

## IV Converter Distortion Measurements with AD1862 NOS DAC

XEN Audio

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As promised earlier, here the distortion measurement results of various IV Converters we have on hand. The subjective impressions have already been posted by Fran earlier.

The 1kHz sine wave file was created in Audacity and was exported from the software as 24/96 wav file. It outputs 1Vrms on a standard build.

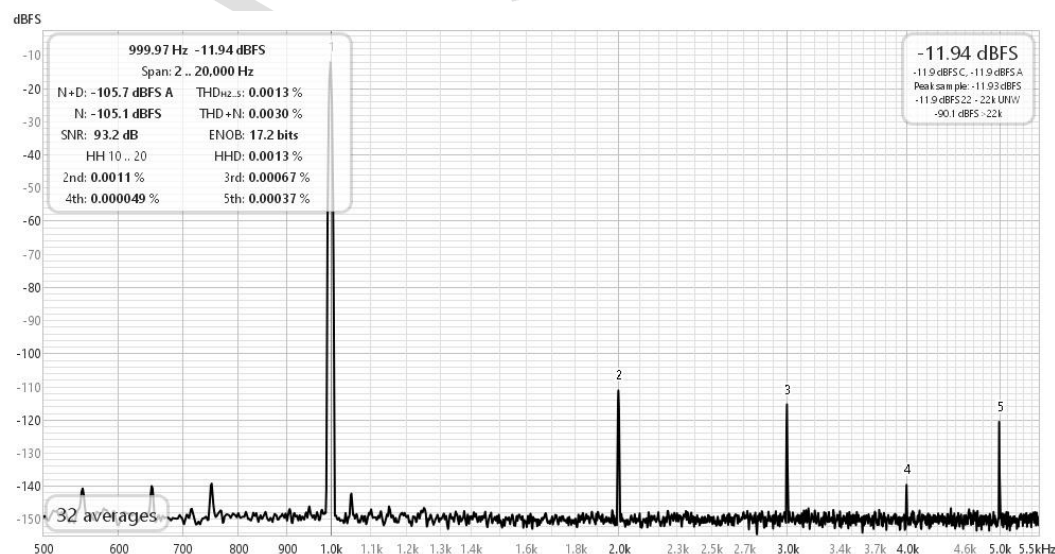
The DAC is a Miro1360 AD1862 coupled with a STM32-based SD card player. The power supplies for the DAC (and any plug in IV stages) is a Miro1360 PSU2 - LT3015/LT1963 with separate 5V and 12V supplies.

All thanks are due to DIYA member woodturner-Fran for performing all the measurements.

### LM6171 Opamp IV

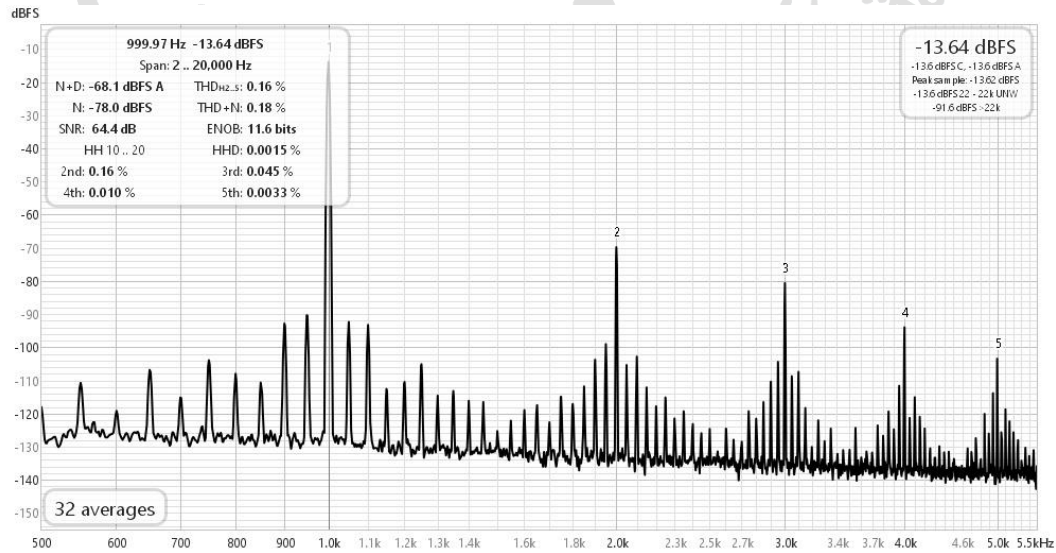
The reference is a LM6171 opamp IV as recommended in the Miro1360 thread.

