BATTERY REPLACEMENT IN IDLE STOP START VEHICLES (ISS)
What are ISS systems

An Idle Stop Start (ISS) system automatically shuts down and restarts the internal combustion engine to reduce the amount of time the engine spends idling.

ISS systems were developed to improve fuel efficiency and reduce CO₂ emissions in line with global emission targets.

ISS systems can deliver a 5-10% reduction in both fuel consumption and carbon emissions.

The number of vehicles featuring ISS systems is growing rapidly.
Facts on ISS systems

Toyota was the first manufacturer using ISS technology in the mid 1970’s, followed by Fiat & VW in the 1980’s. ISS vehicles are now one of the fastest growing markets in the world.

Vehicles fitted with ISS systems are often referred to as ‘mild’ or ‘micro’ hybrids.

ISS technology can be incorporated into petrol and diesel vehicles fitted with automatic or manual transmission systems.

They have relatively low development costs compared with Electric and Hybrid vehicles.
Basic ISS systems work by shutting off the engine whilst the vehicle is stationary. When the brake pedal is released or the accelerator depressed, the engine quickly restarts enabling the vehicle to be driven.

In more advanced ISS systems, the vehicle may also incorporate regenerative braking or engine power assistance technology.

This technology has the ability to also switch off the engine whilst the vehicle is coasting or braking as well as whilst stationary.
How ISS systems work

If the engine is cold the Stop Start system will not engage

Battery temperature determines charge level of battery

Power required to run accessories e.g. air-conditioning & radio

Assesses angle of steering. Stop Start system will not engage unless steering is straight

ADVANCED TECHNOLOGY FOR IDLE STOP START SYSTEMS
Identifying ISS systems

It may not be possible to identify whether a vehicle incorporates ISS technology. Always ask the owner if you are unsure.

Vehicle manufacturers may include a device or icon on the dash board which enables the ISS system to be deactivated.

To avoid fitting an incorrect or conventional battery into an ISS vehicle, refer to the manufacturers handbook or visit www.centurybatteries.co.nz
Emissions laws and increased fuel costs are creating a boom in Electric, Hybrid and Micro-hybrid vehicles.

All manufacturers are developing a range of power trains.

Most OEM's are backing ISS systems as the winner due to the relatively low costs compared with other systems.
In 2016 it is estimated that 70% of cars driven in some countries will have Stop Start technology.

In New Zealand leading manufacturers have already introduced vehicles featuring ISS technology.

This includes but not limited to Mazda, Subaru, Nissan, VW, BMW, Mercedes, Volvo.

At present there is an estimated 40,000 ISS vehicles on New Zealand’s roads.
ISS Market Size

Most OEM’s are backing ISS as the early winner

186 Million ISS vehicles to be in use Globally by 2020

Source: Forecasts Pike research Business Wire
# Conventional versus ISS batteries

<table>
<thead>
<tr>
<th>Stop Start Systems</th>
<th>Conventional Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place extreme demands on battery.</td>
<td>Subject the battery to less stress.</td>
</tr>
<tr>
<td>In Stop Start environments such as city driving the vehicle may stop and start every Kilometre.</td>
<td>Start the vehicle less frequently, typically two to three times per day.</td>
</tr>
<tr>
<td>The short duration between starts will not fully recharge the battery.</td>
<td>Recharges the battery using the alternator to replace the capacity used to start the vehicle, during the duration of the journey.</td>
</tr>
<tr>
<td>Require the battery to be able constantly cycle and operate in partial state of charge.</td>
<td>Requires the battery to operate in a close to full state of charge.</td>
</tr>
<tr>
<td>Necessitate the battery to quickly recharge in between off modes and deliver power for accessories when the engine is off.</td>
<td>Do not cycle the battery as frequently and recharge the battery using a lower charge rate.</td>
</tr>
<tr>
<td>Require the battery to also deliver necessary cranking capacity to start the engine in a fraction of a second.</td>
<td>Can accommodate Stop Start batteries as a result of the improved cranking, cycling and recharge capabilities.</td>
</tr>
</tbody>
</table>
## Conventional versus ISS batteries

