Chapter Z
Diagnostic tools

Z.1 Diagnosable components

The following components are possible to diagnose with the diagnostic tool:

BMI (Battery Management System)
PCU (Power Control Unit)
GEM (Generic Electric Module)
RAC (Remote Acqusition Control)
CDCM (Climate control)
SRS ECU (Airbag and belt tensioner control unit)
ABS (ABS brakes)
PATS (Passive anti-theft system)
EPHS (Power steering)

Z.2 Diagnostic tool

At the moment you need three different diagnostic tools:

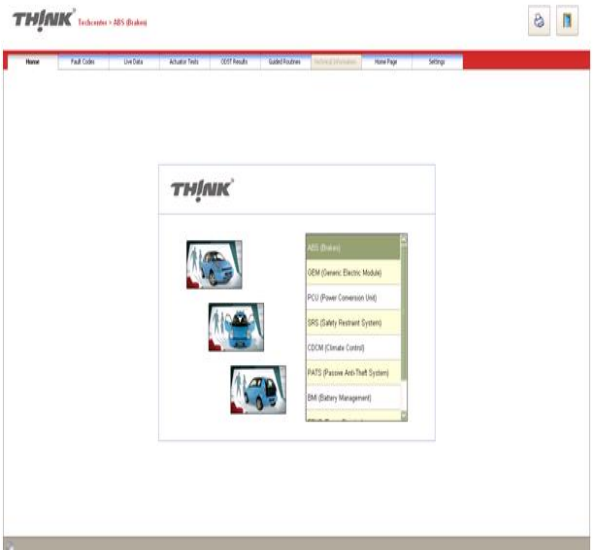
- THINK Techcenter (for GEM, PATS, RAC, airbag ECU, ABS, CDCM)
- CHAS (for PCU)
- ZebraMonitor (for BMI/Zebra battery)

Z.3 THINK Techcenter

This consist of 2 cables and the diagnostic unit (VCI).
You also need a PC with USB output and the correct software.

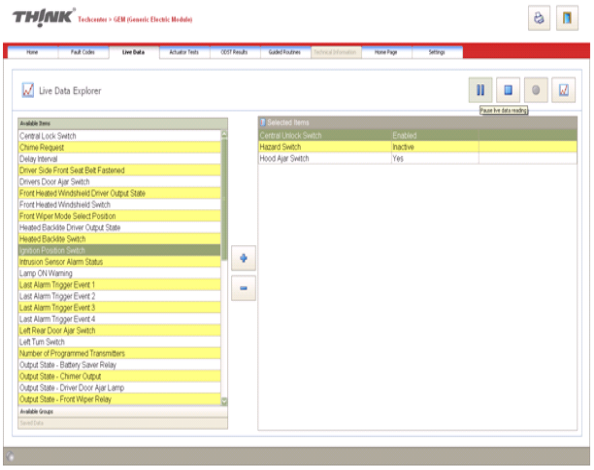
Z.3.1 Connecting

Connect the OBD contact to the diagnostic contact to the left of the fusebox. The other end to the USB contact in the PC. Start THINK Techcenter with ignition on and the charge cable connected.



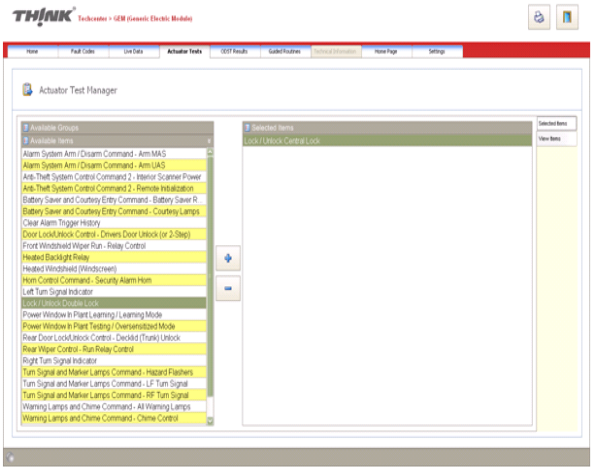
Z.3.2 Reading error codes

- Select the wanted ECU.
- Select ”Fault Codes”.
- Press the magnifier to read error codes.
- Fault Diagnose (not developed yet).



