AN1017 Demonstration ReadMe for the dsPICDEM™ MCHV-2 Development Board with the dsPIC33EP256MC506 External Op Amp PIM (MPLAB 8)

1.1 INTRODUCTION

This document describes the setup requirements for running Sinusoidal PMSM Control, which is referenced in AN1017 *"Sinusoidal Control of PMSM Motors with dsPIC30F DSC"* with the dsPICDEM™ MCHV-2 Development Board.

1.2 SUGGESTED DEMONSTRATION REQUIREMENTS

MPLAB and C30 versions used:

- MPLAB version 8.84 (or later)
- C30 version 3.31 (or later)

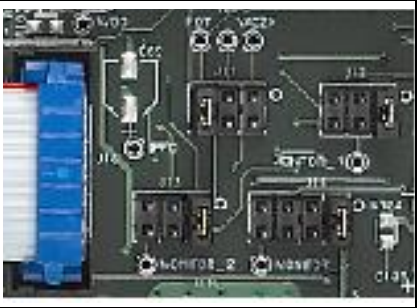
Hardware used with part numbers:

- dsPICDEM MCHV-2 Development Board (DM330023-2) available at www.microchipdirect.com
- dsPIC33EP256MC506 External Op Amp PIM (MA330031-2) available at www.microchipdirect.com
- 220V PMSM/BLDC (e.g., the 80-252140-220) available from www.eletechnic.com

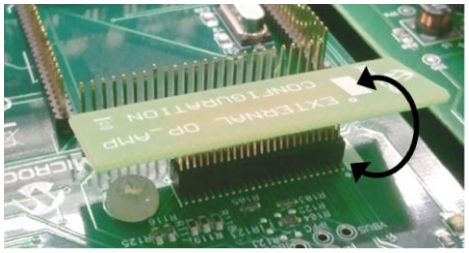
1.3 HARDWARE SETUP

The following hardware setup allows the Sinusoidal Control algorithm to run on the dsPICDEM MCHV-2 Development Board.

1. With the dsPICDEM MCHV-2 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
J11 (inside the enclosure)	Don't care	
J12 (inside the enclosure)	Don't care	
J13 (inside the enclosure)	Don't care	
J14 (inside the enclosure)	Don't care	
PWM OUTPUTS (front of the enclosure)	ENABLE position	

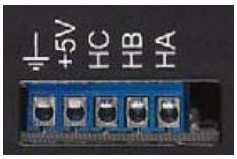
2. Connect the External Op Amp Configuration Matrix board to header J4.



3. Insert the PIM into U11 and connect the PMSM/BLDC Motor to the output header, as shown by the board reference in the following table.

Motor Cable	dsPICDEM MCHV-2 Connector Reference	Board Reference
Phase Blue	M1	
Phase Green	M2	
Phase Yellow	M3	

4. Connect the PMSM/BLDC motor Hall output to the Hall header, as shown by the board reference in the following table.

Motor Cable	dsPICDEM MCHV-2 Hall Sensor/QEI Connector Reference	Board Reference
Hall Green	HA	
Hall Blue	HB	
Hall Yellow	HC	
Hall Red	5V	
Hall Black	GND	

5. Secure the dsPICDEM MCHV-2 Development Board enclosure.
6. Connect dsPICDEM MCHV-2 Development Board to AC input (90 to 265 VAC).

7. Using a mini-USB cable, connect the computer to PROGRAM/DEBUG mini-USB connector located on the front panel of dsPICDEM MCHV-2 Development Board enclosure.

8. For enhanced demonstration, the application requires the Real-Time Data Monitor (RTDM). Users can connect a mini-USB cable from their computer to the J6 connector of the dsPICDEM MCHV-2 Development Board.

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**.

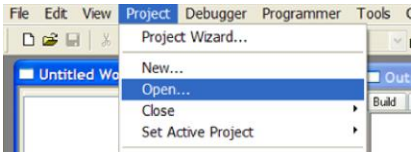
c) When the USB driver is installed, a new COM port should show up in Windows device hardware manager. This should be the COM port used for Enhanced Demonstration.

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. The software, which is available for download from the Microchip website, is already configured for enabling the basic demonstration.

