Small Engine Service and Repair

Curriculum Guide: Small Engine Service and Repair

Module: 1. Installing a Magnetron Ignition and Breaker Points

Unit Objective:
Students will apply principles of small engine ignition service and repair by identifying ignition system tools and components and installing and testing a variety of ignitions.

Show-Me Standards: 1.10, CA3

References:


Instructional Strategies/Activities:
- Students will engage in study questions in lessons 1 through 3.
- Students will complete the Module 1 evaluation, Installing a Magnetron Ignition and Breaker Points.
- Students will complete the following competency profiles: Installing and Servicing Composite Magnetron Ignition, Magnetron Retrofit Installation, and Installing Breaker Points and Condenser.
- Additional activities that relate to the unit objective can be found under the heading “Other Activities” in the following locations: pp. 1.5–1.6 (1, 7), pp. 1.14–1.15 (3), and p. 1.27 (6, 8).

Performance-Based Assessment:
As part of the instructional strategies and activities for this module, students will identify ignition system tools and components. They will also install and test a Magnetron ignition, install and test a retrofit Magnetron ignition, and install and test a breaker point and condenser ignition.

Assessment will be based on performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.
Module 1—Installing a Magnetron Ignition and Breaker Points
Instructor Guide

The instructor should assign the performance-based assessment activity procedures in conjunction with the relevant lesson material outlined in the instructor guide. Students will complete the activity procedures as they progress through the module lessons.

1. Use the Installing and Servicing Composite Magnetron Ignition Competency Profile, p. 17 of the student manual, to assess student performance. The profile covers disassembly and reassembly procedures necessary to install and service a Magnetron ignition system.

2. Use the Magnetron Retrofit Installation Competency Profile, p. 27 of the student manual, to assess student performance. The profile covers disassembly and reassembly procedures for replacing a breaker point ignition with a Magnetron ignition.

3. Use the Installing Breaker Points and Condenser Competency Profile, p. 45 of the student manual, to assess student performance. The profile covers disassembly and reassembly procedures necessary to install and service a breaker point and condenser ignition.

4. Have students complete the Module 1 evaluation, Installing a Magnetron Ignition and Breaker Points. Answers for the evaluation are found on p. 1.28 of the instructor manual.

5. Because the student manual includes step-by-step instructions and an itemized checklist for each competency procedure, there is no student handout for this performance-based assessment activity. However, there is a scoring guide that can be used, if desired. The scoring guide lists the assessment activity procedures and includes spaces for points possible, points earned, and instructor comments.

6. The final assessment score will be based on the performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.
## Small Engine Service and Repair

### Module 1—Installing a Magnetron Ignition and Breaker Points

**Scoring Guide**

<table>
<thead>
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<th>Activity</th>
<th>Points Possible</th>
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<th>Instructor Comments</th>
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<tr>
<td>Magnetron Retrofit Installation Competency Profile</td>
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<td>Installing Breaker Points and Condenser Competency Profile</td>
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<td>Module 1 Evaluation</td>
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</table>

Total Points Earned _________
Small Engine Service and Repair

Curriculum Guide: Small Engine Service and Repair

Module: 2. Carburetor Service and Repair

Unit Objective:
Students will apply principles of small engine carburetor service and repair by identifying and servicing a variety of carburetors, fuel filters, and air cleaners and by explaining the operation and service of all-temperature and standard automatic chokes.

Show-Me Standards: 1.10, CA3

References:

Instructional Strategies/Activities:
- Students will engage in study questions in lessons 1 through 3.
- Students will complete the Module 2 evaluation, Carburetor Service and Repair.
- Students will complete the following competency profile: Small Engine Carburetor Service and Repair.
- Additional activities that relate to the unit objective can be found under the heading “Other Activities” in the following locations: p. 2.19 (2, 5) and p. 2.33 (3).

Performance-Based Assessment:
As part of the instructional strategies and activities for this module, students will identify and service a variety of carburetors, fuel filters, and air cleaners. They will also explain the operation and service of all-temperature and standard automatic chokes.

Assessment will be based on performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.
Module 2—Carburetor Service and Repair
Instructor Guide

The instructor should assign the performance-based assessment activity procedures in conjunction with the relevant lesson material outlined in the instructor guide. Students will complete the activity procedures as they progress through the module lessons.

