Performance Indicators for Small Engine Technician:

A Bridge to Selected Instructional Materials

•Missouri Competencies • EETC Competencies
• All Aspects of the Industry Objectives • Pre- Employment/Work Maturity Skills
• SCANS Competencies

Instructional Materials Laboratory
University of Missouri-Columbia

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INTRODUCTION

This curriculum project includes two components. The first is an updated small engine technician competency profile and this performance indicator "bridge" document. The updated profile contains those skills needed in the field as identified and validated by industry personnel. Also, an asterisk (*) identifies those specific skills that are core or essential, which should be interpreted as "those skills industry identifies as required for the first day on the job." Task identifications for Missouri's Vocational Administrative Management System (VAMS) are shown in brackets.

The Performance Indicator Chart connects small engine technology skills with leading national organizations and other important, but more general, skills needed by students. This document provides instructors and administrators with links between newly updated small engine technology competencies and (1) previous Missouri competencies, (2) competencies from the Equipment and Engine Training Council, (3) All Aspects of the Industry objectives, (4) Pre-Employment/Work Maturity Skills, and (5) SCANS competencies (addressed in National VICA's *Total Quality Curriculum*), and (6) Missouri's Show-Me Standards. These sets of skills are listed after the Performance Indicator Chart.

To use the Small Engine Technician Performance Indicator Chart, consider the following example. Duty bands (umbrella-like categories for competencies) are in **bold** type and shaded.

		Page 23 ↘	Page 31 ↘	Page 35 ↘	Page 37 ↘	Page 39 ↘ Show- Me Standards	
Missouri Competency	Previous Mo. Competencies	EETC Competencies	AAOI Objectives	Pre-Employment/Work Maturity Skills	SCANS Competencies	Know. (Content)	Perform. (Goals)
5. **Fasteners**							
5.2 Measure bolts and threads (SAE grade and metric) [CO2]	C2		D2, E1	F4	3.1-3.3, 5.1, 5.2	MA2	1.10

The second column (Previous Mo. Competencies) is helpful for anyone with curriculum tied to the previous Missouri competency list. Competency 5.2 is a revised competency, as indicated by the competency listed in the second column. Competency 5.2 aligns with AAOI Objectives D2, E1, and so on. Shown in the last two columns are related to Show-Me Standards, the academic skills in Missouri K12 public classrooms.

This document may best be used as an initial step toward more in-dept articulation with national skills standards and Missouri Show-Me Standards. Although every attempt was made to provide a comprehensive crosswalk, local advisory council input should be solicited and used to validate competencies/core competencies required in any given geographic location.

For more detail, obtain or contact the following resources.

- *Equipment & Engine Training Council* (EETC) *Competencies** Austin, TX: Equipment and Engine Training Council, 1998. Contact: Equipment & Engine Training Council, 1946 So. IH-35, Suite 100-A, Austin, TX 78704 (512) 442-1788. (e-mail:opecert@io.com)

- Small Engine Competency Profile (10-7612-C), 1999.* Contact: Instructional Materials Laboratory, 2316 Industrial Drive, Columbia, MO 65203, 800/669-2465, FAX 573/882-1992. (home page: http://www.iml.coe.missouri.edu)

- *Pre-Employment/Work-Maturity Skills Instructional Resource Guide (30-6000-1)*.* University of Missouri-Columbia: Instructional Laboratory, 1998* Contact: IML (see above)

- *All Aspects of the Industry (65-9000-1).* University of Missouri-Columbia: Instructional Materials Laboratory, 1994.* Contact: IML (see above)

- *Learning a Living: A Blueprint for High Performance (A SCANS Report for America 2000).* Washington, DC, U.S. Department of Labor, 1992.* (home page: http://www.dol.gov)

- VIMS/VAMS Support Center, 106 Rothwell, UMC, Columbia, MO 65211, 573/882-2951, FAX 573/884-5455. (home page: http://www.coe.missouri.edu/~vams)

*These resources are available to Missouri educators for free loan from the Missouri Vocational Resource Center (MVRC), University of Missouri-Columbia, 8 London Hall, Columbia, MO 65211 (800/392-7217, FAX 573/882-9935).

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Small Engine Technician – Competency Profile Revision Advisory Committee

Dale Smith, Lewis & Clark Career Center, St. Charles, MO
Tom Kraft, Lawn & Leisure, Lee's Summit, MO
Dale Stotts, Stotts Engine Services, Monett, MO
Al Pabst, Pabst Rentals, Hannibal, MO
Tome Dennis, Modern Distributing, Springfield, MO 65801
Howard Daniel, Current River AVTS, Doniphan, MO
Glen Marshall, UniTec Career Center, Bonne Terre, MO
Dennis Early, Lee's Summit High School, Lee's Summit, MO
Bart Washer, Industrial Education, DESE, Jefferson City, MO

Small Engine Performance Indicator Chart

Notes: The numbers in brackets represent IDs used in computerized tracking software.
* = Core competencies (essential for the first day on the job)

Missouri Competency	Previous Mo. Competencies	EETC Competencies	AAOI Objectives	Pre-Employment/Work Maturity Skills	SCANS Competencies	Show- Me Standards: Knowledge (Content)	Show- Me Standards: Performance (Goals)
1. Basic Personal Safety							
*1.1 Demonstrate safe work habits by using approved eye, ear, and skin protection S01]		IC1 (B)	H1, H2, H9			HP5	1.10, 4.7
*1.2 Demonstrate safe handling of hazardous materials [S02]		IE4 (B)	A5, H1, H4		3.1	HP5, SC8, SS3	1.10, 4.2, 4.3, 4.7
1.3 Read and interpret MSDS and other safety publications [S03]		IE3 (B)	D15, H1, H3		3.1, 3.2, 3.3	HP5, SS3	1.10, 4.2, 4.3, 4.7
1.4 Identify governmental regulations (EPA, DNR, ANSI) [S04]		IE4, 5 (B)	A5, H1		4.1	HP5, SS3	1.10, 4.2, 4.3, 4.7
*1.5 Recognize industry accepted procedures for using proper safety devices, including lock out/tag and blocking devices [S05]		IC4 (B)	H4			HP5, HP7	1.10, 4.7
*1.6 Use basic personal safety practices (no jewelry, no loose clothing, long hair tied back) [S06]		IC1-3 (B)	H1, H2, H9			HP5	1.10, 4.7
*1.7 Demonstrate proper lifting practices [S07]		IA1 (B), IVE2 (B)	H2, H7			HP5	1.10, 4.7
2. Lad and Tool Safety							
*2.1 Demonstrate the safe use of lifting and hoisting devices [T01]		IVE2 (B)	H2, H7			HP4	1.10, 4.7
*2.2 Maintain a clean and safe work area [T02]		IB1 (B)	H2			HP5	1.10, 4.7
*2.3 Demonstrate the safe and proper use of hand tools [T03]		IA2 (B), IB2 (B)	E2, H2		5.2	HP5	1.10, 4.7
*2.4 Demonstrate the safe and proper use of power tools [T04]		IA2 (B), IB2 (B)	E2, H2			HP5	1.10, 4.7
*2.5 Identify the proper use of fire extinguishers [T05]		ID1 (B)	H4			HP7	1.10, 4.7
*2.6 Recognize standard emergency evacuation procedures [T06]	B6	ID2 (B)	H4			HP7	1.10, 4.7
*2.7 Identify fire hazards [T07]		ID3, 4 (B)	H4			HP5	1.10, 4.7

Missouri Competency	Previous Mo. Competencies	EETC Competencies	AAOI Objectives	Pre-Employment/Work Maturity Skills	SCANS Competencies	Knowledge (Content)	Performance (Goals)
*2.8 Identify spill containment [T08]		IE4 (B)	H4			HP5, SC8	1.10, 4.7
*2.9 Demonstrate safe use of cleaning equipment and chemicals [T09]		IVF – ALL (B)	H2, H3			HP5, SC8	1.10, 4.7
3. Lab Procedures							
*3.1 Demonstrate good customer relations skills [A06]		VB1 (B), VB10 (B)	A1, D3, D4, A4	G1	2.1, 2.2, 2.3, 2.5, 2.6, 3.1, 3.3	CA1, SS4	2.1, 2.2, 2.3, 2.6, 4.1, 4.4
*3.2 Document service work and supplies on work orders [A07]		IIA1, 2 (B), VB8 (B)	D3	F4	1.1	CA1, SS4	1.10, 2.1, 2.6, 3.1, 4.1
*3.3 Read and interpret service and parts manuals [A08]		IIIA1, 2 (B), VA1 (B)	D15	F4	3.1, 3.2, 3.3	CA3	1.4, 1.5, 2.6
*3.4 Use basic computer skills [A09]		IIIA6 (B)	D8, E1	F4	3.4	SC8	1.4, 1.8, 2.6, 2.7
3.5 Demonstrate proper use of labor time guides, flat rate time, and billing efficiency [A09]		IIIA4 (B)	C1, D6, D9, I1, I6	B1, B2	1.1, 1.2, 1.3, 1.4, 2.3	SS4, MA1	1.10, 4.4
*3.6 Explain warranty claim process [A11]		IIA3 (B)	D3, I1	G1	3.1, 3.3, 4.1	CA1, SS4	2.1, 2.3, 2.6
3.7 Estimate repair vs. replacement costs (labor, parts)[A12]			C1, D1, I1	A3, B1, B2	1.1, 1.2, 1.3, 1.4	SS4, MA1	1.10, 3.1, 3.8, 4.4
4. Tools and Equipment							
*4.1 Identify industry-related hand tools [B01]	B1	IVB1 (B)	E1		5.1		1.10
*4.2 Demonstrate the proper use of hand tools [B02]	B2	IVB2 (B)	E2, E3		5.1	SC2	1.10, 2.5
*4.3 Identify precision measuring tools and equipment [B03]	B3	IVC1 (B)	E1		3.1, 5.1		1.10
*4.4 Demonstrate the proper use and care of precision measuring tools and equipment [B04]	B4	IVC3 (B)	E2, E3		3.1, 3.3, 5.1, 5.2	MA2, SC2	1.10, 2.5
*4.5 Identify industry-related power tools [B05]	B5		E1		3.1, 5.1		1.10
*4.6 Demonstrate the proper use and care of industry-related power tools [B06]	B6	IVA1 (B)	E2, E3		3.1, 5.1, 5.2	SC2	1.10, 2.5
*4.7 Identify and use tools to restore threads on fasteners [B09]	B9	IVC3 (B)	E2, E3		3.1, 5.1, 5.2	SC2	1.10, 2.5
*4.8 Identify diagnostic tools [B10]			E1		3.1, 5.1		1.10
*4.9 Demonstrate the proper use and care of diagnostic tools [B11}		VA1, 2, G, 7, 8, 9 (L1)	E2, E3		3.1, 5.1, 5.2	SC1, SC2	1.10, 3.1, 3.4
5. Fasteners							

