



ABRITES DIAGNOSTICS FOR VOLVO

User manual
version 1.4



Important notes

The Abrites software and hardware products are developed, designed and manufactured by Abrites Ltd. During the production process we comply to all safety and quality regulations and standards, aiming at highest production quality. The Abrites hardware and software products are designed to build a coherent ecosystem, which effectively solves a wide range of vehicle-related tasks, such as:

- Diagnostic scanning;
- Key programming;
- Module replacement,
- ECU programming;
- Configuration and coding.

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Safety information

The Abrites products are to be used by trained and experienced users in diagnostics and reprogramming of vehicles and equipment. The user is assumed to have a good understanding of vehicle electronic systems, as well as potential hazards while working around vehicles. There are numerous safety situations that cannot be foreseen, thus we recommend that the user read and follow all safety messages in the available manual, on all equipment they use, including vehicle manuals, as well as internal shop documents and operating procedures.

Some important points:

Block all wheels of the vehicle when testing. Be cautious when working around electricity.

Do not ignore the risk of shock from vehicle and building-level voltages.

Do not smoke, or allow sparks/flame near any part of the vehicle fuel system or batteries.

Always work in an adequately ventilated area, vehicle exhaust fumes should be directed towards the exit of the shop.

Do not use this product where fuel, fuel vapours, or other combustibles could ignite.

In case any technical difficulties occur, please contact the

Abrates Support Team by email at support@abrites.com

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List of revisions

Date	Chapter	Description	Revision
24.09.2015	ALL	First version of the document.	1.0
14.12.2016	3.5	Second version of the document.	1.1
12.06.2017	3.5.1	Third version of the document.	1.2
31.08.2017	3.6	Fourth version of the document.	1.3
08.09.2022	ALL	Full revision	1.4

1. Introduction

ABRITES Diagnostics for Volvo is a professional diagnostic software, which works together with the Abrites Vehicle Diagnostic Interface (AVDI).

In order to operate ,the software requires you to have an AVDI interface, a Windows based PC with Windows 7 or later version of the Windows OS. For optimal operation, it is always recommended to have the latest software version installed, active AMS, and a stable Internet connection.

The tool's purpose is to allow you to perform standard and advanced vehicle diagnostics, starting with module identification, reading and clearing diagnostic trouble codes (DTCs), live data monitoring, actuator testing, as well as advanced operations such as service functionality and other special functions.

AVDI should be used with ABRITES software produced by Abrites Ltd.

ABRITES is a trade mark of Abrites Ltd.

2. Abrites diagnostics for Volvo

The ABRITES Diagnostics for Volvo consists of two parts:

Standard diagnostic functions like reading/clearing diagnostic trouble codes (DTC), scanning available devices in the vehicle, displaying actual values (measured parameters), performing actuator tests etc.

Special functions like Key Learning, Cluster Calibration, Service Functions, etc.

All devices, which are present in the car are listed in the main screen of the ABRITES Diagnostics for Volvo. If you want to connect to a specific device, please double click on it or select it and press the “Open” button. The “ABRITES Diagnostics for Volvo will try to connect to the device. From this screen you have the option to select the vehicle in order to complete full vehicle scan, select the special function menu, or set some options and language.

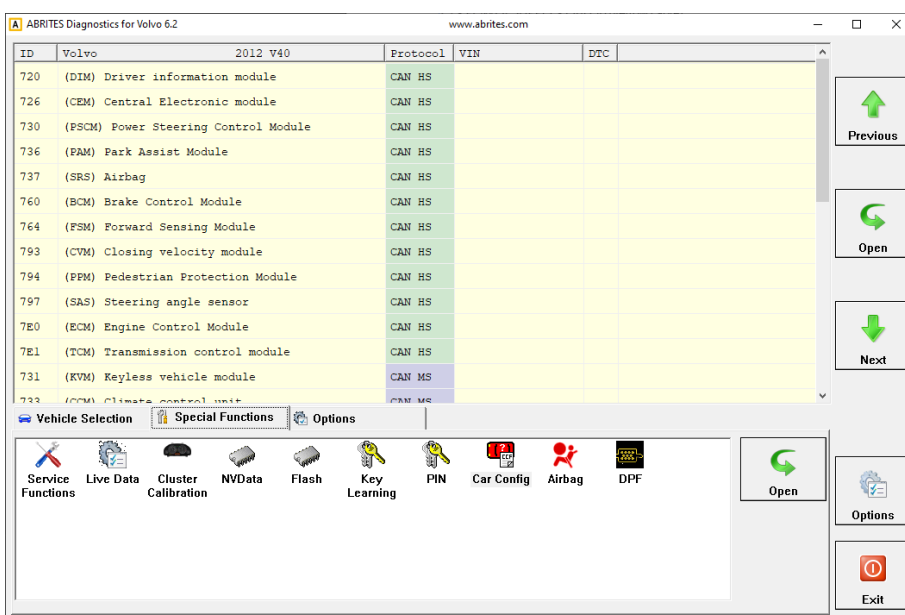
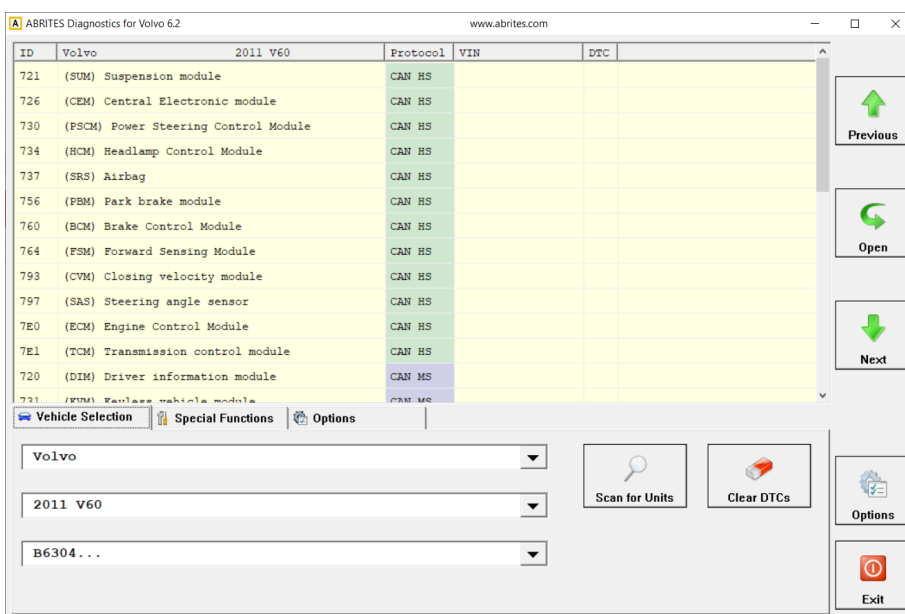
Once the Volvo icon is selected from the Abrites Quick start menu the software will start and you will see the following screen:

ID	Volvo	2011 V60	Prot...	VIN	DTC
721	(SUM)	Suspension module	CAN HS		
726	(CEM)	Central Electronic module	CAN HS		
730	(PSCM)	Power Steering Control Module	CAN HS		
734	(HCM)	Headlamp Control Module	CAN HS		
737	(SRS)	Airbag	CAN HS		
756	(PBM)	Park brake module	CAN HS		
760	(BCM)	Brake Control Module	CAN HS		
764	(FSM)	Forward Sensing Module	CAN HS		
793	(CVM)	Closing velocity module	CAN HS		
797	(SAS)	Steering angle sensor	CAN HS		
7E0	(ECM)	Engine Control Module	CAN HS		
7E1	(TCM)	Transmission control module	CAN HS		
720	(DIM)	Driver information module	CAN MS		
731	(KVM)	Keyless vehicle module	CAN MS		
733	(CCM)	Climate control unit	CAN MS		
736	(PAM)	Park Assist Module	CAN MS		
740	(DEM)	Driver Door Module	CAN MS		
741	(PEM)	Passenger Door Module	CAN MS		
744	(PSM)	Power seat module	CAN MS		
754	(PHM)	Telephone	CAN MS		
784	(ICM)	Infotainment Control Module	CAN MS		

From the first screen you can select the vehicle you are working with, do a Scan for Units (and DTCs) and Clear DTCs. Also, a sub-menu with options is available from this screen.

(The modules may vary according to the vehicle specifications.)

