Experiment No.1

AMPLITUDE SHIFT KEYING

Aim: To generate and demodulate amplitude shift keyed (ASK) signal using OCTAVE online.

Theory

Generation of ASK

Amplitude shift keying - ASK - is a modulation process, which imparts to a sinusoid two or more discrete amplitude levels. These are related to the number of levels adopted by the digital message. For a binary message sequence there are two levels, one of which is typically zero. The data rate is a sub-multiple of the carrier frequency. Thus the modulated waveform consists of bursts of a sinusoid. One of the disadvantages of ASK, compared with FSK and PSK, for example, is that it has not got a constant envelope. This makes its processing (eg, power amplification) more difficult, since linearity becomes an important factor. However, it does make for ease of demodulation with an envelope detector.

Demodulation

ASK signal has a well defined envelope. Thus it is amenable to demodulation by an envelope detector. Some sort of decision-making circuitry is necessary for detecting the message. The signal is recovered by using a correlator and decision making circuitry is used to recover the binary sequence.

Algorithm

Initialization commands

ASK modulation

1. Generate carrier signal.
2. Start FOR loop
3. Generate binary data, message signal(on-off form)
4. Generate ASK modulated signal.
5. Plot message signal and ASK modulated signal.
6. End FOR loop.
7. Plot the binary data and carrier.

ASK demodulation

1. Start FOR loop
2. Perform correlation of ASK signal with carrier to get decision variable
3. Make decision to get demodulated binary data. If x>0, choose ‘1’ else choose ‘0’
4. Plot the demodulated binary data.

Program

```
%ASK Modulation
clc;
clear all;
close all;
%GENERATE CARRIER SIGNAL
Tb=1; fc=10;
t=0:Tb/100:1;
c=sqrt(2/Tb)*sin(2*pi*fc*t);
%generate message signal
N=8;
m=rand(1,N);
t1=0;t2=Tb
for i=1:N
t=[t1:.01:t2]
if m(i)>0.5
m(i)=1;
m_s=ones(1,length(t));
else
m(i)=0;
m_s=zeros(1,length(t));
end
message(i,:)=m_s;
%product of carrier and message
ask_sig(i,:)=c.*m_s;
t1=t1+(Tb+.01);
t2=t2+(Tb+.01);
%plot the message and ASK signal
subplot(5,1,2);axis([0 N -2 2]);plot(t,message(i,:),'r');
title('message signal');xlabel('t--->');ylabel('m(t)');grid on
hold on
subplot(5,1,4);plot(t,ask_sig(i,:));
title('ASK signal');xlabel('t--->');ylabel('s(t)');grid on
hold on
end
hold off
%Plot the carrier signal and input binary data
subplot(5,1,3);plot(t,c);
title('carrier signal');xlabel('t--->');ylabel('c(t)');grid on
subplot(5,1,1);stem(m);
title('binary data bits');xlabel('n--->');ylabel('b(n)');grid on
% ASK Demodulation
t1=0;t2=Tb
for i=1:N
t=[t1:Tb/100:t2]
%correlator
x=sum(c.*ask_sig(i,:));
```

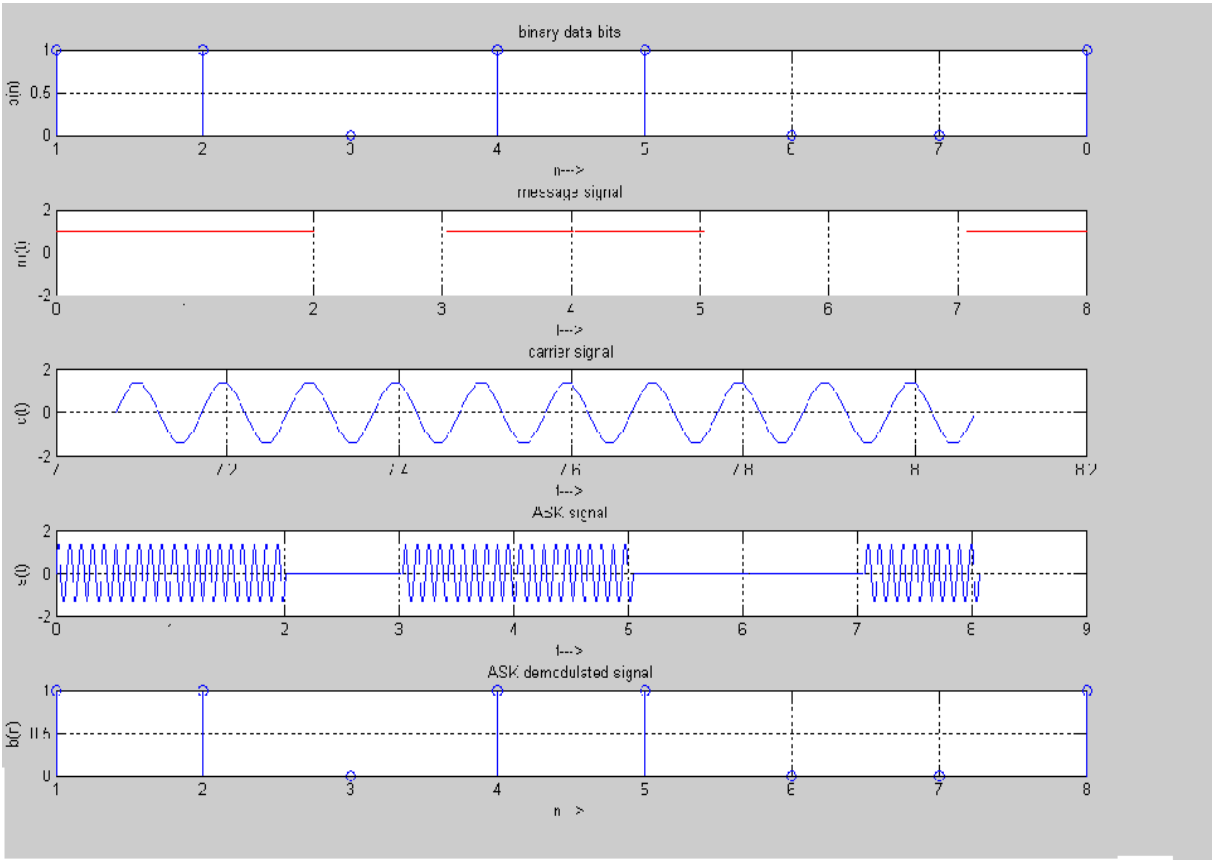
%decision device

```
if x>0
demod(i)=1;
else
demod(i)=0;
end
t1=t1+(Tb+.01);
t2=t2+(Tb+.01);
end
```

%plot demodulated binary data bits

```
subplot(5,1,5);stem(demod);
title('ASK demodulated signal'); xlabel('n--->');ylabel('b(n)');grid on
```

Model Graphs



Result

The program for ASK modulation and demodulation has been simulated in OCTAVE online and necessary graphs are plotted.