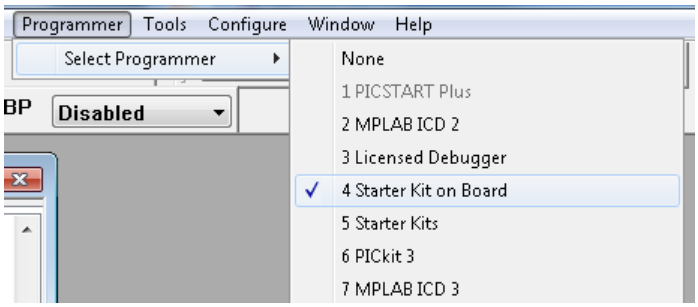
1. Start MPLAB IDE and open the `BLDC.mcp` workspace.



2. Make sure that `RTDM` is not defined in the `userdef.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 **Enhanced Demonstration Using Real-Time Data Monitor (**Rif the DMCI demonstration is required.

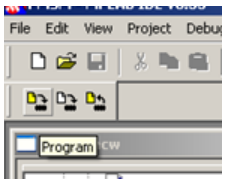
```
#undef RTDM     //
```

3. Select *Programmer>Starter Kit on Board*.



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 MCHV-2 Development Board.



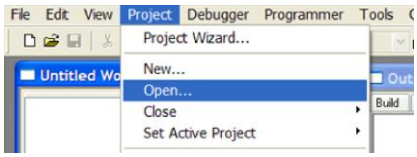
6. Run or stop the motor by pressing S1 (labeled PUSHBUTTON).

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

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

1. 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 J6 connector on the dsPICDEM MCHV-2 Development Board, labeled USB.

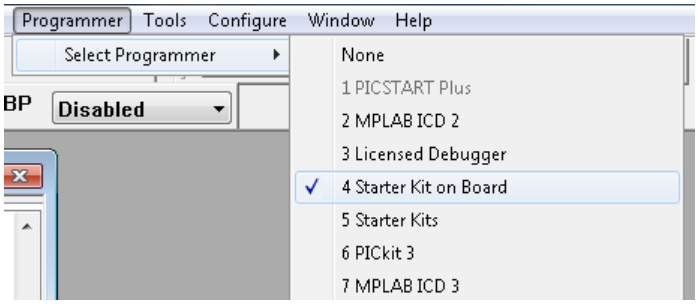
2. Start MPLAB IDE and open the `BLDC.mcp` workspace.



3. Make sure that `RTDM` is defined in the `userdef.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 S1 push button is pressed.

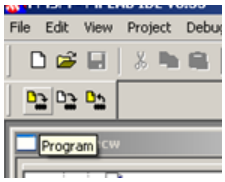
```
#define RTDM
```

4. Select *Select Programmer>Starter Kit on Board*.

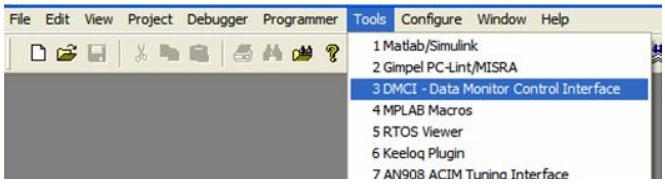


5. Build the code by selecting the **Release** mode from the drop-down list and clicking the **Build All** icon.

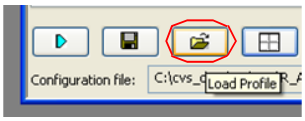
6. Download the code to the dsPICDEM MCHV-2 Development Board.



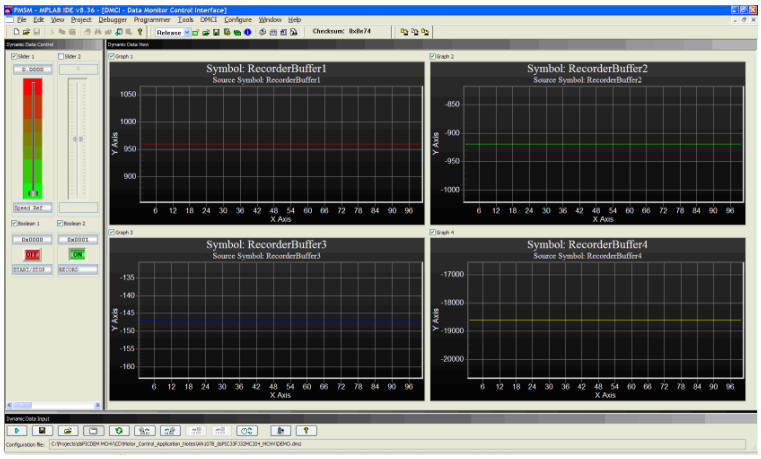
7. Open the DMCI window by selecting *Tools>DMCI – Data Monitor Control Interface*.



