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## Battery Charger Selection Guide

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## Battery Charger Selection Guide

### General :

The selection of the appropriate battery charger for any particular application is far more difficult than first appears.

The timing of discharge, Rate of discharge, Time of recharge are all parameters which vary significantly from application to application & from day to day. This means that battery charger and battery charge programme selection is not an exact science and "experts" may offer different solutions to the same situation.

We have collected together our view of best practice but each application is different and the user often has the best information for charger & charge programme selection.

The charge voltage available is changing significantly as vehicle manufacturers produce EURO 5 & EURO6 engines. The desire to increase miles per gallon and emissions is reducing the production of electricity by the alternator. This is often called the smart alternator. To further reduce emissions STOP /START has also become common and the energy from braking is now being used to recharge the electrical battery. This is called regenerative braking.

These regimes have been given various names by the manufacturers ; Mercedes Benz Blue Efficiency Vehicles, VW Blue Motion Vehicles, Ford ECONetic vehicles, Vauxhall ecoFlex vehicles to name a few.

The Universal Power Converter contains a boost /up converter to cover the voltage drops introduced by long input cables and the voltage variations that Euro 5 & Euro 6 have introduced through the use of a smart alternator . Regenerative braking generates voltage peaks & The Universal Power Converter has been designed with a very wide input range 9-32V to cope with these voltage peaks. Our software also allows maximum power transfer from the primary battery & its charging circuit to the secondary batteries while ensuring that the primary battery retains sufficient charge to start the vehicle.

We have selected a voltage threshold level & we believe this will work with all vehicle manufacturers charging functions without risking a non start primary battery.



## Battery Charging :

The ideal battery charger would charge the battery as quickly as possible without affecting the life of the battery.

It is very difficult & expensive to collect all the data required to optimise the charging process and any loads applied to the secondary battery during charging further complicate the process,

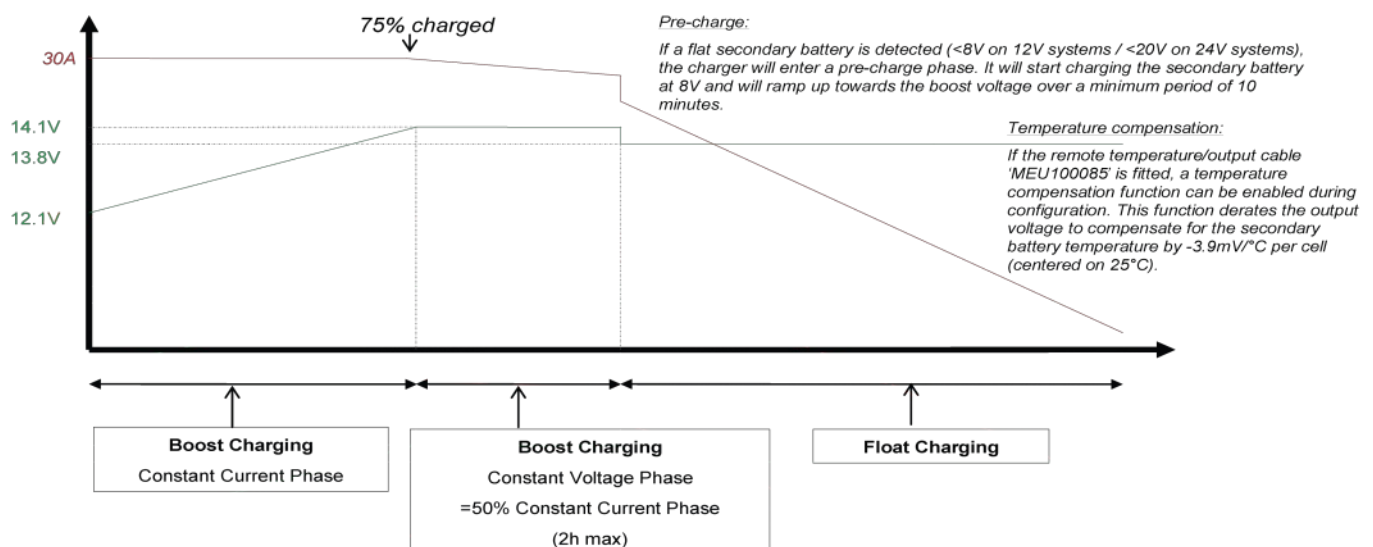
A multistage charger allows the charger to provide the best charge & voltage to the secondary battery dependant on all the variables, The charge settings can be changed to optimise the battery life at the expense of a slower charge time.