Missouri Competency	Previous Mo. Competencies	EETC Competencies	AAOI Objectives	Pre-Employment/Work Maturity Skills	SCANS Competencies	Knowledge (Content)	Performance (Goals)
5.1 Identify and select industry-related fasteners [C01]	C1		E1, E2		3.1, 5.1, 5.2		1.10
5.2 Measure bolts and threads (SAE grade and metric) [C02]	C2		D2, E1		3.1, 3.2, 3.3, 5.1, 5.2	MA2	1.10
*5.3 Determine proper torque value for fasteners [C03]		IVD3 (B)	E1, E2		3.1, 3.3, 4.1	MA1	1.10
*5.4 Demonstrate proper torqueing technique for fasteners [C04]		IVD4 (B)	E1		3.1, 3.3, 5.1, 5.2	SC2	
5.5 Identify and select proper gaskets and sealants [C05]		IIA2, 3, 5 (B)	E1, E2		3.1, 5.1, 5.2	SC1, SC2	1.10
6. Engine/Product Identification							
*6.1 Identify the manufacturer, model, serial number, and type [U01]		IA1 (L1)	D15, E1		3.1, 3.2, 3.3		1.10
*6.2 Identify emission compliance engines [U02]		IA1 (L1), IE15 (L1)	D15, E1		3.1, 3.2, 3.3, 4.1	SS3, HP6	1.10, 4.2, 4.3, 4.7
*6.3 Identify safety compliance parts [U03]		VIC5 (L1)	D15, E1		3.1, 3.2, 3.3, 4.1	SS3, HP6	1.10, 4.2, 4.3, 4.7
7. Four-Stoke Cycle Engines							
*7.1 Describe the operating cycle of the four-stroke cycle engine [N02]	N2	IC1 (L1)	E1		3.1, 3.3, 4.1	SC1, SC2	1.6
*7.2 Disassemble a four-stroke cycle engine [N03]	N3	VIA – ALL (L1)	E1, E4		4.1, 5.3	SC1, SC2	1.6, 1.10, 2.5
7.3 Inspect and service a cylinder [N04]	N4	VIA7-11 (L1)	E1, E4		3.1, 3.2, 3.3, 4.1, 4.2, 5.3	SC1, SC2	2.5, 3.1, 3.2, 3.5
7.4 Inspect and service the pistons, rings and connecting rod [N05]	N5	IE2 (a) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.3	SC1, SC2	2.5, 3.1, 3.2, 3.5
7.5 Inspect and service a crankshaft assembly [N06]	N6	VIA1-6, 13 (L1), VIB5, 6 (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.3	SC1, SC2	2.5, 3.1, 3.2, 3.5
*7.6 Inspect and service a valve train assembly [N07]	N7	VIA-6, 13 (L1), VIB5, 6 (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.3	SC1, SC2	2.5, 3.1, 3.2, 3.5
*7.7 Reassemble a four-stroke cycle engine [N08]	N8	VIB1 (L1)	E1, E4		3.1, 3.2, 3.3, 4.1, 4.2, 5.3	SC1, SC2	1.6, 1.10, 2.5
*7.8 Identify the difference between L-head and overhead valve trains [N09]		IE4 (a) (L1)	E1		3.1, 3.2, 3.3, 4.1, 4.2, 5.3	SC1, SC2	1.10
*7.9 Test compression [N10]		VA6 (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2	SC1, SC2, SC7	2.5, 3.1, 3.2, 3.5
8. Two-Stroke Cycle Engines							
*8.1 Describe the operating cycle of the two-stroke cycle engine [O02]	O2	IB1 (L1)	E1		3.1, 3.3, 4.1	SC1, SC2	1.6

Missouri Competency	Previous Mo. Competencies	EETC Competencies	AAOI Objectives	Pre-Employment/Work Maturity Skills	SCANS Competencies	Knowledge (Content)	Performance (Goals)
*8.2 Disassemble a two-stroke cycle engine [O03]	O3	IVA (L1)	E1, E4		4.1, 5.3	SC1, SC2	1.6, 1.10, 2.5
8.3 Inspect and service a cylinder [O04]	O4	IVA (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.3	SC1, SC2	2.5, 3.1, 3.2, 3.5
8.4 Inspect and service the pistons, rings and connecting rod [O05]	O5	IVA, C, N (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.3	SC1, SC2	2.5, 3.1, 3.2, 3.5
8.5 Inspect and service a crankshaft assembly [O06]	O6	IVD, J, K, M (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3	SC1, SC2	2.5, 3.1, 3.2, 3.5
8.6 Check and replace reed valves [O07]	O7	IVL, F (L1)	E1, E4		3.1, 3.2, 3.3	SC1, SC2	2.5, 3.1, 3.2, 3.5
*8.7 Reassemble two-stroke cycle engines [O08]	O8		E1, E4		3.1, 3.2, 3.3, 4.1, 5.3	SC1, SC2	1.6, 1.1, 2.5
*8.8 Test compression [O09]		IIIA1, 2 (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2	SC1, SC2, SC7	2.5, 3.1, 3.2, 3.5
9. Emissions							
9.1 List types of emissions [V01]			E1		3.1, 3.3, 4.1		1.10
*9.2 Describe the consequences of noncompliance with emission standards [V02]			A5, H1		3.1, 3.2, 3.3, 4.1	SS3, HP6	1.10, 4.2, 4.3
9.3 Comply with manufacture's emission standards [V03]		IE14© (L1)	A5, H1		4.1, 4.2, 5.3	SS3, HP6	1.10, 4.2, 4.3
10. Troubleshooting							
*10.1 Identify the system and components [M04]		VA1 (B)	D13, E1		3.1, 3.2, 3.3, 4.1		1.6
*10.2 Recognize the sequences of events in a system [M05]		VA1 (B)	D13, D15		3.1, 3.2, 3.3, 5.3	SC5	1.6
*10.3 Access technical manuals to find information and specifications		VA1 (B)	A1, B9, D3, D4, D13, I4		3.1, 3.2, 3.3, 3.4, 4.1	CA3	1.4, 1.5
10.4 Interview the customer and/or the operator for information [M07]		VA1 (B)	D13, E5	G1	2.3, 3.1, 3.2, 3.3, 5.3	CA1, CA6	1.1, 1.2, 2.1, 2.3, 2.6
10.5 Identify exact symptoms [M08]		VA2 (B)	D13, E1	A3	3.1, 3.2, 3.3, 4.1, 5.3	SC7	1.2, 3.1, 3.5
10.6 Accurately separate systems [M09]		VA3 (B)	D13, E5	A3	3.1, 3.2, 3.3, 4.1		1.6, 1.10, 3.5
*10.7 Make a complete physical examination [M10]		VA4 (B)	D13, E5	A3	3.1, 3.2, 3.3, 4.1, 5.3	SC7	1.6, 1.10, 3.1, 3.6
*10.8 Replicate or simulate a given problem [M11]		VA5 (B)	D13, E5		3.1, 3.2, 3.3, 4.1, 5.3		1.6, 1.10
*10.9 Determine and classify all symptoms [M12]		VA6 (B)	D13, E5	A3	3.1, 3.2, 3.3, 4.1	SC7	1.6, 1.8, 3.5

Missouri Competency	Previous Mo. Competencies	EETC Competencies	AAOI Objectives	Pre-Employment/Work Maturity Skills	SCANS Competencies	Knowledge (Content)	Performance (Goals)
*10.10 Perform specific tests using tools to determine which components work correctly [M13]		VA7 (B)	D3, D13	A3	3.1, 3.2, 3.3, 4.1, 5.1, 5.3	SC7	2.5, 3.1, 3.2, 3.5
*10.11 Record the results on a worksheet [M14]		VA8 (B)	D13, E1	F4	3 – ALL, 4.1	CA1	1.8, 2.1, 2.2
*10.12 Make repairs and retest to verify the repair [M15]		VA9 (B)	D13, E5		3.1, 3.2, 3.3, 4.1, 4.2	SC1, SC2	1.10, 2.5, 3.1
*10.13 Communicate with the customer regarding the cause and prevention of future problems [M16]		VA10 (B)	A1, B9, D3, D4, D13, I4	G1, G2	2.2, 2.3, 3.1, 3.2, 3.3	CA1, SS4	1.1, 1.2, 2.1, 2.3, 2.6
11. Fuel Systems							
*11.1 Test, repair, or replace diaphragm-type carburetor [D04]	D1		D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC1, SC2	2.5, 3.1, 3.2, 3.5
*11.2 Test, repair, or replace fuel filters and strainers [D02]	D2		D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC1, SC2	2.5, 3.1, 3.2, 3.5
*11.3 Remover, clean, and replace fuel tank, shut-off valves, fuel lines, fuel hoses, and connections [D04]	D3	IIB6 (H, 1) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC1, SC2	2.5, 3.1, 3.2, 3.5
*11.4 Clean, rebuild, or replace diaphragm-type carburetor [D04]	D4	IIB6 (a-d) (L1) IIB6 (h) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC1, SC2	2.5, 3.1, 3.2, 3.5
*11.5 Clean, rebuild, or replace float-type carburetor [D05]	D5		D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC1, SC2	2.5, 3.1, 3.2, 3.5
*11.6 Adjust fuel mixture and check for air leaks [D06]	D6		D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC1, SC2	2.5, 3.1, 3.2, 3.5
*11.7 Service oil-foam air cleaner [D08]	D7		D13, E1, E4, E5		3.1, 4.1, 4.2	SC1, SC2	2.5, 3.1, 3.2, 3.5
*11.8 Service dry-element air cleaner [D09]	D8		D13, E1, E4, E5		3.1, 4.1, 4.2	SC1, SC2	2.5, 3.1, 3.2, 3.5
*11.9 Properly dispose of contaminated fuel [D10]	D9		A5, H1, HE1, E22		4.1	SC8, HP5, SS3	1.10, 4.2, 4.3, 4.7
*11.10 Explain the theory and function of electronic fuel injection [D11]		IE12(a) (L1)	E1, E2		3.1, 3.2, 3.3, 4.1	SC1, SC8	1.10
11.11 Identify the types and grades of gasoline used in power equipment [D12]		IIIB5(a) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.10
*11.12 Describe the use of a fuel additive for storage [D13]		IIIB5(a) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.10
*11.13 Identify purge/prime systems [D14]		IE9 (j, k, o) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC5	1.6
*11.14 Identify fuel venting systems [D15]		IE9 (q) (L1)	E1		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC5	1.6

