Cleveland Institute of Electronics

Electronics Symbols Handbook

This is a reproduction of CIE’s classic Electronics Symbols Handbook. The symbols listed in this handbook were collected after much research by the Technical Staff of Cleveland Institute of Electronics, Inc. Because the electronics industry has not adopted a single symbology standard, CIE has included the most frequently used symbols that represent each component.

The index lists components by general classification. The specific type of component is listed alphabetically under the general classification.

CIE has attempted to illustrate the most common symbols in use today in the industry. Your handbook has been designed to serve as a handy reference guide.
<table>
<thead>
<tr>
<th>Table of Contents</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog and Digital Devices and Hardware</td>
<td>1</td>
</tr>
<tr>
<td>Antennas</td>
<td>3</td>
</tr>
<tr>
<td>Capacitors</td>
<td>4</td>
</tr>
<tr>
<td>Circuit Protectors</td>
<td>5</td>
</tr>
<tr>
<td>Connectors, Terminals and Wiring</td>
<td>5</td>
</tr>
<tr>
<td>Delay Lines</td>
<td>6</td>
</tr>
<tr>
<td>Meters</td>
<td>6</td>
</tr>
<tr>
<td>Microwave and RF Symbols</td>
<td>7</td>
</tr>
<tr>
<td>Optical and Acoustical Devices</td>
<td>8</td>
</tr>
<tr>
<td>Resistors and Attenuators</td>
<td>10</td>
</tr>
<tr>
<td>Rotating Machinery</td>
<td>10</td>
</tr>
<tr>
<td>Semiconductor Devices</td>
<td>12</td>
</tr>
<tr>
<td>Shielding</td>
<td>13</td>
</tr>
<tr>
<td>Switches, Relays and Vibrators</td>
<td>13</td>
</tr>
<tr>
<td>Temperature Sensitive Devices</td>
<td>16</td>
</tr>
<tr>
<td>Transformers, Windings and Inductors</td>
<td>17</td>
</tr>
<tr>
<td>Tubes, Electron</td>
<td>18</td>
</tr>
<tr>
<td>Tube Elements</td>
<td>19</td>
</tr>
<tr>
<td>Electronics Data Guide</td>
<td>20</td>
</tr>
</tbody>
</table>
ANALOG AND DIGITAL DEVICES AND HARDWARE

AMPLIFIERS

- Inverting
- Non-inverting
- Operational
- Phase-splitting amplifier
- Summing

T IS
TRANSFER FUNCTION

OUTPUT TRANSFER

FLIP-FLOPS

D FLIP-FLOP
WITH TRUTH TABLE

CORES

- Conditional transfer
- Bistable magnetic core (S1, S2, S3=core binary states)
- Input transfer
- Memory

PRESET

CLOCK

CLEAR

J-K FLIP-FLOP
WITH TRUTH TABLE

D

Q

0

1

0

1

1

Qn

J

K

0

1

1

1

0

0

1

Qn

PRESET

INPUT TRANSFER
PLUGS

INTERLOCK
PLUG AND
RECEPTACLE

LINE PLUG

PHONO PLUG

TELEPHONE
PLUG

GENERAL SOCKET
AND PIN

WIRING

BUS BAR (WITH CONNECTIONS)

CHASSIS OR
FRAME GROUND

EARTH GROUND

POINTS OF
EQUAL POTENTIAL

TERMINAL STRIP OR BOARD

WIRES CONNECTED
(JUNCTION)

