

# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

**Unit Name:** 2600 - CERTIFICATIONS

**Number:** L 2600 **Hours:** 80.00

**Dates:** Spring 2025

## Description/Objectives:

Students will know and be able to obtain EETC certifications.

## Tasks:

L2601 Obtain EET Four Stroke Certification

L2602 Obtain EETC Two Stroke Certification

L2603 Obtain EETC Electrical Certification

L2604 Obtain EETC Driveline/Hydro Certification

## Standards / Assessment Anchors

### Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

#### Supporting Anchor/Standards:

KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.

Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author's purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.

INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.

Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

### Focus Anchor/Standard #2:

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

#### Supporting Anchor/Standards:

**TEXT TYPES AND PURPOSE GRADES 9-10-11-12**

Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.

Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.

**PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12**

Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.

Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.

**RESEARCH GRADES 9-10-11-12**

Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.

Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.

**RANGE OF WRITING GRADES 9-10-11-12**

Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

**Instructional Activities:****Knowledge:**

Certification is the culmination of the students learning experience. Students will demonstrate knowledge of essential elements and principles that verify a level of knowledge needed for employment in the industry.

Thorough review is required. Students will create an industry "dictionary". Pre-learning will consist of anticipation guides, INSERTS (maxx teaching), and "find it" exercises. Students will cite sources in MLA format.

Students will utilize training videos, on-line manufacturer training courses, text, workbooks, study gides, teacher notes, and network with students from other areas.

- DEMONSTRATE KNOWLEDGE OF THE PRINCIPLES AND DESIGN OF 2-CYCLE AND 4-CYCLE ENGINES
- DEMONSTRATE KNOWLEDGE OF LUBRICATION SYSTEMS.
- DEMONSTRATE KNOWLEDGE OF BASIC ELECTRICITY.
- DEMONSTRATE KNOWLEDGE OF COOLING SYSTEMS.
- DEMONSTRATE THE KNOWLEDGE AND THE SERVICE PROCEDURES OF EXHAUST SYSTEMS.

**Skill:**

- DIAGNOSE PERFORMANCE PROBLEMS ON A 2-CYCLE GASOLINE ENGINE.
- DIAGNOSE PROBLEMS ON A 4-CYCLE GASOLINE ENGINE.
- CONDUCT A FAILURE ANALYSIS ON GASOLINE ENGINES.

**Remediation:**

Review with teacher assistance

Individual or group tutoring

Study guides

Extended time

**Enrichment:**

Work on live work projects to enhance skill

Participate in classroom leadership activities and competitions

**Safety:**

Student must:

Handle material in a safe and workmanlike manner

Use protective clothing and equipment

Use hand tools in a safe manner

Use adequate ventilation when working in enclosed area

Follow manufacturer's directions when using any product, tool, equipment, etc.

Use proper safety precautions when using /operating hand tools

Use tools and equipment in a professional work-like manner according to OSHA standards

Know and follow the established safety rules at all times

### **Assessment:**

Worksheets

Quizzes

Pre/Post Tests

Time Cards

Writing Activities

Video/DVD

Projects

Check Lists

Research

Rubrics

### **Resources/Equipment:**

Roth, A. C. (2009). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox.

Radcliffe, Bruce (2010) Small Engines. Milwaukee, WI Personal Protective Equipment Basic hand tools Precision measuring tools

Manufacturer's service manualHyperlinks:

# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

**Unit Name:** 100 WORKPLACE SAFETY

**Number:** 100 **Hours:** 40.00

**Dates:** Spring 2025

## Description/Objectives:

Student will know and be able to demonstrate knowledge and procedures relating to the workplace in accordance with industry standards.

## Tasks:

PA101 - Interpret Safety Data Sheets (SDS).

PA102 - Lift and move heavy objects.

PA103 - Handle and store flammable materials and toxic substances.

PA104 - Follow Occupational Safety and Health Administration (OSHA) rules and regulations.

PA105 - Identify job-site hazards.

PA106 - Wear personal protective equipment, e.g., safety goggles, hearing protection and respiratory protection.

PA107 - Select appropriate fire extinguisher according to fire type.

PA108 - Follow safety rules for Exposure Control Procedures (ECP) for blood borne pathogens.

PA109 - Use safe work habits while working with electrical systems.

## Standards / Assessment Anchors

### Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

### Supporting Anchor/Standards:

KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.

Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author's purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.

INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.

Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other

sources, etc.

#### INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

#### RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

#### *Focus Anchor/Standard #2:*

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

#### *Supporting Anchor/Standards:*

##### TEXT TYPES AND PURPOSE GRADES 9-10-11-12

Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.

Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.

##### PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12

Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.

Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

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Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.

##### RANGE OF WRITING GRADES 9-10-11-12

Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

#### *Connecting Anchor/Standard:*

- Pennsylvania Core Standards for Mathematics Standard 2.0

#### *Supporting Anchor/Standards:*

##### ALGEBRA

Standard 2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.

#### **Instructional Activities:**

##### Knowledge:

Interpret workplace safety and MSDS sheets.

Explain the purpose of OSHA and how it promotes safety on the job

Describe fire prevention techniques.

##### Skill:

Demonstrate how to lift and move heavy objects.

Demonstrate how to handle and store flammable materials and toxic substances.

Demonstrate and explain appropriate safety precautions to take around job-site hazards.

Demonstrate and properly wear personal protective equipment (safety goggles, hearing protection and respiratory protection).

Follow safety rules for ECP (Exposure Control Procedures) for blood borne pathogens.

Remediation:

Review with teacher assistance

Individual or group tutoring

Study guides

Extended time

Enrichment:

Work on live work projects to enhance skill

Participate in classroom leadership activities and competitions

### **Special Adaptations:**

Extended Time (assignments and/or testing)

Graphic Organizer

Chunking of Assignments/Material

Preferential Seating

Directions/Comprehension Check (frequent checks for understanding)

Study Guide

Directions and/or Tests Read Aloud

Adapted Tests and/or Assignments

Use of Calculator

Taking Tests in Alternate Setting (or if requested)

Verbal/Gestural Redirection (prompts to remain on task)

Drill and Practice (Repetition of Material)

No Penalization for Spelling

Copy of Teacher/Student Notes/Skeleton Notes

Small Group Instruction

Provide Visual Model to Accompany Verbal Directions (Written/Oral Directions)

Use of Daily Planner/Assignment Book (monitor use of)

Teacher Modeling

Use of Computer (Access to)

Positive Reinforcement

Have Student Repeat Directions

Wait Time

Access to School Counselor

Use of Highlighter/Highlighted Text

Positive Reinforcement

Provide Frequent Feedback

Provide Frequent Breaks

Variety of Assessment Methods

Use of Assistive Device (i.e. notepad, laptop, ect.)

Highly Structured Classroom

Limited, Short Directions

Grading Rubric

Communication Regarding Behavior & Consequences (PBS)

Clear Language for Directions

Use of Multisensory Approach

Provide Opportunities to Retest

Frequent Review Sessions

Use a variety of Modalities when Introducing Skills/Concepts

Books on Tape or CD

Cue for Oral Response

De-Escalation Opportunities

Daily Classwork Check

Encourage Student to Check Work Before Turning In

Opportunities for Repeated Practice of MATH Skills

Provide repetition During Initial Instruction

Allow Pre-read of Questions Before Reading Written Passage  
Provide Verbal and Written Directions  
All Vocabulary to be Defined Before Testing

Time out  
Encouragement to Participate in Positive Leadership Roles  
Student Self-Evaluation for Behavior  
Exempt from reading Aloud in Front of Peers

**Safety:**

Student must:  
Handle material in a safe and workmanlike manner  
Use protective clothing and equipment  
Use hand tools in a safe manner  
Use adequate ventilation when working in enclosed area  
Follow manufacturer's directions when using any product, tool, equipment, etc.  
Use proper safety precautions when using /operating hand tools  
Use tools and equipment in a professional work-like manner according to OSHA standards  
Know and follow the established safety rules at all times

**Assessment:**

Worksheets  
Quizzes  
Pre/Post Tests  
Time Cards  
Writing Activities  
Video/DVD  
Projects  
Check Lists  
Presentation  
assessment  
Research  
Rubrics

**Resources/Equipment:**

Solvents and oils. Drain pans and receptacles. Appropriate cleaning supplies. Manufacturers service manual Required gaskets, seals, lubricants, replacement parts MVACC Fire Extinguisher Safety Video MSDS sheets for program area Roth, A. C. (2012). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox. Radcliffe, Bruce (2010) Small Engines. Milwaukee, WI Personal Protective EquipmentHyperlinks:  
<http://www.thepowerportal.com/Login.htm>

[www.stihlvotech.com/](http://www.stihlvotech.com/)

<https://www.meritorbullpen.com/>

[www.pennzoilinformationprogram.com/](http://www.pennzoilinformationprogram.com/)

<https://trucklitecollc.mindflash.com/PublicCoursePage.aspx?c=801602995>

# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

**Unit Name:** 200 BASIC ELECTRICAL PRINCIPLES AND CIRCUIT TESTING.

**Number:** 200 **Hours:** 49.00

**Dates:** Spring 2025

## Description/Objectives:

Student will know and be able to describe fundamental electrical concepts, perform calculations using Ohm's law, demonstrate proficiency with electrical test equipment, and complete basic electrical repairs.

## Tasks:

PA202 - Interpret electrical circuit and wiring diagrams.

PA203 - Use a meter to measure resistance, continuity, amperage and voltage.

PA204 - Solve problems using Ohm's Law.

PA205 - Follow procedures for battery disposal.

PA206 - Construct and test series and parallel circuits.

PA207 - Identify electrical terminals and connectors.

PA208 - Perform a diode test.

PA212 - Inspect, test and replace fusible links, fuses and circuit breakers.

PA213 - Identify American Wire Gauge (AWG) wiring codes.

PA215 - Solder a current carrying wire.

## Standards / Assessment Anchors

### Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

### Supporting Anchor/Standards:

#### KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

#### CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

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#### INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.

Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

#### INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

#### RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

#### *Focus Anchor/Standard #2:*

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

#### *Supporting Anchor/Standards:*

##### TEXT TYPES AND PURPOSE GRADES 9-10-11-12

Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.

Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.

##### PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12

Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.

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##### RESEARCH GRADES 9-10-11-12

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##### RANGE OF WRITING GRADES 9-10-11-12

Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

#### *Connecting Anchor/Standard:*

- 3.5.9-12.2 Strand: Applying, Maintaining, and Assessing Technological Products and Systems

#### *Supporting Anchor/Standards:*

3.5.9-12.L ♦ Interpret laws, regulations, policies, and other factors that impact the development and use of technology.

#### **Instructional Activities:**

Knowledge:

Define the four-stroke cycle and the two-stroke cycle

List advantages and disadvantages of two cycle and four cycle engines

Review terminology and vocabulary

Discuss variation in engine design

explain differences between ports and valves

Skill:

Identify engine model#, type, and code  
 Identify cylinder and valve arrangements  
 Explain the concept of valve timing

**Remediation:**

Review with teacher assistance  
 Individual or group tutoring  
 Study guides  
 Extended time

**Enrichment:**

Work on live work projects to enhance skill  
 Participate in classroom leadership activities and competitions

**Special Adaptations:**

Extended Time (assignments and/or testing)  
 Graphic Organizer  
 Chunking of Assignments/Material  
 Preferential Seating  
 Directions/Comprehension Check (frequent checks for understanding)  
 Study Guide  
 Directions and/or Tests Read Aloud  
 Adapted Tests and/or Assignments  
 Use of Calculator  
 Taking Tests in Alternate Setting (or if requested)  
 Verbal/Gestural Redirection (prompts to remain on task)  
 Drill and Practice (Repetition of Material)  
 No Penalization for Spelling  
 Copy of Teacher/Student Notes/Skeleton Notes  
 Small Group Instruction  
 Provide Visual Model to Accompany Verbal Directions (Written/Oral Directions)  
 Use of Daily Planner/Assignment Book (monitor use of)  
 Teacher Modeling  
 Use of Computer (Access to)  
 Positive Reinforcement  
 Have Student Repeat Directions  
 Wait Time  
 Access to School Counselor  
 Use of Highlighter/Highlighted Text  
 Positive Reinforcement  
 Provide Frequent Feedback  
 Provide Frequent Breaks  
 Variety of Assessment Methods  
 Use of Assistive Device (i.e. notepad, laptop, ect.)  
 Highly Structured Classroom  
 Limited, Short Directions  
 Grading Rubric  
 Communication Regarding Behavior & Consequences (PBS)  
 Clear Language for Directions  
 Use of Multisensory Approach  
 Provide Opportunities to Retest  
 Frequent Review Sessions  
 Use a variety of Modalities when Introducing Skills/Concepts  
 Books on Tape or CD  
 Cue for Oral Response  
 De-Escalation Opportunities  
 Daily Classwork Check  
 Encourage Student to Check Work Before Turning In  
 Opportunities for Repeated Practice of MATH Skills  
 Provide repetition During Initial Instruction

Allow Pre-read of Questions Before Reading Written Passage  
Provide Verbal and Written Directions  
All Vocabulary to be Defined Before Testing

Time out  
Encouragement to Participate in Positive Leadership Roles  
Student Self-Evaluation for Behavior  
Exempt from reading Aloud in Front of Peers

**Safety:**

Student must:  
Handle material in a safe and work-like manner.  
Use personal protective equipment.  
Use hand tools in a safe manner.  
Follow manufacturer's directions when using any product, tool, equipment, etc.  
Ensure adequate ventilation when working in enclosed areas.  
Use tools and equipment in a professional work-like manner according to OSHA standards.  
Know and follow the established safety rules at all times.

**Assessment:**

Worksheets  
Quizzes  
Pre/Post Tests  
Time Cards  
Writing Activities  
Video/DVD  
Projects  
Check Lists  
Presentation  
Research  
Rubrics

**Resources/Equipment:**

Roth, A. C. (2009). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox. Radcliffe, Bruce (2010) Small Engines. Milwaukee, WI Personal Protective Equipment "Engine cycles" power point presentation by Ryan Saucier. Various 2 and 4 - cycle engines in lab area. ARI "Part Smart", March 2016 version DVD Stihl read only tech files CDHyperlinks: <http://www.thepowerportal.com/Login.htm>

[www.stihlvotech.com/](http://www.stihlvotech.com/)

<https://www.meritorbullpen.com/>

[www.pennzoilinformationprogram.com/](http://www.pennzoilinformationprogram.com/)

<https://trucklitecolic.mindflash.com/PublicCoursePage.aspx?c=801602995>

# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

**Unit Name:** 300 COOLING SYSTEMS

**Number:** 300 **Hours:** 48.00

**Dates:** Spring 2025

## Description/Objectives:

Student will know and be able to demonstrate knowledge of lubrication systems at the level of proficient or higher according to industry standards.