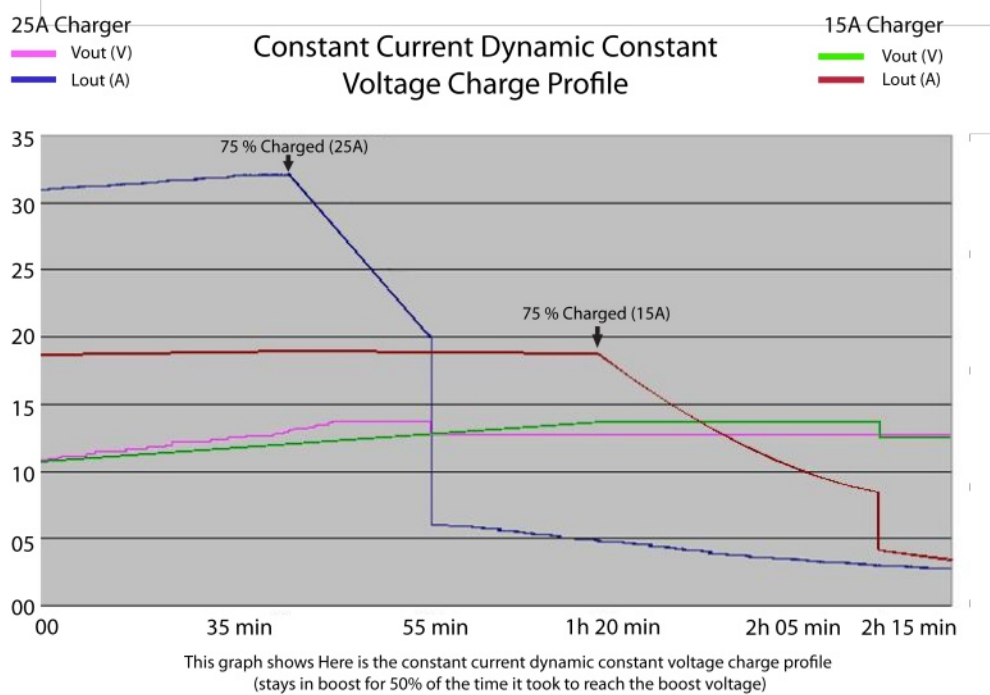
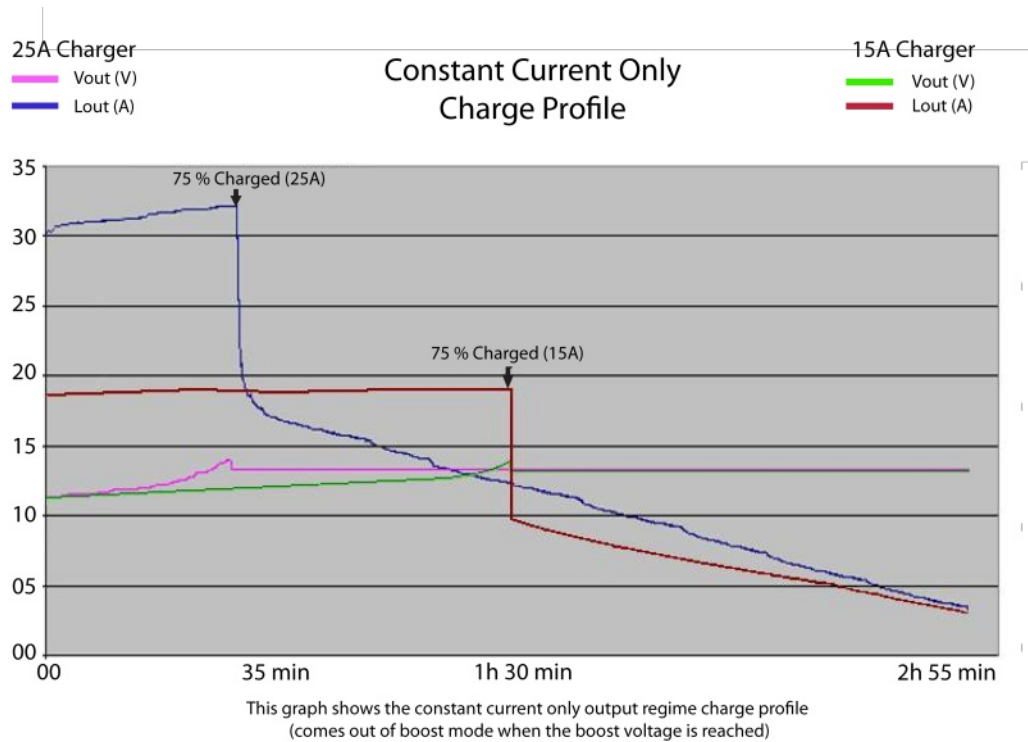
A 3 stage charging process is a very good & very safe way of charging batteries .