Missouri Competency	Previous Mo. Competencies	EETC Competencies	AAOI Objectives	Pre-Employment/Work Maturity Skills	SCANS Competencies	Knowledge (Content)	Performance (Goals)
*11.15 Troubleshoot a fuel system [D16]	M2		D13, E1, E3, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC1. SC2. SC5. SC7	1.6, 1.10, 3.1, 3.2, 3.5
12. Governor System							
*12.1 Identify the purpose of the governor systems [E01]		IE2 (a) (L1)	E1		3.1, 3.2, 3.3, 4.1		1.10
*12.2 Inspect, adjust, and repair air-vane governor system [E01]	E1	IE21 (b) L1 VIC4 (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC1, SC2	2.5, 3.1, 3.2, 3.5
*12.3 Inspect, adjust, and repair mechanical governor systems and linkages [E02]	D2	IE21 (b) L1	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC1	2.5, 3.1, 3.2, 3.5
*12.4 Adjust engine RPMs to manufacturer's specifications [E03]	E3	IE21C (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC1	2.5, 3.1, 3.2, 3.5
*12.5 Troubleshoot a governor system [E05]			D13, E1, E3, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2, 5.3	SC1, SC2, SC5, SC7	1.6, 1.10, 3.1, 3.2, 3.5
13. Electrical Systems							
*13.1 Demonstrate safe work habits when working with electrical systems [F07]		IE19(k) (L1)	H2, H4, I3		3.1, 3.2, 3.3, 4.1	HP5	1.10, 4.7
*13.2 Explain basic electrical theory [F08]		IE18(a) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.10
13.3 Describe series circuit [F09]		IE19(a) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.10
13.4 Describe parallel circuit [F10]		IE19(b) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.10
*13.5 Explain different types of circuit failures [F1]		IE19c (L1)	D13, E1		3.2, 3.2, 3.3, 4.1	SC1	1.10
*13.6 Demonstrate applicable test procedures for testing series and parallel circuits [F12]		IE19(d) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 5.1, 5.2	SC1, SC7	1.10, 2.5, 3.1, 3.2, 3.5
*13.7 Check continuity in circuits and electrical system components [F13]		IE19(e) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 5.1, 5.2	SC1	1.6, 2.5, 3.1, 3.2, 3.5
*13.8 Check current flow in electrical systems and components [F14]		IE19(f) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 5.1, 5.2	SC1	1.6, 2.5, 3.1, 3.2, 3.5
*13.9 Inspect, test, and replace fusible links, fuses, and circuit breakers [F15]		IE19(g) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 5.1, 5.2	SC1, SC7	2.5, 3.1, 3.2, 3.5
*13.10 Identify terminals and connectors used in electrical systems [F16]		IE19(h) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.10
13.11 Identify electrical wire sizes and selection based on anticipated current load [F17]		IE20(I) (L1)	ED3, D151		3.1, 3.2, 3.3, 4.1	SC1	1.10
*13.12 Read and interpret electrical meters [F01]	F1	IVC3 (B)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1	SC1, CA3	1.4, 1.5, 2.6

Missouri Competency	Previous Mo. Competencies	EETC Competencies	AAOI Objectives	Pre-Employment/Work Maturity Skills	SCANS Competencies	Knowledge (Content)	Performance (Goals)
13.13 Read electrical schematics [F02]	F2	IIIA2 (B)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1	SC1, CA3	1.4, 1.5, 2.6
*13.14 Test, repair, and/or replace safety interlock [F04]	F4	IE19(e) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 5.1, 5.2	SC1, SC7	2.5, 3.1, 3.2, 3.5
*13.15 Test, repair, and/or replace charging system components [F05]	F5		D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 5.1, 5.2	SC1, SC7	2.5, 3.1, 3.2, 3.5
*13.16 Test and replace fuel system, lubrication, safety, and temperature sending units [F18]		IE19 (e, f) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 5.1, 5.2	SC1, SC7	2.5, 3.1, 3.2, 3.5
*13.17 Test and replace electrical PTO clutches [F19]		IE19 (e, f) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 5.1, 5.2	SC1, SC7	2.5, 3.1, 3.2, 3.5
*13.18 Explain storage battery theory and operation [F02]		IE20(a) (L1)	E1		3.1, 3.2, 3.3	SC1	1.10
*13.19 Remove, clean, and replace battery [F03]	F3	IE20(b) (L1)	D13, E1, E4, E5		4.1, 4.2	SC1	1.10
*13.20 Perform specific gravity test on battery cell electrolyte [F21]		IE20(c) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3	SC1, SC7	2.5, 3.1, 3.2, 3.5
*13.21 Determine battery state of charge using DMM (Digital Multimeter) [F22]		IE20(d) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3	SC1	2.5, 3.1, 3.2, 3.5
*13.22 Troubleshoot an electrical system [F23]			D13, E1, E3, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2, 5.3	SC1, SC5, SC7	1.6, 1.10, 3.1, 3.2, 3.5
14 Ignition Systems							
*14.1 Explain the theory of operation of the ignition system [G06]		IE6(a, b) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.6, 1.10
*14.2 Identify the components and function of an ignition system [G07]		IE6(c, d, e) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.6, 1.10
*14.3 Remove and service spark plug [G01]	G1		D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC1	2.5, 3.1, 3.2, 3.5
*14.4 Test and repair breaker ignitions system [G043	G3	VB1, 3, 4, 5 (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC1, SC7	1.6, 1.10, 2.5, 3.1, 3.2, 3.5
*14.5 Test and repair electronic ignition system [G08]	G4	VB1, 7, 8 (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC1, SC7	1.6, 1.10, 2.5, 3.1, 3.2, 3.5
*14.6 Identify the components and function of a battery ignition system [G09]		IE6(c) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.10
*14.7 Identify the components and function of an electronic ignition system [G10]		IE6(d) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.10
*14.8 Identify the components and function of a magneto ignition system [G11]		IE6(e) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.10
*14.9 Troubleshoot an ignition system [G12]	M1		D13, E1, E3, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1,	SC1, SC2, SC5, SC7	1.6, 1.10, 3.1, 3.2, 3.5

Missouri Competency	Previous Mo. Competencies	EETC Competencies	AAOI Objectives	Pre-Employment/Work Maturity Skills	SCANS Competencies	Knowledge (Content)	Performance (Goals)
					5.2, 5.3		
15. Lubrication Systems							
*15.1 Explain the importance of lubrication [H08]		VIIB1 (L1)	E1		3.1, 3.2, 3.3, 4.1	SC2	1.10
*15.2 List the common oil contaminants [H09]		IIA8 (L1)	A5, H1, H2		3.1, 3.2, 3.3		1.10
*15.3 Change engine oil and filter [H01]		IIB3(e) (L1)	E1		3.1, 3.2, 3.3, 4.1, 4.2		1.10
*15.4 Properly dispose of oil and oil filter [H10]		IE4 (B)	A5, H1, H2		3.1, 3.2, 3.3, 4.1, 4.2	SS3, HP5, HP6	1.10, 4.2, 4.3, 4.7
*15.5 Service crankcase breather [H02]		IIB3(f) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC2	2.5, 3.1, 3.2, 3.5
*15.6 Inspect, repair, and/or replace pressure lubrication system [H03]		IIB3(b) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC2	2.5, 3.1, 3.2, 3.5
15.7 Inspect and replace splash lubrication components [H04]		IIB3(a) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC2	2.5, 3.1, 3.2, 3.5
*15.8 Locate and repair leaking gaskets and seals [H05]			D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC1	2.5, 3.1, 3.2, 3.5
*15.9 Demonstrate the ability to mix gas and oil for a two-stoke cycle engine [H06]		IIB2(a) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1	SC1	2.5, 3.1, 3.2, 3.5
*15.10 Select proper oil [H07]		IIA10 (L1)	E1, E2		3.1, 3.2, 3.3	SC1	1.10
*15.11 Troubleshoot a lubrication system [H11]			D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2, 5.3	SC1, SC2, SC5, SC7	1.6, 1.10, 3.1, 3.2, 3.5
16 Cooling Systems							
*16.1 Describe the concepts of heat transfer [I07]		IE7(a) L1	E1		3.1, 3.2, 3.3, 4.1	SC1, SC5	1.6, 1.10
*16.2 Explain the purpose of a cooling system [I08]		IE7(b) L1	E1		3.1, 3.2, 3.3, 4.1	SC1	1.6
*16.3 Identify the major types of cooling systems used on power equipment [I09]		IE7(c)(L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.6, 1.10
*16.4 Describe air-cooled system nomenclature and function [I09]		IE7(d) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.6, 1.10
*16.5 List the major cause of air-cooled engine overheating [I11]		IE7(e) (L1)	D13, E1		3.1, 3.2, 3.3, 4.1, 5.3	SC1	1.10
*16.6 Describe normal cooling-related service procedures performed on an air-cooled engine [I12]		IE7(f) (L1)	E1, E2		3.1, 3.2, 3.3, 4.1	SC1	1.10