## Tasks:

PA301 - Identify the methods of heat transfer and the purpose of a cooling system.

PA302 - Perform a cooling system flush on a liquid cooled engine.

PA303 - Remove, service and replace a water pump, hoses, and thermostat.

PA304 - Identify the components of a liquid cooled engine.

PA305 - Pressure-test a liquid-cooled cooling system.

PA306 - Determine causes of engine overheating.

PA307 - Inspect the cooling system for debris, leaks, and damage.

## Standards / Assessment Anchors

### Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

### Supporting Anchor/Standards:

#### KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

#### CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

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#### INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

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Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

#### INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

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*Supporting Anchor/Standards:*

TEXT TYPES AND PURPOSE GRADES 9-10-11-12

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Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.

PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12

Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.

Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.

RESEARCH GRADES 9-10-11-12

Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.

Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.

RANGE OF WRITING GRADES 9-10-11-12

Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

**Instructional Activities:**

Knowledge:

Define friction and explain how it affects the internal engine components

List the functions of lubrication oil

Explain the operation of pumps

Explain the function of filtration systems

Skill:

List common oil contaminants

Describe differences between splash lubrication systems and a pressure lubrication system

Check oil level in an engine

Identify the components and function of a crankcase ventilation breather assembly

Remediation:

Review with teacher assistance

Individual or group tutoring

Study guides

Extended time

Enrichment:

Work on live work projects to enhance skill

Participate in classroom leadership activities and competitions

**Special Adaptations:**

Extended Time (assignments and/or testing)  
 Graphic Organizer  
 Chunking of Assignments/Material  
 Preferential Seating  
 Directions/Comprehension Check (frequent checks for understanding)  
 Study Guide  
 Directions and/or Tests Read Aloud  
 Adapted Tests and/or Assignments  
 Use of Calculator  
 Taking Tests in Alternate Setting (or if requested)  
 Verbal/Gestural Redirection (prompts to remain on task)  
 Drill and Practice (Repetition of Material)  
 No Penalization for Spelling  
 Copy of Teacher/Student Notes/Skeleton Notes  
 Small Group Instruction  
 Provide Visual Model to Accompany Verbal Directions (Written/Oral Directions)  
 Use of Daily Planner/Assignment Book (monitor use of)  
 Teacher Modeling  
 Use of Computer (Access to)  
 Positive Reinforcement  
 Have Student Repeat Directions  
 Wait Time  
 Access to School Counselor  
 Use of Highlighter/Highlighted Text  
 Positive Reinforcement  
 Provide Frequent Feedback  
 Provide Frequent Breaks  
 Variety of Assessment Methods  
 Use of Assistive Device (i.e. notepad, laptop, ect.)  
 Highly Structured Classroom  
 Limited, Short Directions  
 Grading Rubric  
 Communication Regarding Behavior & Consequences (PBS)  
 Clear Language for Directions  
 Use of Multisensory Approach  
 Provide Opportunities to Retest  
 Frequent Review Sessions  
 Use a variety of Modalities when Introducing Skills/Concepts  
 Books on Tape or CD  
 Cue for Oral Response  
 De-Escalation Opportunities  
 Daily Classwork Check  
 Encourage Student to Check Work Before Turning In  
 Opportunities for Repeated Practice of MATH Skills  
 Provide repetition During Initial Instruction  
 Allow Pre-read of Questions Before Reading Written Passage  
 Provide Verbal and Written Directions  
 All Vocabulary to be Defined Before Testing

Time out  
 Encouragement to Participate in Positive Leadership Roles  
 Student Self-Evaluation for Behavior  
 Exempt from reading Aloud in Front of Peers

### **Safety:**

Student must:  
 Handle material in a safe and workmanlike manner  
 Use protective clothing and equipment  
 Use hand tools in a safe manner  
 Use adequate ventilation when working in enclosed area  
 Follow manufacturer's directions when using any product, tool, equipment, etc.

Use proper safety precautions when using /operating hand tools  
Use tools and equipment in a professional work-like manner according to OSHA standards  
Know and follow the established safety rules at all times

**Assessment:**

Worksheets  
Quizzes  
Pre/Post Tests  
Time Cards  
Writing Activities  
Video/DVD  
Projects  
Check Lists  
Presentation  
Research  
Rubrics

**Resources/Equipment:**

Roth, A. C. (2009). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox. Radcliffe, Bruce (2010) Small Engines. Milwaukee, WI Personal Protective Equipment SGE engine measurement, cleaning, inspection video Manufacturers service manual SGE engine dis assembly video SGE engine re-assembly video SGE job sheet #3 SGE engine dis assembly checklist SGE engine reassembly checklist Basic hand tools. Stationary work bench. Drain pans and receptacles. Appropriate cleaning supplies. Manufacturers service manual Required gaskets, seals, lubricants, replacement parts assessment American Honda Motor Co.(2009). inc, Honda University,GP Engines Training materials flash/pdf/pps.Hyperlinks:  
<http://www.thepowerportal.com/Login.htm>

[www.stihlvotech.com/](http://www.stihlvotech.com/)

<https://www.meritorbullpen.com/>

[www.pennzoilinformationprogram.com/](http://www.pennzoilinformationprogram.com/)

<https://trucklitecollc.mindflash.com/PublicCoursePage.aspx?c=801602995>

# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

**Unit Name:** 400 FUEL SYSTEMS

**Number:** 400 **Hours:** 76.00

**Dates:** Spring 2025

## Description/Objectives:

Student will know and be able to demonstrate knowledge of and perform diagnostics and repairs of fuel systems according to industry standards.

## Tasks:

PA401 - Identify the types of fuel systems and explain the function of all components.

PA403 - Identify types of carburetor designs.

PA405 - Describe the operation of the idle fuel circuit and the main fuel circuit.

PA406 - Explain the venturi principle and variable venturi carburetors.

PA407 - Identify and service fuel enrichment devices.

PA410 - Identify the function of electronic fuel injection (EFI) components.

PA411 - Identify the function and components of gaseous fuel systems.

PA412 - Identify types and grades of fuels used in internal combustion engines

PA413 - Describe how fuel additives protect fuel systems.

PA414 - Remove, service, and replace carburetor.

PA416 - Remove, service, and replace a fuel system's air filter and air intake assembly.

PA417 - Remove, service, and replace a fuel pump.

PA418 - Install and adjust throttle and choke linkage.

PA419 - Adjust carburetor mixture screws per manufacturer specifications.

PA420 - Adjust carburetor float level and metering levers.

PA421 - Remove, service and replace a fuel tank, filters, caps, and lines.

PA423 - Check the fuel pump pressure and flow rate.

PA424 - Pressure test the carburetor.

PA425 - Check the engine for proper starting, idle and acceleration.

PA428 - Remove and replace an intake manifold.

PA429 - Remove, service and replace electronic fuel injection (EFI) fuel system components.

PA430 - Diagnose electronic fuel injection (EFI) system failures.

PA431 - Test and replace an anti-backfire/fuel shutoff solenoid.

## Standards / Assessment Anchors

### Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

#### Supporting Anchor/Standards:

##### KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

##### CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.

Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author's purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.

##### INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.

Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

##### INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

##### RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

### Focus Anchor/Standard #2:

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

#### Supporting Anchor/Standards:

##### TEXT TYPES AND PURPOSE GRADES 9-10-11-12

Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.

Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.

##### PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12

Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.

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Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.

##### RESEARCH GRADES 9-10-11-12

Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.

Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

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## RANGE OF WRITING GRADES 9-10-11-12

Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

*Connecting Anchor/Standard:*

- Pennsylvania Core Standards for Mathematics Standard 2.0

*Supporting Anchor/Standards:*

ALGEBRA

Standard 2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.

**Instructional Activities:**

## Knowledge:

List the primary purposes of the ignition system

Describe small engine ignition advance systems

List the advantages of a solid state ignition system

Describe the operation of a battery ignition system

## Skill:

Demonstrate safe work habits when working with electrical systems

Use a meter to measure resistance, continuity, amperage and voltage

Describe series and parallel circuits and explain the different types of circuit failures

Solder a current carrying wire

## Remediation:

Review with teacher assistance

Individual or group tutoring

Study guides

Extended time

## Enrichment:

Work on live work projects to enhance skill

Participate in classroom leadership activities and competitions

**Special Adaptations:**

Extended Time (assignments and/or testing)

Graphic Organizer

Chunking of Assignments/Material

Preferential Seating

Directions/Comprehension Check (frequent checks for understanding)

Study Guide

Directions and/or Tests Read Aloud

Adapted Tests and/or Assignments

Use of Calculator

Taking Tests in Alternate Setting (or if requested)

Verbal/Gestural Redirection (prompts to remain on task)

Drill and Practice (Repetition of Material)

No Penalization for Spelling

Copy of Teacher/Student Notes/Skeleton Notes

Small Group Instruction

Provide Visual Model to Accompany Verbal Directions (Written/Oral Directions)

Use of Daily Planner/Assignment Book (monitor use of)

Teacher Modeling

Use of Computer (Access to)

Positive Reinforcement

Have Student Repeat Directions

Wait Time

Access to School Counselor  
 Use of Highlighter/Highlighted Text  
 Positive Reinforcement  
 Provide Frequent Feedback  
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 Variety of Assessment Methods  
 Use of Assistive Device (i.e. notepad, laptop, ect.)  
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 Books on Tape or CD  
 Cue for Oral Response  
 De-Escalation Opportunities  
 Daily Classwork Check  
 Encourage Student to Check Work Before Turning In  
 Opportunities for Repeated Practice of MATH Skills  
 Provide repetition During Initial Instruction  
 Allow Pre-read of Questions Before Reading Written Passage  
 Provide Verbal and Written Directions  
 All Vocabulary to be Defined Before Testing

Time out  
 Encouragement to Participate in Positive Leadership Roles  
 Student Self-Evaluation for Behavior  
 Exempt from reading Aloud in Front of Peers

### **Safety:**

Student must:  
 Handle material in a safe and workmanlike manner  
 Use protective clothing and equipment  
 Use hand tools in a safe manner  
 Use adequate ventilation when working in enclosed area  
 Follow manufacturer's directions when using any product, tool, equipment, etc.  
 Use proper safety precautions when using /operating hand tools  
 Use tools and equipment in a professional work-like manner according to OSHA standards  
 Know and follow the established safety rules at all times

### **Assessment:**

Worksheets  
 Quizzes  
 Pre/Post Tests  
 Time Cards  
 Writing Activities  
 Video/DVD  
 Projects  
 Check Lists  
 Presentation  
 Research  
 Rubrics

### **Resources/Equipment:**

Roth, A. C. (2009). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox. Radcliffe, Bruce (2010) Small Engines. Milwaukee, WI Personal Protective Equipment SGE Job sheet #10, "Ignition system service" SGE engine measurement, cleaning, inspection video Manufacturers service manual Small gas engine equipped with breaker points Small gas engine equipped with breaker-less ignition DC electric starter Automotive battery Digital Multi meter Battery load tester DC alternator Soldering equipment. American Honda Motor Co.(2009). inc, Honda University,GP Engines Training materials flash/pdf/pps. Briggs and Stratton, (2009). Small Engine Care and Repair. Creative Publishing, Chanhassen, MN. Equipment and Engine training Council (2009). EETC 4-stroke study guide. Oconomowoc, WI.Hyperlinks:  
<http://www.thepowerportal.com/Login.htm>

[www.stihlvotech.com/](http://www.stihlvotech.com/)

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<https://trucklitecollc.mindflash.com/PublicCoursePage.aspx?c=801602995>

# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

Unit Name: 500 EXHAUST SYSTEMS

Number: 500 Hours: 27.00

Dates: Spring 2025

## Description/Objectives:

Student will know and be able to demonstrate knowledge and service of cooling systems at the level of proficient or higher according to industry standards.

## Tasks:

PA501 - Identify problems that can occur from operating engines with a removed or damaged exhaust system.

PA503 - Remove, service, and replace a spark arrestor screen.

PA504 - Identify exhaust system components and their functions.

PA505 - Explain the function of a single stage catalyst (catalytic converters).

PA507 - Remove, service, and replace an exhaust system.

## Standards / Assessment Anchors

*Focus Anchor/Standard #1:*

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

*Supporting Anchor/Standards:*

KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.

Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author's purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.

INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.

Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

*Focus Anchor/Standard #2:*

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

*Supporting Anchor/Standards:*

TEXT TYPES AND PURPOSE GRADES 9-10-11-12

Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.

Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.

PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12

Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.

Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.

RESEARCH GRADES 9-10-11-12

Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.

Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.

