 hrs then off
9)LiFePO4	14.6	14.4 (NB. for LiFePO4, ensure battery has a battery management system (BMS))

BATTERY TYPE SELECTOR

Battery Charging Terminology: We use the word Boost, fast charge which then becomes absorption or equalising charge, to describe the first and second stage of the charge cycle. All it means is that the charger is offering the boost voltage to the batteries (and the batteries will absorb all the current up to the max current of the charger) for as long as possible. Then the current will taper off. After a period of time the voltage will drop to float. This is a voltage which will maintain your batteries and also allows the system to act as a power pack to supply power being used on the boat or vehicle without touching the newly charged batteries. The time on boost is determined by the state of charge of the battery bank and the ratio of your battery bank size and the size of the charger. The internal software program works this out every time the charger is used and will vary within the parameters shown as time.

1) Gel U.S. spec. Boost 14.0V, Time 1 - 10 hrs, Float 13.7V
American gel manufactures want a different charging regime than the European ones. If in doubt ask the battery supplier.

2) European AGM spec. Boost 14.6V, Time 1 - 8 hrs, Float 13.7V
This is what the European AGM suppliers such as Optima want for their batteries. Again, we would strongly recommend you contact your battery supplier to confirm which charging option they require for their batteries. This higher voltage appears to be for AGM batteries with a higher calcium content on their plates.

3) Sealed Lead-Acid. Boost 14.4V, Time 1 - 12 hrs, Float 13.6V
Sealed lead-acid batteries are simply lead-acid batteries which have no access to top up the water level.

4) European Gel / Exide spec. Boost 14.4V, Time 12 - 24 hrs, Float 13.8V
This program is, as per the recommendation of Exide, set at a voltage of 14.4V volts for about 12-24 hrs. The unit then drops to float voltage to maintain the batteries.

5) AGM U.S. spec. Boost 14.35V, Time 1 - 8 hrs, Float 13.35V
This is the setting which most American AGM battery manufacturers would like. Ask your battery supplier for the correct setting as this is a new battery type which is becoming more and more popular.

6) Open Lead-Acid Boost 14.8V, Time 1 - 8 hrs, Float 13.3V
or sealed lead-acid batteries, where you can unscrew the lid of the battery and are able to top it up with water. The maximum boost voltage for this type of batteries is 14.8V.

7) Calcium-Calcium (liquid lead-acid): Boost 15.1V, Time 1 - 6 hrs, Float 13.6V
Some modern batteries have had calcium added to their plates in order to reduce water loss in the battery. The down side with this is that you need a high charge voltage to get the batteries charged. This setting goes up as far as 15.1V on boost and can have a detrimental effect on voltage-senstive equipment on the boat/vehicle. It is important to ensure that your equipment works safely at a voltage in the region of 15.4V (x2 for 24V systems) before selecting this option, most equipment does but not all.

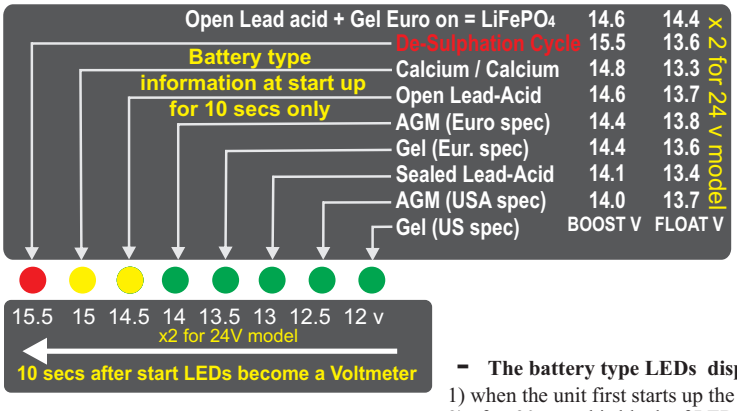
8) De-sulphation Setting: Boost 15.5V, Time 4 hrs, Float none/off.
WARNING: This is a very dangerous setting if used without understanding what it does. First of all, the batteries should be isolated from the boat's system as the voltage will be pushed up close to 16V which will damage some onboard equipment. The reason why you would engage this charge mode is to blast the sulphation off old or unused batteries to regenerate them. It will probably need to be used on an old set of batteries which are not charging or holding a charge. This program will help a lot to remove the sulphation from the plates. It is unlikely this setting would need to be used when the batteries are still new. Do not use this setting on sealed, gel or AGM batteries as they will gas and you will be unable to replace the water loss! DO NOT USE ON LiFePO4 BATTERIES

9) LiFePO4 Lithium batteries, this is a charge of 14.6V and a float of 14.4V. Only charge Lithium batteries with a Battery-Management-System connected. No temperature compensation with this battery setting.

Fuses: Because the instructions refer to 12V as well as 24V units between 200 and 400A and there are a lot of different fuse possibilities and combinations, it is simply not possible for us to recommend any fuse values. This will be up to the installer. However, here are a few key issues to remember when choosing a fuse:

1) In most cases a fuse is there to protect the cable not the product, so always fuse 50% plus on the product rating. For example, if the alternator is a 100A alternator then fuse about 150A etc.

2) Too small a fuse in an alternator line can cause major problems. If, for example, you have a 100A alternator and you only put a 100A fuse on, then, on start up and when cold, a 100A alternator can produce about 120A. This will blow the fuse and because you have open circuited the alternator, this will result in the destruction of the alternator. So, it is vital that an alternator cannot blow its fuse under normal operating parameters as this will be an expensive mistake. Always fuse higher rather than too low.