Temperature, battery type ,input and output cable lengths ,& charger size can all affect the parameters used in the charging profile but we have chosen a set of parameters for the Universal Power Converter which balance safe charging of most batteries under most conditions .

As the customer knows the exact battery specifications & the load profile they may be able to configure the charger to reduce charging time or extend battery life & this can be achieved by adjusting the settings to the clients specific requirements, By adding a temperature sensor significant further optimisation of the charging process is possible . The use of remote input and output voltage measurement can also have a positive effect on charger performance . A gas gauge can be added to display the battery status and with current monitoring this will allow further optimisation of the charging times and battery life.

Different charger sizes make a difference as you can see from the graphs below are the generic programme along with the normal & dynamic charge profiles for both 15A and 30A versions.







## Operating with Smart Alternator

The charge voltage available is changing significantly as vehicle manufacturers produce EURO 5 & EURO6 engines. The desire to increase miles per gallon and emissions is reducing the production of electricity by the alternator. This is often called the smart alternator, Further reduce emissions "the energy" from braking is now being used to recharge the electrical battery. This is called regenerative braking.

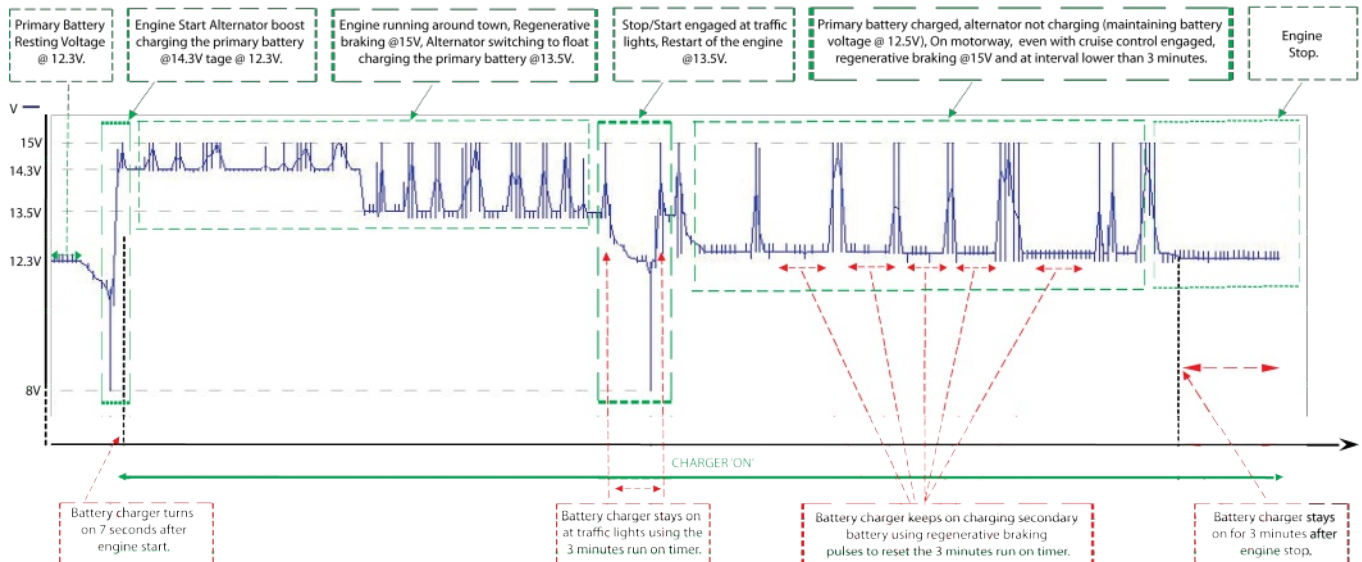
There is no clear standard between the vehicle manufacturers as is seen by our chart of a batch of different vehicle profiles below.