RANGE OF WRITING GRADES 9-10-11-12

Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

**Instructional Activities:**

Knowledge:

Explain how air cooling, exhaust cooling, and water cooling work to lower engine operating temperatures

Define the basic function of a water pump

Describe outboard water circulation systems

Explain the function of a thermostat and a radiator

Skill:

Perform a cooling system flush and cleaning on a liquid cooled engine

Remove, service and replace a water pump hose and replace thermostat

Change engine coolant and clean coolant passages

Identify the components and function of a liquid cooled engine

Properly pressure-test a liquid-cooled cooling system

Describe major causes of liquid-cooled engine overheating

Describe major causes of air-cooled engine overheating

Clean the cooling fins and blower housing on an air-cooled engine

Remediation:

Review with teacher assistance

Individual or group tutoring

Study guides

Extended time

Enrichment:

Work on live work projects to enhance skill

Participate in classroom leadership activities and competitions

**Special Adaptations:**

Extended Time (assignments and/or testing)  
 Graphic Organizer  
 Chunking of Assignments/Material  
 Preferential Seating  
 Directions/Comprehension Check (frequent checks for understanding)  
 Study Guide  
 Directions and/or Tests Read Aloud  
 Adapted Tests and/or Assignments  
 Use of Calculator  
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 Variety of Assessment Methods  
 Use of Assistive Device (i.e. notepad, laptop, ect.)  
 Highly Structured Classroom  
 Limited, Short Directions  
 Grading Rubric  
 Communication Regarding Behavior & Consequences (PBS)  
 Clear Language for Directions  
 Use of Multisensory Approach  
 Provide Opportunities to Retest  
 Frequent Review Sessions  
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Time out  
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Student must:  
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 Use protective clothing and equipment

Use hand tools in a safe manner  
Use adequate ventilation when working in enclosed area  
Follow manufacturer's directions when using any product, tool, equipment, etc.  
Use proper safety precautions when using /operating hand tools  
Use tools and equipment in a professional work-like manner according to OSHA standards  
Know and follow the established safety rules at all times

**Assessment:**

Worksheets  
Quizzes  
Pre/Post Tests  
Time Cards  
Writing Activities  
Video/DVD  
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Check Lists  
Presentation  
Research  
Rubrics

**Resources/Equipment:**

Roth, A. C. (2009). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox. Radcliffe, Bruce (2010) Small Engines. Milwaukee, WI Personal Protective Equipment Air cooled small gas engine Liquid cooled engine Liquid cooled small gas or diesel engine American Honda Motor Co.(2009). inc, Honda University,GP Engines Training materials flash/pdf/pps. Briggs and Stratton, (2009). Small Engine Care and Repair. Creative Publishing, Chanhassen, MN. Equipment and Engine training Council (2009). EETC 4-stroke study guide. Oconomowoc, WI.Hyperlinks:

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# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

**Unit Name:** 600 MEASURING AND TRADE-RELATED MATHEMATICS

**Number:** 600 **Hours:** 75.00

**Dates:** Spring 2025

## Description/Objectives:

Student will know and be able to demonstrate proper use of precision measuring tools and determine the meaning of findings according to industry standards.

## Tasks:

PA601 - Read a standard and a metric ruler

PA602 - Read and use a standard and metric micrometer

PA603 - Read and use a standard and metric dial indicator

PA604 - Use a standard and metric torque wrench

PA605 - Use a standard/metric dial caliper.

PA606 - Calculate displacement and area.

PA607 - Calculate work, power, torque, and horsepower.

## Standards / Assessment Anchors

### Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

### Supporting Anchor/Standards:

#### KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

#### CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

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#### INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.

Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

#### INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

*Focus Anchor/Standard #2:*

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

*Supporting Anchor/Standards:*

TEXT TYPES AND PURPOSE GRADES 9-10-11-12

Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.

Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.

PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12

Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.

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Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.

RESEARCH GRADES 9-10-11-12

Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.

Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.

RANGE OF WRITING GRADES 9-10-11-12

Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

*Connecting Anchor/Standard:*

- Pennsylvania Core Standards for Mathematics Standard 2.0

*Supporting Anchor/Standards:*

NUMBERS AND OPERATIONS

Standard 2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.

Standard 2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multistep problems.

Standard 2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Standard 2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers

ALGEBRA

Standard 2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.

GEOMETRY

Standard 2.3.HS.A.7 Apply trigonometric ratios to solve problems involving right triangles.

Standard 2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.

Standard 2.3.HS.A.13 Analyze relationships between two dimensional and three dimensional objects.

**Instructional Activities:**

Knowledge:

Explain the importance of proper fuel-oil mixture in a two-cycle engine

Describe the purpose of fuel filters

Explain fuel pump operation  
 Describe the operation of a pressurized fuel system  
 explain the importance of emission control  
 Name the various types of fuel that can be used in a small engine and list the practical applications of each

**Skill:**

Identify the function of each component in the fuel system including carburetor, fuel filter, fuel pump, and electronic fuel injector  
 Use proper terms to describe the function of vacuum-feed, diaphragm, float, rotary, and slide valve carburetors  
 Use proper terms to describe the "venturi" principle, and variable venturi carburetors  
 Properly handle and store flammable fuels

**Remediation:**

Review with teacher assistance  
 Individual or group tutoring  
 Study guides  
 Extended time

**Enrichment:**

Work on live work projects to enhance skill  
 Participate in classroom leadership activities and competitions

**Special Adaptations:**

Extended Time (assignments and/or testing)  
 Graphic Organizer  
 Chunking of Assignments/Material  
 Preferential Seating  
 Directions/Comprehension Check (frequent checks for understanding)  
 Study Guide  
 Directions and/or Tests Read Aloud  
 Adapted Tests and/or Assignments  
 Use of Calculator  
 Taking Tests in Alternate Setting (or if requested)  
 Verbal/Gestural Redirection (prompts to remain on task)  
 Drill and Practice (Repetition of Material)  
 No Penalization for Spelling  
 Copy of Teacher/Student Notes/Skeleton Notes  
 Small Group Instruction  
 Provide Visual Model to Accompany Verbal Directions (Written/Oral Directions)  
 Use of Daily Planner/Assignment Book (monitor use of)  
 Teacher Modeling  
 Use of Computer (Access to)  
 Positive Reinforcement  
 Have Student Repeat Directions  
 Wait Time  
 Access to School Counselor  
 Use of Highlighter/Highlighted Text  
 Positive Reinforcement  
 Provide Frequent Feedback  
 Provide Frequent Breaks  
 Variety of Assessment Methods  
 Use of Assistive Device (i.e. notepad, laptop, ect.)  
 Highly Structured Classroom  
 Limited, Short Directions  
 Grading Rubric  
 Communication Regarding Behavior & Consequences (PBS)  
 Clear Language for Directions  
 Use of Multisensory Approach  
 Provide Opportunities to Retest

Frequent Review Sessions  
 Use a variety of Modalities when Introducing Skills/Concepts  
 Books on Tape or CD  
 Cue for Oral Response  
 De-Escalation Opportunities  
 Daily Classwork Check  
 Encourage Student to Check Work Before Turning In  
 Opportunities for Repeated Practice of MATH Skills  
 Provide repetition During Initial Instruction  
 Allow Pre-read of Questions Before Reading Written Passage  
 Provide Verbal and Written Directions  
 All Vocabulary to be Defined Before Testing

Time out  
 Encouragement to Participate in Positive Leadership Roles  
 Student Self-Evaluation for Behavior  
 Exempt from reading Aloud in Front of Peers

### **Safety:**

Student MUST:  
 Handle material in a safe and work-like manner.  
 Use personal protective equipment.  
 Use hand tools in a safe manner.  
 Follow manufacturer's directions when using any product, tool, equipment, etc.  
 Ensure adequate ventilation when working in enclosed areas.  
 Use tools and equipment in a professional work-like manner according to OSHA standards.  
 Know and follow the established safety rules at all times.

### **Assessment:**

Worksheets  
 Quizzes  
 Pre/Post Tests  
 Time Cards  
 Writing Activities  
 Video/DVD  
 Projects  
 Check Lists  
 Presentation  
 Research  
 Rubrics

### **Resources/Equipment:**

Roth, A. C. (2009). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox. Radcliffe, Bruce (2010) Small Engines. Milwaukee, WI Personal Protective Equipment Air cooled small gas engine with carburetor Carburetor cleaning solution tank MSDS Personal protective equipment Briggs and Stratton, (2009). Small Engine Care and Repair. Creative Publishing, Chanhassen, MN. Equipment and Engine training Council (2009). EETC 4-stroke study guide. Oconomowoc, WI. Hand tools Power tools and abrasives Sealants and gaskets Solvents and oils Fuel system components

Hyperlinks:  
<http://www.thepowerportal.com/Login.htm>

[www.stihlvotech.com/](http://www.stihlvotech.com/)

<https://www.meritorbullpen.com/>

[www.pennzoilinformationprogram.com/](http://www.pennzoilinformationprogram.com/)



# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

Unit Name: 700 HAND AND POWER TOOLS.

Number: 700 Hours: 20.00

Dates: Spring 2025

## Description/Objectives:

Student will know and be able to demonstrate the correct selection and use of hand and power tools according to industry standards.

## Tasks:

PA701 - Use common hand tools.

PA702 - Use manufacturer's specialty tools.

PA703 - Use electric, air and hydraulic tools.

## Standards / Assessment Anchors

### Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

#### Supporting Anchor/Standards:

##### KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

##### CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.

Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author's purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.

##### INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.

Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

##### INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

##### RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

### Focus Anchor/Standard #2:

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

**Supporting Anchor/Standards:****TEXT TYPES AND PURPOSE GRADES 9-10-11-12**

Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.

Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.

**PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12**

Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.

Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.

**RESEARCH GRADES 9-10-11-12**

Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.

Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.

**RANGE OF WRITING GRADES 9-10-11-12**

Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

**Instructional Activities:****Knowledge:**

Summarize basic carburetor adjustments

Explain basic procedures fro inspecting, overhauling, and adjusting diaphragm and float-type carburetors

Describe testing a fuel pump for proper operation

Demonstrate troubleshooting procedures for float-type and diaphragm carburetors

**Skill:**

Inspect internal carburetor parts for wear.

Remove, service and replace a carburetor on a small gasoline engine.

Disassemble, clean and reassemble carburetors.

Remove, service, and replace a fuel system's air filter.

Remove, service and replace a fuel pump.

Remove and replace a fuel filter.

Adjust carburetor choke linkage.

Adjust carburetor mixture screws per OEM specifications.

Adjust carburetor float level, adjust carburetor metering levers, remove, replace and repair fuel lines.

Remove and replace a fuel tank, filters, caps and lines.

Adjust an engine's idle speed after servicing a carburetor.

**Remediation:**

Review with teacher assistance

Individual or group tutoring

Study guides

Extended time

**Enrichment:**

Work on live work projects to enhance skill

Participate in classroom leadership activities and competitions

**Special Adaptations:**

Extended Time (assignments and/or testing)  
 Graphic Organizer  
 Chunking of Assignments/Material  
 Preferential Seating  
 Directions/Comprehension Check (frequent checks for understanding)  
 Study Guide  
 Directions and/or Tests Read Aloud  
 Adapted Tests and/or Assignments  
 Use of Calculator  
 Taking Tests in Alternate Setting (or if requested)  
 Verbal/Gestural Redirection (prompts to remain on task)  
 Drill and Practice (Repetition of Material)  
 No Penalization for Spelling  
 Copy of Teacher/Student Notes/Skeleton Notes  
 Small Group Instruction  
 Provide Visual Model to Accompany Verbal Directions (Written/Oral Directions)  
 Use of Daily Planner/Assignment Book (monitor use of)  
 Teacher Modeling  
 Use of Computer (Access to)  
 Positive Reinforcement  
 Have Student Repeat Directions  
 Wait Time  
 Access to School Counselor  
 Use of Highlighter/Highlighted Text  
 Positive Reinforcement  
 Provide Frequent Feedback  
 Provide Frequent Breaks  
 Variety of Assessment Methods  
 Use of Assistive Device (i.e. notepad, laptop, ect.)  
 Highly Structured Classroom  
 Limited, Short Directions  
 Grading Rubric  
 Communication Regarding Behavior & Consequences (PBS)  
 Clear Language for Directions  
 Use of Multisensory Approach  
 Provide Opportunities to Retest  
 Frequent Review Sessions  
 Use a variety of Modalities when Introducing Skills/Concepts  
 Books on Tape or CD  
 Cue for Oral Response  
 De-Escalation Opportunities  
 Daily Classwork Check  
 Encourage Student to Check Work Before Turning In  
 Opportunities for Repeated Practice of MATH Skills  
 Provide repetition During Initial Instruction  
 Allow Pre-read of Questions Before Reading Written Passage  
 Provide Verbal and Written Directions  
 All Vocabulary to be Defined Before Testing

Time out  
 Encouragement to Participate in Positive Leadership Roles  
 Student Self-Evaluation for Behavior  
 Exempt from reading Aloud in Front of Peers

**Safety:**

Student must:  
 Handle material in a safe and workmanlike manner  
 Use protective clothing and equipment

Use hand tools in a safe manner  
Use adequate ventilation when working in enclosed area  
Follow manufacturer's directions when using any product, tool, equipment, etc.  
Use proper safety precautions when using /operating hand tools  
Use tools and equipment in a professional work-like manner according to OSHA standards  
Know and follow the established safety rules at all times

**Assessment:**

Worksheets  
Quizzes  
Writing Activities  
Rubrics  
Diagrams  
Individual Projects  
Check Lists  
Power Point

**Resources/Equipment:**

Roth, A. C. (2009). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox. Radcliffe, Bruce (2010) Small Engines. Milwaukee, WI Personal Protective Equipment Hand tools Small gas engine carburetor Required gaskets and seals MSDS Carburetor cleaning solvent Appropriate manufacturers technical manualHyperlinks:

<http://www.thepowerportal.com/Login.htm>

[www.stihlvotech.com/](http://www.stihlvotech.com/)

<https://www.meritorbullpen.com/>

[www.pennzoilinformationprogram.com/](http://www.pennzoilinformationprogram.com/)

<https://trucklitecollc.mindflash.com/PublicCoursePage.aspx?c=801602995>

# Monroe Career & Technical Institute

**Course:** Outdoor Power Equipment Technologies

**Unit Name:** 800 FASTENERS.

**Number:** 800 **Hours:** 12.00

**Dates:** Spring 2025

## Description/Objectives:

Student will know and be able to demonstrate proper identification, selection, use, and repair of fasteners according to industry standards.

## Tasks:

PA801 - Identify, select and install various fasteners according to specifications.

PA802 - Replace damaged internal threads using a thread repair system.

PA803 - Repair damaged threads, using a tap and die, chaser, or thread file.

PA804 - Use a thread extraction tool to remove a broken fastener.

PA805 - Torque fasteners according to manufacturer specifications.

## Standards / Assessment Anchors

### Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

### Supporting Anchor/Standards:

#### KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

#### CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.

Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author's purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.

#### INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.

Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

#### INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

#### RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and

comprehend technical texts independently and proficiently.

*Focus Anchor/Standard #2:*

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

*Supporting Anchor/Standards:*

TEXT TYPES AND PURPOSE GRADES 9-10-11-12

Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.

Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.

PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12

Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.

Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.

RESEARCH GRADES 9-10-11-12

Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.

Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.

RANGE OF WRITING GRADES 9-10-11-12

Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

*Connecting Anchor/Standard:*

- Pennsylvania Core Standards for Mathematics Standard 2.0

*Supporting Anchor/Standards:*

ALGEBRA

Standard 2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.

**Instructional Activities:**

Knowledge:

Describe the purpose of an exhaust deflector and describe the purpose of a spark arrestor screen.

