

# HOMEWORK ASSIGNMENT #4

**Due Date: Tuesday, March 31, 1997**

*Include your name and student ID on homework.*

- Create a **synthesizable** Morse Code decoder that accepts a stream of high and low pulses (known as a *dit-dah* pattern) and outputs a stream of ASCII characters that corresponds to a translation of the input data stream.
  - Create a stimulus module that reads a text file consisting of a stream of '.' (dot), '-' (dash) and ' ' (space) *characters* and converts them into a string of *std\_logic* '0's and '1's with the correct timing to feed your morse code generator, along with a 92.3 msec clock.
  - Create a testbench entity/architecture pair that instantiates your decoder module along with your stimulus module.
- ◊ Turn in your **code** for the Testbench module, the Stimulus module, and your Morse Code reader module. (HARDCOPY AND E-MAIL)
  - ◊ Turn in the **synthesis report** file for your decoder module (target a C3751 device). (E-MAIL ONLY)
  - ◊ Turn in a **simulation waveform** (HARDCOPY)

**Design Details**

Morse Code is a dot-dash pattern for ASCII characters (see accompanying Table.)

The timing of the various *dit-dah* pulses is:

- A dot '.' is a 92.3 millisecond high pulse (1 "count").
  - A dash '-' is a 276.9 millisecond high pulse (3 "counts").
  - A 92.3 millisecond low gap separates each dot and/or dash within an alphabetic character (*intra-character spacing* -- 1 "count").
  - A 276.9 millisecond low gap separates each alphabetic character (*inter-character spacing* -- 3 "counts").
  - A 646.1 millisecond low gap separates each word (*inter-word spacing* -- 7 "counts").
- A *std\_logic* 92.3 msec clock, *clkIn*
  - A *std\_logic* dit-dah stream, *dataIn*
  - A 8-bit *std\_logic\_vector* output, *charOut* where the *charOut* is the 8-bit ASCII code for the decoded letter (decimal 65 = 'A' thru decimal 90 = 'Z')
  - A *std\_logic* output flag, *validOut*, which is true for one "count" for each *charOut*

**What Is Provided**

A sample data file with an input *dit-dah* pattern. (Create your own for testing, also.)

File: */home/clark/class/morse.dat*

**Morse Code Dit-Dah Patterns**

Char	Pattern	Char	Pattern	Char	Pattern
A	.-	J	.---	S	...
B	-...	K	-.-	T	-
C	-.-.	L	..--	U	..-
D	-..	M	--	V	...-
E	.	N	-.	W	..--
F	..-.	O	---	X	-.-.
G	--.	P	..--.	Y	-.-.
H	....	Q	---.	Z	---..
I	..	R	.-.		