WIRES CROSSING

DELAY LINES

GENERAL

TAPPED

METERS

GENERAL—THE FUNCTION OF
THE METER IS DENOTED BY
REPLACING THE ASTERISK
WITH THE FOLLOWING NOTA-
TIONS: A—ammeter, G—gal-
vanometer, V—voltmeter, mA—
milliammeter, μA—micro-
ammeter, etc.
<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Ohmmeter" /></td>
<td>OHMMETER</td>
</tr>
<tr>
<td><img src="image" alt="Coupling, Loop" /></td>
<td>COUPLING, LOOP</td>
</tr>
<tr>
<td><img src="image" alt="Coupling, Probe" /></td>
<td>COUPLING, PROBE</td>
</tr>
<tr>
<td><img src="image" alt="Coupling by Probe from Coaxial to Rectangular Waveguide with D-C Grounds" /></td>
<td>COUPLING BY PROBE FROM COAXIAL TO RECTANGULAR WAVEGUIDE WITH D-C GROUNDS</td>
</tr>
<tr>
<td><img src="image" alt="Coupling by Probe to Space" /></td>
<td>COUPLING BY PROBE TO SPACE</td>
</tr>
<tr>
<td><img src="image" alt="Coupling, Resistance" /></td>
<td>COUPLING, RESISTANCE</td>
</tr>
<tr>
<td><img src="image" alt="Field Polarization Rotator" /></td>
<td>FIELD POLARIZATION ROTATOR</td>
</tr>
<tr>
<td><img src="image" alt="Flange, Choke" /></td>
<td>FLANGE, CHOKE</td>
</tr>
<tr>
<td><img src="image" alt="Flange, Plain" /></td>
<td>FLANGE, PLAIN</td>
</tr>
<tr>
<td><img src="image" alt="Hybrid—Rectangular Waveguide and Coaxial Coupling" /></td>
<td>HYBRID—RECTANGULAR WAVEGUIDE AND COAXIAL COUPLING</td>
</tr>
</tbody>
</table>

**Microwave and RF Symbols**

- **Cable Terminator (Line at Left)**
- **Circulator**
- **Coaxial Cable**
- **Coupler, General Direction**
- **Coupling, Aperture, 30 dB Loss**
- **Coupling by Loop from Coaxial to Circular Waveguide with D-C Grounds**
- **Coupling by Loop to Space**
- **Coupling by Loop to Transmission Path**
<table>
<thead>
<tr>
<th>Device Description</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetron, Tunable and Aperture Coupled</td>
<td><img src="image1" alt="Symbol" /></td>
</tr>
<tr>
<td>Waveguide, Circular</td>
<td><img src="image2" alt="Symbol" /></td>
</tr>
<tr>
<td>Waveguide, Rectangular</td>
<td><img src="image3" alt="Symbol" /></td>
</tr>
<tr>
<td>Waveguide, Ridged</td>
<td><img src="image4" alt="Symbol" /></td>
</tr>
<tr>
<td>Mode Transducer</td>
<td><img src="image5" alt="Symbol" /></td>
</tr>
<tr>
<td>Movable Short</td>
<td><img src="image6" alt="Symbol" /></td>
</tr>
<tr>
<td>Open Circuit Terminator</td>
<td><img src="image7" alt="Symbol" /></td>
</tr>
<tr>
<td>Reflex Klystron, Integral Cavity, Aperture Coupled</td>
<td><img src="image8" alt="Symbol" /></td>
</tr>
<tr>
<td>Series Capacitor, Path Open</td>
<td><img src="image9" alt="Symbol" /></td>
</tr>
<tr>
<td>Short Circuit Terminator</td>
<td><img src="image10" alt="Symbol" /></td>
</tr>
<tr>
<td>Series Inductor, Path Shorted</td>
<td><img src="image11" alt="Symbol" /></td>
</tr>
<tr>
<td>Unidirectional Attenuator - 1 dB in Main Direction, 10 dB in Opposite Direction</td>
<td><img src="image12" alt="Symbol" /></td>
</tr>
</tbody>
</table>

