AN1078 Demonstration ReadMe for the dsPICDEM™ MCLV Development Board

1.1 INTRODUCTION

This document describes the setup requirements for running Sensorless FOC with Slide Mode Controller, which is referenced in AN1078 *"Sensorless Field Oriented Control of PMSM Motors using dsPIC DSC"* with the dsPICDEM MCLV Development Board.

1.2 SUGGESTED DEMONSTRATION REQUIREMENTS

MPLAB and C30 versions used:

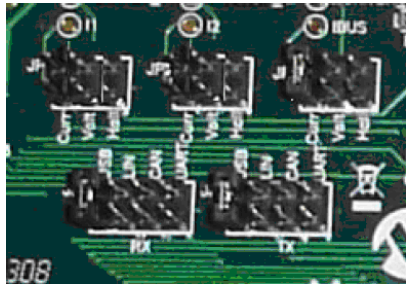- MPLAB version 8.36 (or later)
- C30 version v3.21 (or later)

Hardware used with part numbers:

- dsPICDEM MCLV Development Board (DM330021) available at www.microchipdirect.com
- dsPIC33FJ32MC204 PIM (MA330017) available at www.microchipdirect.com
- 24V 3-Phase BLDC Motor (AC300020) available at www.microchipdirect.com

1.3 HARDWARE SETUP

The following hardware setup allows the Sensorless FOC algorithm to run on the dsPICDEM MCLV Development Board.

1. With the dsPICDEM MCLV Development Board disconnected, and making sure there is no power, open the enclosure and set up the following jumpers:

Jumper	Pins to Short	Board Reference
JP1	Don't care	
JP2	Don't care	
JP3	Don't care	
JP4	USB position	
JP5	USB position	
J5	Don't care	
JP11	Don't care	

2. Connect the motor phases to output header J7. The winding color can be connected to M1, M2, and M3 in any order since it is a sensorless control algorithm. The green cable does not have an internal connection in the motor, so it can be left unconnected.

3. Connect a 24V power supply to the dsPICDEM MCLV Development Board, using the J2 connector.

4. Connect the programmer/debugger using the J11 connector.

5. For enhanced demonstration, the application requires the Real-Time Data Monitor (RTDM). Users can connect a mini-USB cable from a computer to the J8 connector of the dsPICDEM MCLV Development Board.

J8mini-USB connector

Notice that when the development board is powered and connected to the USB host for the first time, the driver needs to be installed on the host for proper operation.

a) Extract the `PC_USB_driver_for_win2k_xp_vista32_64.zip` archive file to a local directory. This file is part of the ZIP file of the code.

b) When prompted to select the driver for new USB device found, select the driver from the ones provided corresponding to the operating system used: Windows 2000, XP, or Vista (32- or 64-bit). Wait for the indication that the new device was installed properly and is ready to be used. Once the USB driver is installed, it will emulate a Serial COM Port, visible in the Windows Device Manager. A message indicating that the driver has not passed Windows logo certification may appear. Click **Continue Anyway**.

c) When the USB driver is installed, a new COM port should show up in Windows device hardware manager. This should be the COM port used for Enhanced Demonstration.

1.4   SOFTWARE SETUP AND RUN

1.4.1   Basic Demonstration

This demonstration consists of running the motor using a push button and varying the speed with a potentiometer.

1. Start MPLAB IDE and open the `PMSM.mcp` workspace.
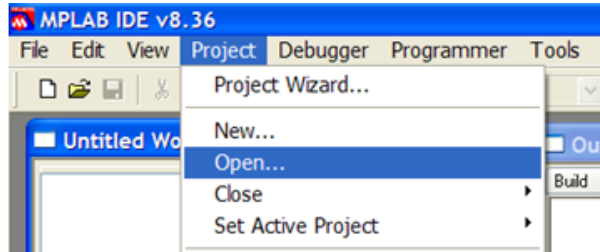
2. Make sure that DMCI_DEMO is not defined in the `UserParms.h` file. This allows the push button and the potentiometer to have control over starting and stopping the motor and its speed. If this is defined, the motor will not start until the proper procedure is followed for the DMCI demonstration. Refer to **Section 1.4.2 "Enhanced Demonstration Using Real-Time Data Monitor (RTDM) and Dynamic Monitor and Control Interface (DMCI)"** if the DMCI demonstration is required.