Riv=2k7, no Civ fitted.



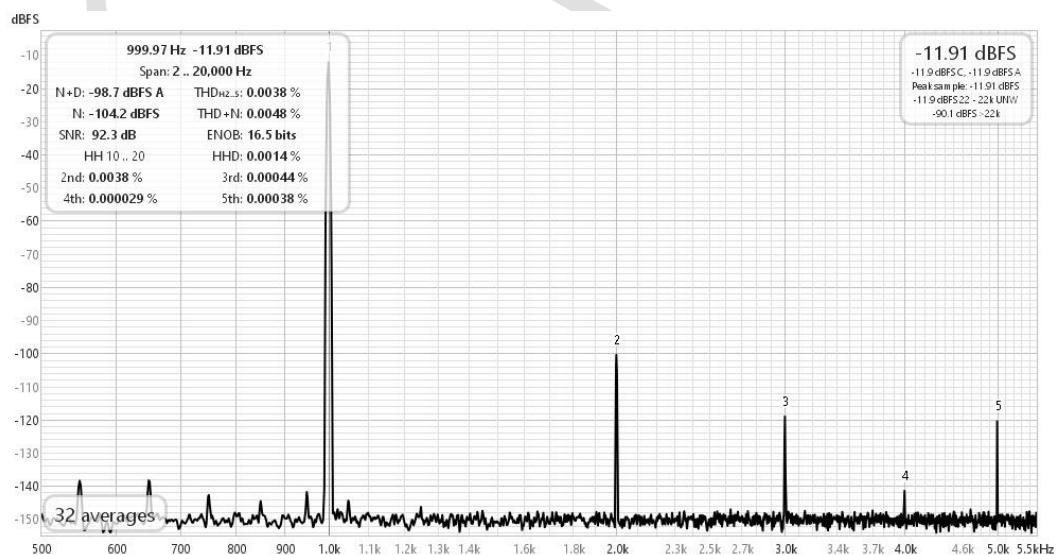
## Woodturner-Fran 3A5 Tube IV

Fran's 3a5 configured as output stage.



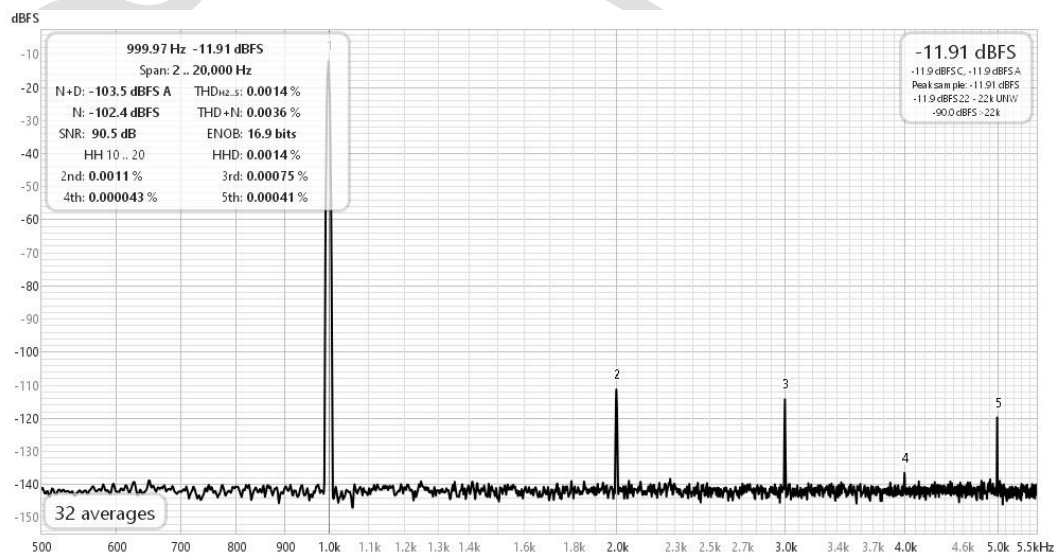
## XEN Current Mirror IV

An earlier IV converter design using currently-produced BJT SMD devices.  
Topology similar to AD844 but with much higher bias.