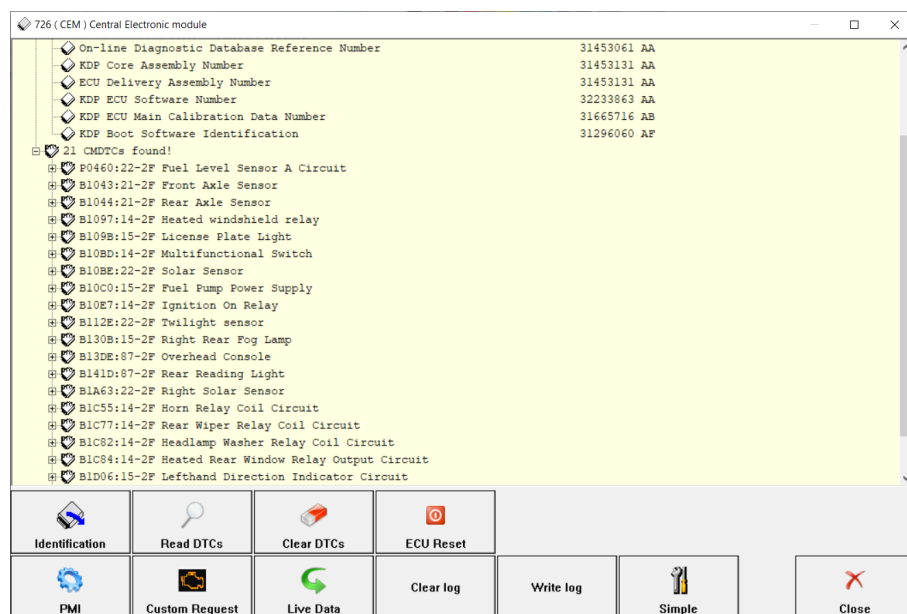
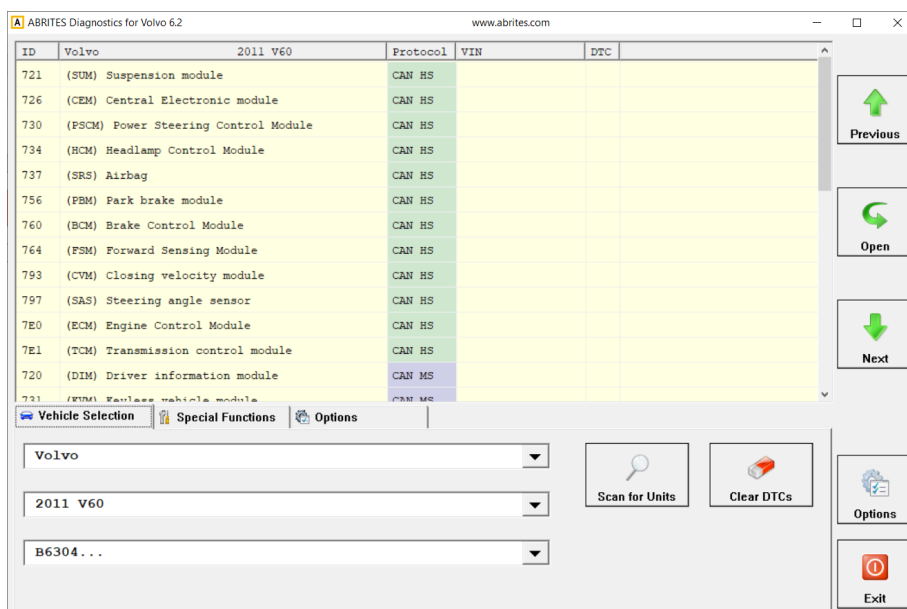
The second screen shows the available special functions in the Abrites Volvo software



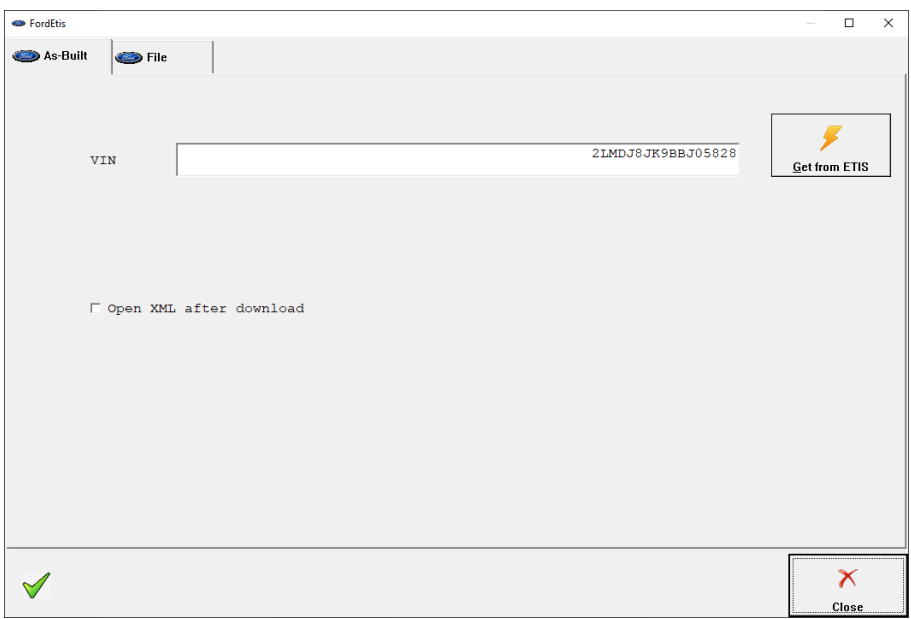
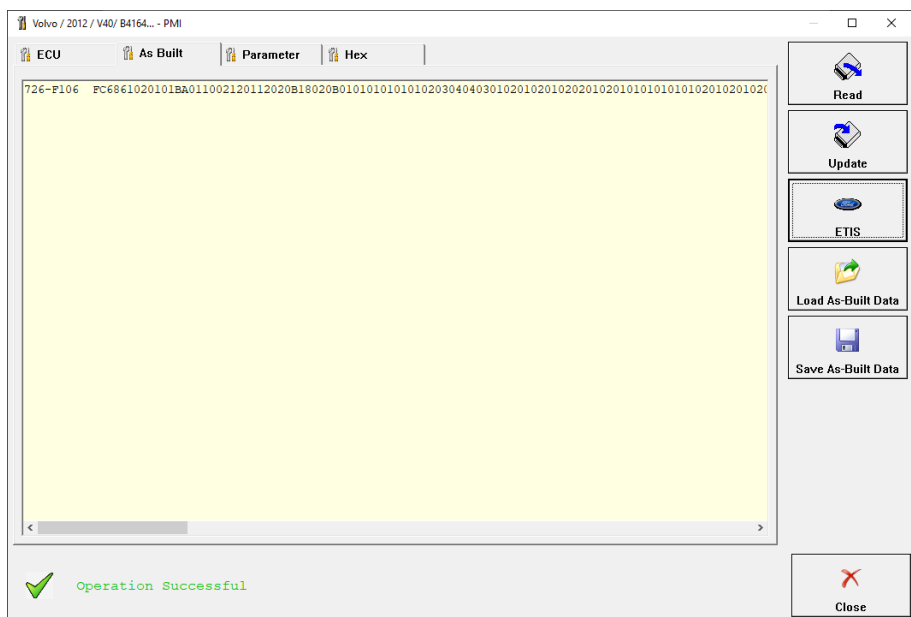
2.1 Standart Diagnostic Functionalities

The Abrites diagnostics for Volvo provides the options for detailed module identification, reading and clearing of diagnostic trouble codes (DTC), monitor live data, save the scan report to a file, use PMI. From the screen below the user can see the diagnostic trouble codes in all the selected units:

There is an option to read and clear all DTCs or individually clearing them when entering the appropriate electronic module.



Before doing anything else, the user can select the model. If the model is not selected at the beginning, many further actions would ask for the model. There are further options in the diagnostic menu of the Abrites Volvo software. You can monitor live data for the unit you have accessed, and also, you can use the Volvo PMI, and have access to ETIS files. From the menus seen in the screenshots below, you can read, save to a file, upload and update the As Build data, and use the ETIS services (if available for the particular vehicle)

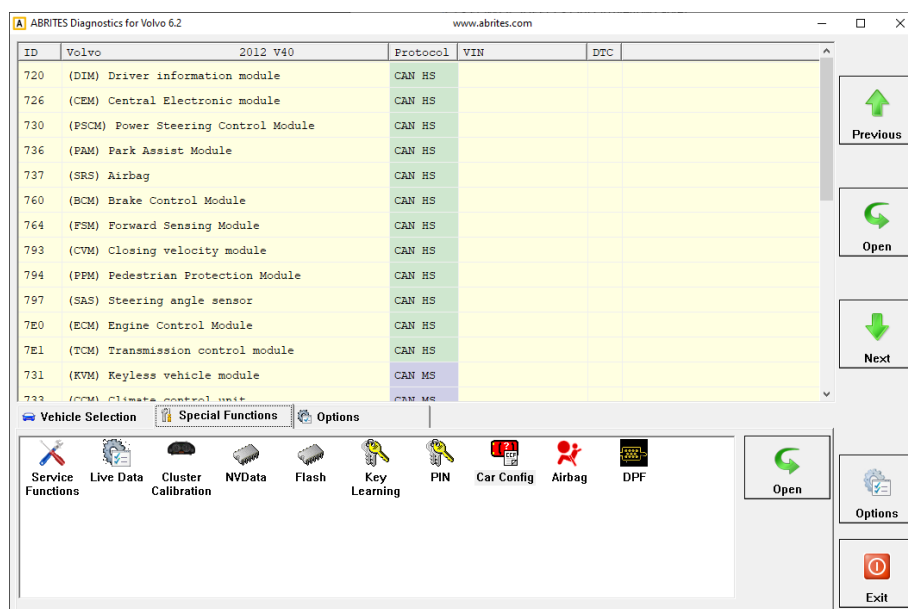


2.2 Special Functions

The software provides a variety of special diagnostic functions in order to assist the user to perform advanced diagnostics on Volvo vehicles. This option from the main screen opens the special function menu of the ABRITES Diagnostics for Volvo. The required special function is opened by selecting it from the menu box and double-clicking on it.

