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Pictogram used to represent various electrical and electronic devices or functionsCommon circuit diagram symbols (US ANSI symbols)An electronic symbol is a pictogram used to represent various electrical and electronic devices or functions, such as wires, batteries, resistors, and transistors, in a schematic diagram of an electrical or electronic circuit. These symbols are largely standardized internationally today, but may vary from country to country, or engineering discipline, based on traditional conventions.The graphic symbols used for electrical components in circuit diagrams are covered by national and international standards, in particular:IEC 60617 (also known as BS 3939).There is also IEC 61131-3 for ladder-logic symbols.JIC JIC (Joint Industrial Council) symbols as approved and adopted by the NMTBA (National Machine Tool Builders Association). They have been extracted from the Appendix of the NMTBA Specification EGPl-1967.ANSI Y32.2-1975 (also known as IEEE Std 315-1975[1] or CSA Z99-1975).IEEE Std 91/91a: graphic symbols for logic functions (used in digital electronics). It is referenced in ANSI Y32.2/IEEE Std 315.Australian Standard AS 1102 (based on a slightly modified version of IEC 60617; withdrawn without replacement with a recommendation to use IEC 60617).The standards do not all agree, and use of unusual (even if standardized) symbols can lead to confusion and errors.[2]Symbols usage is sometimes idiosyncratic to engineering disciplines, and national or local variations to international standards exist. For example, lighting and power symbols used as part of architectural drawings may be different from symbols for devices used in electronics.Symbols shown are typical examples, not a complete list.[3][4]Wire crossover symbols for circuit diagrams. The CAD symbol for insulated crossing wires is the same as the older, non-CAD symbol for non-insulated crossing wires. To avoid confusion, the wire "jump" (semi-circle) symbol for insulated wires in non-CAD schematics is recommended (as opposed to using the CAD-style symbol for no connection), so as to avoid confusion with the original, older style symbol, which means the exact opposite. The newer, recommended style for 4-way wire connections in both CAD and non-CAD schematics is to stagger the joining wires into T-junctions. The large dot signifies an electrical connection.The shorthand for ground is GND. Optionally, the triangle in the middle symbol may be filled in.General ground (IECstyle)Signal/low-noise ground (the asterisk is not part of the symbol)Chassis/Earth ground (IECstyle)Voltage text should be placed next to each battery symbol too, such as "3V".Battery, single-cellBattery, multi-cell Solar (photovoltaic) cell DC voltage sourceControlled DC voltage sourceCurrent sourceControlled current sourceAC voltage sourceSee also: ResistorIt is very common for potentiometer and rheostat symbols to be used for many types of variable resistors and trimmers.ANSIstyle: (a)Resistor, (b)Rheostat, (c)Potentiometer/ TrimmerIECstyle: (a)Resistor, (b)Rheostat, (c)Potentiometer/ TrimmerPhotoresistor (ANSI)Thermistor (ANSI).[5]Use -t for NTC symbol.Use +t for PTC symbol.Varistor (ANSI)See also: CapacitorGeneral capacitor (IECstyle); sometimes drawn with one plate curved[2]Polarized capacitor (Americanstyle), such as electrolytic and tantalum capacitorsVariable capacitorGanged (comoving) variable capacitors (IECstyle)Trimmer variable capacitorSee also: DiodeOptionally, the triangle in these symbols may be filled in, or a line may be drawn through the triangle (less desirable). The words anode and cathode aren't part of the diode symbols. For instructional purposes, sometimes one or two letters (A/C or A/K) are placed next to diode symbols similar to how the letters C/B/E or D/G/S are placed next to transistor symbols. "K" is often used instead of "C", because the origin of the word cathode is kathodos, and to avoid confusion with "C" for capacitors in silkscreen of printed circuit boards. Voltage text should be placed next to each zener and TVS diode symbol too, such as "5.1V". Diode (rectifier) Schottky diode