TEST SPECIFICATIONS AND TASK LISTS FOR THE
NATIONAL AUTOMOTIVE STUDENT SKILLS STANDARDS ASSESSMENT

COLLISION REPAIR AND REFINISHING

The National Automotive Student Skills Standards Assessment (NA3SA) for collision repair and refinishing is comprised of four examinations. Listed below are the test specifications and task lists for each of these four exams.

The task lists are simply lists of the tasks involved in the process of diagnosing and repairing collision damage, and painting / refinishing. The tasks may also be thought of as competencies. Every question found on the NA3SA exams is keyed to one of these tasks. The tasks are organized into content categories, and these content categories, along with the number of questions included in each category, comprise the test specifications. Every form of the exams will be built to meet these specifications.

Students preparing for the NA3SA exams should review the tasks (competencies) listed, and note areas where further preparation may be needed. It also helps students to note how many questions will be included on the exams in each content area.

PAINTING AND REFINISHING

Content Area	Questions In Test
A. Safety Precautions	7
B. Surface Preparation	8
C. Spray Gun and Related Equipment Operation	5
D. Paint Mixing, Matching, and Applying	9
E. Paint Defects – Cause and Cures	7
F. Final Detail	4
Total	40

A. Safety Precautions

1. Identify and take necessary precautions with hazardous operations and materials according to federal, state, and local regulations.

2. Identify safety and personal health hazards according to OSHA guidelines and the “Right to Know Law”.

3. Inspect spray environment to ensure compliance with federal, state and local regulations, and for safety and cleanliness hazards.

4. Select and use the NIOSH approved personal sanding respirator. Inspect condition and ensure fit and operation. Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation.

5. Select and use the NIOSH approved (Fresh Air Make-up System) personal painting/refinishing respirator system. Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation.

6. Select and use the proper personal safety equipment for surface preparation, spray gun and related equipment operation, paint mixing, matching and application, paint defects, and detailing (gloves, suits, hoods, eye and ear protection, etc.).

B. Surface Preparation

1. Inspect, remove, store, and replace exterior trim and components necessary for proper surface preparation.
2. Soap and water wash entire vehicle; use appropriate cleaner to remove contaminants.
3. Inspect and identify substrate, type of finish, surface condition, and film thickness; develop and document a plan for refinishing using a total product system.
4. Remove paint finish.
5. Dry or wet sand areas to be refinished.
6. Featheredge damaged areas to be refinished.
7. Apply suitable metal treatment or primer in accordance with total product systems.
8. Mask and protect other areas that will not be refinished.
9. Mix primer, primer-surfacer or primer-sealer.
10. Apply primer onto surface of repaired area.
11. Apply two-component finishing filler to minor surface imperfections.
12. Dry or wet sand area to which primer-surfacer has been applied.
13. Dry sand area to which two-component finishing filler has been applied.
14. Remove dust from area to be refinished, including cracks or moldings of adjacent areas.
15. Clean area to be refinished using a final cleaning solution.
16. Remove, with a tack rag, any dust or lint particles from the area to be refinished.
17. Apply suitable sealer to the area being refinished when sealing is needed or desirable.
18. Scuff sand to remove nibs or imperfections from a sealer.
19. Apply stone chip resistant coating.
20. Restore corrosion-resistant coatings, caulking, and seam sealers to repaired areas.
21. Prepare adjacent panels for blending.
22. Identify the types of rigid, semi-rigid or flexible plastic parts to be refinished; determine the materials, preparation, and refinishing procedures.
23. Identify aluminum parts to be refinished; determine the materials, preparation, and refinishing procedures.

C. Spray Gun and Related Equipment Operation

1. Inspect, clean, and determine condition of spray guns and related equipment (air hoses,

regulators, air lines, air source, and spray environment).

2. Check and adjust spray gun operation for HVLP (high volume, low pressure) or LVLP (low volume, low pressure) guns.

3. Set-up (fluid needle, nozzle, and cap), adjust, and test spray gun using fluid, air, and pattern control valves.

D. Paint Mixing, Matching, and Applying

1. Determine type and color of paint already on vehicle by manufacturer's vehicle information label.

2. Shake, stir, reduce, catalyze/activate, and strain paint.

3. Apply finish using appropriate spray techniques (gun arc, gun angle, gun distance, gun speed, and spray pattern overlap) for the finish being applied.

