BAKER COLLEGE
STUDENT LEARNING OUTCOMES

DSL 2710 Engine Performance and Maintenance
4 Semester Hours

Student Learning Outcomes & Enabling Objectives

1. Inspect fuel, oil, and coolant levels, and condition.
    a. Determine needed action
2. Identify causes of engine fuel, oil, coolant, air, and other leaks.
    a. Determine needed action.
3. Listen for engine noises; determine needed action.
4. Observe engine exhaust smoke color and quantity.
    a. Determine needed action.
5. Identify causes of no cranking, cranks but fails to start, hard starting, and starts but does not continue to run problems.
    a. Determine needed action.
6. Identify causes of surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and shutdown problems.
    a. Determine needed action.
7. Identify engine vibration problems.
    a. Determine needed action.
8. Check and record electronic diagnostic codes and trip/operational data
    a. Monitor electronic data
    b. Verify customer programmable parameters
    c. Clear codes
    d. Determine further diagnosis.
9. Inspect cam followers.
    a. Determine needed action.
10. Adjust valve bridges (crossheads)
    a. Adjust valve clearances and injector settings.
11. Test engine oil pressure and check operation of pressure sensor, gauge, and/or sending unit.
    a. Test engine oil temperature and check operation of temperature sensor.

    b. Determine needed action.
12. Check engine oil level, condition, and consumption,
    a. Determine needed action.
13. Inspect turbocharger lubrication and cooling systems.
    a. Determine needed action.
14. Test coolant temperature.
    a. Check operation of temperature and level sensors, gauge, and/or sending unit
    b. Determine needed action.
15. Perform air intake system restriction and leakage tests
    a. Determine needed action.
16. Perform intake manifold pressure (boost) test.
    a. Determine needed action.
17. Perform exhaust back pressure test.
    a. Determine needed action.
18. Inspect turbocharger(s), wastegate, and piping systems.
    a. Determine needed action.
19. Inspect and test turbocharger(s) (variable ratio/geometry VGT), pneumatic, hydraulic, electronic controls, and actuators.
20. Check air induction system: piping, hoses, clamps, and mounting.
    a. Service or replace air filter as required.
21. R and I turbocharger/wastegate assembly.
22. Inspect charge air cooler assemblies.
    a. Clean charge air cooler assemblies
    b. Replace charge air cooler assemblies
    c. Inspect aftercooler assemblies
    d. Replace as needed.
23. Inspect exhaust manifold, piping, mufflers, and mounting hardware
    a. Repair as needed.
    b. Replace as needed.
24. Inspect exhaust after treatment devices.
    a. Determine necessary action.
25. Inspect preheater/inlet air heater, or glow plug system and controls
    a. Replace preheater/air inlet heater, or glow plug system and controls
    b. Perform needed action.
26. Inspect and test exhaust gas recirculation (EGR) system including EGR valve, cooler, piping, filter, electronic sensors, controls, and wiring.
    a. Test exhaust gas recirculation (EGR) system including EGR valve, cooler, piping, filter, electronic sensors, controls, and wiring.
    b. Determine needed action.
27. Check fuel level, and condition.
    a. Determine needed action.

28. Perform fuel supply and return system tests.
    a. Determine needed action.
29. Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system, supply and return lines and fittings.
    a. Determine needed action.
30. Inspect, clean, and test fuel transfer (lift) pump, pump drives, screens, fuel/water separators/indicators, filters, heaters, coolers, ECM cooling plates, and mounting hardware, determine needed action.
    a. Clean fuel transfer (lift) pump, pump drives, screens, fuel/water separators/indicators, filters, heaters, coolers, ECM cooling plates, and mounting hardware.
    b. Determine needed action
31. Inspect and test low pressure regulator systems (check valves, pressure regulator valves, and restrictive fittings); determine needed action.
    a. Test low pressure regulator systems (check valves. Pressure regulator valves, and restrictive fittings)
    b. Determine needed action
32. Check fuel system for air
    a. Determine needed action
    b. Prime fuel system
    c. Bleed fuel system
    d. Check primer pump.
33. Inspect power and ground circuits and connections voltage, voltage drop, amperage, and resistance Reading using a digital multi-meter (DMM)
    a. Test power and ground circuits and connections
    b. Measure voltage drop, amperage and resistance readings using a digital multi-meter
    c. Interpret voltage drop, amperage and resistance readings using a digital multi-meter
    d. Determine needed action
34. Interface with vehicle's on-board computer; perform diagnostic procedures using recommended electronic diagnostic equipment and tools (to include PC based software and/or data scan tools)
    a. Determine needed action.
35. Check electronic diagnostic codes and trip/operational data; monitor electronic data; clear codes.
    a. Record electronic diagnostic codes and trip/operational data; monitor electronic data; clear codes.
    b. Determine further diagnosis.
36. Locate relevant service information (to include diagnostic procedures, flow charts, and wiring diagrams).
37. Inspect electrical connector terminals, seals, and locks.
    a. Replace electrical connector terminals, seals, and locks

