# Speed Harmonization MAB Software Installation Instructions

## Scope

This document is aimed at software developers with knowledge of and access to Simulink and dSPACE software packages. It also assumes that the developer has a functional development environment including Simulink, dSPACE, an appropriate C compiler for their operating system, and a cross-compiler for the MicroAutobox II architecture. This document aims to provide instructions to allow the developer to successfully compile and install the Speed Harm software from a starting point of downloading the source code from the Git repository.

## Prerequisites

Before proceeding, the following software must be installed:

* MATLAB R2013b
* Simulink R2013b
* dSPACE 2013-B
* dSPACE ControlDesk 3.5

In addition, this version of the Speed Harmonization control code is designed to work with version 2.0 of the CARMA platform, so that version must be downloaded from the Repository.

## CARMA Platform & Speed Harmonization Software

### Compilation

The CARMA Platform interface and the Speed Harmonization software are distributed as Simulink model files grouped into a Simulink project. As both of these software packages are distributed in separate repositories, the first step is to check out both into a local directory. Merge the “src” folder of the SpeedHarm22-MAB repository into the “src” folder of the CarmaPlatform-MAB repository by copy and pasting it. Everything from here will refer to this directory that contains the contents of both repositories.

Open the SpeedHarm22MAB.prj file with Simulink to load the appropriate .m and .mat files into the workspace. Add the “project” folder and all subfolders to the Simulink path. Several Simulink S-Functions must be compiled before the whole model can be compiled; this can be accomplished with the built-in Simulink MEX tool.

The following S-Functions must be compiled:

* src/
  + platform/adapter/c\_src
    - ParseBSM.mexw64
      * “mex ParseBSM.c ParseBSM\_wrapper.c der\_decoder.c bsm\_parser.c”
    - EncodeBSM.mexw64
      * “mex EncodeBSM.c EncodeBSM\_wrapper.c der\_encoder.c bsm\_encoder.c”

Once the S-Functions are compiled, open the “src/project/SpeedHarm.mdl” file and compile it using the ‘Build Model’ button at the top of the window. The compiled file will be located in the project folder at /bld/speedharm.sdf.

### Installation

To load the compiled artifacts onto a vehicle first you must connect to the MicroAutobox II over Ethernet. Connect to the SRX onboard router using a cable (preferred) or wirelessly. Open dSPACE ControlDesk and create a new dSPACE project (if none was already created) and create a new experiment under it. Add the MicroAutobox II hardware as a platform for the experiment. Load the .sdf file created by the Simulink compilation process under the “bld” directory as a Variable Description for the Experiment. To load the .sdf file permanently to the flash memory on the MicroAutobox II, right click the .sdf file in the project and select “Install to Flash” option. The real-time-application should start immediately and automatically upon power up of the MicroAutobox II hardware.