Z.3.3 Reading Live data

- Select the wanted ECU.
- Select ”Item” from the list by double click.
- Start reading by pressing the ”Play” button.



Z.3.4 Actuator tests

- Select the ECU you want to test.
- Select ”Item” from the list by double-clicking.
- Choose View Item
- Press the ”Play” button.

Z.3.5 ODST Results

ODST means ”On demand self test”. These are different from ECU to ECU.

THINK Techcenter does a selftest and you can read the result.

Z.3.6 Guided Routines

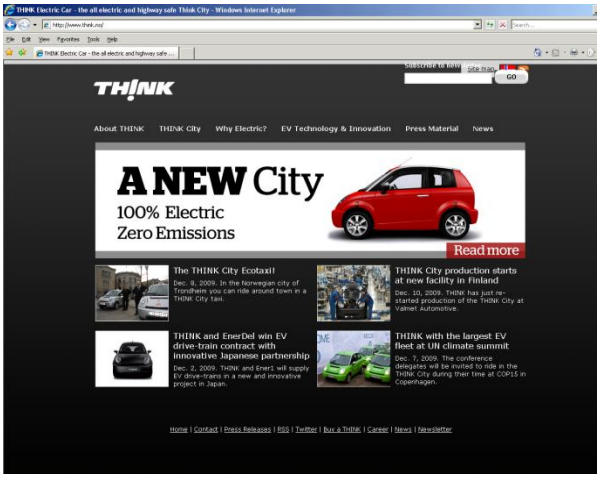
Here you will find guideded routines varying from ECU to ECU. For example:

- ECU Renewal
- Software Download
- Write VIN
- Transponder Learn (key programming)

Follow the instructions on the screen. Keep the car’s VIN ready.

Z.3.7 Technical Information

At the moment not in use.



Z.3.8 Home Page

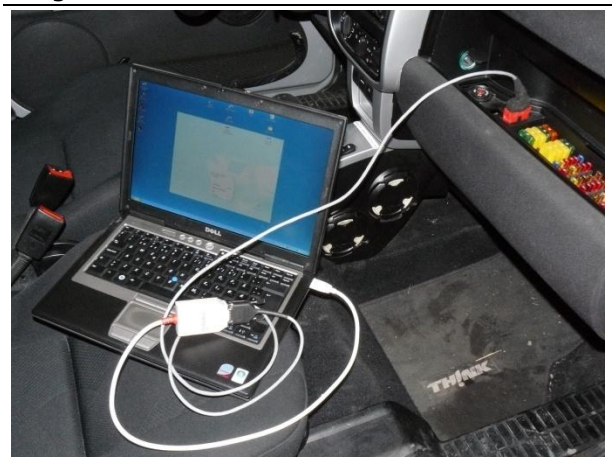
Link to THINKs homepage.

Z.3.9 Settings

Here you'll find system settings, release notes etc. for THINK Techcenter.

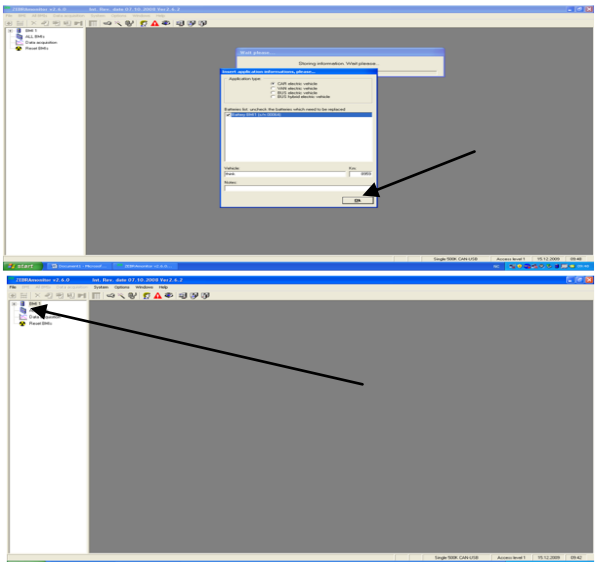
Z.4 ZebraMonitor

Consists of a P-CAN cable and an OBD-2 cable. You also need a PC with USB connector and the correct software.



