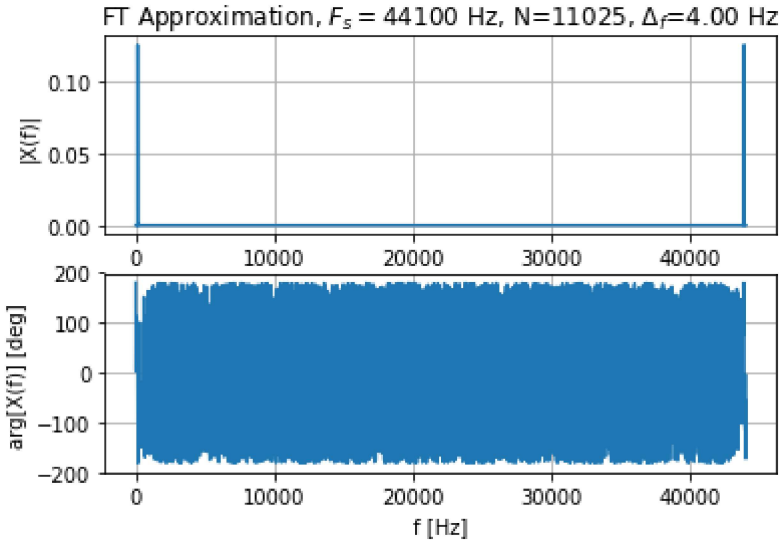
Experiment 1, Question 1 (a)

showft, which computes and plots (a DFT/FFT approximation to) the FT of the CT signal x(t) (after sampling with rate Fs ⇒ xn = x(n/Fs)).

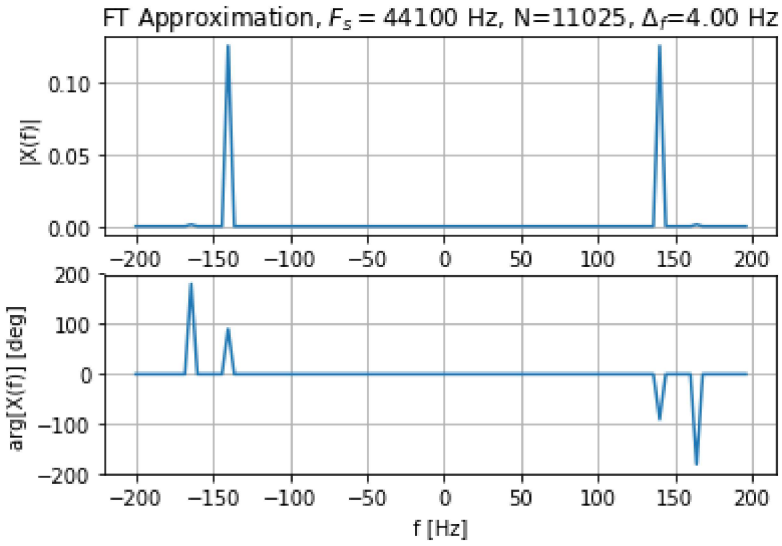
We are generating a sine of amplitude 1 at frequency fa = 140 Hz and a negative cosine of much smaller amplitude 0.01 at frequency fb = 164 Hz

In [2]:
```
run Q1A
```



The above graph is correct in principle but would be easier to interpret if the frequency axis is limited between f1 and f2 and the phase plot is zero if the magnitude of xf is less than llim. So we make the appropriate changes in the code to obtain the following

In [3]:
```
run Q1A
```

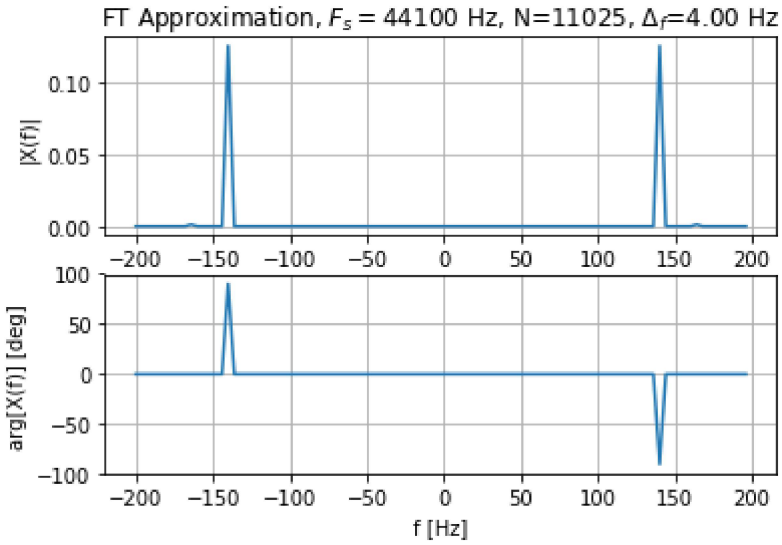


For the above signal on calculating its frequency characteristics we find that the peak values at fb and -fb should be 0.5. But in this case the area underneath the impulse determines the “size” of the impulse. As we can see the area = (fs/n=4)*0.125 = 5.

