

# 74150 Multiplexer

16-Input Multiplexer  
Product Specification

## Logic Products

### FEATURES

- Select data from 16 sources
- Demultiplexing capability
- Active-LOW enable or strobe
- Inverting data output

### DESCRIPTION

The '150 is a logical implementation of a single-pole, 16-position switch with the switch position controlled by the state of four Select inputs,  $S_0, S_1, S_2, S_3$ . The Multiplexer output ( $\bar{Y}$ ) inverts the selected data. The Enable input ( $\bar{E}$ ) is active-LOW. When  $\bar{E}$  is HIGH the  $\bar{Y}$  output is HIGH regardless of all other inputs. In one package the '150 provides the ability to select from 16 sources of data or control information.

| TYPE  | TYPICAL PROPAGATION DELAY | TYPICAL SUPPLY CURRENT (TOTAL) |
|-------|---------------------------|--------------------------------|
| 74150 | 17ns                      | 40mA                           |

### ORDERING CODE

| PACKAGES    | COMMERCIAL RANGE<br>$V_{CC} = 5V \pm 5\%; T_A = 0^\circ C \text{ to } +70^\circ C$ |
|-------------|--|
| Plastic DIP | N74150N  |

#### NOTE:

For information regarding devices processed to Military Specifications, see the Signetics Military Products Data Manual.

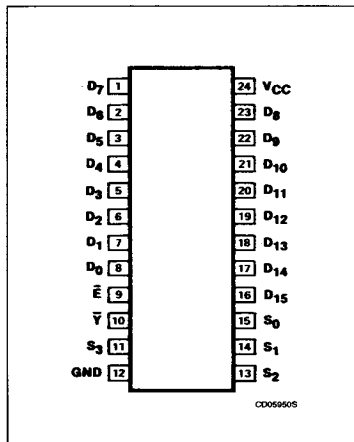
### INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

| PINS      | DESCRIPTION | 74   |
|-----------|-------------|------|
| All       | Inputs      | 1ul  |
| $\bar{Y}$ | Output      | 10ul |

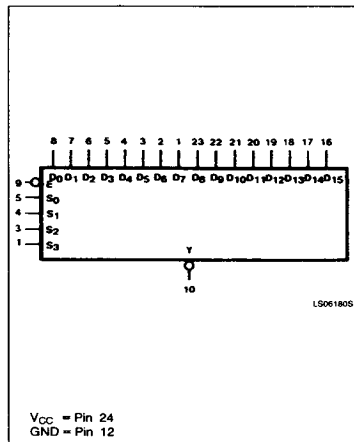
#### NOTE:

A 74 unit load (ul) is understood to be 40 $\mu$ A  $I_{IH}$  and -1.6mA  $I_{IL}$ .

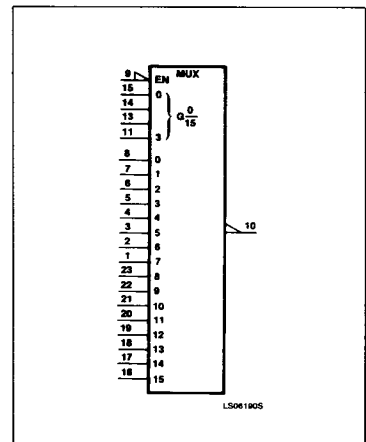
### PIN CONFIGURATION



### LOGIC SYMBOL



### LOGIC SYMBOL (IEEE/IEC)



December 4, 1985

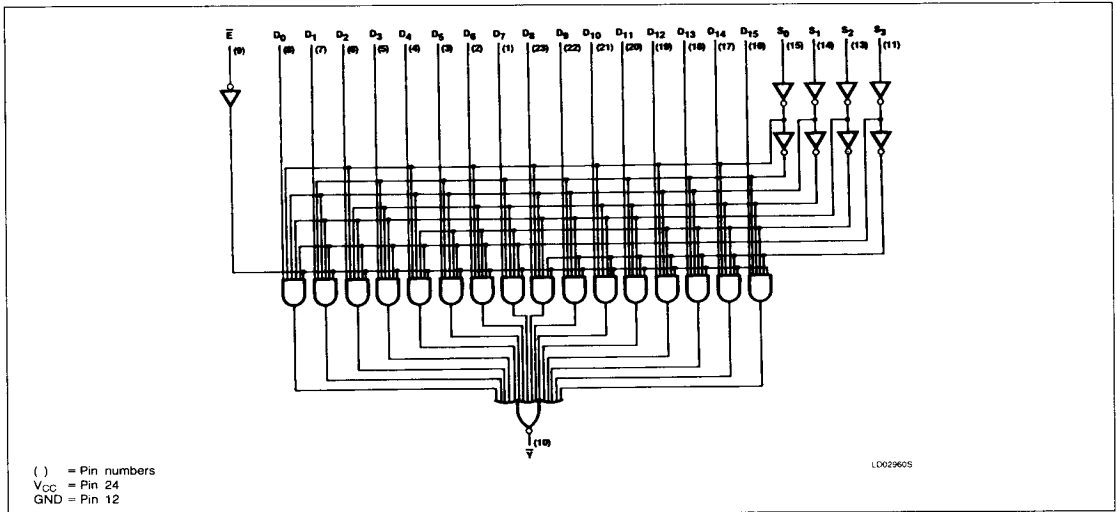
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# Multiplexer