Zener diode TVS (Transient Voltage Suppression) diode. Top is unidirectional, bottom is bidirectional. LED (Light Emitting Diode) Photodiode Tunnel diode Varicap Shockley diode SCR (Silicon Controlled Rectifier) Diac (may be a varistor in older schematics) Constant-current diode Opto-isolator: internal LED (left) and photo transistor (right) See also: Bridge rectifierThere are many ways to draw a single-phase bridge rectifier symbol. Some simplified symbols don't show the internal diodes. Bridge rectifier Bridge rectifierBridge rectifierBridge rectifierThree-phase bridge rectifierSee also: InductorAn inductor can be drawn either as a series of loops, or series of half-circles.Inductor symbol (series of loops)Air-core inductor (IECstyle)Magnetic-core inductor (IEEEstyle)Tapped inductor (IECstyle)Ferrite bead (IEEEstyle)Variable inductorTrimmer variable inductorSee also: TransformerVoltage text should be placed on both sides of power transformers, such as 120V (input side) and 6.3V (output side).TransformerTransformer with center tap on secondary winding (right side)Transformer with two secondary windings (right side)Current transformerZero-sequence current transformer (ZSCT) (also known as a window-type current transformer)Bushing-type current transformerVoltage transformerSee also: TransistorOptionally, transistor symbols may include a circle.[6] Note: The pin letters B/C/E and G/D/S aren't part of the transistor symbols.See also: Bipolar junction transistorNPN bipolar junction transistor (BJT) PNP bipolar junction transistor (BJT) NPN Darlington transistorPNP Darlington transistorNPN PhototransistorSee also: Field-effect transistorN-channel junction gate field-effect transistor (JFET)P-channel junction gate field-effect transistor (JFET)Metaloxidesemiconductor field-effect transistor (MOSFET)Enhancement mode, Nchannel MOSFETEnhancement mode, Pchannel MOSFETSee also: Vacuum tubeVacuum tube diodeVacuum tube triodeVacuum tube tetrode(pin letters not part of symbol)Vacuum tube pentodeSee also: SwitchFor multiple pole switches, a dotted or dashed line can be included to indicate two or more switch at the same time (see DPST and DPDT examples below).Pushbutton, normally open, push-to-make (horizontal line on top)Pushbutton, normally open, push-to-make (IEEE-style)Pushbutton, normally closed, push-to-break (IEEE-style)Pushbutton, normally closed, two circuits (IEEE-style)Switch, 1P1T, SPST (single-pole single-throw)Switch, 2P1T, DPST (double-pole single-throw)Switch, 1P2T, SPDT (single-pole double-throw)Switch, 2P2T, DPDT (double-pole double-throw)Rotary switch, 1P3T,break-before-make, nonshorting styleRotary switch, 1P4T,break-before-make, nonshorting styleRotary switch, 1P4T,make-before-break, shorting styleSlide switch, 1P4T,make-before-break, shorting styleReed switch, normally openSee also: RelayRelays symbols are a combination of an inductor symbol and switch symbol.Note: The pin letters in these symbols aren't part of the standard relay symbol.SPST, SPDT, DPST, DPDT relays (Americanstyle)SPDT relay (IECstyle)LED is located in the diode section.Neon lampIndicating lamp (IEEEstyle)Incandescent lampIndicatory incandescent light bulbLight bulbIEC fuse (b), equivalent symbols (a,c) (IEEE Std 315-1975)Molded-case circuit breaker (MCCB)Fuse: IEC (top) and American (lower two)TVS and Zener diodes are located in the diode section.Gas-discharge tubes (GDT) for ESD dischargeSpark gap for ESD dischargeSpeaker symbols sometimes include an internal inductor symbol. Impedance text should be placed next to each speaker symbol, such as "8 ohms".Loudspeaker(IEEE-style)Buzzer(IEC-style)Microphone(IEEE-style)Microphone(IEC-style)See also: Antenna (radio)General antenna(IEC-style)Dipole antenna(IEC-style)Loop antenna(IEC-style)Loop antenna(IEEE-style)See also: Electrical cableCable, Shielded 1 conductorCable, 2 conductorCable, Shielded 2 conductor with shield connected to groundCable, 5 conductorCable, Shielded 5 conductorSee also: Electrical connectorThere are numerous connector symbol variations. Phone connectors. "A" is TS, "B" is TRS, "D" is TRS with two switches. 