1. Use the Small Engine Carburetor Service and Repair Competency Profile to assess student performance. This profile includes the procedures listed below. The page number indicates the location of a checklist for the procedure. The procedures and checklists are found in the student manual.
   - Servicing an Oil Foam Air Cleaner, p. 11
   - Servicing a Cartridge Air Cleaner (Round), p. 14
   - Servicing a Reverse Air Flow Cartridge Air Cleaner, p. 17
   - Servicing a Flat Cartridge (Vertical Crankshaft) Air Cleaner, p. 20
   - Servicing a Flat Cartridge (Horizontal Crankshaft) Air Cleaner, p. 23
   - Servicing an Oil Bath Air Cleaner, p. 25
   - Servicing Briggs and Stratton Walbro One-Piece Flo-Jet Carburetor, p. 33
   - Servicing Pulsa-Jet, Vacu-Jet All-Temperature Automatic Choke, pp. 43–44
   - Servicing Pulsa-Jet (Suction Feed) Carburetor and Fuel Tank Assembly With Automatic Choke, pp. 56–57
   - Servicing Minlon (Vacu-Jet) Carburetor, p. 61
   - Servicing Pulsa-Jet (Suction Feed) Carburetor and Fuel Tank Assembly, p. 70
   - Servicing a Large One-Piece Flo-Jet Carburetor, pp. 78–79
   - Servicing Briggs and Stratton Pulsa-Prime Carburetor Model Series 95900 to 95999, p. 85

2. Have students complete the Module 2 evaluation, Carburetor Service and Repair. Answers for the evaluation are found on p. 2.34 of the instructor manual.

3. Because the student manual includes step-by-step instructions and an itemized checklist for each competency procedure, there is no student handout for this performance-based assessment activity. However, there is a scoring guide that can be used, if desired. The scoring guide lists the assessment activity procedures and includes spaces for points possible, points earned, and instructor comments.

4. The final assessment score will be based on the performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.
### Module 2—Carburetor Service and Repair

**Scoring Guide**

<table>
<thead>
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<td></td>
<td>Cartridge air cleaner (round)</td>
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<td></td>
<td>Reverse air flow cartridge air cleaner</td>
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<td>Flat cartridge (vertical crankshaft) air cleaner</td>
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<td>Flat cartridge (horizontal crankshaft) air cleaner</td>
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<td></td>
<td>Oil bath air cleaner</td>
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<td></td>
<td>Walbro one-piece Flo-Jet carburetor</td>
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<td>Pulsa-Jet, Vacu-Jet all-temperature automatic choke</td>
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<td></td>
<td>Pulsa-Jet (suction feed) carburetor and fuel tank assembly with automatic choke</td>
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<td>Minlon (Vacu-Jet) carburetor</td>
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<td>Pulsa-Jet (suction feed) carburetor and fuel tank assembly</td>
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<td>Large one-piece Flo-Jet carburetor</td>
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<td>Pulsa-Prime carburetor model series 95900 to 95999</td>
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**Total Points Earned** _________
Small Engine Service and Repair

Curriculum Guide: Small Engine Service and Repair

Module: 3. Rewind Starters

Unit Objective: Students will apply principles of rewind starter service and repair by identifying starter components and servicing a variety of small engine starters.

Show-Me Standards: 1.10, CA3

References:


Instructional Strategies/Activities:
- Students will engage in study questions in lesson 1.
- Students will complete the Module 3 evaluation, Rewind Starters.
- Students will complete the following competency profile: Rewind Starters Service and Repair.
- Additional activities that relate to the unit objective can be found under the heading “Other Activities” in the following location: p. 3.7 (3, 6, 7, 8).

Performance-Based Assessment:
As part of the instructional strategies and activities for this module, students will service a rope-rewind starter, replace a starter rewind spring, replace a starter rope, service a starter clutch, and service a vertical pull starter.

Assessment will be based on performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.
Module 3—Rewind Starters
Instructor Guide

The instructor should assign the performance-based assessment activity procedures in conjunction with the relevant lesson material outlined in the instructor guide. Students will complete the activity procedures as they progress through the module lessons.

1. Use the Rewind Starters Service and Repair Competency Profile to assess student performance. This profile includes the procedures listed below. The page number indicates the location of a checklist for the procedure. The procedures and checklists are found in the student manual.
   - Model 120000 Quantum Rewind Starters, p. 16
   - Starter Service and Repair Model 60000, 80000, 90000, 100200, 100900, and 110000 Rewind Starters, p. 23
   - Vertical Pull Starters, p. 31
   - Starter Clutch, p. 35

2. Have students complete the Module 3 evaluation, Rewind Starters. Answers for the evaluation are found on pp. 3.7–3.8 of the instructor manual.