### Advanced Technology for Idle Stop Start Systems

<table>
<thead>
<tr>
<th>Conventional System</th>
<th>Stop Start System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starts vehicle 2 to 3 times per day</td>
<td>Starts vehicle every 1 to 2 kilometres</td>
</tr>
<tr>
<td>730 average annual starts</td>
<td>17,500 average annual starts</td>
</tr>
<tr>
<td>Delivers 263,000 watt seconds of energy</td>
<td>Delivers 487.5 million watt seconds of energy</td>
</tr>
<tr>
<td>Minimal cycling required</td>
<td>Battery is constantly required to cycle</td>
</tr>
<tr>
<td>Accessories draw from a fully charged battery</td>
<td>Accessories draw from battery when engine is off</td>
</tr>
<tr>
<td>Battery maintained in a near to full state of charge</td>
<td>Battery operates in a partial state of charge</td>
</tr>
<tr>
<td>Battery is recharged by alternator over time during duration of the journey</td>
<td>Battery has to recharge rapidly in between engine off modes</td>
</tr>
</tbody>
</table>

[Graph showing average annual starts for conventional and stop start systems]

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**ADVANCED TECHNOLOGY FOR IDLE STOP START SYSTEMS**
Battery Replacement

- Conventional batteries should not be fitted into ISS systems.
- Conventional batteries are not designed to handle the cycling and rapid recharge requirements required by these systems.
- Fitting a conventional battery into a ISS vehicle could damage the electrical system and lead to premature battery failure.
- Always ensure a like for like battery replacement. Only replace AGM with AGM and EFB with EFB ISS compatible batteries.
**EFB Key differences**

- Expanded grid plate manufacturing process to improve durability.
- Negative plate active material features Carbon/Lithium additives to improve charge acceptance.
- Positive plate features a polyester covering sheet to resist plate damage from cyclic stress.
- High density positive plate active material featuring special additives to increase surface area and improve durability.
- Low Specific Gravity (SG) electrolyte to improve charge acceptance and increase life.
AGM Key differences

- Increased number of plates – more capacity.
- Thinner separators – less internal resistance.
- High CCA performance.
- Excellent cyclic capacity.
- Increased starting capability. (approximately 360,000 start cycles)
- Superior vibration resistance.
- Fast recharge characteristics.
- Improved operation when in a low State of Charge (SOC).
ISS Battery Replacement

New technology ISS vehicles equipped with emission control systems may require configuration of the active energy management system during battery replacement.

These systems control the charging system to ensure optimum battery performance and ISS system functionality.

The active energy management system uses information from the battery monitoring sensor to measure the battery’s Current, Voltage and Temperature.

This data is used to calculate the battery’s state of health and state of charge.

The energy management system then adapts the battery charging strategy to manage electrical loads.
Battery Temperature, Charge Voltage & Regulation

- The battery temperature is measured using a map to determine the duration of the battery load.
- The data obtained allows the charge regulation to adapt to the operating conditions.
Why is battery configuration necessary?

A replacement battery has different charging strategies to a battery that has reached the end of its serviceable life.

The active energy management system may need resetting when the battery is replaced to prevent the use of an incorrect charging strategy.

An incorrect charging strategy could result in:-

- Loss of Micro-hybrid system functionality
- Increased CO2 emissions
- Increased fuel consumption
- Loss of vehicle system functionality
Identifying Energy Management Systems

- Vehicles fitted with Energy Management Systems can be identified by the sensor located on the negative battery post as shown right.
- They are predominantly found on European brands of Idle Stop Start vehicles.
- These vehicles require configuration of the Energy Management System as part of the battery replacement procedure.
- Until recently, battery configuration could only be carried out by main dealer diagnostic tools at considerable expense.
Configuration of the active energy management system can now be carried out using the Yu-Fit battery configuration tool.

Use of the Yu-Fit tool allows the provision of a complete battery replacement solution, even on vehicles featuring new emission reduction Micro-hybrid systems.

The Yu-Fit tool reduces battery replacement costs and customer inconvenience, enhancing the services provided by aftermarket battery suppliers.
Yu-Fit battery configurator

- The Yu-Fit configures the replacement battery to the active energy management system & battery monitoring sensor.
- Informs the vehicle a new battery has been installed.
- That it is of the correct technology and performance specifications.
- Informs the charging system of the new battery characteristics.
- Ensures the use of correct charging strategy.
Battery configuration is currently only required on selected European Idle Stop Start vehicles.

Identified with a sensor affixed to the negative battery terminal post.

Vehicles supported by the Yu-Fit are updated regularly as new vehicles are released.

PDF lists are stored on the supporting web page.

Push notifications released as new vehicles are added to the support list.

Each time the unit is connect to the PC, it will download the latest list of vehicles supported by the Yu-Fit.

