

# SM155 – ADVANCED VEHICLE BATTERY LINKER & ACCESSORIES TIMER INSTALLATION & OPERATION GUIDE

Oct 2008, Ver 1.2

## GENERAL DESCRIPTION

The **SM155** module will automatically manage the charging of a second battery in a motor vehicle.

The second battery can then be used for powering a wide range of 12V accessories such as 240V inverters, winches, fridges etc. without affecting the normal vehicle battery

Should the main vehicle battery go flat or become defective, pressing a **Battery Link** override button will allow the second battery to link to the engine to 'jump start' the vehicle.



The module has a very useful timer function will automatically connect the second battery to auxiliary 12V equipment after the vehicle engine has successfully started. It does this by detecting activity in the vehicle charging system. Later, when the vehicle engine has stopped, a (selectable) 9 or 90 minute time delay is started. At the end of this delay all items connected to the timer will be turned off to prevent the secondary battery from going flat.

**This feature is particularly useful for automatic operation of communications gear, CB, Ham radio etc. where the equipment must remain operational even though the driver must frequently leave the vehicle for short periods.**

- An **Aux Timer** override button is present to force the radio equipment **ON** if indefinite operation is needed.
- An integral microprocessor manages all battery measurements and timing delays.
- The Battery Link contactor is a very heavy duty type with a 200A continuous rating.

## INSTALLATION

The **SM155** has Four connections, these are connected as follows:

### Small Black wire.

This is an earth connection for the module. It should be connected to the nearest convenient vehicle ground point. It is important for this ground connection to be a reliable one, as a poor earth cable can affect battery measurements.

### Yellow wire.

The Yellow wire is the output wire that connects to the positive of any 12V appliances operating from the timer unit. The total load connected to this circuit should not exceed 10 amps.

### Red +12V PRI. terminal

This is for a heavy battery cable. It must be connected to the positive terminal of the (original) **main vehicle battery**. Wiring direct to the battery with a heavy cable is necessary for the high charge & discharge currents that may flow between the two batteries.

### Red +12V SEC terminal

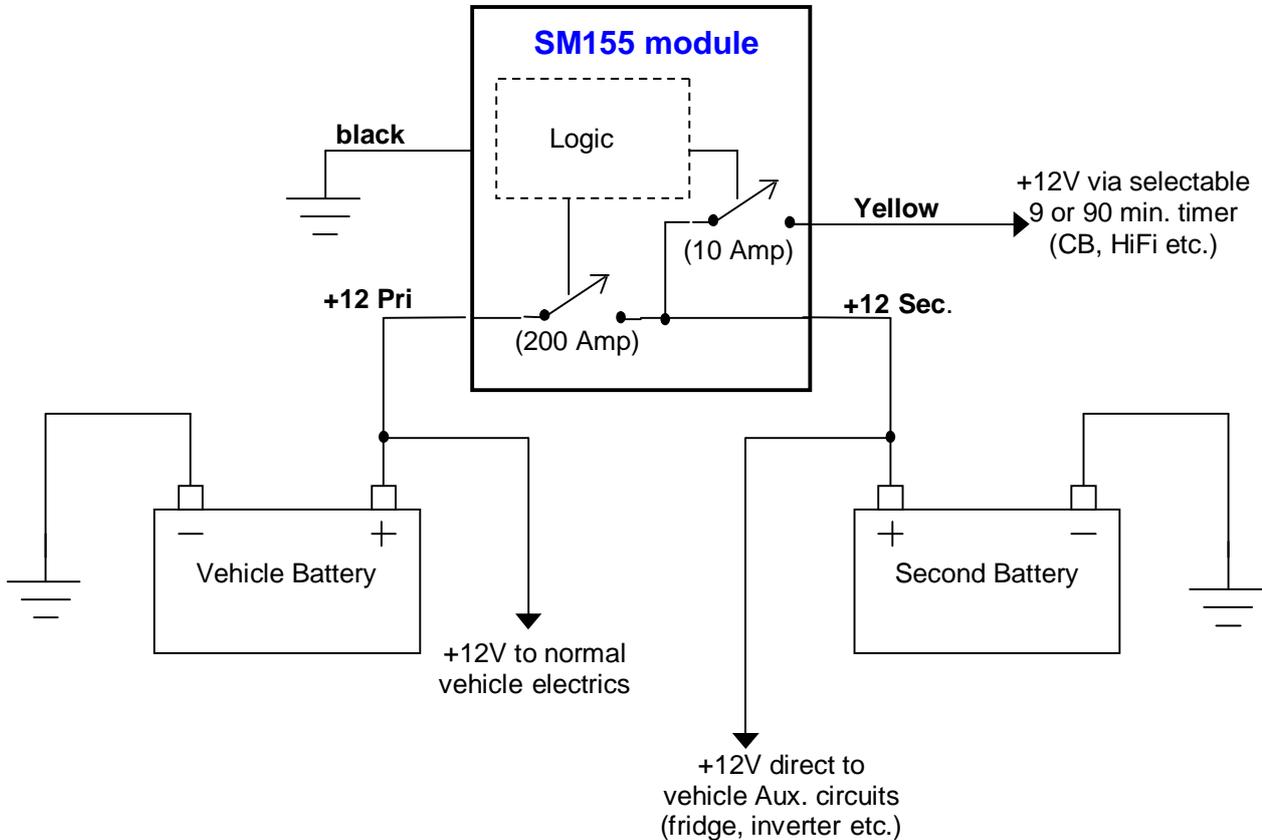
This is also for a heavy battery cable. It must be connected to the positive terminal of the **second vehicle battery**. Like the Primary cable heavy wiring direct to the battery with a heavy cable is necessary for the high currents that may flow between the two batteries.