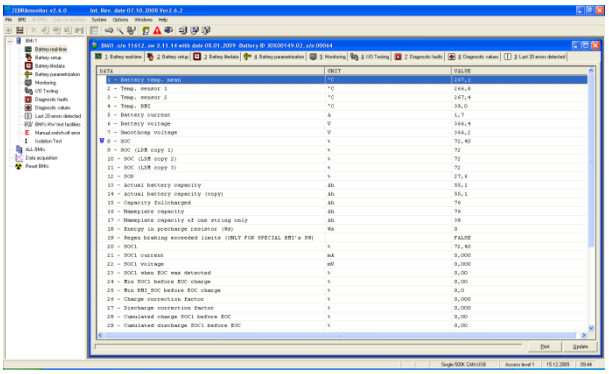
Z.4.1 Connecting ZebraMonitor

Connect the cable from the USB connector on the PC to the OBD-2 contact in the vehicle.



Z.4.2 Starting ZebraMonitor

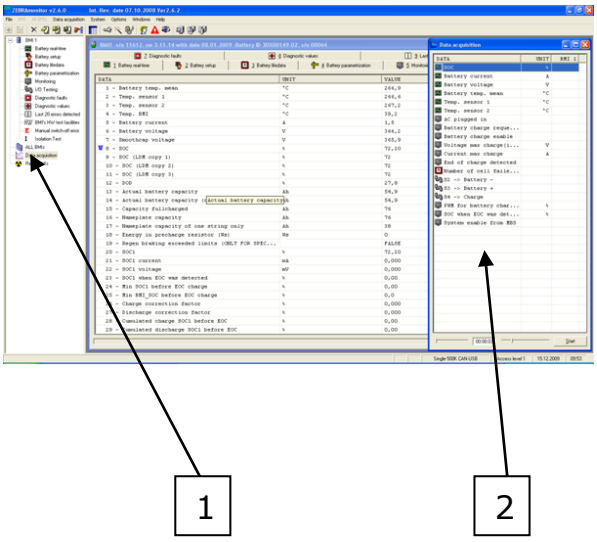
Press ok. Select BMI 1 +.



Z.4.3 Zebramonitor subdivision

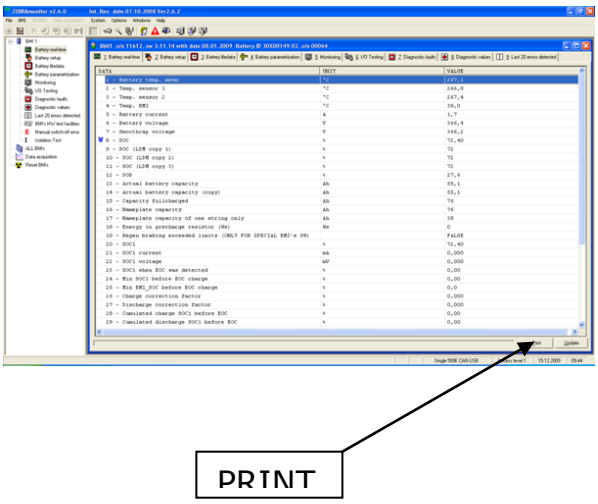
ZebraMonitor is divided in nine subdivisions:

- Battery real time
- Battery Setup
- Battery Lifedata
- Battery parametrizsation
- Monitoring
- I/O Testing
- Diagnostic faults
- Diagnostic values
- Last 20 errors detected



In addition to the data mentioned above you can do tests selecting the parameters you want to monitor.

Select ”Data acquisition” (1).
Pull the wanted data over to the Data acquisition field (2). Press start and follow the instructions on the screen.



You’ll find the data in your local explorer in C:\ZEBRAcquisitionDir.

