The Beginner's Guide to

Coding With NCS Expert

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Introduction

Part I: Intended Audience

This guide is intended for individuals who wish to learn to use the BMW Standard Tools software suite with a D-CAN cable to code the various modules found on late model BMW vehicles. It is assumed that you have at least a basic understanding of the following concepts:

- Common PC hardware and software terminology
- Installing hardware and hardware drivers in Windows environments
- Working with common file archive formats
- The BitTorrent protocol and associated software
- BMW chassis designations and common automotive terminology

Furthermore, it is imperative that you understand that by modifying your vehicle using the procedures in this document entails a potential risk to your vehicle and possibly your warranty. The information in this document is provided as-is, and by using it to modify your vehicle in any way you assume any and all associated risks. Read this document carefully before attempting any of the procedures contained herein.

That said, learning how to code your vehicle can be a very rewarding endeavor. These cars are packed full of features that are deactivated or locked-out from the factory, and learning to unlock that functionality can make owning and driving your car a much more enjoyable experience.

Part II: Scope of This Document

The BMW Standard Tools suite and diagnostic cables have a myriad of uses. Readers are encouraged to seek-out additional ways to make use of the software and hardware employed in the techniques covered in this document. However, the focus of this document is strictly to teach you how to set up and use BMW Standard Tools (primarily NCS Expert) to code the modules found on BMW vehicles. There are several resources online detailing other ways to use BMW Standard Tools and diagnostic cables to get the most out of your car.

Hardware

In order to use BMW Standard Tools to re-code your car, you will need the following hardware:

- A PC (preferably a laptop) running at least Windows XP SP2. Windows 7 is recommended. Many of the underlying programs used by BMW Standard Tools were designed to run on legacy (very old) systems. For this reason, setting-up a dedicated environment using virtualization software is recommended. However, this is an advanced topic and will not be covered in this document.

- An INPA/EDIABAS K+DCAN USB Diagnostic cable. These can be found on eBay and other online retailers. Expect to pay around $100 for the cable and shipping. It should look something like the image to the right.

Installation

This is by far the most complicated and error-prone part of the whole process. Remember, these programs are either a) very old or b) designed to work on very old systems. It is easy for a novice to make a seemingly trivial mistake that will render the entire software suite unusable. Follow the steps below carefully to ensure you wind up with a stable environment.

Part I: Download Software

This guide is distributed as part of an archive that contains 4 sub-folders:

- BMW Standard Tools 5.0
- Datens (v38)
- Drivers
- Misc

The total size of the archive is just over 706MB. If you de-selected certain chassis in the Datens folder, your download will be smaller. Verify that you have all 4 components before you continue. Make sure these files are easily accessible in a working directory.

Part II: Drivers

1. Extract the Drivers.zip archive located in the Drivers sub-folder of your working directory. You can simply extract it to its current location.

2. Connect the diagnostic cable to your PC and to your vehicle. Wait a few moments for Windows to inform you that it was unable to locate drivers automatically. At this point, you will have a new device called "D-CAN" in Device Manager.

3. Right-click the "**D-CAN**" device and select "**Update Driver Software**". Choose to browse your computer for driver software and select the "**Drivers**" folder in your working directory. Windows will find and install drivers for this device. It will now appear as "**USB Serial Converter**" under "**Universal Serial Bus controllers**".

4. Windows will now detect another new device called "**USB Serial Port**". Follow the same procedure from Step 3, pointing Windows to the "**Drivers**" folder to install drivers for this device. After the drivers are installed, Windows will assign a COM port to this device and it will appear as "**USB Serial Port (COM X)**", where X is the assigned COM port number. Take note of this number.

5. Right-click on the "**USB Serial Port (COM X)**" device in Device Manager and open its properties pane. Navigate to the "**Port Settings**" tab, click on "**Advanced...**", and locate the setting for "**Latency Timer**". This value will be 16 by default. Change it to 1, and close the properties pane and Device Manager.

You are now finished installing the drivers for your diagnostic cable.

Part III: BMW Standard Tools

1. Extract the archive in the "**BMW Standard Tools 5.0**" sub-folder and run "**setup.exe**", located in the "**Programinstallation**" folder. *If you are on Windows 7, you will need to enable Windows XP compatibility mode for "setup.exe".*

- Use the defaults for all installation paths.
- Uncheck the box for "Execute backup and restore wizard".
- Select the COM port from Step 3 of the previous section. Do not check the box for "USB to serial adapter".
- Restart your computer when prompted to do so.

2. You are now finished installing BMW Standard Tools 5.0. If you opted to have desktop shortcuts created, then you will have shortcuts for INPA and NCS Expert on your desktop. If you didn't, you may want to create shortcuts for them now. Their paths are (respectively):

- C:\EC-APPS\INPA\BIN\INPALOAD.EXE
- C:\NCSEXPER\BIN\NCSEXPER.EXE

You may also want to create a shortcut to the C:\NCSEXPER\WORK folder, which you will also be using every time you work with NCS Expert.

Part IV: Datens

1. Inside the "**Datens (v38)**" folder in your working directory are archives of the daten files for each chassis supported. Some models will use datens from another similar model in the same generation. For example: R55, R56, R57, and R60 models all use the R56 datens.

2. Once you have determined the correct daten archive to use, extract it to a temporary directory. The archive will contain 3 sub-folders. You will need to copy/move the files in these sub-folders accordingly:

- All files in "**daten**" → C:\NCSEXPER\DATEN\XXX (where XXX is your chassis code)
- All files in "**sgdat**" → C:\NCSEXPER\SGDAT
- All files in "**ecu**" → C:\EDIABAS\ECU

Do not copy the folders themselves, only the files inside them. Choose "Copy and Replace" to resolve conflicts.

