C6713 DSK Overview

- Texas Instruments TMS320C6713 *floating point* DSP running at 225 MHz
- AIC23 stereo codec (ADC and DAC)
  - Ideal for audio applications
  - 8-96 kHz sample rates
  - Line in/out (we use these most of the time)
  - Microphone in
  - Headphone out
- Memory
  - 16 MB dynamic RAM
  - 512 kB nonvolatile FLASH memory
- General purpose I/O
  - 4 LEDs
  - 4 DIP switches
- USB interface to PC
C6713 DSK Functional Block Diagram

Figure 1-1, Block Diagram C6713 DSK
C6713 DSK Physical Layout

- Microphone input
- Line input (stereo)
- Line output (stereo)
- Headphone output (stereo)
- Codec
- CPLD
- 16MB SDRAM
- Flash memory
- DSP 225MHz
- FPGA
- DC power input
- USB port
- DIP switches
- LEDs
- Reset switch
Is my DSK working?

DSK Power On Self Test

- Power up DSK and watch LEDs
- Power On Self Test (POST) program stored in FLASH memory automatically executes
- POST takes 10-15 seconds to complete
- All DSK subsystems are automatically tested
- During POST, a 1kHz sinusoid is output from the AIC23 codec for 1 second
  - Listen with headphones or watch on oscilloscope
- If POST is successful, all four LEDs blink 3 times and then remain on
Is my DSK working?

DSK Diagnostic Utility

press start

start

ok!
Useful TI documentation (available online or on your hard drive):
SPRU509F.PDF  CCS v3.1 IDE Getting Started Guide
C6713DSK.HLP  C6713 DSK specific help material

Note that we will be using CCS v3.1.
Code Composer Studio IDE

- Connect power supply to DSK
- Wait for POST to complete
- Connect USB cable from PC to DSK
  - If this is the first time connecting the DSK, you may be asked to install a driver. The driver is on the Code Composer Studio CD and will automatically be found by Windows if the CD is in the drive.
- Launch Code Composer Studio C6713 DSK
- CCS will load and wait for your input
Code Composer Studio IDE
Connecting to the C6713 DSK

The target is now connected.
Opening an Existing Project

Select a .PJT file and press “Open”. You have several example projects on the CD included in your Kehtarnavaz textbook. There are also lots of example projects in these locations:
c:\CCStudio_v3.1\myprojects\c:\CCStudio_v3.1\examples\dsk6713
Compiling/Building a Project

Project->Build (F7)
Loading and Running a Project on the C6713 DSK

File-> Load Program (ctrl+L)

Select the .out file in the project\Debug directory. Program is sent to DSK.

Debug->Run (F5 or the Run button)

WPI
Halting a Running Program on the C6713 DSK

Debug->Halt (shift+F5 or the Halt button).
Fixing Some Problems with Example Projects

- During compilation, the compiler can’t find some header (.h) files?
  - Fix: Add an item to the CCS search path.

- During compilation, the linker can’t find some libraries?
  - Fix: Remove hard links to libraries and add libraries manually to the project.

- During compilation, you get warnings about “far calls” to data?
  - Fix: Set the memory model to “data=far”
Tip: Fixing the search path

Add `C:\CCStudio_v3.1\C6000\dsk6713\include` to the search path

Project ->
Build Options ->
[Compiler tab] ->
[Preprocessor category]
**Tip: Removing Hard Links to Libraries**

Problem is caused by a bad path for the include libraries in the linker options (Project -> Build Options -> Linker tab)

A fix for this is to remove rts6700.lib, DSK6713bsl.lib, and csl6713.lib from the linker options and add these files manually (Project -> Add files to Project...)

C:\CCStudio_v3.1\c6000\cgtools\lib\rts6700.lib
C:\CCStudio_v3.1\c6000\csl\lib\csl6713.lib
C:\CCStudio_v3.1\c6000\dsk6713\lib\dsk6713bsl.lib

Or you can add the appropriate directories to the library search path.
Tip: Fixing the memory model

Change the memory model to “data=far”

Project ->
Build Options ->
[Compiler tab] ->
[Advanced category]
Optional: Suppress Linker Warnings

Project->Build Options
[linker tab]

In the Advanced category, uncheck “warn about output sections”.

Alternatively, put values for stack and heap in the Basic category.
Creating a New Project (1 of 5)

1. Create new project

   Project-&gt;New

   ![Project Creation Window]

   - **Project Name:** helloworld
   - **Location:** C:\CCStudio_v3.1\MyProjects\helloworld
   - **Project Type:** Executable (.out)
   - **Target:** TMS320C67XX

   ![Finish Button]
Creating a New Project (2 of 5)

2. Write your C code:
   File->New->Source File

3. Save it in your project directory (make sure it has a .c extension):
   File->Save

4. Add your C code to the project:
   Project->Add Files to Project
Creating a new project (3 of 5)

5. Add required support files to project
   Project->Add Files to Project
   a) myprojects\support\c6713dsk.cmd
      [linker command file – this or another cmd file is required]
   b) c6000\cgtools\lib\rts6700.lib
      [run-time support library functions - required]

6. Add optional support files to project, e.g.
   Project->Add Files to Project
   a) myprojects\support\vectors_poll.asm or vectors_intr.asm
      [used to set up interrupt vectors]
   b) c6000\dsk6713\lib\dsk6713bsl.lib
      [DSK board support library functions – useful for interfacing
to the codec, DIP switches, and LEDs]
   c) c6000\csl\lib\csl6713.lib
      [chip support library functions]
Creating a New Project (4 of 5)

7. Set up the build options for C6713:
   - Project -> Build Options (compiler tab)
   - Make sure target version is C671x
   - Also make sure Opt(imization) Level is “none” - this will help with debugging
8. Scan all file dependencies to automatically bring all header files and includes into the project:
   Project -> Scan all file dependencies

9. Build the project:
   Project -> Build

10. If successful, load the .out file to the DSK:
    File -> Load Program
    Select the Debug directory. Select the .out file.

11. Run it:
    Debug -> Run or F5 or the run button.
Useful Reference Material

- Kehtarnavaz Chapter 4
- Kehtarnavaz CD with example projects
- Other example projects installed with CCS
- CCS Help system
- SPRU509F.PDFCCS v3.1 IDE Getting Started Guide
- C6713DSK.HLPC6713 DSK specific help material
- Spectrum Digital TMS320C6713 DSK reference