The same manufacturers are continually introducing improvements or revisions & so the charge voltage regimes are dependant on the manufacturing date. The graph below is a graphical representation of how our charger works with all the various types of smart alternator to maximise charging and protect the secondary battery from the effects of over voltage due to regenerative braking

<b>Vehicle Manufacturer</b>	<b>Alternator Charging Profile Description</b>
Peugeot Expert	Stop/Start = No Regenerative Braking = No
Renault Traffic (Vehicle 1)	Stop/Start = No Regenerative Braking = No
Renault Traffic (Vehicle 2)	Stop/Start = Yes Regenerative Braking = Yes
Renault Traffic (Vehicle 3)	Stop/Start = No Regenerative Braking = No
Ford Transit	Stop/Start = No Regenerative Braking = No
Volkswagen Transporter T5 4motion	Stop/Start = Yes Regenerative Braking = No
Vauxhall Vivaro (Vehicle 1)	Stop/Start = Yes Regenerative Braking = Yes
Vauxhall Vivaro (Vehicle 2)	Stop/Start = Yes Regenerative Braking = Yes



## Input Supply Voltage Graph



## Ablemail Software Interface :

Although a standard set of optimized software programmes suit most applications the **Ablemail Software Interface (ASI)** allows the standard programmes to be optimized by the customer to meet their specific needs. The **Ablemail Software Interface (ASI)** also allows access to the Real time monitor. These allow analysis of converter behaviour & operating conditions in the past & in the present. This data can be used for investigating power supply issues on the vehicle power system as well as converter issues.

The standard unit is suitable for most applications but there are a number of mechanical and electrical optional extras available to suit customer requirements . See Ablemail Mechanical Options (SD1004). Electrical options.

Please contact **Ablemail Technical** on +44(0)161 745 7697 for more Information



# Ablemail Electronics

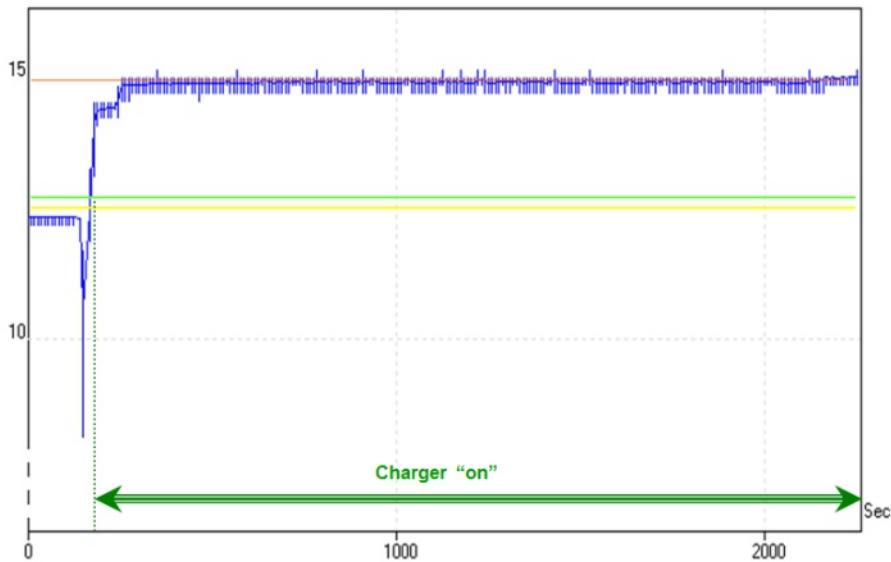
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Universal Power Convertor

