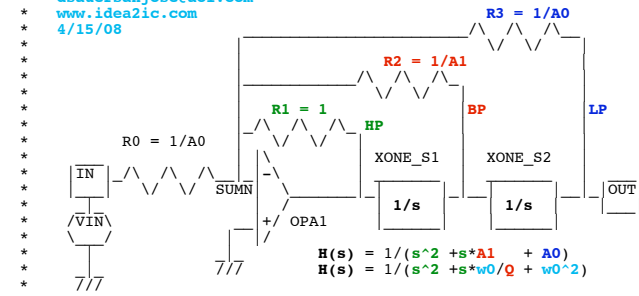


State_Variable_f_1Hz

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 * www.idea2ic.com
 * 4/15/08



$$H(s) = 1/(s^2 + s*A1 + A0)$$

$$H(s) = 1/(s^2 + s*w0/Q + w0^2)$$

Set **A0 = 1** and scale **s** to **1KHz**
 Then **R2 = Q** and **s = 2*PI*1KHz**

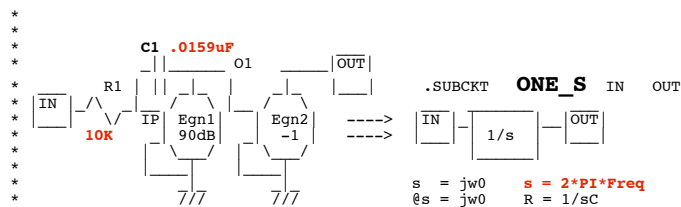
```

.OPTIONS GMIN=1e-18 METHOD=trap srcsteps = 1 gminsteps = 1
=====
V_IN     VIN     0     AC     1     DC     0
R0       VIN     SUMN   1
R1       SUMN   HP     1
R2       SUMN   BP     10
R3       SUMN   LP     1
XOPA1    SUMN   0     HP     OPA
XONES1   HP     BP     ONE_S
XONES2   BP     LP     ONE_S
.ac      dec     50    10    10k
  
```

==Scale_the_Integrator_To_the_Desired_Frequency==

```

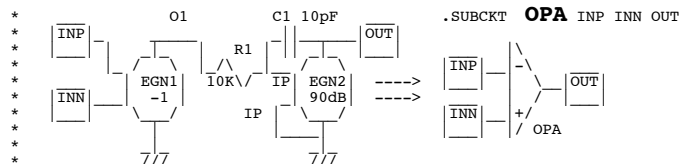
.control
run
plot db(bp) db(hp) db(lp) title StateVariable_Q_10
*====Q_Is_Independant_Of_Frequency=====
alter R2 resistance = 1
run
plot db(bp) db(hp) db(lp) title StateVariable_Q_1
.endc
  
```



$$s = jw0 \quad s = 2*PI*Freq$$

$$@s = jw0 \quad R = 1/sC$$

* http://www.idea2ic.com/PlayWithJavascript/R_C_Freq.html



```

.SUBCKT OPA INP INN OUT
EGN1 O1 0 INP INN -1
EGN2 OUT 0 IP 0 -1000000
R1 O1 IP 10k
C1 OUT IP 10p
  
```

.ends

```

.SUBCKT ONE_S IN      OUT
EGN1  O1  0      IP  0      -1000000
EGN2  OUT 0      O1  0      -1
R1     IN  IP     10k
C1     IP  O1     .01592u
.ends

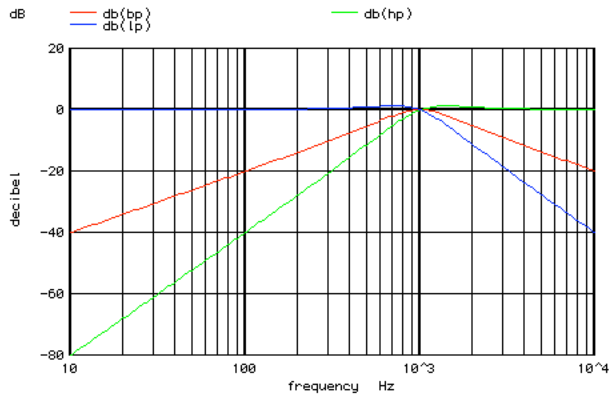
```

.end

=====END_OF_SPICE=====

Scaling frequency involves adjusting the R1 value and C1 value to equal each other at the desired frequency inside the integrator block.

Graph 104 - ac314: StateVariable_Q_1



The External Resistors R1->R3 indendently control Q

Graph 103 - ac313: StateVariable_Q_10