3. Select the programmer/debugger to be used. In this example, REAL ICE is selected.
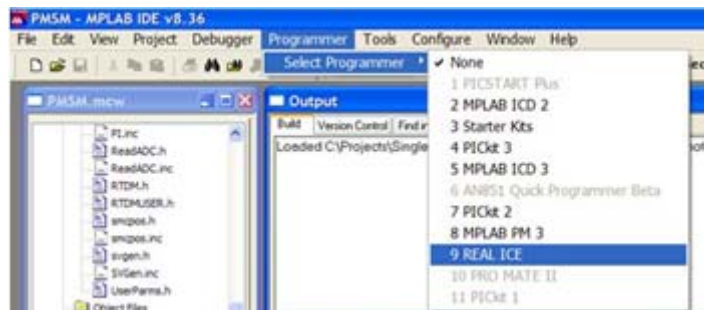
4. Build the code by selecting the **Release** mode from the drop-down list and clicking the **Build All** icon.

5. Download the code to the dsPICDEM MCLV Development Board.

6. Run or stop the motor by pressing the S2 push button. Pressing the push button doubles the speed of the motor.

7. Vary the motor speed using the potentiometer (labeled POT1).

1.4.2   Enhanced Demonstration Using Real-Time Data Monitor (RTDM) and Dynamic Monitor and Control Interface (DMCI)

1. Make sure you have the correct hardware setup as previously described in **Section 1.3 "Hardware Setup"**.

2. In order to utilize RTDM communication for this demonstration, a mini-USB connection is required. Connect a mini-USB cable from your computer to the J8 connector on the dsPICDEM MCLV Development Board, labeled USB.
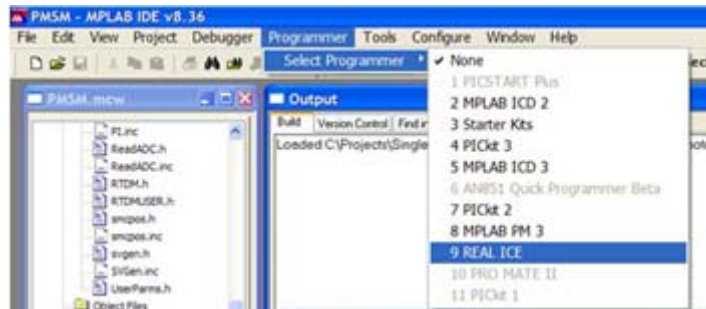

J8mini-USB connector

3. Start MPLAB IDE and open the PMSM.mcp workspace.

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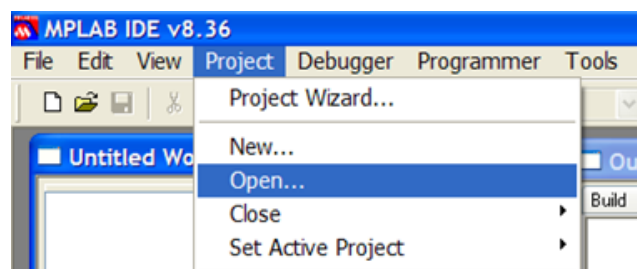
4. Make sure that DMCI_DEMO is defined in the `UserParms.h` file. This allows DMCI to have control over starting and stopping the motor and its speed. If this is not defined, the motor will not start until the S2 push button is pressed.

```
87    #define DMCI_DEMO    //
88                         //
89                         //
90                         //
```
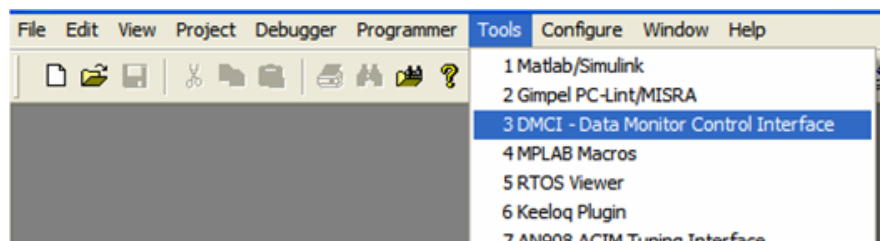
5. Select the programmer/debugger to be used.