Describe exhaust system nomenclature and function as well as types and terms associated with exhaust systems

Describe the theory and function of a single stage catalyst (catalytic converters).

Describe the proper service cleaning procedures for exhaust ports and spark arrestor screens

Skill:

Inspect, remove, service and replace an exhaust system

Remediation:

Review with teacher assistance

Individual or group tutoring

Study guides

Extended time

Enrichment:

Work on live work projects to enhance skill  
Participate in classroom leadership activities and competitions

### **Special Adaptations:**

Extended Time (assignments and/or testing)  
Graphic Organizer  
Chunking of Assignments/Material  
Preferential Seating  
Directions/Comprehension Check (frequent checks for understanding)  
Study Guide  
Directions and/or Tests Read Aloud  
Adapted Tests and/or Assignments  
Use of Calculator  
Taking Tests in Alternate Setting (or if requested)  
Verbal/Gestural Redirection (prompts to remain on task)  
Drill and Practice (Repetition of Material)  
No Penalization for Spelling  
Copy of Teacher/Student Notes/Skeleton Notes  
Small Group Instruction  
Provide Visual Model to Accompany Verbal Directions (Written/Oral Directions)  
Use of Daily Planner/Assignment Book (monitor use of)  
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Use of Computer (Access to)  
Positive Reinforcement  
Have Student Repeat Directions  
Wait Time  
Access to School Counselor  
Use of Highlighter/Highlighted Text  
Positive Reinforcement  
Provide Frequent Feedback  
Provide Frequent Breaks  
Variety of Assessment Methods  
Use of Assistive Device (i.e. notepad, laptop, ect.)  
Highly Structured Classroom  
Limited, Short Directions  
Grading Rubric  
Communication Regarding Behavior & Consequences (PBS)  
Clear Language for Directions  
Use of Multisensory Approach  
Provide Opportunities to Retest  
Frequent Review Sessions  
Use a variety of Modalities when Introducing Skills/Concepts  
Books on Tape or CD  
Cue for Oral Response  
De-Escalation Opportunities  
Daily Classwork Check  
Encourage Student to Check Work Before Turning In  
Opportunities for Repeated Practice of MATH Skills  
Provide repetition During Initial Instruction  
Allow Pre-read of Questions Before Reading Written Passage  
Provide Verbal and Written Directions  
All Vocabulary to be Defined Before Testing

Time out  
Encouragement to Participate in Positive Leadership Roles  
Student Self-Evaluation for Behavior  
Exempt from reading Aloud in Front of Peers

### **Safety:**

Student must:

Handle material in a safe and work-like manner.

Use personal protective equipment.

Use hand tools in a safe manner.

Follow manufacturer's directions when using any product, tool, equipment, etc.

Ensure adequate ventilation when working in enclosed areas.

Use tools and equipment in a professional work-like manner according to OSHA standards.

Know and follow the established safety rules at all times.

### Assessment:

Worksheets

Quizzes

Writing Activities

Rubrics

Diagrams

Individual Projects

Check Lists

Power Point

### Resources/Equipment:

Roth, A. C. (2009). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox. Radcliffe, Bruce (2010) Small Engines. Milwaukee, WI Personal Protective Equipment Hand tools Small gas engine with exhaust system installed Briggs and Stratton, (2009). Small Engine Care and Repair. Creative Publishing, Chanhassen, MN. Equipment and Engine training Council (2009). EETC 4-stroke study guide. Oconomowoc, WI. Air impact gun. Air impact ratchet. Rotary air tools. Grinding tools. Air powered cutting tools. Stationary work bench Electric angle grinder. Solvents and oils. Appropriate cleaning supplies. Manufacturers service manual Required gaskets, seals, lubricants, replacement parts  
assessmentHyperlinks:

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[www.stihlvotech.com/](http://www.stihlvotech.com/)

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[www.pennzoilinformationprogram.com/](http://www.pennzoilinformationprogram.com/)

<https://trucklitecollec.mindflash.com/PublicCoursePage.aspx?c=801602995>

# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

Unit Name: 900 WELDING, HEATING AND CUTTING

Number: 900 Hours: 60.00

Dates: Spring 2025

## Description/Objectives:

Student will know and be able to demonstrate welding and cutting techniques according to industry standards.

## Tasks:

PA901 - Follow safety rules for welding and cutting equipment.

PA903 - Adjust welding amperage and perform various welding repairs.

PA905 - Light and adjust the flame on an oxy-acetylene torch.

PA906 - Heat and cut with an oxy-acetylene torch.

PA907 - Set up and adjust gauges on welding, heating, and cutting equipment.

## Standards / Assessment Anchors

*Focus Anchor/Standard #1:*

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

*Supporting Anchor/Standards:*

KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.

Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author's purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.

INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.

Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

*Focus Anchor/Standard #2:*

- Science, Technology & Engineering, and Environmental Literacy & Sustainability Standards  
3.5.6-8.2 Strand: Applying, Maintaining, and Assessing Technological Products and Systems

*Supporting Anchor/Standards:*

3.5.6-8.A Research information from various sources to use and maintain technological products or systems.

3.5.6-8.B Use instruments to gather data on the performance of everyday products.

3.5.6-8.J Use tools, materials, and machines to safely diagnose, adjust, and repair systems.

3.5.6-8.K Use devices to control technological systems.

3.5.6-8.I Examine the ways that technology can have both positive and negative effects at the same time.

3.5.6-8.M (ETS) Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

3.5.6-8.D Analyze how the creation and use of technologies consumes renewable, non-renewable, and inexhaustible resources; creates waste; and may contribute to environmental challenges.

*Connecting Anchor/Standard:*

- Pennsylvania Core Standards for Mathematics Standard 2.0

*Supporting Anchor/Standards:*

ALGEBRA

Standard 2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.

**Instructional Activities:**

Knowledge:

List the reasons why small engine components must be measured carefully

Review the proper use of common hand tools and measuring equipment

Explain why quality tools and measuring instruments should be used when servicing small gas engines

Skill:

Read a standard and a metric ruler

Read and use a standard and metric micrometer

Read and use a standard and metric dial indicator

Use a standard and metric torque wrench

Use a standard and metric dial caliper

Calculate displacement and horse power

Calculate Work, Power, Torque, Area and Volume

Identify common hand tools used in the repair of outdoor power equipment

Identify specialty tools used in overhaul

Follow rules for hand tool safety

Follow specific rules for portable electric hand tool safety

Remediation:

Review with teacher assistance

Individual or group tutoring

Study guides

Extended time

Enrichment:

Work on live work projects to enhance skill

Participate in classroom leadership activities and competitions

**Special Adaptations:**

Extended Time (assignments and/or testing)  
 Graphic Organizer  
 Chunking of Assignments/Material  
 Preferential Seating  
 Directions/Comprehension Check (frequent checks for understanding)  
 Study Guide  
 Directions and/or Tests Read Aloud  
 Adapted Tests and/or Assignments  
 Use of Calculator  
 Taking Tests in Alternate Setting (or if requested)  
 Verbal/Gestural Redirection (prompts to remain on task)  
 Drill and Practice (Repetition of Material)  
 No Penalization for Spelling  
 Copy of Teacher/Student Notes/Skeleton Notes  
 Small Group Instruction  
 Provide Visual Model to Accompany Verbal Directions (Written/Oral Directions)  
 Use of Daily Planner/Assignment Book (monitor use of)  
 Teacher Modeling  
 Use of Computer (Access to)  
 Positive Reinforcement  
 Have Student Repeat Directions  
 Wait Time  
 Access to School Counselor  
 Use of Highlighter/Highlighted Text  
 Positive Reinforcement  
 Provide Frequent Feedback  
 Provide Frequent Breaks  
 Variety of Assessment Methods  
 Use of Assistive Device (i.e. notepad, laptop, ect.)  
 Highly Structured Classroom  
 Limited, Short Directions  
 Grading Rubric  
 Communication Regarding Behavior & Consequences (PBS)  
 Clear Language for Directions  
 Use of Multisensory Approach  
 Provide Opportunities to Retest  
 Frequent Review Sessions  
 Use a variety of Modalities when Introducing Skills/Concepts  
 Books on Tape or CD  
 Cue for Oral Response  
 De-Escalation Opportunities  
 Daily Classwork Check  
 Encourage Student to Check Work Before Turning In  
 Opportunities for Repeated Practice of MATH Skills  
 Provide repetition During Initial Instruction  
 Allow Pre-read of Questions Before Reading Written Passage  
 Provide Verbal and Written Directions  
 All Vocabulary to be Defined Before Testing

Time out  
 Encouragement to Participate in Positive Leadership Roles  
 Student Self-Evaluation for Behavior  
 Exempt from reading Aloud in Front of Peers

**Safety:**

Student must:  
 Handle material in a safe and workmanlike manner  
 Use protective clothing and equipment

Use hand tools in a safe manner  
Use adequate ventilation when working in enclosed area  
Follow manufacturer's directions when using any product, tool, equipment, etc.  
Use proper safety precautions when using /operating hand tools  
Use tools and equipment in a professional work-like manner according to OSHA standards  
Know and follow the established safety rules at all times

**Assessment:**

Worksheets  
Quizzes  
Writing Activities  
Rubrics  
Diagrams  
Individual Projects  
Check Lists  
Power Point

**Resources/Equipment:**

Roth, A. C. (2009). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox. Radcliffe, Bruce (2010) Small Engines. Milwaukee, WI Personal Protective Equipment Micrometer Dial caliper Steel ruler Dial indicator Feeler Gage Hand tools Small gas engine short block engine build sheet SGE Job Sheet #2 Unit #900/100, job #1 learning guide.Hyperlinks:

<http://www.thepowerportal.com/Login.htm>

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# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

**Unit Name:** 1000 2-STROKE CYCLE ENGINE

**Number:** 1000 **Hours:** 29.00

**Dates:** Spring 2025

## Description/Objectives:

Student will know and be able to demonstrate 2-stroke cycle engine operating principles, troubleshooting, and repair procedures according to industry standards.

## Tasks:

PA1001 - Diagnose performance problems in a 2-stroke cycle gasoline engine.

PA1003 - Perform top end compression.

PA1004 - Perform crankcase vacuum/pressure test.

PA1005 - Identify the component parts in a short block of a 2-stroke cycle engine and explain their purposes.

PA1006 - Pressure test a fuel system on a 2-stroke cycle engine.

PA1007 - Explain 2-stroke cycle engine operating theory.

PA1010 - Identify the types of 2-stroke cycle engine valves.

PA1011 - Inspect and service 2-stroke cycle engine exhaust systems.

## Standards / Assessment Anchors

### Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

### Supporting Anchor/Standards:

KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.

Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author's purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.

INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.

Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in

diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

*Focus Anchor/Standard #2:*

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

*Supporting Anchor/Standards:*

TEXT TYPES AND PURPOSE GRADES 9-10-11-12

Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.

Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.

PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12

Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.

Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.

RESEARCH GRADES 9-10-11-12

Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.

Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.

RANGE OF WRITING GRADES 9-10-11-12

Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

**Instructional Activities:**

Knowledge:

Demonstrate the proper use of hand tools

Explain why quality tools should be used when servicing small gas engines

Skill:

Identify common hand tools used in the repair of outdoor power equipment

Identify specialty tools used in overhaul

Identify specialty tools used in overhaul

Remediation:

Review with teacher assistance

Individual or group tutoring

Study guides

Extended time

Enrichment:

Work on live work projects to enhance skill

Participate in classroom leadership activities and competitions

**Special Adaptations:**

Extended Time (assignments and/or testing)  
 Graphic Organizer  
 Chunking of Assignments/Material  
 Preferential Seating  
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 All Vocabulary to be Defined Before Testing

Time out  
 Encouragement to Participate in Positive Leadership Roles  
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**Safety:**

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Follow manufacturer's directions when using any product, tool, equipment, etc.  
Use proper safety precautions when using /operating hand tools  
Use tools and equipment in a professional work-like manner according to OSHA standards  
Know and follow the established safety rules at all times

**Assessment:**

Worksheets  
Quizzes  
Writing Activities  
Rubrics  
Diagrams  
Individual Projects  
Check Lists  
Power Point

**Resources/Equipment:**

Roth, A. C. (2009). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox. Radcliffe, Bruce (2010) Small Engines. Milwaukee, WI Personal Protective Equipment Hand tools Small gas engine short block Engine build sheet SGE Job Sheet #2 Unit #900/100, job #1 learning guide.Hyperlinks:  
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# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

**Unit Name:** 1100 4-STROKE CYCLE ENGINE

**Number:** 1100 **Hours:** 62.00

**Dates:** Spring 2025

## Description/Objectives:

Student will know and be able to describe 4-stroke engine operating principles, perform diagnostics, and perform required repairs according to industry standards.

## Tasks:

PA1101 - Disassemble, clean, and identify engine components.

PA1103 - Explain 4-stroke cycle engine operating theory.

PA1105 - Inspect shaft(s) bearings and gears.

PA1107 - Measure crankshaft end play, run-out and determine necessary repairs.

PA1108 - Inspect and service valve train components.

PA1112 - Install valve springs using a valve spring compressor.

PA1113 - Adjust valve clearances/lash.

PA1114 - Measure cylinder bore for oversize, out of round, taper, and piston to cylinder wall clearance.

PA1115 - Deglaze/hone a cylinder.

PA1116 - Perform a cylinder balance test.

PA1117 - Perform a cylinder compression test.

PA1118 - Perform a cylinder leak-down test.

PA1119 - Install a crankshaft and bearings.

PA1120 - Install a piston using a ring compressor.

PA1121 - Check ring end gap and side clearance.

PA1122 - Verify camshaft timing.

PA1123 - Install all gaskets and seals according to specifications.

## Standards / Assessment Anchors

### Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

### Supporting Anchor/Standards:

KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

**CRAFT & STRUCTURE GRADES 9-10-11-12**

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

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**INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10**

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.

Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

**INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12**

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

**RANGE OF READING GRADES 9-10-11-12**

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

**Focus Anchor/Standard #2:**

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

**Supporting Anchor/Standards:****TEXT TYPES AND PURPOSE GRADES 9-10-11-12**

Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.

Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.

**PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12**

Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.

Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

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**RESEARCH GRADES 9-10-11-12**

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Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.

