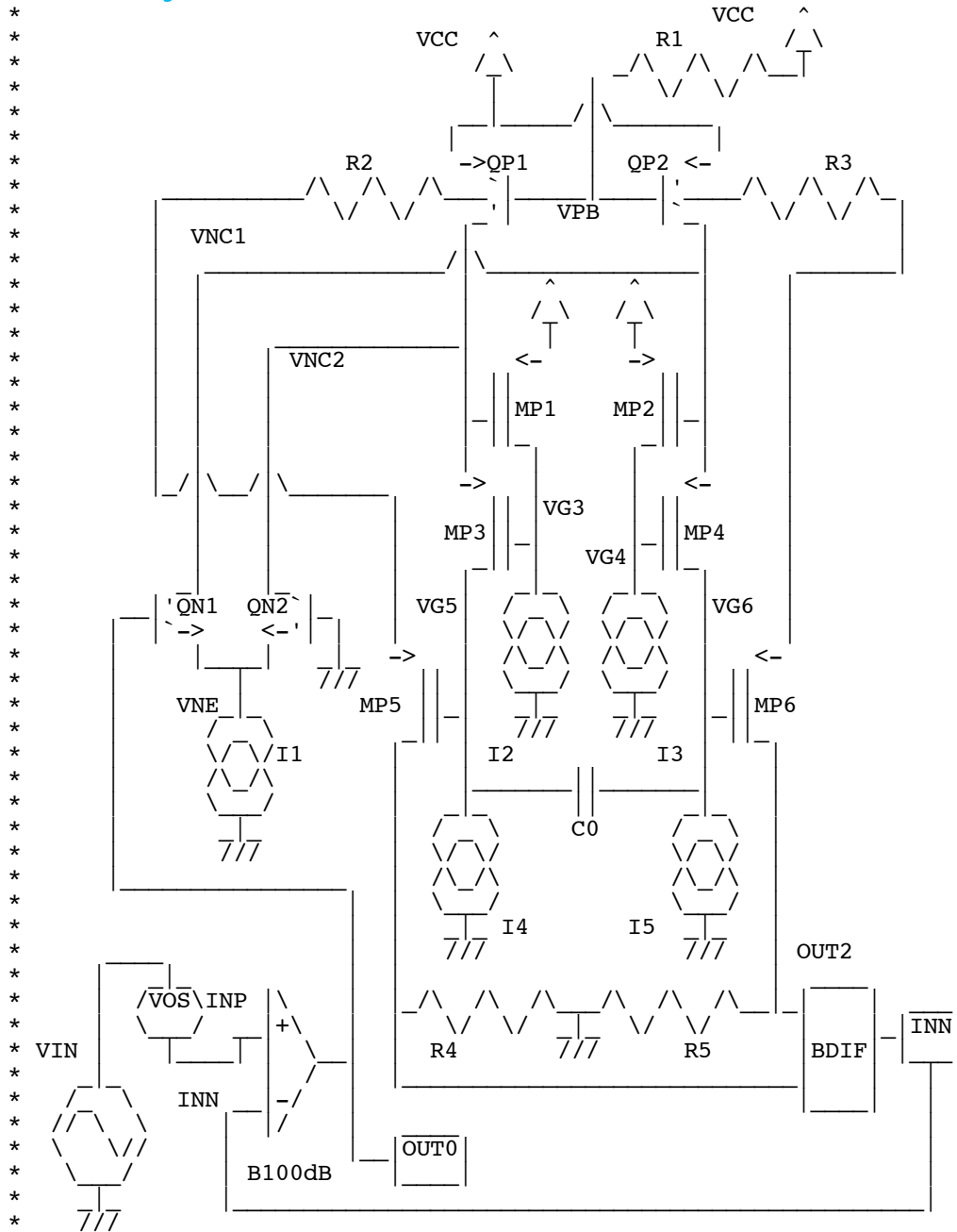


# CanTakeAudioGain

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```

.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
BDIF        INN  0    V = V(OUT2) -V(OUT1)

QN1          VNC1  OUT0  VNE          NPNV
QN2          VNC2  0    VNE          NPNV
I1           VNE  0    .5n

VIN          VIN  0    SIN( 0 .1u 10k) AC .1u
VOS          VIN  INP  DC    1f
B100dB      OUT0  0    V = (V(INP) -V(INN))*100000

```

