Correlation of

Auto Collision Repair and Refinishing, 4e by Crandell and Baker

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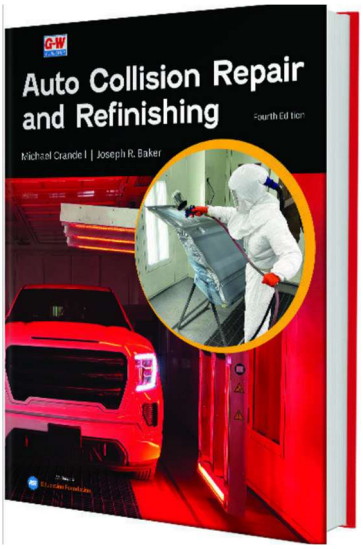
to the

2023 ASE Education Foundation Collision Repair and Refinish Task List

The following chart correlates the *Auto Collision Repair and Refinishing* 4th edition textbook and shop manual (©2027) to the 2023 ASE Education Foundation Collision Repair and Refinish Task List.

The correlation below lists the ASE Education Foundation Collision Repair and Refinish Tasks, priority levels, corresponding sections from the *Auto Collision Repair and Refinish* textbook, and corresponding job numbers from the *Auto Collision Repair and Refinish Shop Manual*.

For more information on the ASE Education Foundation standards, please visit www.aseeducationfoundation.org.



Tasks	Textbook Sections	Shop Manual Related Jobs
I. DAMAGE ANALYSIS, ESTIMATING, AND CUSTOMER SERVICE **I.A Damage Analysis**		
I.A.1 Position the vehicle for inspection under proper lighting; take photos to identify the vehicle and document damage. HP-I	35.1	117 Identifying the Vehicle and its Options 119 Identifying Direct, indirect, and Prior Damage
I.A.2 Identify components to be removed to gain access to damaged areas. HP-G	15.2	3 Reading an Estimate/Repair Order and Blueprinting 4 Repair Procedure Research 123 Hidden Damage and Supplements
I.A.3 Analyze damage to determine appropriate repair methods in accordance with manufacturer's recommendations and guidelines. HP-G	35.3	4 Repair Procedure Research

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Correlation of *Auto Collision Repair and Refinishing* to ASE Education Foundation Collision Repair and Refinish Task List —page 2

Tasks	Textbook Sections	Shop Manual Related Jobs
I.A.4 Determine the direction, point(s) of impact, and extent of direct, indirect, and inertia damage. HP-G	16.1	119 Identifying Direct, indirect, and Prior Damage
I.A.5 Gather details of the incident/accident necessary to determine the full extent of vehicle damage. HP-G	35.1	117 Identifying the Vehicle and its Options 122 Vehicle Conditioning for Valuation
I.A.6 Identify and record pre-existing damage. HP-G	35.1	2 Vehicle Check-in and Pre-Scan 117 Identifying the Vehicle and its Options 119 Identifying Direct, indirect, and Prior Damage 122 Vehicle Conditioning for Valuation
I.A.7 Identify and record prior repairs. HP-G	35.1	2 Vehicle Check-in and Pre-Scan 117 Identifying the Vehicle and its Options 119 Identifying Direct, indirect, and Prior Damage 122 Vehicle Conditioning for Valuation
I.A.8 Perform visual inspection of structural components. HP-G	16.2	117 Identifying the Vehicle and its Options 119 Identifying Direct, indirect, and Prior Damage
I.A.9 Identify structural damage using basic measuring tools and dimensional data. HP-I	16.1	119 Identifying Direct, indirect, and Prior Damage
I.A.10 Perform visual inspection of non-structural components. HP-I	15.2	2 Vehicle Check-in and Pre-Scan 3 Reading an Estimate/Repair Order and Blueprinting
I.A.11 Determine parts, components, material type(s), and procedures necessary for a proper repair. HP-I	35.2	2 Vehicle Check-in and Pre-Scan 3 Reading an Estimate/Repair Order and Blueprinting 4 Repair Procedure Research
I.A.12 Identify type and condition of finish; determine refinish labor operations as required. HP-I	30.3	2 Vehicle Check-in and Pre-Scan 3 Reading an Estimate/Repair Order and Blueprinting 122 Vehicle Conditioning for Valuation
I.A.13 Identify suspension, electrical, and mechanical component physical damage. HP-G	19.1	2 Vehicle Check-in and Pre-Scan 3 Reading an Estimate/Repair Order and Blueprinting
I.A.14 Identify safety systems physical damage. HP-G	25.2	2 Vehicle Check-in and Pre-Scan 3 Reading an Estimate/Repair Order and Blueprinting
I.A.15 Identify interior component damage. HP-G	34.1	2 Vehicle Check-in and Pre-Scan 3 Reading an Estimate/Repair Order and Blueprinting
I.A.16 Identify add-on accessories and modifications. HP-G	9.4	2 Vehicle Check-in and Pre-Scan 3 Reading an Estimate/Repair Order and Blueprinting 122 Vehicle Conditioning for Valuation