3. Navigate to "**C:\NCSEXPER\DATEN\XXX**" (where XXX is your chassis code) and run the "**LADEN.BAT**" file.

4. Finally, copy "**REVTOR.PFL**" from the "**Misc**" folder in your working directory into "**C:\NCSEXPER\PFL**".

You have now finished setting-up NCS Expert to code modules in your car.

Coding

At this point you are ready to begin using NCS Expert to code your car. Follow this procedure **every time** you use NCS Expert.

Part I: Reading

1. Connect your cable to your vehicle's OBD II port and to your computer. Your vehicle's ignition should be in the ON position, but your engine does not need to be running.

2. Launch INPA and verify that it reads **Battery: ON** and **Ignition: ON**. You should also have a program called "**EDIABAS Server**" running in your task bar. If everything checks out, close INPA. Leave the server running.

3. Open "**C:\NCSEXPER\WORK**" and create an empty text file named "**FSW_PSW.MAN**".

4. Launch NCS Expert. Go to **File -> Load profil** and select "**Revtor's NCS Expert Profile**", click OK.

5. Select "**VIN/ZCS/FA**" then "**ZCS/FA f. ECU**". This will tell NCS Expert to attempt to read your VIN from your vehicle's ECU so you don't have to type it in.

6. Select your chassis from the list and click OK. Then select which module you want NCS Expert to read your VIN from. Usually the first choice is fine. Click OK again to have NCS Expert read your VIN. You should see the **CHASSIS**, **FG**, and **FA** fields populated in the top part of the NCS Expert window.

6. Select "**Back**", then "**Process ECU**". You will be prompted to select a module. Select the module you want to read values from and click OK. Click OK again on the window that appears to return to the main NCS Expert window.

WARNING: At this point, it is very easy to do something that could make your entire car explode. Always remember that coding is **serious business**. The default job is "**SG_CODIEREN**" which will **write** to the selected module using the values in FSW_PSW.MAN, which is presently empty. Be **extremely careful** any time you use NCS Expert, but especially at this stage in coding.

7. Select "**Job**" and choose "**CODIERDATEN_LESSEN**" from the menu. This will change the job from one that **writes** to one that only **reads** data. *Many of the job names look very similar. Always read job names carefully to ensure you select the correct one.*

8. At this point NCS Expert is relatively harmless, as all it can do is read from your car. Select "**Execute job**" to begin reading from your selected module. When you see "**Coding ended**" below the module name, the process has completed.

9. Once NCS Expert has read data from a module, it stores that data in a file called "**FSW_PSW.TRC**" (called a "trace file") in the "**C:\NCSEXPER\WORK**" folder. This file contains some general information about your car, as well as all the values currently stored in the module you read from.

Part II: Writing

It is assumed that you already know which field(s) you want to modify and the correct values for those fields. This information is readily available online.

1. Open "**FSW_PSW.TRC**" and find the field you wish to modify. Trace files are formatted as:

```
FIELD_NAME
     field_value
```

2. Change the field value(s) to your desired settings, then save this file as "**FSW_PSW.MAN**", overwriting the empty one you created earlier.

3. If you closed NCS Expert, follow steps 1-6 in the section above to get back to the correct screen. Otherwise, NCS Expert is ready to code your module as soon as the job is changed back to the default, "**SG_CODIEREN**". Do this by selecting "**Job**" and then "**SG_CODIEREN**", then click OK. Verify that the correct job appears in the "**JOBNAME**" field.

4. Click "**Execute job**" to have NCS Expert write the information from FSW_PSW.MAN to your vehicle. When you see "**Coding ended**" below the module name, the process has completed. Depending on what you coded, you may need to turn your car off and back on again to verify the desired feature/behavior has taken effect.

5. Open "**FSW_PSW.MAN**" and delete its contents. Save and close the file.

Repeat the procedure for "reading" and "writing" for each module you want to re-code.

Glossary

BMW Standard Tools – The software suite distributed by BMW Group that contains several interoperating applications and drivers, including NCS Expert, WinKFP, NFS, INPA, and others.

Datens – German for "data sets". In this context, the term refers to various file types that contain information about the modules found on a given vehicle and how to code them. Datens are distributed as part of ISTA-P software releases, and are typically referred along with the version of ISTA-P they were distributed with. For instance, datens from ISTA-P 2.38 are informally referred to as "v38 datens".

D-CAN – A subset of the CAN standard, which stands for Controller Area Network. This is the bus standard used by all the systems in BMW (and other late-model) vehicles to communicate with one another. Analogous to a LAN comprised of several computers which all communicate via a standard protocol. A D-CAN cable is able to connect to an OBD II port and allow another connected device to communicate on the vehicle's network.

EDIABAS – Electronic Diagnostic Base System – A proprietary communication protocol/command set developed by BMW and implemented in all their vehicles. All proprietary BMW software uses EDIABAS to communicate with the vehicle.

INPA – Diagnostic tool distributed with BMW Standard Tools that implements EDIABAS to perform a host of functions related to testing/reporting/troubleshooting.

ISTA-P – Suite of diagnostic software in a client/server architecture. Used by BMW dealers to perform all sorts of tasks, and to update the software on vehicles when BMW releases new versions. Datens are distributed with this software and are extracted and used with NCS Expert.

Module – A standalone computer that performs one or more related, specialized functions in the vehicle. Modules are not centrally located; they are found all throughout the vehicle. Modules communicate with other modules and systems on the CAN network, and implement the EDIABAS standard.

NCS Expert – Software application distributed with BMW Standard Tools that can communicate directly with any module on the CAN network. NCS Expert can, among other things, read the configuration codes from modules and write new configurations to them.