**RANGE OF WRITING GRADES 9-10-11-12**

Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

**Supporting Anchor/Standards:**

Extended Time (assignments and/or testing)

Graphic Organizer

Chunking of Assignments/Material

Preferential Seating

Directions/Comprehension Check (frequent checks for understanding)

Study Guide  
 Directions and/or Tests Read Aloud  
 Adapted Tests and/or Assignments  
 Use of Calculator  
 Taking Tests in Alternate Setting (or if requested)  
 Verbal/Gestural Redirection (prompts to remain on task)  
 Drill and Practice (Repetition of Material)  
 No Penalization for Spelling  
 Copy of Teacher/Student Notes/Skeleton Notes  
 Small Group Instruction  
 Provide Visual Model to Accompany Verbal Directions (Written/Oral Directions)  
 Use of Daily Planner/Assignment Book (monitor use of)  
 Teacher Modeling  
 Use of Computer (Access to)  
 Positive Reinforcement  
 Have Student Repeat Directions  
 Wait Time  
 Access to School Counselor  
 Use of Highlighter/Highlighted Text  
 Positive Reinforcement  
 Provide Frequent Feedback  
 Provide Frequent Breaks  
 Variety of Assessment Methods  
 Use of Assistive Device (i.e. notepad, laptop, ect.)  
 Highly Structured Classroom  
 Limited, Short Directions  
 Grading Rubric  
 Communication Regarding Behavior & Consequences (PBS)  
 Clear Language for Directions  
 Use of Multisensory Approach  
 Provide Opportunities to Retest  
 Frequent Review Sessions  
 Use a variety of Modalities when Introducing Skills/Concepts  
 Books on Tape or CD  
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 Encourage Student to Check Work Before Turning In  
 Opportunities for Repeated Practice of MATH Skills  
 Provide repetition During Initial Instruction  
 Allow Pre-read of Questions Before Reading Written Passage  
 Provide Verbal and Written Directions  
 All Vocabulary to be Defined Before Testing

Time out  
 Encouragement to Participate in Positive Leadership Roles  
 Student Self-Evaluation for Behavior  
 Exempt from reading Aloud in Front of Peers

### **Instructional Activities:**

Knowledge:

Describe fastener grading and marking

Describe thread pitch

Identify difference between metric, SAE, and USS fasteners

Locate torque values in manufacturers service manuals

Skill:

Select correct fasteners for specific repairs.

Install selected fasteners according to specifications.

Replace damaged internal threads using a thread repair system.  
 Repair damaged internal threads using a tap.  
 Repair damaged threads, if needed, using a die.  
 Demonstrate use of an "Easy-out" type tool to remove broken fasteners.

**Remediation:**

Review with teacher assistance  
 Individual or group tutoring  
 Study guides  
 Extended time

**Enrichment:**

Work on live work projects to enhance skill  
 Participate in classroom leadership activities and competitions

**Safety:**

**Student must:**

Handle material in a safe and workmanlike manner  
 Use protective clothing and equipment  
 Use hand tools in a safe manner  
 Use adequate ventilation when working in enclosed area  
 Follow manufacturer's directions when using any product, tool, equipment, etc.  
 Use proper safety precautions when using /operating hand tools  
 Use tools and equipment in a professional work-like manner according to OSHA standards  
 Know and follow the established safety rules at all times

**Assessment:**

Worksheets  
 Quizzes  
 Pre/Post Tests  
 Time Cards  
 Writing Activities  
 Video/DVD  
 Projects  
 Check Lists  
 Presentation  
 assessment  
 Research  
 Rubrics

**Resources/Equipment:**

Roth, A. C. (2009). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox. Radcliffe, Bruce (2010) Small Engines. Milwaukee, WI Personal Protective Equipment Thread pitch gage Basic hand tools. Grinding tools. Air powered cutting tools. Stationary work bench. Drill press. Manufacturers service manual  
 Hyperlinks:

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# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

**Unit Name:** 1200 ENGINE FAILURE ANALYSIS.

**Number:** 1200 **Hours:** 80.00

**Dates:** Spring 2025

## Description/Objectives:

The student will know and be able to perform engine failure analysis for warranty purposes according to industry standards.

## Tasks:

PA1201 - List engine failure categories.

PA1202 - Identify insufficient lubrication failures.

PA1203 - Identify fuel system failures.

PA1204 - Identify cooling system failures.

PA1205 - Identify detonation and pre-ignition failures.

PA1207 - Identify the effects of over speeding.

PA1208 - Identify the signature breakage of a connecting rod.

PA1209 - Identify exhaust port piston scoring and large end bearings failure on a 2-stroke cycle engine.

PA1210 - Identify the effects of excessing vibration on engine block and mounting base.

## Standards / Assessment Anchors

*Focus Anchor/Standard #1:*

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

*Supporting Anchor/Standards:*

KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

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INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

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INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

*Focus Anchor/Standard #2:*

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*Supporting Anchor/Standards:*

TEXT TYPES AND PURPOSE GRADES 9-10-11-12

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PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12

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**Instructional Activities:**

Knowledge:

Identify types of metals and appropriate welding medium.

Describe proper surface preparation prior to welding.

Describe required personal protective equipment.

Score 100% on PDE arc welder safety test.

Skill:

Adjust welding amperage for a specific welding repair.

Weld a broken metal frame on a piece of outdoor equipment.

Remediation:

Review with teacher assistance

Individual or group tutoring

Study guides

Extended time

Enrichment:

Work on live work projects to enhance skill

Participate in classroom leadership activities and competitions

Practice welding scrap metals of varying sizes and thicknesses.

**Special Adaptations:**

Extended Time (assignments and/or testing)  
 Graphic Organizer  
 Chunking of Assignments/Material  
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 Directions/Comprehension Check (frequent checks for understanding)  
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 Use protective clothing and equipment

Use hand tools in a safe manner  
Use adequate ventilation when working in enclosed area  
Follow manufacturer's directions when using any product, tool, equipment, etc.  
Use proper safety precautions when using /operating hand tools  
Use tools and equipment in a professional work-like manner according to OSHA standards  
Know and follow the established safety rules at all times

**Assessment:**

Worksheets  
Quizzes  
Pre/Post Tests  
Time Cards  
Writing Activities  
Power Point Presentation  
Projects  
Check Lists  
Presentation  
assessment  
Research  
Rubrics

**Resources/Equipment:**

Arc welder MIG Welder PDE "Safety Guidelines for Technology Education & Elementary Science/Technology Education" mac arc welding safety information sheet and arc welder safety test.Hyperlinks:

<http://www.thepowerportal.com/Login.htm>

[www.stihlvotech.com/](http://www.stihlvotech.com/)

<https://www.meritorbullpen.com/>

[www.pennzoilinformationprogram.com/](http://www.pennzoilinformationprogram.com/)

<https://trucklitecollc.mindflash.com/PublicCoursePage.aspx?c=801602995>

# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

**Unit Name:** 1300 STARTING SYSTEMS

**Number:** 1300 **Hours:** 40.00

**Dates:** Spring 2025

## Description/Objectives:

Student will know and be able to perform manual and electrical starting system service and repairs according to industry standards.

## Tasks:

PA1301 - Disassemble, identify, and describe the parts of a recoil starting system.

PA1303 - Replace a starter spring, pulley, and starter rope.

PA1305 - Troubleshoot and repair a starting/safety interlock circuit.

PA1306 - Remove, service and replace a direct current (DC) starter.

PA1307 - Remove, service and replace an alternating current (AC) starter.

PA1308 - Identify and describe the components of a direct current (DC) starting system.

PA1309 - Perform a 12-volt direct current (DC) starter motor current draw test.

PA1310 - Remove, test, and replace a starter relay or solenoid.

## Standards / Assessment Anchors

### Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

### Supporting Anchor/Standards:

#### KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

#### CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.

Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author's purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.

#### INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.

Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

#### INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

*Focus Anchor/Standard #2:*

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

*Supporting Anchor/Standards:*

TEXT TYPES AND PURPOSE GRADES 9-10-11-12

Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.

Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.

PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12

Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.

Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.

RESEARCH GRADES 9-10-11-12

Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.

Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.

RANGE OF WRITING GRADES 9-10-11-12

Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

**Instructional Activities:**

Knowledge:

List the three systems required for basic engine operation.

Identify possible failures in the three basic systems and their relationship to engine performance.

Define scavenging.

Describe cross-scavenging and loop-scavenging.

Differentiate between "Check", "Inspect", and "Service".

Describe systematic troubleshooting.

Skill:

Diagnose performance problems in a 2-cycle gasoline engine

Check engine for top end compression.

Check engine for base/ primary compression (bottom end).

Inspect the fuel system for proper operation.

Perform a carburetor pressure test.

Inspect the ignition system for proper operation and perform a 3-point spark test.

Inspect the exhaust port for carbon obstructions.

Check crankcase integrity with a pressure/vacuum pump.

Operate the engine to check for proper starting and power output under load.

Remediation:

Review with teacher assistance

Individual or group tutoring

Study guides

Extended time

Enrichment:

Work on live work projects to enhance skill

Participate in classroom leadership activities and competitions

### **Special Adaptations:**

Extended Time (assignments and/or testing)

Graphic Organizer

Chunking of Assignments/Material

Preferential Seating

Directions/Comprehension Check (frequent checks for understanding)

Study Guide

Directions and/or Tests Read Aloud

Adapted Tests and/or Assignments

Use of Calculator

Taking Tests in Alternate Setting (or if requested)

Verbal/Gestural Redirection (prompts to remain on task)

Drill and Practice (Repetition of Material)

No Penalization for Spelling

Copy of Teacher/Student Notes/Skeleton Notes

Small Group Instruction

Provide Visual Model to Accompany Verbal Directions (Written/Oral Directions)

Use of Daily Planner/Assignment Book (monitor use of)

Teacher Modeling

Use of Computer (Access to)

Positive Reinforcement

Have Student Repeat Directions

Wait Time

Access to School Counselor

Use of Highlighter/Highlighted Text

Positive Reinforcement

Provide Frequent Feedback

Provide Frequent Breaks

Variety of Assessment Methods

Use of Assistive Device (i.e. notepad, laptop, ect.)

Highly Structured Classroom

Limited, Short Directions

Grading Rubric

Communication Regarding Behavior & Consequences (PBS)

Clear Language for Directions

Use of Multisensory Approach

Provide Opportunities to Retest

Frequent Review Sessions

Use a variety of Modalities when Introducing Skills/Concepts

Books on Tape or CD

Cue for Oral Response

De-Escalation Opportunities

Daily Classwork Check

Encourage Student to Check Work Before Turning In

Opportunities for Repeated Practice of MATH Skills

Provide repetition During Initial Instruction

Allow Pre-read of Questions Before Reading Written Passage

Provide Verbal and Written Directions

All Vocabulary to be Defined Before Testing

Time out

Encouragement to Participate in Positive Leadership Roles

Student Self-Evaluation for Behavior

Exempt from reading Aloud in Front of Peers

**Safety:**

Student must:

Handle material in a safe and workmanlike manner

Use protective clothing and equipment

Use hand tools in a safe manner

Use adequate ventilation when working in enclosed area

Follow manufacturer's directions when using any product, tool, equipment, etc.

Use proper safety precautions when using /operating hand tools

Use tools and equipment in a professional work-like manner according to OSHA standards

Know and follow the established safety rules at all times

**Assessment:**

Worksheets

Quizzes

Pre/Post Tests

Time Cards

Writing Activities

Video/DVD

Projects

Check Lists

Presentation

assessment

Research

Rubrics

**Resources/Equipment:**

Roth, A. C. (2009). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox. Radcliffe, Bruce (2010) Small Engines. Milwaukee, WI Personal Protective Equipment SGE Job sheet #8, "2-cycle engine reassembly" SGE Job sheet #9, "General engine troubleshooting" SGE Job sheet #10, "Ignition system service" SGE Job sheet #11, "Fuel system service" "Small engines.com", URL - <http://small-engines.com/index.html> Strap wrench. Flywheel holder. Spark tester. Solvents and oils. Overhead gantry crane. Drain pans and receptacles. Appropriate cleaning supplies. Manufacturers service manual Required gaskets, seals, lubricants, replacement parts Cylinder honing hand tools. Cylinder boring machine. Cylinder honing machine. Hydraulic lifting tables. Stationary work bench. Hydraulic floor jack. Hydraulic motorcycle/atv jack

Hyperlinks:

<http://www.thepowerportal.com/Login.htm>

[www.stihlvotech.com/](http://www.stihlvotech.com/)

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<https://trucklitecollc.mindflash.com/PublicCoursePage.aspx?c=801602995>

# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

**Unit Name:** 1400 IGNITION SYSTEM

**Number:** 1400 **Hours:** 78.00

**Dates:** Spring 2025

## Description/Objectives:

Student will know and be able to perform the proper diagnostics, inspections, services, and repairs of ignition systems and accurately describe ignition operating theory according to industry standards.

## Tasks:

PA1401 - Identify, remove, service and replace battery ignition system components

PA1402 - Identify, remove, service and replace electronic ignition system components.

PA1404 - Check and set ignition timing/air gap.

PA1406 - Test an ignition system using a spark tester.

PA1407 - Inspect the engine for a sheared flywheel key.

PA1408 - Remove, inspect, and replace points and condenser.

PA1410 - Replace a spark plug terminal and boot.

PA1411 - Test a solid-state, transistor-controlled discharge system.

PA1412 - Test a capacitive discharge ignition system.

PA1414 - Perform timing procedures on an engine with a solid state/ electronic ignition system.

PA1416 - Replace an engine ignition kill switch.

## Standards / Assessment Anchors

### Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

### Supporting Anchor/Standards:

KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.

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INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a

technical problem.

Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

*Focus Anchor/Standard #2:*

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

*Supporting Anchor/Standards:*

TEXT TYPES AND PURPOSE GRADES 9-10-11-12

Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.

Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.

PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12

Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.

Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.

RESEARCH GRADES 9-10-11-12

Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.

Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.

RANGE OF WRITING GRADES 9-10-11-12

Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

*Connecting Anchor/Standard:*

- Pennsylvania Core Standards for Mathematics Standard 2.0

*Supporting Anchor/Standards:*

ALGEBRA

Standard 2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.

**Instructional Activities:**

Knowledge:

List the three systems required for basic engine operation.

Identify possible failures in the three basic systems and their relationship to engine performance.

Differentiate between "Check", "Inspect", and "Service".