**Optical and Acoustical Devices**

<table>
<thead>
<tr>
<th>Type</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td><img src="image13" alt="Symbol" /></td>
</tr>
<tr>
<td>Bell</td>
<td><img src="image14" alt="Symbol" /></td>
</tr>
<tr>
<td>Buzzer</td>
<td><img src="image15" alt="Symbol" /></td>
</tr>
<tr>
<td>Frequency Determining Crystal</td>
<td><img src="image16" alt="Symbol" /></td>
</tr>
<tr>
<td>Handset</td>
<td><img src="image17" alt="Symbol" /></td>
</tr>
<tr>
<td>Double Headphones</td>
<td><img src="image18" alt="Symbol" /></td>
</tr>
<tr>
<td>Single Headphones</td>
<td><img src="image19" alt="Symbol" /></td>
</tr>
<tr>
<td>Horn, General</td>
<td><img src="image20" alt="Symbol" /></td>
</tr>
<tr>
<td>Symbol</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td><img src="image1.png" alt="Symbol" /></td>
<td>Pickup heads</td>
</tr>
<tr>
<td><img src="image2.png" alt="Symbol" /></td>
<td>Piezoelectric crystal phonograph cartridges</td>
</tr>
<tr>
<td><img src="image3.png" alt="Symbol" /></td>
<td>Lamps - Neon</td>
</tr>
<tr>
<td><img src="image4.png" alt="Symbol" /></td>
<td>Lamps - Pilot light</td>
</tr>
<tr>
<td><img src="image5.png" alt="Symbol" /></td>
<td>Lamps</td>
</tr>
<tr>
<td><img src="image6.png" alt="Symbol" /></td>
<td>Lamp, general - light source</td>
</tr>
<tr>
<td><img src="image7.png" alt="Symbol" /></td>
<td>Lamp - ballast</td>
</tr>
<tr>
<td><img src="image8.png" alt="Symbol" /></td>
<td>Lamps - flasher</td>
</tr>
<tr>
<td><img src="image9.png" alt="Symbol" /></td>
<td>Lamps - fluorescent</td>
</tr>
<tr>
<td><img src="image10.png" alt="Symbol" /></td>
<td>Lamps - incandescent, filament</td>
</tr>
<tr>
<td><img src="image11.png" alt="Symbol" /></td>
<td>Microphones</td>
</tr>
<tr>
<td><img src="image12.png" alt="Symbol" /></td>
<td>Microphone - capacitor</td>
</tr>
<tr>
<td><img src="image13.png" alt="Symbol" /></td>
<td>Microphone - crystal</td>
</tr>
<tr>
<td><img src="image14.png" alt="Symbol" /></td>
<td>Microphone - directional</td>
</tr>
<tr>
<td><img src="image15.png" alt="Symbol" /></td>
<td>Microphone - double button</td>
</tr>
<tr>
<td><img src="image16.png" alt="Symbol" /></td>
<td>Microphone - dynamic</td>
</tr>
<tr>
<td><img src="image17.png" alt="Symbol" /></td>
<td>Microphone, general - single button</td>
</tr>
<tr>
<td><img src="image18.png" alt="Symbol" /></td>
<td>Speakers</td>
</tr>
<tr>
<td><img src="image19.png" alt="Symbol" /></td>
<td>Speakers - dynamic - E.M. - P.M.</td>
</tr>
</tbody>
</table>
GENERATOR, A-C SIX PHASE

GENERATOR OR MOTOR, A-C SINGLE PHASE

GENERATOR, RECTIFIED A-C (ALTERNATOR)

MOTOR, A-C THREE PHASE SYNCHRONOUS

MOTOR, HYSTERESIS

MOTOR, RELUCTANCE

MOTOR, REPULSION START

MOTOR, SHADDED POLE

D-C

COMMUTATING OR COMPENSATING FIELD WINDING

GENERATOR, D-C

GENERATOR, SERIES

GENERATOR, SHUNT, SELF-EXCITED

GENERATOR, SHUNT, SEPARATELY EXCITED

SERIES FIELD WINDING

SHUNT FIELD WINDING

GENERATOR, COMPOUND

MOTORS—REPLACE THE SYMBOL "G" IN THE ABOVE SYMBOLS BY THE LETTER "M"
### SEMICONDUCTOR DEVICES

#### DIODES
- **Anode** → **Cathode**
- **Diode Rectifier**
- **Light Emitting Diodes**
- **Light Sensor Diode**
- **Shockley Diode**
- **Symmetrical Diode**
- **Tunnel Diode**
- **Varactor Diode**
- **Voltage Limiter, Bipolar Diode**
- **Zener Diode**

#### ELECTRONIC SWITCHES

#### DIAC
- GTO (Gate Turn-Off Switch)
- GTO ANODE CATHODE
- GATE ANODE CATHODE

#### LASER (Light Activated SCR)
- LASER ANODE CATHODE
- LASER ANODE GATE CATHODE

#### LASCS (Light Activated Switch)
- LASCS ANODE CATHODE GATE

#### SCR (Silicon Controlled Rectifier)
- SCR ANODE GATE CATHODE

#### SCS (Silicon Controlled Switch)
- SCS ANODE CATHODE GATE

#### TRIAC
- TRIAC $T_1$ GATE $T_2$

### TRANSISTORS

#### IGFET, MOSFET, N-Channel

#### IGFET, MOSFET, P-Channel
SHIELDING

COMMON GROUND BETWEEN TWO WIRES

GENERAL (ELECTRIC OR MAGNETIC)

OPTICAL SHIELDING

SHEilded ASSEMBLY

SHEilded PAIR, TWIN LEAD

SHEilded WIRED, SINGLE CONDUCTOR

WIRE SHEilded BETWEEN TWO POINTS

SWITCHES, RELAYS AND VIBRATORS

THIS SECTION IS LISTED IN PRACTICAL RATHER THAN ALPHABETICAL ORDER

SPST (SINGLE POLE, SINGLE THROW)
DPST (DOUBLE POLE, SINGLE THROW)