WHAT CABLE TO USE IN sq mm

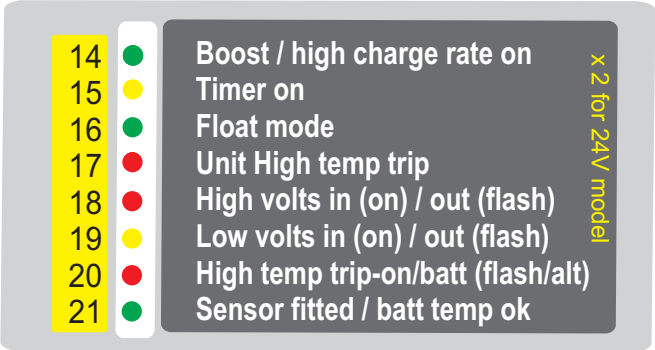
A charger or inverter up to	cable run distance 0-1.5 mtr	1.5 - 4 mtr
0-25 amps	6 mm sq	10 mm sq
25-45 amps	16 mm sq	25 mm sq
45-85 amps	25 mm sq	35 mm sq
85-125 amps	35 mm sq	50 mm sq
125- 180 amps	50 mm sq	70 mm sq
180-330 amps	70 mm sq	90 mm sq

Please note that if there is a problem obtaining for example 90 sq mm cable, simply use 2 x 50 sq mm or 3 x 35 sq mm. The cable is simply copper, and all you require is the copper. It does not matter if it is one cable or 10 cables as long as the cross-section adds up. Performance of any product can be improved by thicker cable, so if in doubt round up.

- **The battery type LEDs display 2 different sets of information**

1) when the unit first starts up the LEDs show the battery type selected for the first 30 secs.
2) after 30 secs this block of LEDs becomes a voltmeter showing the voltage at the output of the unit this allow you to access if the unit is working correctly. I.e. after a few minutes on start up the LEDs should progress up to the preset voltages set by the battery type adjustment.This could take a few minutes to a few hours depending on the size and state of the battery bank.

The LED meanings and functions (fig 8)



14) **BOOST / HIGH CHARGE RATE ON:** Green: This should be on from start-up (a slow flash shows that the unit is on but on standby. I.e. the high alt temp trip or some other trip has switched the boost aspect off and the unit is waiting to reset if possible). When this LED is on continuously this shows that the system should be working at it's maximum rate to achieve the full preset desired output voltage. It should remain on until the green float comes on and this shows the high charge rate is complete.

15) **TIMER ON:** Yellow: Timer Activated: This comes on, when the voltage reaches about 13.9 - 14V (x2 for 24V) and depending on how long it took to achieve this voltage from start up will dictate how long the timing cycle will remain on. The software will calculate the timing for the high charge rate. This will vary from 1 - 10 hours and the time will be displayed on the remote panel as a count down. This light will remain on until the high charge rate is over, and will go out at the same time as the high charge rate between 1-6 hours after activation. (a slow flash shows that the unit is on, but on standby. I.e. the high alternator temp trip or some other trip has switched the boost aspect off and the unit is waiting to reset if possible).

16) **FLOAT:** Green Float Mode: This indicates that all the high charge cycles are now over and should remain on after all the high charge lights are out. The system is now running at a standard float voltage rate only (about 14V) regulated on the battery (a slow flash shows that the unit is on but on standby, i.e. the high alt temp trip or some other trip has switched the boost aspect off and the unit is waiting to reset if possible).

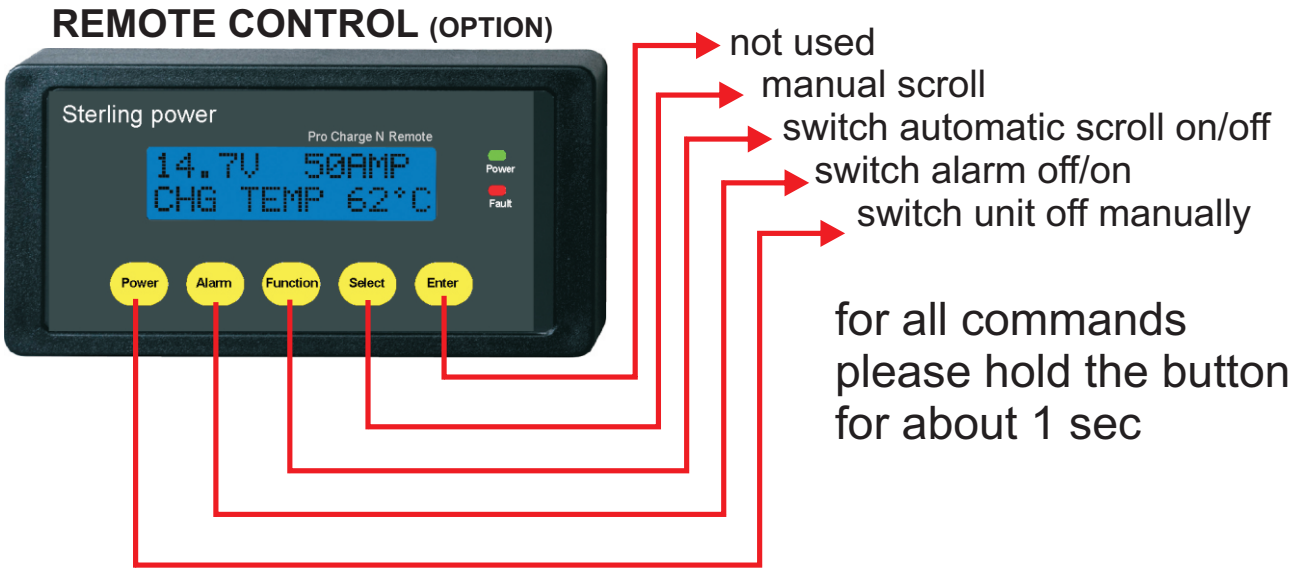
17) **HIGH TEMPERATURE:** red: (LED on solid) This device monitors both heat sinks and in the event of that exceeding 75 deg C the unit will switch off until the temperature has been reduced. It is important not to fit the unit inside a hot engine room or somewhere with no air flow round the unit total unit shutdown, auto reset on unit temp dropping below 65 deg C. (LED Flashing constant) and the current lights flashing, this means the boost has been switched off (to reduce the heat being produced on the heat sink, if the temp keeps increasing then the LED will come on solid and trip the unit completely, as such, the unit is on standby waiting for the temperature to reduce.

