

**Competency Task List – Secondary Component
Electromechanical Technology/Electromechanical Engineering Technology CIP
15.0403**

High School Graduation Years 2023, 2024, 2025

100 Technical Reports

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
101	Complete technical reports.		
102	Identify the common components of technical documents.		
103	Maintain a daily journal or timecard.		

200 Safety in the Laboratory

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
201	Practice accident prevention.		
202	Practice safe work habits.		
203	Use hand tools.		
204	Use portable power tools.		
205	Use a drill press.		
	RESERVED (206)		
207	Identify electric shock hazards.		
	RESERVED (208)		
209	Use fire extinguishers for different classes of fires.		
210	Collect Safety Data Sheets (SDS) information.		
211	Follow arc flash protection and National Fire Protection Administration 70E.		
212	Execute lock out/tag out procedure.		

300 Electrical Symbols on Blueprints and Schematics

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
301	Interpret electrical symbols, notes, details, and components on schematics.		
302	Draw schematics for electrical circuits.		

400 Basic Electricity

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
	RESERVED (401)		
402	Describe the application of a magnetic force.		
403	Describe the atomic structure for materials.		
404	Describe the direction of electron flow in circuits.		
405	List the effect of electric current flow.		
406	Construct simple circuits.		
407	Define voltage, current, resistance, and power.		
	RESERVED (408)		
	RESERVED (409)		
410	Describe the characteristics and purposes of good conductors of electricity.		
411	Use prefixes in the metric system of measurement.		
	RESERVED (412)		
413	Follow Ohm's law.		
414	Follow Watt's law.		

500 Electrical Systems Measurements

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
501	Use an analog and a digital multimeter to measure voltage, amperage, and resistance.		

502	Use a non-contact voltage tester to detect voltage.		
503	Perform a continuity test.		

600 National Electric Code (NEC)

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
601	Follow regulations for wiring.		
602	Follow NEC code for sizes and types of wire conductors, raceways, and boxes.		
603	Follow NEC rules for grounding and bonding.		
604	Follow NEC rules for over-current protection devices.		
605	Locate the NEC code for motor circuit wiring.		
606	Use the NEC reference book to locate regulations for industrial electrical installations.		

700 Electrical Resistance

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
701	Define resistance.		
702	Identify resistor materials.		
703	Describe how length and thickness of wire affect resistance.		
	RESERVED (704)		
705	Calculate resistance of a wire.		
	RESERVED (706)		
707	Explain power and heat dissipation in a resistor.		
	RESERVED (708)		
	RESERVED (709)		
710	Identify components of a potentiometer and rheostat.		
	RESERVED (711-714)		
715	Identify values for color-coded resistors.		

	RESERVED (716)		
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800 Direct Current (DC) Motors

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
	RESERVED (801)		
802	Apply the theory of operation of a direct current motor.		
803	Operate and test a series, shunt, and compound direct current motor.		
	RESERVED (804)		
805	Perform calculations for horsepower, speed, and torque for direct current motors.		
806	Measure performance and efficiency of a direct current motor.		
807	Use technical terms to describe the construction of direct current motors.		
808	Determine the operations of variable speed control for direct current motors.		

900 Inductance and Capacitance

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
901	Connect a capacitor in a circuit.		
902	Calculate the time required to charge and discharge a capacitor.		
903	Identify capacitive and inductive circuits.		
904	Calculate total capacitance and inductance of series and parallel circuits.		
905	Perform calculations for capacitive and inductive reactance.		
906	Analyze the effect of an inductor in a direct current and alternating current circuit.		
907	Analyze the effect of a capacitor in a direct current and alternating current circuit.		

1000 Alternating Current (AC) Motors

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
1001	Explain the theory of operation of alternating current motors.		
1002	Calculate the synchronous speed of an alternating current motor.		
	RESERVED (1003)		
1004	Connect and operate split-phase, capacitor-start, capacitor-run, and dual capacitor motors.		
1005	Reverse the rotation of a split phase, capacitor-start, capacitor-run, and dual capacitor motors.		
	RESERVED (1006)		
1007	Determine operating characteristics of universal motors.		
1008	Connect and operate a three-phase, squirrel cage motor.		
1009	Reverse the rotation of a three-phase motor.		