SPDT (SINGLE POLE, DOUBLE THROW)

DPDT (DOUBLE POLE, DOUBLE THROW)

IN THE FOLLOWING SYMBOLS:
NC = CONTACTS NORMALLY CLOSED
NO = CONTACTS NORMALLY OPEN

INTERLOCK, SAFETY SWITCH

KNIFE SWITCH

LIMIT SWITCH

LIQUID-LEVEL SWITCH

MULTI-CONTACT OR SELECTOR SWITCHES

FLOW SWITCH

PUSHBUTTON, MOMENTARY MAKE OR BREAK

PUSHBUTTON, MOMENTARY TRANSFER

PUSHBUTTON, MAINTAINED CONTACT

SOLENOID SWITCH

TEMPERATURE ACTUATED SWITCH

VACUUM OR PRESSURE ACTUATED SWITCH

WAFER OR ROTARY SWITCHES
<table>
<thead>
<tr>
<th>Component Description</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reed Switch</td>
<td>![Reed Switch Symbol]</td>
</tr>
<tr>
<td>Relay Contacts, Time Delay Opening</td>
<td>![Relay Contacts Symbol]</td>
</tr>
<tr>
<td>Relay Contacts, Make-Before-Break</td>
<td>![Relay Contacts Symbol]</td>
</tr>
<tr>
<td>Relay Contacts, Normally Closed But Held Open</td>
<td>![Relay Contacts Symbol]</td>
</tr>
<tr>
<td>Relay Contacts, Normally Open But Held Closed</td>
<td>![Relay Contacts Symbol]</td>
</tr>
<tr>
<td>Relay Contacts, Transfer</td>
<td>![Relay Contacts Symbol]</td>
</tr>
<tr>
<td>Relay Contacts, Transfer, Time Delay Closing</td>
<td>![Relay Contacts Symbol]</td>
</tr>
<tr>
<td>Single Pole Relay</td>
<td>![Single Pole Relay Symbol]</td>
</tr>
<tr>
<td>Double Pole Relay</td>
<td>![Double Pole Relay Symbol]</td>
</tr>
<tr>
<td>Double Pole, Double Make Relay</td>
<td>![Double Pole Relay Symbol]</td>
</tr>
<tr>
<td>Polarized Relay With Transfer Contact</td>
<td>![Polarized Relay Symbol]</td>
</tr>
<tr>
<td>Counter Relay</td>
<td>![Counter Relay Symbol]</td>
</tr>
</tbody>
</table>
TRANSFORMERS, WINDINGS
AND INDUCTORS

THIS SECTION IS LISTED IN
PRACTICAL RATHER THAN
ALPHABETICAL ORDER

GENERAL WINDING OR
AIR-CORE INDUCTOR

ADJUSTABLE INDUCTOR

TAPPED INDUCTOR

INDUCTOR, IRON-CORE

INDUCTOR, PERMANENT
MAGNET CORE
(ELECTROMAGNET)

INDUCTOR, POWDERED IRON-
CORE (FERRITE)

TRANSFORMER, ADJUSTABLE

TRANSFORMER, IRON-CORE

TRANSFORMER, POWDERED
IRON-CORE (FERRITE)

TRANSFORMER, SATURABLE
CORE (TRANSDUCTOR)

TRANSFORMER, IRON-CORE
WITH ELECTROSTATIC SHIELD

SECONDARIES

CT

INDUCTOR, SATURABLE CORE

TRANSFORMER, MULTI-
WINDING SECONDARY
WITH CENTER-TAP (CT)

TRANSFORMER, AIR-CORE

AUTOTRANSFORMER

AUTOTRANSFORMER,
VARIABLE
TRANSFORMER, TOROIDAL CORE

CURRENT TRANSFORMER

SATURABLE REACTOR

TUBES, ELECTRON

DIODE

TRIODE

TETRODE

PENTODE

BEAM POWER

PENTAGRID CONVERTER

DUO-DIODE

DUO-TRIODE

BEAM POWER

PENTAGRID CONVERTER

DUO-DIODE

DUO-TRIODE

GAS-FILLED RECTIFIER

HIGH VOLTAGE RECTIFIER

CONTINUED NEXT PAGE