

2021-2022 FFA/GEMC

Speech/Demonstration Topic

PROBLEM:

The contestant will be expected to thoroughly explain the operating principle and installation of one, 120 volt, 20-amp multi-wire branch circuit consisting of one duplex receptacle in a surface mount metal box. This circuit will be used for a 4-inch, 11 amp, angle grinder and a Mobiflex 400-MS fume extraction system. The individual equipment circuit will power a Miller Multimatic 215 multi-process welder. Individual Equipment Conductors will be sized in accordance with NEC Article 630.11(A) and will be based on 240V input and 190A stick output. In order to prevent nuisance tripping the conductor overcurrent protection device will be rated at 200 percent of the maximum conductor ampacity in accordance with NEC Article 630.12(B). The multi-wire branch circuit will consist of 12 AWG THHN/THWN insulated; stranded copper conductor installed in 1/2" Rigid PVC conduit protected by one 20 amp GFCI breaker. The individual equipment circuit will be supplied by 14 AWG THHN/THWN insulated stranded copper installed in 1/2" Rigid PVC Conduit protected by a 30 amp double pole breaker. In accordance with local code requirements for agriculture buildings, 2 AWG copper service entrance conductors will be installed in 1 1/4" PVC conduit on the service entrance panel and a #6 bare copper grounding conductor will be installed. Number 2 AWG Copper is being used to allow for additional circuits at a later time

Materials List:

The following list of materials will either be attached to the demo frame or laid out for the contestant to use as they explain the installation of the circuits.

- 1 - Eaton, BR12100 100 Amp Main Breaker Service Entrance Panel
- 1 - 1 1/4" Schedule 40 Rigid PVC Conduit
- 1 - 1 1/4" PVC threaded male adaptor w/locking ring
- 1/2" Schedule 40 PVC Conduit
- 1/2" PVC Conduit Couplings
- 1/2" PVC 90-degree Sweeps
- 1 - 1/2" PVC Type T Conduit Body
- 3 - 1/2" PVC threaded male adaptor w/locking ring
- 1 - 1/2" Conduit Straps
- 3 - 2 AWG Copper THHN insulated conductors, 24" long
- 1 - #6 Soft Drawn Bare Copper Conductor installed
- 1 - 5/8" Grounding Rod attached to display board
- 1 - 5/8" Grounding Clamps
- 1 - 20 amp Double Pole GFCI Breaker
- 1 - 30 amp Double Pole Breaker
- 1 - 50 amp Welding Receptacle
- 1 - 20 amp duplex receptacle with tab removed between the ungrounded terminals
- 1ea - Black, Red, White, Green – 12 AWG, Stranded, THHN insulated conductor
- 1ea - Black, Red, Green – 14 AWG, Stranded, THHN insulated conductor
- Insulated Forked Connectors for AWG 12, AWG 12
- 1 - 4" Square Box
- 1 - 4" Cover Plate, Square Metal Electrical Box Cover for 30 or 50-amp Receptacle
- 1 - 2 1/8 x 2 1/8 Device Box
- 1 - Coverplate, Metal, Duplex receptacle, handy box, with mounting screws
- Green Grounding Wire Nuts

References:

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| 2020 National Electrical Code | Student Guide to Wiring |
| Agricultural Wiring Handbook, 17 th Edition | Miller Multimatic 215 Owner's Manual/Quick Specs Sheet |
| AAVIM Electrical Wiring 9 th Edition | Milwaukee 4 inch, 11amp angle grinder Owner's Manual |
| Lincoln Electric Mobiflex 400-MS Fume Extractor Owner's Manual | |