18) **HIGH VOLTS IN (ON) / OUT (FLASH):** (LED on solid) This will warn you and switch off the boost section, this means that your alternator's own regulator has failed and the alternator will now boil and destroy your batteries, there is simply nothing we can do about this except warn you:
Please take this warning very seriously and stop your engine as soon as possible, remove the alternator input cable to prevent damage to your batteries then continue your journey and have the alternator inspected and repaired at next available place. This is a fatal warning and should not be ignored.
Battery output voltage high (LED on flashing continually). This will warn you and switch off the boost section, this means that either this unit has failed and was in the process of overcharging your battery bank, or, you have some other charging source on your output battery bank which is overcharging the batteries and our unit thinks it is at fault. I.e. if there was a battery charger or solar cell which was putting out a voltage in excess of 1.5V above the boost voltage of each of the different battery types. This is a fatal trip and the unit will not come back on again until reset. I.e engine switched off and on again.
LED 2 flash, high internal voltage, fatal flaw, unit defective and must be returned.
LED 3 flash, group high voltage starter battery, warning only no action by our unit.
LED 4 flash, high voltage drop from unit output to the end of the remote sensing cable, this is due to either to small a cable, to long a run, deflective crimping, or broken cable. Not fatal, find fault and fix, max voltage drop between unit output and cable end is 0.8 volts this is a warning but no action from our unit.
LED 5 flash short circuit on output, the parameters are , voltage below 6 volts and current in excess of 100A (the software will take this as a short circuit).

19) **LOW VOLTS IN (ON)/ OUT (FLASH)** yellow: **Low Input Voltage Warning**: (LED on solid) This is simply saying that there is a low voltage at the main battery bank and has no active function. For information only, this usually indicates a defective alternator or very high demand at low r.p.m.
Battery output low voltage: Low Voltage Warning: (LED flashing) This is saying that this could simply be that the output batteries are so flat that it could take a few hours to build up the voltage, or, the unit is defective and unable to charge the batteries.
Low Starter battery 2 flash then pause.

20) **HIGH TEMP TRIP, ON / BATT (FLASH / ALT)** Red: This shows that the battery temperature sensor has picked up a temperature in excess of 50 deg C at its source (whereever you have fitted it) this will trip the unit until it has been reset. Please find the fault before resetting, it could be a hot defective battery or a loose terminal near the temp sensor which has overheated the terminal giving the sensor a false temp reading, the unit processes taking this reading as the actual battery temperature.

21) **SENSOR FITTED/BATTERY TEMPERATURE OK** this confirms that the battery temperature sensor is fitted and that all is okay. If the sensor is not fitted this LED will go out.



Optional Remote Control

Place of Installation

Install the remote control panel in a dry place and in such away that you can easily read the display and access the control buttons.

Important: The panel must be installed in a dry place!

The installation location should be accessible easily.

The remote panel can be flush-mounted or top-mounted with or without frame:

1) Top-Mounting with Frame

Drill a hole for the wires into the back board. Slide the small left and right hand covers (A) off the front panel which will expose the screws. Unscrew, remove the frame (B) and drill the required holes into the back board. Connect all necessary wires to the correct terminals at the back of the unit. Mount the unit using the frame (B) and suitably long screws onto the back board.Reattach the covers (A) onto the front panel.

2) Top-Mounting without Frame

Slide the small left and right hand covers (A) off the front panel which will expose the screws. Unscrew and remove the frame (B). Use the inside of the frame (B) as a template for the required cutout in the back board. Carefully cut out the back board and connect all necessary wires to the correct terminals at the back of the unit. Mount the unit using the four short screws supplied and reattach the covers (A) onto the front panel.en.

3) Flush-Mounting

Remove the small left and right hand covers (A) off the front panel and make a cutout of 134mm x 90mm into the back board. Ideally, the back board should not be thicker than 3mm; otherwise the front panel will stand back a little. Using the actual Power Management Panel as a template, drill the required holes with counterbores into the back board. Connect all necessary wires to the correct terminals at the back of the unit. Push the unit from behind into the cutout and fix it with the screws provided..

Installation of the Remote Control

Connect the supplied remote control cable with the remote control unit. On the back of the remote panel is a small opening with a socket behind. Mind the correct orientation of the plug when you connect the cable. The small clip on top of the plug must be directed upwards. Then, connect the remote control cable with the corresponding connector on the alternator-to-battery charger. Again, mind the correct orientation of the plug! (clip on top).

Avoid if possible laying the remote control cable next to any 230volts AC cables or next to high current d/c cables. This may cause interference and erroneous data transmission. Remember, the remote control cable is purely a data transmission working on very low voltages.

We strongly recomend not to shorten this cable. If you cut and reconnect the cable this may void the warranty of your unit.

When all cables have been correctly laid and connected, reconnect the batteries and the alternator.

Basic Functions

1) Switching the charger on and off

The alternator-to-battery charger can be switched on and off manually by pressing the on/off key (assumming the alternato is working. Even when the charger has been switched off, it will remain on standby mode. Also, the batteries will still be charged, but without the boost on the domestic battery side.

After the unit has been switched on, the remote control will show the software release of the charger and the remote control unit. In case you are experiencing a problem with your alternator-to-battery charger, please take a note of these numbers before you contact us.

When the engine is restarted, the alternator-to-battery charger will also restart, even when the charger has been switched off manually before.

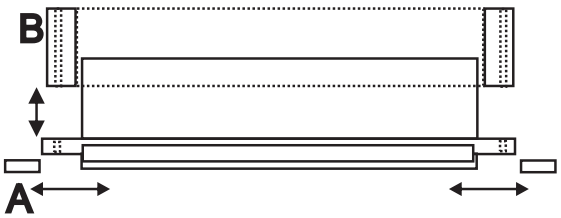
2) Alarm Sound

The alarm sound indicating any system faults can be muted using the alarm key.