3. Because the student manual includes step-by-step instructions and an itemized checklist for each competency procedure, there is no student handout for this performance-based assessment activity. However, there is a scoring guide that can be used, if desired. The scoring guide lists the assessment activity procedures and includes spaces for points possible, points earned, and instructor comments.

4. The final assessment score will be based on the performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.
## Module 3—Rewind Starters
### Scoring Guide

<table>
<thead>
<tr>
<th>Activity</th>
<th>Criteria</th>
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<td>❑ Starter service and repair model 60000, 80000, 90000, 100200, 100900, and 110000 rewind starters</td>
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<td>❑ Vertical pull starters</td>
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<td>❑ Starter clutch</td>
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Total Points Earned ________
Small Engine Service and Repair

Curriculum Guide: *Small Engine Service and Repair*

Module: 4. Small Engine Compression

Unit Objective:
Students will demonstrate an understanding of small engine compression by identifying valve tools and their uses and inspecting and servicing the valve train of a small engine.

Show-Me Standards: 1.10, CA3

References:


Instructional Strategies/Activities:
- Students will engage in study questions in lesson 1.
- Students will complete the Module 4 evaluation, Compression–Valve Service and Repair.
- Students will complete the following competency profile: Compression–Valve Service and Repair.
- Additional activities that relate to the unit objective can be found under the heading “Other Activities” in the following location: p. 4.9 (1, 2).

Performance-Based Assessment:
As part of the instructional strategies and activities for this module, students will identify valve tools and their uses and inspect and service the valve train of a small engine.

Assessment will be based on performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.
Module 4—Small Engine Compression
Instructor Guide

The instructor should assign the performance-based assessment activity procedures in conjunction with the relevant lesson material outlined in the instructor guide. Students will complete the activity procedures as they progress through the module lessons.

1. Use the Compression–Valve Service and Repair Competency Profile to assess student performance. This profile includes the procedures listed below. The page number indicates the location of a checklist for the procedure. The procedures and checklists are found in the student manual.
   - Checking Compression, p. 33
   - Removing Cylinder Head, p. 33
   - Removing the Valves, p. 33
   - Inspecting the Valves and Accessories, p. 33
   - Replacing the Valve Guide, p. 34
   - Refacing the Valves, p. 34
   - Refacing Valve Seats, p. 34
   - Replacing Valve Seats, p. 34
   - Lapping the Valves, p. 35
   - Installing the Cylinder Head, p. 35

2. Have students complete the Module 4 evaluation, Compression–Valve Service and Repair. Answers for the evaluation are found on pp. 4.10–4.11 of the instructor manual.

3. Because the student manual includes step-by-step instructions and an itemized checklist for each competency procedure, there is no student handout for this performance-based assessment activity. However, there is a scoring guide that can be used, if desired. The scoring guide lists the assessment activity procedures and includes spaces for points possible, points earned, and instructor comments.

4. The final assessment score will be based on the performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.
## Small Engine Service and Repair

### Module 4—Small Engine Compression

#### Scoring Guide

<table>
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<tr>
<th>Activity</th>
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<tr>
<td>Compression-Valve Service and Repair Competency Profile</td>
<td>Checking compression</td>
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<tr>
<td></td>
<td>Removing cylinder head</td>
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<td>Removing the valves</td>
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<td>Inspecting the valves and accessories</td>
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<td>Replacing the valve guide</td>
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<td>Refacing valve seats</td>
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<td>Replacing valve seats</td>
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<td>Lapping the valves</td>
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Total Points Earned ________
Small Engine Service and Repair

Curriculum Guide: Small Engine Service and Repair

Module: 5. Governor Adjustment and Repair

Unit Objective:
Students will apply principles of governor adjustment and repair by identifying governor components and inspecting, servicing, and repairing small engine governor systems.

Show-Me Standards: 1.10, CA3

References:


Instructional Strategies/Activities:
• Students will engage in study questions in lesson 1.
• Students will complete the Module 5 evaluation, Governor Adjustment and Repair.
• Students will complete the following competency profile: Governor Adjustment and Repair.
• Additional activities that relate to the unit objective can be found under the heading “Other Activities” in the following location: p. 5.7 (1, 2).

