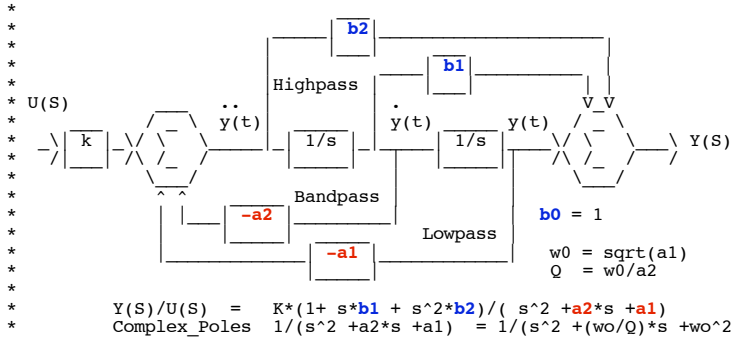
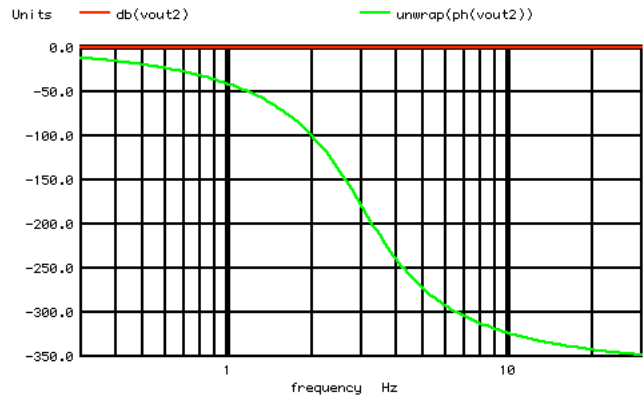


# Hibert\_AllPass\_Analog

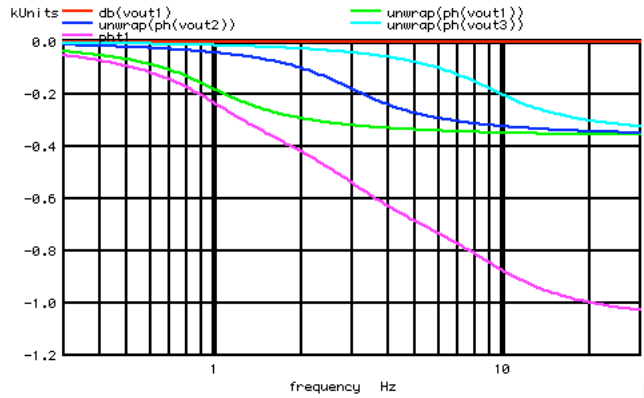


An old method to building wide bandwidth 90 degree phase shifters was to use two 6 pole allpass filters.



VFC1	FC1	0	DC	1
VK	K	0	DC	1
VA1	A1	0	DC	1
VA2	A2	0	DC	1
VB0	B0	0	DC	1
VB1	B1	0	DC	-1
VB2	B2	0	DC	1
XStates1	VIN	FC1	K	A1 A2 B0 B1 B2 VOUT1 HP BP LP StateVS

A DC controlled subcircuit has been built to do the ALL Pass.



VFC1	FC1	0	DC	1
VFC2	FC2	0	DC	3
BVFC3	FC3	0	V	= V(FC2)*V(FC2)
XStates1	VIN	FC1	K	A1 A2 B0 B1 B2 VOUT1 HP BP LP StateVS
XStates2	VIN	FC2	K	A1 A2 B0 B1 B2 VOUT2 HP2 BP2 LP2 StateVS
XStates3	VIN	FC3	K	A1 A2 B0 B1 B2 VOUT3 HP3 BP3 LP3 StateVS

