# Vehicle Maintenance Technology/Other CIP 47.0699

# Competency Task List – Secondary Component

# High School Graduation Years 2023, 2024, 2025

## 100 Workplace Safety

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| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
| 101 | Interpret Safety Data Sheets (SDS). |  |  |
| 102 | Lift and move heavy objects. |  |  |
| 103 | Handle and store flammable materials and toxic substances. |  |  |
| 104 | Follow Occupational Safety and Health Administration (OSHA) rules and regulations. |  |  |
| 105 | Identify job-site hazards. |  |  |
| 106 | Wear personal protective equipment, e.g., safety goggles, hearing protection and respiratory protection. |  |  |
| 107 | Select appropriate fire extinguisher according to fire type. |  |  |
| 108 | Follow safety rules for Exposure Control Procedures (ECP) for blood borne pathogens. |  |  |
| 109 | Use safe work habits while working with electrical systems. |  |  |

## 200 Basic Electrical Principles and Circuit Testing

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| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
|  | RESERVED (201) |  |  | |
| 202 | Interpret electrical circuit and wiring diagrams. |  |  | |
| 203 | Use a meter to measure resistance, continuity, amperage, and voltage. |  |  | |
| 204 | Solve problems using Ohm's law. |  |  | |
| 205 | Follow procedures for battery disposal. |  |  | |
| 206 | Construct and test series and parallel circuits. |  |  | |
| 207 | Identify electrical terminals and connectors. |  |  | |
| 208 | Perform a diode test. |  |  | |
|  | RESERVED (209-211) |  |  | |
| 212 | Inspect, test, and replace fusible links, fuses and circuit breakers. |  |  | |
| 213 | Identify American Wire Gauge (AWG) wiring codes. |  |  | |
|  | RESERVED (214) |  |  | |
| 215 | Solder a current carrying wire. |  |  | |

## 300 Cooling Systems

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| --- | --- | --- | --- |
| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
| 301 | Identify the methods of heat transfer and the purpose of a cooling system. |  |  | |
| 302 | Perform a cooling system flush on a liquid cooled engine. |  |  | |
| 303 | Remove, service and replace a water pump, hoses, and thermostat. |  |  | |
| 304 | Identify the components of a liquid cooled engine. |  |  | |
| 305 | Pressure-test a liquid-cooled cooling system. |  |  | |
| 306 | Determine causes of engine overheating. |  |  | |
| 307 | Inspect the cooling system for debris, leaks, and damage. |  |  | |

## 400 Fuel Systems

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| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
| 401 | Identify the types of fuel systems and explain the function of all components. |  |  | |
|  | RESERVED (402) |  |  | |
| 403 | Identify types of carburetor designs. |  |  | |
|  | RESERVED (404) |  |  | |
| 405 | Describe the operation of the idle fuel circuit and the main fuel circuit. |  |  | |
| 406 | Explain the venturi principle and variable venturi carburetors. |  |  | |
| 407 | Identify and service fuel enrichment devices. |  |  | |
|  | RESERVED (408) |  |  | |
|  | RESERVED (409) |  |  | |
| 410 | Identify the function of electronic fuel injection (EFI) components. |  |  | |
| 411 | Identify the function and components of gaseous fuel systems. |  |  | |
| 412 | Identify types and grades of fuels used in internal combustion engines |  |  | |
| 413 | Describe how fuel additives protect fuel systems. |  |  | |
| 414 | Remove, service, and replace carburetor. |  |  | |
|  | RESERVED (415) |  |  | |
| 416 | Remove, service, and replace a fuel system's air filter and air intake assembly. |  |  | |
| 417 | Remove, service, and replace a fuel pump. |  |  | |
| 418 | Install and adjust throttle and choke linkage. |  |  | |
| 419 | Adjust carburetor mixture screws per manufacturer specifications. |  |  | |
| 420 | Adjust carburetor float level and metering levers. |  |  | |
| 421 | Remove, service and replace a fuel tank, filters, caps, and lines. |  |  | |
|  | RESERVED (422) |  |  | |
| 423 | Check the fuel pump pressure and flow rate. |  |  | |
| 424 | Pressure test the carburetor. |  |  | |
| 425 | Check the engine for proper starting, idle and acceleration. |  |  | |
|  | RESERVED (426) |  |  | |
|  | RESERVED (427) |  |  | |
| 428 | Remove and replace an intake manifold. |  |  | |
| 429 | Remove, service and replace electronic fuel injection (EFI) fuel system components. |  |  | |
| 430 | Diagnose electronic fuel injection (EFI) system failures. |  |  | |
| 431 | Test and replace an anti-backfire/fuel shutoff solenoid. |  |  | |

## 500 Exhaust Systems

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| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
| 501 | Identify problems that can occur from operating engines with a removed or damaged exhaust system. |  |  | |
|  | RESERVED (502) |  |  | |
| 503 | Remove, service, and replace a spark arrestor screen. |  |  | |
| 504 | Identify exhaust system components and their functions. |  |  | |
| 505 | Explain the function of a single stage catalyst (catalytic converters). |  |  | |
|  | RESERVED (506) |  |  | |
| 507 | Remove, service, and replace an exhaust system. |  |  | |
|  | RESERVED (508) |  |  | |

## 600 Measuring and Trade-Related Mathematics

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| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
| 601 | Read a standard and a metric ruler. |  |  | |
| 602 | Read and use a standard and metric micrometer. |  |  | |
| 603 | Read and use a standard and metric dial indicator. |  |  | |
| 604 | Use a standard and metric torque wrench. |  |  | |
| 605 | Use a standard/metric dial caliper. |  |  | |
| 606 | Calculate displacement and area. |  |  | |
| 607 | Calculate work, power, torque, and horsepower. |  |  | |

## 700 Hand and Power Tools

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| --- | --- | --- | --- |
| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
| 701 | Use common hand tools. |  |  | |
| 702 | Use manufacturer’s specialty tools. |  |  | |
| 703 | Use electric, air, and hydraulic tools. |  |  | |

## 800 Fasteners

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| --- | --- | --- | --- |
| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
| 801 | Identify, select, and install various fasteners according to specifications. |  |  | |
| 802 | Replace damaged internal threads using a thread repair system. |  |  | |
| 803 | Repair damaged threads, using a tap and die, chaser, or thread file. |  |  | |
| 804 | Use a thread extraction tool to remove a broken fastener. |  |  | |
| 805 | Torque fasteners according to manufacturer specifications. |  |  | |

## 900 Welding, Heating, and Cutting

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| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
| 901 | Follow safety rules for welding and cutting equipment. |  |  | |
|  | RESERVED (902) |  |  | |
| 903 | Adjust welding amperage and perform various welding repairs. |  |  | |
|  | RESERVED (904) |  |  | |
| 905 | Light and adjust the flame on an oxy-acetylene torch. |  |  | |
| 906 | Heat and cut with an oxy-acetylene torch. |  |  | |
| 907 | Set up and adjust gauges on welding, heating, and cutting equipment. |  |  | |

## 1000 2-Stroke Cycle Engine

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| --- | --- | --- | --- |
| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
| 1001 | Diagnose performance problems in a 2-stroke cycle gasoline engine. |  |  | |
|  | RESERVED (1002) |  |  | |
| 1003 | Perform top end compression test. |  |  | |
| 1004 | Perform crankcase vacuum/pressure test. |  |  | |
| 1005 | Identify the component parts in a short block of a 2-stroke cycle engine and explain their purposes. |  |  | |
| 1006 | Pressure test a fuel system on a 2-stroke cycle engine. |  |  | |
| 1007 | Explain 2-stroke cycle engine operating theory. |  |  | |
|  | RESERVED (1008) |  |  | |
|  | RESERVED (1009) |  |  | |
| 1010 | Identify the types of 2-stroke cycle engine valves. |  |  | |
| 1011 | Inspect and service 2-stroke cycle engine exhaust systems. |  |  | |
|  | RESERVED (1012) |  |  | |

## 1100 4-Stroke Cycle Engine

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| --- | --- | --- | --- |
| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
| 1101 | Disassemble, clean, and identify engine components. |  |  | |
|  | RESERVED (1102) |  |  | |
| 1103 | Explain 4-stroke cycle engine operating theory. |  |  | |
|  | RESERVED (1104) |  |  | |
| 1105 | Inspect shaft(s) bearings and gears. |  |  | |
|  | RESERVED (1106) |  |  | |
| 1107 | Measure crankshaft end play, run-out and determine necessary repairs. |  |  | |
| 1108 | Inspect and service valve train components. |  |  | |
|  | RESERVED (1109-1111) |  |  | |
| 1112 | Install valve springs using a valve spring compressor. |  |  | |
| 1113 | Adjust valve clearances/lash. |  |  | |
| 1114 | Measure cylinder bore for oversize, out of round, taper, and piston to cylinder wall clearance. |  |  | |
| 1115 | Deglaze/hone a cylinder. |  |  | |
| 1116 | Perform a cylinder balance test. |  |  | |
| 1117 | Perform a cylinder compression test. |  |  | |
| 1118 | Perform a cylinder leak-down test. |  |  | |
| 1119 | Install a crankshaft and bearings. |  |  | |
| 1120 | Install a piston using a ring compressor. |  |  | |
| 1121 | Check ring end gap and side clearance. |  |  | |
| 1122 | Verify camshaft timing. |  |  | |
| 1123 | Install all gaskets and seals according to specifications. |  |  | |
|  | RESERVED (1124-1126) |  |  | |

## 1200 Engine Failure Analysis

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| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
| 1201 | List engine failure categories. |  |  | |
| 1202 | Identify insufficient lubrication failures. |  |  | |
| 1203 | Identify fuel system failures. |  |  | |
| 1204 | Identify cooling system failures. |  |  | |
| 1205 | Identify detonation and pre-ignition failures. |  |  | |
|  | RESERVED (1206) |  |  | |
| 1207 | Identify the effects of over speeding. |  |  | |
| 1208 | Identify the signature breakage of a connecting rod. |  |  | |
| 1209 | Identify exhaust port piston scoring and large end bearings failure on a 2-stroke cycle engine. |  |  | |
| 1210 | Identify the effects of excessing vibration on engine block and mounting base. |  |  | |
|  | RESERVED (1211) |  |  | |

## 1300 Starting Systems

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| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
| 1301 | Disassemble, identify, and describe the parts of a recoil starting system. |  |  | |
|  | RESERVED (1302) |  |  | |
| 1303 | Replace a starter spring, pulley, and starter rope. |  |  | |
|  | RESERVED (1304) |  |  | |
| 1305 | Troubleshoot and repair a starting/safety interlock circuit. |  |  | |
| 1306 | Remove, service and replace a direct current (DC) starter. |  |  | |
| 1307 | Remove, service and replace an alternating current (AC) starter. |  |  | |
| 1308 | Identify and describe the components of a direct current (DC) starting system. |  |  | |
| 1309 | Perform a 12-volt direct current (DC) starter motor current draw test. |  |  | |
| 1310 | Remove, test, and replace a starter relay or solenoid. |  |  | |

## 1400 Ignition System

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| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
| 1401 | Identify, remove, service, and replace battery ignition system components. |  |  | |
| 1402 | Identify, remove, service, and replace electronic ignition system components. |  |  | |
|  | RESERVED (1403) |  |  | |
| 1404 | Check and set ignition timing/air gap. |  |  | |
|  | RESERVED (1405) |  |  | |
| 1406 | Test an ignition system using a spark tester. |  |  | |
| 1407 | Inspect the engine for a sheared flywheel key. |  |  | |
| 1408 | Remove, inspect, and replace points and condenser. |  |  | |
|  | RESERVED (1409) |  |  | |
| 1410 | Replace a spark plug terminal and boot. |  |  | |
| 1411 | Test a solid-state, transistor-controlled discharge system. |  |  | |
| 1412 | Test a capacitive discharge ignition system. |  |  | |
|  | RESERVED (1413) |  |  | |
| 1414 | Perform timing procedures on an engine with a solid state/electronic ignition system. |  |  | |
|  | RESERVED (1415) |  |  | |
| 1416 | Replace an engine ignition kill switch. |  |  | |

## 1500 Charging Systems

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| --- | --- | --- | --- |
| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
| 1501 | Explain battery theory and perform maintenance and storage procedures. |  |  | |
| 1502 | Identify and describe the function of charging system components. |  |  | |
| 1503 | Perform a current draw test. |  |  | |
| 1504 | Test and troubleshoot the components of a charging system. |  |  | |
|  | RESERVED (1505-1507) |  |  | |
| 1508 | Remove and replace charging system components. |  |  | |

## 1600 Lubrication System

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| --- | --- | --- | --- |
| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
|  | RESERVED (1601) |  |  | |
|  | RESERVED (1602) |  |  | |
| 1603 | Change engine oil and filter. |  |  | |
| 1604 | Select proper oil and grade utilizing application charts. |  |  | |
| 1605 | Prepare a fuel/oil mixture for a 2-stroke cycle engine. |  |  | |
| 1606 | Service a crankcase breather assembly. |  |  | |
| 1607 | Describe lubrication systems and their functions. |  |  | |
| 1608 | Interpret American Petroleum Institute (API) oil ratings and Society of Automotive Engineers (SAE) viscosity ratings. |  |  | |
| 1609 | Describe the standard classification of 2-cycle oils. |  |  | |
| 1610 | List common oil contaminants. |  |  | |
| 1611 | Identify differences between splash lubrication systems and a pressure lubrication system. |  |  | |
| 1612 | Describe the operation of oil filtration systems. |  |  | |
| 1613 | Describe methods of checking the oil level in an engine. |  |  | |
|  | RESERVED (1614) |  |  | |
| 1615 | Identify the components and function of a crankcase ventilation breather assembly |  |  | |
| 1616 | Perform an oil pressure test. |  |  | |
| 1617 | Diagnose and repair a low-oil alert system. |  |  | |

## 1700 Governor Systems

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| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
| 1701 | Perform static and dynamic governor adjustments. |  |  | |
| 1702 | Remove, service, and replace pneumatic and mechanical governor. |  |  | |
| 1703 | Check top no-load speed and adjust governor as needed. |  |  | |
| 1704 | Differentiate hunting/surging symptom between the fuel system and governor system. |  |  | |

## 1800 Brake Systems

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| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
| 1801 | Inspect, remove, service, and repair mechanical brake systems. |  |  | |
| 1802 | Inspect, remove, service, and repair hydraulic brake systems. |  |  | |
| 1803 | Inspect, remove, service, and repair drum and disc brakes. |  |  | |
| 1804 | Explain hydraulic brake theory. |  |  | |
|  | RESERVED (1805) |  |  | |

## 1900 Clutch and Drive System

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| --- | --- | --- | --- |
| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
| 1901 | Inspect and service or replace belts and tensioning devices. |  |  | |
| 1902 | Inspect and service or replace centrifugal clutches. |  |  | |
| 1903 | Inspect and service or replace clutch discs. |  |  | |
| 1904 | Inspect and service or replace sprockets and chains. |  |  | |
| 1905 | Inspect and service or replace an electric power take-off. |  |  | |
| 1906 | Inspect and service or replace universal joints. |  |  | |
| 1907 | Disassemble, service and reassemble gearboxes and components |  |  | |
| 1908 | Disassemble, service and reassemble transaxles. |  |  | |
| 1909 | Disassemble, service and reassemble hydrostatic drives. |  |  | |
| 1910 | Change hydraulic fluid and filter. |  |  | |

## 2000 Parts Management, Invoicing, and Recordkeeping

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| --- | --- | --- | --- |
| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
| 2001 | Interpret illustrations, graphs, diagrams, and tables. |  |  | |
| 2002 | Use reference materials, service manuals, and parts tables. |  |  | |
| 2003 | Perform inventory of parts in stock. |  |  | |
| 2004 | Locate parts and specifications using a computerized or microfiche parts reference database. |  |  | |
| 2005 | Complete a service order/invoice form. |  |  | |
| 2006 | Interpret time and flat rate information. |  |  | |
| 2007 | Order materials and supplies. |  |  | |
| 2008 | Explain a manufacturer's model number, serial number, engine type number, and vehicle identification numbers (VIN). |  |  | |

## 2100 Wheels and Chassis Service

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| Item | Task | (X) Indicates Proficiency 1 | Secondary Course Crosswalk |
| 2101 | Remove and replace or repair tubeless tire and valve stem. |  |  | |
| 2102 | Remove and replace or repair a tube type tire. |  |  | |
| 2103 | Service and replace wheel bearings and bushings. |  |  | |
| 2104 | Inspect, service, and replace steering components. |  |  | |
| 2105 | Inspect, service, and repair chassis. |  |  | |

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

Secondary CTE Instructor Signature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Student Signature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[PA In-Demand Occupations List (PA IDOL)](https://nam10.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.workstats.dli.pa.gov%2FProducts%2FIDOL%2FPages%2Fdefault.aspx&data=04%7C01%7Celw12%40psu.edu%7C465d2f58a43f45631dac08d9e0349a4c%7C7cf48d453ddb4389a9c1c115526eb52e%7C0%7C0%7C637787338795980555%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000&sdata=yZW%2BaPOFwIBGxV3Jk72%2BGXlAbGWgkjCVKy%2FQtYol1F0%3D&reserved=0)

[Industry-Recognized Credential Resource Guide](https://www.education.pa.gov/K-12/Career%20and%20Technical%20Education/Resources/Teacher%20Resources/IndustryRecognized/Pages/default.aspx)