The available special functions in ABRITES Diagnostics for Volvo software are:

- Service Functions
- Live Data
- Cluster Calibration
- NVData
- Flash
- Key Learning
- PIN
- Car Configuration
- Airbag
- DPF

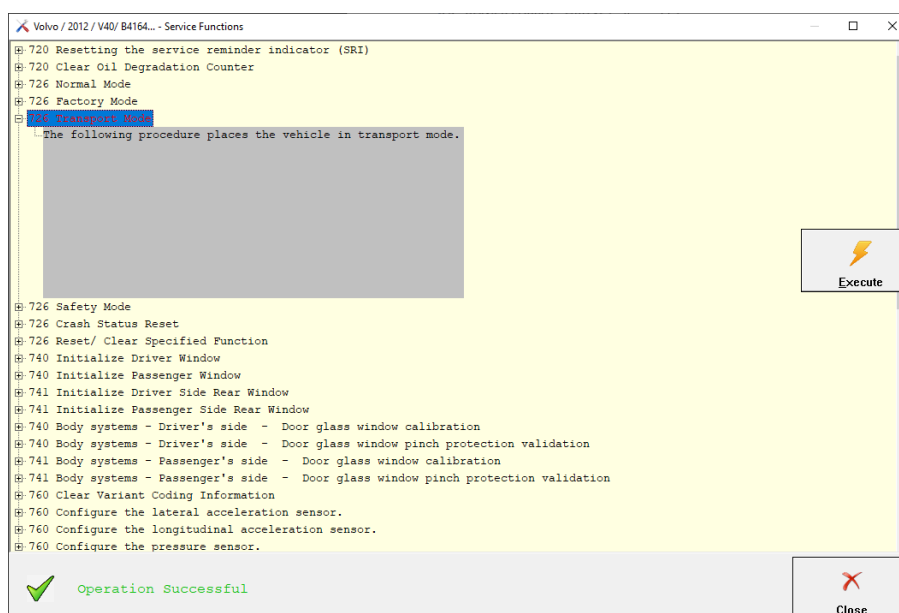
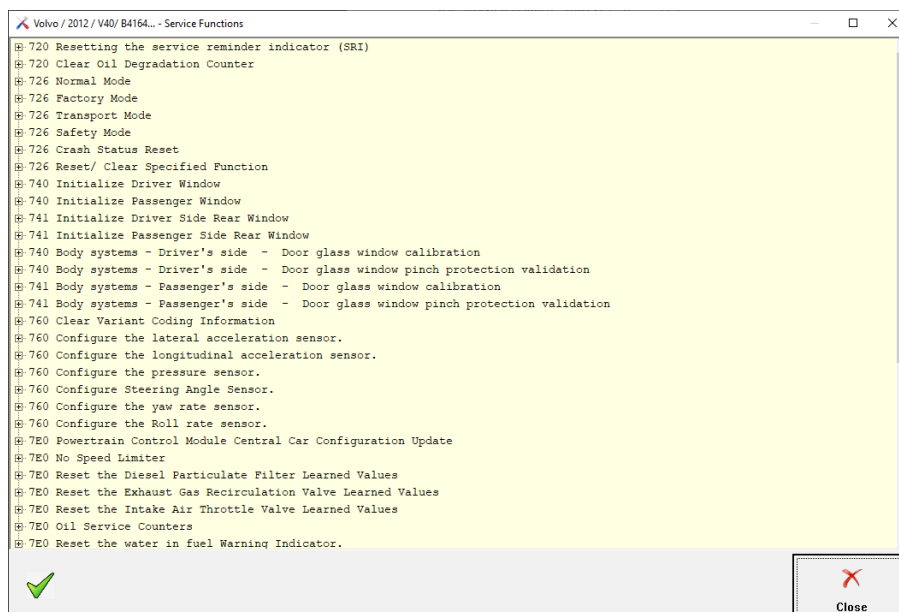


3. Special Function “Service Functions”

The option service functions refers to modifications of the service history of the vehicle after maintenance or during testing. It also provides access to real time testing of actuators.

When the icon is selected the user can select a model of vehicle to begin using the service functions.

Different models have different service functions available.



4. Special Function “Live Data”

This special function lets you monitor live values in the modules of the vehicle. Once you open this special function, you will get a list with the available modules in the vehicle, and once you open a module you can select each data that you want to monitor. You can see the following 2 screenshots for further clarification:



The screenshot shows the same window as above, but now displaying a list of selected parameters in a table format:

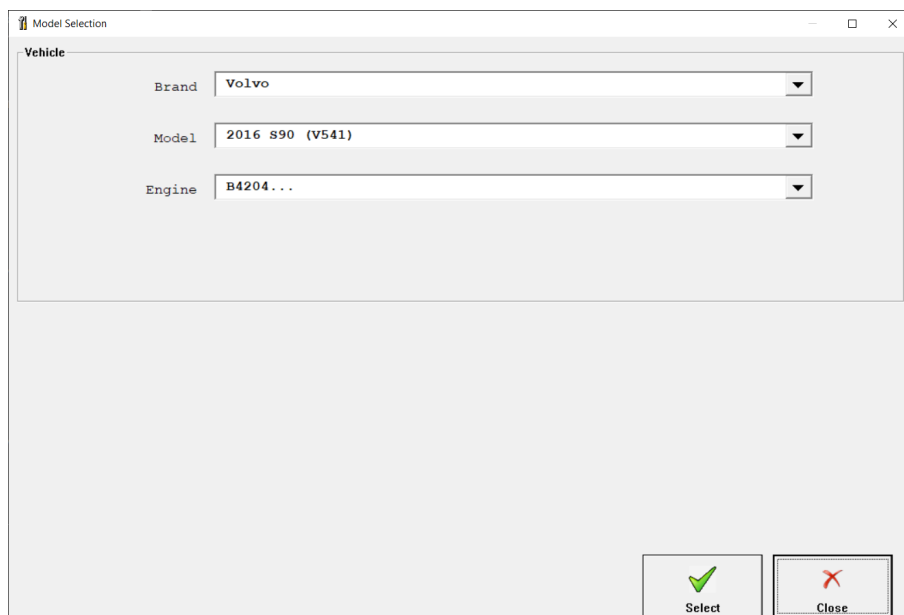
Parameter	Value	Units
<input checked="" type="checkbox"/> Vehicle Battery State Of Charge - Estimated	75	%
<input checked="" type="checkbox"/> Vehicle Battery Temperature - Estimated	20	°C
<input checked="" type="checkbox"/> Vehicle Battery Voltage	12.80	V
<input checked="" type="checkbox"/> Fuel Level Sensor A	5.000	V
<input checked="" type="checkbox"/> Fuel Level Sensor B	5.000	V
<input checked="" type="checkbox"/> Requested Charge Voltage	10.6	V
<input checked="" type="checkbox"/> PATS Number of Ignition Key Codes Supported	2	
<input checked="" type="checkbox"/> Alarm Trigger Cause 1, Global real time	104922.190	min
<input checked="" type="checkbox"/> ECU Power Supply Voltage	13.36	V
<input checked="" type="checkbox"/> Global Real Time	1534243.401	min
<input checked="" type="checkbox"/> Total Distance	5765	km
<input checked="" type="checkbox"/> Main ECU Voltage Supply	13.3	V
<input checked="" type="checkbox"/> In-Car temperature	199	°C

At the bottom, there are buttons for "ECU", "All", "Selected", and "Graph". On the right side, there are "Stop" and "Close" buttons.

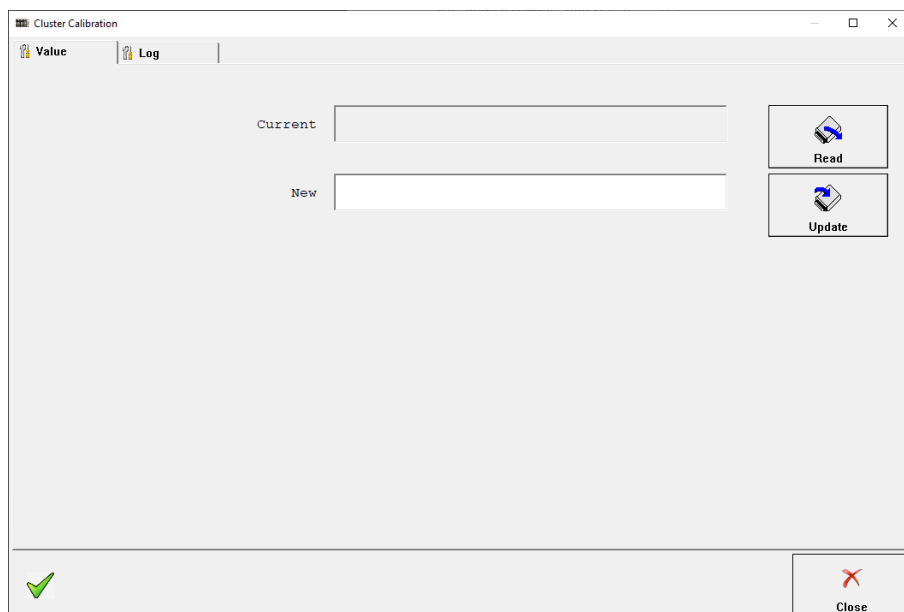
5. Special Function “Cluster Calibration”

Using the “Cluster calibration” function the user can calibrate the values for different modules. This function is particularly useful in the cases where a module needs to be replaced with a second hand unit, which has a different than the original mileage value.