3) Background Light

The background light of the display panel can be switched on and off using the light key.

BOX INSTALLATION INSTRUCTIONS
SLIDE PARTS A TO EXPOSE SCREW HOLES
FOR FLUSH MOUNT, REMOVE PART B
FOR SURFACE MOUNT KEEP PART B
AFTER INSTALLATION REPLACE PARTS A



SCREENS (START UP)

COMPANIES INVOLVED IN THIS PRODUCT

```
STERLING EUROPE
PRO MARINER USA
```

ABOUT 2 SECONDS▼

SEARCHING FOR THE COMS SIGNAL ,IF MORE THAN A FEW SECONDS, CHECK THE LINK CABLE AND CONNECTORS

```
SEARCHING
****************
```

ABOUT 2 SECONDS▼

PRODUCT INFORMATION MODEL TYPE

```
ALTERN > BATTERY
IN 12V - OUT 12V
```

ABOUT 2 SECONDS▼

SHOWING INFORMATION ON THE BATTERY TYPE SETTING, TO CHANGE ADJUST BATTERY TYPE POT

```
BATTERY TYPE SET
FLOODED POS 6
```

ABOUT 2 SECONDS▼

SHOWING THE CHARGE STATE & VOLTS IE FAST/ADSORPTION/FLOAT CHARGE.
DEFAULT SCREEN

```
FAST CHARGE
14.8 VOLTS
```

FOR MORE INFORMATION PUSH THE FUNCTION BUTTON ON THE REMOTE CONTROL. AND THE SCREENS WILL AUTOMATICALLY SCROLL THROUGH. ALL VOLTAGE READINGS BELOW ARE JUST EXAMPLES TO STOP THE AUTOMATIC SCROLLING AND LOCK ONTO ANY OF THE BELOW SCREENS THEN SIMPLY PUSH THE FUNCTION BUTTON AGAIN AND THE SCREEN WILL SAY SCROLL OFF AND LOCK ON THE SELECTED SCREEN.

AFTER YOU PUSH THE FUNCTION BUTTON

```
SCROLLING ON
```

ABOUT 2 SECONDS▼

WHAT PART OF THE CHARGE CYCLE THE UNIT IS CURRENTLY ON AND THE VOLTAGE. IE FAST/ABSORBTION/FLOAT

```
FLOAT CHARGE
13.4 V
```

ABOUT 5 SECONDS▼

WHEN THE CYCLE IS ON ADSORPTION MODE, THIS IS THE COUNT DOWN TIMER UNTIL IT GOES ONTO FLOAT

```
ADSORPTION TIME
   154 MINS
```

ABOUT 5 SECONDS▼

ALTERNATOR INPUT VOLTAGE TAKEN AT THE INPUT STUD AT OUR UNIT

```
ALTERNATOR INPUT
   14.0 VOLTS
```

ABOUT 5 SECONDS▼

DOMESTIC OUTPUT VOLTAGE AT OUR STUD

```
DOMESTIC OUTPUT
   14.7 VOLTS
```

ABOUT 5 SECONDS▼

REFERS TO THE STARTER BATTERY VOLTAGE TAKEN AT OUR UNITS TERMINAL

```
STARTER OUTPUT
13.1 VOLTS
```

ABOUT 5 SECONDS▼

REFERS TO THE DOMESTIC BATTERY BANK VOLTAGE IF THE REMOTE SENSE WIRE IS USED ONLY. IF NOT USED THEN NO DATA

```
DOMESTIC BATTERY
   NO DATA
```

ABOUT 5 SECONDS▼

SHOWING BETWEEN 1-100% THIS IS THE EFFECTIVE BOOST
1%= LITTLE WORK
100% = MAX WORK

```
POWER BOOST
    20%
```

ABOUT 5 SECONDS▼

UNIT TEMP SHOWN IN DEGREE C AND IN DEGREE F THE UNIT WILL SWITCH OFF AT 80 DEG C

```
UNIT INTERN TEMP
82 F      28 C
```

ABOUT 5 SECONDS▼

ALTERNATOR TEMP
IF SENSOR FITTED, IF SENSOR NOT FITTED THEN NO SENSE.

```
ALTERNATOR TEMP
  NO SENSE
```

ABOUT 5 SECONDS▼

BATTERY TEMP
IF SENSOR FITTED, IF SENSOR NOT FITTED THEN NO SENSE.

```
BATTERY TEMP
  NO SENSE
```

ALARMS:
THE UNIT IS FITTED WITH A LOT OF ALARM AND SAFETY FEATURES.
UNDER NORMAL RUNNING THEY SHOULD NEVER COME ON.
THE ALARM BUZZER CAN BE SWITCHED OFF BY
PUSHING THE ALARM BUTTON ON THE REMOTE CONTROL,
THE ACTUAL ALARM WILL REMAIN ON THE SCREEN.
IN THE EVENT OF SEVERAL ALARMS HAPPENING THEN
THEY ARE PRIORITIZED TO SHOW THE WORST ONE

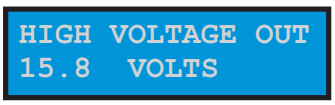
IF THE VOLTAGE DROP BETWEEN THE UNIT OUT & THE DOM BATT (IF SENSE WIRE IS USED) EXCEEDS 1.6V. THERE IS A CABLE PROBLEM.

Thick cable is very important to avoid too much voltage drop at high currents. Thin cable could lead to a fire in the cable. It is always a good idea to test the unit at full power and feel all the battery cables, if you have problems touching the cable then the temp will be in excess of about 50 deg C and this is getting too hot, add more cable to reduce the voltage drop and the temp will also drop.

THE STANDARD ALTS REG MUST HAVE FAILED AND IS PUSHING OUT IN EXCESS OF 15.5V

The only way this can happen if the alternators standard regulator has failed and too much voltage is being produced at the alternator. This is a serious event and requires the engine to be switched off as soon as possible to prevent damage being done to the system. We cannot stop this, only warn you. if you are somewhere where you cannot fix this problem, then please stop the engine as soon as possible and remove the alternator output cable or the alternator drive belt before continuing on. Sort the alternator out as soon as possible.

