

## I. Introduction

Use the double side band suppressed carrier (DSB-SC) modulation scheme to send a single frequency signal via a communication channel. Next, using DSB-SC demodulator recover the original signal with minimum amount of distortion.

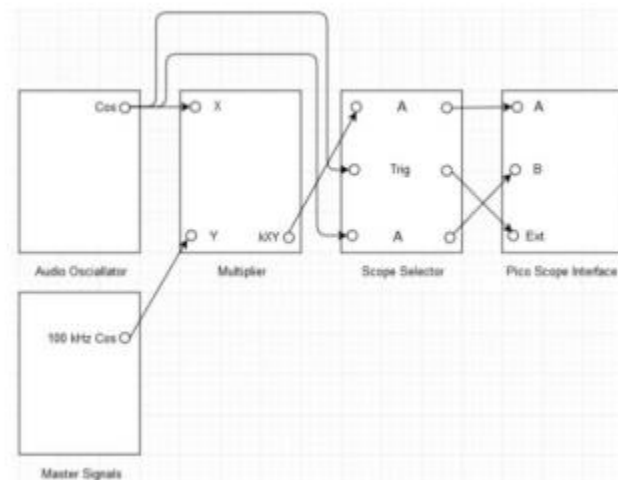
## II. Theory

The double side band suppressed carrier modulation scheme upconverts the message signal to desired higher frequency. Hence, multiple message signals can be sent without them overlapping in frequency spectrum. Mathematically, this modulation scheme can be expressed

$$s(t) = A_c \cos(2\pi f_c t) m(t) \quad [1]$$

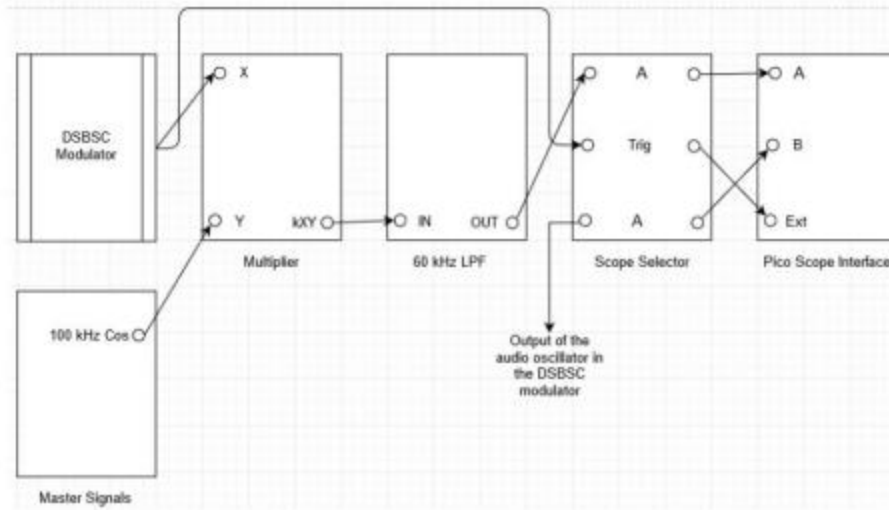
The modulated signal is  $s(t)$ , the message signal is  $m(t)$ , the modulation frequency is  $f_c$  and the amplitude of the carrier signal is  $A_c$ . The demodulation is performed by multiplying the modulated signal by the carrier signal and sending the product thru the low pass filter.