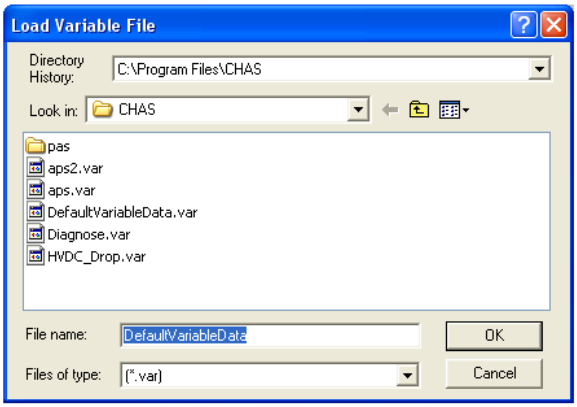
Z.4.4 Data storage

On each of the nine ZebraMonitor pages you’ll find a print button in the right bottom corner. Select this to store the files. After selecting print, choose ”Save on file” instead of printing.
You’ll find the files in C:\ZEBRAcquisitionDir.
The files are stored as small text files that are easy to attach to an e-mail for example if you are sending the files to THINK for help.

Z.5 CHAS

Consists of only one cable; D-SUB 9 pin – SIADIS contact. You also need the correct software and a PC with a COM port. Using an adapter on a USB port will not work.

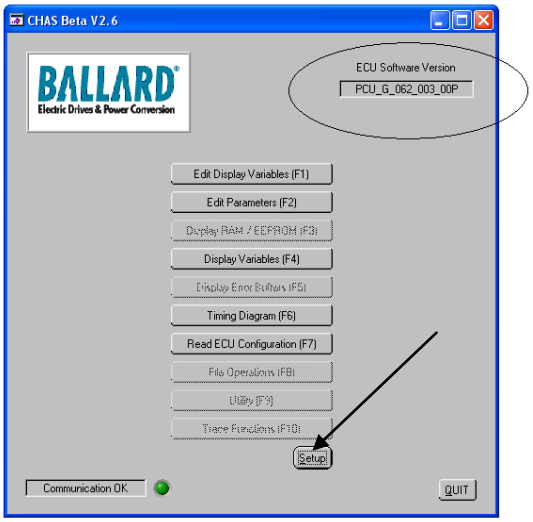
CHAS has a lot of different possibilities. It is a development software originally intended for internal use. In the future the necessary functions will be integrated in THINK Techcenter but the tool is not developed yet.



Z.5.1 Start CHAS

CHAS is a development tool and is not optimal regarding communication and user-friendliness etc.

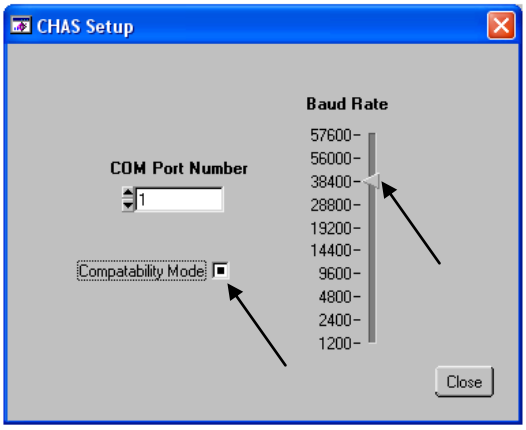
When starting CHAS you'll first see this picture. Select a "variable file" and press ok.



You'll now see this picture.
In the upper right corner you'll see the PCU software version in the vehicle.

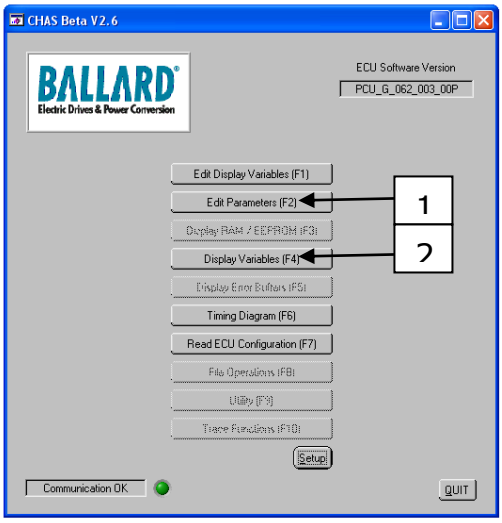
In the bottom left corner you'll see: "Communication OK".

Choose "Setup".



Check”Compatability Mode” and select ”Baud Rate 38400”.