Performance-Based Assessment:
As part of the instructional strategies and activities for this module, students will identify governor components and inspect, service, and repair small engine governor systems.

Assessment will be based on performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.
Module 5—Governor Adjustment and Repair
Instructor Guide

The instructor should assign the performance-based assessment activity procedures in conjunction with the relevant lesson material outlined in the instructor guide. Students will complete the activity procedures as they progress through the module lessons.

1. Use the Governor Adjustment and Repair Competency Profile to assess student performance. This profile includes the procedures listed below. The page number indicates the location of a checklist for the procedure. The procedures and checklists are found in the student manual.
   - Adjusting and Repairing Air Vane Governors, p. 17
   - Servicing Mechanical Governors, p. 23
   - Servicing Mechanical Governors (New Style), p. 27

2. Have students complete the Module 5 evaluation, Governor Adjustment and Repair. Answers for the evaluation are found on pp. 5.7–5.8 of the instructor manual.

3. Because the student manual includes step-by-step instructions and an itemized checklist for each competency procedure, there is no student handout for this performance-based assessment activity. However, there is a scoring guide that can be used, if desired. The scoring guide lists the assessment activity procedures and includes spaces for points possible, points earned, and instructor comments.

4. The final assessment score will be based on the performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.
## Module 5—Governor Adjustment and Repair

### Scoring Guide

<table>
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<th>Activity</th>
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<td>• Servicing mechanical governors</td>
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<td>• Servicing mechanical governors (new style)</td>
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Total Points Earned _________
Small Engine Service and Repair

Curriculum Guide: Small Engine Service and Repair

Module: 6. Lubricating Small Engines

Unit Objective:
Students will apply principles of small engine lubrication by selecting the correct type and grade of oil for a four-cycle engine and inspecting and servicing the lubrication system.

Show-Me Standards: 1.10, CA3

References:


Instructional Strategies/Activities:
• Students will engage in study questions in lesson 1.
• Students will complete the Module 6 evaluation, Lubricating Small Engines.
• Students will complete the following competency profile: Lubricating Small Engines.
• Additional activities that relate to the unit objective can be found under the heading “Other Activities” in the following location: p. 6.8 (1, 2, 3).

Performance-Based Assessment:
As part of the instructional strategies and activities for this module, students will select the correct type and grade of oil for a four-cycle engine and inspect and service the lubrication system.

Assessment will be based on performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.
Module 6—Lubricating Small Engines
Instructor Guide

The instructor should assign the performance-based assessment activity procedures in conjunction with the relevant lesson material outlined in the instructor guide. Students will complete the activity procedures as they progress through the module lessons.

1. Use the Lubricating Small Engines Competency Profile to assess student performance. This profile includes the procedures listed below. The page number indicates the location of a checklist for the procedure. The procedures and checklists are found in the student manual.
   - Checking and Adding Oil to the Lubrication System, p. 14
   - Changing the Crankcase Oil (Four-Cycle Engines), p. 18

2. Have students complete the Module 6 evaluation, Lubricating Small Engines. Answers for the evaluation are found on pp. 6.8–6.9 of the instructor manual.

3. Because the student manual includes step-by-step instructions and an itemized checklist for each competency procedure, there is no student handout for this performance-based assessment activity. However, there is a scoring guide that can be used, if desired. The scoring guide lists the assessment activity procedures and includes spaces for points possible, points earned, and instructor comments.

4. The final assessment score will be based on the performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.
## Module 6—Lubricating Small Engines

### Scoring Guide

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<td>Changing the crankcase oil (four-cycle engines)</td>
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Total Points Earned _________
Small Engine Service and Repair

Curriculum Guide: Small Engine Service and Repair

Module: 7. Troubleshooting

Unit Objective:
Students will apply principles of small engine repair by systematically evaluating the condition of the ignition system, fuel supply, spark plug, and compression to locate and eliminate engine malfunctions.

Show-Me Standards: 3.1, CA3

References:


Instructional Strategies/Activities:
- Students will engage in study questions in lesson 1.
- Students will complete the Module 7 evaluation, Troubleshooting.
- Students will complete the following competency profile: Maintenance Procedures.
- Additional activities that relate to the unit objective can be found under the heading “Other Activities” in the following location: p. 7.6 (1).

