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## **Letter to the Editor**

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*Brian Lenharth writes:*

*Dear editor,*

I read with interest Les Bordelon's article on DAC design in Linear Audio Vol 4. However, Les incorrectly lists the Burr-Brown (TI) PCM179x DAC family as R-2R ladder DACs. In reality they are "advanced segment DAC architecture" which probably has more in common with delta-sigma than R-2R ladders

*Brian Lenharth  
Tucson, Arizona, USA*

*Les Bordelon replies:*

Brian is correct. The PCM179x DACs should have been labeled as "Hybrid" instead of "R2R" in Table 1 in the article. According to TI data on Advanced Segment DACs, "...digital input data from the digital interpolation filter is split into six upper bits and 18 lower bits. The upper six bits are converted to ICOB (Inverted Complementary Offset Binary) code. The lower 18 bits associated with the MSB are processed by fifth-level, third-order, delta-sigma modulators..." Thus, the PCM179x Advanced Segment DACs are more correctly identified as a hybrid architecture converting the most significant bits using a ladder and the lower bits using delta-sigma modulation. Thank you for identifying this correction.

As an additional correction, Table 1 also identifies the PCM179x as not "NOS Capable." This is correct except for the PCM1792 which offers a full set of user-programmable functions accessible through an SPI or I2C serial control port and supports register write and read-back functions. The oversampling can be bypassed by disabling the digital filter of the PCM1792 through software to change the DFTH bit (bit 4) of register 20. Theoretically, this would make the PCM1792 NOS capable, although implementation might be a challenge.

*Brian Lenharth amplifies:*

I should also mention that the PCM1792 and 1794 appear to be essentially the same device. The '1792 is set up to be driven by a uController as Les mentions, which gives it more flexibility - digital volume control, DSD decoding, etc. The '1794 is limited to the 'basic' functions that can be accommodated with the given pins available for hardware control. The '1794 can also bypass its digital filter in mono mode. I think all the circuitry is inside the '1794 but the hardware IO prevents access.

Additionally, there are the DSD1794/1792, which seem to be yet more variations on the theme, except oriented to DSD.



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Add to that the slightly lower spec devices, PCM1796/1798 and DSD1796. From what I can tell these are mostly the same as the above, but to a slightly lower spec.  
Some investigation is in order.

However, all that said, I can surely relate to Les's preference for the 'purity' of the PCM1704 ladder DAC. However, it looks like they are on their way out of production and the \$75/ea at Digikey is pretty steep!