

Electronics (47.0101)*Cross-reference to Show-Me standards (main report)*

Measurable Learner Objective and Task Statement	Knowledge (Content)	Performance (Goals)	National Standards
A. Appreciate and apply all personal and workplace safety procedures	CA 3, HP 6, HP 7, SC 8	1.4, 1.5, 1.10, 3.1, 3.5, 4.7	
1. Identify types, purposes, and operation of fire extinguishers and suppression resources.			
2. Recognize when first aid is needed for occupational injuries and follow proper procedures.			
3. Identify electrical hazards.			
4. Demonstrate appropriate work place safety practices (e.g., electrical, hand tools, power tools, fall protection, PPE, lockout/tagout, and environmental hazards).			A.02, A.04, A.05
5. Identify hazard of RF radiation devices.			
6. Demonstrate safe and proper use of AC line-operated equipment (e.g., isolation transformers, grounding, leakage current testing, and GFI).			C.06, C.07
B. Test fundamental electronic circuits and devices	CA 3, MA 1, MA 2 SC 1, SC 7	1.8, 1.10, 3.1, 3.2, 4.1	
1. Evaluate and test sources of DC and AC signals and power.			A.06, B.01, B.04
2. Apply Ohm's law.			B.05, C.01-C.05, C.15
3. Evaluate and test DC circuits (e.g., parallel and series-parallel).			B.03, B.24, C.15
4. Evaluate and test bridge circuits.			B.05, B.08-B.10, B.11, B.12, B.13 B.14-B.16, B.18-B.20
5. Evaluate and test magnetic and electromagnetic devices.			B.14-B.17
6. Evaluate and test transformers.			B.05, B.06, C.15
7. Evaluate and test capacitors.			C.06, C.14-C.17
8. Evaluate and test inductors.			B.07, C.08-C.10
9. Evaluate and test resistive devices.			B.07, B.08, C.11-C.13
10. Evaluate and test basic circuit controls (e.g., switches, fuses, and circuit breakers).			A.10

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11. Evaluate and test AC series R/L/C (resistance-inductance-capacitance) and filter circuits.			C.21-C.29
12. Evaluate and test AC parallel R/L/C and filter circuits.			B.13, C.21-C.29
13. Evaluate and test time constants.			B.21-B.23
14. Evaluate electronic system problems logically.			
C. Analyze and repair power supplies consistent with industry and safety standards	CA 3, MA 1, SC 1, SC 7	1.8, 1.10, 3.1, 3.2, 3.5, 4.1	
1. Evaluate and test batteries.			B.02
2. Analyze and repair linear power supplies.			D.06-D.08, E.07-E.09
3. Analyze and repair voltage and current regulator circuits.			D.06-D.08, E.16-E.17 (excluding switching power supplies)
D. Test semiconductor devices consistent with industry and safety standards	CA 3, MA 1, SC 1, SC 7	1.8, 1.10, 3.1, 3.2, 3.5, 4.1, 4.7	
1. Evaluate and test diodes.			D.01, D.02, D.05-D.08
2. Evaluate and test transistors (e.g., BJTs and FETs).			D.03, D.04
3. Evaluate and test thyristors (e.g., SCRs, TRIACs, and DIACs).			D.15-D.17
4. Select semiconductors using specification sheets and substitution guides.			A.07, partial A.09, E.10-E.12
5. Demonstrate proper semiconductor handling and replacing.			
E. Analyze and repair amplifiers consistent with industry and safety standards	CA 3, MA 1, SC 1, SC 7	1.8, 1.10, 3.1, 3.2, 3.5, 4.1	
1. Analyze and repair transistor switching circuit.			
2. Analyze and repair bipolar transistor amplifier circuits.			D.12-D.14, E.13-E.15
3. Analyze and repair FET amplifier circuits.			D.12-D.14

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4. Analyze and repair operational amplifier circuit.			E.10-E.12
5. Analyze and repair multistage amplifiers.			E.01-E.03, F.03, F.04
F. Analyze and repair frequency generation equipment consistent with industry and safety standards	CA 3, MA 1, MA 2, SC 1, SC 7	1.8, 1.10, 3.1, 3.2, 3.5, 4.1	
1. Analyze and repair oscillators.			E.20, E.21
2. Analyze and repair pulse generators and multivibrators.			E.20, E.21, F.17-F.19
3. Apply the oscillator operation theory.			
G. Test equipment	CA 3, MA 1, MA 2, SC 1	1.10, 3.2	
1. Measure voltage, time, and frequency using an oscilloscope.			Partial A.09, C.02, C.03
2. Measure voltage, current, and resistance using multimeters (e.g., VOM, EVM, and DVM).			
3. Operate signal generators (e.g., audio, RF, and function).			
4. Construct a circuit using a Quad bilateral switch.			
H. Analyze common optical devices	CA 3, MA 1, SC 1	1.10, 3.1, 3.2, 4.1	
1. Analyze common optical devices (e.g., photodetectors, emitters, optical isolators, and LEDs).			D.O9
2. Construct a circuit using fiber optic cable to transmit a digital or analog signal.			
I. Analyze and interpret digital logic system components	CA 3, MA 2, MA 3, MA 5, SC 1, SC 7	1.8, 1.10, 3.1, 3.2, 3.5, 4.1	
1. Convert number systems and codes (e.g., binary, hex, ASCII and BCD).			
2. Analyze basic logic gate operations.			F.01, F.05-F.07
3. Interpret logic circuit truth tables.			F.05-F.07

