

## **SMALL ENGINE REPAIR**

### **Description:**

The student (maximum one individual per school for the hands-on portion of the competition), will be evaluated on knowledge and proficiency in repair of handheld outdoor power equipment engines. Competitor must show knowledge in engine component identification, engine operation theory, failure analysis, and competency in tool selection, shop safety, troubleshooting, repair, and testing of engines and related components. All participants will take an online exam on Tuesday or Wednesday, with the top scoring participants advancing to Friday's event.

The 10 students that advance to the hands-on portion of the competition will be offered the unit they test on for their school. We will be sure the unit is in fact repaired and in proper working condition after the contest and the BG 50 will be packaged in a box and shipped to the school after the competition. There is a donation receipt form that must be filled out in order for the school to receive the unit.

The file: **05\_BG-50\_Service\_2020.pdf** describes the engine function and how to use the STIHL Engine Check evaluation process to find any faults present on the engine. There are also other files that can be used to prepare for the test.

There are several support files in .pdf format for the BG 50 that can be used for reference and the Service Manual, Instruction Manual, and Illustrated Parts List will be available for those students that qualify for the hands-on practical portion of the contest.

**Pre-Event Qualifying Test:** There will be a proctor monitored online test held onsite at NCLC. The testing center will be open Tuesday, March 14 from 10 am – 8 pm and Wednesday, March 15 from 7 am – 7 pm. See the schedule for room assignments. Results will be posted on Wednesday night at 9 pm.

**Time:** 1 hour and 50 minutes

**Limits:** There is no limit to the number of individuals that may participate in the online exam. The number of individuals participating on Friday will be limited to the host school's space availability with a maximum of 10.

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### JUDGING CRITERIA

**Points:** 100 possible points for the individual score; the individual score is doubled toward the team score for a total of 200 possible points.

Points will be assigned based on the following criteria:

Practical Exam (100%)

Fault analysis: 40%

Engine repair: 50%

Safe and correct use of tools and equipment: 10%

Time will be used as a tie breaker.

### Online Exam Description:

**Time:** 1 hour and 50 minutes

The online exam will have 50 multiple choice questions. There will be some general knowledge questions on four-stroke and two-stroke engines, along with some very specific questions from the training lessons supplied to the instructor by STIHL Inc. The student should be familiar with all the modules on the CD with emphasis on these modules: Engine Principles, Ignition Principles, Carburetion, and most importantly the STIHL Engine Check procedure. Additionally, the student should be familiar with the Instruction Manual for a BG 50, as well as the Service Manual and Illustrated Parts List.

There will be some exam questions utilizing the Technician A, Technician B format. Here is an example:

Technician A says that STIHL chain saws are the number one selling brand of chain saw in the world. Technician B says that STIHL has over 30 different models of chain saws available in the US today. Who is right?

- a) Technician A
- b) Technician B
- c) Both Technician A and B
- d) Neither Technician A or B

The way to look at this type of question is to take Technician A's comment and decide if it is true or false, and in this case it is true. Then look at Technician B's comment and decide if it is true or false, and in this case it is also true, so the correct response would be c) Both Technician A and B. Think of it as a double true/false question.

There will be questions where the student must identify some common hand tools without using brand names (adjustable wrench is correct, Crescent wrench is incorrect) by looking at a picture, and describe the events in a four-stroke and two-stroke engine. There will be fill in pictures of internal engine parts from both two-cycle and four-cycle engines.

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### Hands On Testing Description:

**Time:** 1 hour and 50 minutes

The ten students that advance to the hands on testing will be expected to use the STIHL Engine Check worksheet to evaluate a BG 50. The unit has been serviced and ran, and verified to be in proper working order, then the fuel was drained out and several faults were planted on the unit. All the units used for the test will have the same number and type of faults. A student who is practiced and familiar with the STIHL Engine Check evaluation process should have no trouble identifying the faults that are present. A hard copy Service Manual and IPL will be available for the student to use. When the STIHL Engine Check evaluation is completed the student will fill out a Parts Request form, by writing in the part number and description of the part and then present it to the proctor at the students work station. The proctor will have a closed box with only the parts needed for repair, and if the part the student asks for is in the box it will be given to the student. If the student asks for a part that is not in the box he will be told it is not needed for the repair. Gaskets are not considered faults and any that the student feels should be replaced will be available but they do not have to be replaced nor will the grading be based on whether the student replaced a gasket or not, unless the student installed it incorrectly or damaged a gasket and did not replace when it should have been replaced.

The carburetor will be tuned correctly and will not have any faults, and the student should not take the carb apart. Once the engine is repaired the student will add gasoline to the fuel tank, start the engine and verify that the engine is idling and running to specification, and demonstrate to the proctor that the engine runs. A tachometer will be supplied and the student may have to make very slight adjustments to the idle screw when verifying that the product is running to specification. Once the student hands the unit to the proctor the elapsed time will be recorded and the grading process will start.

The STIHL Engine Check worksheet will be graded as 40% of the total grade.

The proctor will observe the student while doing the evaluation and repair and observing for safe and correct use of tools, proper shop practice with fuel, chemicals, and cleanup, safety glasses and proper attire worn, and verification of parts replaced. The repair portion is 50% of the grade, and the safety observation is 10% of the grade.

### **Students are required to bring the following materials to the practical exam:**

Students are required to wear long pants, collared work shirt or event shirt, and hard-soled leather shoes or boots. Open toe or canvas athletic shoes are **not acceptable**.

### **Sponsor is required to supply the following materials for the event:**

- All tools required to complete the STIHL Engine Check and verify running of the unit will be supplied.
- A complimentary pair of STIHL safety glasses will be supplied for student use, but the student should bring their own safety glasses if they have any special needs for eye protection or any special gloves required for skin protection.
- All necessary information and materials for contest officials
- Sufficient number of judges and event monitors
- Any other items deemed necessary for this event

### **Study Materials:**

[Click here for the study materials](#)

Questions? Contact: Roger Phelps 757-486-9148 [roger.phelps@stihl.us](mailto:roger.phelps@stihl.us)