BPSKwaveformGen -- Overview

Phase Shift Keying (PSK Modulation)



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OBJECTIVES:

At the end of performing this experiment, learners would be able to:

- Describe the concept of discrete phase modulation
- Obtain the Phase shift keying (PSK) from given input
- Understand the working of LF398 IC (sample-and-hold circuit)

EQUIPMENT:

- IC LF398
- µA741
- Signal generator
- Resistors 47 k Ω , 1k Ω
- +/- 15V DC Power Supply
- Digital Storage Oscilloscope & probes
- Connecting wires & Bread Board

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-todigital converters to eliminate variations in input signal that can corrupt the conversion process.

• Phase shift keying (PSK) or discrete phase modulation. The waveforms $S1(t) = -A \cos Wc t$ and $S2(t) = A \cos Wc t$ are used to convey binary digits 0 and 1 respectively.

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.

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BPSKwaveformGen -- Procedures

Step 1

Circuit setup:

Build the following circuit with given component values





Step 2

• Use a signal generator to generate Binary messge data (square wave signal) input and carrier wave (sinusoidal signal). The binary data input will be set to 1 kHz square wave and carrier signal will be 15-20 kHz.

• Use R1 and Rf = $1k\Omega$

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

• Connect the DSO probe – CH1 at binary data input (pin # 8 of LF398 IC), CH2 at Sinusoidal carrier input (pin # 3 of the LF398 IC) and CH3 at output (pin # 5 of the LF398 IC).

Step 3

• Perform Autoset on DSO and capture the output signal.

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

• Observe and record the signal – input and output.

Step 4

Following figure shows the Binary message data and corresponding BPSK waveform



Step 5

Observation:

For the binary digit 0, 180 degree phase shift is observed with respect to carrier

Open-ended Question / Can you answer this?

What will be the effect on output waveform if:

- 1) we change the amplifier resistor values?
- 2) Carrier input voltage is less than the binary data input voltage?