Peugeot Expert  
Stationary

Alternator Charge Profiles

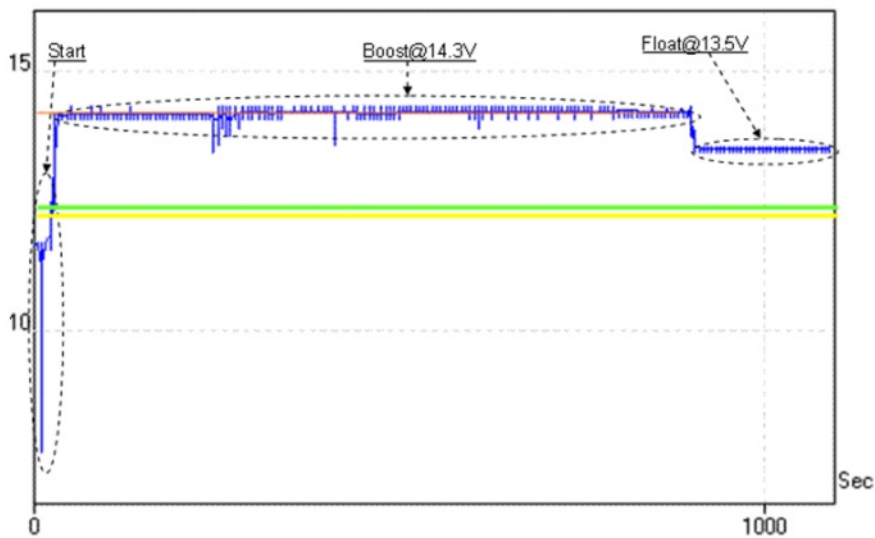


- Battery Resting Voltage = 12.1V
- 25A Charger Turn On Voltage = 12.5V
- Alternator 'on' = 15.0V at all time