Missouri Competency	Previous Mo. Competencies	EETC Competencies	AAOI Objectives	Pre-Employment/Work Maturity Skills	SCANS Competencies	Knowledge (Content)	Performance (Goals)
*16.7 Describe liquid-cooled system nomenclature and functions [I13]		IE7(g) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.6, 1.10
*16.8 List major causes of liquid-cooled engine overheating [I14]		IE7(h) (L1)	D13, E1		3.1, 3.2, 3.3, 4.1, 5.3	SC1	1.6, 1.10
*16.9 Describe the function of a thermostat [I15]		IE7(l) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.6, 1.10
*16.10 Describe the function of a water pump [I16]		IE7(j) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.10
*16.11 Describe the function of antifreeze [I17]		IE7(k) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.10
*16.12 Remove and replace water pump/fan drive belt [I03]	I3	IE7(l) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 5.1, 5.2	SC1	2.5, 3.1, 3.2, 3.5
*16.13 Perform a cooling system pressure test [I05]	I5	IE7(m) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 5.1, 5.2	SC1, SC7	2.5, 3.1, 3.2, 3.5
*16.14 Service an air-cooled system [I01]	I1	IIB4(b) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 5.1, 5.2	SC1	2.5, 3.1, 3.2, 3.5
*16.15 Service a liquid-cooled system [I02]	I2	IIB4(c) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 5.1, 5.2	SC1	2.5, 3.1, 3.2, 3.5
*16.16 Remove, check, and replace thermostat [I04]	I4		D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 5.1, 5.2	SC1	2.5, 3.1, 3.2, 3.5
*16.17 Remove, check, and replace radiator [I06]	I6		D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 5.1, 5.2	SC1	2.5, 3.1, 3.2, 3.5
*16.18 Troubleshoot a cooling system [I18]		IE7(m) (L1)	D13, E1, E3, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2, 5.3	SC1, SC2, SC5, SC7	1.6, 1.10, 3.1, 3.2, 3.5
17. Exhaust Systems							
17.1 Describe exhaust system nomenclature and function [J03]		IE15(a) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.6, 1.10
17.2 Describe proper service cleaning procedures for exhaust ports and spark arrestor screens [J04]		IE15(d) (L1)	E1		3.1, 3.2, 3.3, 4.1, 4.2	SC1	1.10
*17.3 Service and/or replace a two-stroke cycle exhaust system [J01]	J1		D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC1	2.5, 3.1, 3.2, 3.5
*17.4 Service and/or replace a four-stroke cycle exhaust system [J02]	J2	IVB (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC1	2.5, 3.1, 3.2, 3.5
*17.5 Troubleshoot an exhaust system [J05]			D13, E1, E3, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2, 5.3	SC1, SC2, SC5, SC7	1.6, 1.10, 3.1, 3.2, 3.5
18. Recoil Starting Systems							
*18.1 Remove, repair, and/or replace recoil	K1	IIB7(a) (L1)	D13, E1,		3.1, 3.2, 3.3,	SC1, SC2	2.5, 3.1, 3.2, 3.5

Missouri Competency	Previous Mo. Competencies	EETC Competencies	AAOI Objectives	Pre-Employment/Work Maturity Skills	SCANS Competencies	Knowledge (Content)	Performance (Goals)
starter [K01]			E4, E5		4.1, 4.2, 5.1, 5.2		
*18.2 Remove, inspect, and replace starter clutch [K02]	K2	IIB7(a) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC1, SC2	2.5, 3.1, 3.2, 3.5
*18.3 Demonstrate safe spring replacement procedures [K03]		IIB7(a) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	HP5	1.10, 2.5, 4.7
*18.4 Troubleshoot a recoil starting system [K04]			D13, E1, E3, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2, 5.3	SC1, SC2, SC5, SC7	1.6, 1.10, 3.1, 3.2, 3.5
19. Electric Starting Systems							
*19.1 Describe electrical starting systems, nomenclature and function [L04]		IE17(a) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.6, 1.10
*19.2 Identify the components of a DC electrical starting system and describe the function of each [L05]		IE17(c) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.6, 1.10
*19.3 Identify the components of AC electrical starting system and describe the function of each [L06]		IE17(d) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.6, 1.10
19.4 Perform 12-volt DC starter motor current draw test [I07]		IE17(f) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 5.1, 5.2	SC1, SC7	2.5, 3.1, 3.2, 3.5
*19.5 Remove and replace starter motor [L02]	L2	IE17(g) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC1, SC7	2.5, 3.1, 3.2, 3.5
*19.6 Remove, test, and replace starter relay [L08]		IE17(h) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC1, SC7	2.5, 3.1, 3.2, 3.5
*19.7 Troubleshoot an electrical starting system [L09]			D13, E1, E3, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2, 5.3	SC1, SC5, SC7	1.6, 1.10, 3.1, 3.2, 3.5
20. Charging Systems							
*20.1 Explain electrical/electronic terms that are common in the power equipment industry [W02]		IE18(a) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.10
*20.2 Describe the charging system nomenclature and function [W02]		IE18(b) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.10
*20.3 Identify types of charging systems [W03]		IE18(c) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.10
*20.4 Describe a DC amps test [W04]		IE18(d) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.10
*20.5 Describe an AC volts test [W05]		IE18(e) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.10
*20.6 Explain the function of a diode [W06]		IE18(f) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.10

Missouri Competency	Previous Mo. Competencies	EETC Competencies	AAOI Objectives	Pre-Employment/Work Maturity Skills	SCANS Competencies	Knowledge (Content)	Performance (Goals)
*20.7 Describe a resistance test [W07]		IE18(g) (L1)	E1		3.1, 3.2, 3.3, 4.1	SC1	1.10
20.8 Perform current drain test using a DC shunt [W08]		IE18(h) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 5.1, 5.2	SC1, SC7	2.5, 3.1, 3.2, 3.5
*20.9 Remove and replace regulator/rectifier [W09]		IE18(I) (L1)	D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC1	2.5, 3.1, 3.2, 3.5
*20.10 Troubleshoot a charging system [W10]			D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2, 5.3	SC1, SC7	1.6, 1.10, 3.1, 3.2, 3.5
21. Power Train System							
21.1 Identify the component parts of a manual transmission [P01]	P1		E1		3.1, 3.2, 3.3, 4.1	SC2	1.10
21.2 Identify the component parts of a transaxle [P02]	P2		E1		3.1, 3.2, 3.3, 4.1	SC2	1.10
21.3 Identify the component parts of a clutch system [P03]	P3		E1		3.1, 3.2, 3.3, 4.1	SC2	1.10
21.4 Identify the component parts of a hydrostatic transmission [P04]	P4		E1		3.1, 3.2, 3.3, 4.1	SC2	1.10
*21.5 Identify the component parts of a brake [P05]	P5		E1		3.1, 3.2, 3.3, 4.1	SC2	1.10
*21.6 Isolate and troubleshoot a power train system [P06]			D13, E1, E3, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2, 5.3	SC2, SC5	1.6, 1.0, 3.1, 3.1, 3.5
22. Lawn and Garden Equipment							
*22.1 Adjust tension and alignment of pulleys and belts [Q01]	Q1		D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2, 5.3	SC2	2.5, 3.1, 3.2, 3.5
*22.2 Sharpen and balance rotary blades [Q02]	Q2		D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC2	2.5, 3.1, 3.2, 3.5
*22.3 Adjust and replace control cables/linkages [Q03]	Q3		D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC2	2.5, 3.1, 3.2, 3.5
*22.4 Service decks and accessories [Q04]	Q4		D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC2	2.5, 3.1, 3.2, 3.5
*22.5 Lubricate chassis components [Q05]	Q5		D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC2	2.5, 3.1, 3.2, 3.5
*22.6 Inspect and adjust brakes [Q06]	Q6		D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC2	2.5, 3.1, 3.2, 3.5
*22.7 Inspect and adjust clutch [Q07]	Q7		D13, E1, E4, E5		3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2	SC2	2.5, 3.1, 3.2, 3.5
23. Failure Analysis							