6. Build the code by selecting the **Release** mode from the drop-down list and clicking the **Build All** icon.
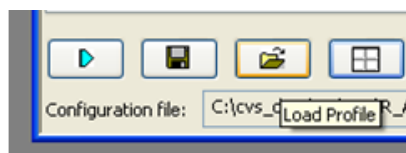
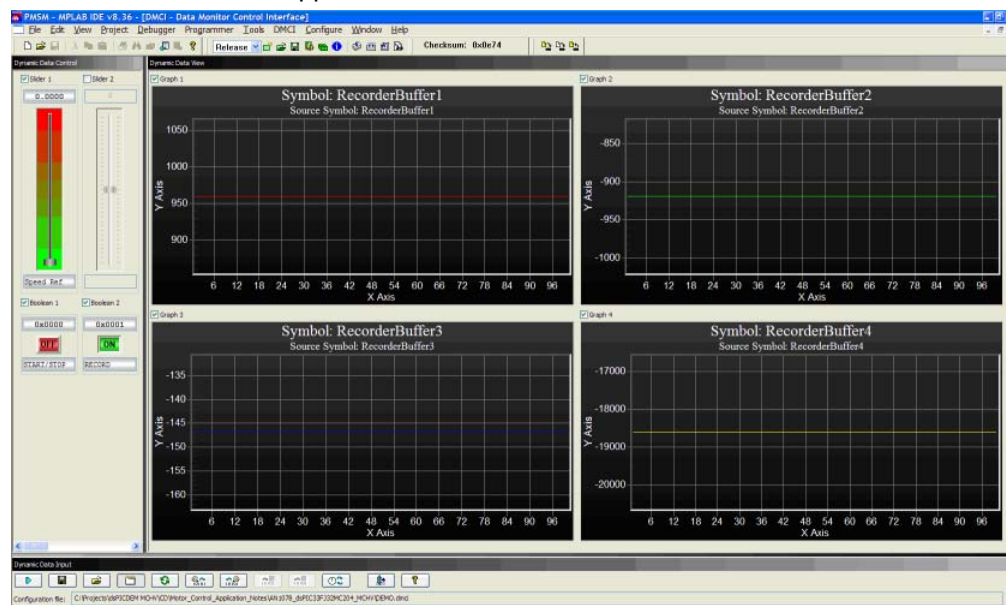7. Download the code to the dsPICDEM MCLV Development Board.

8. Open the DMCI window by selecting *Tools>DMCI – Data Monitor Control Interface*.

9. Click the **Load Profile** button, and from the same folder where your project resides, load the DEMO.dmci file, which contains a previously configured profile.
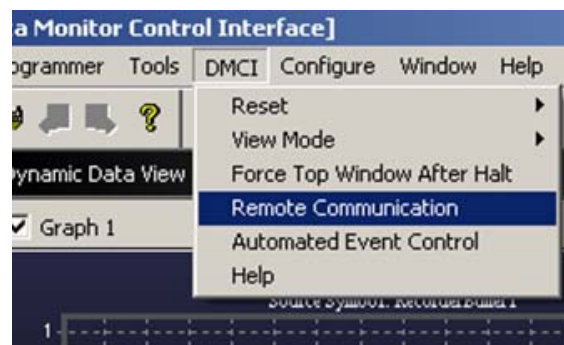

10. The DMCI window appears as follows:

Please consult the *"Real-Time Data Monitor User's Guide"* (DS70567) for additional settings needed for a RDTM connection. This document explains the steps needed for the proper communication settings between the Host and Embedded side.

11. Select *DMCI>Remote Communication* to connect RTDM with your computer.

12. The Remote Communication needs to be established, as indicated in the figure below (the communication baud rate should be set to 38400, while the COM port used depends on your particular settings).
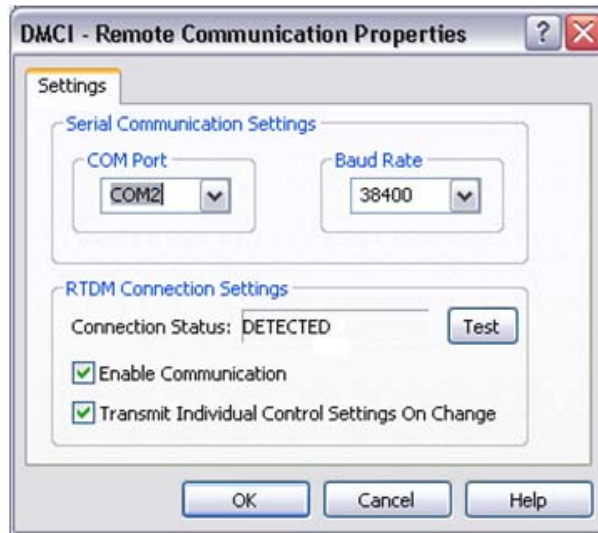
13. Once communication is detected, make sure the **Enable Communication** box is checked and click **OK**.

14. Press the "START/STOP" button from DMCI to start the motor at initial speed

15. Vary the speed of the motor by changing the value of the slider. Make sure to do this slowly, so that the speed controller has time to change the speed to a new set point
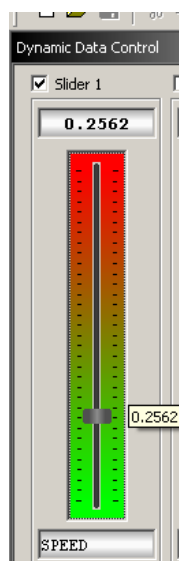
16. To plot variables in real time, enable Automated Event Control by clicking the DMCI button .

17. The DMCI window shows variables plotted in real time, which are updated automatically.