## MOUNTING THE HARDWARE

The **SM155** module should be located under the bonnet, reasonably close to the battery and other electrical equipment. While the module enclosure has good resistance to water ingress, it should not be placed in a position where it may be submerged.

## WIRING DIAGRAM

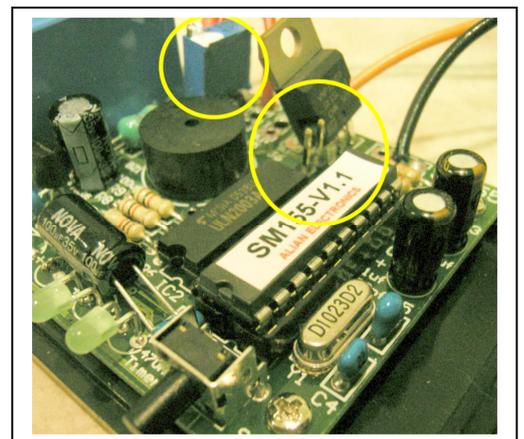
The circuit below shows the general wiring arrangement of the **SM155** system.



## THE INTERNAL OPTION LINK

The default timer duration is **90 minutes** from when the vehicle has stopped and the battery voltage has fallen sufficiently. This is an appropriate setting for most Hi Fi and communications equipment because the power demands are low.

If equipment with higher is being used, such as 12V fridges, then the shorter **9 minute** option may be more suitable. This can be set by removing the cover to the **SM155** unit by way of the four underside screws, and then removing the small shunt inserted between two pins. (As shown in the image to the right, in the larger of the two circles)



## ADJUSTMENT OF BATTERY LINK VOLTAGE

The **SM155** unit has been factory adjusted to suit the vast majority of motor vehicles. It will first switch auxiliary loads when the voltage rises above 13.4Volts. The timer function will be started when the vehicle engine has stopped running and the battery voltage falls below 12.5Volts. For 95% of vehicles the factory setting will be fine and need no adjustment. There is a small portion of vehicles that may normally run with lower battery charging voltages where the link threshold may need to be adjusted. A symptom of this problem would be where the SM155 module enters the 'countdown timing' mode while the vehicle is in motion and large loads are being applied, headlights, fog lights etc. This difficulty can be overcome by a once only-adjustment process as follows:

- Temporarily disconnect 12V power from the module.
- Remove the four screws from the underside of the module and slide the cover off to expose the electronics within.
- Locate the small adjustable resistor as shown within the smaller white circle of the diagram on the previous page. With a small flat-blade screwdriver, rotate the brass trimmer head three full turns anticlockwise as a starting position for the adjustment. (this style of trimmer has 25 turns of travel from minimum to maximum)
- Start the vehicle engine, turn on headlights, driving lights and other typical loads on the vehicle and wait for one minute for the battery to settle. (this is to establish the normal operating battery voltage for this vehicle) Then re-connect 12V power to the module.
- Very slowly rotate the trimmer clockwise (approximately 1 turn every three seconds) until the green timer LED indicator comes on. (The relay may be heard to 'click' at this point.) The setting should now be complete.