4. Apply selected product on test and let-down panel; check for color match.

5. Apply single stage topcoat.

6. Apply basecoat/clearcoat for panel blending or partial refinishing.

7. Apply basecoat/clearcoat for overall refinishing.

8. Denib, buff, and polish finishes where necessary.

9. Refinish rigid, semi-rigid, and flexible plastic parts.

10. Apply multi-stage coats for panel blending or overall refinishing.

11. Identify and mix paint using a formula.

12. Identify poor hiding colors; determine necessary action.

13. Tint color using formula to achieve a blendable match.

14. Identify alternative color formula to achieve a blendable match.

E. Paint Defects - Causes and Cures

1. Identify blistering (raising of the paint surface); determine the cause(s) and correct the condition.

2. Identify blushing (milky or hazy formation); determine the cause(s) and correct the condition.

3. Identify a dry spray appearance in the paint surface; determine the cause(s) and correct the condition.

4. Identify the presence of fish-eyes (crater-like openings) in the finish; determine the cause(s) and correct the condition.

5. Identify lifting; determine the cause(s) and correct the condition.

6. Identify clouding (mottling and streaking in metallic finishes); determine the cause(s) and correct the condition.

7. Identify orange peel; determine the cause(s) and correct the condition.

8. Identify overspray; determine the cause(s) and correct the condition.

9. Identify solvent popping in freshly painted surface; determine the cause(s) and correct the condition.

10. Identify sags and runs in paint surface; determine the cause(s) and correct the condition.

11. Identify sanding marks (sandscratch swelling); determine the cause(s) and correct the condition.

12. Identify contour mapping (shrinking and splitting) while finish is drying; determine the cause(s) and correct the condition.

13. Identify color difference (off-shade); determine the cause(s) and correct the condition.

14. Identify tape tracking; determine the cause(s) and correct the condition.

15. Identify low gloss condition; determine the cause(s) and correct the condition.

16. Identify poor adhesion; determine the cause(s) and correct the condition.

17. Identify paint cracking (crowsfeet or line-checking, micro-checking, etc.); determine the cause(s) and correct the condition.

18. Identify corrosion; determine the cause(s) and correct the condition.

19. Identify dirt or dust in the paint surface; determine the cause(s) and correct the condition.

20. Identify water spotting; determine the cause(s) and correct the condition.

21. Identify finish damage caused by bird droppings, tree sap, and other natural causes; correct the condition.

22. Identify finish damage caused by airborne contaminants (acids, soot, rail dust, and other industrial-related causes); correct the condition.

23. Identify die-back conditions (dulling of the paint film showing haziness); determine the cause(s) and correct the condition.

24. Identify chalking (oxidation); determine the cause(s) and correct the condition.

25. Identify bleed-through (staining); determine the cause(s) and correct the condition.

26. Identify pin-holing; determine the cause(s) and correct the condition.

27. Identify buffing-related imperfections (swirl marks, wheel burns); correct the condition.

28. Identify pigment flotation (color change through film build); determine the cause(s) and correct the condition.

29. Measure mil thickness.

F. Final Detail

1. Apply decals, transfers, tapes, woodgrains, pinstripes (painted and taped), etc.

2. Buff and polish finish to remove defects as required.

3. Clean interior, exterior, and glass.

4. Clean body openings (door jambs and edges, etc.).

5. Remove overspray.

NON-STRUCTURAL ANALYSIS AND DAMAGE REPAIR

Content Area	Questions In Test
A. Preparation	8
B. Outer Body Panel Repair, Replacements, and Adjustments	9
C. Metal Finishing and Body Filling	8
D. Moveable Glass and Hardware	3
E. Metal Welding and Cutting	8
F. Plastics and Adhesives	4
Total	**40**

A. Preparation

1. Review damage report and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan.

2. Inspect, remove, store, and replace exterior trim and moldings.

3. Inspect, remove, store, and replace interior trim and components.

4. Inspect, remove, store, and replace non-structural body panels and components that may interfere with or be damaged during repair.