```

.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
plot v(inp)
plot v(out0)
ac dec 30 1M 100k
plot db(inp) db(out0) db(out0/inp) db(inn/out0)

```

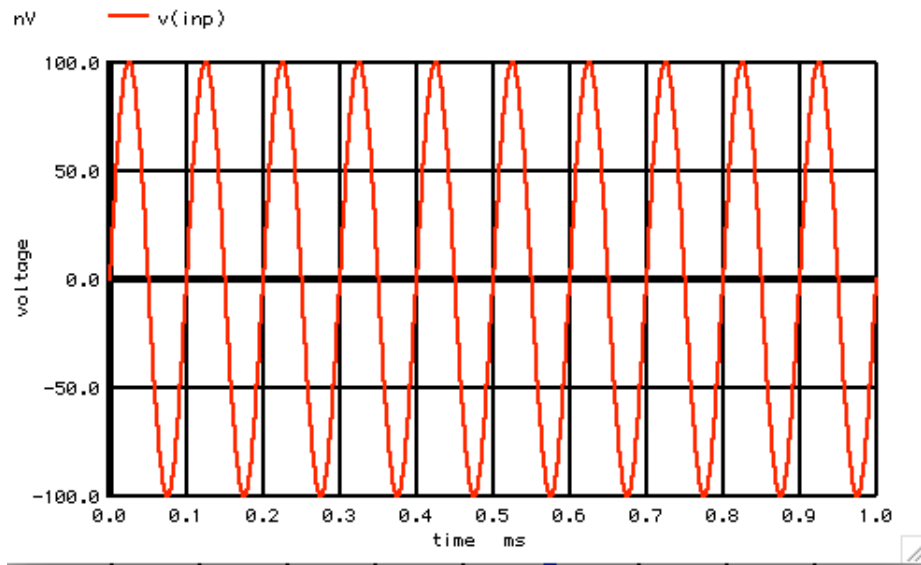
```
.endc
```

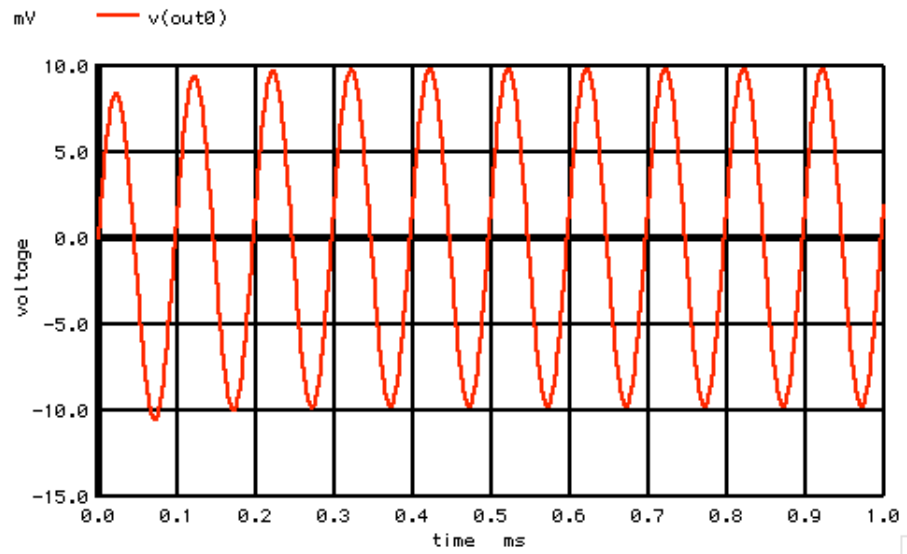
```
.end
```

```
=====END_OF_SPICE=====
```

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

The integrator block gets connected to the 100dB gain block and now the required gain can be done on chip.

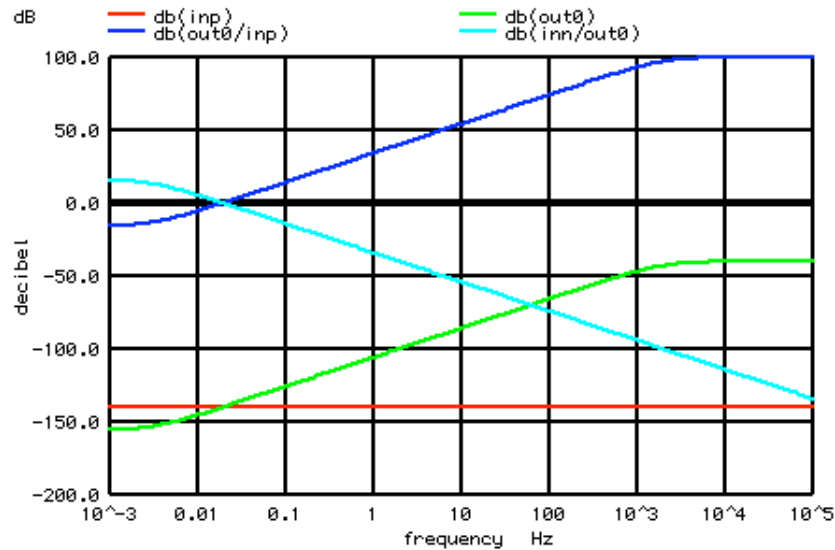




**Testing the ability to reject offset appears to be pushing the convergence limits in some versions of spice. But the AC plots show the integrator block functioning as desired.**



Input signal levels and gain is shown below.



There were three integration blocks in the LMC2001. One was used to gain up the chopper signal as shown above. Another one was used to integrate the output of the chopper signal. A third was used to actually gain up the shot noise of an input stage which was then applied to spread spectrum the clock. As before, this was done in a way which did not introduce clock glitches on the supply.

For some reason National Semiconductor applied for three patents on the concept of actually using real random noise to spread spectrum the chopper. Perhaps the wording on the claims need some rework.