

# BINARY-TO-OCTAL DECODER BCD-TO-DECIMAL DECODER

**8250**  
**8251**  
**8252**

DIGITAL 8000 SERIES TTL/MSI

## DESCRIPTION

The 8250, 8251 and 8252 are gate arrays for decoding and logic conversion applications.

The 8250 converts 3 lines of input to a one-of-eight output. The fourth input line (D) is utilized as an inhibit to allow use in larger decoding networks.

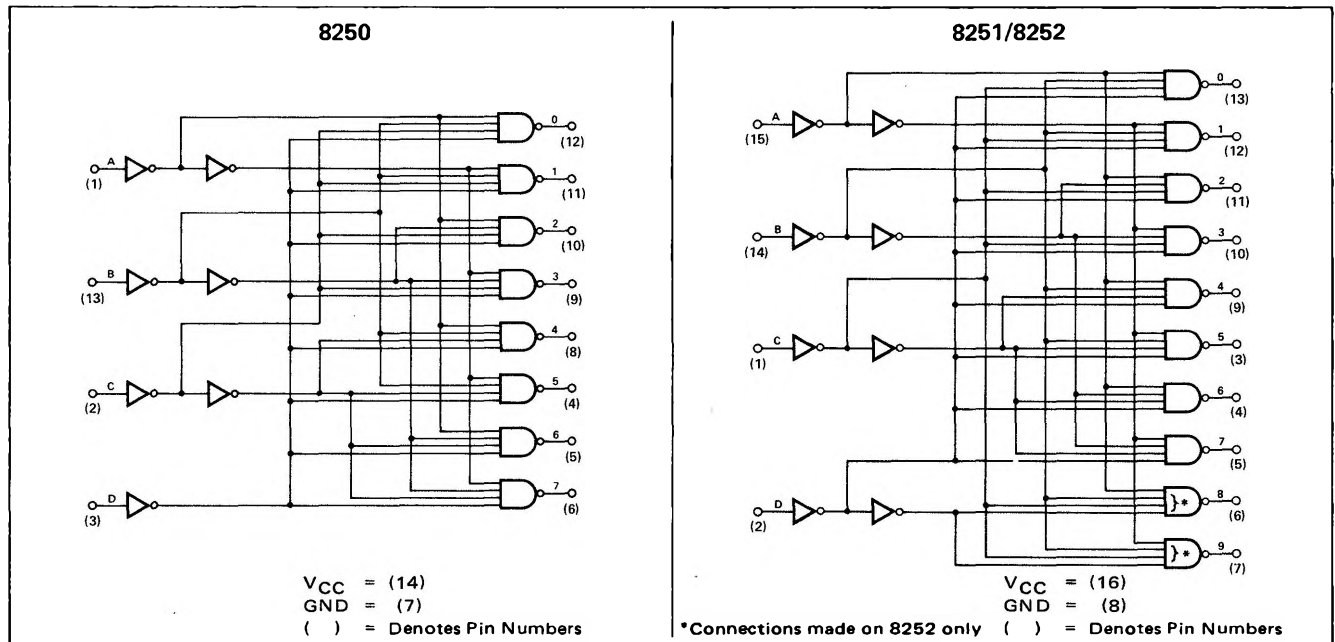
The 8251 and 8252 convert a 4 line input code (with

1-2-4-8 weighting) to a one-of-ten output as shown in the Truth Table.

The 8252 is a direct replacement for the 9301 with all outputs being forced high when a binary code greater than nine is applied to the inputs.

The selected output is a logic "0".

