Hirel Board (PEDB) Testing Procedure

LOADING THE HIRELTEST PROGRAM:

- Connect a dSPACE breakout box to the back of the computer. Make sure that the cable is correctly and fully engaged.
- Copy the files *hireltest.mdl* and *hireltest.lay* into a folder on the C:\ drive or on a USB drive connected to the computer.
- Double-click on the Matlab icon on the desktop. If asked about the platform, click on DS1104. Change the Matlab working directory to the folder where the *hireltest* files were copied.
- In the Matlab window, type *open hireltest.mdl* or simply double click on the .mdl file in the working directory. After a short time, a Simulink window should open showing the block diagram of the test program.
- The program outputs the same constant reference to all the pulse width modulated (PWM) outputs and reads the values measured by the current sensors. Click on the Simulink window and type Ctrl+B.
- If there are build errors, consult the checklist on the lab web page.Ensure that the settings and adjustments that apply to this simple test are in place.The results of the compilation and loading of the program should appear in the Matlab window.
- If the model is successfully built, the program generates a .sdf file that is loaded onto the dSPACE board.

SETTING UP THE LAYOUT IN CONTROLDESK:

- Open the dSPACE ControlDesk software by double clicking on the "dSPACE ControlDesk 5.2" icon.
- In dSPACE, click on *New Project + Experiment*. Finish creating the project and experiment in the following windows by entering a name for the project, selecting the root directory as the folder with the .mdl and .sdf files, naming the experiment, ensuring that the selected Platform/Device is the DS1104 R&D Controller Board, importing the previously generated .sdf file (it has the same name as the .mdl file built), and then clicking on *Finish*.
- A workspace with a blank layout should open. Note that a layout file (*hireltest.lay*) was previously downloaded. So, close the blank layout and click on the *Layouting* tab, then click on the *Import Layout* button and choose the layout file.
- In the dSPACE window, two numerical boxes should appear. The first box shows the voltage applied by the Hirel board (set by the user) and the second box shows the current measured by the sensor. There should also be a radio button block that allows you to start/stop the program on the DS1104 R&D platform. If needed, resize the window so that all the displays are visible.

CONNECTION TO THE HIREL BOARD:

- Connect the Hirel board to the dSPACE breakout box with the flat ribbon cable. Ensure that the layout is in the offline or STOP (radio button) mode while making all these connections.
- Connect the board to a dedicated 12V supply (with the round plug on the side of the board) and make sure that the sliding switch on the board is on.

- After setting a benchtop supply to 42V, turn it off, then connect it to the power inputs of the Hirel board using banana plugs and turn it on again.
- Connect the red lead of a DCM or DCG to connector A1 on the Hirel board using a banana cable and connect the black lead to the black (ground) lead of the 42V supply.
- Connect the BNC port of the current sensor for phase A1 on the Hirel board to ADCH1 on the dSPACE breakout box.

TESTING THE HIREL BOARD:

- Engage the ControlDesk layout by clicking on the '*Go Online*' button. Next, activate the program by clicking on the *'START'* radio button. Now the program is running on the platform. On the top box of the layout, raise the voltage applied to the motor to 6V. The motor should rotate and the current measurement on the second box of the layout should increase with the voltage. After testing channel A1, **bring the voltage to 0V and click on the *'STOP'* radio button to stop the program** before you change the connections to test the rest of the PWM outputs. You can check the other PWM outputs B1, C1, A2, B2, and C2 by moving the banana cable, as well as the current sensors by moving the BNC cable (there is no current sensor for the C phases) and following the same procedure. **Make sure that you never make/change the connections while the program is active and there are outputs at the PWM channels!**

SHUTTING DOWN:

- Bring the voltage command to zero.
- Turn-off the 42V supply and move the sliding switch for the 12V supply into the OFF position.
- Click on the *'STOP'* radio button.
- Click on the *Go Offline* button to disengage the ControlDesk layout. Close the dSPACE and the Matlab windows.

IN CASE OF FAILURE:

Please report the problem to the TA and, if confirmed, return the board to the stockroom with a tag.