38. Inspect switches, sensors, controls, actuator components, and circuits.
    a. Test switches, sensors, controls, actuator components, and circuits.
    b. Adjust as needed
    c. Replace as needed
39. Using recommended electronic diagnostic tools (to include PC based software and/or data scan tools), access and interpret customer programmable parameters.
40. Inspect, test, and adjust electronic unit injectors (EUI).
    a. Test electronic unit injectors (EUI)
    b. Adjust electronic unit injectors (EUI)
    c. determine action as needed
41. R and I electronic unit injectors (EUI) and related components a. recalibrate ECM (if applicable).
42. Perform cylinder contribution test utilizing recommended electronic diagnostic tool.
43. Perform on-engine inspections and tests on hydraulic electronic unit injectors and system electronic controls.
    a. Determine needed action.
44. Perform on-engine inspections and tests on hydraulic electronic unit injector high pressure oil supply and control systems
    a. Determine needed action.
45. Perform on-engine inspections and tests on common rail type injection systems
    a. Determine needed action.
46. Inspect high pressure injection lines, hold downs, fittings and seals.
    a. Determine needed action.
47. Inspect engine compression/exhaust brakes.
    a. Adjust engine compression/exhaust brakes.
    b. Determine needed action.
48. Inspect engine compression/exhaust brake control circuits, switches and solenoids.
    a. Test
    b. Repair as needed
    c. Replace as needed
49. Inspect engine compression/exhaust brake housing, valves, seals, lines, and fittings; controls circuits, switches and solenoids.
    a. Test engine compression/exhaust brake housing, valves, seals, lines and fittings; control circuits, switches and solenoids.
    b. Adjust engine compression/exhaust brake housing, valves, seals, lines and fittings; control circuits, switched and solenoids.
    c. Repair as needed.
    d. Replace as needed.
50. Inspect belts, tensioners, and pulleys
    a. Check and adjust belt tension.
    b. Replace as needed.

51. Inspect engine mounts for looseness and deterioration.
52. Check engine compartment wiring harnesses, connectors, and seals for damage and proper routing.
53. Check fuel tanks, mountings, lines, caps, and vents.
54. Drain water from fuel system.
55. Service water separator/fuel heater.
    a. Replace fuel filter(s)
    b. Prime and bleed fuel system.
56. Inspect crankcase ventilation system.
    a. Service crankcase ventilation system.
57. Check operation of fan clutch.
58. Inspect radiator (including air flow restriction, leaks, and damage) and mountings.
59. Inspect fan assembly and shroud.
60. Service coolant filter.
61. Inspect water pump for leaks and bearing play.
62. Change engine oil and filters.
    a. Visually check oil for coolant or fuel contamination
    b. Inspect and clean magnetic drain plugs.
63. Take an engine oil sample.
64. Inspect key condition and operation of ignition switch.
65. Check warning indicators.
66. Check operation of electronic power take off (PTO) and engine idle speed controls (if applicable).
67. Check HVAC controls.
68. Check operation of all accessories.
69. Check operation of electric/air horns and reverse warning devices.
70. Check condition of spare fuses, triangles, fire extinguisher, and all required decals.
71. Inspect seat belts and sleeper restraints.
72. Inspect wiper blades and arms.
73. Check operation of wiper and washer.
74. Inspect windshield glass for cracks or discoloration; check sun visor.
75. Check seat condition, operation, and mounting.
76. Check door glass and window operation.
77. Inspect steps and grab handles.
78. Inspect mirrors, mountings, brackets, and glass.
79. Record all observed physical damage.
80. Lubricate all cab and hood grease fittings.
81. Inspect door and hood hinges, latches, strikers, lock cylinders, safety latches, linkages and cables.
82. Inspect cab mountings, hinges, latches, linkages and ride height
    a. Service as needed.

83. Inspect A/C condenser and lines for condition and visible leaks
    a. Check mountings.
84. Inspect A/C compressor and lines for condition and visible leaks
    a. Check mountings.
85. Check A/C system condition and operation a. check A/C monitoring system, if applicable.
86. Check HVAC air inlet filters and ducts; a. service as needed.
87. Inspect battery box (es), cover(s), and mountings.
88. Inspect battery hold-downs, connections, cables, and cable routing
    a. Service as needed.
89. Perform battery test (load and/or capacitance).
90. Inspect alternator, mountings, cable, wiring, and wiring routing
    a. Determine needed action.
91. Perform alternator output tests.
92. Check operation of interior lights.
    a. Determine needed action.
93. Check all exterior lights, lenses, reflectors, and conspicuity tape; check headlight alignment
    a. Determine needed action.
94. Inspect tractor-to-trailer multi-wire connector(s), cables(s) and holder(s)
    a. Test tractor-to-trailer multi-wire connector(s), cable(s), and holder(s)
    b. Determined needed action
95. Check operation of parking brake.
96. Record air governor cut-out setting (psi).
97. Check operation of air reservoir/tank drain valves.
98. Check air system for leaks (brakes released).
99. Check air system for leaks (brakes applied).
100. Test one-way and double-check valves.
101. Check low air pressure warning devices.
102. Check air governor cut-in pressure.
103. Check emergency (spring) brake control/modulator valve, if applicable.
104. Check tractor protection valve.
105. Test air pressure build-up time.
106. Inspect coupling air lines, holders, and glad-hands.
107. Check brake chambers and air lines for secure mounting and damage.
108. Check operation of air drier.
109. Inspect brake shoe/pad condition, thickness and contamination.
    a. Record brake shoe/pad condition, thickness, and contamination.
110. Inspect and record condition of brake drums/rotors.
111. Check antilock brake system wiring, connectors, seals, and harnesses for damage and proper routing.
112. Check operation and adjustment of brake automatic slack adjusters (ASA)
    a. Check push rod stroke