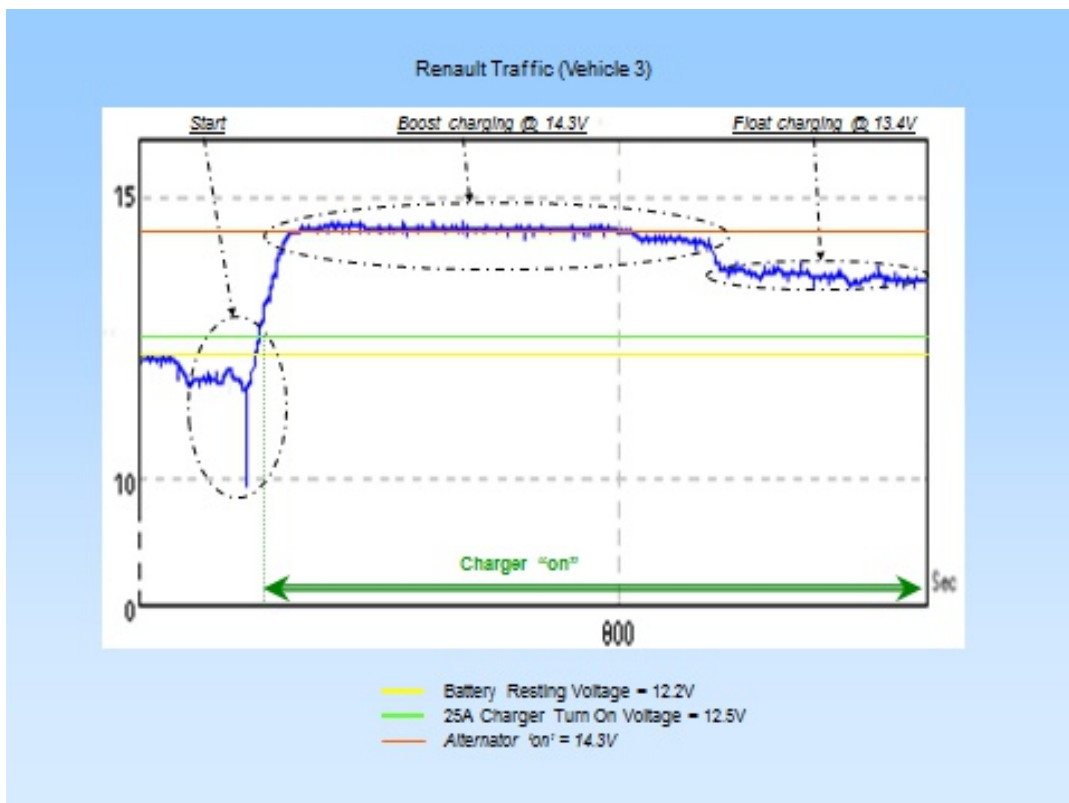
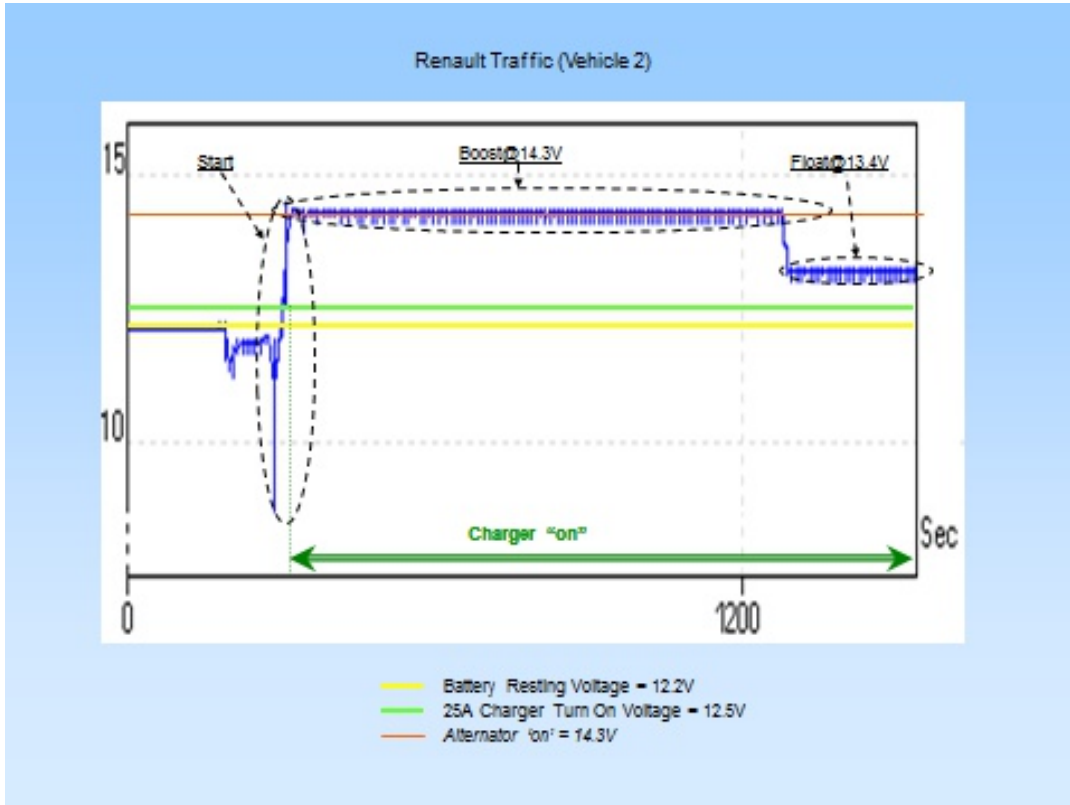
Universal Power Convertor

