

# improved 7 segment display

As discussed elsewhere in this issue, it is possible to distinctly improve the readability of 7-segment numeric displays by adding an extra stroke at the top of a six and at the bottom of a nine.

The other circuit uses two transistors to achieve this; however, in digital circuits one often has a few gates "left over" because the integrated circuits are not fully used. In this case it is more attractive to use these extra gates to achieve the improved readability.

The circuit in figure 1 uses two open-collector NAND gates (e.g. SN7401). The output of  $N_1$  switches "low" when the B and C inputs are "high", i.e. for a 6 and for a 7, and adds the stroke at the top of the 6. The 7 uses this stroke anyway, so it remains unchanged. In the same way  $N_2$  switches on the bottom stroke when A and D are "high", i.e. for the 9. The circuit in figure 2 uses one NAND gate (either normal or open collector, e.g. SN7400 or SN7401) and two diodes. As soon as the lower stroke (segment d)

is turned on, the stroke at the top (segment a) is added via  $D_1$ . This is the case for a 2, 3, 5, 6, and 8, all of which except the 6 had this stroke anyway. The result is that only the display for the 6 is changed: the stroke at the top is added. When input D is "high", i.e. for 8 and 9,  $N_1$  switches on the top and bottom segments through  $D_1$  and  $D_2$ . This gives the extra stroke at the bottom of the nine.

Figure 1. Improved readability of the 6 and 9, achieved with two open collector NAND gates.

Figure 2. The same improvement can be obtained with two diodes and one NAND gate.