## LOGIC DIAGRAMS



## TRUTH TABLE

| INPUT STATE |   |   |   | OUTPUT STATES |   |   |   |   |   |   |   |      |   |      |   |
|-------------|---|---|---|---------------|---|---|---|---|---|---|---|------|---|------|---|
|             |   |   |   | 8250          |   |   |   |   |   |   |   | 8251 |   | 8252 |   |
|             |   |   |   |               |   |   |   |   |   |   |   |      |   |      |   |
| A           | B | C | D | 0             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8    | 9 | 8    | 9 |
| 0           | 0 | 0 | 0 | 0             | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1    | 1 | 1    | 1 |
| 1           | 0 | 0 | 0 | 1             | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1    | 1 | 1    | 1 |
| 0           | 1 | 0 | 0 | 1             | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1    | 1 | 1    | 1 |
| 1           | 1 | 0 | 0 | 1             | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1    | 1 | 1    | 1 |
| 0           | 0 | 1 | 0 | 1             | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1    | 1 | 1    | 1 |
| 1           | 0 | 1 | 0 | 1             | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1    | 1 | 1    | 1 |
| 0           | 1 | 1 | 0 | 1             | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1    | 1 | 1    | 1 |
| 1           | 1 | 1 | 0 | 1             | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1    | 1 | 1    | 1 |
| 0           | 0 | 0 | 1 | 1             | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0    | 1 | 0    | 1 |
| 1           | 0 | 0 | 1 | 1             | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1    | 0 | 1    | 0 |
| 0           | 1 | 0 | 1 | 1             | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0    | 1 | 1    | 1 |
| 1           | 1 | 0 | 1 | 1             | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1    | 0 | 1    | 1 |
| 0           | 0 | 1 | 1 | 1             | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0    | 1 | 1    | 1 |
| 1           | 0 | 1 | 1 | 1             | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1    | 0 | 1    | 1 |
| 0           | 1 | 1 | 1 | 1             | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0    | 1 | 1    | 1 |
| 1           | 1 | 1 | 1 | 1             | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1    | 0 | 1    | 1 |

# SIGNETICS DIGITAL 8000 SERIES TTL/MSI – 8250/51/52

## ELECTRICAL CHARACTERISTICS (Over Recommended Operating Temperature And Voltage)

| CHARACTERISTICS                           | LIMITS |      |      |       | A    | B    | C    | D    | OUTPUTS | NOTES |
|-------------------------------------------|--------|------|------|-------|------|------|------|------|---------|-------|
|                                           | MIN.   | TYP. | MAX. | UNITS |      |      |      |      |         |       |
| "1" Output Voltage                        | 2.6    | 3.5  |      | V     |      |      |      |      | -800    | 6, 10 |
| "0" Output Voltage                        |        |      | 0.4  | V     |      |      |      |      | 16mA    | 7, 10 |
| "1" Input Current<br>A, B, C, D           |        |      | 40   | μA    | 4.5V | 4.5V | 4.5V | 4.5V |         |       |
| "0" Input Current<br>A, B, C (8250, 8251) | -0.1   |      | -1.2 | mA    | 0.4V | 0.4V | 0.4V |      |         |       |
| A, B, C, D (8252)                         | -0.1   |      | -1.6 | mA    | 0.4V | 0.4V | 0.4V | 0.4V |         |       |
| D (8251 Only)                             | -0.1   |      | -1.2 | mA    |      |      |      | 0.4V |         |       |
| D (8250 Only)                             | -0.1   |      | -1.0 | mA    |      |      |      | 0.4V |         |       |