A Frequency spacing of 3 will be use for each All Pass.



```

VK      K      0      DC      1
VA1     A1     0      DC      1
VA2     A2     0      DC      1
VB0     B0     0      DC      1
VB1     B1     0      DC     -1
VB2     B2     0      DC      1

XStateS1 VIN  FC1  K      A1 A2 B0 B1 B2 VOUT1 HP1 BP1 LP1 StateVS
XStateS2 VIN  FC2  K      A1 A2 B0 B1 B2 VOUT2 HP2 BP2 LP2 StateVS
XStateS3 VIN  FC3  K      A1 A2 B0 B1 B2 VOUT3 HP3 BP3 LP3 StateVS

XStateS4 VIN  FC4  K      A1 A2 B0 B1 B2 VOUT4 HP4 BP4 LP4 StateVS
XStateS5 VIN  FC5  K      A1 A2 B0 B1 B2 VOUT5 HP5 BP5 LP5 StateVS
XStateS6 VIN  FC6  K      A1 A2 B0 B1 B2 VOUT6 HP6 BP6 LP6 StateVS

```

```

.control
set pensize = 2
*AC DECLin NUMDEC FSTART FSTOP
ac dec 100 .3 30
let pht1 = unwrap(ph(vout1)) + unwrap(ph(vout2)) + unwrap(ph(vout3))
let pht2 = unwrap(ph(vout4)) + unwrap(ph(vout5)) + unwrap(ph(vout6))

plot db(vout2) unwrap(ph(vout2))
plot db(vout1) unwrap(ph(vout1)) unwrap(ph(vout2)) unwrap(ph(vout3)) pht1
plot db(vout4) unwrap(ph(vout4)) unwrap(ph(vout5)) unwrap(ph(vout6)) pht2

plot pht1 pht2 title Phase1_Phase2
plot pht1- pht2 title Delta_Phase ylimit -100 0

```

```

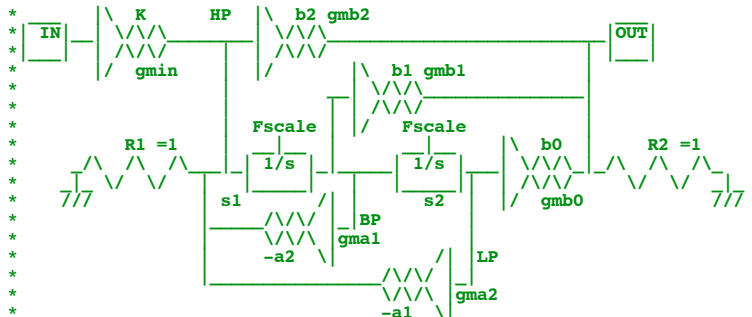
title AllPassOut
title AllPassOut1
title AllPassOut2

```

```

.endc
*====StateVariable_Cell_S=====
*
*

```



```

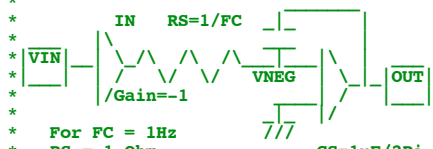
.SUBCKT StateVS VIN FC K A1 A2 B0 B1 B2 VOUT HP BP LP
R1 HP 0 1
R2 OUT 0 1
Bgmin HP 0 I = -V(VIN)*V(K)*1
Bgma1 HP 0 I = V(LP)*V(A1)
Bgma2 HP 0 I = (V(BP))*V(A2)
Bgmb0 OUT 0 I = -V(LP)*V(B0)
Bgmb1 OUT 0 I = -V(BP)*V(B1)
Bgmb2 OUT 0 I = -V(HP)*V(B2)
XS1block HP BP FC Sblock
XS2block BP LP FC Sblock
BOUT VOUT 0 V = V(OUT)
.ENDS StateVS

```

```

*====S_BLOCK=====
*

```



```

* For FC = 1Hz
* RS = 1 Ohm CS=1uF/2Pi
* Xc = 1 Ohm
.SUBCKT Sblock VIN OUT FC
Bbuf IN 0 V = -V(VIN)
BRS IN VNEG I = (V(IN)-V(VNEG))*V(FC)
Cs VNEG OUT .159
BSOUT OUT 0 V = -V(VNEG)*3000
.ENDS Sblock
.end

```

6.7.11\_12.38PM  
dsauersanjose@aol.com  
Don Sauer