Checkpoint 3

Playing Music from your Xilinx Board

Converting a bi-phase encoded bit stream into a format that a dual channel digital to analog converter can recognize

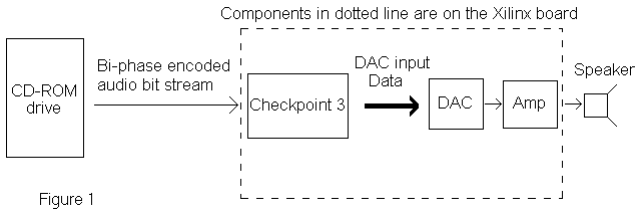

Figure 1

Inputs and Outputs

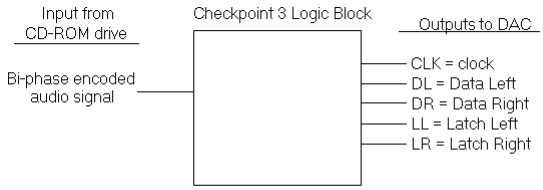

Figure 2 - Graphical representation of inputs and outputs

Note: Your logic block also uses an internal clock

Bi-Phase Encoding

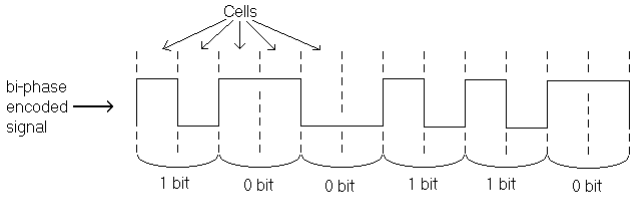

Figure 3

- Bi-phase encoded stream is composed of cells
- Every 2 cells represents 1 data bit

Frames

Figure 6

- 16 bit audio samples sent in frames
- Assume garbage bits are sent between frames

Preambles

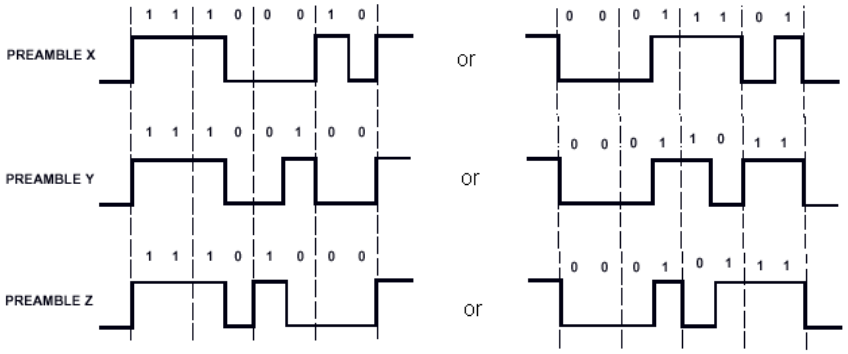

Figure 4

- 3 kinds of preambles
- Each has 8 cells
- Each has two representations

What do the different preambles mean?

	BIPHASE PATTERNS	CHANNEL
X	11100010 OR 00011101	LEFT
Y	11100100 OR 00011011	RIGHT
Z	11101000 OR 00010111	LEFT

Figure 5

- The preamble tells you which channel the audio sample is for
- Left and right channels for stereo sound

How to extract audio samples

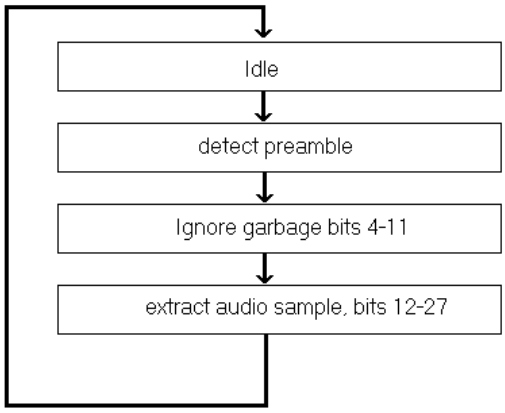

Figure 7

A Minor Complication…

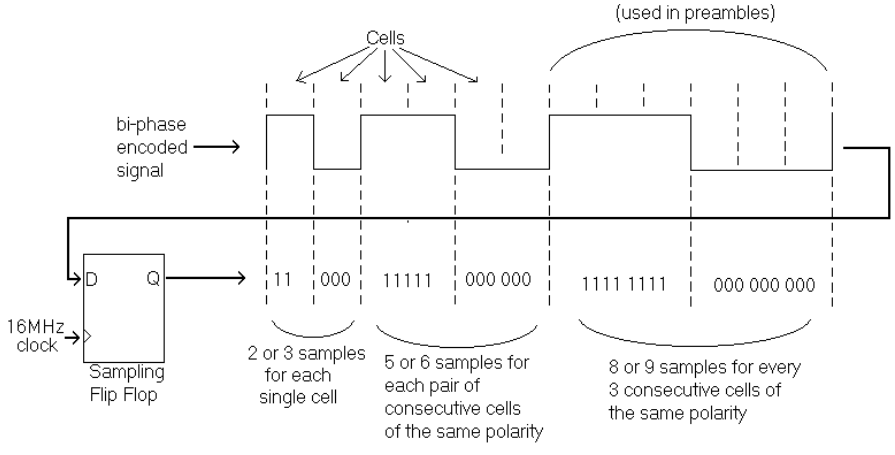

Figure 8

(Use an IFDI latch to sample the bi-phase encoded stream)

How do we make a cell stream from a sampled bi-phase encoded stream?