In the first screen of the cluster calibration menu you can select the vehicle you are working with (if not previously selected) and then you will see the screen where the value is read and can be updated:



The screenshot shows a dialog box titled "Model Selection". It contains three dropdown menus under the heading "Vehicle":
- Brand: Volvo
- Model: 2016 S90 (V541)
- Engine: B4204...
At the bottom right, there are two buttons: "Select" (with a green checkmark icon) and "Close" (with a red X icon).



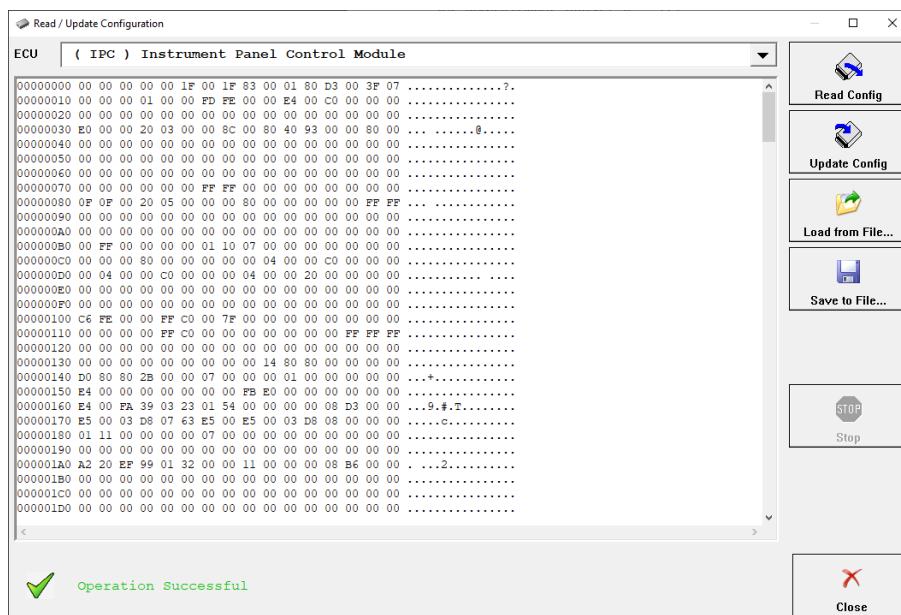
The screenshot shows a dialog box titled "Cluster Calibration". It has two tabs: "Value" (selected) and "Log".
Under the "Value" tab, there are two input fields:
- "Current": An empty text box.
- "New": An empty text box.
To the right of these fields are two buttons: "Read" (with a blue document icon) and "Update" (with a blue document icon).
At the bottom left, there is a green checkmark icon. At the bottom right, there is a "Close" button with a red X icon.

6. Special Function “NVData”

The NV data special function allows the user to read and update the configuration data of different modules, save it to a file on their computer, upload and update it back to the module if needed.

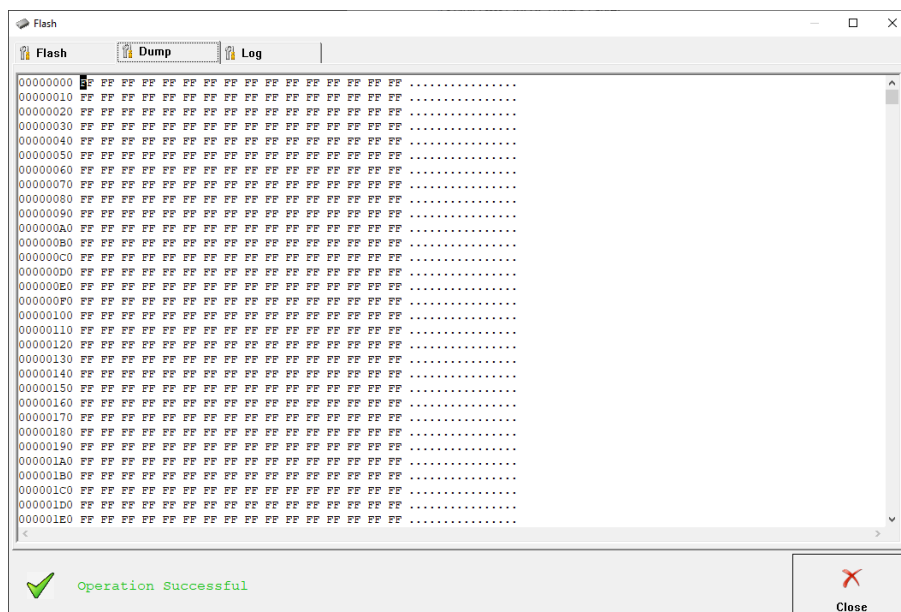
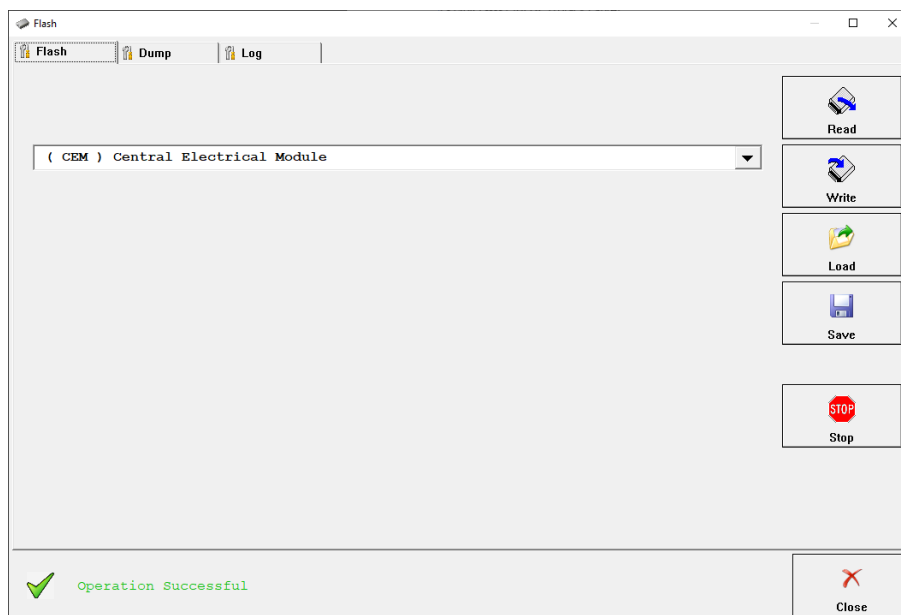
Once this function of the Abrites diagnostics for Volvo is selected the user can see all the options.

This function is very useful for electronic module replacement.



7. Special Function “Flash”

Similar to the NV data function in terms of its operation, the “Flash” function is very helpful when flash files need to be transferred from one unit to another or for flash tuning purposes. You can read, save to a file, load from a file and update (write) into a unit with this function. Supported units can be seen in the dropdown menu.



8. Special Function “Key Learning”

When the key learning function is selected, you will see a screen where you need to select the vehicle you are working with (if not previously done) and the PATS Menu will be opened. The Key Learning function is intended for HITAG2 key programming for the following models:

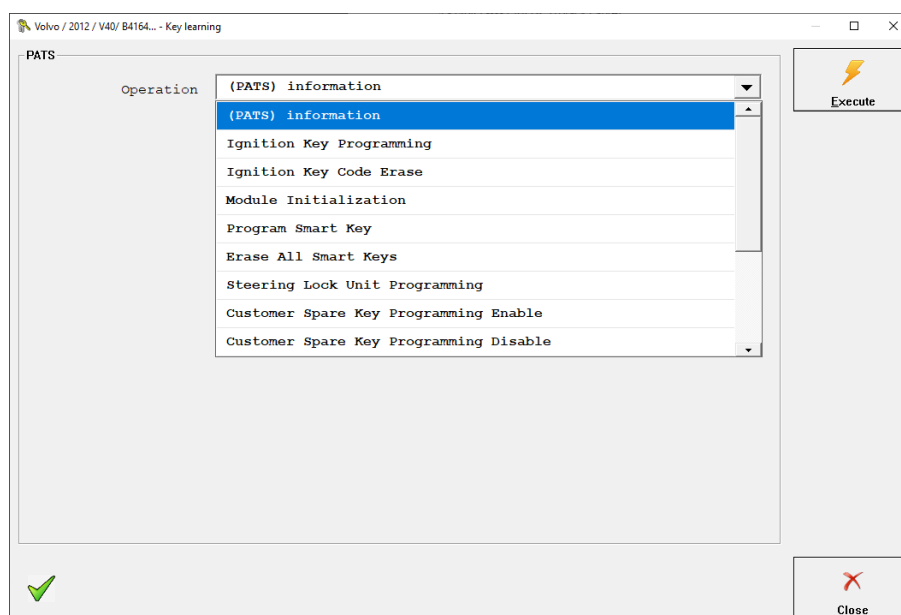
Volvo V40 / V40 Cross Country (up to 2016)
Volvo V60 / V60 Cross Country (up to 2018)
Volvo V70 (up to 2016)
Volvo S60 / S60 Cross Country (up to 2018)
Volvo S80 (up to 2016)
Volvo XC60 (up to 2017)
Volvo XC70 (up to 2017)

