

# Diesel Technology: Steering and Suspension

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## National Skills Crosswalk

The following NATEF Suspension and Steering tasks (rev. 2004) are covered in this publication. The chart shows where each task is located within the publication. The first column identifies the NATEF task by name and number. The second column identifies the exact location by number and assignment sheet or job sheet number.

| NATEF Tasks  | MAVCC Tasks   |
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| <b>V. Suspension and Steering</b>  |   |
| <b>A. Steering Systems Diagnosis and Repair</b>  |   |
| <b>1. Steering Column</b>  |   |
| 1. Diagnose fixed and driver adjustable steering column and shaft noise, looseness, and binding problems; determine needed action.   | Unit 1-B, Job Sheet 1 – Diagnose and troubleshoot problems on the steering column and steering gear assembly.   |
| 2. Inspect steering shaft U-joint(s), slip joints, bearings, bushings, and seals; determine needed action.   | Unit 1-B, Job Sheet 6 – Inspect and replace steering U-joints.  |
| 3. Check and adjust cab mounting and ride height.  | Unit 1-A, Job Sheet 1 – Inspect, test, and adjust cab air suspension components and determine needed repairs.<br><br>Unit 4-C, Job Sheet 2 – Inspect and test an air suspension system, replace the leveling valve, and adjust frame (ride) height. |
| 4. Center the steering wheel.  | Unit 1-B, Job Sheet 2 – Remove steering wheel, inspect, repair, or replace to proper alignment position.  |
| 5. Disable and enable supplemental restraint system (SRS) in accordance with manufacturer's procedures.  | Not covered. (see MAVCC's Diesel Electrical and Electronic Systems publication)   |
| <b>2. Steering Units</b>   |   |
| 1. Diagnose power steering system noise, steering binding, darting/oversteer, reduced wheel cut, steering wheel kick, pulling, non-recovery, turning effort, looseness, hard steering, overheating, fluid leakage, and fluid aeration problems; determine needed action. | Unit 2-B, Job Sheet 1 – Diagnose, test, and troubleshoot problems on a power steering system.   |
| 2. Determine recommended type of power steering fluid; check level and condition; determine needed action.   | Not covered. (see MAVCC's Diesel Preventive Maintenance publication)  |
| 3. Flush and refill power steering system; purge air from system.  | Unit 2-B, Job Sheet 7 – Fill and bleed the power steering system.   |

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| 4. Perform power steering system pressure, temperature, and flow tests; determine needed action.                  | Unit 2-B, Job Sheet 6 – Test and repair/replace flow control/pressure relief valve(s) on power steering pump.<br><br>Unit 2-B, Job Sheet 7 – Fill and bleed the power steering system.                |
| 5. Inspect, service, or replace power steering reservoir including filter, seals, and gasket.                     | Unit 2-B, Job Sheet 7 – Fill and bleed the power steering system.   |
| 6. Inspect and reinstall/replace pulleys, tensioners, and drive belts; adjust drive belts and check alignment.    | Unit 2-B, Job Sheet 4 – Remove and replace power steering pump; adjust belt if used.  |
| 7. Inspect, replace as required, power steering pump drive gear and coupling.                                     | Unit 2-B, Job Sheet 2 – Remove and repair/replace power steering gear.  |
| 8. Inspect, adjust, or replace power steering pump, mountings, and brackets.                                      | Unit 2-B, Job Sheet 4 – Remove and replace power steering pump; adjust belt if used.<br><br>Unit 2-B, Job Sheet 5 – Inspect, clean, disassemble, and rebuild power steering pump; replace worn parts. |
| 9. Inspect and replace power steering system cooler, lines, hoses, clamps/mountings, hose routings, and fittings. | Unit 2-B, Job Sheet 2 – Remove and repair/replace power steering gear.  |
| 10. Inspect, adjust, or replace linkage-assist type power steering cylinder or gear (dual system).                | Unit 2-B, Job Sheet 6 – Test and repair/replace flow control/pressure relief valve(s) on power steering pump.   |
| 11. Inspect, adjust, repair, or replace integral type power steering gear.  | Unit 2-B, Job Sheet 2 – Remove and repair/replace power steering gear.  |
| 12. Adjust manual and automatic steering gear poppet/relief valves.   | Unit 2-B, Job Sheet 2 – Remove and repair/replace power steering gear.<br><br>Unit 2-B, Job Sheet 3 – Rebuild power steering gear.  |
| <b>3. Steering Linkage</b>  |   |
| 1. Inspect and align pitman arm; replace as needed.   | Unit 1-B, Job Sheet 5 – Inspect and replace pitman arm on steering gear assembly.   |
| 2. Inspect drag link (relay rod) and tie rod ends; adjust or replace as needed.                                   | Unit 3-B, Job Sheet 2 – Repair or replace steering knuckle assembly.<br><br>Unit 3-B, Job Sheet 3 – Inspect and replace tie rod ends.   |

