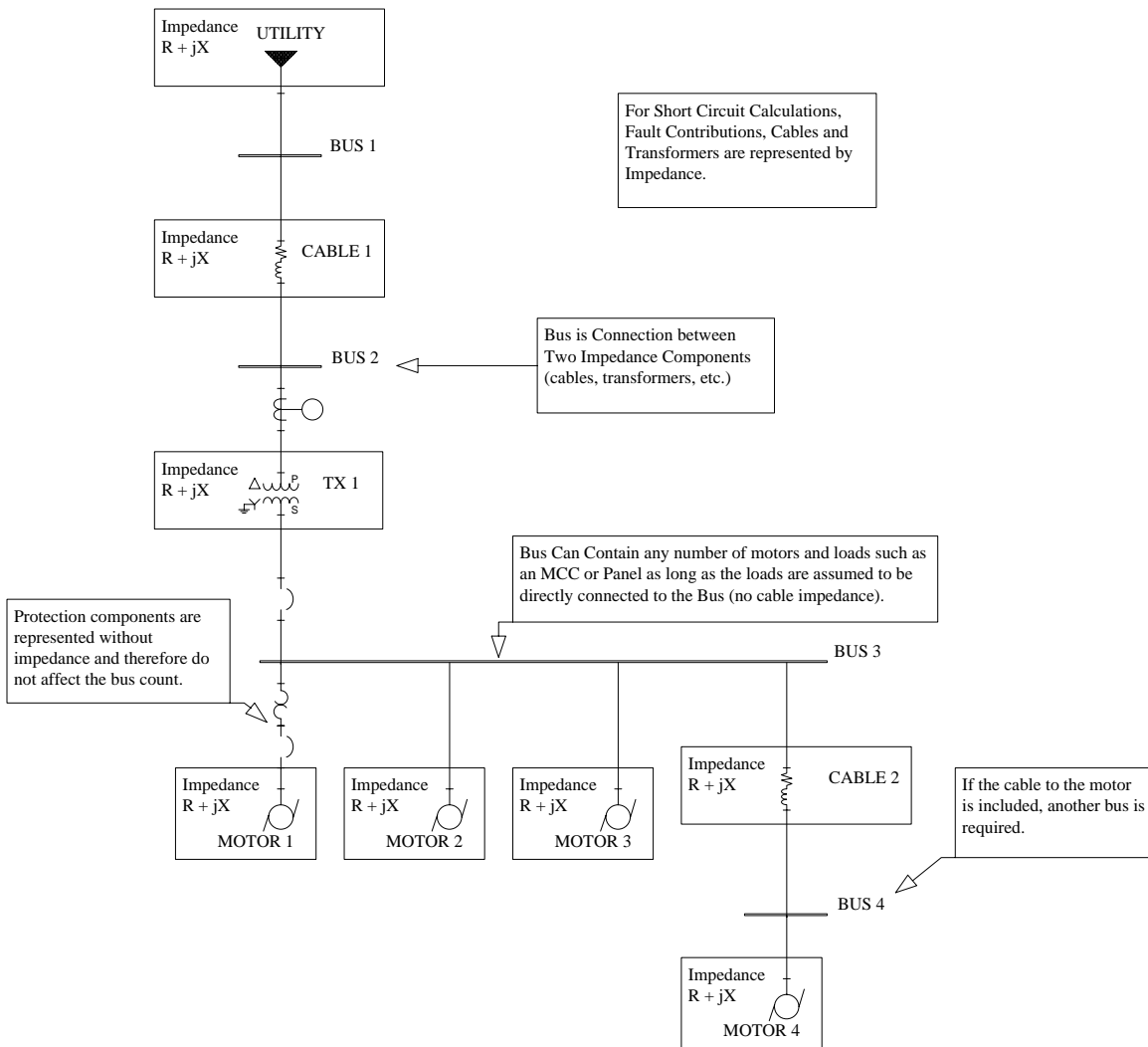


Definition of a Bus as it pertains to Short Circuit Calculations.

The term Bus is taken from the IEEE 141, 241, and 399 standards where impedance diagrams are discussed. Impedance diagrams are used to facilitate short circuit calculations, whereby the connection point between two different impedance values is described as a bus.

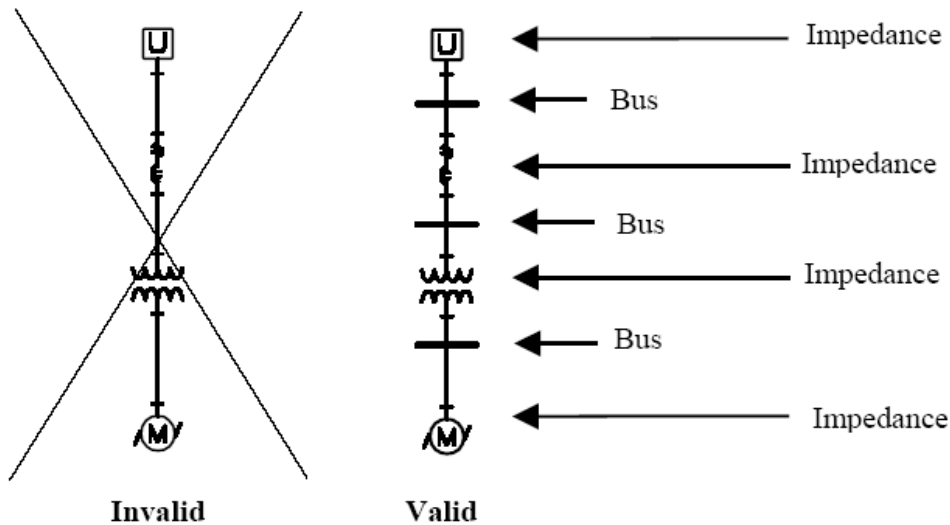
Very often, a bus represents the bus bar within a piece of switchgear, MCCs, Panels or other load points, however for convenience of entry, additional buses are created between two cables, between cables and transformer so that each impedance component can be entered separately without manually calculating an equivalent impedance for a group of components.



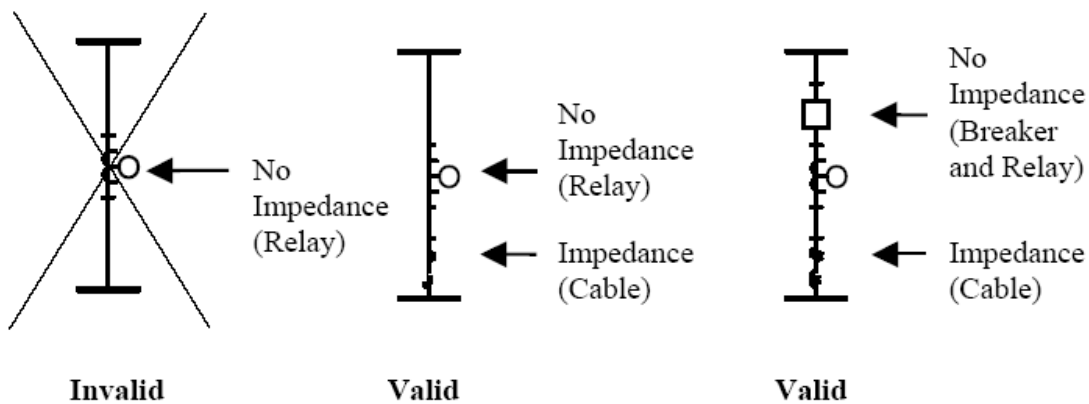
Connecting Components on the One-line

It is important to note that system studies requires definition of impedance between designated points in the power system. Traditionally, these designated points are called “Buses” and the impedance components connecting the buses are called “Branches”. Traditionally, each end of an impedance component must be connected to a bus. Components that don’t have defined impedance or the negligible impedance is ignored (such as relays, breakers, switches, etc.) can be connected in series with impedance devices without affecting the impedance connections. A few examples will help illustrate the allowable connections in PTW:

- You cannot place two impedance components in series without an interconnecting bus or bus-node. (When we refer to impedance components, we mean cables, 2-winding and 3-winding transformers, transmission lines, pi impedances, motors, generators and loads.) If you connect two impedance components in series, PTW will automatically insert a bus or bus-node.



- In order to connect any two buses, you must use at least one impedance device. This means that you cannot connect two buses with only a protective device (such as a fuse or circuit breaker). Once you have an impedance device in the connection, though, you may insert multiple protective devices into the connection.



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