NYS SkillsUSA Standards

# AUTOMOTIVE MAINTENANCE AND LIGHT REPAIR

## PURPOSE

To evaluate each competitor's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of automotive service technology.

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- **NYS SkillsUSA –**
- White crew neck short- sleeved T-shirt
- Work pants or jeans,
- Leather or steel toed work shoes.
- Long hair must be restrained.
- Safety glasses with side shields or goggles, (Prescription glasses can be used only if they are equipped with side shields and approved by OSHA(Z-87). If not, they must be covered with goggles.)

Note: Contestants must wear their official contest clothing to the contest orientation meeting.
Also bring #2 pencil, resume, safety assurance form and Conference Program

## ELIGIBILITY

Open to active SkillsUSA high school members enrolled in career and technical programs with automotive technician or automotive service technology as the occupational objective.

## EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
a. All necessary tools and equipment for the competition
b. All necessary service publications for the competitors
2. Supplied by the competitor:
a. All competitors must create a one-page resume. See "Resume Requirement" below for guidelines.

### RESUME REQUIREMENT

Competitors must create a one-page resume to submit at orientation.

### DEVICES

Cell phones or other electronic devices not approved by the NYS Chairperson will be collected by the contest chair during the competition. Chairpersons will announce their acceptance by listing it on their standard or at the orientation meeting. In case of emergencies advisors should allow the competitors to take their phones to the contest areas.

If the competitor uses their device in a manner which compromises the integrity of the competition, the competitor's score may be penalized.

## SCOPE OF THE COMPETITION

The competition will be consistent with the automobile technician task list outlined in guidelines published by the National Institute for Automotive Service Excellence (ASE) and the ASE Education Foundation at: www.aseeducationfoundation.org.

Competitors will demonstrate their ability to perform jobs or skills selected from the standards mentioned above as determined by the SkillsUSA Championships technical committee. Committee membership includes American Honda Motor Co. Inc., ATech, ConsuLab, Gates Corp., General Motors, Hunter Engineering Co., Megatech Corp., National Institute for Automotive Service Excellence, Pittsburg State University, Snap-on Inc., S/P2, Toyota Motor North America, Inc., CCAR, ATech, Stellantis North America, Nissan North America, Lucas-Nuelle and Subaru of America, and Mercedes-Benz, USA.

## KNOWLEDGE PERFORMANCE

All competitors are required to take the SkillsUSA professional development test online.

The competition will include a written knowledge test given by ASE covering all skill areas found in the ASE Education Foundation Maintenance and Light Repair Program Standards and the Official ASE Study Guide — Auto Maintenance and Light Repair (G1) test. The test for this competition will consist of maintenance and repair content from these skill areas: engine repair, automatic transmission/transaxle, manual drivetrain and axles, suspension and steering, brakes, electrical/electronic steering, heating and air conditioning and engine performance.

## SKILL PERFORMANCE

The competition will include a series of workstations. Workstations consist of a vehicle and/or simulators, components, service publications, and interpersonal skills stations (such as Customer Service and Job Interview).

## COMPETITION GUIDELINES

1. A variety of vehicles sold in the United States will be used in the competition. This will include both domestic and imported vehicles.
2. Safety, quality, ability to follow instructions and procedures, accuracy (in comparison with factory specifications), workmanship, and other skills representative of the trades identified by industry leaders will be judged.
3. A total of eight to 15 stations will be assigned. Each station must be broken down into specific task criteria and separate steps based on the task. For example:

Station No. 1 Wire test and repair segments
Identify faulty circuit = x points Repair condition = x points Assemble/retest = x points Resistor board tests = x points
Compare values to specs = x points Workmanship = x points
Safety practices = x points

4. The points allowed for each station will be assigned by the national technical committee and will be based on the difficulty of each assigned task.
5. Time limits will be assigned for each task, but no bonus points will be awarded for early completion.

## STANDARDS AND COMPETENCIES

### MLR 1.0 — Perform vehicle HVAC system inspection and maintenance to related tasks in the ASE Education Foundation Maintenance and Light Repair (MLR) Program Standards — Heating and Air Conditioning section of the ASE MLR (G1) Test Task List.

1.1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
1.2. Inspect and replace A/C compressor drive belts, pulleys, and tensioners; determine necessary action.
1.3. Identify hybrid vehicle A/C system electrical circuits and the service/safety precautions.
1.4. Inspect A/C condenser for airflow restrictions; determine necessary action.
1.5. Inspect engine cooling and heater systems hoses; perform necessary action.
1.6. Inspect A/C-heater ducts, doors, hoses, cabin filters, and outlets; perform necessary action.
1.7. Identify the source of A/C system odors.