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| 3. Inspect steering arm and levers, and linkage pivot joints; replace as needed.   | Unit 3-B, Job Sheet 2 – Repair or replace steering knuckle assembly.  |
| 4. Inspect clamps and retainers on cross type/relay rod/center link/tie rod; position or replace as needed.  | Unit 3-B, Job Sheet 2 – Repair or replace steering knuckle assembly.  |
| 5. Check and adjust wheel stops.   | Unit 3-B, Job Sheet 2 – Repair or replace steering knuckle assembly.<br><br>Unit 3-B, Job Sheet 3 – Inspect and replace tie rod ends. |
| 6. Lubricate steering linkage joints as needed.  | Not covered. (see MAVCC's Diesel Preventive Maintenance publication)  |
| <b>B. Suspension Systems Diagnosis and Repair</b>  |   |
| 1. Inspect front axles, U-bolts, and nuts; determine needed action.  | Unit 1-C, Job Sheet 1 – Inspect front suspension components.  |
| 2. Inspect and service king pin, steering knuckle bushings, locks, bearings, seals, and covers; determine needed action.                                   | Unit 3-B, Job sheet 2 – Repair or replace steering knuckle assembly.  |
| 3. Inspect shock absorbers, bushings, brackets, and mounts; replace as needed.   | Unit 1-C, Job Sheet 2 – Remove and replace front spring suspension components.  |
| 4. Inspect leaf springs, center bolts, clips, eye bolts and bushings, shackles, slippers, insulators, brackets, and mounts; determine needed action.       | Unit 1-C, Job Sheet 1 – Inspect front suspension components.  |
| 5. Inspect torque arms, bushings, and mounts; determine needed action.   | Unit 1-C, Job Sheet 1 – Inspect front suspension components.  |
| 6. Inspect axle aligning devices such as radius rods, track bars, stabilizer bars, and related bushings, mounts, shims, and cams; determine needed action. | Unit 1-C, Job Sheet 1 – Inspect front suspension components.  |
| 7. Inspect walking beams, center (cross) tube, bushings, mounts, load pads, and saddles/caps; replace as needed.   | Unit 1-C, Job Sheet 1 – Inspect front suspension components.  |

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| 8. Inspect and test air suspension pressure regulator and height control valves, lines, hoses, dump valves, and fittings; adjust, repair or replace as needed. | Unit 4-C, Job Sheet 2 – Inspect and test an air suspension system, replace the leveling valve, and adjust frame (ride) height.   |
| 9. Inspect and test air springs, mounting plates, springs, suspension arms, and bushings; replace as needed.   | Unit 4-C, Job Sheet 1 – Inspect, test, and replace an air spring.  |
| 10. Measure vehicle ride height; determine needed action.  | Unit 4-C, Job Sheet 2 – Inspect and test an air suspension system, replace the leveling valve, and adjust frame (ride) height.   |
| 11. Diagnose rough ride problems; determine needed action.   | <p>Unit 2-A, Job Sheet 1 – Diagnose unusual tire wear patterns, check tire pressure, and measure and match tires.</p> <p>Unit 2-A, Job Sheet 2 – Diagnose tire/wheel vibration, inspect mounting hardware, and check tire/wheel runout and balance.</p> <p>Unit 3-B, Job Sheet 4 – Diagnose and troubleshoot the steering axle assembly.</p> |
| <b>C. Wheel Alignment Diagnosis, Adjustment, and Repair</b>  |  |
| 1. Diagnose vehicle wandering, pulling, shimmy, hard steering problem(s), and off-center steering problem(s); adjust and repair as needed.                     | Unit 3-B, Job Sheet 4 – Diagnose and troubleshoot the steering axle assembly.  |
| 2. Check camber; determine needed action.  | Unit 5-C, Job sheet 2 – Check camber and kingpin inclination; determine needed repairs.  |
| 3. Check caster; adjust as needed.   | Unit 5-C, Job Sheet 3 – Check caster; adjust or repair as needed.  |
| 4. Check toe; adjust as needed.  | Unit 5-C, Job Sheet 4 – Check toe; adjust as needed.   |
| 5. Check rear axle(s) alignment (thrustline/ centerline) and tracking; adjust or repair as needed  | Unit 5-C, Job Sheet 5 – Check rear axle alignment; adjust or repair as needed.   |
| 6. Diagnose turning/Ackerman angle (toe-out-on-turns) problems; determine needed action.   | Not covered.   |

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| 7. Check front axle alignment (centerline); adjust or repair as needed.  | Not covered.   |
| <b>D. Wheels and Tires Diagnosis and Repair</b>  |  |
| 1. Diagnose unusual tire wear patterns, check tread depth, mismatched tread design; determine needed action.                         | Unit 2-A, Job Sheet 1 – Diagnose unusual tire wear patterns, check tire pressure, and measure and match tires.             |
| 2. Diagnose wheel/tire vibration, shimmy, pounding, hop (tramp) problems; determine needed action.                                   | Unit 2-A, Job Sheet 2 – Diagnose tire/wheel vibration, inspect mounting hardware, and check tire/wheel runout and balance. |
| <b>E. Frame Service and Repair</b>   |  |
| 1. Inspect and adjust fifth wheel, pivot pins, bushings, locking jaw mechanisms, and mounting bolts; determine needed action.        | Unit 3-A, Job Sheet 3 – Inspect and service fifth wheel assemblies, pintle hitch, kingpin, and trailer plate.              |
| 2. Inspect sliding fifth wheel, tracks, stops, locking systems, air cylinders, springs, lines, hoses, and controls.                  | Unit 3-A, Job Sheet 3 – Inspect and service fifth wheel assemblies, pintle hitch, kingpin, and trailer plate.              |
| 3. Inspect frame and frame members for cracks, breaks, distortion, elongated holes, looseness, and damage; determine needed repairs. | Unit 3-A, Job Sheet 2 – Check and inspect vehicle frame alignment.   |
| 4. Inspect, install, or repair frame hangers, brackets, and cross members in accordance with manufacturer's recommended procedures.  | Unit 3-A, Job Sheet 1 – Inspect and install or repair frame, hangers, brackets, and cross members.                         |
| 5. Inspect, repair or replace pintle hooks and draw bars.  | Unit 3-A, Job Sheet 3 – Inspect and service fifth wheel assemblies, pintle hitch, kingpin, and trailer plate.              |