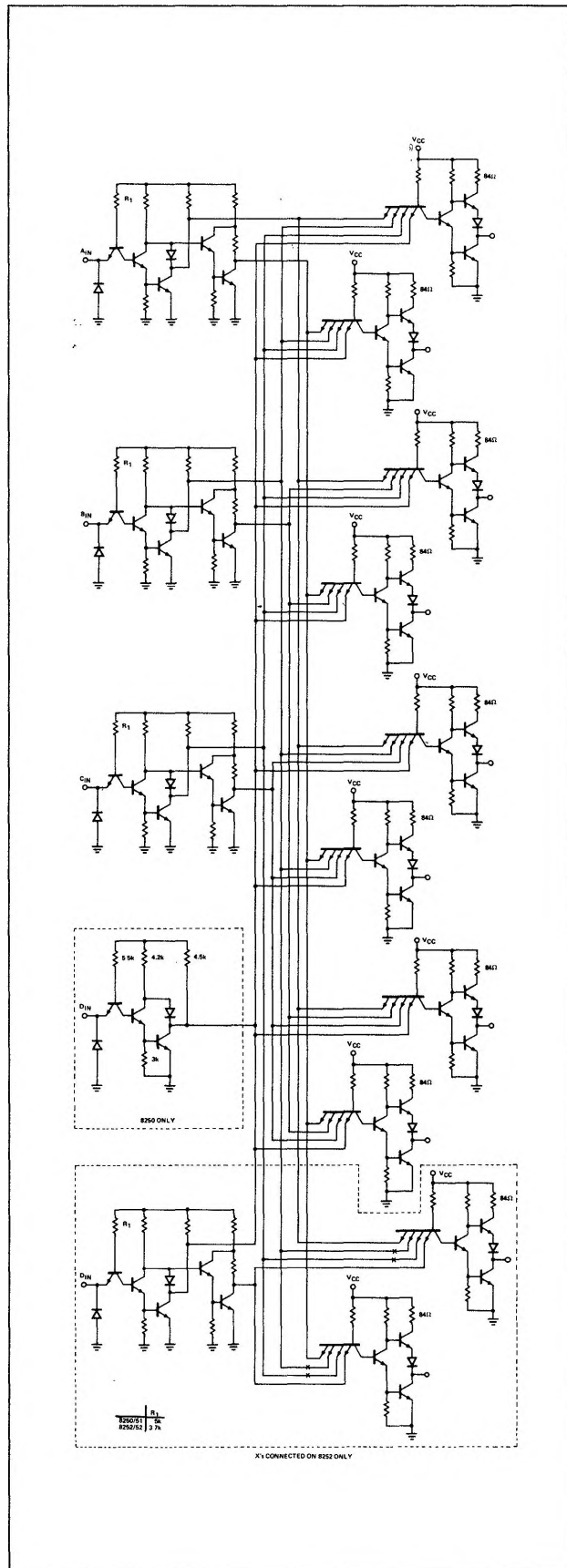
$T_A = 25^\circ \text{C}$  and  $V_{CC} = 5.0\text{V}$

| CHARACTERISTICS                          | LIMITS |      |          |       | A     | B     | C     | D    | OUTPUTS | NOTES |
|------------------------------------------|--------|------|----------|-------|-------|-------|-------|------|---------|-------|
|                                          | MIN.   | TYP. | MAX.     | UNITS |       |       |       |      |         |       |
| Turn-on Delay $t_{on}$                   |        | 20   | 35       | ns    |       |       |       |      |         | 8     |
| Turn-off Delay $t_{off}$                 |        | 20   | 35       | ns    |       |       |       |      |         | 8     |
| Power/Current Consumption<br>(8251 Only) |        |      | 135/25.7 | mW/mA | 5.25V | 5.25V | 5.25V | 0V   |         | 12    |
| (8250 Only)                              |        |      | 125/23.8 | mW/mA | 5.25V | 5.25V | 5.25V | 0V   |         | 12    |
| Input Latch Voltage                      | 5.5    |      |          | V     | 10mA  | 10mA  | 10mA  | 10mA |         | 11    |
| Output Short Circuit Current             |        |      |          |       |       |       |       |      |         |       |
| Outputs 1 thru 9                         | -10    |      | -55      | mA    | 0V    | 0V    | 0V    | 0V   | 0V      |       |
| Output 0                                 | -10    |      | -55      | mA    | 5.0V  | 0V    | 0V    | 0V   | 0V      |       |

### NOTES:

- All voltage measurements are referenced to the ground terminal. Terminals not specifically referenced are left electrically open.
- All measurements are taken with ground pin tied to zero volts.
- Positive current flow is defined as into the terminal referenced.
- Positive logic definition:  
"UP" Level = "1". "DOWN" Level = "0".
- Precautionary measures should be taken to ensure current limiting in accordance with Absolute Maximum Ratings should the isolation diodes become forward biased.
- Output source current is supplied through a resistor to ground.
- Output sink current is supplied through a resistor to  $V_{CC}$ . Refer to AC Test Figures.
- Manufacturer reserves the right to make design and process changes and improvements.
- Inputs for "1" and "0" output voltage test is per TRUTH table with threshold levels of 0.8V for logical "0" and 2.0V for logical "1".
- This test guarantees operation free of input latch-up over the specified operating power supply voltage range.
- $V_{CC} = 5.25$  volts.