b. Record push rod stroke.

113. Lubricate all brake component grease fittings.
114. Check condition and operation of hand brake (trailer) control valve.
115. Perform antilock brake system (ABS) operational system self-test.
116. Drain air tanks and check for contamination.
117. Check condition of pressure relief (safety) valves.
118. Check parking brake operation.
    a. Inspect parking brake application and holding devices
    b. Adjust as needed.
119. Check operation of hydraulic system: pedal travel, pedal effort, pedal feel (drift).
120. Inspect calipers for leakage and damage.
121. Inspect brake assist system (booster), hoses and control valves.
    a. Check reservoir fluid level and condition.
122. Inspect brake lining/pad condition, thickness, and contamination.
    a. Check brake lining/pad condition, thickness and contamination.
123. Inspect condition of brake rotors.
    a. Check condition of brake rotors
124. Check antilock brake system wiring, connectors, seals, and harnesses for damage and proper routing.
125. Check operation of clutch, clutch brake, and gearshift.
126. Check clutch linkage/cable for looseness or binding, if applicable.
127. Check hydraulic clutch slave and master cylinders, lines, fittings, and hoses, if applicable
128. Check clutch adjustment a. adjust as needed.
129. Check transmission case, seals, filter, hoses, and cooler for cracks and leaks.
130. Inspect transmission breather.
131. Inspect transmission mounts.
132. Check transmission oil level, type, and condition.
133. Inspect U-joints, yokes, drive shafts, boots/seals, center bearings, and mounting hardware for looseness, damage, and proper phasing.
134. Inspect axle housing(s) for cracks and leaks.
135. Inspect axle breather(s).
136. Lubricate all drive train grease fittings.
137. Check drive axle(s) oil level, type, and condition.
138. Change drive axle(s) oil and filter a. check and clean magnetic plugs.
139. Check transmission wiring, connectors, seals, and harnesses for damage and proper routing.
140. Change transmission oil and filter a. check and clean magnetic plugs.
141. Check interaxle differential lock operation.
142. Check range shift operation.
143. Check steering wheel operation for free play or binding.
144. Check power steering pump, mounting, and hoses for leaks, condition, and routing

a. Check fluid level.

145. Change power steering fluid and filter.
146. Inspect steering gear for leaks and secure mounting.
147. Inspect steering shaft U-joints, pinch bolts, splines, pitman arm-to-steering sector shaft, tie rod ends, and linkages.
148. Check kingpin for wear.
149. Check wheel bearings for looseness and noise.
150. Check oil level and condition in all non-drive hubs; check for leaks.
151. Inspect springs, pins, hangers, shackles, spring U-bolts, and insulators.
152. Inspect shock absorbers for leaks and secure mounting.
153. Inspect air suspension springs, mounts, hoses, valves, linkage, and fittings for leaks and damage.
154. Check and record suspension ride height.
155. Lubricate all suspension and steering grease fittings.
156. Check toe setting.
157. Check tandem axle alignment and spacing.
158. Check axle locating components (radius, torque, and/or track rods).
159. Inspect tires for wear patterns and proper mounting.
160. Inspect tires for cuts, cracks, bulges, and sidewall damage.
161. Inspect valve caps and stems a. replace as needed.
162. Measure tread depth; probe for imbedded debris.
    a. Record tread depth
    b. Probe for imbedded debris
163. Check air pressure
    a. Adjust air pressure in accordance with manufacturers' specifications.
164. Check for loose lugs
    a. Check mounting hardware condition
    b. Service as needed.
165. Re-torque lugs in accordance with manufacturers' specifications.
166. Inspect wheels for cracks or damage.
167. Check tire matching (diameter and tread) on dual tire installations.
168. Inspect fifth wheel mounting, bolts, air lines, and locks.
169. Test operation of fifth wheel locking device
    a. Adjust if necessary.
170. Check quarter fenders, mud flaps, and brackets.
171. Check pintle hook assembly and mounting.
172. Lubricate all fifth wheel grease fittings and plate.
173. Inspect frame and frame members for cracks and damage.

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