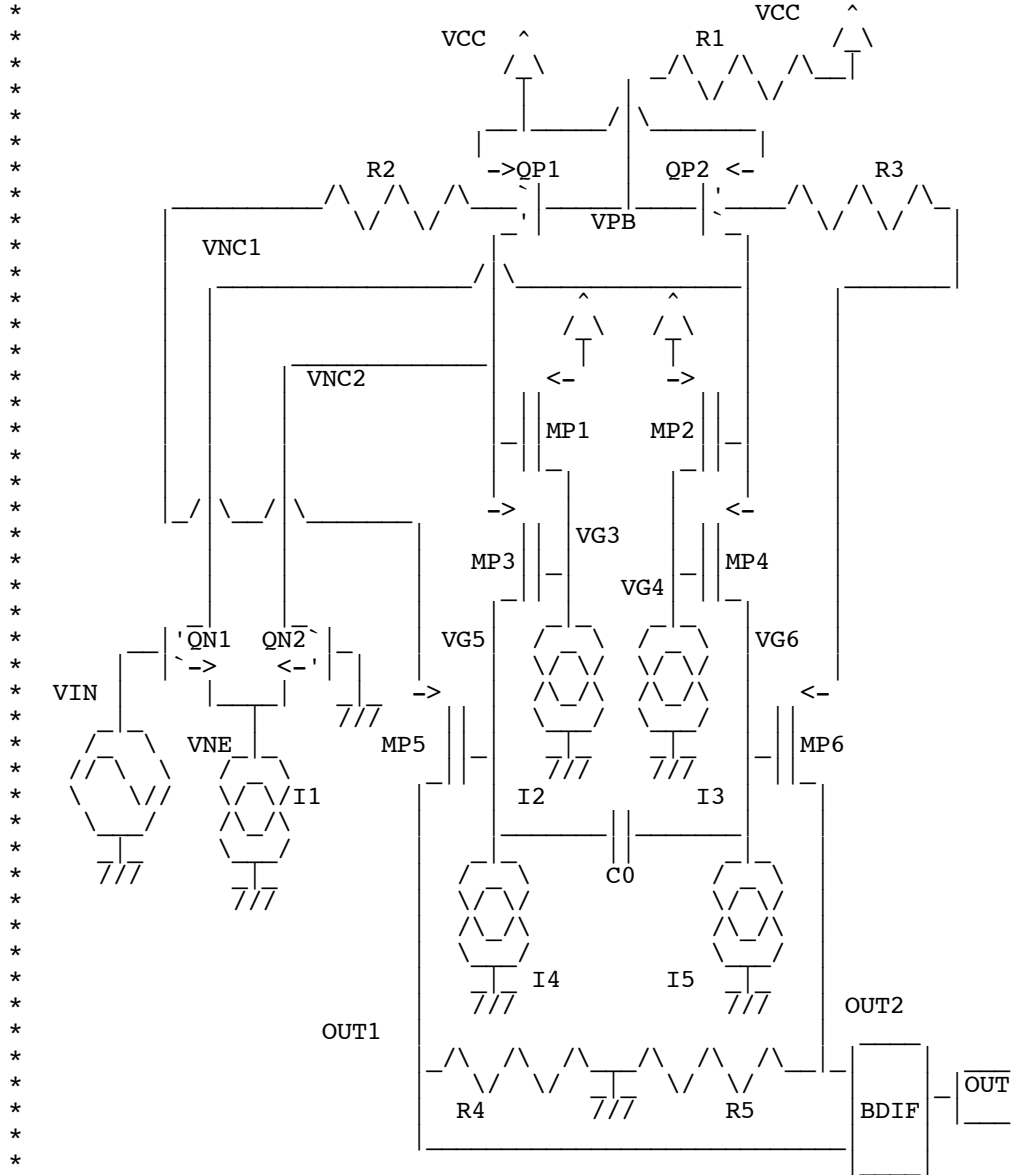


# SUB HZ INTEGRATOR

\* dsauersanjose@aol.com 1/15/09  
\* www.idea2ic.com



```

.OPTIONS      GMIN = 1e-18
VCC           VCC  0    DC    5
I4            VG5  0    20u
I5            VG6  0    20u
MP5           OUT1 VG5  VS5   VCC  pchannel  w=10u l=1u
MP6           OUT2 VG6  VS6   VCC  pchannel  w=10u l=1u
QP1           VNC2 VPB  VCC    PNPL
QP2           VNC1 VPB  VCC    PNPL
R1            VCC  VPB  10K
R2            VPB  VS5  30K
R3            VPB  VS6  30K
MP1           VG3  VNC2 VCC    VCC  pchannel  w=10u l=1u
MP2           VG4  VNC1 VCC    VCC  pchannel  w=10u l=1u
MP3           VG5  VG3  VNC2 VCC  pchannel  w=10u l=1u
MP4           VG6  VG4  VNC1 VCC  pchannel  w=10u l=1u
I2            VG3  0    20u
I3            VG4  0    20u
R4            OUT1 0    10
R5            OUT2 0    10
C0            VG5  VG6  10p

QN1           VNC1 VIN  VNE    NPNV
QN2           VNC2 0    VNE    NPNV
I1            VNE  0    1n
VIN           VIN  0    AC     1m
BDIFF        OUT  0    V =    V(OUT1) -V(OUT2)

.MODEL PNPL    PNP( BF=50 VAF=20 )