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4. Analyze clock and timing circuit operations.			
5. Analyze combinational logic circuits for a given application.			D.09-D.11, F.08-F.10, F.22, F.23, F.26, F.27, F.30-F.33
6. Analyze counter and controller circuits for sequential logic applications.			F.11-F.16
7. Interpret digital data sheet information.			A.07, partial A.09
8. Analyze the operation of A/D and D/A converters.			F.24,F.25
J. Test microprocessors and microcontrollers	CA 3, MA 2, MA 3, SC 1	1.8, 1.10, 3.1, 3.2, 3.5, 4.1	
1. Evaluate and test microprocessor bus signals.			G.03-G.05
2. Evaluate and test IO devices.			G.01-G.02
3. Evaluate and test memory devices.			G.06-G.07
4. Evaluate and test dedicated microcontrollers.			
5. Write, deploy and test an original microcontroller program.			
K. Construct circuits consistent with industry and safety standards	CA 3, SC 1	1.8, 1.10, 3.1, 3.2	
1. Construct multistage circuits according to schematic diagrams.			A.07, A.08
2. Surface mount solder and desolder components (e.g., defective and replacement) to IPC standards.			A.05
3. Thru-Hole solder and desolder components (e.g., defective and replacement).			A.05
L. Analyze and repair electronic telecommunication systems	CA 1, CA 3, MA2, SC 1	1.8, 3.1, 3.2, 3.5, 3.7	
1. Analyze and repair circuits [e.g., phase-locked loop, IF (intermediate frequency), active filter, and RF (radio frequency)].			C.31, C.32, E.18, E.04-E.06, E.24-E.26,
2. Analyze and repair modulation systems.			E.27, E.28

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3. Analyze and repair transmitters and receivers.			
4. Test and align antennas.			
5. Analyze and repair telephone and personal communication systems (PCS).			
6. Install, test, and repair satellite receivers.			
7. Operate frequency counters.			
M. Analyze and repair audio/video systems	CA 1, CA 3, MA 2	1.8, 3.1, 3.2, 3.5, 3.7	
1. Analyze and repair record/play systems (e.g., analog audio, analog video, digital audio, and digital video).			
2. Analyze and repair video display systems (e.g., digital and analog).			
3. Analyze and repair audio and video reproduction systems.			
4. Analyze and repair interactive audio and video systems.			
N. Install and maintain computer network systems			
1. Analyze and repair transmitters and receivers (e.g., photonic and electronic).			E.22, E.23
2. Analyze and repair transmission mediums.			
3. Install, test, and repair physical layer of a network.			
4. Install protocol stack.			
5. Install network software.			
O. Install and maintain computer software and hardware components	CA 1, CA 3, MA 4	1.8, 3.1, 3.2	
1. Test computer component functions (e.g., microprocessor, memory, and I/O).			H.01, H.02
2. Install and configure hardware components (e.g., drives, cards, memory expansion, motherboard, and disk interfaces).			
3. Install and configure operating system software (e.g., operating and supporting).			H.04

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4. Test and maintain computer peripherals.			H.03, H.05
P. Install and maintain automatic identification and data capture systems	CA 1, CA 3, MA 1, SC1, SC2	1.8, 3.1, 3.2, 3.5, 3.7	
1. Analyze, install, configure, repair and maintain bar code readers and printers.			
2. Analyze, install, configure, repair and maintain magnetic stripe programmers and readers.			
3. Install and configure smart card programmers and readers.			
4. Analyze, install, configure, repair and maintain radio frequency identification (RFID) systems.			
5. Analyze, install, configure, repair and maintain electronic article surveillance (EAS) systems.			
6. Analyze, install, configure, repair and maintain real time locating systems (RTLS).			
7. Install and configure machine vision.			
8. Install and configure magnetic ink character recognition (MICR).			
9. Install and configure voice recognition.			
10. Analyze, install, configure, repair and maintain biometric identification systems (e.g., retinal scanners, hand geometry, and voice patterns).			
Q. Install, analyze, and repair industrial electronic systems	CA 1, CA 3, MA 1, MA 2, SC 1, SC 2	1.8, 3.1, 3.2, 3.5, 3.7	
1. Design and create simple ladder logic diagrams/programs.			
2. Install and configure programmable logic controllers (e.g., PLC code).			
3. Analyze and repair motor control systems (e.g., starters and control wiring, and overcurrent protection).			
4. Analyze and repair variable-speed motor drives.			
5. Identify and test sensors.			
6. Analyze and repair solid-state power controls.			
7. Analyze, repair, and maintain computer-controlled systems (e.g., CNC and robotics).			

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R. Demonstrate leadership skills in the classroom, industry, and society	CA 1, CA 4, CA 6, SS 6, HP 2	2.1, 2.3, 2.6, 4.3, 4.4, 4.6, 4.8	
1. Demonstrate an understanding of SkillsUSA, its structure, and activities.			
2. Demonstrate an understanding of one's personal values.			
3. Perform tasks related to effective personal management skills.			
4. Demonstrate interpersonal skills.			
5. Demonstrate etiquette and courtesy.			
6. Demonstrate effectiveness in oral and written communication.			
7. Develop and maintain a code of professional ethics.			
8. Maintain an appropriate professional appearance.			
9. Perform tasks related to securing and terminating employment.			
10. Perform basic parliamentary procedures in a group meeting.			
S. Explain and demonstrate skills in a specialization area identified by the instructor			

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