Renault Trafic (vehicle1)  
Stationary

Alternator Charge Profiles



- Battery Resting Voltage = 12.3V
- 25A Charger Turn On Voltage = 12.5V
- Alternator 'on' = 14.3V
- Reduced Output as Primary Battery Charges.  
(This take no account of Secondary Battery)







# Ablemail Electronics

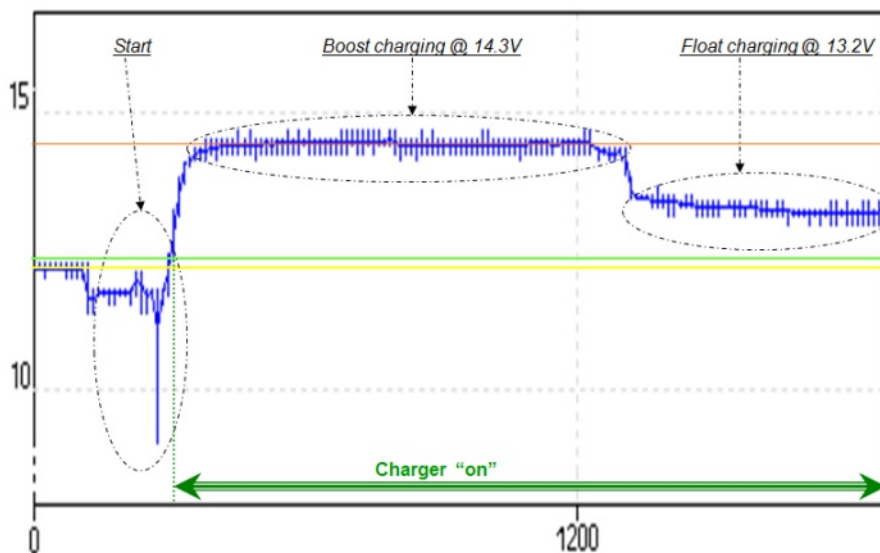
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Alternator Charge Profiles

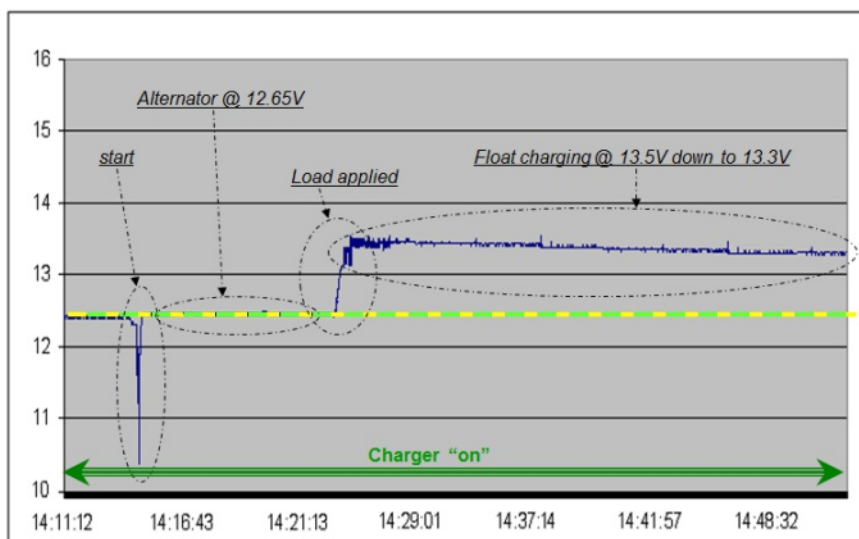


- Battery Resting Voltage = 12.4V
- 25A Charger Turn On Voltage = 12.5V
- Alternator 'on' = 14.3V

