



ELECTRICAL APPLICATIONS

OVERVIEW

Participants take a written test of basic electrical and electronic theory to qualify as semifinalists. Semifinalists assemble a specific circuit from a schematic diagram using a provided kit and make required electrical measurements. Semifinalists explain their solution during an interview.

ELIGIBILITY

Participants are limited to two (2) individuals per chapter.

TIME LIMITS


- A. Participants are allowed one (1) hour to complete the written test.
- B. Semifinalists are allowed one (1) hour to solve the circuit problem. Upon completion of the circuit, or at the end of the time limit, semifinalists are questioned about their solution in an interview.


ATTIRE

TSA competition attire, as described in the National TSA Dress Code section of this guide, is required.

PROCEDURE

- A. Participants report to the event area at the time and place stated in the conference program.
- B. Participants complete the test within the time limit.
- C. Tests are scored. A semifinalist list in random order is posted.
- D. Semifinalists report to the event area at the time stated in the conference program.
- E. Semifinalists will build a circuit from the provided schematic diagram and make electronic measurements with their multimeter at the designated positions in the circuit, within the time limit, using the provided kit.
- F. Evaluators interview the semifinalists.

 To participate in this event, participants should bring a standard calculator and a basic knowledge of electrical theory.

 The Electrical Applications written test consists of a variety of questions about electrical and electronic theory. Participants may want to research the type of content to expect on the test.

It is essential that students and advisors routinely check the TSA website (www.tsaweb.org) for updated information about TSA general rules and competitive event guidelines. This information is found on the website under Competitions/ Competition Updates. When students participate in any TSA competitive event, they are responsible for knowing of all updates, changes, and clarifications related to that event.

REGULATIONS

- A. An answer sheet (scan-type) and paper are furnished to each participant at the test site. Participants must provide their own pencils for the written test.
- B. Semifinalists provide their own standard calculator (no scientific calculators) and a battery-operated multimeter. All other equipment necessary to solve the on-site problem is provided by the coordinator.
- C. Semifinalists remain with their circuit solution until the evaluators have completed the interview.

EVALUATION

Evaluation is based on points earned for the test, the accuracy and degree of completion of the circuit problem in the allotted time, and the interview. Please refer to the official rating form for more information.

STEM INTEGRATION

This event has connections to the STEM areas noted below.
Please refer to the STEM INTEGRATION section of this guide.

Science, Technology, Engineering, Mathematics

COMMON CORE STATE STANDARDS (CCSS) INTEGRATION

Please refer to the Common Core State Standards (CCSS) Integration section of this guide for more information.

LEADERSHIP SKILLS

Leadership skills promoted in this event:

- Critical thinking: Students research and study electronics and electrical theory. Use leadership activities: *Guess the Famous Leader* and *Rebus Puzzles*
- Evaluation: Students adapt the solution as the event progresses. Use leadership activities: *Finish Line to Start Line* and *The Great "Evaluate"*
- Problem solving: Students apply knowledge while solving an on-site electrical problem. Use leadership activities: *Finding a Way* and *Resolving Conflict*

Additional leadership skills promoted in this event:

- Creative thinking

TSA AND CAREERS

This competition has connections to one or more of the career areas featured in the TSA AND CAREERS section of this guide. Use *The 16 Career Clusters* chart and the *TSA Competitions and Career Clusters* grid as resources for information about careers.

CAREERS RELATED TO THIS EVENT

- Electrical engineer
- Electrical technician
- Electrician
- Electronic analyst
- Electronic designer
- Research assistant

ELECTRICAL APPLICATIONS EVENT COORDINATOR INSTRUCTIONS

PERSONNEL

- A. Event coordinator
- B. Evaluators, two (2) or more
- C. Assistants, two (2)

MATERIALS

- A. Coordinator's packet, containing
 - 1. Event guidelines, one (1) copy for the coordinator and each evaluator
 - 2. TSA Event Coordinator Report
 - 3. List of evaluators/assistants
 - 4. Copies of the written test for each participant
 - 5. On-site semifinalist circuit diagram problem, twelve (12) copies
 - 6. Results envelope with with coordinator forms
- B. Twelve (12) basic electricity kits for the semifinalist problem containing:
 - 1. (Minimum) 1.375" x 3.25" solderless circuit breadboard 10 x 30 pin positions
 - 2. One (1) 9-volt battery with snap-on battery connector
 - 3. One (1) 9-volt battery clip
 - 4. One (1) speaker (wires pre-soldered)
 - 5. Two (2) LEDs
 - 6. Twelve (12) connector wires
 - 7. Pushbutton switch (wires pre-soldered)
 - 8. One (1) photocell
 - 9. One (1) potentiometer (wires pre-soldered)
 - 10. One (1) IN4003 diode
 - 11. One (1) IC555 integrated circuit
 - 12. One (1) 2N3906 transistor
 - 13. One (1) 2N3904 transistor
 - 14. Resistors (minimum of one [1] each, ohms): 10, 10K, 47, 100, 220, 1K, 2.2K, 3.3K, 6.8K, 16K, 33K, 120K, 330, 470K
 - 15. Capacitors (in microfarads): .01, .1, 10, 100, 1000
 - 16. S106B1 SCR
- C. Twelve (12) wire strippers
- D. Twelve (12) schematic copies of the circuit problem