## III. Methodology



**Figure 1** DSB-SC modulator

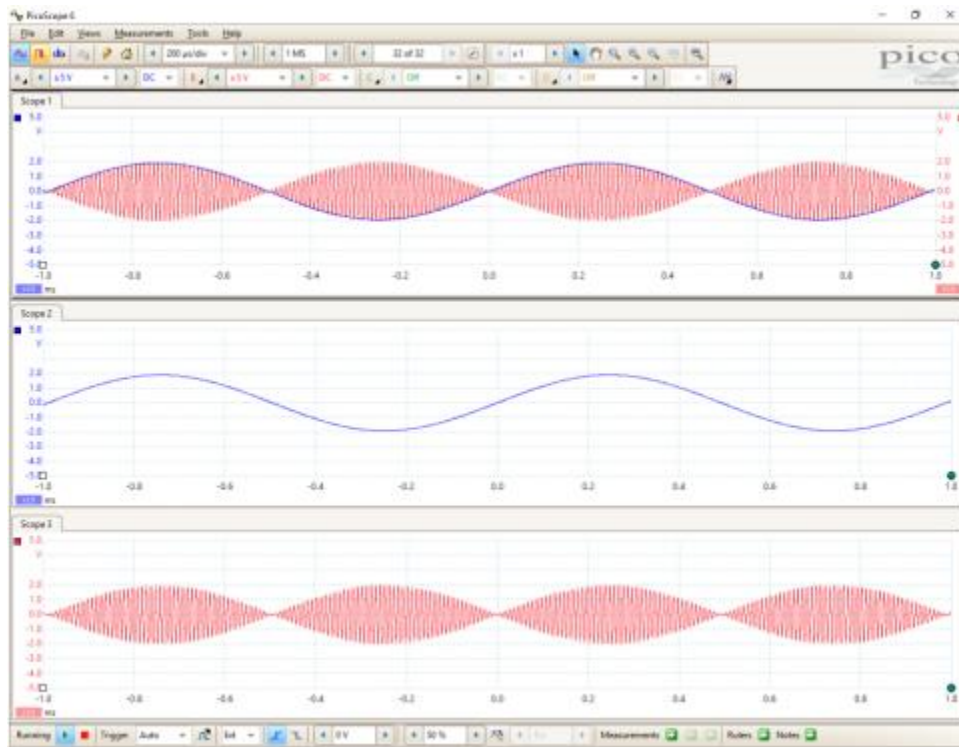
The DSB-SC modulator is built as shown in Figure 1. The message signal is used as a cosine wave at 1kHz frequency. The multiplier module's front panel switch is set to DC. The modulated signal is acquired via a Pico-scope and its trace is captured along with the message signal. Next, the demodulator is realized as shown in Figure 2.



**Figure 2** DSB-SC demodulator

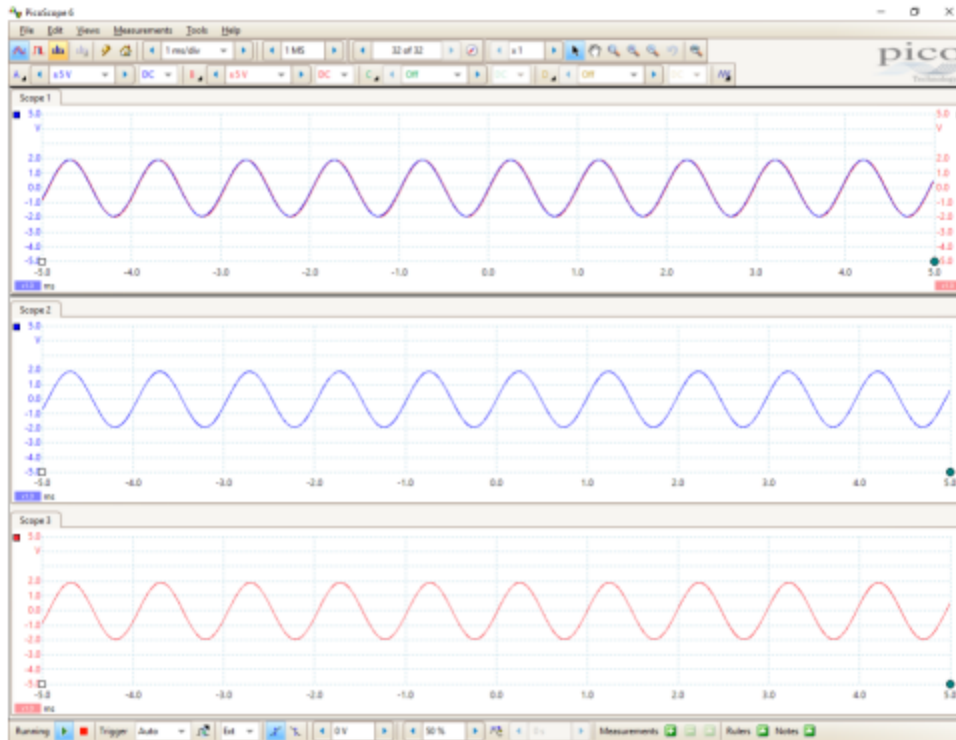
The demodulated signal is captured for the comparison purposes.

#### IV. Discussion & Results



**Figure 3** DSB-SC modulated signal with the message signal

Figure 3 shows DSB-SC carrier signal that is in red and the message signal which is in blue.



**Figure 4** DSB-SC de-modulated signal with the message signal

Next, Figure 4 represents the de-modulated signal in red and the message signal in blue. The top scope in Figure 4 shows that the message is overlapping with the demodulated signal. Hence, the original signal was recovered with minimum distortion via the DSB-SC demodulation scheme.

## V. Conclusion

The goal of the lab was to modulate the signal using DSB-SC scheme and use the DSB-SC demodulator to recover the original signal. The original signal was recovered with minimum distortion showing that DSB-SC scheme can be used to transmit and recover signals. During this lab a few faulty modules were identified. They were replaced with new ones.