Universal Power Converter

Vauxhall Vivaro (vehicle 1)  
Stationary

Alternator Charge Profiles



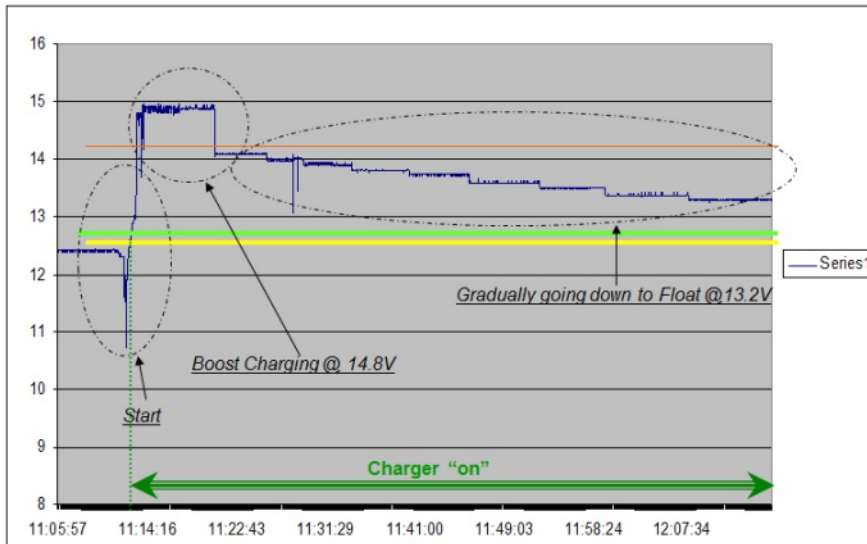
- Battery Resting Voltage = 12.5V
- 25A Charger Turn On Voltage = 12.5V



Universal Power Convertor

Vauxhall Vivaro (vehicle2)  
Stationary

Alternator Charge Profiles

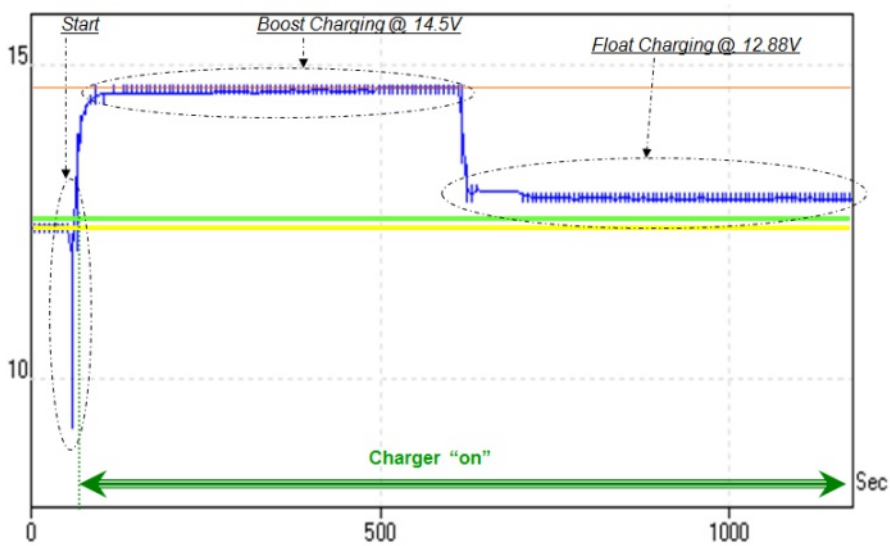


- Battery Resting Voltage = 12.4V
- 25A Charger Turn On Voltage = 12.5V
- Alternator 'on' = 14.5V

Universal Power Convertor

Volkswagen Transporter T5 4motion  
Stationary

Alternator Charge Profiles



- Battery Resting Voltage = 12.4V
- 25A Charger Turn On Voltage = 12.5V
- Alternator 'on' = 14.5V