74150

## LOGIC DIAGRAM



## FUNCTION TABLE

| INPUTS         |                |                |                |   |                |                |                |                |                |                |                |                |                |                |                 | OUTPUT          |                 |                 |                 |                 |   |
|----------------|----------------|----------------|----------------|---|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---|
| S <sub>3</sub> | S <sub>2</sub> | S <sub>1</sub> | S <sub>0</sub> | E | D <sub>0</sub> | D <sub>1</sub> | D <sub>2</sub> | D <sub>3</sub> | D <sub>4</sub> | D <sub>5</sub> | D <sub>6</sub> | D <sub>7</sub> | D <sub>8</sub> | D <sub>9</sub> | D <sub>10</sub> | D <sub>11</sub> | D <sub>12</sub> | D <sub>13</sub> | D <sub>14</sub> | D <sub>15</sub> | Y |
| X              | X              | X              | X              | H | X              | X              | X              | X              | X              | X              | X              | X              | X              | X              | X               | X               | X               | X               | X               | X               | H |
| L              | L              | L              | L              | L | L              | X              | X              | X              | X              | X              | X              | X              | X              | X              | X               | X               | X               | X               | X               | X               | H |
| L              | L              | L              | L              | L | L              | H              | X              | X              | X              | X              | X              | X              | X              | X              | X               | X               | X               | X               | X               | X               | L |
| L              | L              | L              | L              | L | L              | X              | L              | X              | X              | X              | X              | X              | X              | X              | X               | X               | X               | X               | X               | X               | L |
| L              | L              | L              | L              | L | L              | X              | H              | X              | X              | X              | X              | X              | X              | X              | X               | X               | X               | X               | X               | X               | L |
| L              | L              | L              | L              | L | L              | X              | X              | L              | X              | X              | X              | X              | X              | X              | X               | X               | X               | X               | X               | X               | L |
| L              | L              | L              | L              | L | L              | X              | X              | X              | H              | X              | X              | X              | X              | X              | X               | X               | X               | X               | X               | X               | L |
| L              | L              | L              | L              | L | L              | X              | X              | X              | X              | L              | X              | X              | X              | X              | X               | X               | X               | X               | X               | X               | L |
| L              | L              | L              | L              | L | L              | X              | X              | X              | X              | X              | H              | X              | X              | X              | X               | X               | X               | X               | X               | X               | L |
| L              | L              | L              | L              | L | L              | X              | X              | X              | X              | X              | X              | L              | X              | X              | X               | X               | X               | X               | X               | X               | L |
| L              | L              | L              | L              | L | L              | X              | X              | X              | X              | X              | X              | X              | H              | X              | X               | X               | X               | X               | X               | X               | L |
| L              | L              | L              | L              | L | L              | X              | X              | X              | X              | X              | X              | X              | X              | X              | L               | X               | X               | X               | X               | X               | L |
| L              | L              | L              | L              | L | L              | X              | X              | X              | X              | X              | X              | X              | X              | X              | X               | X               | H               | X               | X               | X               | L |
| L              | L              | L              | L              | L | L              | X              | X              | X              | X              | X              | X              | X              | X              | X              | X               | X               | X               | X               | X               | X               | L |
| L              | L              | L              | L              | L | L              | X              | X              | X              | X              | X              | X              | X              | X              | X              | X               | X               | X               | X               | X               | X               | L |
| L              | L              | L              | L              | L | L              | X              | X              | X              | X              | X              | X              | X              | X              | X              | X               | X               | X               | X               | X               | X               | L |
| L              | L              | L              | L              | L | L              | X              | X              | X              | X              | X              | X              | X              | X              | X              | X               | X               | X               | X               | X               | X               | L |
| L              | L              | L              | L              | L | L              | X              | X              | X              | X              | X              | X              | X              | X              | X              | X               | X               | X               | X               | X               | X               | L |
| L              | L              | L              | L              | L | L              | X              | X              | X              | X              | X              | X              | X              | X              | X              | X               | X               | X               | X               | X               | X               | L |

H = HIGH voltage level  
L = LOW voltage level  
X = Don't care

December 4, 1985

## Multiplexer

74150

**ABSOLUTE MAXIMUM RATINGS** (Over operating free-air temperature range unless otherwise noted.)

| PARAMETER |  | 74                | UNIT |
|-----------|--|-------------------|------|
| $V_{CC}$  | Supply voltage                                 | 7.0               | V    |
| $V_{IN}$  | Input voltage                                  | -0.5 to +5.5      | V    |
| $I_{IN}$  | Input current                                  | -30 to +5         | mA   |
| $V_{OUT}$ | Voltage applied to output in HIGH output state | -0.5 to $+V_{CC}$ | V    |
| $T_A$     | Operating free-air temperature range           | 0 to 70           | °C   |