Question 1(b)

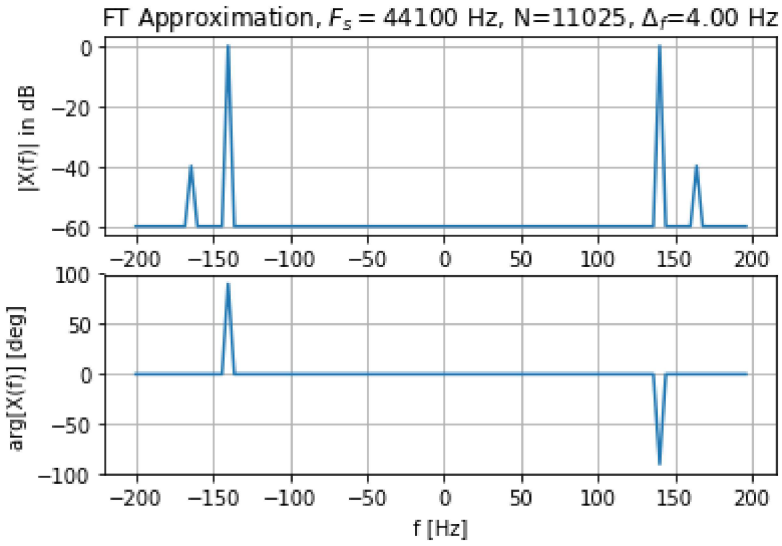
We try plotting the FFT of xt2 = np x sin(2 x np x pi x fa x tt)+0.01 x np x cos(2 x np x pi x fb x tt). But two sinusoids arent visible from the following graph

In [6]:
```
run Q1A
```



We make further modifications from the code to make sure the sinusoids are now visible

In [5]:
```
run Q1B
```



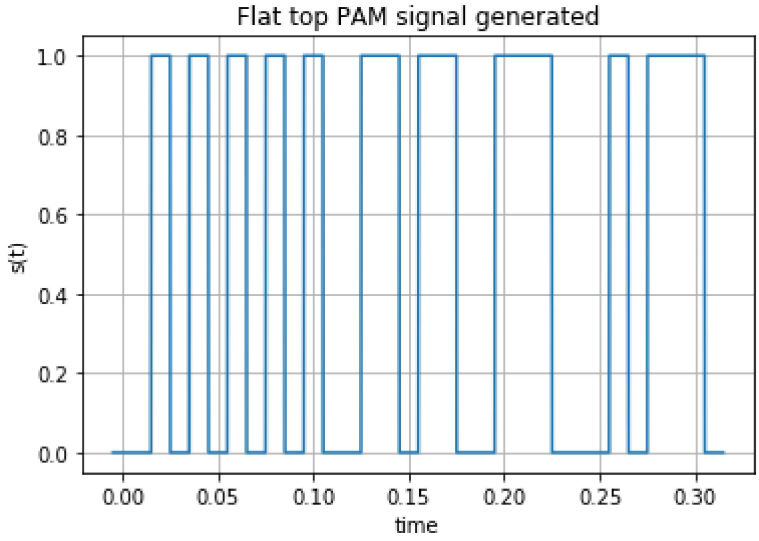
Question 1(c)

plotting a P(f) (magnitude in normalized dB, llim=-40, phase in degrees) in the range -2000 Hz to 2000 Hz for a rectangular PAM pulse p(t) with amplitude 1 and pulsewidth TB = 1/100 sec, symmetric around t = 0.

First We generate the flat top PAM signal with Fs = 10000

In [9]:
```
run ftpam01
```

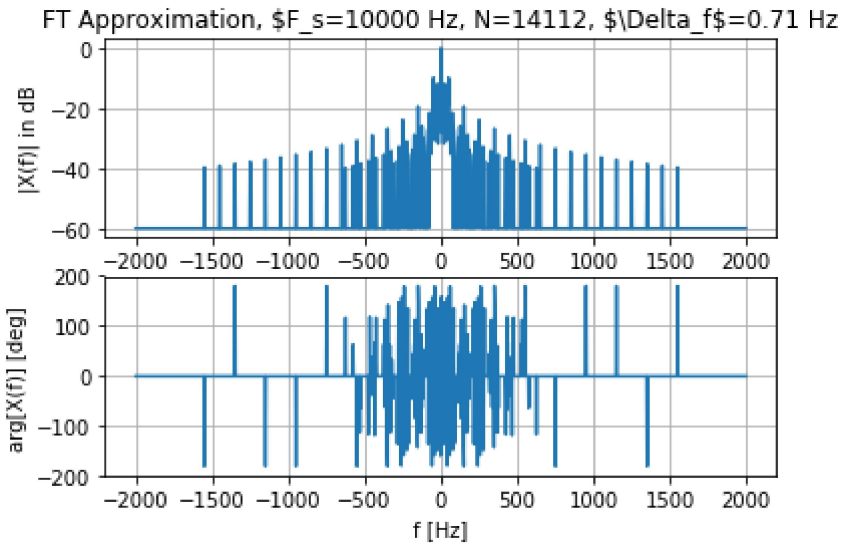
```
[0 0 1 0 1 0 1 0 1 0 1 0 0 1 1 0 1 1 0 0 1 1 1 0 0 0 1 0 1 1 1 0]
```



Next we plot the fft P(f) (magnitude in normalized dB, llim=-40, phase in degrees) in the range -2000 Hz to 2000 Hz of the PAM generated in the previous plot

In [15]:
```
import numpy as np
import comsig
import showfun
import importlib
importlib.reload(showfun)
import ftpam01 as ft

showfun.showft(ft.sdit,[-2000,2000,-40])
```



In [ ]:
```
```