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

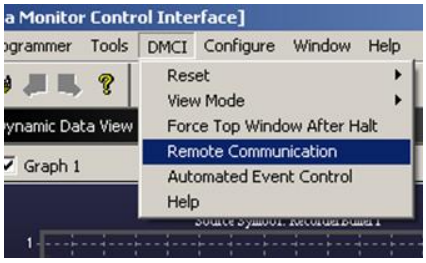


9. The DMCI window appears as follows:

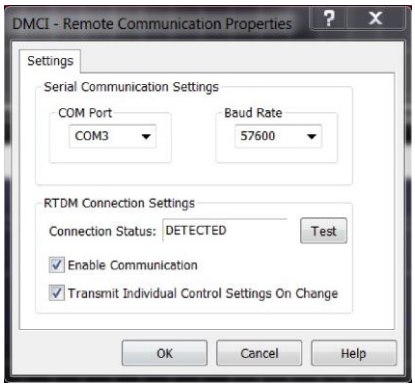


Please consult the *"Real-Time Data Monitor User's Guide"* (DS70567) for additional settings needed for a RDTM connection. This document explains the steps needed for the proper communication settings between the Host and Embedded side.

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

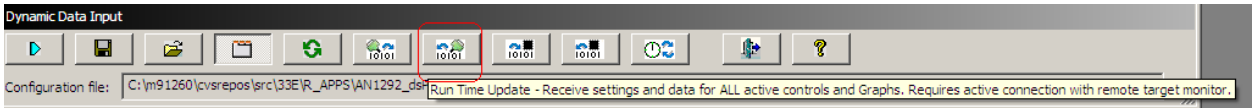


11. Remote Communication needs to be established, as indicated in the following figure (the communication baud rate should be set to 57600, while the COM port used depends on your particular settings).

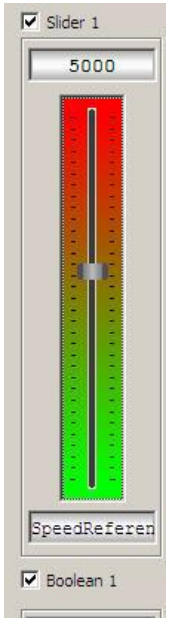


12. Once communication is detected, make sure the **Enable Communication** box is checked and click **OK**.

13. Click the Run Time Update icon in the DMCI window to use the initial setup that exists on the target device.



14. Using the SPEED slide control, adjust the value. Please note that both positive and negative speed values are available.



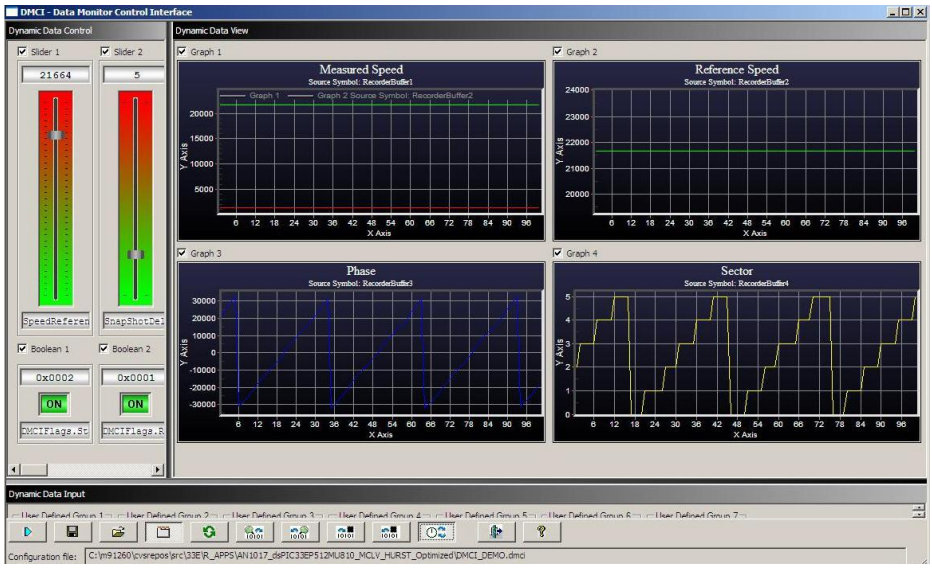
15. Press START/STOP in the DMCI window to start the motor at initial speed.

16. Vary the speed of the motor by changing the value of the slider. Be sure to do this slowly, so that the

speed controller has time to change the speed to a new set point

17. To plot variables in real time, enable Automated Event Control by clicking the DMCI icon.

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



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