NB ! You’ll have to do this evey time you start CHAS.

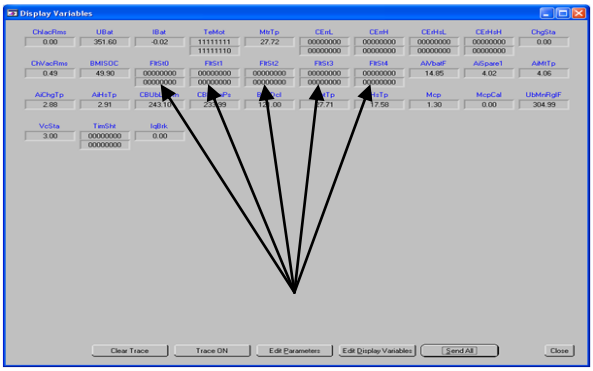


Z.5.2 Edit Parameters

Trained personnel can edit PCU parameters.
Select ”Edit Parameters F2” (1).

Z.5.3 Display Variables (F4)

For reading error codes and other parameters select ”Display Variables (F4)” (2).



When opening Display variables you'll see this page. It will be different depending of which variable file you choosed when starting CHAS.
You can also create/edit variable files by choosing "Edit Display Variables".

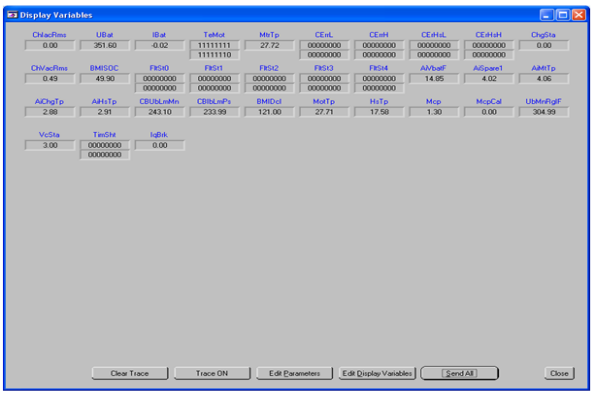
15	14	13	12	11	10	9	8
7	6	5	4	3	2	1	0

First we look for errors set by the PCU. We can see this in the fault status fields "FltSt 0-4".
We find the errors by reading the bits the following way: Start at the bottom to the right, count to the left, start with null (0) 0-1-2-3-4-5-6-7. Then go up one line, continue with 8-9-10-11-12-13-14-15.

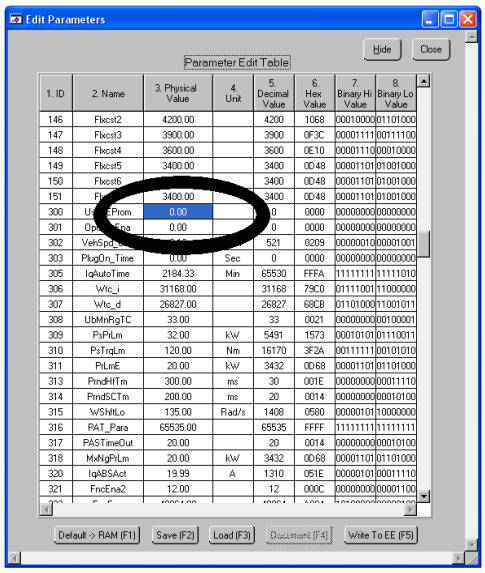
Example **FltSt 2**

0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0

Example:
Here we see fault status 2 with bit no. 6 active indicating "Charger fault".
The error code list can be found together with the software on THINK's ftp serveren.