1100 Series-Parallel Circuits

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
1101	Build and test a series circuit.		
1102	Build and test a parallel circuit.		
1103	Build and test a series/parallel circuit.		
1104	Troubleshoot series and parallel circuits.		
1105	Calculate voltage, current, and resistance.		
1106	Measure voltage, current, and resistance.		

1200 Electric Motor Controls

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
1201	Identify symbols and terms used in electromechanical motor control circuits.		

1202	Identify relays, contactors, and motor starters.		
1203	Read schematic wiring diagrams of motors and their controls.		
1204	Wire a simple two- and three-wire motor control circuit.		
1205	Wire a reversing starter.		
1206	Wire multiple push button/jogging control circuits.		
1207	Wire sequential control circuits.		
1208	Wire and test electrical control circuits.		
1209	Perform preventive maintenance and troubleshooting on motor controls.		
	RESERVED (1210)		
	RESERVED (1211)		
1212	Use conductor ampacity to select wire size and wire type for a specific wiring application.		
1213	Label control and power wiring.		
	RESERVED (1214)		
1215	Connect and operate alternating current and direct current variable speed drives.		

1300 Transformers

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
1301	Connect and operate a transformer.		
1302	Calculate the voltage-and-turns ratio.		
1303	Connect a step-up and a step-down transformer in a circuit.		
1304	Identify transformer windings and related output voltages.		
1305	Calculate volt-amps of a single-phase and three-phase transformer.		
1306	Measure single-phase transformer voltage and currents.		
1307	Measure series/parallel transformer voltages and currents.		
1308	Demonstrate knowledge of three-phase transformers.		
1309	Wire and analyze three-phase transformers.		

1400 Soldering Techniques

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
1401	Use and care for soldering equipment.		
1402	Implement soldering techniques for splicing conductors.		
1403	Implement soldering techniques for terminals.		
1404	Remove and install components on a printed circuit board.		

1500 Troubleshoot and Repair Electrical Devices

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
1501	Troubleshoot and repair motor controls.		
1502	Troubleshoot and replace relays.		
1503	Troubleshoot and replace sensors.		
1504	Troubleshoot and replace limit switches.		
1505	Troubleshoot and replace power supplies.		
	RESERVED (1506)		
1507	Troubleshoot alternating current and direct current variable speed drives.		

1600 Basic Electronics

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
1601	Interpret electronic symbols shown on diagrams and schematics.		
1602	Identify the function of diodes.		
1603	Identify the function of Zener diodes.		
1604	Identify the function of transistors.		
1605	Identify the function of power supplies.		
1606	Identify the function of filters.		
1607	Identify the function of half-wave, full-wave, and three-phase rectifiers.		

1608	Identify the function of thyristors.		
1609	Identify the function of single-phase and three-phase inverters.		
	RESERVED (1610)		
	RESERVED (1611)		

1700 Basic Logic Functions

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
	RESERVED (1701)		
1702	Convert between binary, BCD, octal, hexadecimal, and decimal number systems.		
	RESERVED (1703-1705)		
1706	Construct logic circuits containing and, or, nand, nor, and not gates.		
1707	Create truth tables for and, or, nand, nor, and not logic.		
	RESERVED (1708)		

1800 Programmable Logic Controls (PLCs)

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
1801	Explain where programmable logic control (PLC) networks may be used in the manufacturing process.		
1802	Identify the parts and operating principles of PLCs.		
1803	Use number systems and codes for PLCs.		
1804	Create a relay logic diagram.		
1805	Create PLC logic gate functions in PLCs.		
1806	Explain PLC logic and math functions.		
1807	Explain PLC timer and counter functions.		
1808	Explain PLC jump, compare, and sub-routine functions.		
1809	Edit PLC programs.		
1810	Troubleshoot a PLC system.		

1900 Mechanical Power Transmission Systems

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
1901	Use vocabulary words and terms associated with the fundamental principles of the transmission of mechanical power.		
1902	Construct simple machines and use them to illustrate mechanical principles.		
1903	Lubricate bearings.		
1904	Install and adjust belt, chain, and gear drives.		
1905	Use brakes and clutches.		
	RESERVED (1906)		
1907	Set and adjust mechanical stops.		
1908	Calculate speed and torque rates of mechanical equipment components.		