.MODEL NPNV    NPN( BF=50 VAF=20 )
.model nchannel nmos (level=3)
.model pchannel pmos (level=3)

.control
set pensize = 2

tran          1u    1m    0    1u
ac            dec   30    1M    100k
plot          db(out/vin)

.endc

.end

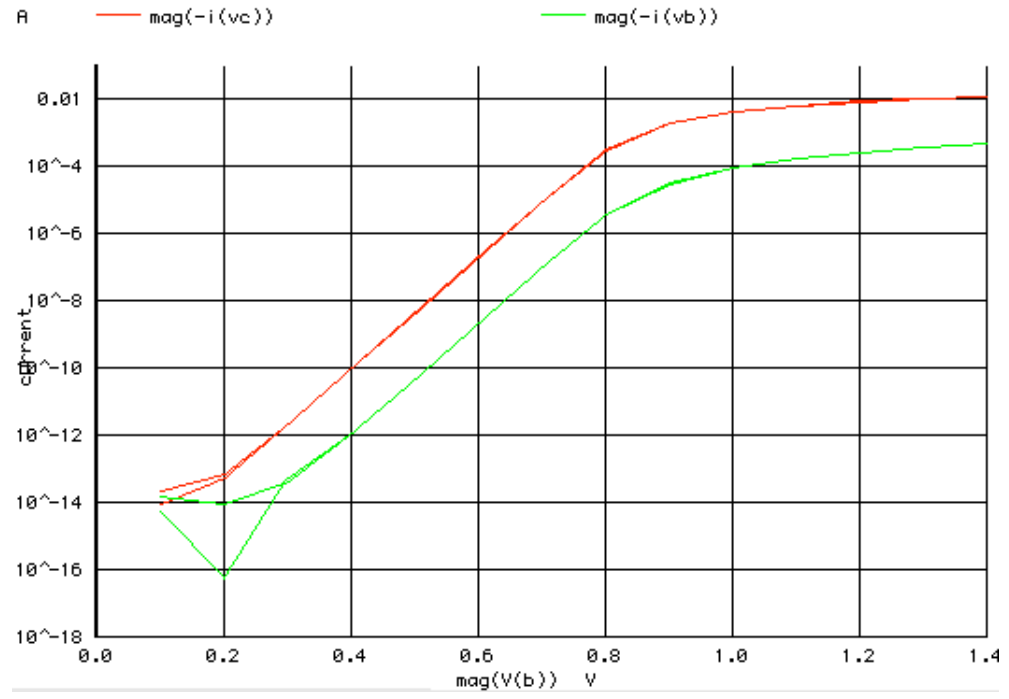
=====END_OF_SPICE=====

```

To Covert PDF to plain text click below  
<http://www.fileformat.info/convert/doc/pdf2txt.htm>

Perhaps one of the most under appreciated aspects

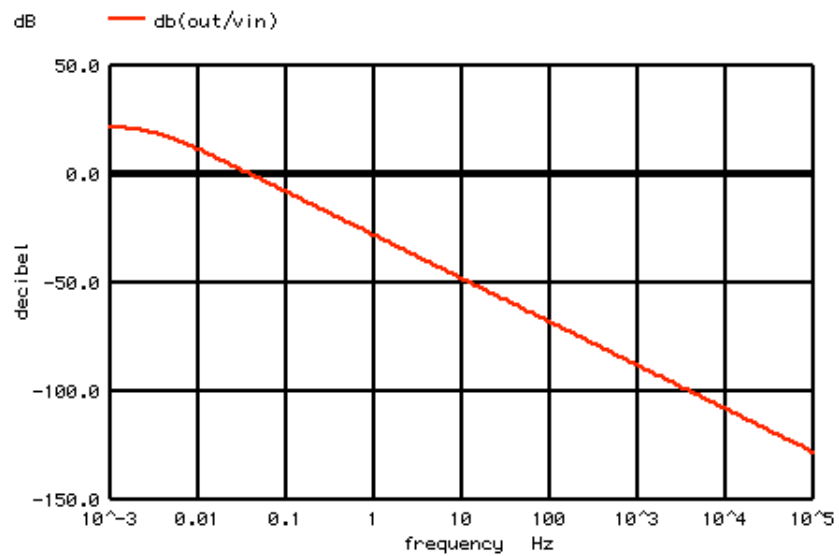
to BiCMOS processes is what CMOS requirements do to bipolar performance. The lifetime of minority carriers used to be in microseconds in the old bipolar processes. Now life time is in milliseconds.



What that means is that transistors can now operate at much lower collector currents than before.

In addition, the gate resistance for CMOS transistors is in effect that of very good glass. These two features were used to build the integrator below.





**And the other goal is to be able to do it completely on chip using standard processing with nothing special.**