Performance-Based Assessment:
As part of the instructional strategies and activities for this module, students will locate and eliminate engine malfunctions by testing the ignition system and checking the fuel supply, spark plug, and compression.

Assessment will be based on performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.
Module 7—Troubleshooting
Instructor Guide

The instructor should assign the performance-based assessment activity procedures in conjunction with the relevant lesson material outlined in the instructor guide. Students will complete the activity procedures as they progress through the module lessons.

1. Use the Maintenance Procedures Competency Profile to assess student performance. This profile includes the procedures listed below. The page number indicates the location of a checklist for the procedure. The procedures and checklists are found in the student manual.
   - Check Fuel Supply, p. 14
   - Test Ignition System, p. 14
   - Check the Spark Plug, p. 14
   - Checking Compression, p. 14

2. Have students complete the Module 7 evaluation, Troubleshooting. Answers for the evaluation are found on pp. 7.6–7.7 of the instructor manual.

3. Because the student manual includes step-by-step instructions and an itemized checklist for each competency procedure, there is no student handout for this performance-based assessment activity. However, there is a scoring guide that can be used, if desired. The scoring guide lists the assessment activity procedures and includes spaces for points possible, points earned, and instructor comments.

4. The final assessment score will be based on the performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.
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<td></td>
<td>Test ignition system</td>
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<td>Check the spark plug</td>
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Total Points Earned _________
Small Engine Service and Repair

Curriculum Guide: Small Engine Service and Repair

Module: 8. Operation and Maintenance of Small Engines

Unit Objective:
Students will demonstrate an understanding of correct operation procedures for small engines by operating and maintaining a small engine.

Show-Me Standards: 4.7, HP5

References:


Instructional Strategies/Activities:
• Students will engage in study questions in lesson 1.
• Students will complete the Module 8 evaluation, Maintaining Small Engines.
• Students will complete the following competency profile: Maintenance Procedures.
• Additional activities that relate to the unit objective can be found under the heading “Other Activities” in the following location: pp. 8.7–8.8 (1, 2).

Performance-Based Assessment:
As part of the instructional strategies and activities for this module, students will follow a step-by-step procedure for safely and correctly operating a small gas engine. They will also perform maintenance procedures, such as servicing ignition stop switches, mufflers, and cutter blades, and adjusting “System 2” and “System 4” Consumer Product Safety Commission (CPSC) compliance engines.

Assessment will be based on performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.
Module 8—Operation and Maintenance of Small Engines

Instructor Guide

The instructor should assign the performance-based assessment activity procedures in conjunction with the relevant lesson material outlined in the instructor guide. Students will complete the activity procedures as they progress through the module lessons.

1. Use the Maintenance Procedures Competency Profile to assess student performance. This profile includes the procedures listed below. The page number indicates the location of a checklist for the procedure. The procedures and checklists are found in the student manual.
   - Procedure for Safe Lawn Mower Operation, p. 8
   - Operating Small Engines, p. 14
   - Servicing Cutter Blade, p. 17
   - Servicing Mufflers: Bolt-On and Pipe Thread, p. 23
   - Adjusting “System 2” and “System 4” CPSC Compliance Engines, p. 25
   - Adjusting the Brake for “System 2” and “System 4” CPSC Compliance Engines, p. 28
   - Servicing Ignition Stop Switches, p. 30

2. Have students complete the Module 8 evaluation, Maintaining Small Engines. Answers for the evaluation are found on p. 8.8 of the instructor manual.

3. Because the student manual includes step-by-step instructions and an itemized checklist for each competency procedure, there is no student handout for this performance-based assessment activity. However, there is a scoring guide that can be used, if desired. The scoring guide lists the assessment activity procedures and includes spaces for points possible, points earned, and instructor comments.

4. The final assessment score will be based on the performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.
## Module 8—Operation and Maintenance of Small Engines

### Scoring Guide

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<th>Activity</th>
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<th>Points Earned</th>
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<tr>
<td>Maintenance Procedures Competency Profile</td>
<td>□ Procedure for safe lawn mower operation</td>
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<td>□ Adjusting “System 2” and “System 4” CPSC compliance engines</td>
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<td>□ Adjusting the brake for “System 2” and “System 4” CPSC compliance engines</td>
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<tr>
<td>Module 8 Evaluation</td>
<td>Complete Module 8 evaluation</td>
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Total Points Earned _________