Design methodology:

Part 2)

In this section the digital signal processor is required to produce a sine wave and a cosine wave. This must be performed using the look up table in section 1 to produce the sine wave function. Instead of using another table for a cosine function, it is known using trigonometric identities that cos(x) = sin (x – π/2). This will allow the DSP processor to save on memory of the unit. Next issue to deal with is to determine shift to be applied sine function. Since the sine function has a period of 2 π, a phase shift of π/2 is a quarter of the period. By taking the sine function index and shifting the index a head by a quarter of the table’s length will produce the cosine function. Finally, to ensure the cosine function is produced smoothly, the cosine function will need its own index variable and modulus function to prevent the cosine from overflowing.

Part 3)

In this section the Digital signal processor will produce an amplitude modulated signal from 2 sine functions. Since the digital signal processing operates at 16 KHz and Nyquist rate requires a sampling rate of double the bandwidth, the largest frequency of the carrier is 8 KHz. Since the message must have a smaller frequency then the carrier frequency, the largest frequency of the message can have is 400 Hz. During the operation of this program there will be two gel sliders that will alter the carrier frequency, to change the signal to the appropriate station for broadcast, and the modulation index, which will ensure the integrity of the message. The message is calculated with the following formula Yam(T) = C(T) + AmM(T)C(T). The modulation index is calculated using the following equation M = Am/Ac.

* Yam(T) =Modulated AM signal.
* C(T) = Carrier Signal.
* Am = Message amplitude.
* M(T) = message signal.