Hobby Scene

By John McVeigh

Have a problem or question on circuitry, components, parts availability, etc? Send it to the Hobby Scene Editor, POPULAR ELECTRONICS, One Park Ave., New York, N.Y. 10016. Though all letters can't be answered individually, those with wide interest will be published.

COMMON ANODE vs. COMMON CATHODE DISPLAYS

Q. A circuit calls for common-cathode LED displays, but the ones I have are the common-anode type. Is there a circuit that will allow me to use common-anode displays with common-cathode circuits, and vice versa?—Chris Iannuzzi, Warrenton, VA.

A. The common-anode display, connected to a chip designed to operate with such a display, is shown at A in the figure. When base current is applied to a driver transistor, it turns on and sinks current for the diode in a given segment. (For simplicity, only one diode per segment is assumed and only two segments are shown. Also, multiplexing details are omitted.) Note that all anodes in the display have a common connection to + V_{CC}. A common-cathode display is shown at B. Base current applied to a segment's driver transistor causes the device to conduct and source current for the LED. All cathodes in the display have a common connection to ground.

As far as the display-driver IC is concerned, one for common-anode applications sinks current through its output stages, but one for common-cathode displays sources current at its outputs. To use a common-anode driver with a common-cathode display, the circuit shown at C can be used. Pull-up resistor R, whose value should be chosen so that a few milliamperes flow through the driver transistor when base current is applied, is connected to $+V_{CC}$. When the transistor conducts, the input of the inverter is grounded. Accordingly, the output of the inverter is high and sources current for the segment LED. When the driver transistor is cut off, the input of the inverter is high and the output low. The segment LED is darkened.

To use a common-anode display with a common-cathode driver IC, the circuit shown at D can be employed. When base current turns a transistor on, the voltage appearing across R causes the inverter output to go low and sink current through the LED. When the transistor is cut off, the input of the inverter is low and its output high. No voltage drop exists across the LED, no current flows through it, and it remains darkened.

If you use either of these converter circuits, be sure that the inverters can handle the amount of current required by the LED segments.

Interestingly, some manufacturers are now producing IC's that will work with either common-cathode or common-anode displays. At E, National Semiconductor's MM5402 and MM5405 clock chips' output stage is shown connected to a common-anode display. The SEGMENT pin, internally connected to the drain of the driver, is wired to the cathode of a segment LED. The OUTPUT COMMON pin, internally connected to the source of the driver, is grounded.

At F, the common cathode application is shown. The OUTPUT COMMON pin is connected to the positive supply voltage and the SEGMENT pin connected to the anode of one segment diode in the common-cathode display. The diode cathodes are grounded. Thus, the driver either sinks or sources display current, depending on how the output pins are connected, making the clock chips compatible with either type of display. Another nice feature of these clock chips is their ability to be directly connected to LED displays. Current limiting resistors are not required.