RESPONSIBILITIES

- A. Upon arrival at the conference, report to the CRC room and check the contents of the coordinator's packet. Review the event guidelines and check to see that enough evaluators/assistants have been scheduled.
- B. Inspect the area or room in which the event is to be held for appropriate set-up, including room size, chairs, tables, outlets, etc. Notify the event manager of any potential problems.
- C. One (1) hour before the event is scheduled to begin, meet with evaluators/assistants to review time limits, procedures, and regulations. If questions arise that cannot be answered, speak to the event manager before the event begins.
- D. Begin the event at the scheduled time by closing the doors and checking the entry list. All participants and evaluators should be in the room at this time. In order to compete, participants must be on the entry list or must have approval of the CRC.
- E. Monitor the one (1)-hour written test.
- F. For participants who violate the rules, the decision either to 1) deduct twenty percent (20%) of the total possible points or 2) disqualify the entry, must be discussed and verified with the evaluators, event coordinator, and CRC manager, who all must initial either of these actions on the rating form.
- G. Determine the twelve (12) semifinalists.
- H. Submit semifinalist results to the CRC for posting.
- I. Provide kits and the on-site circuit problem to the semifinalists.
- J. Supervise the one (1)-hour on-site circuit problem.
- K. Evaluators conduct semifinalist interviews in an area away from the other semifinalists.
- L. Evaluators determine the ten (10) finalists. Any ties should be broken on: first, test scores; second, interview points; third, electronic measurement accuracy.
- M. Submit the finalist results and all related forms in the results envelope to the CRC room.
- N. Manage security and the removal of materials from the event area.



Participant/Team ID# _____

ELECTRICAL APPLICATIONS**2016 & 2017 OFFICIAL RATING FORM****MIDDLE SCHOOL**

Record scores in the column spaces below.

CRITERIA	Minimal performance 1-4 points	Adequate performance 5-8 points	Exemplary performance 9-10 points
Evaluators: Using minimal (1-4 points), adequate (5-8 points), or exemplary (9-10 points) performance levels as a guideline, record the scores earned for the event criteria in the column spaces to the right. The X1 or X2 notation in the criteria column is a multiplier factor for determining the points earned. (Example: an "adequate" score of 7 for an X1 criterion = 7 points; an "adequate" score of 7 for an X2 criterion = 14 points.)			
Written Test Score (50 points)			
SUBTOTAL (50 points)			
Semifinalist Interview (80 points)			
Solution accuracy (X1)	Solution attempt is evident but the solution is not complete, and/or there is no final solution.	Solution is not complete, though some measurements can be taken.	Solution is accurate and complete.
Proper use of components (X1)	Components are not used properly, and/or they are placed in the wrong sequence.	Components are used correctly, however, they may be placed in the improper sequence.	Components are used correctly and they are in the proper sequence and arrangement.
Accuracy of measurements (X1)	Measurements taken and calculated are 0-49% accurate.	Measurements taken and calculated are 50-89% accurate.	Measurements taken and calculated are 90-100% accurate.
Articulation (X1)	The interview is full of illogical thoughts that lack clarity, and/or there is insufficient information provided describing the solution.	The interview is somewhat logical, easy-to-follow, and/or there is sufficient information provided that describes the solution.	The interview is clear, concise, and there is ample information provided that describes the solution.
Delivery (X1)	Participant is verbose and/or uncertain in the interview; participant's posture, gestures, and lack of eye contact diminish the interview.	Participant is somewhat well-spoken and clear in the interview; participant's posture, gestures, and eye contact are acceptable in the interview.	Participant is well-spoken and distinct in the interview; participant's posture, gestures, and eye contact result in a polished, natural, and effective interview.
Organization (X1)	Participant seems unorganized and unprepared for the interview; an illogical explanation of the solution is presented.	Participant is generally prepared for the interview; an explanation of the solution is communicated adequately.	The interview is logical and easy to follow; the solution is communicated in an organized and concise manner.
Knowledge (X2)	Participant seems to have little understanding of the necessary concepts; answers to questions may be vague.	Participant exhibits understanding of the concepts involved in the solution.	Participant shows clear evidence of a thorough understanding of the concepts involved in the solution.
SUBTOTAL (80 points)			



Rules violations (a deduction of 20% of the total possible points for the semifinalist section) must be initialed by the evaluator, coordinator and manager of the event. Record the deduction in the space to the right.

Indicate the rule violated: _____

(To arrive at the TOTAL score, add any subtotals and subtract rules violation points, as necessary.)

TOTAL (130 points)

Comments:

I certify these results to be true and accurate to the best of my knowledge.

Evaluator

Printed name: _____

Signature: _____