SkillsUSA
2014 Contest Projects

Mobile Electronics Installation

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SkillsUSA Mobile Electronics Competition Activities

Activity Stations

The SkillsUSA Mobile Electronics Competition consists of several test-station activities to assess three main areas of competency:

1) Hands-on technical skill
2) Topic-related knowledge
3) General personal presentation skills

Contestants must successfully complete assigned tasks at each station. The tasks are designed to provide a variety of challenges based on the MECP-recommended practices and known skill sets desirable for employment in the industry. Identical tasks are used in high school and college/postsecondary categories. Approximately 45 minutes are allowed at each station (with the exception of the Written Exam Station, which is allowed up to two hours).

Station 1 - MECP Exam Station

Contestants will take an examination covering their knowledge of basic and advanced electrical theory, installation knowledge and techniques, and aftermarket automotive consumer electronics systems. Questions cover basic 12-volt circuits and devices, aftermarket electronic products intended for installation into a vehicle (sound, security, wireless communications and navigation), and basic mobile electronics diagnostic and troubleshooting questions. The exam consists of multiple-choice questions and lasts up to two hours.

Competitor's Requirements:

a. Pencil or Pen
b. Note Paper (cannot be removed from the station)
c. Calculator

Station Requirements:

a. MECP Sample Test(s)
b. MECP Test Answer Key
c. Proctor

Suggested Activities Include:

a. Take the Test

Station 2 - Customer Service Activity Station

Contestants will respond to various questions related to providing professional customer service techniques. These questions are intended to closely replicate real-world situations that occur in a retail car electronics installation shop.

Competitor's Requirements
a. Pencil
b. Note Paper
c. Personal Resume (1-page, typed)

Station Requirements:
c. Evaluator
d. Evaluator's Check List

Suggested Activities include:
a. Inform the customer that a small amount of damage has occurred to their vehicle during the installation of the electronic devices they have purchased from your store.
b. Explain to a customer why their bill is higher than they were quoted.
c. Handle a situation where a customer is going to leave their 4-year old in the car while you install the components they have purchased through your store. The customer is going to do some additional shopping while you do the work.

Station 3 - Personal Interview Station
A business/industry preliminary interview will be conducted with an industry professional focusing on the customer service culture.

Competitor's Requirements:
a. Personal Resume
b. Pencil
c. Note Paper

Station Requirements:
a. Evaluator
b. Evaluator's Check List

Suggested Activities include:
a. Ask the competitor about any previous employment they have had.
b. Ask the competitor to describe the scope of the mobile installer training they have had and what they feel their capabilities are.
c. Ask the competitor to explain why they are the best candidate for the job you have open in your mobile install bay

Station 4 - Electrical Measurements Station
This task contains one task associated with using standard test instruments to establish a State of Health (SOH) report for a given vehicle's battery and charging system.

Competitor's Requirements
a. Pencils
b. Safety glasses
c. Calculator

Station Requirements
a. Digital Multimeter (with vampire probe)
b. 12 V Battery
c. Multi-conductor Wiring Harness
d. Multi-pin cable connector
(Or Marcraft Mobile Power Unit/Trainer)

Suggested Hands-On Activities Include:
a. Use a multimeter to measure a voltage source
b. Use a multimeter to determine the voltage on a wire within a cable.
c. Use a multimeter to determine the voltage in a connector.

Proper set up and usage of the test equipment for the task
Accuracy of measurements
Applying the correct measurement technique

Station 5 - Soldering Station
The soldering station activity evaluates a competitor's ability to correctly make wire-to-wire solder joints and solder components (such as diodes, resistors or wire terminals) to wires in the correct MECP-recommended practice fashion.

Competitor's Requirements
a. Pencils
b. Safety glasses

Station Requirements
a. Soldering Iron and Stand (or solder station)
b. Rosin Core Solder
c. Heat Shrink Tubing
d. 18 Gauge Wire
e. Wire Strippers
f. Wire Cutters
g. Electrical Tape

Suggested Hands-On Activities Include:
a. Create a "Soldered Splice Connection"*
b. Create a "Soldered Tap-In Connection"*

c. Add inline diodes to a cable for isolation*

*These connections must be created correctly, soldered correctly and dressed correctly according to MECP-recommended practices as described in the MECP Basic Installation Technician Study Guide from the Consumer Electronics Association (CEA).