Describe systematic troubleshooting.

**Skill:**

Check the fuel pump pressure.  
 Pressure test the carburetor.  
 Operate the engine to check for proper starting and acceleration.  
 Differentiate hunting/surging symptom between the fuel system and governor system.  
 Perform a cylinder balance test and demonstrate understanding of findings  
 Perform a cylinder compression test.  
 Perform a cylinder leak-down test.  
 Perform an engine crankcase vacuum test.  
 Perform an oil pressure test.  
 Test an ignition system using a spark tester.  
 Inspect the engine for a partially-sheared flywheel key.  
 Remove, inspect and replace points and condenser.  
 Remove and replace an ignition armature (ignition coil, ignition ).  
 Test and replace ignition armature assembly.  
 Test and replace high tension lead(s).  
 Test the solid-state transistor-controlled discharge system.  
 Test a capacitive ignition system.  
 Demonstrate timing procedure for an engine with ignition points.  
 Demonstrate timing procedures on an engine with a solid state/ electronic ignition system.  
 Measure primary and secondary resistance.  
 Check/replace an engine ignition kill switch.  
 Inspect the cooling system.  
 Check for damage to the cooling fins or fan.  
 Identify debris clogging cooling air fins.  
 Identify the proper order of assembling an air intake system.  
 Remove and replace an intake manifold

**Remediation:**

Review with teacher assistance  
 Individual or group tutoring  
 Study guides  
 Extended time

**Enrichment:**

Work on live work projects to enhance skill  
 Participate in classroom leadership activities and competitions

**Special Adaptations:**

Extended Time (assignments and/or testing)  
 Graphic Organizer  
 Chunking of Assignments/Material  
 Preferential Seating  
 Directions/Comprehension Check (frequent checks for understanding)  
 Study Guide  
 Directions and/or Tests Read Aloud  
 Adapted Tests and/or Assignments  
 Use of Calculator  
 Taking Tests in Alternate Setting (or if requested)  
 Verbal/Gestural Redirection (prompts to remain on task)  
 Drill and Practice (Repetition of Material)  
 No Penalization for Spelling  
 Copy of Teacher/Student Notes/Skeleton Notes  
 Small Group Instruction  
 Provide Visual Model to Accompany Verbal Directions (Written/Oral Directions)  
 Use of Daily Planner/Assignment Book (monitor use of)  
 Teacher Modeling  
 Use of Computer (Access to)  
 Positive Reinforcement  
 Have Student Repeat Directions

Wait Time  
 Access to School Counselor  
 Use of Highlighter/Highlighted Text  
 Positive Reinforcement  
 Provide Frequent Feedback  
 Provide Frequent Breaks  
 Variety of Assessment Methods  
 Use of Assistive Device (i.e. notepad, laptop, ect.)  
 Highly Structured Classroom  
 Limited, Short Directions  
 Grading Rubric  
 Communication Regarding Behavior & Consequences (PBS)  
 Clear Language for Directions  
 Use of Multisensory Approach  
 Provide Opportunities to Retest  
 Frequent Review Sessions  
 Use a variety of Modalities when Introducing Skills/Concepts  
 Books on Tape or CD  
 Cue for Oral Response  
 De-Escalation Opportunities  
 Daily Classwork Check  
 Encourage Student to Check Work Before Turning In  
 Opportunities for Repeated Practice of MATH Skills  
 Provide repetition During Initial Instruction  
 Allow Pre-read of Questions Before Reading Written Passage  
 Provide Verbal and Written Directions  
 All Vocabulary to be Defined Before Testing

Time out  
 Encouragement to Participate in Positive Leadership Roles  
 Student Self-Evaluation for Behavior  
 Exempt from reading Aloud in Front of Peers

### **Safety:**

Student must:  
 Handle material in a safe and workmanlike manner  
 Use protective clothing and equipment  
 Use hand tools in a safe manner  
 Use adequate ventilation when working in enclosed area  
 Follow manufacturer's directions when using any product, tool, equipment, etc.  
 Use proper safety precautions when using /operating hand tools  
 Use tools and equipment in a professional work-like manner according to OSHA standards  
 Know and follow the established safety rules at all times

### **Assessment:**

Worksheets  
 Quizzes  
 Pre/Post Tests  
 Time Cards  
 Writing Activities  
 Video/DVD  
 Projects  
 Check Lists  
 Presentation  
 assessment  
 Research  
 Rubrics

**Resources/Equipment:**

Roth, A. C. (2009). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox. Radcliffe, Bruce (2010) Small Engines. Milwaukee, WI Personal Protective Equipment SGE Job sheet #7, "4-cycle engine reassembly" SGE Job sheet #9, "General engine troubleshooting" SGE Job sheet #10, "Ignition system service" SGE Job sheet #11, "Fuel system service" "Small engines.com", URL - <http://small-engines.com/index.html> Briggs and Stratton "The Power Channel" Failure analysis course @ <http://www.thepowerportal.com/nA/English/PowerChannel/Courses/FailureAnalysis.htm>. Basic hand tools. Cylinder compression tester Cylinder leak-down tester Spark tester Crankcase vacuum tester Precision measuring tools Manufacturer's service manual

Hyperlinks:  
<http://www.thepowerportal.com/Login.htm>

[www.stihlvotech.com/](http://www.stihlvotech.com/)

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[www.pennzoilinformationprogram.com/](http://www.pennzoilinformationprogram.com/)

<https://trucklitecollc.mindflash.com/PublicCoursePage.aspx?c=801602995>

# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

Unit Name: 1500 CHARGING SYSTEM

Number: 1500 Hours: 65.00

Dates: Spring 2025

## Description/Objectives:

Student will know and be able to describe charging system operating principles, perform diagnostics, and make required repairs according to industry standards.

## Tasks:

PA1501 - Explain battery theory and perform maintenance and storage procedures.

PA1502 - Identify and describe the function of charging system components.

PA1503 - Perform a current draw test.

PA1504 - Test and troubleshoot the components of a charging system.

PA1508 - Remove and replace charging system components.

## Standards / Assessment Anchors

### Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

### Supporting Anchor/Standards:

#### KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

#### CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.

Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author's purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.

#### INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.

Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

#### INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

#### RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and

comprehend technical texts independently and proficiently.

*Focus Anchor/Standard #2:*

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

*Supporting Anchor/Standards:*

TEXT TYPES AND PURPOSE GRADES 9-10-11-12

Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.

Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.

PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12

Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.

Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.

RESEARCH GRADES 9-10-11-12

Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.

Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.

RANGE OF WRITING GRADES 9-10-11-12

Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

*Connecting Anchor/Standard:*

- Pennsylvania Core Standards for Mathematics Standard 2.0

*Supporting Anchor/Standards:*

ALGEBRA

Standard 2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.

**Instructional Activities:**

Knowledge:

Explain simple engine operation.

Describe four-stroke cycle engine operation and explain the purpose of each stroke.

List the qualities of gasoline that make it an efficient fuel for small engines.

Explain why gasoline is atomized in the small engine.

Identify the basic components of a small engine and describe the function of each part.

Describe the procedure for removing an engine from an implement

List the steps involved in disassembling an engine

Explain the procedures involved in re boring a cylinder Describe piston and piston ring construction explain the purpose of ring end gap

Summarize the function of the crankshaft

describe the proper procedures for valve reconditioning

Skill:

Inspect the engine for signs of trouble before removal.

Remove store and label external parts.

Remove flywheel and related parts.

Disassemble internal parts, including rotating and reciprocating groups, Making critical measurements when required.

Given an engine, required tools and applicable service manual, you will be able to:

- Disassemble the engine to the part-level.
- Adjust the valve clearance in accordance with the service manual.
- Adjust the ignition coil installation gap in accordance with the service manual.
- Replace the limiter cap and pilot screw in the carburetor.
- Tighten the bolts securing the connecting rod cap, flywheel and case cover to the torques specified in the service manual.

Given an engine, required tools and the service manual, you will be able to:

Perform the following inspections and judge if the parts in question are usable.

- Check the piston ring groove for carbon deposit.
- Check if the piston rings fit to the piston operate smoothly.
- Measure piston ring end gaps.
- Measure cylinder I.D.
- Measure piston skirt O.D.
- Measure connecting rod big end I.D.
- Measure crankshaft bearing O.D.

Remediation:

Review with teacher assistance

Individual or group tutoring

Study guides

Extended time

Enrichment:

Work on live work projects to enhance skill

Participate in classroom leadership activities and competitions

### **Special Adaptations:**

Extended Time (assignments and/or testing)

Graphic Organizer

Chunking of Assignments/Material

Preferential Seating

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Verbal/Gestural Redirection (prompts to remain on task)

Drill and Practice (Repetition of Material)

No Penalization for Spelling

Copy of Teacher/Student Notes/Skeleton Notes

Small Group Instruction

Provide Visual Model to Accompany Verbal Directions (Written/Oral Directions)

Use of Daily Planner/Assignment Book (monitor use of)

Teacher Modeling

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Positive Reinforcement

Have Student Repeat Directions

Wait Time

Access to School Counselor

Use of Highlighter/Highlighted Text

Positive Reinforcement

Provide Frequent Feedback

Provide Frequent Breaks

Variety of Assessment Methods

Use of Assistive Device (i.e. notepad, laptop, ect.)

Highly Structured Classroom

Limited, Short Directions

Grading Rubric

Communication Regarding Behavior & Consequences (PBS)

Clear Language for Directions

Use of Multisensory Approach

Provide Opportunities to Retest

Frequent Review Sessions

Use a variety of Modalities when Introducing Skills/Concepts

Books on Tape or CD

Cue for Oral Response

De-Escalation Opportunities

Daily Classwork Check

Encourage Student to Check Work Before Turning In

Opportunities for Repeated Practice of MATH Skills

Provide repetition During Initial Instruction

Allow Pre-read of Questions Before Reading Written Passage

Provide Verbal and Written Directions

All Vocabulary to be Defined Before Testing

Time out

Encouragement to Participate in Positive Leadership Roles

Student Self-Evaluation for Behavior

Exempt from reading Aloud in Front of Peers

### **Safety:**

Student must:

Handle material in a safe and workmanlike manner

Use protective clothing and equipment

Use hand tools in a safe manner

Use adequate ventilation when working in enclosed area

Follow manufacturer's directions when using any product, tool, equipment, etc.

Use proper safety precautions when using /operating hand tools

Use tools and equipment in a professional work-like manner according to OSHA standards

Know and follow the established safety rules at all times

### **Assessment:**

Worksheets

Quizzes

Pre/Post Tests

Time Cards

Writing Activities

Video/DVD

Projects

Check Lists

Presentation

Research

Rubrics

### **Resources/Equipment:**

Roth, A. C. (2009). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox. Radcliffe, Bruce (2010) Small Engines. Milwaukee, WI Personal Protective Equipment SGE engine dis assembly video SGE engine re-assembly video SGE engine measurement, cleaning, inspection video SGE job sheet #3 SGE engine dis assembly checklist SGE engine reassembly checklist Basic hand tools. Gear and flywheel pullers. Valve cutting tools. Valve seating tools. Valve spring compressors. Air impact gun. Air impact ratchet. Rotary air tools. Grinding tools. Air powered cutting tools. Cylinder honing hand tools. Cylinder boring machine. Cylinder honing machine. Hydraulic lifting tables. Stationary work bench. Hydraulic floor jack. Hydraulic motorcycle/atv jack. Manual lawn tractor jack. Bench grinder. Electric angle grinder. Drill press. Strap wrench. Flywheel holder. Spark tester. Solvents and oils. Overhead gantry crane. Drain pans and receptacles. Appropriate cleaning supplies. Manufacturers service manual Required gaskets, seals,

lubricants, replacement parts assessment Viable 4-cycle engine American Honda Motor Co.(2009). inc,  
Honda University,GP Engines Training materials flash/pdf/pps.Hyperlinks:

<http://www.thepowerportal.com/Login.htm>

[www.stihlvotech.com/](http://www.stihlvotech.com/)

<https://www.meritorbullpen.com/>

[www.pennzoilinformationprogram.com/](http://www.pennzoilinformationprogram.com/)

<https://trucklitecollc.mindflash.com/PublicCoursePage.aspx?c=801602995>

# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

**Unit Name:** 1600 LUBRICATION SYSTEM

**Number:** 1600 **Hours:** 13.00

**Dates:** Spring 2025

## Description/Objectives:

Student will know and be able to demonstrate knowledge of and perform service, diagnostics, and repairs of lubrication systems according to industry standards.

## Tasks:

PA1603 - Change engine oil and filter.

PA1604 - Select proper oil and grade utilizing application charts.

PA1605 - Prepare a fuel/oil mixture for a 2-stroke cycle engine.

PA1606 - Service a crankcase breather assembly.

PA1607 - Describe lubrication systems and their functions.

PA1608 - Interpret American Petroleum Institute (API) oil ratings and Society of Automotive Engineers (SAE) viscosity ratings.

PA1609 - Describe the standard classification of 2-cycle oils.

PA1610 - List common oil contaminants.

PA1611 - Identify differences between splash lubrication systems and a pressure lubrication system.

PA1612 - Describe the operation of oil filtration system.

PA1613 - Describe methods of checking the oil level in an engine.

PA1615 - Identify the components and function of a crankcase ventilation breather assembly

PA1616 - Perform an oil pressure test.

PA1617 - Diagnose and repair a low-oil alert system.

## Standards / Assessment Anchors

### Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

### Supporting Anchor/Standards:

KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.

Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author's purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.

#### INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.

Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

#### INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

#### RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

#### *Focus Anchor/Standard #2:*

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

#### *Supporting Anchor/Standards:*

##### TEXT TYPES AND PURPOSE GRADES 9-10-11-12

Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.

Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.

##### PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12

Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.

Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.

##### RESEARCH GRADES 9-10-11-12

Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.

Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.

##### RANGE OF WRITING GRADES 9-10-11-12

Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

#### *Connecting Anchor/Standard:*

- Pennsylvania Core Standards for Mathematics Standard 2.0

#### *Supporting Anchor/Standards:*

##### ALGEBRA

Standard 2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.

#### **Instructional Activities:**

Knowledge:

List the three systems required for basic engine operation.

Identify possible failures in the three basic systems and their relationship to engine performance.  
Differentiate between "Check", "Inspect", and "Service".  
Describe systematic troubleshooting.