### AST 2.0 — Perform vehicle engine performance diagnosis and testing to related tasks in the ASE Education Foundation Maintenance and Light Repair (MLR) Program Standards — Engine Performance section of the ASE MLR (G1) Test Task List

2.1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
2.2. Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.
2.3. Perform cylinder power balance test; determine necessary action.
2.4. Perform cylinder cranking and running compression tests; determine necessary action
2.5. Perform cylinder leakage test; determine necessary action.
2.6. Remove and replace spark plugs; inspect secondary ignition components for wear and damage.
2.7. Use a provided factory scan tool for the current model vehicle
    2.7.1. Read and record DTC
    2.7.2. Read and record OBD monitor status
    2.7.3. Read and record freeze frame data
    2.7.4. Clear codes when applicable
2.8. Describe the importance of operating all OBD monitors for repair verification.
2.9. Inspect, service, or replace air filters, filter housings, and intake duct work.
2.10. Check and refill diesel exhaust fluid (DEF).
2.11. Inspect, test and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action.

### MLR 3.0 — Perform vehicle body electrical testing to related tasks identified in the ASE Education Foundation Maintenance and Light Repair (MLR) Program Standards — Electrical/Electronic Systems section of the ASE MLR (G1) Test Task List.

3.1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
3.2. Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).
3.3. Demonstrate proper use of a DMM when measuring source voltage, voltage drop, current flow, resistance, and parasitic draw.

3.3.1. Identify correct test procedures
3.3.2. Follow the correct test procedure
3.3.3. Identify connector pin-outs
3.3.4. Identify component locations
3.3.5. Use wiring schematics

3.4. Check operation of electrical circuits:
3.4.1. With fused jumper wires

3.5. Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.

3.6. Perform solder repair of electrical wiring

3.7. Replace electrical connectors and terminal ends.

3.8. Perform battery state-of-charge test.

3.9. Confirm proper battery capacity for vehicle application

3.10. Maintain or restore electronic memory functions.

3.11. Identify vehicle systems that require initialization or code entry after reconnecting the vehicle battery.
3.11.1. Perform battery capacity test

3.12. Identify high voltage circuits of electric or hybrid electric vehicle and related safety precautions
3.12.1. Identify hybrid 12v battery service and test procedures

3.13. Inspect and test starter control circuits
3.13.1. Perform current draw test
3.13.2. Perform voltage drop test

3.14. Inspect and test charging system
3.14.1. Perform output test
3.14.2. Perform voltage drop test

3.15. Inspect, adjust, or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment.

3.16. Inspect interior and exterior lamps and sockets

3.17. Identify system voltage and safety precautions associated with high-intensity discharge headlights

3.18. Verify windshield wiper and washer operation; replace wiper blades.

3.19. Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators.

3.20. Diagnose and repair a body electrical issue on a current model vehicle

## MLR 4.0 — Demonstrate application of environment, health and safety knowledge in auto service situations to related OSHA section 1910 standards and EPA standards

4.1. Identify and explain the use of personal protective equipment

4.2. Recall information about automotive-related EPA and OSHA requirements

4.3. Identify and explain the use of blood- borne pathogens kits

4.4. Answer questions from a provided Safety Data Sheet (SDS)

4.5. Describe proper use of a fire extinguisher

4.6. Demonstrate knowledge of automotive lift safety best-practices

4.7. Demonstrate knowledge of automotive battery safety best-practices

**MLR 5.0 — Complete a mock job interview for maintenance and light repair related position**

5.1. Conduct a mock job interview with appropriate professional behavior
5.2. Communicate clearly and effectively
5.3. Clearly and completely fill out a job application
5.4. Submit copy of resume as directed in "Resume Requirement" above

**MLR 6.0 — Perform suspension and steering related tasks identified in the ASE Education Foundation Maintenance and Light Repair (MLR) Program Standards — Suspension and Steering section of the ASE MLR (G1) Test Task List.**

6.1. Perform pre alignment inspection and measure vehicle ride height
6.2. Inspect tire condition; identify tire wear patterns; check for correct tire size, application (load and speed ratings), and air pressure as listed on the tire information placard/label.
6.3. Rotate tires according to manufacturer's recommendations
6.4. Dismount, inspect and remount tire on wheel
6.5. Balance tire and wheel assembly
6.6. Inspect tire and wheel assembly for air loss
6.7. Repair tire using an internal patch
6.8. Identify indirect and direct tire pressure monitoring systems (TPMS); calibrate system; verify operation of instrument panel lamps.
6.9. Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system (TPMS) including relearn procedure.
6.10. Identify and inspect steering components
6.11. Identify and inspect suspension components
6.12. Use reference materials provided
6.13. Use tools provided to complete the above tasks.