5. Inspect, remove, store, and replace all vehicle mechanical and electrical components that may interfere with or be damaged during repair.

6. Protect panels, glass, and parts adjacent to the repair area.

7. Soap and water wash entire vehicle; use appropriate cleaner to remove contaminants from those areas to be repaired.

8. Remove corrosion protection, undercoatings, sealers, and other protective coatings necessary to perform repairs.

9. Inspect, remove, and replace repairable plastics and other components that are recommended for off-vehicle repair.

B. Outer Body Panel Repairs, Replacements, and Adjustments

1. Determine the extent of direct and indirect damage and direction of impact; develop and document a repair plan.

2. Inspect, remove and replace bolted, bonded, and welded steel panel or panel assemblies.

3. Determine the extent of damage to aluminum body panels; repair or replace.

4. Inspect, remove, replace, and align hood, hood hinges, and hood latch.

5. Inspect, remove, replace, and align deck lid, lid hinges, and lid latch.

6. Inspect, remove, replace, and align doors, tailgates, hatches, lift gates, latches, hinges, and related hardware.

7. Inspect, remove, replace, and align bumper bars, covers, reinforcement, guards, isolators, and mounting hardware.

8. Inspect, remove, replace and align front fenders, headers, and other panels.

9. Straighten and rough-out contours of damaged panels to a suitable condition for body filling or metal finishing using power tools, hand tools, and weld-on pull attachments.

10. Weld damaged or torn steel body panels; repair broken welds.

11. Restore corrosion protection.

12. Replace door skins.

13. Restore sound deadeners and foam materials.

14. Perform panel bonding.

15. Diagnose and repair water leaks, dust leaks, and wind noise.

C. Metal Finishing and Body Filling

1. Remove paint from the damaged area of a body panel.

2. Locate and reduce surface irregularities on a damaged body panel.

3. Demonstrate hammer and dolly techniques.

4. Heat shrink stretched panel areas to proper contour.

5. Cold shrink stretched panel areas to proper contour.

6. Mix body filler.

7. Apply body filler; shape during curing.

8. Rough sand cured body filler to contour; finish sand.

9. Determine the proper metal finishing techniques for aluminum.

10. Determine proper application of body filler to aluminum.

D. Moveable Glass and Hardware

1. Inspect, adjust, repair or replace window regulators, run channels, glass, power mechanisms, and related controls.

2. Diagnose and repair water leaks, dust leaks, and wind noises; inspect, repair, and replace weather-stripping.

3. Inspect, repair or replace, and adjust removable, manually or power operated roof panel and hinges, latches, guides, handles, retainer, and controls of sunroofs.

4. Inspect, remove, reinstall, and align convertible top and related mechanisms.

E. Metal Welding and Cutting

1. Identify weldable and non-weldable materials used in collision repair.

2. Weld and cut high-strength steel and other steels.

3. Weld and cut aluminum.

4. Determine the correct GMAW (Mig) welder type, electrode, wire type, diameter, and gas to be used in a specific welding situation.

5. Set up and adjust the GMAW (MIG) welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the material being welded.

6. Store, handle, and install high-pressure gas cylinders.

7. Determine work clamp (ground) location and attach.

8. Use the proper angle of the gun to the joint and direction of gun travel for the type of weld being made in the flat, horizontal, vertical, and overhead positions.
9. Protect adjacent panels, glass, vehicle interior, etc. from welding and cutting operations.

10. Protect computers and other electronic control modules during welding procedures.

11. Clean and prepare the metal to be welded, assure good metal fit-up, apply weld-through primer if necessary, and clamp as required.

12. Determine the joint type (butt weld with backing, lap, etc.) for weld being made.

13. Determine the type of weld (continuous, butt weld with backing, plug, etc.) for each specific welding operation.

14. Perform the following welds: continuous, stitch, tack, plug, butt weld with and without backing, and fillet.

15. Perform visual and destructive tests on each weld type.

16. Identify the causes of various welding defects; make necessary adjustments.

17. Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments.