Good practice to connect and update the tool on a monthly basis.
Yu Fit Battery Configurator

ADVANCED TECHNOLOGY FOR IDLE STOP START SYSTEMS
Yu-Fit Configurator Kit

Each Century Yu-Fit kit contains:-

- Yu-Fit Tool
- USB Cable
- Registration & Software Installation Guide
- User Guide
- List of vehicles supported by the Yu-Fit
Setting Up the Yu-Fit Tool

Before using the Century Yu-Fit tool it must first be registered and the supporting application software downloaded.

The supporting application software should be downloaded from:

www.centurybatteries.co.nz

Scroll to the bottom of the page or select from the menu options on the right hand panel.

Click on the link and then select the ‘RUN’ option.
Yu-Fit Set up – Software Installation

Yu-Fit Installation Procedure

1. When you run the installer you are prompted with a User account Control message asking whether the application you are installing will make changes to your computer. It is important that you ensure that you have Administrator rights on the PC before continuing.

2. Wait while the PC prepares to install.

3. After the Yu Fit software application, the Wizard for the Yu-Fit will be displayed, select Next.

4. The ‘Select installation folder’ screen will appear, accept the folder if appropriate and select Next.

5. A window is the finishing stage your Yu-Fit has been connected to your PC. The Driver installation Wizard will be displayed.

6. The installation will take a minimum of 2 minutes, the system will be updated during this process.

7. The ‘Completing the installation Wizard’ screen is displayed, when your Yu-Fit has been installed Select Finish.

8. After the Yu-Fit’s installation, the Driver Application from the start menu, select ‘Yu-Fit’ > ‘Settings’ > ‘Centurion’. There will be an icon created into your Desktop.

ADVANCED TECHNOLOGY FOR IDLE STOP START SYSTEMS
Yu-Fit Set Up - Registration

Yu-Fit Registration Procedure

1. Read the Privacy Policy and accept before continuing.

2. Connect the USB supplied to the Yu-Fit and then install the software on the PC. Make sure the printer is on the same network as the PC.

3. The driver should indicate that it is fully installed and running. It may not install the .Net framework.

4. When you press the Start button, the Yu-Fit will be registered to your PC base.

5. The software will then check the internet connection in process. Once the connection is established, the registration will be completed in the main registration section of the Yu-Fit base.

6. Complete the Product Registration using your complete address recorded within a PC. Once completed press the Next button.

Advantage Technology for Idle Stop Start Systems
Yu-Fit - Vehicle Update Procedure

1. Open the YU-FIT Suite application.
   From the Start menu, select "Start -> All Programs" -> "Century Technology" -> "Yu-Fit Suite" (There will also be an icon installed on your desktop)

2. Select the option "Setup YU-FIT Updated"

3. Connect the YU-FIT suite to the Yu-Fit and then to a USB port on the PC. A main display will contain the main menu (opposed to an extension on the front of the PC)

4. Whene you press the "YU-FIT" button, the YU-Fit will be detected by the Yu-Fit Suite

5. The Suite will then check the internet connection and proceed. You may experience pauses at this point.

6. Follow the on-screen instructions to update your box to the latest version. A description of the update will also be shown on screen.

REMEMBER

The latest list of vehicles supported by the Yu-Fit is available @ www.centrurytechnology.com.au
Using the Yu-Fit Battery Configurator
Once the battery has been replaced, the Yu-Fit should be connected to the vehicle via the 16 Pin EOBD diagnostic socket.

This is usually located within the vicinity of the steering column.

The Yu-Fit will then guide the user through the battery configuration process with a series of on screen options and menus.

The length of time and steps involved in the battery configuration process will vary according the vehicle type and manufacturer.
Using the Yu-Fit Battery Configurator

EOBD Location
Using the Yu-Fit Battery Configurator

Navigation around the menus and options displayed by Yu-Fit is controlled by a series of arrows and confirmation buttons as displayed.

The tool also encompasses a mini USB port for connection to a PC.
Using the Yu-Fit Battery Configurator

Important Note

- Depending on the make & model of the vehicle, the Yu-fit tool will guide you through one of two possible options for battery configuration.
- Both are detailed to avoid any confusion.
Option 1: Overview

Select DIAGNOSTICS icon

Select BATTERY MANAGEMENT icon

Select VEHICLE SELECTION icon

Select MANUFACTURER from list

The levels in the battery configuration procedure vary according to the vehicle & manufacturer

Select VALIDATE BATTERY function

Select REPLACE BATTERY function

Await confirmation before switching on ignition

Select & Confirm Century as the correct battery data.