Missouri Competency	Previous Mo. Competencies	EETC Competencies	AAOI Objectives	Pre-Employment/Work Maturity Skills	SCANS Competencies	Knowledge (Content)	Performance (Goals)
23.1 Identify the effects of abrasive ingestion on engine components [X01]		VIIA1 (L1)	D13, E1, E4, E5	A3	3.1, 3.2, 3.3, 4.1	SC1, SC2, SC5, SC7	1.10, 3.1, 3.5
23.2 Identify the entrance path of abrasives on several engine failure examples [X02]		VIIA2 (L1)	D13, E1, E4, E5	A3	3.1, 3.2, 3.3, 4.1, 5.3	SC1, SC2, SC5, SC7	1.10, 3.1, 3.5
23.4 Identify the effects of insufficient lubrication on engine components [X03]		VIIB1 (L1)	D13, E1, E4, E5	A3	3.1, 3.2, 3.3, 4.1, 5.3	SC1, SC2, SC5, SC7	1.10, 3.1, 3.5
23.5 Identify two-stroke lubrication/fuel quality failure root cause [X05]		VIIB2 (L1)	D13, E1, E4, E5	A3	3.1, 3.2, 3.3, 4.1, 5.3	SC1, SC2, SC5, SC7	1.10, 3.1, 3.5
23.6 Identify the effects of incorrect/no lubricant [X06]		VIIB3 (L1)	D13, E1, E4, E5	A3	3.1, 3.2, 3.3, 4.1, 5.3	SC1, SC2, SC5, SC7	1.10, 3.1, 3.5
23.7 Identify and describe engine failures caused by phase separation of fuel [X07]		VIIB5 (L1)	D13, E1, E4, E5	A3	3.1, 3.2, 3.3, 4.1, 5.3	SC1, SC2, SC5, SC7	1.10, 3.1, 3.5
23.8 Identify the effects of overheating on engine component parts [X08]		VIIC1 (L1)	D13, E1, E4, E5	A3	3.1, 3.2, 3.3, 4.1, 5.3	SC1, SC2, SC5, SC7	1.10, 3.1, 3.5
23.9 Identify overheating effects on two-stroke cycle engines due to poor exhaust system maintenance [X09]		VIIC3 (L1)	D13, E1, E4, E5	A3	3.1, 3.2, 3.3, 4.1, 5.3	SC1, SC2, SC5, SC7	1.10, 3.1, 3.5
23.10 Define denotation, pre-ignition, and list the effects on engine components [X10]		VIIC4 (L1)	D13, E1, E4, E5	A3	3.1, 3.2, 3.3, 4.1, 5.3	SC1, SC2, SC5, SC7	1.10, 3.1, 3.5
23.11 Identify two-stroke cycle engine failures caused by state fuel varnish [X11]		VIIC5 (L1)	D13, E1, E4, E5	A3	3.1, 3.2, 3.3, 4.1, 5.3	SC1, SC2, SC5, SC7	1.10, 3.1, 3.5
23.12 Identify engine failure caused by lean mixture [X12]		VIIC6 (L1)	D13, E1, E4, E5	A3	3.1, 3.2, 3.3, 4.1, 5.3	SC1, SC2, SC5, SC7	1.10, 3.1, 3.5
23.13 Identify the effects of over speeding on engine component parts [X13]		VIID1 (L1)	D13, E1, E4, E5	A3	3.1, 3.2, 3.3, 4.1, 5.3	SC1, SC2, SC5, SC7	1.10, 3.1, 3.5
23.14 Identify the signature break on a connected rod on several engine failure examples [X14]		VIID2 (L1)	D13, E1, E4, E5	A3	3.1, 3.2, 3.3, 4.1, 5.3\	SC1, SC2, SC5, SC7	1.10, 3.1, 3.5
23.15 Identify exhaust port piston scoring and large bearings due to over speeding [X15]		VIID3 (L1)	D13, E1, E4, E5	A3	3.1, 3.2, 3.3, 4.1, 5.3	SC1, SC2, SC5, SC7	1.10, 3.1, 3.5
23.16 Identify the effects of excessive vibration on engine block and mounting base [X16]		VIIE1 (L1)	D13, E1, E4, E5	A3	3.1, 3.2, 3.3, 4.1, 5.3	SC1, SC2, SC5, SC7	1.10, 3.1, 3.5
24. Leadership Competencies							
*24.1 Demonstrate an understanding of VICA, its structure, and activities	R1			ALL	2.1, 3.1, 3.2, 3.3, 4.1		1.10

Missouri Competency	Previous Mo. Competencies	EETC Competencies	AAOI Objectives	Pre-Employment/Work Maturity Skills	SCANS Competencies	Knowledge (Content)	Performance (Goals)
[R01]							
*24.2 Demonstrate an understanding of one's personal values [R02]	R2		I1-6	A1	3.1, 3.2, 3.3	CA6, SS6	1.10, 2.3, 4.1, 4.3, 4.4
*24.3 Perform tasks related to effective personal management skills [R03	R3		D6, D9, D11, E3, F1-6	F1-6	3.1, 3.2, 3.3	SS6	1.1, 4.5, 4.6
*24.4 Demonstrate good interpersonal skills [R04]	R4	VB1, 10(B)	D3, D4, D5, D10	G1-2	3.1, 3.2, 3.3	CA1, CA6, SS6	1.10, 2.3, 4.3, 4.4
*24.5 Demonstrate etiquette and courtesy [R05]	R5	VB1, 10 (B)	D4, I1-5	F3	3.1, 3.2, 3.3	CA1, CA6, SS6	1.10, 2.3, 4.3, 4.4
*24.6 Demonstrate effectiveness in oral and written communication [R06]	R6	VB, 8, 10 (B)	D3-5	G1	3.1, 3.2, 3.3	CA1, CA6, SS6	1.10, 2.1-7
*24.7 Develop and maintain a code of professional ethics [R07]	R7	VB10 (B), IIA3 (B)	I1-5	F1-6, A1	3.1, 3.2, 3.3	SS6	1.10, 4.3, 4.4
*24.8 Maintain a good professional appearance [R08]	R8		I5	F5	3.1, 3.2, 3.3	SS6	1.10
*24.9 Perform basic tasks related to securing and terminating employment [R09]	R9		B2, D11	C, D, E, G	3.1, 3.2, 3.3	CA6	1.10, 2.3, 3.6, 4.1, 4.3, 4.4, 4.5, 4.6, 4.8
*24.10 Perform basic parliamentary procedures in group meetings [R10]	R10		B15, D3, D12	G1	2.1, 2.4, 2.5, 3.1, 3.2, 3.3	CA6	1.10, 2.3 2.6

EQUIPMENT & ENGINE TRAINING COUNCIL COMPETENCIES

The Equipment and Engine Training Council is a professional organization focused on ensuring that there will be a continuous and highly trained pool of service technicians available in the future to meet the needs of the outdoor power equipment industry.

LEVEL BASIC – POWER EQUIPMENT SAFETY FUNDAMENTALS

I. Shop Safety

A. Work Habits
   1. Demonstrate the proper lifting and blocking of equipment
   2. Demonstrate safe usage of all service shop tools

B. Working Environment
   1. Maintain a clean and safe work area
   2. Maintain clean tools and equipment

C. Personal Safety
   1. Demonstrate safe work habits by wearing approved eye, hearing and skin protection
   2. Demonstrate safe work habits by using approved safety and personal protection equipment
   3. Describe personal safety practices
   4. Recognize industry accepted procedures for using proper safety devices, including lock out tags

D. Emergency Awareness
   1. Demonstrate the use of fire extinguishers
   2. Recognize emergency evacuation procedures
   3. Apply fire safety awareness
   4. Describe safety precautions to prevent fires

E. Regulations
   1. Recognize use of safety color codes
   2. Identify hazard communication labels and symbols
   3. Explain Material Safety Data Sheet (MSDS) purpose, use and location
   4. Describe hazardous materials safe handling and disposal as required by EPA local ordinances
   5. Recognize and observe industry and OSHA, federal and state safety and environmental rules

II. Shop Practices

A. Maintain Records
   1. Document service work on work orders
   2. Document parts and shop supplies on shop inventory lists and work orders
   3. Complete various OEM warranty forms

III. Technical Publications

A. Service Manuals, IPLs, Microfiche
   1. Describe types of service and parts manual formats and their applications
   2. Demonstrate the ability to use and interpret reference manuals and materials correctly
   3. Recognize industry specific terminology and nomenclature
   4. Demonstrate proper usage of labor time guides and flat rate time
   5. Demonstrate ability to use a diagnostic and troubleshooting manual

6. Look-up parts using paper, microfiche and electronic parts and service lookup system (CD-ROM)

IV. Tools and Equipment

A. Service Tools and Equipment
   1. Demonstrate safe and proper use of all tools
   2. Clean and return tools to proper storage are

B. Hand Tools
   1. Identify the basic hand tools
   2. Demonstrate the proper use of hand tools
   3. Demonstrate the proper care and storage of hand tools

C. Precision Measuring Tools
   1. Identify, care, and storage of measuring tools
   2. Make accurate measurements
   3. Demonstrate use of the following tools:
      a) Micrometers
      b) Dial Indicator
      c) Bore Gauge
      d) Feeler Gauge
      e) Dial Calipers
      f) Compression Gauge
      g) Vacuum Gauge
      h) Pressure Gauge
      i) Tachometer
      j) Digital Miltimeter

D. Torque Wrenches
   1. Demonstrate identification of torque wrench styles
   2. Demonstrate the proper use, maintenance, and calibration requirements of torque wrenches
   3. Demonstrate understanding of the manufacturer's torque values and where to find the specification
   4. Demonstrate the following torque methods and procedures:
      a) Incremental Torque
      b) Break-away Torque

E. Use of Lifting Equipment
   1. Identify the various types of lifting and hoisting equipment
   2. Proper and safe use of lifting and hoisting equipment used in the shop or field location
   3. Proper and safe use of lifting tools used by technician: hydraulic presses, hydraulic pullers

F. Use of Cleaning Equipment
   1. Identify the basic cleaning equipment
   2. Proper and safe use of cleaning equipment used to wash parts and components of machines, including,: solvent tank, pressure washer, steam cleaner
   3. Proper and safe disposal of cleaning materials based on EPA and local regulations

V. Troubleshooting

A. Methods
   1. Demonstrate an understanding of the principles of troubleshooting including: can identify systems and the components, understands the sequence of events in a system, can access technical manuals to find information and specifications

B. Information Gathering
   1. Interview the customer and/or the operator for information
   2. Identify exact symptoms
   3. Accurately separate systems
   4. Make a complete physical examination
   5. Replicate or simulate a given problem
   6. Determine and classify all symptoms
   7. Perform specific tests using tools to determine which components are working correctly
   8. Record the results on a worksheet
   9. Make repairs, then retest to verify the repair
   10. Communicate with the customer regarding the cause and prevention of future problems

LEVEL ONE- TWO AND FOUR-STROKE CYCLE GASOLINE ENGINES

I. Small Engine Fundamentals

A. Engine Identification
   1. Identify manufacturer, model, serial number and type

B. Two-Stroke Cycle Engine
   1. Explain two-stroke cycle engine operation theory
      a) Piston ported type
      b) Reed valve type
   2. Describe normal combustion process
   3. Describe pre-ignition and its effects
   4. Describe detonation and its effects

C. Engine Identification
   1. Identify two-stroke cycle engine components and parts and explain their purpose

D. Four-Stroke Cycle Engines
   1. Explain four-stroke cycle engine operation theory
   2. Describe normal combustion process
   3. Describe pre-ignition and its effects
   4. Describe detonation and its effects
   5. Identify four-stroke cycle engine components and parts and explain their purpose