**Skill:**

Classify failures into 5 major categories; electrical, fuel, ignition, lubrication, and compression.  
Identify the entrance path and the effects of abrasives on several failed engines.  
Identify the effects of insufficient lubrication on engine components; piston cylinders, etc.  
Find the root cause of failure on a failed engine.  
Identify and describe engine failures caused by the breakdown of fuel.  
Identify the effects of overheating on engine component parts.  
Define detonation, pre-ignition and effects on engine components.  
Identify engine failure caused by lean mixture of fuel.  
Identify the effects of over speeding on engine component parts.  
Identify the signature "breakage" of a connecting rod on a failed engine.  
Identify exhaust port piston scoring and large end bearings due to over speeding.  
Identify the effects of excessive vibration on engine block and mounting base.  
Inspect a damaged engine and identify the symptoms, types and causes of failures.

**Remediation:**

Review with teacher assistance  
Individual or group tutoring  
Study guides  
Extended time

**Enrichment:**

Work on live work projects to enhance skill  
Participate in classroom leadership activities and competitions

**Special Adaptations:**

Extended Time (assignments and/or testing)  
Graphic Organizer  
Chunking of Assignments/Material  
Preferential Seating  
Directions/Comprehension Check (frequent checks for understanding)  
Study Guide  
Directions and/or Tests Read Aloud  
Adapted Tests and/or Assignments  
Use of Calculator  
Taking Tests in Alternate Setting (or if requested)  
Verbal/Gestural Redirection (prompts to remain on task)  
Drill and Practice (Repetition of Material)  
No Penalization for Spelling  
Copy of Teacher/Student Notes/Skeleton Notes  
Small Group Instruction  
Provide Visual Model to Accompany Verbal Directions (Written/Oral Directions)  
Use of Daily Planner/Assignment Book (monitor use of)  
Teacher Modeling  
Use of Computer (Access to)  
Positive Reinforcement  
Have Student Repeat Directions  
Wait Time  
Access to School Counselor  
Use of Highlighter/Highlighted Text  
Positive Reinforcement  
Provide Frequent Feedback  
Provide Frequent Breaks  
Variety of Assessment Methods  
Use of Assistive Device (i.e. notepad, laptop, ect.)  
Highly Structured Classroom

Limited, Short Directions  
 Grading Rubric  
 Communication Regarding Behavior & Consequences (PBS)  
 Clear Language for Directions  
 Use of Multisensory Approach  
 Provide Opportunities to Retest  
 Frequent Review Sessions  
 Use a variety of Modalities when Introducing Skills/Concepts  
 Books on Tape or CD  
 Cue for Oral Response  
 De-Escalation Opportunities  
 Daily Classwork Check  
 Encourage Student to Check Work Before Turning In  
 Opportunities for Repeated Practice of MATH Skills  
 Provide repetition During Initial Instruction  
 Allow Pre-read of Questions Before Reading Written Passage  
 Provide Verbal and Written Directions  
 All Vocabulary to be Defined Before Testing

Time out  
 Encouragement to Participate in Positive Leadership Roles  
 Student Self-Evaluation for Behavior  
 Exempt from reading Aloud in Front of Peers

#### **Safety:**

Student must:  
 Handle material in a safe and workmanlike manner  
 Use protective clothing and equipment  
 Use hand tools in a safe manner  
 Use adequate ventilation when working in enclosed area  
 Follow manufacturer's directions when using any product, tool, equipment, etc.  
 Use proper safety precautions when using /operating hand tools  
 Use tools and equipment in a professional work-like manner according to OSHA standards  
 Know and follow the established safety rules at all times

#### **Assessment:**

Worksheets  
 Quizzes  
 Pre/Post Tests  
 Time Cards  
 Writing Activities  
 Video/DVD  
 Projects  
 Check Lists  
 Presentation  
 assessment  
 Research  
 Rubrics

#### **Resources/Equipment:**

Roth, A. C. (2009). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox. SGE Job sheet #7, "4-cycle engine reassembly" SGE Job sheet #8, "2-cycle engine reassembly" SGE Job sheet #9, "General engine troubleshooting" SGE Job sheet #10, "Ignition system service" SGE Job sheet #11, "Fuel system service" "Small engines.com", URL - <http://small-engines.com/index.html> Briggs and Stratton "The Power Channel" Failure analysis course @ <http://www.thepowerportal.com/nA/English/PowerChannel/Courses/FailureAnalysis.htm>. Any Manufacturer's service manual specific to a particular engine. Clevite 77 form# CL77-3-402 "Engine

Bearing failure analysis guide". @ <http://engineparts.com/publications/CL77-3-402.pdf>. American Honda Motor Co.(2009). inc, Honda University,GP Engines Training materials flash/pdf/pps.Hyperlinks:  
<http://www.thepowerportal.com/Login.htm>

[www.stihlvotech.com/](http://www.stihlvotech.com/)

<https://www.meritorbullpen.com/>

[www.pennzoilinformationprogram.com/](http://www.pennzoilinformationprogram.com/)

<https://trucklitecollc.mindflash.com/PublicCoursePage.aspx?c=801602995>

# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

Unit Name: 1700 GOVERNOR SYSTEMS

Number: 1700 Hours: 15.00

Dates: Spring 2025

## Description/Objectives:

Student will know and be able to inspect, service, repair, and perform diagnostics on governor systems according to industry standards.

## Tasks:

PA1701 - Perform static and dynamic governor adjustments.

PA1702 - Remove, service, and replace pneumatic and mechanical governor.

PA1703 - Check top no-load speed and adjust governor as needed.

PA1704 - Differentiate hunting/surging symptom between the fuel system and governor system.

## Standards / Assessment Anchors

### Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

### Supporting Anchor/Standards:

#### KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

#### CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.

Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author's purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.

#### INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.

Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

#### INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

#### RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

*Focus Anchor/Standard #2:*

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

*Supporting Anchor/Standards:*

## TEXT TYPES AND PURPOSE GRADES 9-10-11-12

Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.

Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.

## PRODUCTION &amp; DISTRIBUTION OF WRITING GRADES 9-10-11-12

Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.

Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.

## RESEARCH GRADES 9-10-11-12

Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.

Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.

## RANGE OF WRITING GRADES 9-10-11-12

Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

*Connecting Anchor/Standard:*

- Pennsylvania Core Standards for Mathematics Standard 2.0

*Supporting Anchor/Standards:*

## NUMBERS AND OPERATIONS

Standard 2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.

Standard 2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multistep problems.

Standard 2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Standard 2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers

**Instructional Activities:**

## Knowledge:

Describe the function of a manual starting system.

Describe the various types of manual starting systems.

Identify specifications in the appropriate service manual.

Use industry terminology.

## Skill:

Identify and describe the parts of a recoil starting system.

Disassemble starter housing.

Replace a starter spring.

Replace a manual starter rope.

Troubleshoot a starting / safety interlock circuit.

**Remediation:**

Review with teacher assistance  
 Individual or group tutoring  
 Study guides  
 Extended time

**Enrichment:**

Work on live work projects to enhance skill  
 Participate in classroom leadership activities and competitions

**Special Adaptations:**

Extended Time (assignments and/or testing)  
 Graphic Organizer  
 Chunking of Assignments/Material  
 Preferential Seating  
 Directions/Comprehension Check (frequent checks for understanding)  
 Study Guide  
 Directions and/or Tests Read Aloud  
 Adapted Tests and/or Assignments  
 Use of Calculator  
 Taking Tests in Alternate Setting (or if requested)  
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 Drill and Practice (Repetition of Material)  
 No Penalization for Spelling  
 Copy of Teacher/Student Notes/Skeleton Notes  
 Small Group Instruction  
 Provide Visual Model to Accompany Verbal Directions (Written/Oral Directions)  
 Use of Daily Planner/Assignment Book (monitor use of)  
 Teacher Modeling  
 Use of Computer (Access to)  
 Positive Reinforcement  
 Have Student Repeat Directions  
 Wait Time  
 Access to School Counselor  
 Use of Highlighter/Highlighted Text  
 Positive Reinforcement  
 Provide Frequent Feedback  
 Provide Frequent Breaks  
 Variety of Assessment Methods  
 Use of Assistive Device (i.e. notepad, laptop, ect.)  
 Highly Structured Classroom  
 Limited, Short Directions  
 Grading Rubric  
 Communication Regarding Behavior & Consequences (PBS)  
 Clear Language for Directions  
 Use of Multisensory Approach  
 Provide Opportunities to Retest  
 Frequent Review Sessions  
 Use a variety of Modalities when Introducing Skills/Concepts  
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 De-Escalation Opportunities  
 Daily Classwork Check  
 Encourage Student to Check Work Before Turning In  
 Opportunities for Repeated Practice of MATH Skills  
 Provide repetition During Initial Instruction  
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 All Vocabulary to be Defined Before Testing

Time out  
Encouragement to Participate in Positive Leadership Roles  
Student Self-Evaluation for Behavior  
Exempt from reading Aloud in Front of Peers

**Safety:**

Student must:  
Handle material in a safe and workmanlike manner  
Use protective clothing and equipment  
Use hand tools in a safe manner  
Use adequate ventilation when working in enclosed area  
Follow manufacturer's directions when using any product, tool, equipment, etc.  
Use proper safety precautions when using /operating hand tools  
Use tools and equipment in a professional work-like manner according to OSHA standards  
Know and follow the established safety rules at all times

**Assessment:**

Worksheets  
Quizzes  
Pre/Post Tests  
Time Cards  
Writing Activities  
Video/DVD  
Projects  
Check Lists  
Presentation  
assessment  
Research  
Rubrics

**Resources/Equipment:**

Roth, A. C. (2009). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox. Honda university "Training Materials Flash/PDF" CD. Appropriate service manual.Hyperlinks:

<http://www.thepowerportal.com/Login.htm>

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<https://trucklitecollc.mindflash.com/PublicCoursePage.aspx?c=801602995>

# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

**Unit Name:** 1800 BRAKE SYSTEMS

**Number:** 1800 **Hours:** 60.00

**Dates:** Spring 2025

## Description/Objectives:

Student will know and be able to inspect, service, repair, and replace an electric starter and electric starter components and supporting systems according to industry standards.

## Tasks:

PA1801 - Inspect, remove, service and repair mechanical brake systems.

PA1802 - Inspect, remove, service and repair hydraulic brake systems.

PA1803 - Inspect, remove service and repair drum and disc brakes.

PA1804 - Explain hydraulic brake theory.

## Standards / Assessment Anchors

### Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

### Supporting Anchor/Standards:

#### KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

#### CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.

Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author's purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.

#### INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.

Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

#### INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

#### RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

**Focus Anchor/Standard #2:**

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

**Supporting Anchor/Standards:****TEXT TYPES AND PURPOSE GRADES 9-10-11-12**

Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.

Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.

**PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12**

Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.

Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.

**RESEARCH GRADES 9-10-11-12**

Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.

Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.

**RANGE OF WRITING GRADES 9-10-11-12**

Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

**Instructional Activities:**

Knowledge:

Vocabulary.

Describe basic units of electrical measurement.

Apply Ohm's law.

Describe the function of a electric starting system.

Identify the two types of electrical starting systems.

Define polarity.

Identify specifications in the appropriate service manual.

Skill:

Remove, service and replace a Direct Current starter.

Remove, service and replace and Alternating Current starter.

Identify and describe the components of a DC starting system.

Perform a 12-volt DC starter motor current draw test.

Remove, test and replace a starter relay or solenoid.

Identify, remove, service and replace battery ignition system components

Identify, remove, service and replace electronic ignition system components.

Remediation:

Review with teacher assistance

Individual or group tutoring

Study guides

Extended time

Enrichment:

Work on live work projects to enhance skill

Participate in classroom leadership activities and competitions

**Special Adaptations:**

Extended Time (assignments and/or testing)  
 Graphic Organizer  
 Chunking of Assignments/Material  
 Preferential Seating  
 Directions/Comprehension Check (frequent checks for understanding)  
 Study Guide  
 Directions and/or Tests Read Aloud  
 Adapted Tests and/or Assignments  
 Use of Calculator  
 Taking Tests in Alternate Setting (or if requested)  
 Verbal/Gestural Redirection (prompts to remain on task)  
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 Copy of Teacher/Student Notes/Skeleton Notes  
 Small Group Instruction  
 Provide Visual Model to Accompany Verbal Directions (Written/Oral Directions)  
 Use of Daily Planner/Assignment Book (monitor use of)  
 Teacher Modeling  
 Use of Computer (Access to)  
 Positive Reinforcement  
 Have Student Repeat Directions  
 Wait Time  
 Access to School Counselor  
 Use of Highlighter/Highlighted Text  
 Positive Reinforcement  
 Provide Frequent Feedback  
 Provide Frequent Breaks  
 Variety of Assessment Methods  
 Use of Assistive Device (i.e. notepad, laptop, ect.)  
 Highly Structured Classroom  
 Limited, Short Directions  
 Grading Rubric  
 Communication Regarding Behavior & Consequences (PBS)  
 Clear Language for Directions  
 Use of Multisensory Approach  
 Provide Opportunities to Retest  
 Frequent Review Sessions  
 Use a variety of Modalities when Introducing Skills/Concepts  
 Books on Tape or CD  
 Cue for Oral Response  
 De-Escalation Opportunities  
 Daily Classwork Check  
 Encourage Student to Check Work Before Turning In  
 Opportunities for Repeated Practice of MATH Skills  
 Provide repetition During Initial Instruction  
 Allow Pre-read of Questions Before Reading Written Passage  
 Provide Verbal and Written Directions  
 All Vocabulary to be Defined Before Testing

Time out  
 Encouragement to Participate in Positive Leadership Roles  
 Student Self-Evaluation for Behavior  
 Exempt from reading Aloud in Front of Peers

### **Safety:**

Student must:  
 Handle material in a safe and workmanlike manner  
 Use protective clothing and equipment  
 Use hand tools in a safe manner  
 Use adequate ventilation when working in enclosed area  
 Follow manufacturer's directions when using any product, tool, equipment, etc.