ALARM IN THE EVENT OF THE OUTPUT VOLTAGE BEING 1 VOLT ABOVE THE DESIRED PROGRAMMED VOLTAGE



The usual only way this can happen if the alternators standard regulator has failed and to much voltage is being produced at the alternator (as above). However, it is possible the alternator is okay but the alternator to battery charger regulator has failed in some way and it is going to damage / overcharge your batteries. In this case when the trip is activated the voltage should drop down to within safe limits (about 14V) the unit is then defective.

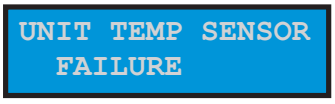
SENSOR READING IN EXCESS OF 55 DEG C COULD BE HOT BATTS OR LOSE CONNECTION ON TERMINAL

This fault is intended to show high battery temp in excess of 55 deg C, however, other factors can trigger this alarm, for example, a large amount of current going through loose / small cable can cause the temperature on the battery stud (where the temp sensor is connected). If over heat, this can set the alarm off. So, in the event of this alarm activating, visit the terminal in question as soon as possible (within a minute or so) and confirm if the batteries are hot or simply the terminal, in which case fix the terminal/wiring to stop this.

ALT TEMP SENSOR SENSING IN EXCESS OF 90 DEG C AT THE ALT

This fault is intended to show high temp at the alternator, if this keeps going off then you should consider piping cold air in around the back of the alternator. The alternator will then suck the air from the back of the alternator through to the front, this will dramatically cool the alternator down.

ONE OF THE 3 INTERNAL TEMP SENSORS HAS FAILED



There are 3 internal temperature sensors controlling the fans inside our unit, in the event of one of them failing then this alarm will sound, it would be a good idea to return the unit for service.

THIS IS A WARNING THAT YOUR DOMESTIC BATTERY CABLE IS TOO THIN OR MAYBE LOOSE

This is the first stage warning that the voltage drop down your main domestic cable between the unit and the domestic batteries is getting too much (assuming the remote sense wire is connected) and you should be looking at increasing the amount of copper on that run of cable (i.e. double it up). if the voltage drop goes over 1.8V then the unit will trip (see above alarm).

IF UNIT TEMP EXCEEDS 80 DEG C THEN IT WILL SWITCH OFF THE UNIT

This alarm is as it states, the unit is getting too hot and has switched off. Make sure the unit is in a ventilated space and reasonablely cool. Not in an engine room or a sealed cupboard. You may need to reposition the unit.

IF THE UNIT IS ABOVE 70 DEG C BUT BELOW 80 DEG C THEN THIS IS A WARNING IT'S GETTING HOT

This is just a pre-warning saying the unit is getting into a uncomfortable condition but is still working and has got hot, yet to have tripped out yet.

COULD BE DUE TO MAJOR ALTERNATOR FAILURE OR OTHER CHARGING SOURCE

Hard to say what would cause this, an alternator regulator failure causing a high alt voltage would but then i would expect other alarms to go off first. Another possibility would be another charging source causing the problem, maybe a solar or wind generator or a battery charger has failed open circuit. Check the alternator voltage.

THIS IS A WARNING THAT YOUR STARTER BATTERY IS TOO LOW. ALTERNATOR FAILURE ??

This fault could be caused by an excessive load on the starter battery or an alternator failure

DOMESTIC BATTERY BANK LOW, EITHER EXPECTED OR ALT / UNIT FAILURE

This alarm could be as a result or the alternator failure (check alt voltage is above 13.3V). If so, then you could simply have a heavy load exceeding the ability of the system to sustain that load, the problem will resolve itself when the load is relieved, and the system given a chance to recover.

