

## Appendix A

### WORK PROCESS SCHEDULE BUS MAINTENANCE TECHNICIAN

(Existing Title: Diesel Mechanic)

O\*NET-SOC CODE: 49-3031.00 RAPIDS CODE: 0124R

This schedule is attached to and a part of these Standards for the above identified occupation.

#### 1. TERM OF APPRENTICESHIP

The term of the apprenticeship shall be two and a half (2 ½) years with an OJL attainment of 5,568 *including* the required hours of related instruction. (This example assumes a certain level of competency in math and reading. Math and reading classes will be added by transit agencies that are not able to find candidates with these qualifications within their labor market.)

#### 2. RATIO OF APPRENTICES TO JOURNEYWORKERS

Ratio as covered in the local collective bargaining agreement (CBA).

#### 3. APPRENTICE' WAGE SCHEDULE

Apprentices shall be paid a progressively increasing schedule of wages based on a percentage of the current journeyworker wage rate per the CBA.

##### **Bus Maintenance Technician Apprenticeship Term:**

**By Percentage of Journey-level Wage: SAMPLE for a 36 month program and an hourly wage rate of \$28.75.**

(The hourly rate is a composite representative of the current state of the industry.

Local rates will be determined by the CBA.)

*Time Period | Percentage of Journey-level | APPRENTICE*

1 <sup>st</sup> six months	= 60%	= \$ 17.25
2 <sup>nd</sup> six months	= 67%	= \$ 19.26
3 <sup>rd</sup> six months	= 74%	= \$ 21.28
4 <sup>th</sup> six months	= 81%	= \$ 23.29
5 <sup>th</sup> six months	= 88%	= \$ 25.30
6 <sup>th</sup> six months	= 95%	= \$ 27.31

#### 4. SCHEDULE OF WORK EXPERIENCE (See attached Work Process Schedule)

***The Local Joint Apprenticeship and Training Committee (JATC)*** may modify the work processes to meet local needs prior to submitting these Standards to the appropriate Registration Agency for approval.

#### 5. SCHEDULE OF RELATED INSTRUCTION (See attached Related Instruction Outline)

WORK PROCESS SCHEDULE  
BUS MAINTENANCE TECHNICIAN  
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**WORK PROCESS SCHEDULE**

**APPROXIMATE HOURS**

Transit orientation	12
History of transit in the U.S. and local community. How transit is funded. Basic regulatory agency information, Federal and state.	
Electrical and electronics	746
Inspect, test, remove and replace relays, circuit breakers, fuses, solenoids, batteries, starter motors, alternators, lights and other components. Demonstrate knowledge of safety practices and electrical theory. Demonstrate wire terminal connection and soldering. Jump start a bus using auxiliary power. Use a Multimeter to check circuits.	
Brakes	952
Describe the brake air supply and service systems. Identify brake system components. Describe proper safety procedures and demonstrate the use of hoists and jacks. Describe the use of test equipment and demonstrate its use. Remove and replace defective components.	
Diesel engines	940
General engine diagnosis. Cylinder head and valve training diagnosis and repair. Engine block diagnosis, repair, and overhaul. Lubrication and cooling systems diagnostics and repair. Air induction and exhaust systems diagnostics and repair. Fuel systems – electronic and mechanical sub systems. Starting and charging system diagnosis and repair.	
** See attached example of expanded learning objectives.	
Heating Ventilation Air Conditioning (HVAC)	424
Describe the HVAC system and components. Demonstrate test equipment. Describe the refill/recycle machine and demonstrate proper recovery of coolant and refill system. Explain evaporator and condenser operation. Describe inspection procedures and use of test equipment including an electronic sniffer, Volt/Ohm Meter (VOM), pressure meter and the use of human sight, sound and smell. Explain the different refrigerant types and uses. Earn EPA 608 certification.	
Transmission and drive train	960
Describe the transmission system and how it networks with other components. Demonstrate removal and replacement of transmission. Demonstrate test equipment and describe computer software use for testing. Demonstrate removal, replacement (i.e. u-joint) and replacement of drive line components.	

