Reference designator

A **reference designator** unambiguously identifies a component within an electrical schematic or on a printed circuit board. The reference designator usually consists of one or two letters followed by a number, e.g. R13, C1002. The number is sometimes followed by a letter, indicating that components are grouped or matched with each other, e.g. R17A, R17B. IEEE 315 contains a list of Class Designation Letters

to use for electrical and electronic assemblies. For example, the letter R is a reference prefix for the resistors of an assembly, C for capacitors, K for relays.

History

IEEE 200-1975 or "Standard Reference Designations for Electrical and Electronics Parts and Equipments" is a standard that was used to define referencing naming systems for collections of electronic equipment. IEEE 200 was ratified in 1975. The IEEE renewed the standard in the 1990s, but withdrew it from active support shortly thereafter. This document also has

an ANSI document number, ANSI Y32.16-1975.

This standard codified information from, among other sources, a United States military standard MIL-STD-16 which dates back to at least the 1950s in American industry.

To replace IEEE 200-1975, ASME, a standards body for mechanical engineers, initiated the new standard ASME Y14.44-2008. This standard, along with IEEE 315-1975, provide the electrical designer with guidance on how to properly reference and annotate everything from a single circuit

board to a collection of complete enclosures.

Definition

ASME Y14.44-2008[1] and IEEE 315-1975[2] define how to reference and annotate components of electronic devices.

It breaks down a system into units, and then any number of sub-assemblies. The unit is the highest level of demarcation in a system and is always a numeral. Subsequent demarcation are called assemblies and always have the Class Letter "A" as a prefix following by a sequential number starting with 1. Any

number of sub-assemblies may be defined until finally reaching the component. Note that IEEE-315-1975[2] defines separate class designation letters for *separable* assemblies (class designation 'A') and *inseparable* assemblies (class designation 'U'). Inseparable assemblies—i.e., "items which are ordinarily replaced as a single item of supply"[2]—are typically treated as components in this referencing scheme.

Examples:

- 1A12A2R3 - Unit 1, Assembly 12, Sub-assembly 2, Resistor 3

- 1A12A2U3 - Unit 1, Assembly 12, Sub-assembly 2, Inseparable Assembly 3

Especially valuable is the method of referencing and annotating cables plus their connectors within and outside assemblies. Examples:

- 1A1A44J5 - Unit 1, Assembly 1, Sub-Assembly 44, Jack 5 (J5 is a connector on a box referenced as A44)
- 1A1A45J333 - Unit 1, Assembly 1, Sub-Assembly 45, Jack 333 (J333 is a connector on a box referenced as A45)

A cable connecting these two might be:

- 1A1W35 - In the assembly A1 is a cable called W35.

Connectors on this cable would be designated:

- 1A1W35P1
- 1A1W35P2

ASME Y14.44-2008 continues the convention of Plug P and Jack J when assigning references for electrical connectors in assemblies where a J (or jack) is the more fixed and P (or plug) is the less fixed of a connector pair, without regard to the gender of the connector contacts.

The construction of reference designators is covered by IEEE 200-1975/ANSI Y32.16-1975[3] (replaced by ASME Y14.44-2008[1]) and IEEE-315-1975.[2]

Designators

The table below lists designators commonly used, and does not necessarily comply with standards.

Designator	Component type
A	Separable assembly or sub-assembly (e.g. printed circuit assembly)
AT	Attenuator or isolator
BR	Bridge rectifier
BT	Battery
C	Capacitor
CN	Capacitor network
D, CR	Diode (all types, including LED), thyristor
DL	Delay line
DS	Display
F	Fuse
FB	Ferrite bead
FD	Fiducial
FL	Filter
G	Generator or oscillator
GN	General network
H	Hardware, e.g., screws, nuts, washers
HY	Circulator or directional coupler
IR	Infrared Diode
J	Jack (least-movable connector of a connector pair), Jack connector (connector may have "male" pin contacts and/or "female" socket contacts)
JP	Jumper (Link)
K	Relay or contactor
L	Inductor or coil or ferrite bead
LS	Loudspeaker or buzzer
M	Motor
MK	Microphone
MP	Mechanical part (including screws and fasteners)
P	Plug (most-movable connector of a connector pair), Plug connector (connector

	may have "male" pin contacts and/or "female" socket contacts)
PS	Power supply
Q	Transistor (all types)
R	Resistor
RN	Resistor network
RT	Thermistor
RV	Varistor, Variable resistor
S	Switch (all types, including buttons)
T	Transformer
TC	Thermocouple
TP	Test point
TUN	Tuner
U	Integrated circuit (IC)
V	Vacuum tube
VR	Voltage regulator (voltage reference), Variable resistor (potentiometer or rheostat)
X	Socket connector for another item not P or J, paired with the letter symbol for that item (XV for vacuum tube socket, XF for fuse holder, XA for printed circuit assembly connector, XU for integrated circuit connector, XDS for light socket, etc.)
XTAL	Crystal
Y	Crystal or oscillator

Other designators

- AE: Aerial, antenna
- ASSY: Separable assembly

- B: Battery
- BR: Bridge rectifier
- CN: Connector
- CRT: Cathode ray tube
- CR: Diode
- DSP: Digital signal processor
- FET: Field-effect transistor
- GDT, SVP: Gas discharge tube, Surge Voltage Protector
- H: Pin header
- IC: Integrated circuit
- J, JW: Wire link ("jumper")
- JFET: Junction gate field-effect transistor

- LA: Lightning arrester
- LCD: Liquid crystal display
- LDR: Light-dependent resistor
- LED: Light-emitting diode
- MCB: Miniature circuit breaker
- MIC: Microphone
- MOSFET: Metal-oxide-semiconductor field-effect transistor
- MOV: Metal-oxide varistor
- NE: Neon lamp
- PCB: Printed circuit board
- PLC: Programmable logic controller
- PU: Pickup
- RY, RLA: Relay

- SCR: Silicon-controlled rectifier
- SUS: Silicon unilateral switch
- SW: Switch
- TFT: Thin-film transistor (display)
- TH: Thermistor
- V: Valve (tube)
- VC: Variable capacitor
- VDR: Voltage-dependent resistor
- VFD: Vacuum fluorescent display
- VT: Voltage transformer
- W: Wire
- X: Crystal, ceramic resonator
- X, XTAL: Crystal oscillator

See also

- Circuit diagram
- Electronic symbol

References

1. *Reference Designations for Electrical and Electronics Parts and Equipment: ASME Y14.44-2008 (Replaced IEEE 200-1975) . ASME, Fairfield, NJ. 2008.*
2. *IEEE (1975), "22. Class Designation Letters", IEEE Std 315-1975: Graphic Symbols for Electrical and Electronics Diagrams (Including Reference Designation Letters) (Reaffirmed 1993), IEEE and ANSI, New York, NY*

3. *Standard Reference Designations for Electrical and Electronics Parts and Equipments: IEEE 200-1975 (Reaffirmed 1988): Section 4.1.5.3 (2). IEEE and ANSI, New York, NY. 1975.*

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