IF LOW INPUT VOLTAGE, CHECK ALT VOLTAGE TO SEE IF ALT STILL WORKING OR REMOVE LARGE LOAD

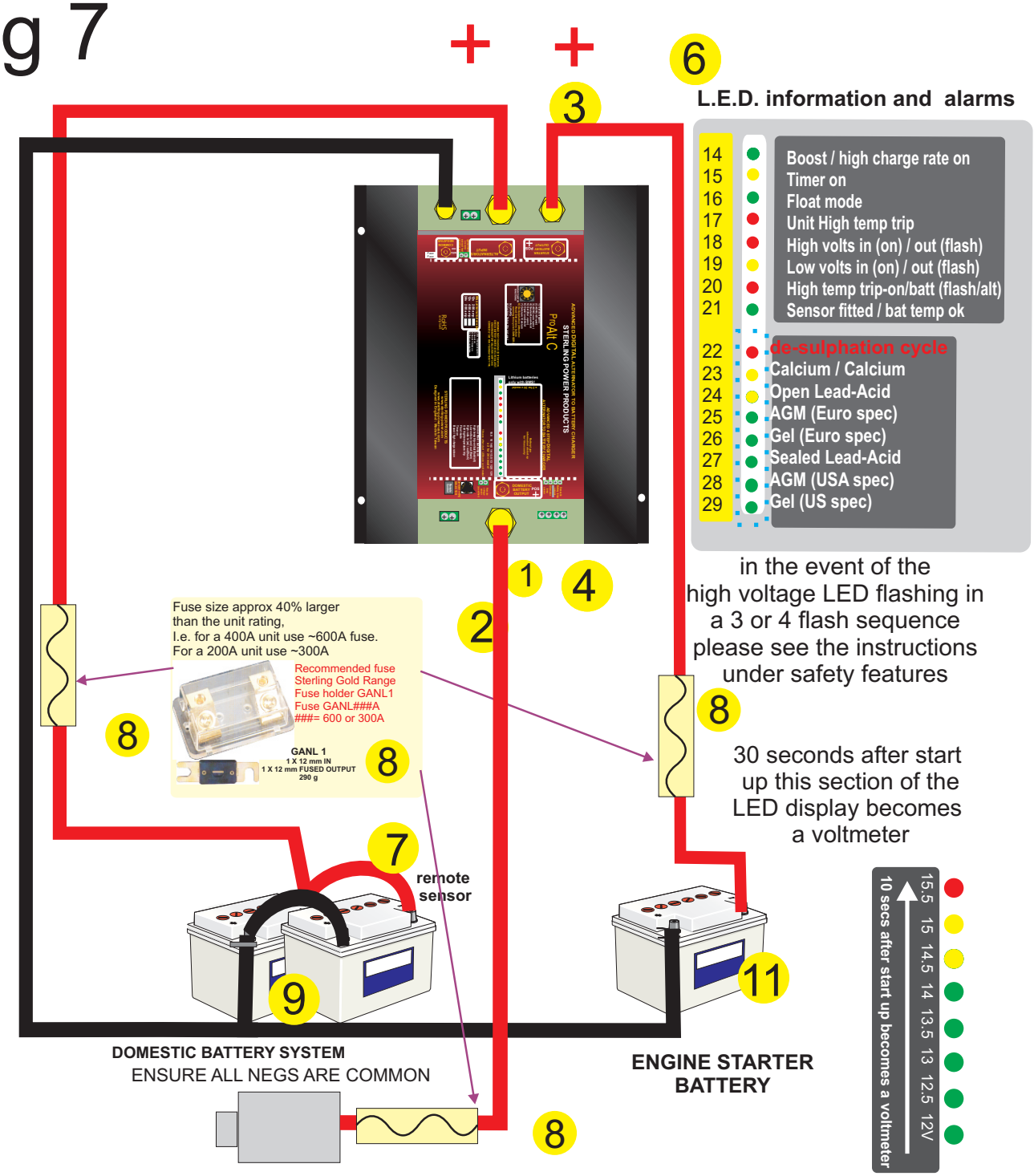
I would say the most likely problem here would be the alternator failure, or possible such a large load on the system the alternator has collapsed. Remove all large loads and see if the alternator recovers, if not, then the alternator has failed.

MAJOR FAULT ON THE DOMESTIC BATTERY BANK

This would be a catastrophic short circuit on the domestic batteries, fix as soon as possible.

Minimum System Wiring
Basic installation

fig 7



How to increase the number of battery banks charged from a Pro Alt using a Pro Split this can be done in any configuration

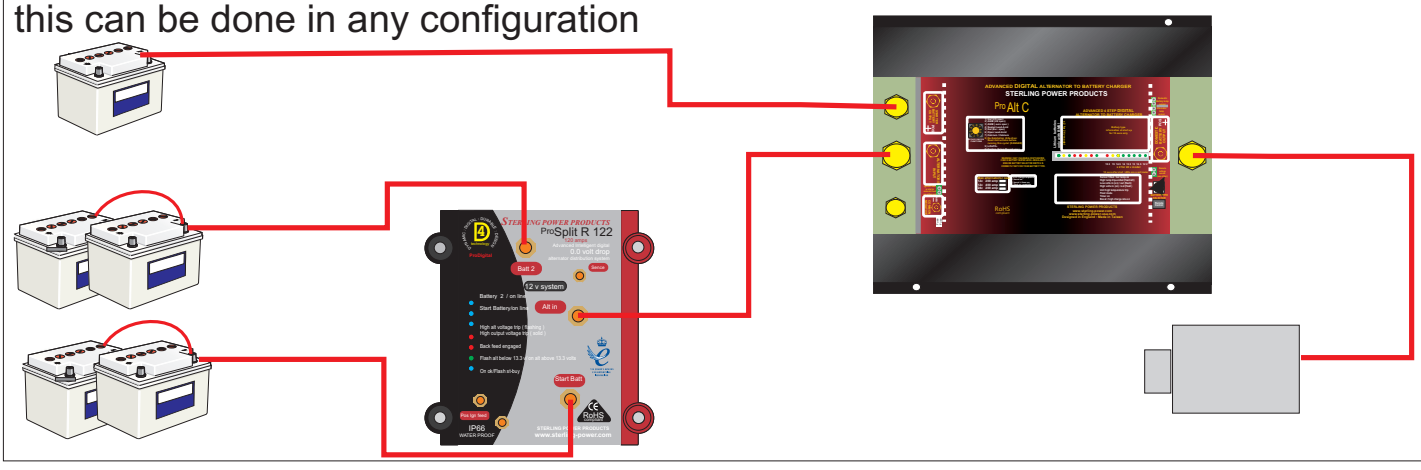
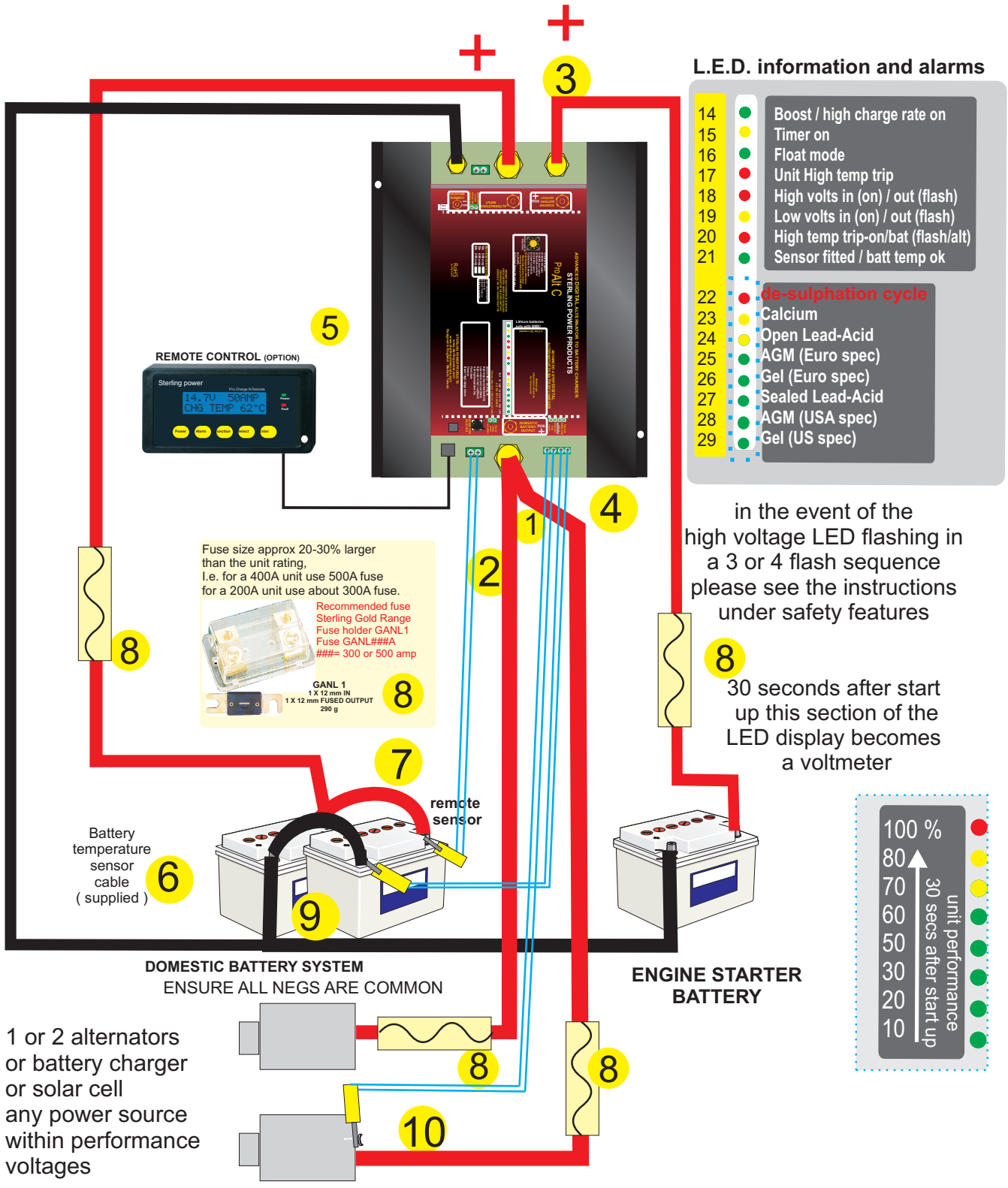


