306_ASC Supplement

Exercise Setup
(PCs, Dem Brds, …)

This presentation is closely related to the following 2005 Masters presentation:

• DAQ 972, "Cool Data Acquisition Applications (or how to interface the PIC16F68X to the Real World)"

This presentation put more emphasis on the firmware (F/W) and software (S/W) issues. Its goal was to show how to integrate several analog and PIC solutions together in one application: a data logger that collects temperature, humidity, and light data. It also includes a real time clock using a watch crystal and two SPI memory chips. It included code, description of subroutines, and coding practices information.

This presentation places the emphasis on the analog signal conditioning aspects of the same applications. It also pulls together information in AN990 (a bird's eye view of sensor applications), FilterLab® V2.0's User's Guide, and adds essential material.

The lab exercises will help show how the theory applies to real applications, and demonstrates the power of our modular demo board approach.

The PDF file for 306_ASC presentation are printed from this file; use the Notes View option on the print driver.

Display the presentation view on the screen.

Overview

- **This file helps the instructor organize the class**
  - Prior Preparations
    - Order Tools
    - Set class environment
      - Classroom Setup
      - Teaching Assistants
    - Handouts
      - Printed Handouts
      - CD-ROM

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Overview

- – Set up the Instructor's Table
  - Software for the PC
  - Demo Boards for Demonstrations
- – Set up the Students' Desks
  - Software for the PCs
  - Demo Boards
  - Firmware for the Demo Boards
  - Printed Handouts

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Most of the PC software and the PIC firmware are in common to the students' desks and the instructor's desk. The differences are:

• The PowerPoint files (*.ppt) are not for the students

• The 972 DAQ masters class files are not for the students

• The Answers to the Exercises are intended to be opened by the students after the class is done

Exercise Setup

Class Preparation

Allow plenty of time to obtain the tools. All of the demo boards are available through Dev. Tools; please order them directly through your sales assistant.

Order Class Tools

- **PICkit™ 1 Flash Starter Kit**
  - Order # DV164101
    - 1 for the instructor
    - 1 per student
  - Kit Contents
    - PCB
    - CD-ROM (v2.0 or later)
    - USB Cable

It is possible to search our website using the Order Numbers.

Order Class Tools

● **PICkit™ 2 Starter Kit**
  – Order # DV164120
    ● 1 for the instructor (for demo purposes only)
    ● (none for the students)
  – Kit Contents
    ● Programmer
    ● Demo Board
    ● CD-ROM
    ● USB Cable
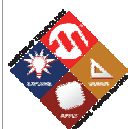 – PICkit™ 2 Microcontroller Programmer USER'S GUIDE (DS51553)

Only one is needed for the instructor. It is used to demonstrate that the Humidity Sensor board has the 6-pin header that connects to the PICkit 2.

The software to run any of these boards using the PICkit 2 has not been developed yet. Customers will need to develop their own software to make this happen if it is needed in the near future.

Order Class Tools

● **Signal Analysis PICtail™ Daughter Board**

    – Order # AC164120

       ● 1 for the instructor

       ● 1 per student

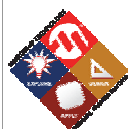   – Kit Contents

       ● PCB

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Order Class Tools

- **MCP6SX2 PGA Photodiode PICtail™ Demo Board**
  - Order # MCP6SX2DM-PCTLPD
    - 1 for the instructor
    - 1 per student
  - Kit Contents
    - PCB

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Order Class Tools

- **MCP6SX2 PGA Thermistor PICtail™ Demo Board**
  - Order # MCP6SX2DM-PCTLTH
    - 1 for the instructor
    - 1 per student
  - Kit Contents
    - PCB

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Order Class Tools

- **Humidity Sensor PICtail™ Demo Board**
  - Order # PIC16F690DM-PCTLHS
    - 1 for the instructor
    - 1 per student
  - Kit Contents
    - PCB

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Class Environment

- **Classroom Setup**
  - Maximum Class Size = 30 students
  - Instructor's Desk
    - 2 PCs
      - Show the Presentation on one
      - Show supplemental material on the other
        - `PICkit™ 1 Signal Analysis Software`
        - Lab Exercises
        - FilterLab
        - `capacitance.exe`
    - 2 Projectors
    - Demo Boards

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Class Environment

– Students' Desk
  - 1 PC per student
  - 1 set of demo boards per student
  - Install software on Master Hard Drive
    – To be mirrored onto the students' PCs

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Class Environment

- **Teaching Assistants**
  - Recommended # = 2 or 3 (for 30 students)
  - Help set up class
    - 2 to 3 hours the first time
    - ½ to 1 hours the other times
  - Help Students
    - Answer individual questions
    - Debug lab problems
  - Help tear class down
    - ½ to 1 hours

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Handouts

- **Printed Handouts**
  - 1 printed Exercise Handout per student
- **Student CD-ROM**
  - 1 PDF file of the Exercise Handout
  - 1 PDF file of the Exercises' Answers
    - Do not let students see this file before the end of class