18. Identify cutting process for different materials and locations; perform cutting operation.

19. Identify different methods of attaching non-structural components (squeeze type resistant spot welds (STRSW), riveting, non-structural adhesive, silicon bronze, etc.)

F. Plastics and Adhesives

1. Identify the types of plastics; determine repairability.

2. Identify the types of plastic repair procedures; clean and prepare the surface of plastic parts.

3. Replace or repair rigid, semi-rigid, and flexible plastic panels.

4. Remove or repair damaged areas from rigid exterior composite panels.

5. Replace bonded rigid exterior composite body panels; straighten or align panel supports.

STRUCTURAL ANALYSIS AND DAMAGE REPAIR

Content Area	Questions In Test
A. Frame Inspection and Repair	10
B. Unibody inspection, Measurement, and Repair	14
C. Fixed Glass	2
D. Metal Welding and Cutting	14
Total	**40**

A. Frame Inspection and Repair

1. Diagnose and measure structural damage using tram and self-centering gauges.
2. Attach vehicle to anchoring devices.
3. Analyze, straighten and align mash (collapse) damage.
4. Analyze, straighten and align sag damage.
5. Analyze, straighten and align sidesway damage.
6. Analyze, straighten and align twist damage.
7. Analyze, straighten and align diamond frame damage.
8. Remove and replace damaged structural components.
9. Restore corrosion protection to repaired or replaced frame areas.
10. Analyze and identify misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and wheel alignment problems.
11. Align or replace misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and wheel alignment problems.
12. Identify heat limitations in structural components.
13. Restore structural foam.
14. Diagnose and measure structural damage using a universal measuring system (mechanical, electrical, laser).
15. Diagnose and measure structural damage to vehicles using a dedicated (fixture) measuring system.
16. Determine the extent of the direct and indirect damage and the direction of impact; document the methods and sequence of repair.
17. Analyze and identify crush/collapse zones.

B. Unibody Inspection, Measurement, and Repair

1. Analyze and identify misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and chassis alignment problems.

2. Realign or replace misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering and chassis alignment problems.

3. Diagnose and measure unibody damage using tram and self-centering gauges.

4. Determine and inspect the locations of all suspension, steering, and powertrain component attaching points on the vehicle.

5. Diagnose and measure unibody vehicles using a dedicated (fixture) measuring system.

6. Diagnose and measure unibody vehicles using a universal measuring system (mechanical, electronic, and laser).

7. Determine the extent of the direct and indirect damage and the direction of impact; plan and document the methods and sequence of repair.

8. Attach anchoring devices to vehicle; remove or reposition components as necessary.

9. Straighten and align cowl assembly.

10. Straighten and align roof rails/headers and roof panels.

11. Straighten and align hinge and lock pillars.

12. Straighten and align vehicle openings, floor pans, and rocker panels.

13. Straighten and align quarter panels, wheelhouse assemblies, and rear body sections (including rails and suspension/powertrain mounting points).

14. Straighten and align front-end sections (aprons, strut towers, upper and lower rails, steering, and suspension/power train mounting points, etc.).

15. Identify heat limitations in unibody vehicles.

16. Identify proper cold stress relief methods.

17. Repair damage using power tools and hand tools to restore proper contours and dimensions.

18. Remove and replace damaged sections of structural steel body panels.

19. Restore corrosion protection to repaired or replaced unibody structural areas.
20. Determine the extent of damage to aluminum structural components; repair, weld, or replace.

21. Analyze and identify crush/collapse zones.

C. Fixed Glass

1. Remove and reinstall or replace fixed glass (heated and non-heated) using recommended materials.

2. Remove and reinstall or replace modular glass using recommended materials.

D. Metal Welding and Cutting

1. Identify weldable and non-weldable materials used in collision repair.
2. Weld and cut high-strength steel and other steels.

3. Weld and cut aluminum.

4. Determine the correct GMAW (MIG) welder type, electrode, wire type, diameter, and gas to be used in a specific welding situation.