fig 8

Full System Wiring
(including optional remote kit)



Battery type rotary selection switch

ROTARY SWITCH FUNCTIONS	MAX. CHARGING VOLTAGE		
1) gel usa	14.0 V	1 - 10 hrs	13.7 V
2) agm 1 usa	14.35 V	1 - 8 hrs	13.35 V
3) sealed lead acid	14.4 V	1 - 12 hrs	13.6 V
4) gel euro	14.4 V	12 - 24 hrs	13.8 V
5) agm 2 euro	14.6 V	1 - 8 hrs	13.7 V
6) open lead acid	14.8 V	1 - 8 hrs	13.3 V
7) calcium/calcium	15.1 V	1 - 6 hrs	13.6 V
8) de-sulphation (danger, read instructions before running this cycle)	15.5 V	4 hrs	off
9) $LiFePO_4$	14.6 V		14.4 V

What do I expect to see from this unit and why?

The illustration below shows results from bench tests representing a typical split charge system with an engine battery of 100Ah (standard lead acid) and a domestic battery of 3 x 100Ah (standard lead acid). The engine battery was discharged to 11V (about 10 engine starts) and the domestic bank to about 11V (will no longer run an inverter and is about 60% empty). The alternator used was a Bosch 90A with a standard 13.9V (variable) regulator. The unit battery type is programmed to open lead acid. There are 2 x graphs, one is the current delivered into the batteries, and the other is various voltages measured on the system.

System voltage graph:

The key points to pick up on here are:

The yellow trace (alternator voltage into the unit) clearly shows the system doing its job it is designed to pull this voltage down a little to enable the standard alternator regulator to produce its full current. You can clearly see that the standard alternator voltage is at position **4** on the voltage curve, however, the input voltage has been pulled down to position **5**. The effect on the alternator output current is full output at position **8** - **9.** Where you can clearly see the standard alternator current without the advanced charging system taper down fast from 80 - 30 amps over the same time (from position **2-3).** The advanced charging equates to about 70A improvement over the standard non assisted alternator.

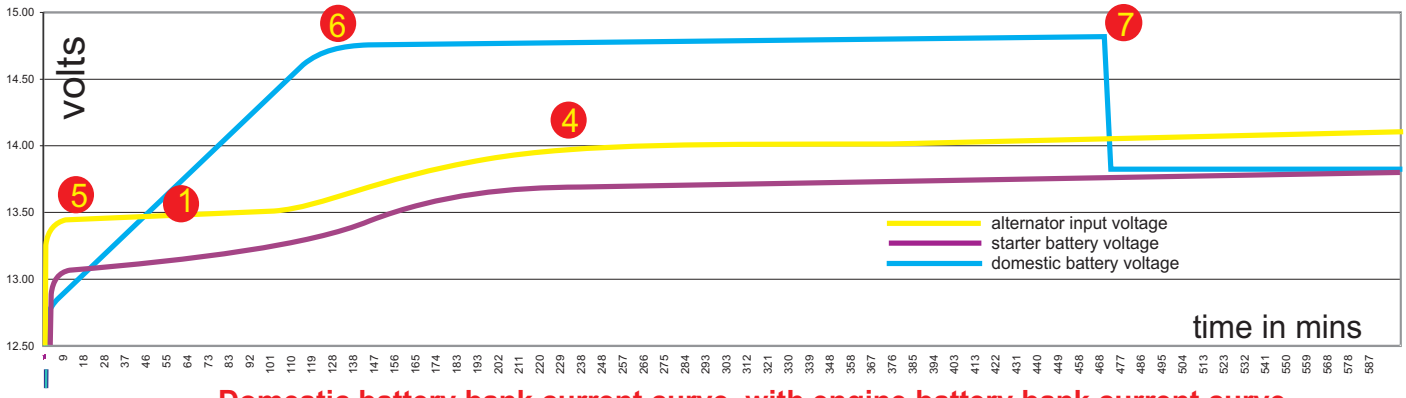
Position **1** : This is the most interesting stage where the magic is at work, the point where the domestic battery voltage exceeds the alternator input voltage, this is what the advanced charging process is all about.