It covers the following CEM units:

6G9T-14C256-GG, HE, HF
7G9T-14C256-FA, GA
AG9T-14C256-HC
BG9T-14C256-FB, GA, HA
CG9T-14C256-FA

Note:

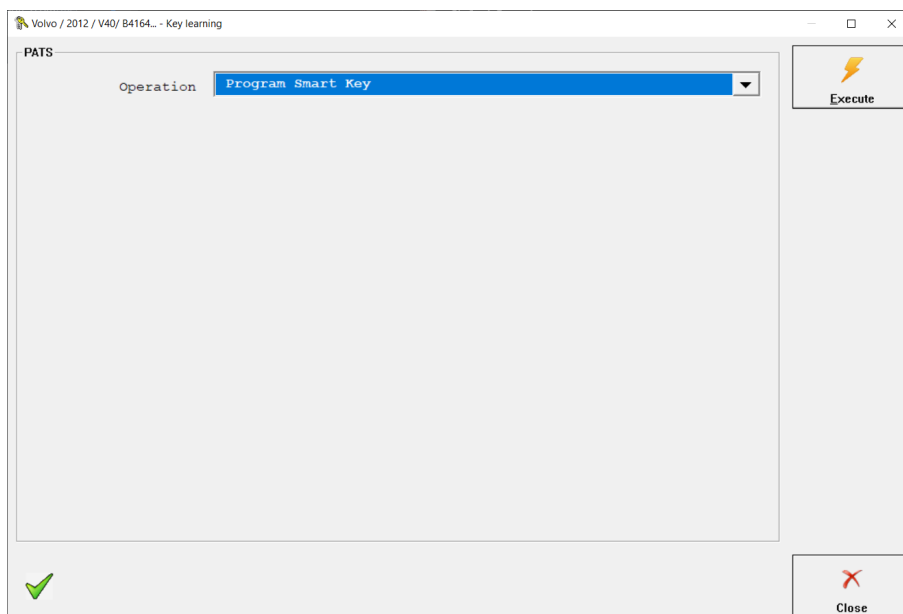
1. Old Volvo models with L-Shape CEM are not supported (XC90).
2. Only HITAG2 keys with ID xxxxxx9x are suitable.



When programming smart keys, for example, you need to select the appropriate option from the drop down menu and press the button “Execute”. The procedure would continue with on-screen suggestion messages on what needs to be done on you side.

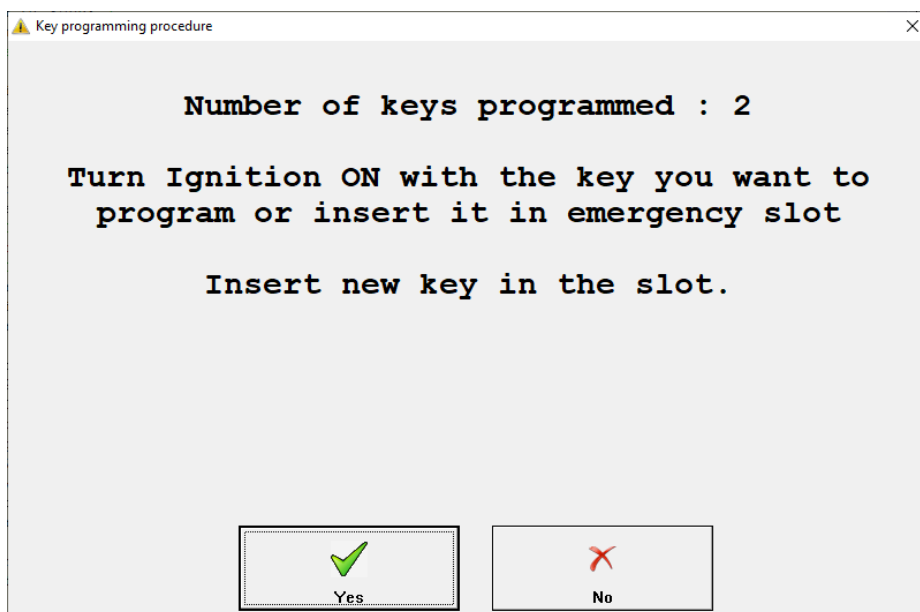
(Key programming needs CEM unlocking. The CEM unlocking is a long time lasting procedure. It may take up to several hours).

You can stop the CEM unlocking at any time with the STOP button in the right side of the dialog. The procedure can be resumed on the same computer later from the point of stopping (Previous progress from the procedure start is not lost)



Please follow the on-screen instructions and once asked, insert an new (unlocked) key in the key slot. The number of the keys on screen must increase once the key is programmed. New key ID will appear in the screen log. The CEM accepts only unlocked HITAG2 transponders. Once you programm all the keys that you wish (you need to see the number as in the second picture) you can stop the procedure and keys should already be successfully programmed and you can see it in the logs sreen behind.

If you have a transponder locked from this CEM, you can unlock it with the ProTag and reuse it. The transponder SK (secret key) is 6bytes long and you can find it in the screen log.



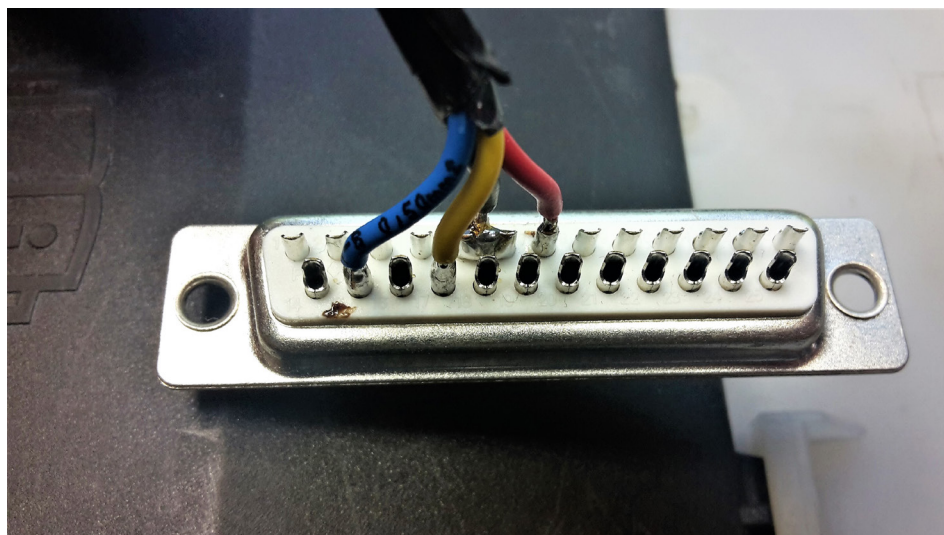
8.1 CEM Unit bench wiring

If you decide to work on bench, you can remove the immobilizer system from the car and work remotely. This can be done when you don't have the time to wait a few hours in the car for the immobilizer to get unlocked. The unit is located above the front passenger's feet. You need to connect it with the corresponding cables, unlock it and continue with the procedure. Once it is finished, you can reconnect the unit to the car and with the same computer used to unlock it, start the procedure again and program keys. This time, the procedure will last no more than two minutes as the unit has already been prepared with this computer. It is better to use clips to make the connections to the unit instead soldering.

1. Pinout for models from 2007 up to 2010

6G9T-14A073-xx

7G9T-14A073-xx



The blue socket has the following pinout:

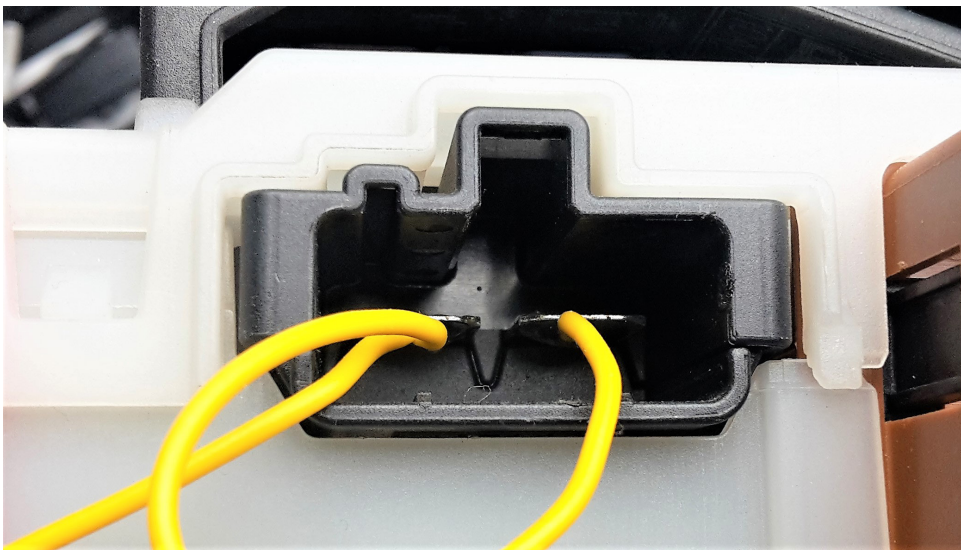
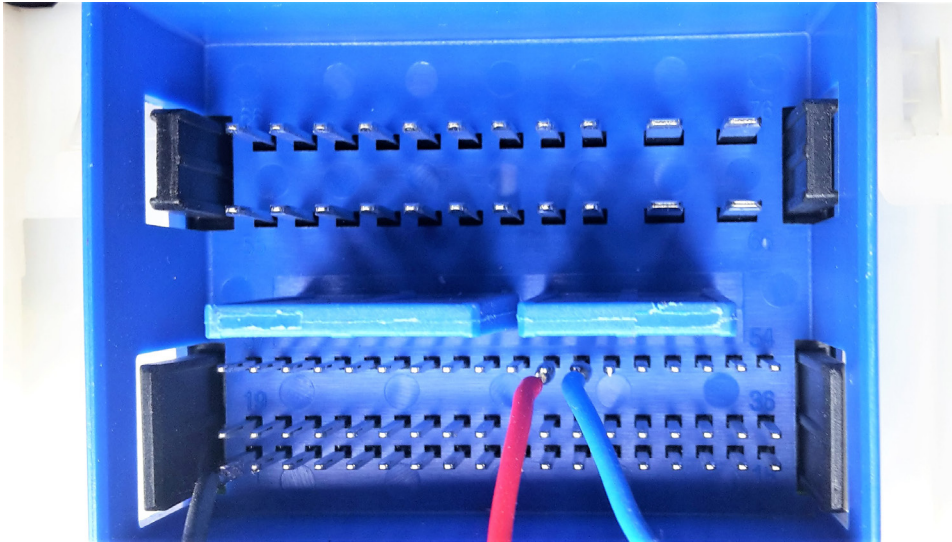
Pin 1 - GND ---- OBD 4,5 , where GND is using a black cable

Pin 47 - CANH --- OBD 14 , which has the red cable

Pin 48 - CANL ---- OBD 6 , where the blue cable is applied

Black socket:

POWER SUPPLY - OBD 16 (yellow cable)



For models from 2010 - present, the versions are as follows:

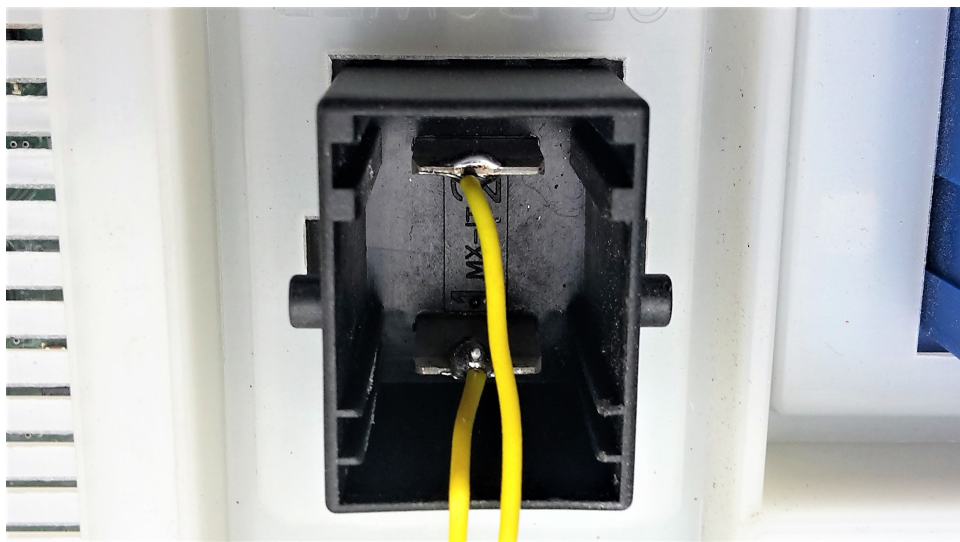
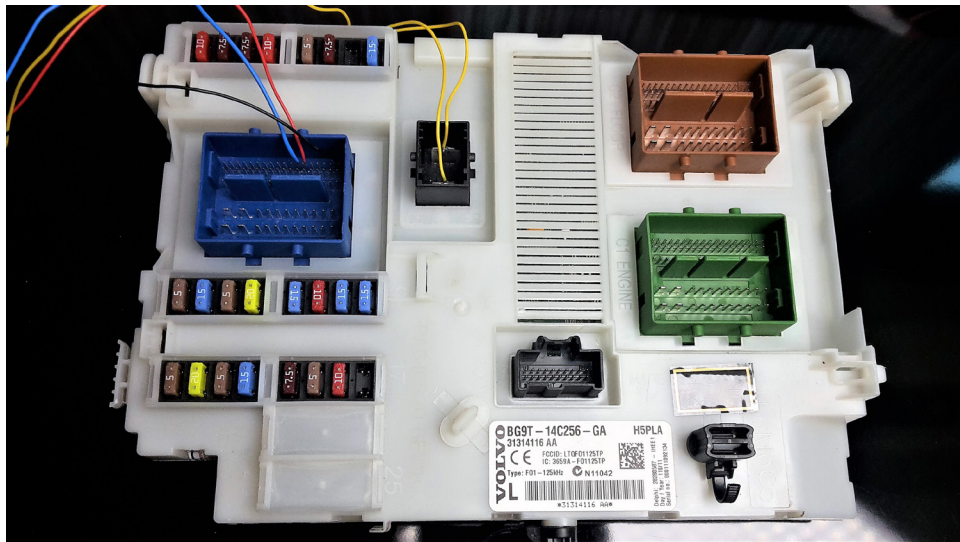
AG9T-14A073-xx

BG9T-14A073-xx

CG9T-14A073-xx

Black Socket, used for power:

POWER SUPPLY - OBD 16 (yellow cable)

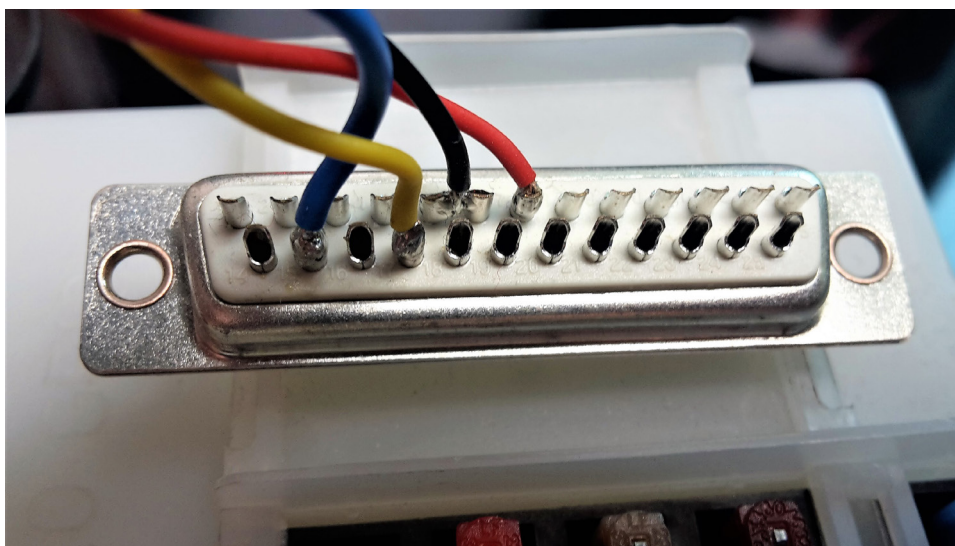
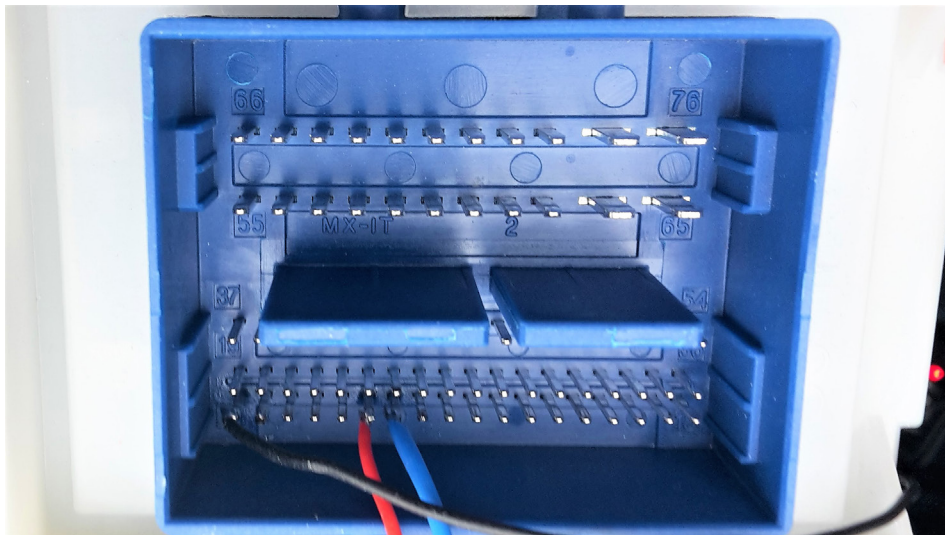


Pinouts for the CEM module, which serves as an immobilizer (Blue socket):

1 - GND ---- OBD 4,5 (black cable)

6 - CANH --- OBD 14 (red cable)

7 - CANL ---- OBD 6 (blue cable)



8.2 Module Initialization

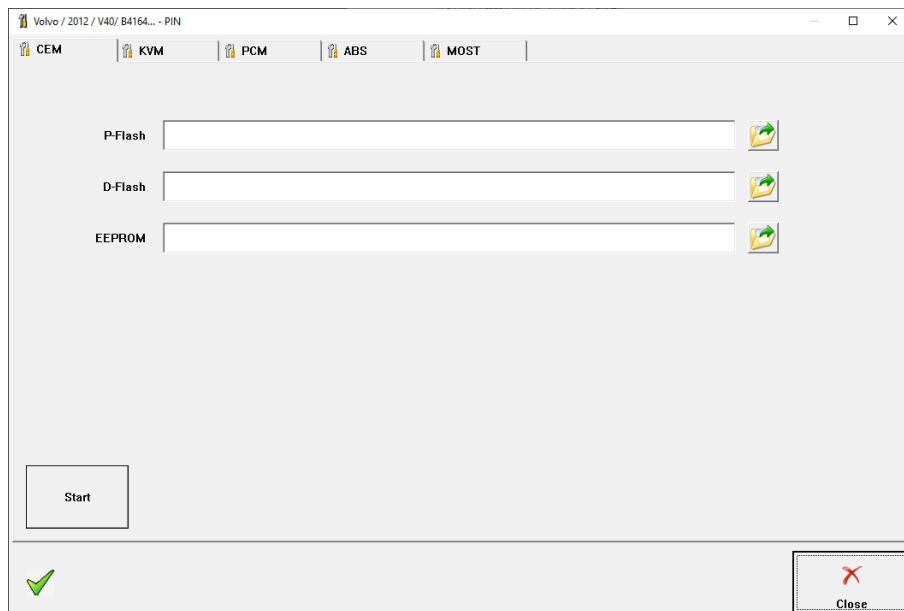
In the Key Learning special function menu, you will find the “Module Initialization” option in the drop-down menu. This function helps you when replacing PATS modules. You need to install the appropriate for the vehicle second hand module, and then start the module initialization function, so that the module is programmed with the rest of the modules in the vehicle and the car would operate as supposed to. The software would suggest what needs to be done. With the next ignition on all modules would be synchronized



9. Special Function “PIN”

PIN special function lets you upload Program Flash, Data Flash, or EEPROM files into the software, in order to extract the PIN on the vehicle. It works for older Volvo models and you can work with the following modules:

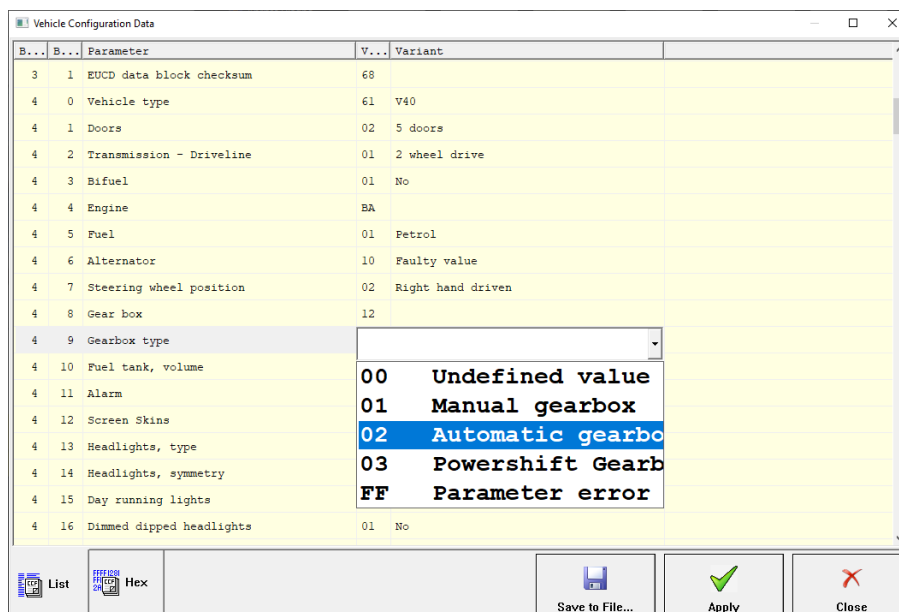
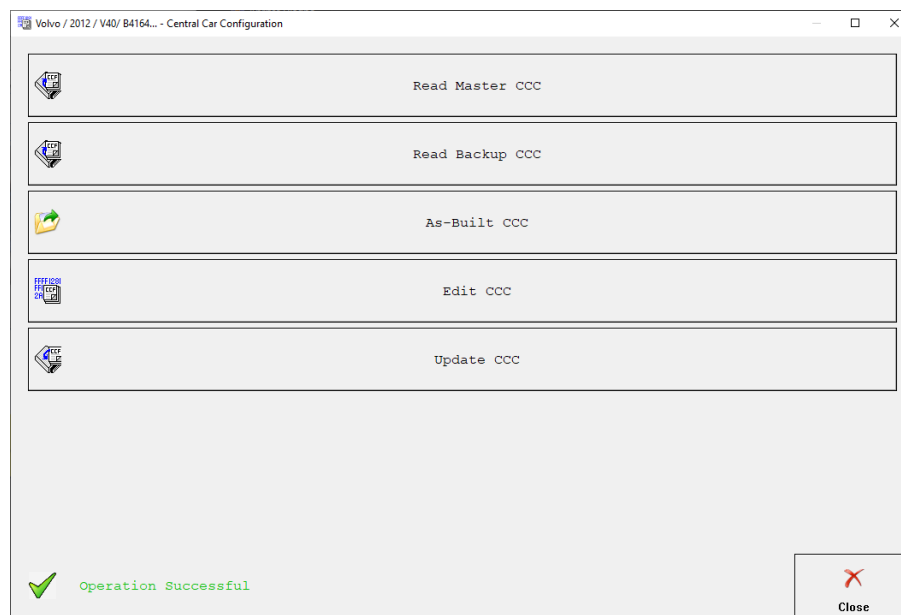
- CEM
- KVM
- PCM
- ABS



10. Special Function “Car Config”

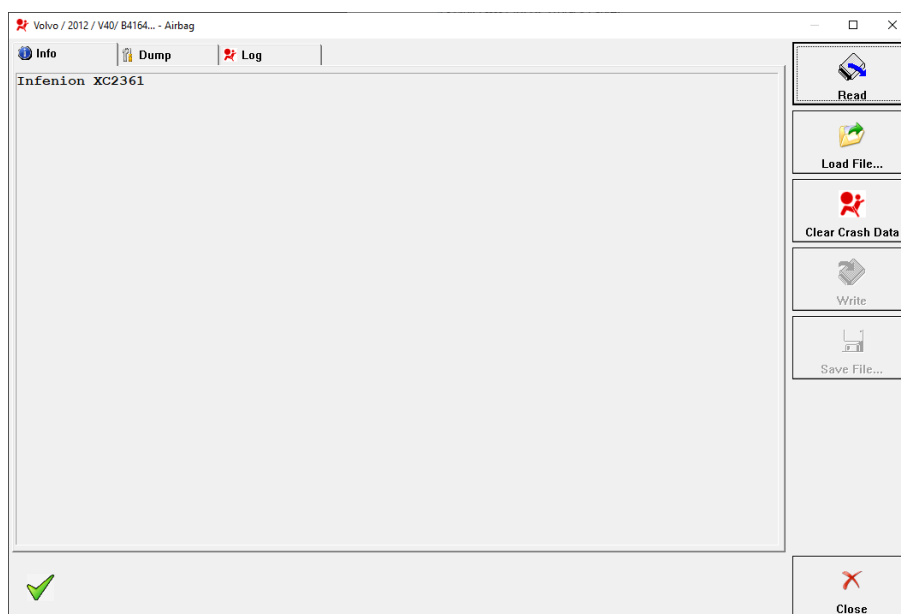
Car Config lets you change parameters in the vehicle configuration data, letting you exchange units (not part of the immobiliser system), add extras previously not present in the vehicle, etc. Once you open the function you have the option to read the Master CCC or Back-up CCC (if available), edit and update the configuration.

In the picture below you can see an example on how to set the vehicle to be with automatic gearbox, previously using manual transmission.