Use proper safety precautions when using /operating hand tools  
Use tools and equipment in a professional work-like manner according to OSHA standards  
Know and follow the established safety rules at all times

**Assessment:**

Worksheets  
Quizzes  
Pre/Post Tests  
Time Cards  
Writing Activities  
Video/DVD  
Projects  
Check Lists  
Presentation  
assessment  
Research  
Rubrics

**Resources/Equipment:**

Roth, A. C. (2009). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox. Radcliffe, Bruce (2010) Small Engines. Milwaukee, WI Personal Protective Equipment Honda university "Training Materials Flash/PDF" CD. Briggs and Stratton "The Power Channel" electrical systems instructional video's @ [http://www.thepowerportal.com/nA/English/PowerChannel/FindaVideo.htm?FB\\_Values=!!&F1\\_ajaxEnabled=1&F1\\_DocID=36421&F1\\_keywordFilter=&F1\\_PageNum=1&](http://www.thepowerportal.com/nA/English/PowerChannel/FindaVideo.htm?FB_Values=!!&F1_ajaxEnabled=1&F1_DocID=36421&F1_keywordFilter=&F1_PageNum=1&). Appropriate service manual. Electric starters. Solenoids. Electric start equipped engines. Hyperlinks: <http://www.thepowerportal.com/Login.htm>

[www.stihlvotech.com/](http://www.stihlvotech.com/)

<https://www.meritorbullpen.com/>

[www.pennzoilinformationprogram.com/](http://www.pennzoilinformationprogram.com/)

<https://trucklitecollc.mindflash.com/PublicCoursePage.aspx?c=801602995>

# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

**Unit Name:** 1900 CLUTCH AND DRIVE SYSTEM

**Number:** 1900 **Hours:** 39.00

**Dates:** Spring 2025

## Description/Objectives:

Student will know and be able to inspect, service, repair, and perform diagnostics on clutch and drive systems according to industry standards.

## Tasks:

PA1901 - Inspect and service or replace belts and tensioning devices.

PA1902 - Inspect and service or replace centrifugal clutches.

PA1903 - Inspect and service or replace clutch discs.

PA1904 - Inspect and service or replace sprockets and chains.

PA1905 - Inspect and service or replace an electric power take-off.

PA1906 - Inspect and service or replace universal joints.

PA1907 - Disassemble, service and reassemble gearboxes and components

PA1908 - Disassemble, service and reassemble transaxles.

PA1909 - Disassemble, service and reassemble hydrostatic drives.

PA1910 - Change hydraulic fluid and filter.

## Standards / Assessment Anchors

### Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

### Supporting Anchor/Standards:

KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.

Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author's purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.

INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.

Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other

sources, etc.

#### INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

#### RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

#### *Focus Anchor/Standard #2:*

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

#### *Supporting Anchor/Standards:*

##### TEXT TYPES AND PURPOSE GRADES 9-10-11-12

Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.

Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.

##### PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12

Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.

Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.

##### RESEARCH GRADES 9-10-11-12

Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.

Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.

##### RANGE OF WRITING GRADES 9-10-11-12

Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

#### **Instructional Activities:**

##### Knowledge:

Describe the function of a manual starting system.

Describe the various types of manual starting systems.

Identify specifications in the appropriate service manual.

Use industry terminology.

##### Skill:

Identify, remove, service and replace battery ignition system components

Identify, remove, service and replace electronic ignition system components.

Remove, test and replace a coil or electronic ignition.

Check and set ignition timing.

Check engine RPM.

##### Remediation:

Review with teacher assistance

Individual or group tutoring

Study guides

Extended time

Enrichment:  
 Work on live work projects to enhance skill  
 Participate in classroom leadership activities and competitions

### **Special Adaptations:**

Extended Time (assignments and/or testing)  
 Graphic Organizer  
 Chunking of Assignments/Material  
 Preferential Seating  
 Directions/Comprehension Check (frequent checks for understanding)  
 Study Guide  
 Directions and/or Tests Read Aloud  
 Adapted Tests and/or Assignments  
 Use of Calculator  
 Taking Tests in Alternate Setting (or if requested)  
 Verbal/Gestural Redirection (prompts to remain on task)  
 Drill and Practice (Repetition of Material)  
 No Penalization for Spelling  
 Copy of Teacher/Student Notes/Skeleton Notes  
 Small Group Instruction  
 Provide Visual Model to Accompany Verbal Directions (Written/Oral Directions)  
 Use of Daily Planner/Assignment Book (monitor use of)  
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 Provide Frequent Feedback  
 Provide Frequent Breaks  
 Variety of Assessment Methods  
 Use of Assistive Device (i.e. notepad, laptop, ect.)  
 Highly Structured Classroom  
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 Use of Multisensory Approach  
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 All Vocabulary to be Defined Before Testing

Time out  
 Encouragement to Participate in Positive Leadership Roles  
 Student Self-Evaluation for Behavior  
 Exempt from reading Aloud in Front of Peers

### **Safety:**

Student must:

Handle material in a safe and workmanlike manner

Use protective clothing and equipment

Use hand tools in a safe manner

Use adequate ventilation when working in enclosed area

Follow manufacturer's directions when using any product, tool, equipment, etc.

Use proper safety precautions when using /operating hand tools

Use tools and equipment in a professional work-like manner according to OSHA standards

Know and follow the established safety rules at all times

### Assessment:

Worksheets

Quizzes

Pre/Post Tests

Time Cards

Writing Activities

Video/DVD

Projects

Check Lists

Presentation

assessment

Research

Rubrics

### Resources/Equipment:

Roth, A. C. (2012). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox. Radcliffe, Bruce (2010)

Small Engines. Milwaukee, WI Personal Protective Equipment Honda university "Training Materials

Flash/PDF" CDHyperlinks:

<http://www.thepowerportal.com/Login.htm>

[www.stihlvotech.com/](http://www.stihlvotech.com/)

<https://www.meritorbullpen.com/>

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# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

**Unit Name:** 2000 PARTS MANAGEMENT, INVOICING AND RECORDKEEPING.

**Number:** 2000 **Hours:** 45.00

**Dates:** Spring 2025

## Description/Objectives:

Student will know and be able to manage parts, keep inventory, and keep service records according to industry standards.

## Tasks:

PA2001 - Interpret illustrations, graphs, diagrams, and tables.

PA2002 - Use reference materials, service manuals, and parts tables.

PA2003 - Perform inventory of parts in stock.

PA2004 - Locate parts and specifications using a computerized or microfiche parts reference database.

PA2005 - Complete a service order/invoice form.

PA2006 - Interpret time and flat rate information.

PA2007 - Order materials and supplies.

PA2008 - Explain a manufacturer's model number, serial number, engine type number, and vehicle identification numbers (VIN).

## Standards / Assessment Anchors

### Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

### Supporting Anchor/Standards:

KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.

Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author's purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.

INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.

Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in

diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

*Focus Anchor/Standard #2:*

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

*Supporting Anchor/Standards:*

TEXT TYPES AND PURPOSE GRADES 9-10-11-12

Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.

Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.

PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12

Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.

Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.

RESEARCH GRADES 9-10-11-12

Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.

Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.

RANGE OF WRITING GRADES 9-10-11-12

Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

*Connecting Anchor/Standard:*

- Career Education and Work Academic Standards  
13.2. Career Acquisition (Getting a Job)

*Supporting Anchor/Standards:*

13.2.11 E. Demonstrate, in the career acquisition process, the application of essential workplace skills/knowledge, such as, but not limited to: Commitment Communication Dependability Health/safety Laws and regulations (that is Americans With Disabilities Act, child labor laws, Fair Labor Standards Act, OSHA, Material Safety Data Sheets) Personal initiative Self-advocacy Scheduling/time management Team building Technical literacy Technology

**Instructional Activities:**

Knowledge:

List the three systems required for basic engine operation.

Identify possible failures in the three basic systems and their relationship to engine performance.

Differentiate between "Check", "Inspect", and "Service".

Describe systematic troubleshooting.

Skill:

Explain storage battery theory and perform maintenance.

Identify types of charging systems including an under flywheel alternator and a belt drive alternator.  
 Perform a current drain test using a DC shunt or its equivalent.  
 Troubleshoot a charging circuit.  
 Test a charging system.  
 Test a voltage regulator.  
 Test an alternator's output.  
 Remove, service and replace an alternator, a voltage rectifier and a diode.

**Remediation:**

Review with teacher assistance  
 Individual or group tutoring  
 Study guides  
 Extended time

**Enrichment:**

Work on live work projects to enhance skill  
 Participate in classroom leadership activities and competitions

**Special Adaptations:**

Extended Time (assignments and/or testing)  
 Graphic Organizer  
 Chunking of Assignments/Material  
 Preferential Seating  
 Directions/Comprehension Check (frequent checks for understanding)  
 Study Guide  
 Directions and/or Tests Read Aloud  
 Adapted Tests and/or Assignments  
 Use of Calculator  
 Taking Tests in Alternate Setting (or if requested)  
 Verbal/Gestural Redirection (prompts to remain on task)  
 Drill and Practice (Repetition of Material)  
 No Penalization for Spelling  
 Copy of Teacher/Student Notes/Skeleton Notes  
 Small Group Instruction  
 Provide Visual Model to Accompany Verbal Directions (Written/Oral Directions)  
 Use of Daily Planner/Assignment Book (monitor use of)  
 Teacher Modeling  
 Use of Computer (Access to)  
 Positive Reinforcement  
 Have Student Repeat Directions  
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 Variety of Assessment Methods  
 Use of Assistive Device (i.e. notepad, laptop, ect.)  
 Highly Structured Classroom  
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 All Vocabulary to be Defined Before Testing

Time out  
 Encouragement to Participate in Positive Leadership Roles  
 Student Self-Evaluation for Behavior  
 Exempt from reading Aloud in Front of Peers

### **Safety:**

Student must:  
 Handle material in a safe and workmanlike manner  
 Use protective clothing and equipment  
 Use hand tools in a safe manner  
 Use adequate ventilation when working in enclosed area  
 Follow manufacturer's directions when using any product, tool, equipment, etc.  
 Use proper safety precautions when using /operating hand tools  
 Use tools and equipment in a professional work-like manner according to OSHA standards  
 Know and follow the established safety rules at all times

### **Assessment:**

Worksheets  
 Quizzes  
 Pre/Post Tests  
 Time Cards  
 Writing Activities  
 Video/DVD  
 Projects  
 Check Lists  
 Presentation  
 assessment  
 Research  
 Rubrics

### **Resources/Equipment:**

Roth, A. C. (2009). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox. Radcliffe, Bruce (2010) Small Engines. Milwaukee, WI Honda university "Training Materials Flash/PDF" CD. Briggs and Stratton "The Power Channel" electrical systems instructional video's @  
[http://www.thepowerportal.com/nA/English/PowerChannel/FindaVideo.htm?FB\\_Values=!!&F1\\_ajaxEnabled=1&F1\\_DocID=36421&F1\\_keywordFilter=&F1\\_PageNum=1&](http://www.thepowerportal.com/nA/English/PowerChannel/FindaVideo.htm?FB_Values=!!&F1_ajaxEnabled=1&F1_DocID=36421&F1_keywordFilter=&F1_PageNum=1&). Appropriate manufacturers service manual. American Honda Motor Co.(2009). inc, Honda University,GP Engines Training materials flash/pdf/ppts.Hyperlinks:  
<http://www.thepowerportal.com/Login.htm>

[www.stihlvotech.com/](http://www.stihlvotech.com/)

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# Monroe Career & Technical Institute

Course: Outdoor Power Equipment Technologies

**Unit Name:** 2100 WHEELS AND CHASSIS SERVICE

**Number:** 2100 **Hours:** 60.00

**Dates:** Spring 2025

## Description/Objectives:

Student will know and be able to service and repair tires, wheel bearings, steering components and chassis.

## Tasks:

PA2101 - Remove and replace or repair tubeless tire and valve stem.

PA2102 - Remove and replace or repair a tube type tire.

PA2103 - Service and replace wheel bearings and bushings.

PA2104 - Inspect, service, and replace steering components.

PA2105 - Inspect, service, and repair chassis.

## Standards / Assessment Anchors

### Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

### Supporting Anchor/Standards:

KEY IDEAS/DETAILS GRADES 9-10-11-12

Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.

Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.

Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.

CRAFT & STRUCTURE GRADES 9-10-11-12

Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

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INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10

Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).

Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.

Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12

Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

*Focus Anchor/Standard #2:*

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

*Supporting Anchor/Standards:*

TEXT TYPES AND PURPOSE GRADES 9-10-11-12

Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.

Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.

PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12

Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.

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Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.

RESEARCH GRADES 9-10-11-12

Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.

Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.

RANGE OF WRITING GRADES 9-10-11-12

Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

**Instructional Activities:**

Knowledge:

Describe the meaning of API and SAE standards.

Describe and demonstrate viscosity.

Identify specifications in the appropriate service manual.

Review the importance of preventive maintenance.

Skill:

Label types of oil filters used on power equipment.

Interpret charts that outline oil applications.

Change engine oil and filter on a variety of outdoor power equipment.

Select proper oil and grade.

Prepare a fuel/oil mixture for a 2-cycle engine.

Service a crankcase breather assembly.

Remediation:

Review with teacher assistance

Individual or group tutoring

Study guides

Extended time

Enrichment:

Work on live work projects to enhance skill

Participate in classroom leadership activities and competitions

**Safety:**

Student must:

Handle material in a safe and workmanlike manner

Use protective clothing and equipment

Use hand tools in a safe manner

Use adequate ventilation when working in enclosed area

Follow manufacturer's directions when using any product, tool, equipment, etc.

Use proper safety precautions when using /operating hand tools

Use tools and equipment in a professional work-like manner according to OSHA standards

Know and follow the established safety rules at all times

**Assessment:**

Worksheets

Quizzes

Pre/Post Tests

Time Cards

Writing Activities

Video/DVD

Projects

Check Lists

Presentation

assessment

Research

Rubrics

**Resources/Equipment:**

Roth, A. C. (2009). Small gas engines. Tinley Park, Illinois: Goodheart-Willcox. Appropriate service manual.

American Honda Motor Co.(2009). inc, Honda University,GP Engines Training materials flash/pdf/pps.

Briggs and Stratton, (2009). Small Engine Care and Repair. Creative Publishing, Chanhassen, MN.

Equipment and Engine training Council (2009). EETC 4-stroke study guide. Oconomowoc, WI. Solvents

and oils. Overhead gantry crane. Drain pans and receptacles. Appropriate cleaning supplies.

Manufacturers service manual Required gaskets, seals, lubricants, replacement parts Valvoline motor oils

certification course and exam. Timken Tech-series on-line lubrication certification course and

exam.Hyperlinks: