DSBSC -- Overview

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OBJECTIVES:

At the end of performing this experiment, learners would be able to:
• Describe the concept of Double Sideband Suppressed Carrier modulation
• Obtain the DSBSC from given input
• Understand the working of LF398 IC (sample-and-hold circuit)
• Understand the working of µA 741 IC

EQUIPMENT:

• IC LF398
• IC µA 741
• Signal generator
• Resistors – 47 kΩ, 1 kΩ
• Capacitor – 0.01 µF
• Decade inductance box
• +/- 15V DC Power Supply
• Digital Storage Oscilloscope & probes
• Connecting wires & Bread Board

DESIGN OF BPF :

$f = 1/(2\pi\sqrt{LC})$
f = 30kHz
L = ?
let C= 0.01µF

L= 2.18mH

THEORY:

• LF398 is a monolithic sample-and-hold circuit utilizing BI-FET technology for accurate fast acquisition of input signal.

• A sample and hold circuit is an analog device that samples (captures) the voltage of a continuously varying analog signal and holds (locks) its value at a constant level for a specified minimum period of time (hold time). They are typically used in analog-to-digital converters to eliminate variations in input signal that can

corrupt the conversion process.

• DSBSC Modulation carrier component is suppressed from the modulated wave resulting in Double Sideband Suppressed Carrier modulation

Reference reading:

B Kanmani, “Some applications of the combination: LM-741 and LF - 398”, WASET CESSE 2009: International conference on Computer, Electrical and Systems science and Engineering, Rome, 28th-30thApril, Italy, 2009.Volume 52, April 2009, ISSN: 2070-3724, pages 335-340.

Acknowledgement

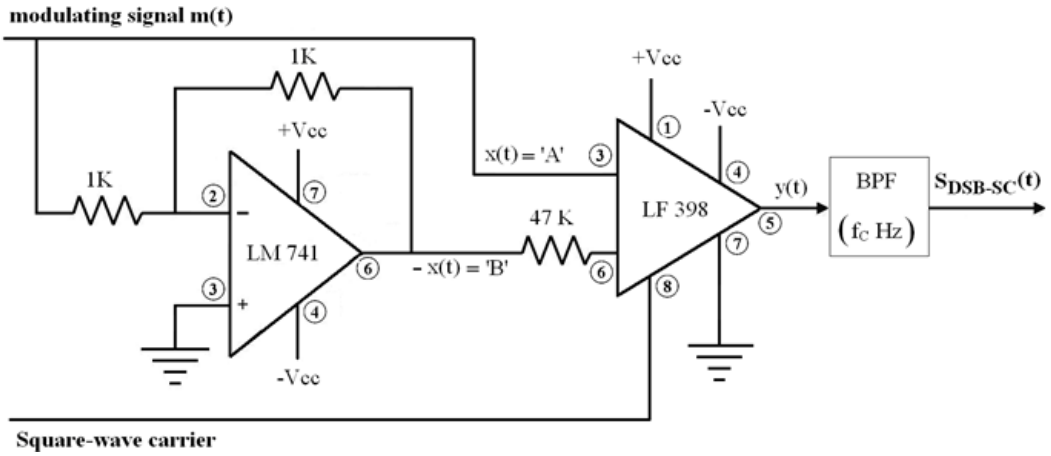
Mr.Shreenivas B for converting laboratory experiment to Tektronix courseware format

DSBSC -- Procedures

Step 1

Circuit setup:

Build the following circuit with given component values



Step 2

• Use a signal generator to generate modulating signal m(t) (sine wave of 5kHz for example) and carrier frequency (square wave signal).

• Design the BPF for the carrier frequency of 30kHz

• Turn on the supply of the circuit and enable signal generator that is feeding signal to the circuit.

• Tune the circuit, by varying the carrier frequency so that output of the BPF is maximum

• The modulating signal will be set to 5 kHz Sine wave

Step 3

• Connect the DSO probe – CH1 at modulating input (pin # 3 of LF398 IC), CH2 at carrier input (pin # 8 of LF398 IC), CH3 at (pin # 6 of µA 741 IC) and CH4 at output

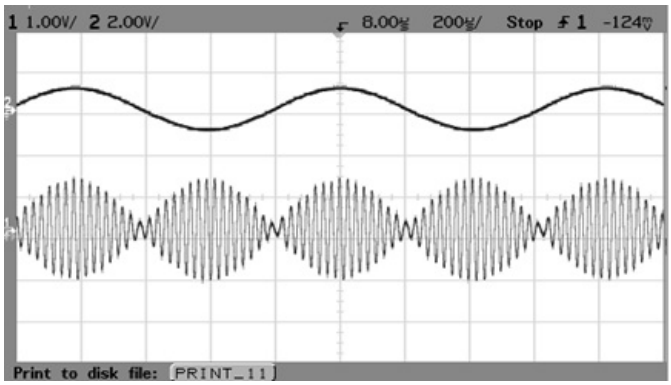
• Perform Autoset on DSO and capture the output signal.

Step 4

• Configure PEAK-to-PEAK measurement on the input and output signal.

• Observe – input and output on DSO and record the signal

Step 5



Step 6

Observation:

• Op-Amp output will be 180degree phase shifted

Open-ended Question / Can you answer this?

What will be the effect on output waveform if:

1) Capacitor vaule is changed from 0.01µF to 0.1µF ?
2) Modulating signal dc-offset is given ?