306_ASC   Slide   14

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Exercise Setup

**PCs and
Demo Boards**

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Demo Board & PC Setup

- ## Demo Boards Setup for Exercises 1- 4
  - PICkit™ 1 Flash Starter Kit
    - Review the PICkit™ 1 Flash Starter Kit User's Guide (DS40051)
    - Remove PIC from EVALUATION SOCKET on the PICkit™ 1 Flash Starter Kit's board
    - Connect to PC using USB cable
    - Make sure the PIC16C745 (U1) has the correct firmware version (2.0.2 or later)
    - Install the `PICkit™ 1 Signal Analysis Software` on your PC
      - Comes on the PICkit™ 1 Flash Starter Kit CD-ROM (v2.0 or later)
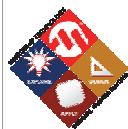
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Demo Board & PC Setup

- Signal Analysis PICtail™ Daughter Board
  - Review Chapters 1 and 2 of the Signal Analysis PICtail™ Daughter Board User's Guide (DS51476)
  - Connect to the PICkit™ 1 Flash Starter Kit board's 14-pin socket J3
    - See Signal Analysis PICtail™ Daughter Board User's Guide for a detailed picture
  - Install PIC firmware file
    - Open the `PICkit™ 1 Signal Analysis` program
    - Open the `PICA2Dlab.hex` file (File → Import Hex)
    - Install the file on the Signal Analysis PICtail™ Daughter Board's PIC™
      - Use the Write Device button

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Demo Board & PC Setup

- MCP6SX2 PGA Photodiode PICtail™ Demo Board
  - Review Chapters 1 and 2 of the Photodiode PGA PICtail™ Daughter Board User's Guide (DS51514)
  - Connect to the Signal Analysis PICtail™ Daughter Board's 14-pin socket J1
    - See Photodiode PGA PICtail™ Daughter Board User's Guide for a detailed picture
  - See Lab # 2 Handout for more details

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Demo Board & PC Setup

- MCP6SX2 PGA Thermistor PICtail™ Demo Board
  - Review Chapters 1 and 2 of the MCP6SX2 PGA Thermistor PICtail™ Demo Board User's Guide (DS51517)
  - Connect to the Signal Analysis PICtail™ Daughter Board's 14-pin socket J1
    - See MCP6SX2 PGA Thermistor PICtail™ Demo Board User's Guide for a detailed picture
  - See Lab # 3 Handout for more details

There are additional PIC files discussed in AN897; *do not use them* in this class:

- `Therm_PGA1.hex`
- `Therm_PGA2.hex`

Demo Board & PC Setup

- Humidity Sensor PICtail™ Demo Board
  - Review Chapters 1 and 2 of the Humidity Sensor PICtail™ Demo Board User's Guide (DS51594)
  - Connect to the PICkit™ 1 Flash Starter Kit board's 14-pin socket J3
    - See Humidity Sensor PICtail™ Demo Board User's Guide for a detailed picture
  - You might need to re-install the firmware for the PIC on the Humidity Sensor PICtail™ Demo Board
    - File = `00084R1.hex`
  - Install the `capacitance.exe` PC program
    - Install using `AN1016 install.exe`
  - See Lab # 4 Handout for more details

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Demo Board & PC Setup

- **Demo Boards for Instructor Only**
  - PICkit™ 2 Starter Kit
    - Order # DV164120
      - 1 for the instructor (for demo purposes only)
      - (none for the students)
    - Kit Contents
      - Programmer
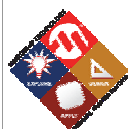   - Demo Board
      - CD-ROM
      - USB Cable

No installation or use is needed. It is intended to show the newest low cost programmer, and should be discussed when doing the humidity sensor Exercise (# 4).

If desired, you may review the PICkit™ 2 Microcontroller Programmer USER'S GUIDE.

Demo Board & PC Setup

- DAQ-1 Printed Circuit Board
  - Presented in the 2005 Masters Class
    - DAQ 972, "Cool Data Acquisition Applications (or how to interface the PIC16F68X to the Real World)"
    - Files included in the folder
      `972 DAQ Presentation Handouts.zip`
  - Unavailable (a prototype board only)
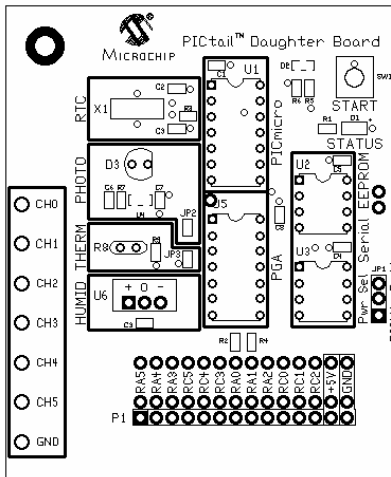
It must be emphasized that this board is not available– even internal to Microchip. Please don't even ask.

If desired, this board plot can be used to show what the DAQ-1 board looked like. The key point to discuss is that the humidity sensor is a different one than shown in 306_ASC. Its information was included in the presentation as a way to validate the data logger graphs (time, temperature, humidity, and light intensity) taken in the preparer's fridge. In other words, the prototype board is real, but no production run was every made.

Handouts

- **Student Handouts**
  - Printed Exercise Handouts
  - CD-ROM
    - 1 PDF file of the Exercise Handout
    - 1 PDF file of the Exercises' Answers
      - Do not let students see this file before the end of class

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