5. Set up and adjust the GMAW (MIG) welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the material being welded.

6. Store, handle, and install high-pressure gas cylinders.

7. Determine work clamp (ground) location and attach.

8. Use the proper angle of the gun to the joint and direction of gun travel for the type of weld being made in the flat, horizontal, vertical, and overhead positions.

9. Protect adjacent panels, glass, vehicle interior, etc. from welding and cutting operations.

10. Protect computers and other electronic control modules during welding procedures.

11. Clean and prepare the metal to be welded, assure good metal fit-up, apply weld-through primer if necessary, and clamp as required.

12. Determine the joint type (butt weld with backing, lap, etc.) for weld being made.

13. Determine the type of weld (continuous, butt weld with backing, plug, etc.) for each specific welding operation.

14. Perform the following welds: continuous, stitch, tack, plug, butt weld with and without backing, and fillet weld.

15. Perform visual and destructive tests on each weld type.

16. Identify the causes of various welding defects; make necessary adjustments.

17. Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments.

18. Identify cutting process for different materials and locations; perform cutting operation.

19. Identify different methods of attaching structural components (squeeze type resistance spot welding (STRSW), riveting, structural adhesive, silicon bronze, etc.) HP-G

MECHANICAL AND ELECTRICAL COMPONENTS

Content Area	Questions In Test
A. Suspension and Steering	9
B. Electrical	8
C. Brakes	3
D. Heating and Air Conditioning	5
E. Cooling Systems	4
F. Drive Train	3
G. Fuel, Intake and Exhaust Systems	2
H. Restraint Systems	6
Total	**40**

A. Suspension and Steering

1. Identify one–time use fasteners.

2. Remove, replace, inspect or adjust power steering pump, pulleys, belts, hoses, fittings and pump mounts.

3. Remove and replace power steering gear (non-rack and pinion type).

4. Remove and replace power rack and pinion steering gear; inspect and replace mounting bushings, tie rod ends, bellow boots, and brackets; ensure proper mounting location.

5. Inspect and adjust (where applicable) steering linkage geometry (attitude/parallelism).

6. Inspect and replace pitman arm.

7. Inspect and replace relay (center link/intermediate) rod.

8. Inspect, remove and replace idler arm and mountings.

9. Inspect, remove and replace tie rod sleeves, clamps, and tie rod ends.

10. Inspect, remove and replace steering linkage damper.

11. Inspect, remove and replace upper and lower control arms.

12. Inspect, remove and replace upper and lower control arm bushings, shafts, and rebound bumpers.

13. Inspect, remove and replace upper and lower ball joints.

14. Inspect, remove and replace steering knuckle/spindle/hub assemblies (including bearings, races, seals, etc.).

15. Inspect, remove and replace front suspension system coil springs and spring insulators (silencers).

16. Inspect, remove, replace, and adjust suspension system torsion bars, and inspect mounts.

17. Inspect, remove and replace stabilizer bar bushings, brackets, and links.

18. Inspect, remove and replace MacPherson strut cartridge or assembly, upper bearing, and mount.

19. Inspect, remove, and replace rear suspension system transverse links, control arms, stabilizer bars, bushings, and mounts.

20. Inspect, remove, and replace suspension system leaf spring(s), leaf spring insulators (silencers), shackles, brackets, bushings, and mounts.

21. Inspect axle assembly for damage and misalignment.

22. Inspect, remove and replace shock absorbers.

23. Diagnose, inspect, adjust, repair or replace active suspension systems and associated lines and fittings.

24. Measure vehicle ride height; determine needed repairs.

25. Inspect, remove, replace, and align front and rear frame (cradles/sub).

26. Diagnose steering column damage, looseness, and binding problems (including tilt mechanisms); determine needed repairs.

27. Inspect, remove and replace steering shaft U-joint(s), flexible coupling(s), collapsible columns, and steering wheels.

28. Diagnose manual and power steering gear (non-rack and pinion type) noises, binding, uneven turning effort, looseness, hard steering, and fluid leakage problems; determine needed repairs.

