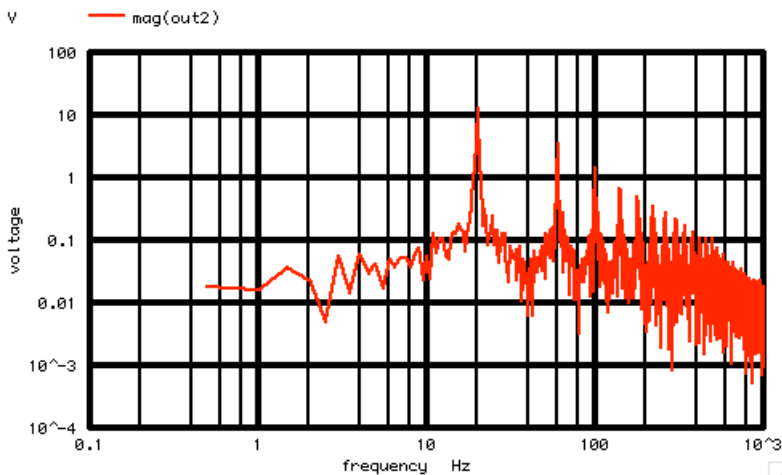


The Noise source **BPWL** can be seen on the **inp** input. But its PM effects are hard to see. A spectrum can show the details.

```

=====Find_Spectrum=====
linearize
set      specwindow=  "none"
spec    .5  1k      .5  v(out2)
plot    mag(out2)  loglog
plot    mag(out2)  loglog xlimit 10 100 ylimit .001 100
=====Wrap_Up=====
.endc
.end
=====

```



The actual noise is appearing close to the peak signals at 20Hz and 60Hz and 100Hz, etc. Since white noise was applied, the slope of the adjacent noise sidebands around 20Hz drop in power to the $1/f^2$ as they get farther away from 20Hz. The same is true for all the odd harmonics.

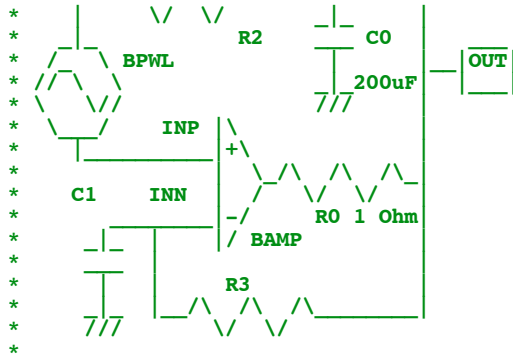
But it is also possible to get the same plot by doing a jitter plot on this oscillator, and then creating a PWL file which will be used to phase modulate a 20Hz signal. This will produce a spectrum which is very close.

And it is possible to map how the noise gets around to producing its sidebands at its magnitude and at its frequency.

```

=====Full_Netlist_For_Copy_Paste=====
OSCILLATOR_WITH_PWL_Noise
*
*      R1
*
*
* VFB
*

```



```

* VpwlT OUT 0          PWL( + 0.0005 0.988835 +.....
*=====Include_Noise_File=====
.include PWL_File.inc
Rload   OUT  0      1k
BAMP    OUT1  0      V = 9.9*tanh( (V(INP)-V(INN))*10)
R0      OUT1  OUT2  1
C0      OUT2  0      500u
R1      VFB   0      1K
R2      VFB   OUT2  1K
R3      INN   OUT2  2.49K
BPWL    INP   VFB   V = .1*V(OUT)
C1      INN   0      9.415u IC= .1
*=====Run_Simulation=====
*TRAN   TSTEP  TSTOP  TSTART  TMAX    ?UIC?
.tran   5u     2      0       5u     UIC
.control
run
set     pensize =    2
plot   out2  inp   inn
*=====Find_Spectrum=====
linearize
set     specwindow= "none"
spec   .5    1k    .5    v(out2)
plot   mag(out2) loglog
plot   mag(out2) loglog xlimit 10 100 ylimit .001 100
*=====Wrap_Up=====
.endc
.end

```

2.18.10_12.15PM
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