Safe use of the soldering equipment
Wearing proper protective gear
Proper Tinning of the iron
Correct solder joint
Correct insulation of solder joints (including diodes/resistors soldered inline)
Wire Management
Cleaning

Station 6 - Installing Audio Equipment Station
This task contains one task related to removing an existing head unit and replacing it with an OEM upgrade head unit. For post-secondary competitors, an additional task related to physically adding an audio amplifier to an existing mobile audio installation and configuring it for safe usage by the customer.

Competitor's Requirements
a. Pencils
b. Safety glasses
c. Calculator

Station Requirements
a. Standard OEM Head Unit Installation with wired in speakers, power source, wired in auto key switch, Model specific Head Unit wiring harness
b. Aftermarket amplifier, head unit wiring adapter kit, subwoofer, amplifier wiring kit.
c. Phillips Screw Driver
d. Flat blade Screw Driver
e. Panel Removal Tools
f. Wire Strippers
g. Crimping Tool
h. Radio Harness Adapter Wiring Kits - appropriate for the Upgrade Radio and the existing radio wiring harness (Scosche kits)
i. Manufacturer's Documentation (Install Manuals) for the Upgrade Radio, Wiring Harness Adapter wiring kit, and Aftermarket Amplifier.
j. Wiring Diagrams for the ignition and radio harnesses.

Suggested Hands-On Activities Include:
a. Given an existing head unit installation, install an upgrade head unit.

b. Given a specific head unit installation, install an audio amplifier and subwoofer according to manufacturer's specifications.

Safe use of the equipment
Take steps and use proper tools to prevent damage to the customer's equipment

Station 7 - Relay/Security Station
This task contains one task requiring the contestant to design and configure a relay-based circuit to perform the requested installation-related upgrades or electronic interfacing required for integrating aftermarket car electronics in a vehicle. A contestant's deep knowledge of relay operation and configuration is helpful to have a successful outcome in this task, as they will first draw out their circuit before proceeding to wire and connect it.

Competitor's Requirements
a. Pencils
b. Safety glasses
c. Calculator

Station Requirements
a. SPDT Automotive Relays (at least two)
b. 12 V Battery
c. 18 Gauge Wires
d. Digital Multimeter
e. 12 V Auto Lamp (single filament incandescent bulb)
f. Two-Wire Reversing Polarity Electrical Door Lock Actuator
g. SPST Automotive Toggle Switch
h. On-Off Automotive Pull Switch
i. Pre-made Cabling

Suggested Hands-On Activities Include:
a. Draw a relay circuit that correlates to the specific activity before wiring it. This allows the judge to visualize the contestant's conceptual understanding of relay operation.
b. Create/wire a relay circuit to activate an electrical door lock actuator when a lock or unlock signal is applied to it.
b. Create/wire a relay circuit to turn on a light when an intrusion signal is applied to it.
c. Create/wire a relay circuit to activate a trunk release mechanism when an activation signal is applied to it.

Knowledge of Relay operation and connection
Wiring and Connection Techniques
Crimping Quality

Station 8 - Troubleshooting Station
This task contains one task related to locating and repairing an open circuit and/or a short circuit condition and will be judged on ability to locate, identify and repair all malfunctions; and adherence to safety and ESD procedures.

Competitor's Requirements
a. Pencils
b. Safety glasses
c. Calculator

Station Requirements
a. Wiring Harness with Shorted Cable
b. Open Electrical Circuit (Cabling, Battery, Chassis piece, Lamp module, Switch and Fuse)
c. Digital Multimeter
d. Good and blown auto fuses, good and blown lamp, good and matching open cable length

Suggested Hands-On Activities Include:
a. Use a multimeter to locate an open in a conductor
b. Use a multimeter to detect a short circuit condition.
c. Use a multimeter to identify good and bad fuses.
d. Use a multimeter to identify anode and cathode sides of a diode.
e. Use a multimeter to identify if a bad diode is open or shorted.

Efficient troubleshooting steps to isolate shorts and faults
Ability to test and diagnose fuses
Ability to test and identify diodes operating properly or incorrectly positioned
Ability to locate a diode problem (open or shorted condition)
Use of proper safety precautions with electrical circuits

Summary
All hands-on activities follow MECP-recommended practices and preferred industry-accepted processes. The interpersonal evaluations are intended to closely replicate the situations that contestants would encounter in a real-time retail car electronics store, whether seeking employment or employed and dealing with customers.