29. Diagnose power rack and pinion steering gear noises, vibration, looseness, hard steering, and fluid leakage problems, ensure proper mounting location; determine needed repairs.

30. Diagnose non-MacPherson front and rear suspension system noises and body sway problems; determine needed repairs.

31. Diagnose MacPherson strut suspension system noises and body sway problems; determine needed repairs.

32. Diagnose vehicle wandering, pulling, hard steering, bump steer, memory steering, torque steering, and steering return problems; determine needed repairs.

33. Adjust front and rear wheel camber on suspension systems with camber adjustments.

34. Check front and rear wheel camber on adjustable and non-adjustable suspension systems; determine needed repairs.

35. Adjust caster on suspension systems with caster adjustments.

36. Check caster on adjustable and non-adjustable suspension systems; determine needed repairs.

37. Check and adjust wheel toe including centering steering wheel; determine needed adjustment or repair.

38. Identify toe-out-on-turns (turning radius) related problems; determine needed repairs.

39. Identify SAI (steering axis inclination), included angle, and KPI (king pin inclination) related problems; determine needed repairs.

40. Identify thrust angle related problems; determine needed repairs.

41. Check for front wheel setback; determine needed repairs.

42. Diagnose tire wear patterns; determine needed repairs.

43. Inspect tires; identify direction of rotation and location; check and adjust air pressure.

44. Diagnose wheel/tire vibration, shimmy, and tramp (wheel hop) problems; determine needed repairs.

45. Measure wheel, tire, axle, and hub runout; determine needed repairs.

46. Diagnose tire pull (lead) problems; determine corrective actions.

47. Reinstall wheels and torque lug nuts.

B. Electrical

1. Check voltages in electrical wiring circuits with a DMM (digital multimeter).

2. Check for voltage drop and/or current flow in electrical wiring circuits and components with a DMM (digital multimeter).

3. Repair electrical circuits, wiring, and connectors.

4. Inspect, test, and replace fusible links, circuit breakers, and fuses.

5. Perform battery state-of-charge test; determine needed service.

6. Inspect, clean, and replace battery.

7. Dispose of batteries and battery acid according to local, state, and federal requirements.

8. Perform slow/fast battery charge.

9. Identify programmable electrical/electronic components; record data for reprogramming before disconnecting battery.

10. Inspect, clean, and repair or replace battery cables, connectors, and clamps.

11. Inspect alignment, adjust, remove and replace alternator (generator), drive belts, pulleys, and fans.

12. Check operation of exterior lighting; determine needed repairs.

13. Aim headlamp assemblies and fog/driving lamps; determine needed repairs.

14. Inspect, test, and repair or replace switches, relays, bulbs, sockets, connectors, and wires of interior and exterior light circuits.

15. Remove and replace horn(s); check operation.

16. Check operation of wiper/washer systems; determine needed repairs.

17. Check operation of power side and tailgate window; determine needed repairs.

18. Inspect, remove and replace power seat, motors, linkages, cables, etc.

19. Inspect, remove and replace components of electric door and hatch/trunk lock.

20. Inspect, remove and replace components of keyless lock/unlock devices and alarm systems.

21. Inspect, remove and replace components of electrical sunroof and convertible top.

22. Check operation of electrically heated mirrors, windshields, back lights, panels, etc.; repair as necessary.

23. Inspect, remove and replace components of power antenna circuits.

24. Demonstrate the proper self-grounding procedures for handling electronic components.

25. Check for module communication errors using a scan tool.

26. Use wiring diagrams and diagnostic flow charts during diagnosis of electrical circuit problems.

27. Demonstrate safe disarming techniques of high voltage systems on hybrid vehicles.

C. Brakes

1. Inspect brake lines and fittings for leaks, dents, kinks, rust, cracks or wear; tighten loose fittings and supports; replace brake lines (double flare and ISO types), fittings, and supports.

2. Inspect flexible brake hoses for leaks, kinks, cracks, bulging or wear; remove and replace hoses; tighten loose fittings and supports.

3. Identify, handle, store, and install appropriate brake fluids; dispose of in accordance with federal, state, and local regulations.