- Steering and Suspensions 576  
Identify steering and suspension components. Describe and demonstrate the basics of steering and axle alignment. Explain basic hydraulic principles and identify components. Inspect steering and suspension components for missing parts, rust, wear and leaks. Conduct road test. Diagnose problems. Remove, repair and replace components including steering pump, air suspension system, bushings, valves, hydraulics, etc.
- Preventive maintenance (PM) and inspection 320  
Visually, functionally inspect or test all bus components including electronic, hydraulic, physical (body) and mechanical. Inspect for corrosion, cracks, leaks (air, fluid), slide, tightness, missing parts, wiring condition (chafing marks), cable routing, fluid levels, and functionality. Demonstrate taking transmission, engine and differential fluid samples, and describe how to perform and interpret tests. Identify and describe the uses of various lubricant types. Clean and lubricate mirror swivel, latches, clutch bearings, slides, hinges, suspension and steering components. Change filters and fluids per PM charts.
- Electronic Diesel Diagnostics 142  
Describe and demonstrate the use of computer based diagnostics software. Describe the engine control systems and how they network with other components. Demonstrate finding manufacturer information on CDs and websites as well as paper manuals. Describe and identify fuel injection components. Test fuel injection system including pressure and voltages in the common rail. Demonstrate knowledge of fault codes. Test, remove, repair and replace components. Test the multiplex system.
- Compressed Natural Gas (CNG) 64  
Describe and demonstrate safety procedures for working with CNG systems. Inspect CNG tanks and lines for leaks, corrosion and damage. Demonstrate the depressurization of CNG system for maintenance. Demonstrate fire suppression system.
- Hybrid Systems 312  
Describe the types of hybrid systems (parallel, series). Demonstrate removal, repair and replacement of system components. Demonstrate adjustment of drive control systems using electronic means. Test regenerative braking system. Test battery recharging systems.
- Welding 120  
Demonstrate various welding techniques and describe the appropriate application of each type (MIG, TIG, and arc). Demonstrate and describe the use of personal protective equipment and other safety procedures for welding.

**Total hours are subject to local CBA 5,568**

\*Descriptions are limited to brief summaries and are not meant to be inclusive of the many, complex components on today's buses.

\*\*A expansive list of learning objectives for engines is attached as an example.

RELATED INSTRUCTION OUTLINE  
 BUS MAINTENANCE TECHNICIAN  
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**HOURS**

(Sub-component lists are for illustrative purposes and are not inclusive.) (All classes include practical application, diagnostics and troubleshooting where applicable.)

Transit agency and workplace orientation Safety, Right to Know	8
Electrical and electronics Electrical theory Circuits, relays and switches Starting and charging systems Troubleshooting and test equipment Multiplexing	94
Brakes Hydraulic and air systems Anti-lock and traction control Reline procedures	48
Diesel engines Air intake, combustion and exhaust Turbo charging Adjustments and tune-up Teardown and rebuild procedures	60
HVAC Principles of refrigeration Recovery and recycling Preventive maintenance Troubleshooting and test procedures	24
Transmission and drive train Pressure valves, filters, coolers, clutches Preventive maintenance Inspection & adjustments Differentials and driveshaft's Teardown and rebuild procedures	40
Steering and Suspensions Steering systems operation and components Spring vs. air suspensions Shock absorbers	32
Preventive maintenance inspections Purpose and understanding Frequency	24

PMI check sheet and procedures  
Quality control follow-up

Electronic Diesel Diagnostics	18
Theory of operation	
Sensors and controls	
Diagnostic procedures	
Emission Controls	
Engine protection and shutdown	
CNG	16
Safety and methane detection	
High pressure fuel delivery	
High pressure storage	
Properties and characteristics of natural gas	
Hybrid propulsion	48
Theory of operation	
Parallel vs. series design	
Energy storage	
Regenerative braking	
Welding	20
Types of welding	
Properties of various gases	
Application of various welding techniques	

**Total hours are subject to local CBA**

**432 (144 per year)**

Safety is a part of all instruction

Several components will have equipment-specific instruction on schematic reading.