# C2000 Teaching Materials



# **Route Map for C2000 CD**

#### 1. Contents

The CD contains 10 tutorials, which show how to use assembly language with the TMS320C2000 family. Each tutorial has its own questions and answers.

Also contained are some applications, which have been written in C for the TMS320LF2407 DSK.

Some simple add-on circuits are also included, which show how to interface to an audio signal, to produce pulse width modulation (PWM) outputs and to control DC and stepper motors.

The term TMS320F24x means that the examples given do not apply to TMS320LF2407, which uses a slightly different architecture.

#### Please Click on Selected Item to View

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1.	Tutorial 1	A first Program. Getting started with the assembler supplied		
		with the TMS320F243 DSK. A very simple assembly language		
		program.		
2.	Tutorial 2	Controlling the XF LED (specific to TMS320F24x). Instruction		
		cycles. Controlling the brightness of the XF LED.		
3.	Tutorial 3	Generating a Time Delay. do-while loop vs. while loop.		
4.	Tutorial 4	Using Direct Addressing (assembly language specific). Data		
		types. Memory mapping of device.		
5.	Tutorial 5	Using Input and Output ports. Logical operations (AND and		
		OR). Input ports, output ports, mixed input and output ports.		
6.	Tutorial 6	Analog to Digital Conversion (TMS320F24x specific).		
		Selecting the ADC channel. Circuit for connecting an external		
		potentiometer.		
7.	Tutorial 7	Indirect Addressing (assembly language specific). Differences		
		between direct and indirect addressing.		
8.	Tutorial 8	Multiplication (assembly language specific). Signed and		
		unsigned multiplication. Scaling the result of an analog to		
		digital conversion.		
9.	Tutorial 9	Using the General Purpose Timers. Setting the duty cycle		
		(PWM). Using a timer output as a digital to analog converter.		
		Using a timer to control an analog to digital conversion.		
10.	Tutorial 10	Storing Values in Buffers. Using straight buffers. Relationship		
		of buffers to the Z transform. Multiplication with accumulation.		
		Implementation of a Finite Impulse Response (FIR) filter for		
		the TMS320F243 using assembly language.		

Each application has the program code to run on the DSP. These can be found in the file named "applications" under the file named "code". Another window should be opened if you wish to compare the applications and the codes.

11.	Template	A basic project for the TMS320LF2407 DSK. Configures an analog-to-digital converter and generates a pulse width modulation (PWM) output.		
		D:\C2000 Teaching Materials\Applications\Code\Template		
12.	Application 1	Sine wave generation using C code for the TMS320LF2407 DSK. Uses table look-up method.		
		D:\C2000 Teaching Materials\Applications\Code\Sine		
13.	Application 2	Finite Impulse Response (FIR) filter using C code for the TMS320LF2407 DSK. Provides high pass, low pass and com-		
		filters. Also contains an assembly language version of a low-		
		pass filter, which interfaces to C code.		
		D:\C2000 Teaching Materials\Applications\Code\FIR		
14.	Application 3	Infinite Impulse Response (IIR) filter. Uses C code. For		
		TMS320LF2407 DSK.		
1.5	A 1: .: A	D:\C2000 Teaching Materials\Applications\Code\IIR		
15.	Application 4	Fast Fourier Transform (FFT) using C code. Uses interrupts to		
		control the calling of the FFT. Used with TMS320LF2407 DSK and produces PWM outputs.		
		DSK and produces F will outputs.  D:\C2000 Teaching Materials\Applications\Code\FFT		
16.	Application 5	Stepper Motor driver using the L293D motor driver chip with		
10.	Application 5	the TMS320LF2407 DSK. Bi-directional control using an		
		external potentiometer using C code.		
		D:\C2000 Teaching Materials\Applications\Code\Stepper		
17.	Application 6	DC Motor control using PWM with the TMS320LF2407 DSK		
		using C code. Measurement of supply voltage and current to		
		calculate power taken.		
		D:\C2000 Teaching Materials\Applications\Code\DCMotor		
18.	Reference	TMS320F/C240 DSP Controllers. Peripheral Library &		
	Documents	Specific Devices.		
		TMS320F243/F241 DSP Controllers.		
		TMs320F/C24x DSP Controllers. CPU and Instruction Set.		
		TMS320LF2407/F2406/F2402 DSP Controllers.		
		L293D Quadruple Half – H Driver.		
		OPA2337 CMOS Operational Amplifiers.		
10	Author profile	SLAA116 App on – PWM.  A profile of the author of the contents of this CD.		
19.	Author profile	A prome of the author of the contents of this CD.		

# Schematics can be found at the end of marked applications

Schematic 1	Simple add-on circuit to generate output waveforms for	Application 1
	the TMS320F243 DSK or the TMS320LF2407 DSK.	
Schematic 2	Audio interface add-on for the TMS320F243 DSK or	Application 2
	the TMS320LF2407 DSK.	Application 3
		Application 4
Schematic 3	Motor control add-on for the TMS320F243 DSK or the	Application 5
	TMS320LF2407 DSK.	Application 6

# Please use these next two sections (2 & 3) as a reference to help find your way around the CD ROM.

### 2. Selection by Application

#### **2.1 Sinewave Generation** D:\C2000 Teaching Materials\Applications\Code\Sine

Application 1 Schematic 1 SLAA116

#### **2.2** FIR Filter D:\C2000 Teaching Materials\Applications\Code\FIR

Tutorial 10. Application 2 Schematic 2

#### **2.3 IIR Filter** D:\C2000 Teaching Materials\Applications\Code\IRR

Application 3 Schematic 2

#### **2.4 FFT** D:\C2000 Teaching Materials\Applications\Code\FFT

Application 4 Schematic 2

#### **2.5 Stepper Motor** D:\C2000 Teaching Materials\Applications\Code\Stepper

Application 5 Schematic 3

#### **2.6 DC Motor** D:\C2000TeachingMaterials\Applications\Code\DCMotor

Application 6 Schematic 3

#### 3. How To Use...

Analog to Digital converter (TMS320F243) Tutorial 6

Analog to Digital converter (TMS320LF2407) Application 5 + Application 6 DC Motor control Application 6 + Schematic 3

Direct Addressing Tutorial 4
FIR using C Application 2

FIR using assembly language Tutorial 10 and Application 2

FFT Application 4
IIR filter Application 3
Indirect Addressing Tutorial 7
Input / Output ports Tutorial 5
Interrupts on TMS320LF2407 Application 4
Logical AND and OR Tutorial 5
Multiplication (assembly language) Tutorial 8

Multiplication with accumulation (assembly language) Tutorial 10

Set-up the General Purpose Timers Tutorial 9

Stepper Motor Control Template for TMS320LF2407 Time delays Application 5 + Schematic 3 Template Tutorial 3

## 4. Resource Library

Word documents of the tutorials, tutorial answers, and applications can be used for 'cut and paste' purposes. These can be found in the directory:

D:\C2000 Teaching Materials\Resource Library\Word Documents Sources

#### 5. Adobe Acrobat Reader

When Acrobat Reader is run from the CD, rather than from a copy installed on a local hard disk, Acrobat Reader's support files are not installed on the local hard disk. Therefore, some features may be missing or will not work. The full Adobe Reader V4.05 is contained on this CD-ROM, and it can be installed onto the local hard disk.

D:\C2000 Teaching Materials\Adobe Acrobat Reader\Adobe Reader.exe

To View Guide To CD Click Here



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 ${\it http://www.ti.com/sc/docs/general/dsp/programs/shareware/index.htm}$