**MLR 7.0 — Perform manual drive train service, testing and diagnosis to related tasks identified in the ASE Education Foundation Maintenance and Light Repair (MLR) Program Standards— Manual Drive Train and Axles section of the ASE MLR (G1) Test Task List.**

7.1. Identify components manual drive trains, axles, drivelines and transfer cases
7.2. Inspect, remove, and replace front wheel drive bearings, hubs and seals
7.3. Inspect, service, and replace shafts, yokes, boots, and universal/CV joints
7.4. Check and adjust clutch master cylinder fluid level
7.5. Check manual transmission/transaxle fluid level and condition
7.6. Check and adjust differential housing fluid level
7.7. Use tools provided to complete the above tasks

**MLT 8.0 — Perform brake inspection and service for the related tasks identified in the ASE Education Foundation Maintenance and Light Repair (MLR) Program Standards— Brake Systems section of the ASE MLR (G1) Test Task List.**

8.1. Identify different brake components
8.2. Describe procedure for performing a road test to check brake system operation, including antilock brake systems (ABS)
8.3. Install wheel and torque lug nuts
8.4. Measure brake pedal height, travel, and free play
8.5. Test brake fluid for contamination
8.6. Measure brake drum diameter

8.7. Remove, inspect and install brake shoes, springs, pins, clips, levers, adjusters and other brake hardware
8.8. Remove, inspect and install wheel cylinders
8.9. Pre-adjust brake shoes and parking brake before installing brake drums
8.10. Remove, inspect and install caliper, pads and related hardware; measure brake pad wear; check wear indicators; determine necessary action
8.11. Clean and inspect rotor, measure thickness, thickness variation, and lateral runout; determine necessary action
8.12. Remove, inspect and install caliper, pads and related hardware and determine necessary action
8.13. Check parking brake components; clean, lubricate, adjust or replace as necessary
8.14. Describe importance of operating vehicle to burnish/break-in replacement brake pads
8.15. Inspect brake booster for proper operation
8.16. Remove, clean, inspect, repack and install wheel bearings; install hub and adjust wheel bearings
8.17. Check operation of brake stop light system
8.18. Inspect and replace wheel studs.
8.19. Use tools provided to complete the above tasks

**MLR 9.0 — Perform automatic transmission maintenance to related tasks identified in the ASE Education Foundation Maintenance and Light Repair (MLR) Program Standards— MLR Automatic Transmission/Transaxle section of the ASE MLR (G1) Test Task List.**

9.1. Identify components on an automatic transmission/transaxle
9.2. Check fluid level in a transmission/ transaxle equipped with a dipstick
9.3. Check fluid level in a transmission/ transaxle not equipped with a dipstick
9.4. Check fluid condition
9.5. Describe the operational characteristics of a continuously variable transmission (CVT)
9.6. Describe the operational characteristics of a hybrid vehicle drivetrain
9.7. Use tools provided to complete the above tasks

**MLR 10.0 — Perform engine inspection and maintenance to related tasks identified in the ASE Education Foundation Maintenance and Light Repair (MLR) Program Standards— MLR Engine Systems section of the ASE MLR (G1) Test Task List.**

10.1. Remove and replace timing belt; verify correct camshaft timing
10.2. Perform common fastener thread repair
  10.2.1. Remove broken bolt
  10.2.2. Restore internal and external threads
  10.2.3. Restore internal and external threads using a thread insert
10.3. Adjust valves (mechanical or hydraulic lifters)
10.4. Check coolant condition and level
  10.4.1. Inspect and test radiator and pressure cap
  10.4.2. Test coolant concentration
10.5. Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment
10.6. Use tools provided to complete the above tasks

**MLR 11.0 — Use electrical service information resources**

11.1. Locate specifications and other service information using electronic service information resources

**MLR 12.0 — Vehicle lifting and support**

12.1. Use provided information to identify the proper vehicle lifting location using a floor jack; lift vehicle and properly locate jack stands to support vehicle during service.