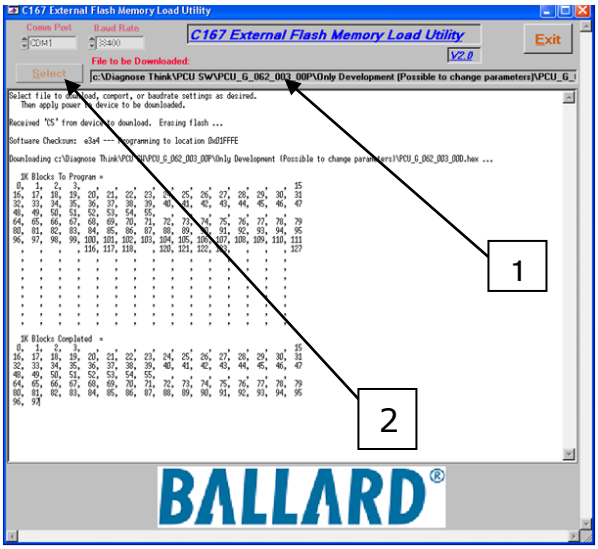
The other fields are showing everything from motor temperature, battery voltage and similar but will vary depending of which starting file (Variable File) selected when starting the program.



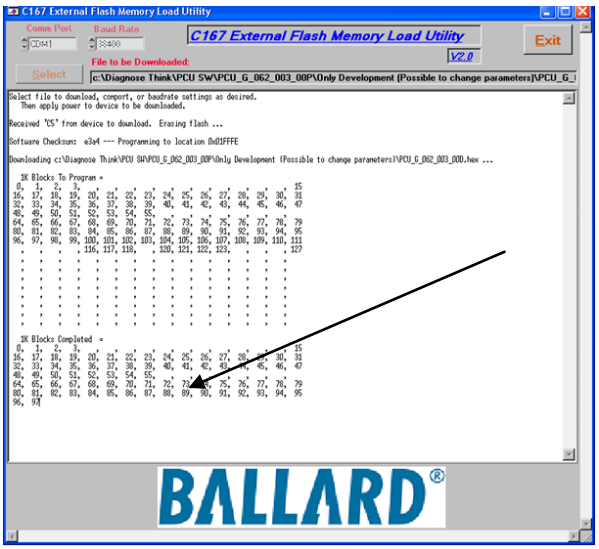
Z.6 Downloading PCU Software

Before the work is started:
Make sure you have installed the correct software version (SW) on the PC that you are about to download to the PCU. Then connect the CHAS cable and start CHAS.

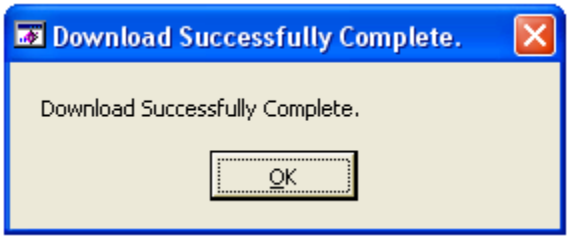
- Select Edit Parameters.
- Scroll down to line 300. Make sure no. 3 Physical Value is 0. If not double click on the number and write 0. Press ”Write to EE(F5)” and wait for confirmation.
- Select Close.
- Logg off CHAS.
- Turn the ignition off.



- Open C167 loader
- Make sure you have the correct .HEX file for downloading (1).
- Select the .HEX file by selecting”Select” (2).



- Twist the key to position two and the download will start.
- Allow the program to finish.
- Press OK.



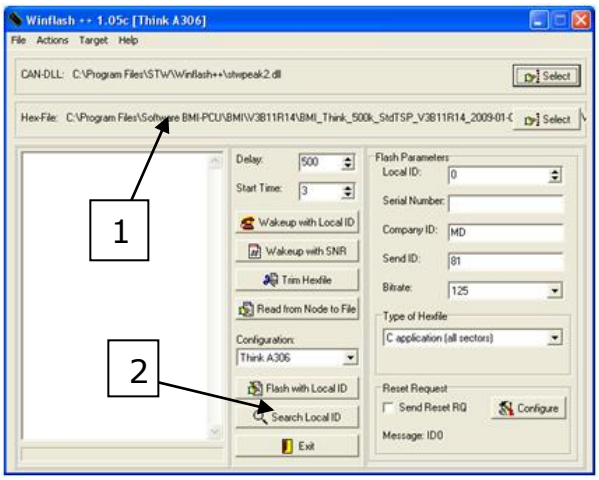
- Turn off the ignition.

The software download is now finished.