E. Engine Components (Two- and Four-Stroke)
   1. Engine Block, Crankcase, Cylinder, Head Components
      a) Describe engine block nomenclature and function
      b) Describe crankcase nomenclature and function
      c) Describe cylinder nomenclature and function
      d) Describe cylinder head nomenclature and function
   2. Piston, Wrist Pins, Rings Components
      a) Describe piston, wrist pins and ring types
   3. Connecting Rods, Bearings, Crankshafts, Seals Components
      a) Describe connecting rod, bearing and crankshaft nomenclature and function
      b) Describe engine bearing types and service applications
      c) Describe crankshaft types and service applications
      d) Describe engine oil seal types
   4. Engine Valve Train Components
      a) Describe valve train nomenclature and function
      b) Describe valve retainer types
      c) Demonstrate and understanding of crankshaft angle and valve timing degrees
      d) Describe “Valve Overlap” and its function
   5. Lubrication Systems Components
      a) Describe lubrication systems nomenclature and function
   6. Ignition Systems Components
      a) Describe the purpose of an ignition system
      b) Describe ignition system nomenclature and function
      c) Identify the components and function of a battery ignition system
      d) Identify the components and function of an electronic ignition system
      e) Identify the components and function of magnets ignition system
   7. Cooling Systems Components
      a) Understand the concepts of heat transfer
      b) Define the purpose of a cooling system
      c) Define the major types of cooling systems used on power equipment
      d) Describe air-cooled system nomenclature and function
      e) List major causes of air cooled engine overheating

f) Describe normal service procedures performed on an air cooled engine
g) Describe liquid cooled system nomenclature and function
h) List major causes of liquid cooled engine overheating
i) Describe function of a thermostat
j) Describe function of the water pump
k) Describe function of anti-freeze
l) Remove and replace water pump/fan drive belt
m) Perform a cooling system pressure test

8. Fuel System Components (Two- and Four-Stroke)
   a) Identify the basic types of fuel systems used in power equipment
   b) Identify the functions of each components in the fuel system, including the following: carburetor, fuel filter, fuel pump and electronic fuel injection
9. Carburetors Components
   a) Identify types of carburetor designs used on small engines
   b) Describe carburetor nomenclature and function, including: vacuum-feed carburetor, diaphragm carburetor, float type carburetors, rotary carburetors, slide valve carburetors
   c) Identify transition circuit
   d) Identify and describe the idle circuit
   e) Identify and describe the main circuit
   f) Discuss the venture principle
   g) Describe variable venture carburetor and terms
   h) Describe enrichment devices
   i) Choke types
   j) Purging systems
   k) Primer types
   l) Describe the function of a fixed orifice jet
   m) Describe the function of a high speed nozzle
   n) Describe the function of the emulsion tube
   o) Describe the function of the purging system
   p) Identify and test crankcase impulse passages
   q) Describe the function and service of fuel tank vents and lines
10. Fuel Filters, Components
   a) Explain the purpose of a fuel filter
   b) Identify the common types of fuel filters
   c) Describe the difference between micron and mesh
11. Fuel Pumps, Components
   a) Identify common types of fuel pumps
   b) Describe fuel pump nomenclature and function
   c) Describe accelerator pump nomenclature and function
12. Electronic Fuel Injection (EFI) Components
   a) Explain the theory and function
13. Gaseous Fuels Components
   a) Explain the theory, function and components
14. Air Filter System Components
   a) Describe air filter system nomenclature and function
   b) List 5 types of air filters used on small engines
   c) Describe normal service procedures performed on each type of air filter system
15. Exhaust Systems Components
   a) Describe exhaust system nomenclature and function
   b) Identify terms associated with exhaust systems
   c) Describe types of exhaust systems
   d) Describe proper service cleaning procedures for exhaust ports and spark arrestor screens
16. Catalytic Converters Components
   a) Describe theory and function of single stage catalyst

17. Starting Systems Components
    a) Describe engine starting systems, nomenclatures and function
    b) Identify the components of a recoil starting system and describe the function of each
    c) Identify the components of a DC electric starting system and describe the function of each
    d) Identify the components of a AC electric starting system and describe the function of each
    e) Describe the operation of a break-away clutch used on AC and DC electric starter motors
    f) Perform 12-volt DC starter motor current draw test
    g) Remove and replace starter motor
    h) Remove, test, and replace starter relay (Solenoid)
18. Charging Systems Components
    a) Explain electrical/electronic terms that are common to the power equipment industry
    b) Describe charging system nomenclature and function
    c) Identify types of charging systems including: under flywheel alternator, belt drive alternator
    d) Describe a DC amps test
    e) Describe an AC volts test
    f) Describe the function of a diode
    g) Describe resistance test
    h) Perform current drain test using a DC shunt
    i) Remove and replace regulator/rectifier
19. Circuits
    a) Describe series circuit
    b) Describe parallel circuit
    c) Explain different types of circuit failures
    d) Demonstrate applicable test procedures for testing series and parallel circuits
    e) Check continuity in circuits and electrical system components
    f) Check current flow in electrical systems and components
    g) Inspect, test and replace fusible links, fuses and circuit breakers
    h) Identify terminals and connectors used in electrical systems
    i) Identify electrical wire sizes and selection based on anticipated current load
    j) Identify spending units used in an electrical circuit and explain their function
    k) Demonstrate safe work habits when working with electrical/charging systems and circuits
20. Batteries
    a) Explain storage battery theory and operation
    b) Remove, clean and replace battery
    c) Perform specific gravity test on battery cell electrolyte
    d) Determine battery state of charge using DMM
    e) Explain proper procedure for battery disposal based on EPA and local ordinance
21. Governor System Components
    a) Identify the purpose of the governor system
    b) Describe the governor system nomenclature and function, including: Pneumatic (air vane) governor system, mechanical governor system
    c) Perform dynamic governor adjustments

II. Maintenance

A. Lubrication Fundamentals
    1. Describe the theory of lubrication
    2. Describe (generally) API oil ratings
    3. Describe the meaning of SAE viscosity ratings

4. Describe the classification of 2 stroke oils
5. Describe IS0/LEG 2 stroke oil standard, A, B, C, D
6. Describe Jaso oil standard, classification PCS pcw-1, -2, -3
7. List common oil contaminants
8. Label types of oil filters used on power equipment
9. State guidelines for selecting and using oils

B. Engine Maintenance
   1. Lubrication
      a) Classify types of lubrication systems as for either two- or four-stroke cycle engines
      b) Identify terms associated with an engine lubrication system
      c) List the functions of engine oil
      d) Interpret engine oil application charts used in owners/operators manuals
   2. Stoke Engine Oils
      a) Prepare pre-mixed fuel for a two-stroke cycle engine
      b) Describe potential problems for oil/fuel mixtures
      c) Describe effects of using alcohol based fuels
   3. Four-Stroke Lubrication
      a) Describe splash lubrication systems
      b) Describe pressure lubrication systems
      c) Describe oil filtration system
      d) Describe methods of checking oil level in an engine
      e) Change engine oil and filter on a variety of selected equipment
      f) List the benefits of positive crankcase ventilation
      g) Identify the components and function of a crankcase ventilation breather assembly
      h) Service a crankcase breather assembly
   4. Cooling System
      a) Describe proper cooling system cleaning methods
      b) Perform cooling system cleaning for air cooled
      c) Perform cooling system flush and cleaning of liquid cooled engine
      d) Demonstrate, remove and replace water pump
      e) Demonstrate, remove and replace thermostat
   5. Fuel System
      a) Identify types and grades of gasoline used in power equipment
      b) Describe the use of a fuel additive for storage
      c) Describe the proper method of carburetor cleaning
   6. Carburetors
      a) Remove and replace a carburetor on a small gasoline engine
      b) Disassemble, clean and reassemble carburetors
      c) Install a repair kit in a carburetor
      d) Inspect internal carburetor parts for wear
      e) Adjust carburetor choke linkage
      f) Adjust carburetor mixture screws per OEM specifications
      g) Adjust carburetor float level
      h) Adjust carburetor metering levers
      i) Remove, replace and repair fuel lines and hoses
      j) Remove and replace the fuel tank, filters, caps, and lines
      k) Adjust the engine idle speed
   7. Starting Systems
      a) Repair three different styles of rewind starters
      b) Perform starter drive gear replacement
      c) Can disassemble and reassemble 12 volt DC-120 volt AC starter motor
   8. Exhaust System

a) Describe equipment problems that can occur from operating equipment and a removed/damaged exhaust system
b) State the danger of operating a power product in a closed area
c) Describe the purpose of an exhaust deflector
d) Describe the purpose of a spark arrestor screen

III. Two-Stroke Cycle Gasoline Engines Disposal

A. Test a two-stroke cycle engine for proper operation including:
    1. Check engine for top end compression
    2. Check engine for base/primary compression (bottom end)
    3. Inspect the fuel system for proper operation: Perform carburetor pressure test
    4. Inspect the ignition system for proper operation: Perform 3 point spark test
    5. Inspect the exhaust system/port of carbon obstruction
    6. Check crankcase integrity with pressure/vacuum pump
    7. Operate the engine to check for proper starting and power out put under load
B. Service and Maintain Chainsaws
    1. Has viewed videos in power equipment safety
    2. Demonstrates power equipment safety practices
    3. Demonstrates understanding of cutting attachment operation, replacement and sharpening: rotary blade, saw chain, hedge trimmer, etc.
    4. Explain ANSI standards i.e. kick back, operator presence etc.
C. Hands-On Performance Test
    1. Given a 2-cycle engine on a produce with trouble symptoms installed, the student can solve the problem with the use of the proper manual and tools

IV. Two-Stroke Cycle Gasoline Engine Overhaul

A. Disassemble engine, inspect, measure service and repair components
B. Remove, service and replace an exhaust system
C. Remove the cylinder and demonstrate de-carboning techniques
D. Remove and inspect the connecting rod and piston
E. Remove and inspect the crankshaft
F. Remove, replace needle bearings
G. Remove, replace main ball bearings
H. Inspect, measure, service or replace
I. Inspect the crankcase and components
J. Demonstrate two-cycle ring installation
K. Demonstrate two-cycle ring groove cleaning
L. Inspect reed values
M. Inspect intake side of piston skirt on piston ported engines valves
N. Repair damaged spark plug thread using heli-coil
O. Inspect and repair the recoil starting system
P. Inspect and service clutch assembly