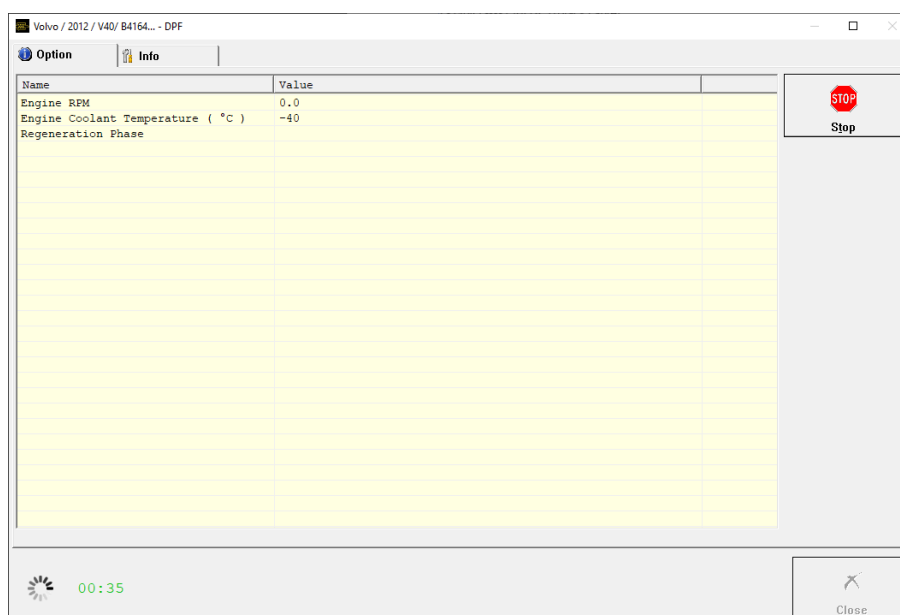
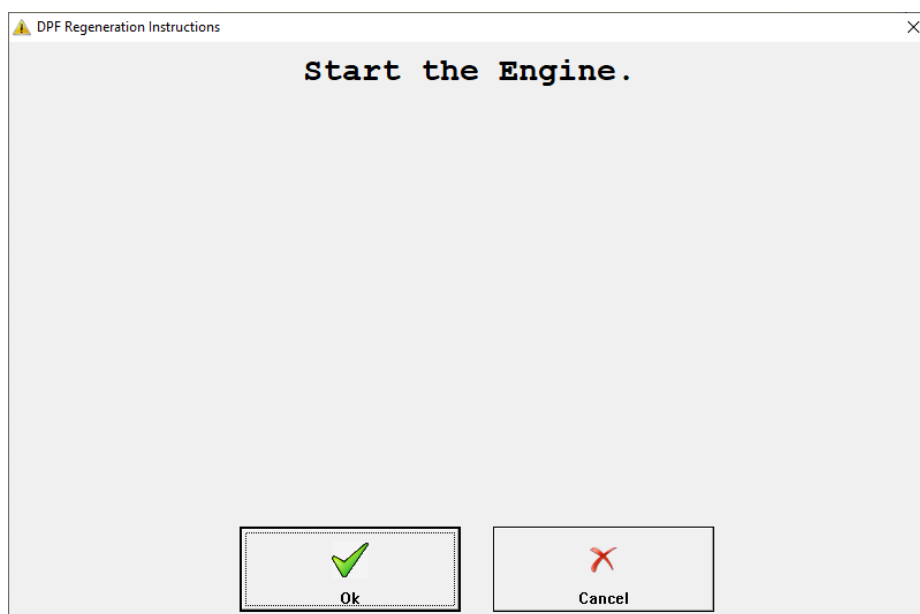
11. Special Function “Airbag”

Airbag function in the Abrites Volvo software is dedicated to reading the memory of airbag unit, and clearing crash data. It is a very useful functionality when it comes to module replacement. You have the option to read the data, save it to a file, and upload a file. Please see a screenshot of the software below:



12. Special Function “DPF”

The DPF function in the Abrites diagnostics for Volvo Software is dedicated to doing DPF regeneration to vehicles with Diesel Particulate Filters. Once the software is open, you need to press “Execute” button and you will get suggestion that engine needs to be started, and you can later monitor the process as in the pictures below:



13. KP001 - Key programming using the Volvo key programmer

The Volvo key programmer is dedicated to the following Volvo models using HITAG2 keys (keyless and non-keyless models):

- V40 (2012-2019)
- V60 and V60 Cross Country (2010-2018)
- V70 (2007-2016)
- S40 (2011+)
- S60 and S60 Cross Country (2010-2018)
- S80 (2006-2016)
- XC60 (2008-2017)
- XC70 (2007-2016)

It is a standalone key programming device that supports key addition and key programming in all keys lost situations. It is very usefull so that you do not spend hours in the car to wait for the CEM unit to be prepared. The hardware device is plugged directly into the car OBDII - no need for additional cables or connection to a computer. The device does not delete previously programmed keys and the procedure takes around 4-5 hours.

Here are the steps:

1. Insert the key programming device into the OBDII port.
2. The LED flashes slowly in green - it will start working.
3. After about 4-5 hours (non-keyless cars) and about 10 hours (keyless cars) the LED flashes quickly in green - the car is ready to accept a NEW key. The car could remain in this state until the next day.
4. The new key has to be inserted into the key slot.

The LED lights up in a constant green color - the key is suitable for the car and successfully programmed.

Supported keys are the keys that are compatible with the vehicle you are working with . As long as you have the correct key, there should be no problem with the procedure.



14. Renew Keys using ZN046 ABPROG adapter adapter

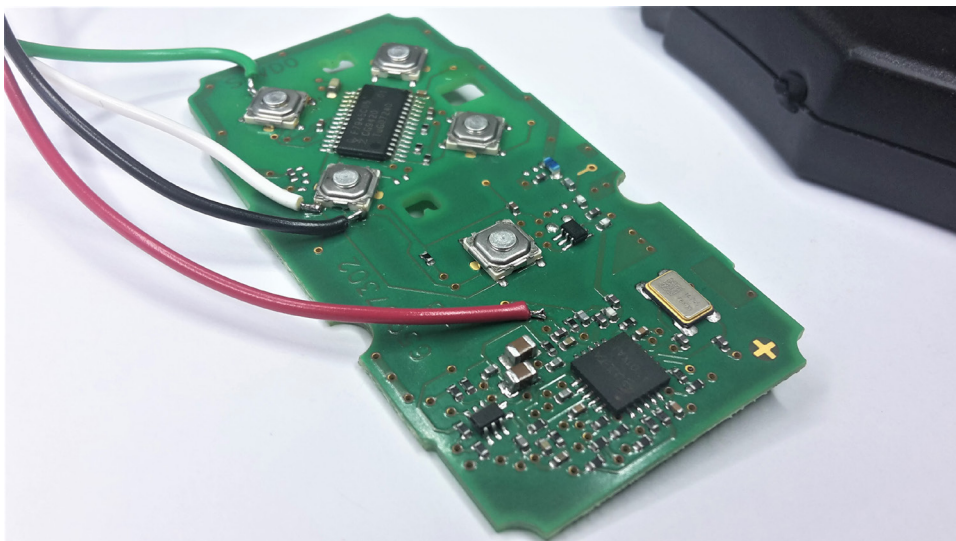
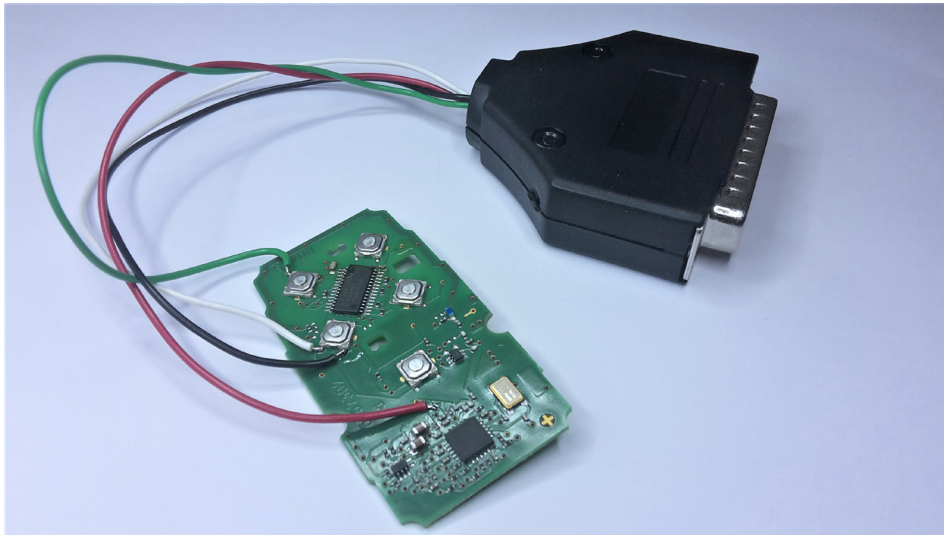
You can renew Volvo Key PCBs using the ZN046 ABPROG adapter.

The following photos will show you how the connection points on the key PCBs look like, so that you can proceed with the soldering.

Detailed information can be found in the Abprog User Manual.



The following photos will show you how a soldered PCB looks like.



Once the cables of the ABPROG adapter are soldered to the PCB, the ABPROG software can be started. Select the “PCF” Option from the drop-down menu and the PCB model. After the desired options are selected, you can click on “Program” to renew the key and make it virgin. Click on “Yes” to confirm the renewal process. Once the procedure is completed, you will see the “KEY Write finished successfully message”. This means that the key is now renewed. You can continue with programming the key to another car.

You can connect the adapter to the ABPROG adapter to AVDI as shown in the picture below:

