

UNITED STATES MARINE CORPS
Utilities Instruction Company
Marine Corps Engineer School
PSC Box 20069
Camp Lejeune, North Carolina 28542-0069

U-07F03
DEC 99

STUDENT HANDOUT

INTERIOR WIRING

1. Terminal Learning Objective:

(1) Provided a field electrical power generation and distribution system plan, MEPDIS system, generator sets, general illumination set, an installation crew equipped with a lineman's tool kit, material for construction a bus bar, tents, and references, install a field electrical power generation and distribution system. The system must satisfy power requirements in accordance with the field electrical power generation and distribution system plan. (1141.03.04)

2. Enabling Learning Objectives:

(1) Provided a selection of electrical symbols and definitions, without the aid of reference, identify the correct definition for each symbol, in accordance with MCI 11.43 and FM 5-424. (1141.03.04au)

(2) Provided wire and lineman's tools, without the aid of reference, perform a Western Union wire splice, in accordance with MCI 11.43, FM 5-424. (1141.03.04av)

(3) Provided wire and lineman's tools, without the aid of reference, perform a pigtail wire splice, in accordance with MCI 11.43, FM 5-424. (1141.03.03ax)

(4) Provided a lineman's tool kit, 12/2 AWG wire, lamp holders, single pole switch and receptacles, without the aid of reference, construct a wiring harness, in accordance with MCI 11.43, FM 5-424, and the NEC. (11.41.03.04ay)

(5) Provided a MEPDIS wiring harness set and a structure, without the aid of reference, install a wiring harness, in accordance with TM 09049A-12&P/1, MCI 11.43, FM 5-424. (1141.03.04az)

(6) Provided a structure, 12/2 AWG wire, device boxes, junction boxes, a circuit breaker box, a single pole switch, lamp holders and receptacles, without the aid of reference, install a interior wiring system into the tents, in accordance with TM 09049A-12&P/1, MCI 11.43, FM 5-424. (1141.03.04ba)

BODY

1. Electrical Symbols:

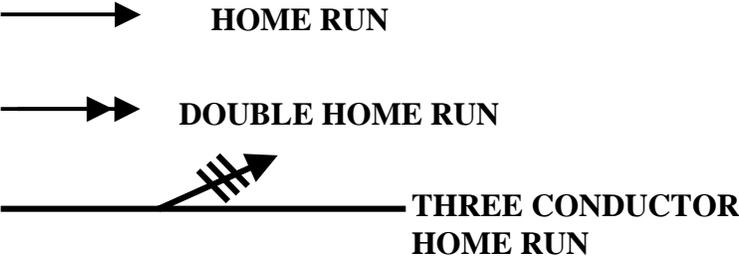
a. Every symbol on a wiring plan represents an electrical device or component of an electrical circuit. Symbols take the place of what words can't explain on construction blue prints. Symbols are another way people tell other people what is going on when it comes to reading plans.

b. The various symbols found in most books and technical manuals may vary slightly, but the resemblance can be identified in the following set of symbols below.

(1) Exposed and Unexposed Wire.



(2) Home Runs and service drops.



(3) 2 Conductor Run.



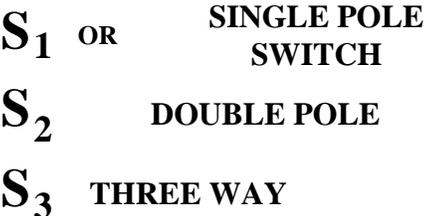
(4) Crossed Conductors not electrically connected.



(5) Cross Conductors Electrically Connected.



(6) Switches.



S₄ FOUR WAY SWITCH

S_D DOOR

S_P SWITCH WITH

(7) Lighting Outlet.



(8) Lighting Outlet with Pull Chain.



(9) Duplex Receptacle Outlet.



(10) Junction Box.



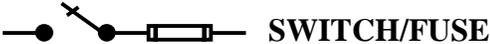
(11) Ground.



(12) Panel Board.



(13) Over Current Protection Device.



(14) Branch Circuit.



(15) Battery.

 **BATTER**

2. Western Union Splice:

a. The western union splice is used for support and strength. This splice is used when the wire is intended on being under a lot of stress.

(1) First strip four to six inches of insulation from the ends of two (2) wires.

(2) Each end will meet and overlap three to four inches.

(3) Using one pair of pliers to hold the wires at their middle twist each extending end in opposite directions at right angles to the run of the wire. Make five to six turns with each end of the conductors.

3. Pigtail Splice:

a. A pigtail splice is used for joining two or more conductors together. This splice is used when **NO** strain will be on the conductors.

(1) First the wires are stripped an inch from the end of the wire.

(2) Next cross the ends.

(3) While holding the crossed wires in one hand, twist the wires together in a clockwise direction six to eight turns with a pair of lineman's pliers.

(4) Finally ensure a wire nut or tape is covering the bare conductor.

4. Wiring Harness:

a. A wiring harness consists of one length of Romex cable with the devices taped or spliced into it to fit the required application.

(1) First you begin with a length of wire. The length will be determined by the situation.

(2) Then you take and strip the protective covering of the wire off about six inches from where ever you need to input a device. Ensure that you do not damage the insulation.

(3) Once this has been accomplished, you remove about three inches of insulation and perform a T-Tap with the desired electrical device.

5. Wiring Harness Installation:

a. A wiring harness installation consist of nothing more than connecting the wire to the over current protection devices and securing it to the ceiling of the structure.

6. Interior Wiring Installation:

a. For the sake of uniformity, we install our components and run our wires using accepted standards as our guidelines. When you walk into a dark room you reach out your hand to flick on the light switch without even thinking about it. When you go to plug an appliance into an outlet, you automatically bend down to reach for the outlet, because you know that it will be about a foot off of the deck. We accept such things as a standard, but when we are actually installing a system we have to place the switch and outlets in the proper places. The accepted standards for the following equipment are as follows:

(1) Wall outlets are placed one foot off the deck.

(2) Light switches are placed four feet off the deck on the side of the wall that the door opens.

(3) Panel boxes, such as fuse and circuit breaker boxes are mounted at eye level for ease of access for electricians.

(4) Romex cable is run under headers or through holes drilled through floor or ceiling joists. The holes must be drilled at least 1-1/4 inches back from the edge of the wood to prevent from being damaged by nails or screws. When they must be ran to work boxes for outlets or switches, they are ran along the center of the wall studs at least 1-1/4 inches back from the edge of the wood.

(5) Bends in romex cable shall have a radius of at least five times the diameter of the cable, or in other words, do not make tight bends, make wide bends.

(6) Romex cable shall be supported by staples or straps at intervals of no more than 4 1/2 feet and within 12 inches from every box or fitting.

(7) When romex cable is run to any kind of work box, you must measure enough cable to leave about six inches protruding from the box. The outer sheathing must also be removed at about 1/4 to 1/2 inches past the romex connector. Never try to remove the outer sheathing while the romex cable is in the box! Measure out the length of cable and remove the outer sheathing before you secure it in the box. Make sure that you leave enough of the black, white and bare conductors to extend about six inches from the box.

REFERENCES: MCI 11.43
NEC
TM 09049A/12.8PI