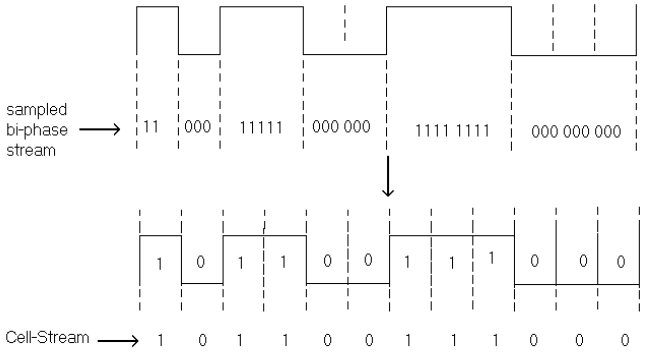

Figure 9

- 2-3 samples of the same polarity = 1 cell
- 4-5 samples of the same polarity = 2 cells
- 8-9 samples of the same polarity = 3 cells

Outputting to the DAC

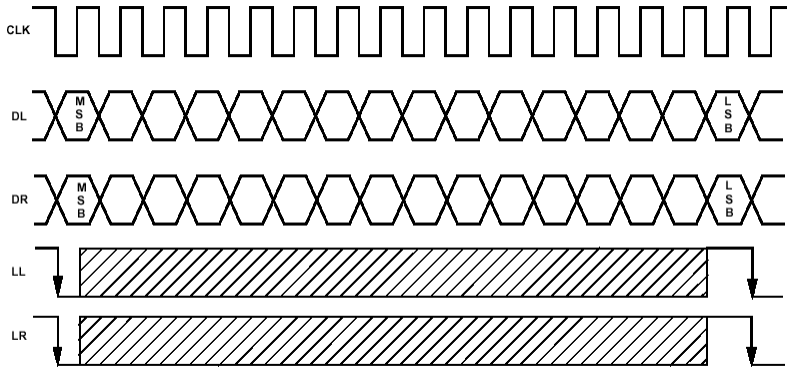

Figure 10

•Data is serially sent on the DL and DR data lines

•When the DAC it detects a falling edge on the LL or LR control lines, it latches onto the most recent 16 bits received

How to create the LL and LR pulses

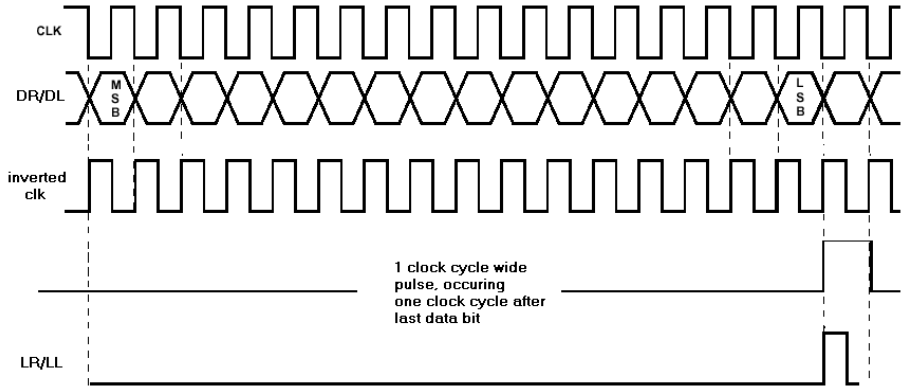

Figure 11

AND an inverted clock with a 1 clock cycle wide pulse occuring 1 clock cycle after the last data bit

Wire wrapping

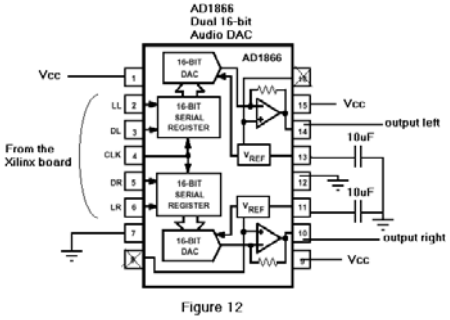

Figure 12

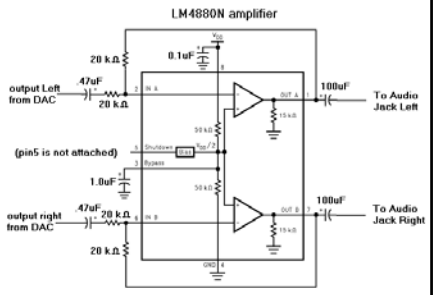

Figure 13

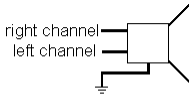

Figure 15- wire wrapping the audio jack

pin	function
61	DR
62	DL
68	LR
69	LL
78	CLK
79	input from CD-ROM

Figure 14 - Checkpoint 3 pinouts

Make sure you pick up 2 capacitor/resistor discrete packs

Extra Credit

- Turned in 2 weeks early (11/2/01) = 120%
- Turned in 1 week early (11/9/01) = 110%
- Turned in on time (11/16/01) = 100%
- Turned in 1 week late (11/23/01) = 50%

Tips

• Start early. Go for some extra credit, but don't burn yourself out. You should probably spend time in other classes too.

•Simulate all you logic using script files.

•Understand the checkpoint. Read this specification several times. If you need more clarification, please refer to the data sheets or ask me questions.

• **USE SCRIPT FILES!!!!!!**