V. Four-Stroke Gasoline Engines Diagnosis

A. Test a four-stroke cycle engine for proper operation including:
    1. Fuel pump pressure
    2. Pressure test carburetor
    3. Operate the engine to check for proper starting and acceleration
    4. Can differentiate hunting/surging symptom between fuel system or governor system
    5. Perform cylinder balance test and demonstrate understanding of findings
    6. Perform cylinder compression test
    7. Perform cylinder leak down test
    8. Perform engine crank case vacuum test

9. Perform oil pressure test

B. Ignition System
    1. Ignition system using spark tester
    2. Understand the effect of a partially sheared flywheel key
    3. Remove, inspect, and replace point and condenser
    4. R/R ignition armature (ignition coil, ignition module)
    5. Test and replace ignition armature assembly
    6. Test and replace high tension lead(s)
    7. Test solid state transistor controlled discharge system
    8. Test capacitive ignition system
    9. Demonstrate timing procedure for points style
    10. Demonstrate timing procedure solid state/electronic style
    11. Test a four-stroke cycle engine for proper operation including: measure primary and secondary resistance

C. Servicing Liquid Cooling Systems
    1. Check/replace engine ignition kill switch
    2. Inspect the cooling system
    3. Check for damage to the fins or fan
    4. Can identify debris clogging air fins

D. Servicing the Air Intake System
    1. Identify proper order of assembly
    2. Remove and replace intake manifold

E. Hands-On Performance Test
    1. Given a four-stroke cycle engine on a produce with trouble symptoms installed, the student can solve the problem with the use of the proper manual and tools

VI. Two- and Four-Stroke Gasoline Engines Service

A. Disassemble engine, inspect and repair components
    1. Inspect hydraulic or mechanical lifters
    2. Replace valve stem seals
    3. Inspect valve guides for wear
    4. Inspect valves; resurface or replace
    5. Perform valve lapping operation; explain why
    6. Inspect and measure cylinder bore
    7. De-glaze and clean cylinder bore using a rigid hone
    8. Demonstrate the proper cleaning of the engine block
    9. Demonstrate understanding of OEM cylinder reuse specifications
    10. Inspect and measure camshaft bearings for wear, damage
    11. Inspect valve train including: valves, rocker arms, lifters, studs & push rods
    12. Inspect balance system; inspect shaft(s) and support bearings for damage and wear
    13. Measure and determine values for engine bearings
    14. Use plastic-gage to determine bearing clearances in an engine

B. Reassembly Procedures
    1. Install all engine components, assemblies and gaskets; torque according to manufacturer's specifications and procedures
    2. Install the crankshaft with its bearings
    3. Measure the crankshaft end play
    4. Measure crankshaft run-out
    5. Verify camshaft timing according to manufacturer's specifications and procedure
    6. Adjust valves (mechanical and hydraulic lifters)
    7. Assemble and test run engine

C. After Overhaul Procedures
    1. Initial start-up procedures
    2. Demonstrate static governor adjustment
    3. Engine installation
    4. Check top no-load speed
    5. Check all safety-related devices for proper operation, correct all problems. Provide written documentation of safety device failures to customer and manufacturer.

6. From written documentation from the work order, inform the customer of problems related to maximum engine life and future methods of failure prevention

VII. Failure Analysis

A. Abrasive Ingestion
    1. Can identify the effects of abrasive ingestion on engine components
    2. Can accurately identify the entrance path of abrasives on several engine failure examples

B. Insufficient Lubrication
    1. Can identify the effect of insufficient lubrication on engine components: piston cylinders, etc.
    2. Can accurately define cause of failure on several engine failure examples
    3. Can accurately identify 2 stroke lubrication/fuel quality failure root cause
    4. Can identify the use of incorrect/no lubricant
    5. Can identify and describe engine failures caused by "Phrase separation" of fuel

C. Overheating
    1. Can identify the effect of overheating on engine component parts
    2. Can accurately define the root cause of failure on several engine failure examples
    3. Can identify overheating effects on two-stroke engines due to poor exhaust system maintenance: i.e. piston carbon scoring
    4. Can define detonation, preignition and effects on engine components
    5. Can identify two-stroke engine failures cause by tale fuel varnish
    6. Can identify engine failure caused by lean mixture

D. Over Speeding
    1. Can identify the effects of over speeding on engine component parts
    2. Can identify the signature break on a connecting rod on several engine failure examples
    3. Can identify exhaust port piston scoring and large end bearing due to overspeeding

E. Vibration
    1. Can identify the effect of excessive vibration on engine block and mounting base

F. Hands-On Performance Test
    1. Given a sample of various failed components, the student can identify the symptoms, type and causes of failure

ALL ASPECTS OF THE INDUSTRY

Recent national legislation requires that vocational education programs provide a strong experience in "all aspects of the industry" (AAO1) for industries that students are preparing to enter. AAO1's ultimate goal is to give future workers a sense of the issues involved in the world of work. Such knowledge can empower future workers to make informed decisions about their career paths. This knowledge can also allow workers to make meaningful contributions to the industry, instead of performing mindlessly like another piece of equipment. The main areas of AAO1 include:

- Planning
- Management
- Finance
- Technical and Production Skills
- Principles of Technology
- Labor and Community Issues
- Health/Safety/Environment
- Personal Conduct

Duty Bands and Objectives

A. Planning

A1 Describe why industries respond to customer wants and expectations
A2 List differences in how companies deliver products versus delivering services
A3 Describe ways a worker can influence company decision-making
A4 Identify benefits in anticipating technology and market trend changes
A5 Identify an example of how regulatory laws can impact how a business operates
A6 Identify an example of how a political organization can impact how a company operates

B. Management

B1 Identify key components of a company "mission statement'
B2 Identify how a corporate "chain of command' works
B3 Describe the significance of a company's "corporate cultures
B4 Describe how a company organizes its departments
B5 List typical ways company departments communicate
B6 Cite examples of why a worker should adjust to different management styles
B6 Cite examples of why a worker should adjust to different management styles
B7 Cite an example of how companies are dependent on the national economy
B8 cite an example of how a company is dependent upon the local economy
B9 Describe the importance of achieving internal and external customer satisfaction
B10 Identify examples of how cultural diversity can affect an industry
B11 Identify key differences in how private companies and government agencies operate
B12 List reasons why written policies are used in industry
B13 Identify resources available from professional organizations
B14 Identify how roles and responsibilities in a family business are different that in larger companies

B15 List benefits a worker can get by participating in meetings
B16 List key differences in how a family farm operates versus how another small business operates

C. Finance

C1 List typical ways a business obtains capital
C2 Describe the importance of accounting in a business
C3 Describe key implications for a company which grants credit
C4 Describe how a company estimates and bids for a contract
C5 Describe how paycheck deductions affect a worker
C6 Describe the importance of cost containment in a company

D. Technical and Production Skills

D1 Demonstrate a basic math ability
D2 Demonstrate the capability to measure quickly and accurately
D3 Demonstrate the ability to speak and write the English language effectively
D4 Demonstrate the ability to listen effectively
D5 Demonstrate the ability to use effective negotiation skills
D6 Demonstrate the ability to manage time effectively
D7 Demonstrate the ability to read blueprints and drawings
D8 Demonstrate the ability to perform basic computer operation
D9 Describe the importance of deadlines and schedules
D10 Demonstrate the ability to use team player skills
D11 Demonstrate the ability to use supervisory and delegation skills
D12 Demonstrate the ability to utilize good public speaking skills
D13 Describe the importance of using troubleshooting techniques
D14 Cite one example of a job that is inter-related with another job
D15 Demonstrate the ability to obtain technical information
D16 Identify certification requirements for a specific job

E. Principles of Technology

E1 Describe the key characteristics of the technology used in your industry
E2 Describe the importance of analyzing new equipment for possible use
E3 Describe the importance of continuously upgrading one's job skills
E4 Describe the importance of adaptability and learning from experience
E5 Describe the importance of acquiring and analyzing information effectively and making sound decisions
E6 Describe the importance of cross-training

F. Labor and Community Issues

F1 Describe the importance of a written job description
F2 Describe the importance of knowing your rights as a worker
F3 Describe the role labor organizations play in your industry (if any)
F4 List advantages/disadvantages of hourly and salaried pay
F5 List differences between being a self-employed worker and a worker employed by a company
F6 Describe the importance of participating in quality enhancement programs
F7 Describe the importance of understanding why a worker is asked to occasionally work longer hours
F8 Describe the importance of cultural sensitivity

G. Community

G1 Describe the importance of recognizing a worker should contribute special skills through volunteer work
G2 Identify key ways a company helps its community

G3 Identify key ways a community helps a company
G4 Identify an impact of buying outside the community
G5 Describe how a company's public perception is important
G6 Describe the importance of providing for the access needs of the physically challenged

H. Health, Safety and Environment

H1 Describe the importance of complying with federal agency regulations
H2 Describe why it is important to avoid job-specific health threats
H3 Read and comprehend major components of a Material Safety Data Sheet
H4 Identify basic safety training (tornado, fire, first aid) techniques
H5 Describe the importance of participating in preventive medicine programs
H6 Describe the importance of handling stress effectively
H7 Describe the importance of good workplace ergonomics
H8 Identify any effects weather could have on an industry
H9 Describe the importance of management's responsibility for a safe workplace

I. Personal Conduct

I1 Describe the importance of recognizing the dignity of all work
I2 Describe the importance of producing quality and effective work
I3 Describe the importance of being fit for duty (no drugs, no alcohol)
I4 Describe the importance of exhibiting good attitude, enthusiasm, integrity
I5 Describe the importance of exhibiting good grooming and appearance
I6 Describe the importance of good personal financing

Source: *All Aspects of the Industry (65-9000-1).* University of Missouri-Columbia: Instructional Materials Laboratory, 1994.