Wait for fault codes to be cleared & confirmation of configuration process

Turn off ignition & disconnect YU-FIT
Once the Yu-Fit Tool is connected, the diagnostic menu will be displayed. Select the icon with the vehicle bonnet raised and press ok.
Option 1 – Step 2

BATTERY MANAGEMENT
You will then need to select the battery icon, and press OK.
Option 1 – Step 3

VEHICLE SELECTION
Select the vehicle bonnet raised icon and press OK
Option 1 – Step 4

SELECT MANUFACTURER
Use the up & down arrows to select the vehicle manufacturer then press OK
Option 1 – Step 5

TURN ON THE IGNITION
You will be asked to switch on the ignition. Once done press OK
INITIALISING
There will be a slight wait while the system is initialising
Option 1 – Step 7

**SELECT FUNCTION**
Use the up & down arrows to select the REPLACE BATTERY option and press OK
Option 1 – Step 8

SELECT FUNCTION
Use the up & down arrows to select the VALIDATE BATTERY option and press OK.
INITIALISING
There will be a slight wait while the system is initialising
BATTERY CONFIRMATION

It will then ask you if the battery is equivalent in technology and performance to the previous battery in the vehicle.

This should be the case if you have used the Century Battery Finder tool to identify the correct battery, so the answer should always be YES. Select YES and press OK.
Option 1 – Step 11

CODE RESETING
The system will then clear any fault codes that are generated from the replacement of the battery.
Option 1 – Step 12

BATTERY MANUFACTURER
The system will then ask you who the battery manufacturer is. Use the up & down arrows to always select Century and press OK.
BATTERY VALIDATION
After a short time a confirmation message will appear that tells you that the battery programming has been successful.

Press the OK button to exit
Option 2: Overview

Select DIAGNOSTICS icon

Select BATTERY MANAGEMENT icon

Select VEHICLE SELECTION icon

Select MANUFACTURER

Select FUEL

Select ENGINE SIZE

Select BATTERY MANAGEMENT

Select MODEL

Select YEAR

Select SYSTEM

Select VALIDATE BATTERY

ALWAYS SELECT YES

Select & Confirm Century as the correct battery data.

Wait for fault codes to be cleared & confirmation of configuration process

VALIDATION COMPLETE
Option 2 – Step 1

DIAGNOSTICS
Once the YU-FIT Tool is connected, the diagnostic menu will be displayed. Select the icon with the vehicle bonnet raised and press ok.
Option 2 – Step 2

**BATTERY MANAGEMENT**
You will then need to select the battery icon, and press OK.
Option 2 – Step 3

VEHICLE SELECTION
Select the vehicle bonnet raised icon and press OK
Option 2 – Step 4

SELECT MANUFACTURER
Use the up & down arrows to select the vehicle manufacturer then press OK
Option 2 – Step 5

SELECT MODEL
Use the up & down arrows to select the vehicle model then press OK

SELECT MODEL
3 SERIES (E91)
3 SERIES (E92)
3 SERIES (E93)
3 SERIES (F30)
3 SERIES (F31)
Option 2 – Step 6

SELECT TYPE
Select BATTERY MANAGEMENT then press OK
Option 2 – Step 7

SELECT ENGINE SIZE
Use the up & down arrows to select the engine size then press OK
Option 2 – Step 8

SELECT FUEL
Use the up & down arrows to select the fuel type and press OK.
Option 2 – Step 9

SELECT YEAR
Use the up & down arrows to select the Year of vehicle and press OK
Option 2 – Step 10

SELECT SYSTEM
Select CONFIGURE BATTERY then press OK
INITIALISING
There will be a slight wait while the system is initialising
Option 2 – Step 12

SELECT FUNCTION
Use the up & down arrows to select the VALIDATE BATTERY option and press OK
INITIALISING
There will be a slight wait while the system is initialising.
BATTERY CONFIRMATION

It will then ask you if the battery is equivalent in technology and performance to the previous battery in the vehicle.

This should be the case if you have used the Century Battery Finder tool to identify the correct battery, so the answer should always be YES. Select YES and press OK.
CODE CLEARING
The system will then clear any fault codes that are generated from the replacement of the battery.
BATTERY MANUFACTURER
The system will then ask you who the battery manufacturer is. Use the up & down arrows to always select Century and press OK.
Option 2 – Step 17

BATTERY VALIDATION
After a short time a confirmation message will appear that tells you that the battery programming has been successfully.

Press the OK button to exit
If you have any further enquiries about the Century YU-FIT tool or need assistance, please contact Century Batteries or visit our website at:

www.centurybatteries.co.nz
BATTERY REPLACEMENT IN IDLE STOP START VEHICLES (ISS)