5x2 shrouded header with notch key and pin names for Olimex UEXT. DE-9 D-subminiature with host side pin names for RS-232 serial port.See also: Integrated circuitSee also: Logic gatesFor the symbols below: A and B are inputs, Q is output. Note: These letters are not part of the symbols.There are variations of these logic gate symbols. Depending on the IC, the two-input gates below may have: 1) two or more inputs; 2) infrequently some have a second inverted Q output too.BufferInverter (NOT)ANDNANDORNORXORXNORThe above logic symbols may have additional I/O variations too: 1) schmitt trigger inputs, 2) tri-state outputs, 3) open-collector or open-drain outputs (not shown).Buffer gate with schmitt trigger inputBuffer gate with tri-state output control.(B is the tri-state control)See also: Flip-flopsFor the symbols below: Q is output, Q is inverted output, E is enable input, internal triangle shape is clock input, S is Set, R is Reset (some datasheets use clear (CLR) instead of reset along the bottom).There are variations of these flip-flop symbols. Depending on the IC, a flip-flop may have: 1) one or both outputs (Q only, Q only, both Q & Q); 2) one or both forced inputs along top & bottom (R only, S only, both R & S); 3) some inputs may be inverted.Simple SR flip-flop (inverted S & R inputs)Gated SR flip-flopGated D flip-flop (Transparent Latch)Clocked D flip-flop(Set & Reset inputs)Clocked JK flip-flopClocked T flip-flopNote: The outside text isn't part of these symbols.Operational amplifier (opamp)ComparatorNote: 3pin linear or LDO voltage regulator symbols typically have three words inside their symbols, such as "In" on left side, "Out" on right side", "Gnd" on bottom (for fixed output parts, such as LM7805) or "Adj" on bottom (for adjustable output parts, such as LM317).3-pin Linear or LDO voltage regulatorSee also: Electronic oscillatorFrequency text should be placed next to each oscillator symbol, such as "16MHz".Crystal oscillator (IEEEstyle)Ceramic resonator (3pins)Hall-effect sensorThe shape of some electronic symbols have changed over time. The following historical electronic symbols can be found in old electronic books / magazines / schematics, and now considered obsolete.All of the following are obsolete capacitor symbols.Obsolete capacitor (very old style)Obsolete capacitorObsolete capacitorObsolete capacitorObsolete capacitorElectronics portalCircuit diagramReference designatorSymbols for appliance classes^ "IEEE Standard American National Standard Canadian Standard Graphic Symbols for Electrical and Electronics Diagrams (Including Reference Designation Letters)," in IEEE Std 315-1975 (Reaffirmed 1993), vol., no., pp.i-244, 1993, doi:10.1109/IEEESTD.1993.93397.^ a b Sobering, Tim (April 2008). Guidelines for Drawing Schematics.^ Circuit Symbols for all Electronic Components. Talking Electronics, 2013. Retrieved 01 Apr 2015.^ Electrical Symbols & Electronic Symbols. UnitConvertHub, 2012. Retrieved 17 April 2016.^ "Standards for Resistor Symbols". EePower. EETech Media. Retrieved September 13, 2021.^ "A4.11 Envelope or Enclosure". ANSI Y32.2-1975 (PDF). Archived from the original (PDF) on 2022-10-09. Retrieved 2020-12-29. The envelope or enclosure symbol may be omitted from a symbol referencing this paragraph, where confusion would not resultStandardsIEC 60617: Graphical Symbols for Diagrams; 2012.IEEE 315: Graphic Symbols for Electrical and Electronics Diagrams (including Reference Designation Letters); 1975.U.S. DoD MIL-STD-806B: Graphical Symbols for Logic Diagrams; 1962. (RevB in 1962)BooksBeginner's Guide to Reading Schematics; 4th Ed; Stan Gibilisco; McGraw-Hill, 224 pages; 2018; ISBN978-1260031119.How to Read Schematic Diagrams; 5th Ed; Donald Herrington; Literary Licensing; 130 pages; 2011; ISBN978-0672224577. (4ed in 1986)(2ed in 1967)How to Read Electronic Circuit Diagrams; 2nd Ed; Robert Brown, Paul Lawrence, James Whitson; Tab Books; 214 pages; 1988; ISBN978-0830628803. (2ed in 1988)Engineer's Mini-Notebook: Schematic Symbols, Device Packages, Design and Testing; 1st Ed; Forrest M. Mims III; Radio Shack; 48 pages; 1988. (1ed in 1988)Wikimedia Commons has media related to Electrical symbols.Retrieved from "

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