4. Bleed (manual, pressure, vacuum or surge) hydraulic brake system.

5. Pressure test brake hydraulic system; determine needed repair.

6. Adjust brake shoes; remove and reinstall brake drums or drum/hub assemblies and wheel bearings.

7. Reinstall wheel and torque lug nuts.

8. Remove and reinstall caliper assembly.

9. Clean and inspect caliper mountings for wear and damage.

10. Check parking brake system operation.

11. Identify and replace ABS wheel speed sensor components.

12. Depressurize ABS hydraulic or electronic system.

13. Identify the proper procedures for handling brake dust.

14. Check for bent or damaged brake system components.

D. Heating and Air Conditioning

1. Identify and comply with environmental concerns relating to refrigerants and coolants.

2. Maintain and verify correct operation of certified refrigerant recovery and recharging equipment.

3. Locate and identify A/C system service ports.

4. Identify and recover refrigerant from A/C system.

5. Recycle refrigerant in accordance with EPA regulations.

6. Identify, label, and store refrigerant.

7. Test recycled refrigerant for non-condensable gases.

8. Evacuate A/C system; check for leaks.

9. Recharge A/C system with refrigerant; perform leak test.

10. Identify oil type and maintain correct amount in A/C system.

11. Inspect, adjust, and replace A/C compressor drive belts; check pulley alignment.

12. Remove and replace A/C compressor; inspect, repair or replace A/C compressor mount.

13. Inspect, repair or replace A/C system mufflers, hoses, lines, fittings, orifice tube, expansion valve, and seals.

14. Inspect, test, and replace A/C system condenser and mounts.

15. Inspect and replace receiver/drier or accumulator/drier.

16. Inspect and repair A/C component wiring.

E. Cooling Systems

1. Check engine cooling and heater system hoses and belts; determine needed repairs.

2. Inspect, test, remove, and replace radiator, pressure cap, coolant recovery system, and water pump.

3. Recover, refill, and bleed system with proper coolant and check level of protection; leak test system and dispose of materials in accordance with EPA specifications.

4. Remove and replace fan (both electrical and mechanical), fan pulley, fan clutch, and fan shroud.

5. Inspect, remove, and replace auxiliary oil/fluid coolers; check oil levels.

6. Inspect, remove, and replace electric fan sensors; check operation.

F. Drive Train

1. Remove, replace, and adjust shift or clutch linkage as required.
2. Remove, replace, and adjust cables or linkages for throttle valve (TV), kickdown, and accelerator pedal.
3. Remove and replace electronic sensors, wires, and connectors.
4. Remove and replace powertrain assembly; inspect, replace, and align powertrain mounts.
5. Remove and replace drive axle assembly.
6. Inspect, remove and replace half shafts and axle constant velocity (CV) joints.
7. Inspect, remove and replace drive shafts and universal joints.

G. Fuel, Intake and Exhaust Systems

1. Inspect, remove and replace exhaust pipes, mufflers, converters, resonators, tail pipes, and heat shields.
2. Inspect, remove and replace fuel tank, fuel tank filter, fuel cap, fuel filler hose, and inertia switch; inspect and replace fuel lines and hoses; check fuel for contaminants.
3. Inspect, remove and replace engine components of air intake systems.
4. Inspect, remove and replace canister, filter, vent, and purge lines of fuel vapor (EVAP) control systems.

H. Restraint Systems

1. Identify and perform vehicle manufacturer's recommended procedures for inspecting or replacing restraint systems and components.
2. Inspect, remove, and replace seatbelt and shoulder harness assembly and components.
3. Inspect restraint system mounting areas for damage; repair as needed.
4. Verify proper operation of seatbelt.
5. Deactivate and reactivate Supplemental Restraint System (SRS).
6. Inspect, remove and replace Supplemental Restraint Systems (SRS) sensors and wiring; ensure sensor orientation.
7. Verify that Supplemental Restraint System (SRS) is operational.
8. Inspect, remove, replace and dispose of deployed and non-deployed airbag(s) and pretensioners.
9. Use Diagnostic Trouble Codes (DTC) to diagnose and repair the Supplemental Restraint System (SRS).