# SCHEMATIC DIAGRAM



# AC TEST FIGURE AND WAVEFORMS

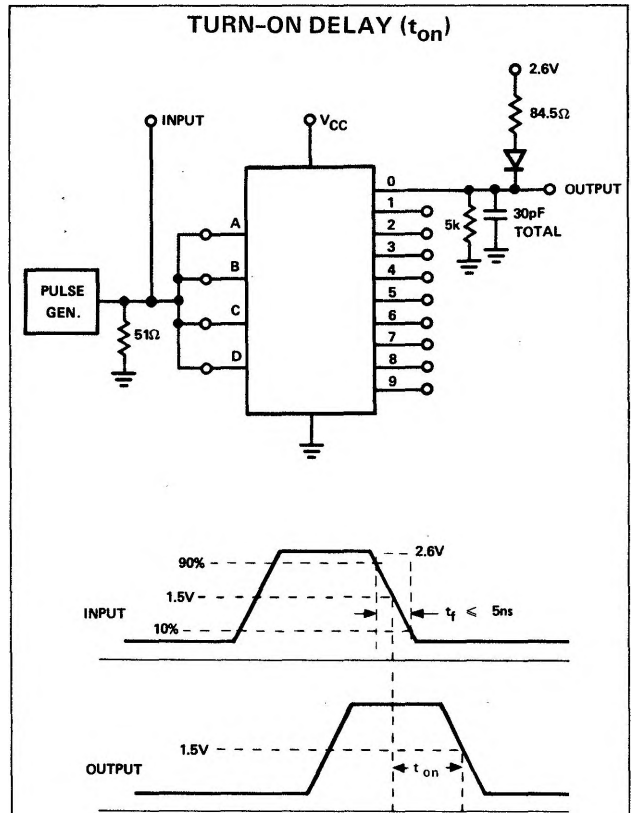


FIGURE 1

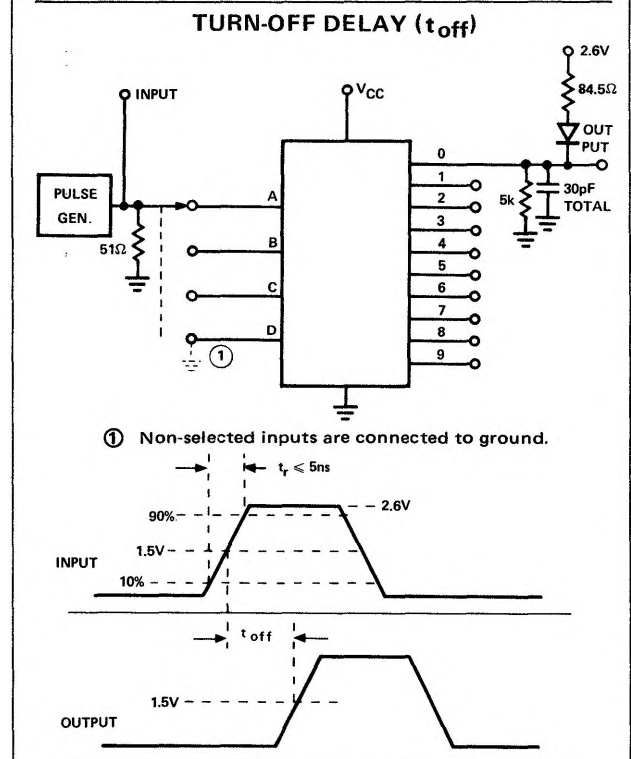
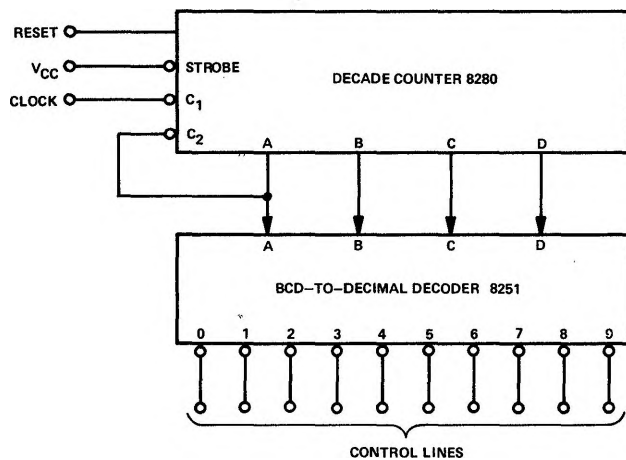


FIGURE 2

# TYPICAL APPLICATIONS

## ONE-OF-10 DECODER



## ONE-OF-64 DECODER