PRE-EMPLOYMENT/WORK MATURITY SKILLS

The following competencies from *Pre-Employment and Work-Maturity Competencies: A Guide for Practitioners* (Revised 1998) have been endorsed by three agencies: the Missouri Department of Elementary and Secondary Education, the Department of Labor and Industrial Relations, and the Department of Economic Development. The list includes seven core competencies and related employability skills. Locally developed learner outcomes may, of course, be added, and local groups are encouraged to utilize the identified state competencies for development of their own pre-employment and work maturity skills.

A. Making Career Decisions
- A1. Perform self assessment
- A2. Explorer occupational information
- A3. Perform decision-making process

B. Using Labor Market Information
- B1. Identify sources of information
- B2. Use Labor market information

C. Preparing a Resume
- C1. Collect resume data
- C2. Develop a resume

D. Completing the Job Application Process
- D1. Prepare letters of inquiry
- D2. Provide accurate educational data
- D3. Provide accurate work history data
- D4. Provide accurate personal data
- D5. Provide accurate reference information
- D6. Fill out job application form

E. Demonstrating Effective Interviewing Skills
- E1. Present proper appearance
- E2. Prepare for interview
- E3. Greet the interviewer
- E4. Participate in the interview
- E5. Respond to interview closure
- E6. Prepare a letter of follow-up

F. Demonstrating Knowledge of Proper Work Attitudes and Behaviors
- F1. Be dependable
- F2. Be punctual
- F3. Maintain a positive attitude and behavior
- F4. Complete tasks effectively with or without supervision
- F5. Practice good grooming and personal hygiene
- F6. Recognize legal issues in the workplace

G. Demonstrating Knowledge of Effective Interpersonal Skills
- G1. Communicate with others
- G2. Maintain relationships with others

SCAN COMPETENCIES

SCANS *foundation skills* identified by the U.S. Department of Labor describe generic skills needed by nearly everyone. The SCANS *competencies,* however, are more specific in nature and are listed below. (SCANS is the acronym for the Secretary [of Labor]'s Commission of Achieving Necessary Skills.) National VICA's *Total Quality Curriculum* incorporates SCANS competencies and Total Quality Management (TQM) principles in a 17-module set of activities.

1. Resources
1. Allocates time
2. Allocates money
3. Allocates material and facility resources
4. Allocates human resources

2. Interpersonal
1. Participates as a member of a team
2. Teaches others
3. Serves clients/customers
4. Exercises leadership
5. Negotiates to arrive at a decision
6. Works with cultural diversity

3. Information
1. Acquires and evaluates information
2. Organizes and maintains information
3. Interprets and communicates information
4. Uses computers to process information

4. Systems
1. Understands systems
2. Monitors and corrects performance
3. Improves and designs systems

5. Technology
1. Selects technology
2. Applies technology to task
3. Maintains and troubleshoots equipment

SHOW-ME STANDARDS

The new educational goals and standards are a result of the Outstanding Schools Act of 1993, which calls on Missouri citizens and educators to define appropriate, rigorous expectations for children's learning. Committees of teachers, citizens, parents, lawmakers and state officials have been working on the proposed goals and standards since then. The goals and standards listed below were approved as a final regulation by the Missouri State Board of Education, January 18, 1996, and are available through the Missouri Department of Elementary and Secondary Education's home page. *(URL http:dese.state.mo.us/standards/goal1.html)*

Goal 1: Students in Missouri public schools will acquire the knowledge and sills to *gather, analyze and apply information and ideas.*

Students will demonstrate within the integrate and integrate across all content areas the ability to

- 1.1 develop questions and ideas to initiate and refine research
- 1.2 conduct research to answer questions and evaluate information and ideas
- 1.3 design and conduct field and laboratory investigations to study nature and society
- 1.4 use technological tools and other resources to locate, select, and organize
- 1.5 comprehend and evaluate written, visual and oral presentations and works
- 1.6 discover and evaluate patterns and relationships in information, ideas and structures
- 1.7 evalutate the accuracy of information and the reliability of its sources
- 1.8 organize data, information and ideas into useful forms (including charts, graphs, outlines) for analysis or presentation
- 1.9 identify, analyze and compare the institutions, traditions and art forms of past and present societies
- 1.10 apply acquired information, ideas and skills to different contexts as students, workers, citizens and consumers

Goal 2: Students in Missouri public schools will acquire the knowledge and skills to *communicate effectively within and beyond the classroom.*

Students will demonstrate within and integrate across all content areas the ability to

- 2.1 plan and make written, oral and visual presentations for a variety of purposes and audiences
- 2.2 review and revise communications to improve accuracy and clarity
- 2.3 exchange information, questions and ideas while recognizing the perspectives of others
- 2.4 present perceptions and ideas regarding works of the arts, humanities and sciences
- 2.5 perform or produce works in the fine and practical arts
- 2.6 apply communication techniques to the job search and to the workplace
- 2.7 use technological tools to exchange information and ideas

Goal 3: Students in Missouri public schools will acquire the knowledge and skills to *recognize and solve problems*

Students will demonstrate within and integrate across all content areas the ability to

- 3.1 identify problems and define their scope and elements
- 3.2 develop and apply strategies based on ways others have prevented or solved problems
- 3.3 develop and apply strategies based on one's own experience in preventing or solving problems

3.4 evaluate and processes used in recognizing and solving problems
3.5 reason inductively from a set of specific facts and deductively from general premises
3.6 examine problems and proposed solutions from multiple perspectives
3.7 evaluate the extent to which a strategy addresses the problem
3.8 assess costs, benefits and other consequences of proposed solutions

Goal 4: Students in Missouri public schools will acquire the knowledge and skills to *make decisions and act as responsible members of society.*

Students will demonstrate within and integrate across all content areas the ability to

4.1 explain reasoning and identify information used to support decisions
4.2 understand and apply the rights and responsibilities of citizenship in Missouri and the United States
4.3 analyze the duties and responsibilities of individuals in societies
4.4 recognize and practice honesty and integrity in academic work and in the workplace
4.5 develop, monitor and revise plans of action to meet deadlines and accomplish goals
4.6 identify tasks that require a coordinated effort and work with others to complete those tasks
4.7 identify and apply practices that preserve and enhance the safety and health of self and others
4.8 explore, prepare for and seek educational and job opportunities

Communication Arts (CA)

In Communication Arts, students in Missouri public schools will acquire a solid foundation which includes knowledge of and proficiency in

CA1 speaking and writing standard English (including grammar, usage, punctuation, spelling, capitalization)
CA2 reading and evaluating fiction, poetry and drama
CA3 reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
CA4 writing formally (such as reports, narratives, essays) and informally (such as outlines, notes)
CA5 comprehending and evaluating the content and artistic aspects of oral and visual presentations (such as story-telling, debates, lectures, multi-media productions)
CA6 participating in formal and informal presentations and discussions of issues and ideas
CA7 identifying and evaluating relationships between language and culture

Fine Arts (FA)

In Fine Arts, students in Missouri public schools will acquire a solid foundation which includes knowledge of

FA1 process and techniques for the production, exhibition or performance of one or more of the visual or performed arts
FA2 the principles and elements of different art forms
FA3 the vocabulary to explain perceptions about and evaluations of works in dance, music, theater and visual arts
FA4 interrelationships of visual and performing arts and the relationships of the arts to other disciplines
FA5 visual and performing arts in historical and cultural contexts

Health/Physical Education (HP)

In Health/Physical Education, students in Missouri public schools will acquire a solid foundation which includes knowledge of

HP1 structures of, functions of, and relationships among human body systems
HP2 principles and practices of physical and mental health (such as personal health habits, nutrition, stress management)
HP3 diseases and methods for prevention, treatment and control

HP4 principles of movement and physical fitness
HP5 methods used to assess health, reduce risk factors, and avoid high risk behaviors (such as violence, tobacco, alcohol and other drug use)
HP6 consumer health issues (such as the effects of mass media and technologies on safety and health0
HP7 responses to emergency situations

Mathematics (MA)

In Mathematics, students in Missouri public schools will acquire a solid foundation which includes knowledge of

MA1 addition, subtraction, multiplication and division; other number sense, including numeration and estimation; and the application of these operations and concepts in the workplace and other situations
MA2 geometric and spatial sense involving measurement (including length, area, volume), trigonometry, and similarity and transformations of shapes
MA3 data analysis, probability and statistics
MA4 patterns and relationships within and among functions and algebraic, geometric and trigonometric concepts
MA5 mathematical system (including real numbers, whole numbers, integers, fractions), geometry, and number theory (including primes, factors, multiples)
MA6 discrete mathematics (such as graph theory, counting techniques, matrices)

Science (SC)

In Science, students in Missouri public schools will acquire a solid foundation which includes knowledge of

SC1 properties and principles of matter and energy
SC2 properties and principles of force and motion
SC3 characteristics and interactions of living organisms
SC4 changes in ecosystems and interactions of organisms with their environments
SC5 processes (such as plate movement, water cycle, air flow) and interactions of earth's biosphere, atmosphere, lithosphere and hydrosphere
SC6 composition and structure of the universe and the motions of the objects within it
SC7 processes of scientific inquiry (such as formulating and testing hypotheses)
SC8 impact of science, technology and human activity on resources and the environment

Social Studies (SS)

In Social studies, students in Missouri public schools will acquire a solid foundation which includes knowledge of

SS1 principles expressed in the documents shaping constitutional democracy in the United States
SS2 continuity and change in the history of Missouri, the United States and the world
SS3 principles and processes of governance systems
SS4 economic concepts (including productivity and the market system) and principles (including the laws of supply and demand)
SS5 the major elements of geographical study and analysis (such as location, place, movement, regions) and their relationships to changes in society and environment
SS6 relationships of the individual and groups to institutions and cultural traditions
SS7 the use of tools of social science inquiry (such as surveys, statistics, maps, documents)

Source: "The Show-Me Standards." Jefferson City, MO: Missouri Department of Elementary and Secondary Education, March 1996.