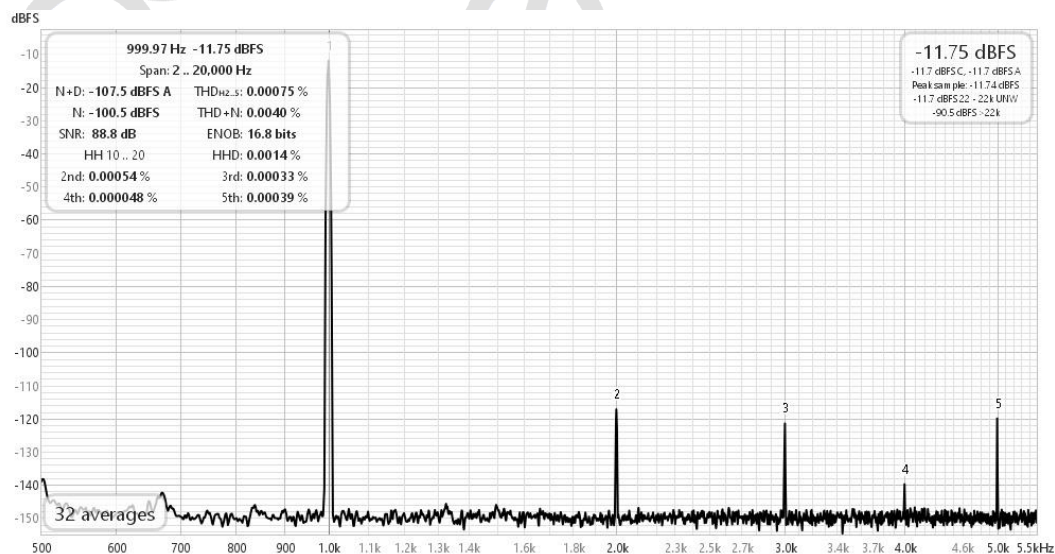
## Passive IV + 100x AD797 LNA

The AD797 is configured as 100x amplifier after passive 27R IV.  
This was fed from the PSU2 as it is built to fit into the Miro DAC opamp sockets



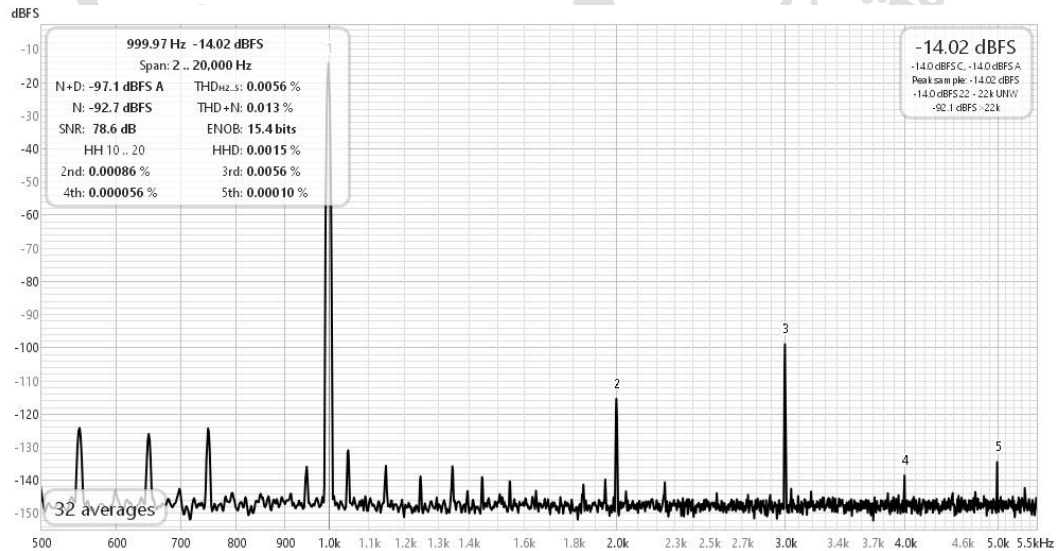
## SMMS73 IV

Our interpretation of the all BJT IV as posted by member SMMS73, using +/-12V supplies.  
It was fitted into the opamp sockets on the Miro DAC board.  
The low input impedance is probably the main reason for low distortion.