Z.7 Software download to BMI/Winflash

Z.7.1 Connecting

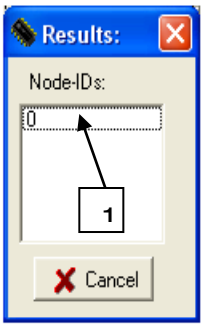
The charge cable must not be connected when downloading the software.
Use the P-CAN cable from the ZebraMonitor cable. Connect it to the D-SUB contactc in the software download box. 12V supply is connected to a 12V source for example the 12V outlet in the car. The BMI contact is connected to the 16 pin contact in BMI.

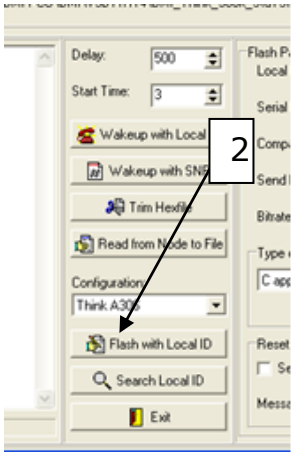


Z.7.2 Winflash

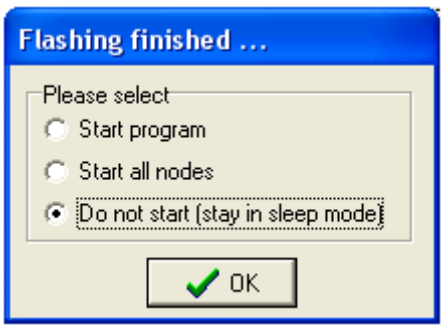
Start WinFlash.

- Make sure you have the correct .HEX file installed (1). You can find the latest file on THINK's ftp server.
- Make sure the On/Off button is in Off position.
- You'll find a reset button on the software download box. Press it in for 15 seconds.
- Press " Search Local ID". Immediately (within 3 seconds) tip the On/Off button to On position.



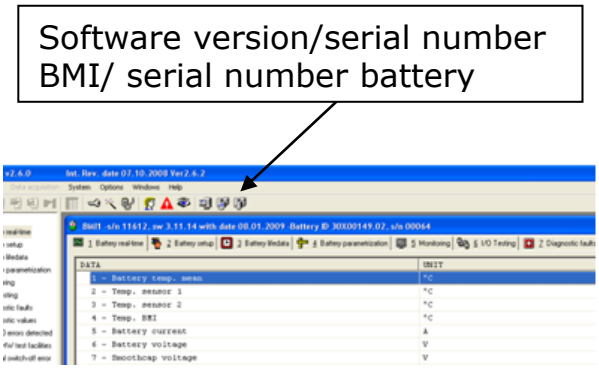


- You will now see the window called "Results". Press the line with zero (0). See fig 1.
- Press"Flash With Local ID". See fig 2.
- The software will now be downloaded to the BMI.



When the download is finished you will see this picture.

- Select: Do not start (stay in sleep mode).
- Wait for ten (10) seconds.
- Disconnect the box. Reconnect the BMI contact. Start ZebraMonitor.



Check that everything is ok. For example that SOC corresponds to battery Volt, new error codes etc.

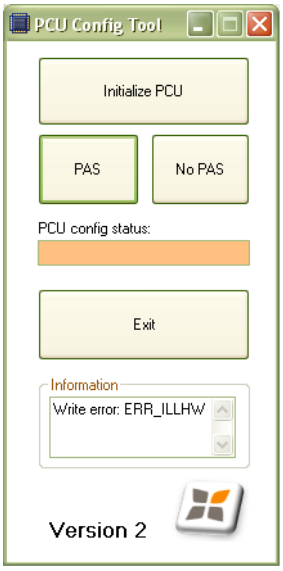
In the upper part of the screen you'll find battery and BMI serial numbers and the BMI software version.

Z.8 PCU Config. Tool

On vehicles without power steering you have to disable power steering after for example replacing the PCU.

Z.8.1 Connecting

Use the same cable as for when using ZebraMonitor.



Z.8.2 Disabling power steering

1. Turn the ignition off.
2. Start the PCU Config. Tool by double clicking the shortcut on the desktop.
3. Turn the key to position two (2).
4. Press "Initialize PCU".
5. Press "No PAS" (PAS=power assisted steering).
6. PAS Disabled will appear in the information field.