Department of Education | College, Career and Technical Education

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Maintenance and Light Repair II (MLR II)

Primary Career Cluster:	Transportation
Course Contact:	CTE.Standards@tn.gov
Course Code(s):	C20H10
Prerequisite(s):	*Maintenance and Light Repair I* (C20H09)
Credit:	2
Grade Level:	10
Elective Focus - Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Transportation courses.
POS Concentrator:	This course satisfies one out of two required courses that meet the Perkins V concentrator definition, when taken in sequence in the approved program of study.
Programs of Study and Sequence:	This is the second course in the *Automotive Maintenance and Light Repair* program of study.
Aligned Student Organization(s):	SkillsUSA: http://www.skillsusatn.org/
Coordinating Work-Based Learning:	Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit https://www.tn.gov/content/tn/education/career-and-technical-education/work-based-learning.html.
Promoted Tennessee Student Industry Credentials:	Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit https://www.tn.gov/education/career-and-technical-education/student-industry-certification.html
Teacher Endorsement(s):	506, 508, 770
Required Teacher Certifications/Training:	ASE A-4, ASE A-5, ASE A-6, and ASE A-8 or G1 Industry Certification 2016-17
Teacher Resources:	https://www.tn.gov/education/career-and-technical-education/career-clusters/cte-cluster-transportation-distribution-logistics.html Best for All Central: https://bestforall.tnedu.gov/

Approved February 1, 2013, Amended January 30, 2018

Course at a Glance

CTE courses provide students with an opportunity to develop specific academic, technical, and 21st century skills necessary to be successful in career and in life. In pursuit of ensuring every student in Tennessee achieves this level of success, we begin with rigorous course standards which feed into intentionally designed programs of study.

Students engage in industry relevant content through general education integration and experiences such as career & technical student organizations (CTSO) and work-based learning (WBL). Through these experiences, students are immersed with industry standard content and technology, solve industry-based problems, meaningfully interact with industry professionals and use/produce industry specific, informational texts.

Using a Career and Technical Student Organization (CTSO) in Your Classroom

CTSOs are a great resource to put classroom learning into real-life experiences for your students through classroom, regional, state, and national competitions, and leadership opportunities. Below are CTSO connections for this course, note this is not an exhaustive list.

- Participate in CTSO Fall Leadership Conference to engage with peers by demonstrating logical thought processes and developing industry specific skills that involve teamwork and project management.
- Participate in contests that highlight job skill demonstration. These include Career Pathways Showcase, Job Interview, Maintenance Light Repair, and Automotive Service Technology.

Using a Work-based Learning (WB) in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standard 1** | Include a safety briefing in a visit to a shop.
- **Standard 3 |** Have a technician discuss working on suspension and steering systems.
- **Standards 4-5 |** Have a technician discuss how they work on brakes.

Course Description

The *Maintenance and Light Repair II (MLR II)* course prepares students for entry into *Maintenance and Light Repair III*. Students study and service suspension and steering systems and brake systems. Upon completing all of the Maintenance and Light Repair courses, students may enter automotive service industry as an ASE Certified MLR Technician.

Hours earned in the *Maintenance and Light Repair* courses may be used toward meeting Automotive Service Excellence (ASE) Education Foundation standards and Tennessee Department of Education standards. ASE requires that 95% of the P-1 tasks, 80% of the P-2 tasks, and 50% of the P-3 tasks will be accomplished. These tasks are notated in these standards.

Course Standards

1. Safety

1.1 Use and inspect personal protective equipment. Demonstrate appropriate related safety procedures.
1.2 Inspect, maintain, and employ safe operating procedures with tools and equipment, such as hand and power tools, ladders, scaffolding, and lifting equipment.
1.3 Demonstrate continuous awareness of potential hazards to self and others and respond appropriately.
1.4 Assume responsibilities under HazCom (Hazard Communication) regulations.
1.5 Adhere to responsibilities, regulations, and Occupational Safety & Health Administration (OSHA) policies to protect coworkers and bystanders from hazards; reporting of accidents and observed hazards; and regarding emergency response procedures.
1.6 Pass with 100% accuracy a written examination relating to safety issues relating specifically to Maintenance and Light Repair.
1.7 Pass with 100% accuracy a performance examination relating to safety issues relating specifically to Maintenance and Light Repair.

2. Leadership, citizenship, and teamwork

2.1 Cultivate positive leadership skills. Practice and demonstrate personal leadership skills. For example, taking advantage of opportunities provided by a career and technical student organization (CTSO), such as SkillsUSA.
2.2 Assess situations, apply problem-solving techniques and decision-making skills within the school, community, and workplace.
2.3 Participate as a team member in a learning environment.
2.4 Respect the opinions, customs, and individual differences of others.
2.5 Identify career interests, strengths, and opportunities.

3. Suspension and steering systems

3.1 Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. (P-1)
3.2 Disable and enable supplemental restraint system (SRS). (P-1)
3.3 Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellow boots. (P-1)
3.4 Determine proper power steering fluid type; inspect fluid level and condition. (P-1)
3.5 Flush, fill, and bleed power steering system. (P-2)
3.6 Inspect for power steering fluid leakage; determine necessary action. (P-1)
3.7 Remove, inspect, replace, and adjust power steering pump drive belt. (P-1)
3.8 Inspect and replace power steering hoses and fittings. (P-2)
3.9 Replace power steering pump filter(s). (P-2)
3.10 Inspect pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper. (P-1)
3.11 Inspect tie rod ends (sockets), tie rod sleeves, and clamps. (P-1)

3.12 Inspect upper and lower control arms, bushings, and shafts. (P-1)
3.13 Inspect and replace rebound and jounce bumpers. (P-1)
3.14 Inspect track bar, strut rods/radius arms, and related mounts and bushings. (P-1)
3.15 Inspect upper and lower ball joints (with or without wear indicators). (P-1)
3.16 Inspect suspension system coil springs and spring insulators (silencers). (P-1)
3.17 Inspect suspension system torsion bars and mounts. (P-1)
3.18 Inspect and replace front stabilizer bar (sway bar) bushings, brackets, and links. (P-1)
3.19 Inspect strut cartridge or assembly. (P-1)
3.20 Inspect front strut bearing and mount. (P-1)
3.21 Inspect rear suspension system lateral links/arms (track bars), control (trailing) arms. (P-1)
3.22 Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts. (P-1)
3.23 Inspect, remove, and replace shock absorbers; inspect mounts and bushings. (P-1)
3.24 Inspect electric power-assisted steering. (P-3)
3.25 Identify hybrid vehicle power steering system electrical circuits and safety precautions. (P-2)
3.26 Describe the function of the power steering pressure switch. (P-3)
3.27 Perform pre-alignment inspection and measure vehicle ride height; determine necessary action. (P-1)

4. Brake systems

4.1 Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. (P-1)
4.2 Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS). (P-1)
4.3 Measure brake pedal height, travel, and free play (as applicable); determine necessary action. (P-1)
4.4 Check master cylinder for external leaks and proper operation. (P-1)
4.5 Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, loose fittings and supports; determine necessary action. (P-1)
4.6 Select, handle, store, and fill brake fluids to proper level. (P-1)
4.7 Identify components of brake warning light system. (P-3)
4.8 Bleed and/or flush brake system. (P-1)
4.9 Test brake fluid for contamination. (P-1)
4.10 Remove, clean, inspect, and measure brake drum diameter; determine necessary action. (P-1)
4.11 Refinish brake drum and measure final drum diameter; compare with specifications. (P-1)
4.12 Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. (P-1)
4.13 Inspect wheel cylinders for leaks and proper operation; remove and replace as need (P-2)
4.14 Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; make final checks and adjustments. (P-2)
4.15 Install wheel and torque lug nuts. (P-1)
4.16 Remove and clean caliper assembly; inspect for leaks and damage/wear to caliper housing; determine necessary action. (P-1)
4.17 Clean and inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action. (P-1)
4.18 Remove, inspect, and replace pads and retaining hardware; determine necessary action. (P-1)

4.19 Lubricate and reinstall caliper, pads, and related hardware; seat pads and inspect for leaks. (P-1)
4.20 Clean and inspect rotor, measure rotor thickness, thickness variation, and lateral runout; determine necessary action. (P-1)
4.21 Remove and reinstall rotor. (P-1)
4.22 Refinish rotor on vehicle; measure final rotor thickness and compare with specification (P-1)
4.23 Refinish rotor off vehicle; measure final rotor thickness and compare with specifications. (P-1)
4.24 Retract and re-adjust caliper piston on an integral parking brake system. (P-3)
4.25 Check brake pad wear indicator; determine necessary action. (P-2)
4.26 Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer'srecommendations. (P-1)

5. Related vehicle brake systems

5.1 Check brake pedal travel with, and without, engine running to verify proper power booste operation. (P-2)
5.2 Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster. (P-1)
5.3 Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings. (P-1)
5.4 Check parking brake cables and components for wear, binding, and corrosion; clean lubricate, adjust or replace as needed. (P-2)
5.5 Check parking brake operation and parking brake indicator light system operation; determine necessary action. (P-1)
5.6 Check operation of brake stop light system. (P-1)
5.7 Replace wheel bearing and race. (P-2)
5.8 Identify traction control/vehicle stability control system components. (P-3)
5.9 Describe the operation of a regenerative braking system. (P-3)

Teacher Resources

The following resources are available to assist teachers of this course.

- *Development Guidance: Classroom Activities*, Center on Education and Work, Madison, Wisconsin
- *Instructor Guide,* Automotive Service Excellence (ASE), http://aseinstructorguide.com/
- *Introduction to Transportation Service Technology*, Service Series, Curriculum and Instructional Material Center (CIMC), Oklahoma Department of Vocational and Technical Education
- *Module 1 Introduction to Transportation Technology*, Instructional Materials Laboratory (IML), University of Missouri
- *Today's Technician Basic Transportation Service & Systems*, Webster & Owens, Delmar/ITP
- 2018 Automotive Standards, Automotive Service Excellence (ASE), https://www.aseeducationfoundation.org/resources
- General Motors Diagnostic Plan
- Ford Motor Company Diagnostic Plan
- Harley Davidson Institute