2000 Troubleshooting and Repair Mechanical Power Transmission Systems

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
	RESERVED (2001-2006)		
2007	Troubleshoot and repair or replace speed-reduction units.		
2008	Troubleshoot and repair or replace clutches.		
	RESERVED (2009)		
	RESERVED (2010)		

2100 Fluid Power Systems

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
2101	Interpret electrical and electronic control circuit symbols and schematics for hydraulic systems.		
	RESERVED (2102)		
2103	Identify fundamentals of hydraulics.		

2104	Connect and operate various pumps.		
2105	Identify types of hydraulic fluid transmission and conditioning.		
2106	Measure oil flow and oil pressure.		
2107	Operate manual and pilot operated directional control valves.		
	RESERVED (2108)		
	RESERVED (2109)		
2110	Construct, test and troubleshoot hydraulic control circuits.		
	RESERVED (2111-2120)		
2121	Perform adjustments to control oil temperature and pressure.		
2122	Conduct routine preventive maintenance on hydraulic equipment in accordance with manufacturer instructions.		
2123	Identify electrical symbols/schematics for pneumatics.		
2124	Apply the fundamental principles of pneumatics.		
2125	Describe the characteristics of air compressors.		
2126	Identify systems used for the distribution and conditioning of air.		
2127	Measure and control air flow and air pressure.		
2128	Identify pneumatic actuators.		
2129	Operate and explain mechanical devices that operate on air pressure.		
2130	Construct, test, and troubleshoot a pneumatic circuit.		
2131	Analyze pneumatic circuits.		
2132	Identify where electronic switches and sensors may be found in pneumatic systems.		
2133	Interpret electric control circuits and devices in pneumatic systems.		
2134	Sketch flow path symbols and air logic schematics.		
2135	Interpret flow path symbols and air logic schematics.		
2136	Select and use properly sized pneumatic piping.		
2137	Use dampers, thermostats, switches, pneumatic positioners, linkage assemblies and accessories in pneumatic systems.		

2200 Troubleshoot and Repair Fluid Power Systems and Their Components

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
	RESERVED (2201-2203)		
2204	Install, troubleshoot, repair or replace, and adjust pressure regulators.		
2205	Install, troubleshoot, and repair or replace airlines.		
2206	Install, troubleshoot, repair or replace, and adjust pumps.		
2207	Install, troubleshoot, and repair or replace gauges.		
2208	Install, troubleshoot, repair or replace, and adjust cylinders.		
2209	Install, troubleshoot, and repair or replace filters.		
2210	Install, troubleshoot, repair or replace and adjust control valves.		
2211	Install, troubleshoot, and repair or replace actuators.		
2212	Install, troubleshoot, repair or replace, and adjust pressure switches.		
2213	Install, troubleshoot, repair or replace, and adjust relays.		
	RESERVED (2214)		
	RESERVED (2215)		
2216	Conduct routine preventive maintenance on pneumatic equipment in accordance with manufacturer instructions.		
2217	Install, troubleshoot, and repair or replace, hydraulic lines.		
2218	Install, troubleshoot, repair or replace, and adjust hydraulic pumps.		
2219	Install, troubleshoot, and repair or replace hydraulic gauges.		
2220	Install, troubleshoot, and repair or replace hydraulic filters.		
2221	Install, troubleshoot, and repair or replace hydraulic directional control valves.		
2222	Install, troubleshoot, repair or replace, and adjust hydraulic pressure control valves.		

2300 Robotics

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
2301	Follow safety rules and regulations for working around robots.		
2302	Use vocabulary words and terms specific to robotics.		
2303	Identify major systems of a robot.		
2304	Identify a robot’s work envelope in a manufacturing cell.		
	RESERVED (2305)		
2306	Determine the operation of a robot's drive system.		
2307	Determine the mobility of an industrial robot.		
2308	Program a robot.		
2309	Use a robot for industrial applications.		

2400 Works Cells in a Manufacturing System

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
2401	Identify the fundamental operating principles used in flexible manufacturing systems.		
	RESERVED (2402)		

2500 Raceway Systems

Item	Task	(X) Indicates Proficiency ¹	Secondary Course Crosswalk
2501	Cut, bend, and install conduit or tubing.		
2502	Install raceway or wire duct.		

¹ Student Demonstrated Entry-Level Industry Proficiency as Indicated by (X)

Secondary CTE Instructor Signature _____ Date _____

Student Signature _____ Date _____

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