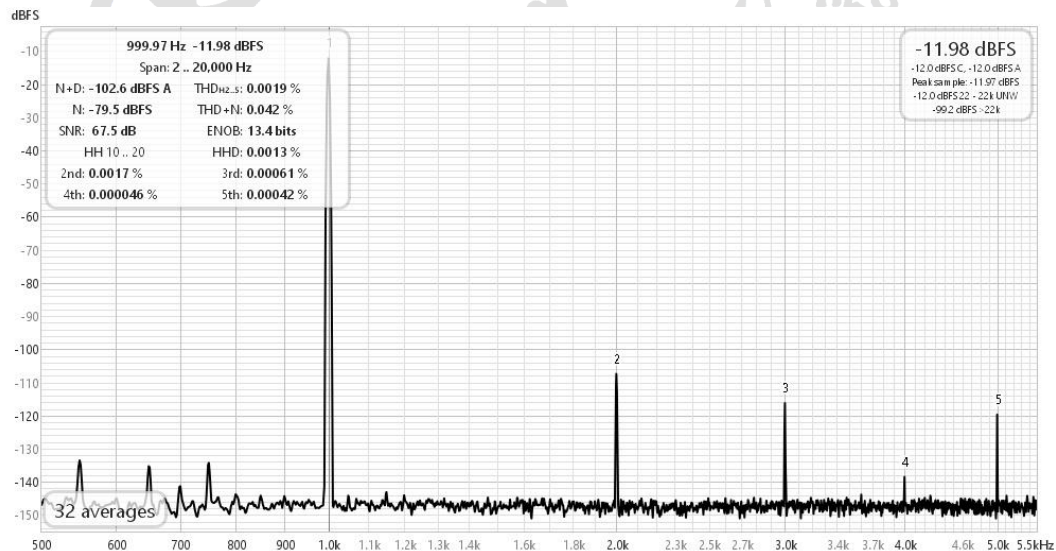
## Cascoded SEN IV with Floating Battery Supply

An unpublished cascoded SEN IV using currently-available SMD JFETs and floating battery supply.



## FC CEN IV -- Through Hole Version

Last but not least, the through hole version of the Folded Cascode CEN IV with 15V rails.



## Summary

All measurement results are summarised in the table below :

IV Type	H2	H3
Opamp IV LM6171	0.0011%	0.00067%
Fran's 3a5 Tube IV	0.16%	0.045%
XEN Current Mirror IV	0.0038%	0.00044%
Passive IV + AD797 100x	0.0011%	0.00075%
SMMS73 BJT IV	0.00054%	0.00033%
Cascoded SEN IV	0.00086%	0.0056%
FC CEN IV	0.0017%	0.00061%

When viewing these results, one should bear in mind that the measurement includes the intrinsic distortion of the AD1862 itself. According to our measurement of a batch of 20 AD1862's, the average value of H2 and H3 is about -100dB, or 0.001%, using the OPA1656 as IV, into a 10k Caddock MK132 load. As such, any results significantly below 0.001% should be viewed with caution. It is not unlikely that some form of distortion cancellation is taking place between the IV circuit and the DAC itself.

Also noteworthy is that if one were to go balanced, H2 reduction by a factor of 10 could be achieved with good matching.

## References

1. <https://www.diyaudio.com/community/threads/a-simple-discrete-current-mirror-iv-converter-a-la-ad844.360162/post-6340962>
2. <https://www.diyaudio.com/community/threads/dac-ad1862-almost-tht-i2s-input-nos-r-2r.354078/post-7299245>
3. <https://www.diyaudio.com/community/threads/dac-ad1862-almost-tht-i2s-input-nos-r-2r.354078/post-7594471>
4. <https://www.diyaudio.com/community/threads/zen-cen-sen-evolution-of-a-minimalistic-iv-converter.195483/post-2688666>
5. <https://www.diyaudio.com/community/threads/folded-cascode-cen-iv-with-fixed-rails.389776/post-7109978>