It is simple to check the effectiveness of this adjustment. When the engine is running, the LED indicator should be steady ON. When the engine is stopped, the indicator should flash rapidly. (After stopping, it can take up to one minute before this flashing level is reached because it takes time for the battery to settle. You can speed up this settling time by turning on headlights.)

### **AUTOMATIC OPERATION**

When the SM155 is first connected to the vehicle battery, the module will power up. **A One Second Beep** will be heard to confirm the presence of power.

If the vehicle engine is **OFF** when the module is first connected, there should be no active LED indicators. When the vehicle is started, the battery starts to charge. As soon as the battery its normal operating level the internal relay will switch the desired 12V appliances **ON**. (Radio's, fridge etc) The green **TIMER ON** indicator will now have a steady glow to show this.

The **SM155** module will briefly sound the morse code signal for 'X' ( **■ ■ ■ ■ ■** ) to show that the activation was successful. Being able to hear the status beeps is not critical, but hearing them in the background on a regular basis provides reassurance that the system is operating as it should.

*It will take 4-10 seconds for this to take place depending upon the battery condition and the effectiveness of the vehicle charging system. Should the activation time take more than approximately 30 seconds, then consider using the **Battery Voltage Adjustment** directions described in the previous section of this manual to optimise settings for your vehicle.*

With the engine on and the TIMER ON indicator showing a steady glow, all the 12V appliances connected through the module will be operating. The countdown timer will not be active as long as the vehicle engine remains running, as the timer runs after the vehicle is turned off.

When the vehicle engine is turned off, the vehicle battery is no longer being charged and the voltage will slowly fall. How quickly it falls will mostly depend upon the amount of battery energy being used at the time. If very few devices are drawing from the battery it may take 5 minutes for the battery to settle down enough to trip the timer sequence. This period may be as short as a few seconds if bigger loads, such as headlamps are running. However, the voltage will soon fall enough to activate the internal timers of the **SM155**.

To show when the countdown delay sequence has begun, the **TIMER ON** indicator will rapidly flash. After One Minute, the letter 'P' will sound in morse code ( **■ ■ ■ ■ ■** ) and the output provided to deactivate the car headlights will turn off. (this is the feature that prevents flattening of the vehicle battery by the headlamps because the driver left them turned on for some time.) This event does not change the two green LED indicators on the front of the module,

The main accessories continue to run for the 90 minute (or selectable 9 minute) delay period. At the end of this delay period the module will sound the letters 'A R' ( **■ ■ ■ ■ ■** ), and deactivate all appliances connected through the unit.

While this section has described the operation of this timer unit in some detail, it is present simply to give users a better understanding of how the system works. In practise, the system will look after itself and the vehicle equipment will be ready to use when needed.

## MANUAL OVERRIDE FEATURE

The **SM155** module has two push-button switches to override the automatic battery linking and timer features.

This can be useful if the 12V appliance must operate for extended periods (without the vehicle engine being used) beyond the normal 9 – 90 minute delay.



The override button is behind the white rectangle on the front of the module labelled 'Aux Timer'. Pressing this button performs two tasks. Firstly, it activates the green **TIMER OVERRIDE** indicator to show that manual intervention has taken place. Secondly, it *reverses* the present output state of the module. This means that if the timer was presently **OFF**, pressing the button will force the output **ON**. If the timer was already **ON**, then pressing the button once more will turn the output back **OFF**, forcing the shutdown of accessory devices.

The second button labelled '**Batt Link**' works in a similar way, except that it controls the manual linking of the contactor between the primary and secondary batteries within the vehicle.

## IMPORTANT

It should be understood that the Manual Override feature of the **SM155** module will only last until the vehicle is next started or stopped. This is on order to prevent the manual override feature being 'forgotten about' by the user. The next time the vehicle undergoes a normal start the timer override function will be automatically reset and the **Timer ON** function will activate as it usually would.

## SPECIFICATIONS

Supply voltage	8-15 Volts (D.C.)
Maximum battery link current	200 Amps (continuous)
Maximum switched output Current	10 Amps
Current consumption (output active)	60 ma
Current consumption (output standby)	3.7 ma

## WARANTY INFORMATION

*A warranty period of 12 months applies to this product from the date of purchase. This warranty becomes void where: (A) The unit has been damaged by excessive and unreasonable impacts, or (B) The module has been used for an application other than that specified in the installation document.*

The warranty implies that a repair or replacement will be given when the defective unit is returned to the supplier. The warranty does not cover delivery and handling charges, compensation for time lost, damage caused by incorrect wiring during installation, or damage to other equipment at the installed location.