**RECOMMENDED OPERATING CONDITIONS**

| PARAMETER |                                | 74   |     |      | UNIT    |
|-----------|--------------------------------|------|-----|------|---------|
|           |                                | Min  | Nom | Max  |         |
| $V_{CC}$  | Supply voltage                 | 4.75 | 5.0 | 5.25 | V       |
| $V_{IH}$  | HIGH-level input voltage       | 2.0  |     |      | V       |
| $V_{IL}$  | LOW-level input voltage        |      |     | +0.8 | V       |
| $I_{IK}$  | Input clamp current            |      |     | -12  | mA      |
| $I_{OH}$  | HIGH-level output current      |      |     | -800 | $\mu$ A |
| $I_{OL}$  | LOW-level output current       |      |     | 16   | mA      |
| $T_A$     | Operating free-air temperature | 0    |     | 70   | °C      |

**DC ELECTRICAL CHARACTERISTICS** (Over recommended operating free-air temperature range unless otherwise noted.)

| PARAMETER |   | TEST CONDITIONS <sup>1</sup>   | 74150 |                  |      | UNIT    |
|-----------|---|--|-------|------------------|------|---------|
|           |   |  | Min   | Typ <sup>2</sup> | Max  |         |
| $V_{OH}$  | HIGH-level output voltage                 | $V_{CC} = \text{MIN}, V_{IH} = \text{MIN}, V_{IL} = \text{MAX}, I_{OH} = \text{MAX}$ | 2.4   | 3.4              |      | V       |
| $V_{OL}$  | LOW-level output voltage                  | $V_{CC} = \text{MIN}, V_{IH} = \text{MIN}, V_{IL} = \text{MAX}, I_{OL} = \text{MAX}$ |       | 0.2              | 0.4  | V       |
| $V_{IK}$  | Input clamp voltage                       | $V_{CC} = \text{MIN}, I_I = I_{IK}$  |       |                  | -1.5 | V       |
| $I_I$     | Input current at maximum input voltage    | $V_{CC} = \text{MAX}, V_I = 5.5\text{V}$   |       |                  | 1.0  | mA      |
| $I_{IH}$  | HIGH-level input current                  | $V_{CC} = \text{MAX}, V_I = 2.4\text{V}$   |       |                  | 40   | $\mu$ A |
| $I_{IL}$  | LOW-level input current                   | $V_{CC} = \text{MAX}, V_I = 0.4\text{V}$   |       |                  | -1.6 | mA      |
| $I_{OS}$  | Short-circuit output current <sup>3</sup> | $V_{CC} = \text{MAX}$  | -18   |                  | -55  | mA      |
| $I_{CC}$  | Supply current <sup>4</sup> (total)       | $V_{CC} = \text{MAX}$  |       | 40               | 68   | mA      |

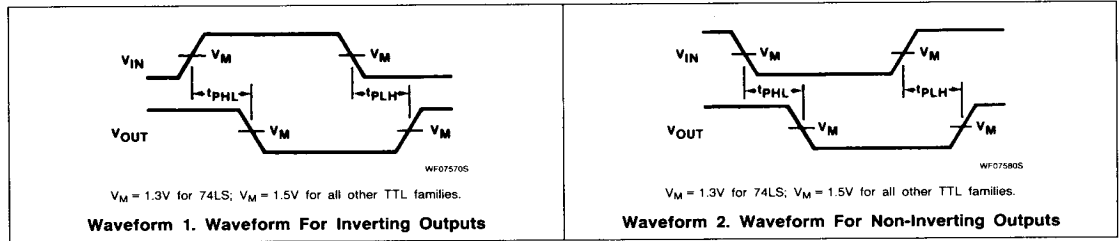
**NOTES:**

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
- All typical values are at  $V_{CC} = 5\text{V}, T_A = 25^\circ\text{C}$ .
- $I_{OS}$  is tested with  $V_{OUT} = +0.5\text{V}$  and  $V_{CC} = V_{CC} \text{ MAX} + 0.5\text{V}$ . Not more than one output should be shorted at a time and duration of the short circuit should not exceed one second.
- Measure  $I_{CC}$  with E, S<sub>0</sub> - S<sub>3</sub> inputs at 4.5V, all other inputs and outputs open.

# Multiplexer

74150

## AC WAVEFORMS



## AC ELECTRICAL CHARACTERISTICS TA = 25°C, VCC = 5.0V

| PARAMETER    | TEST CONDITIONS                                 | 74                   |          | UNIT |
|--------------|---|----------------------|----------|------|
|              |   | CL = 15pF, RL = 400Ω |          |      |
|              |   | Min                  | Max      |      |
| tPLH<br>tPHL | Propagation delay<br>Select to $\bar{Y}$ output | Waveform 1           | 35<br>33 | ns   |
| tPLH<br>tPHL | Propagation delay<br>Enable to $\bar{Y}$ output | Waveform 2           | 24<br>30 | ns   |
| tPLH<br>tPHL | Propagation delay<br>Data to $\bar{Y}$ output   | Waveform 1           | 14<br>20 | ns   |

5

## TEST CIRCUITS AND WAVEFORMS