The current graph The domestic current graph clearly shows the constant current charge between points **8-9.** At position **9** the current starts to taper off until it reaches position 10. The accuracy of the software can be seen when the voltage drops from the high voltage charge to the constant voltage charge (float). The current only dropped 5A (at position **10**) showing without doubt that the software program was spot on. The batteries could not accept any more positive charge and were clearly full. The high charge voltage is maintained between voltage positions **6-7** at 14.8V.

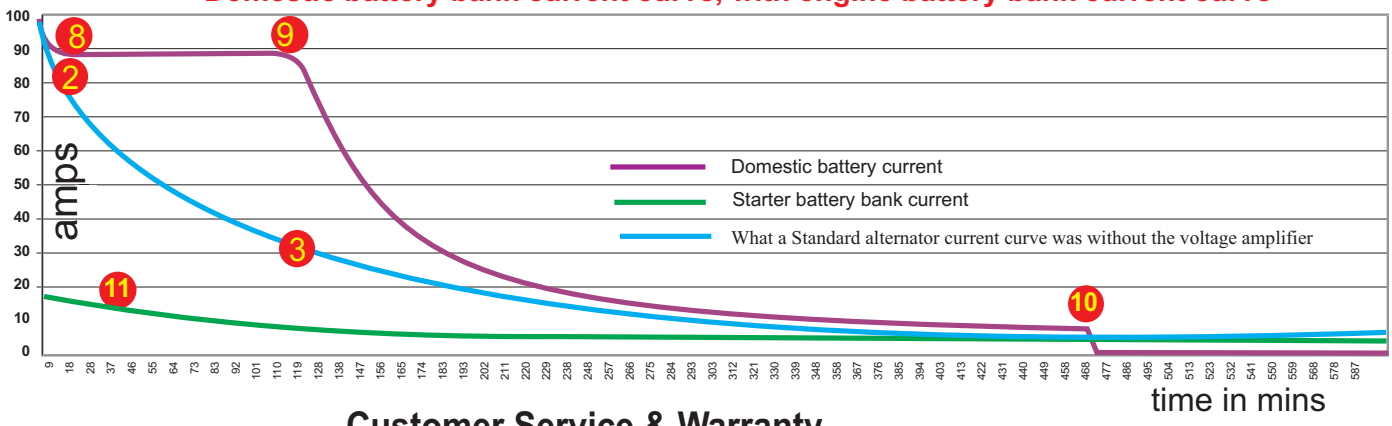
Engine priority

Position **11** shows that through the whole process the engine battery continues to charge and is not deprived of its charging voltage, the engine battery performance is the most important as at the end of the day it must be able to restart the engine.

Engine battery bank, domestic battery bank, and alternator voltage curves



Domestic battery bank current curve, with engine battery bank current curve



Customer Service & Warranty

Your 100 % satisfaction is our goal. We realise that every customer and circumstance is unique. If you have a problem, question, or comment please do not hesitate to contact us. We welcome you to contact us even after the warranty and return time has passed.

Product Warranty:

Each product manufactured by Sterling Power comes with at least a 2 year limited factory warranty. Certain Products have a warranty period of time greater than 2 years. Each product is guaranteed against defects in material or workmanship from the date of purchase. At our discretion, we will repair or replace free of charge any defects in material or workmanship that fall within the warranty period of the Sterling Power product. The following conditions do apply:

- The original receipt or proof of purchase must be submitted to claim warranty. If proof cannot be located a warranty is calculated from the date of manufacture.
- Our warranty covers manufacture and material defects. Damages caused by abuse, neglect, accident, alterations and improper use are not covered under our warranty.
- Warranty is null and void if damage occurs due to negligent repairs.
- Customer is responsible for inbound shipping costs of the product to Sterling Power either in the USA or England.
- Sterling Power will ship the repaired or warranty replacement product back to the purchaser at their cost.

If your order was damaged in transit or arrives with an error, please contact us ASAP so we may take care of the matter promptly and at no expense to you. This only applies for shipping which was undertaken by our company and does not apply for shipping organised by yourself. Please do not throw out any shipping or packaging materials.

All returns for any reason will require a proof of purchase with the purchase date. The proof of purchase must be sent with the returned shipment. If you have no proof of purchase call the vendor who supplied you and acquire the appropriate documentation.

To make a claim under warranty, call our customer care check telephone numbers on **www.sterling-power.com** or **www.sterling-power-usa.com**. We will make the best effort to repair or replace the product, if found to be defective within the terms of the warranty. Sterling Power will ship the repaired or warranty replacement product back to the purchaser, if purchased from us.

Please review the documentation included with your purchase. Our warranty only covers orders purchased from Sterling Power. We cannot accept warranty claims from any other Sterling Power distributor. Purchase or other acceptance of the product shall be on the condition and agreement that Sterling Power USA LLC and Sterling Power LTD shall not be liable for incidental or consequential damages of any kind. Some states may not allow the exclusion or limitation of consequential damages, so, the above limitations may not apply to you. Additionally, Sterling Power USA and Sterling Power LTD neither assumes nor authorizes any person for any obligation or liability in connection with the sale of this product. This warranty is made in lieu of all other obligations or liabilities. This warranty provides you specific legal rights and you may also have other rights, which vary from state to state. This warranty is in lieu of all other, expressed or implied.