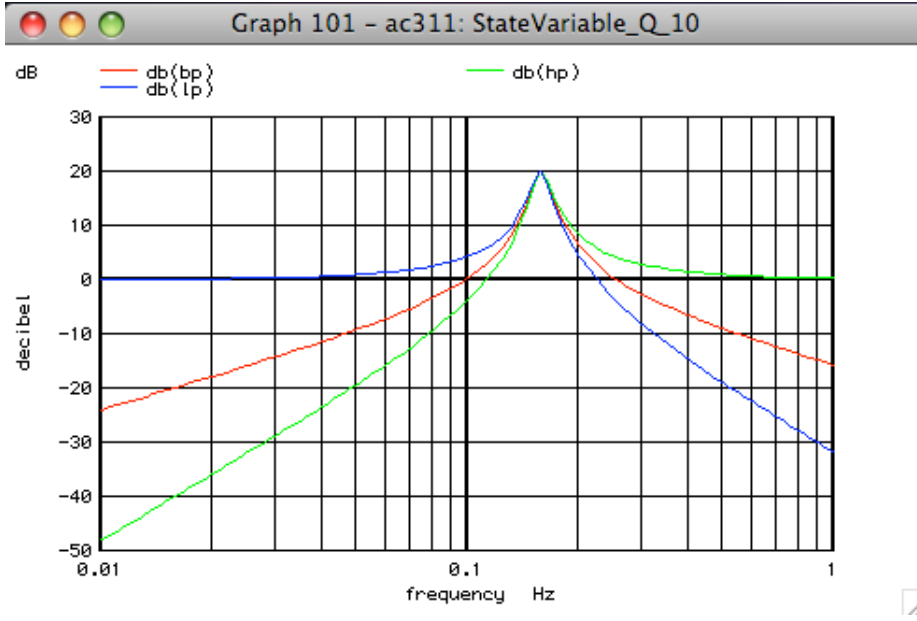


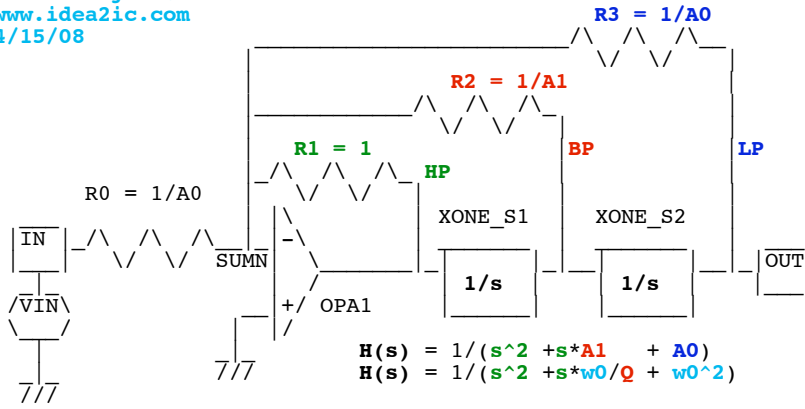
State_Variable_s_eq_1

STATE VARIABLE FILTERS MAP POLES AND ZEROS DIRECTLY TO CIRCUIT COMPONENT VALUES.



State_eq_1

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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 $w0^2 = s^2 = 1$
 Then $R2 = Q$ and $2*PI*0.159Hz = 1$

```

.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 .01 1

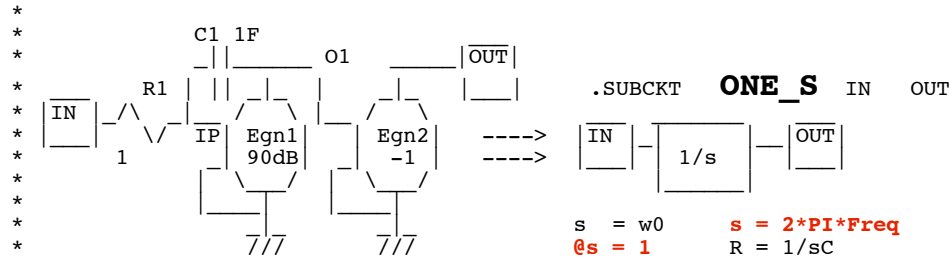
```

==State_Variable_Filters_Map_Equations_To_Components==

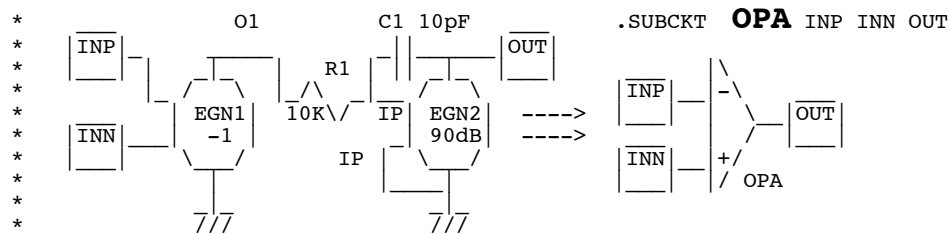
```

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

```



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      1
C1        IP      O1      1

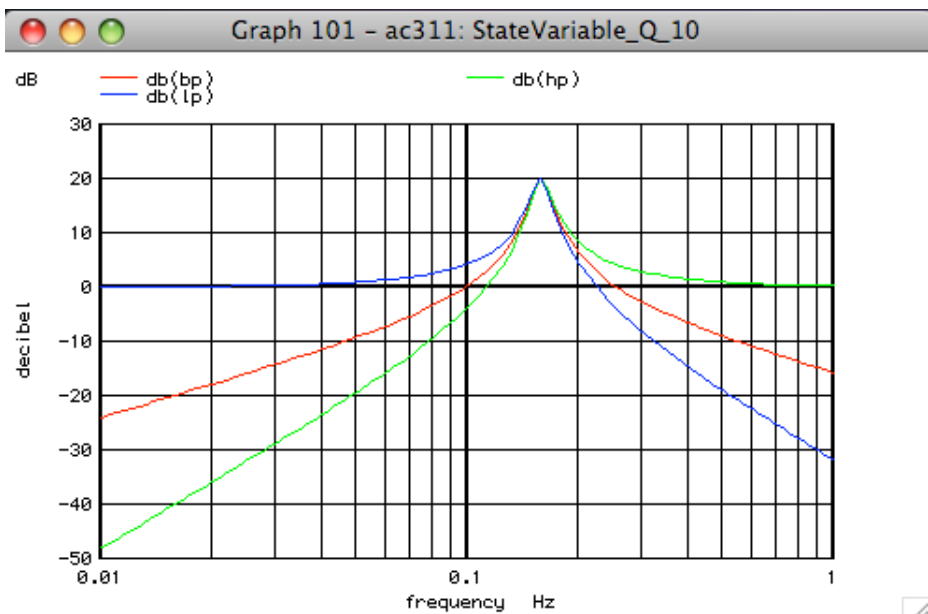
```

.ends

.end

=====END_OF_SPICE=====

Q is control by the ratio of R2 to the other resistors.
For a **Q=10** there is a peaking of 20dB.



For a Q=1 there is little peaking.

Graph 102 - ac312: StateVariable_Q_1