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Correlation of *Auto Collision Repair and Refinishing* to ASE Education Foundation Collision Repair and Refinish Task List —page 3

Tasks	Textbook Sections	Shop Manual Related Jobs
I.A.17 Identify single (one time) use components. HP-G	16.4	2 Vehicle Check-in and Pre-Scan 3 Reading an Estimate/Repair Order and Blueprinting
I.A.18 Perform a pre-scan; identify and document illuminated dash malfunction indicator lamp(s) (MIL) and stored diagnostic codes. HP-I	21.5	2 Vehicle Check-in and Pre-Scan 3 Reading an Estimate/Repair Order and Blueprinting 119 Identifying Direct, indirect, and Prior Damage
I.A.19 Perform a pre-repair inspection of the vehicle with the customer. Record fit and finish concerns (color mismatch, factory gaps, unrelated prior damage, and prior repairs). HP-G	35.1	02 Vehicle Check-in and Pre-Scan 03 Reading an Estimate/Repair Order and Blueprinting
I.A.20 Identify and document Advanced Driver Assistance Systems (ADAS) on the vehicle being repaired; identify damaged ADAS components and/or recalibration requirements. HP-G	21.6	117 Identifying the Vehicle and its Options
I.B Estimating		
I.B.1 Determine and record customer/vehicle owner information. HP-I	35.1	118 Collecting and Inputting Administration Information
I.B.2 Identify and record vehicle identification number (VIN) information, including nation of origin, make, model, restraint system, body type, production date, engine type, build data, and assembly plant. HP-I	35.1	118 Collecting and Inputting Administration Information
I.B.3 Identify and record vehicle mileage and options, including trim level, paint code, transmission, accessories, and modifications. HP-I	35.1	118 Collecting and Inputting Administration Information
I.B.4 Identify safety systems; determine precautions, inspections and replacement items as required. HP-G	25.1	118 Collecting and Inputting Administration Information
I.B.5 Apply appropriate estimating and parts nomenclature (terminology). HP-I	35.2	2 Vehicle Check-in and Pre-Scan 123 Hidden Damage and Supplements
I.B.6 Determine and apply appropriate estimating sequence. HP-I	35.2	3 Reading an Estimate/Repair Order and Blueprinting 120 Estimating System Line Notes and Overlaps 123 Hidden Damage and Supplements
I.B.7 Utilize estimating procedure pages. HP-I	35.2	3 Reading an Estimate/Repair Order and Blueprinting 120 Estimating System Line Notes and Overlaps 123 Hidden Damage and Supplements

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Tasks	Textbook Sections	Shop Manual Related Jobs
I.B.8 Apply estimating footnotes, headnotes, and line notes as needed. HP-I	35.2	3 Reading an Estimate/Repair Order and Blueprinting 120 Estimating System Line Notes and Overlaps 123 Hidden Damage and Supplements
I.B.9 Identify operations requiring labor value judgment. HP-G	35.3	3 Reading an Estimate/Repair Order and Blueprinting 123 Hidden Damage and Supplements
I.B.10 Select appropriate labor code for each operation (structural, non-structural, mechanical, and refinish). HP-I	35.3	3 Reading an Estimate/Repair Order and Blueprinting 123 Hidden Damage and Supplements
I.B.11 Select and price OEM parts; optional OEM parts, aftermarket parts, recyclable/used parts, remanufactured, rebuilt, and reconditioned parts; verify availability, compatibility, and condition. HP-G	35.2	3 Reading an Estimate/Repair Order and Blueprinting 123 Hidden Damage and Supplements 125 Sourcing and Checking In Parts
I.B.12 Determine necessary sublet operations. HP-G	35.2	3 Reading an Estimate/Repair Order and Blueprinting 120 Estimating System Line Notes and Overlaps 123 Hidden Damage and Supplements
I.B.13 Determine included and non-included operations and miscellaneous items. HP-G	35.2	3 Reading an Estimate/Repair Order and Blueprinting 120 Estimating System Line Notes and Overlaps 123 Hidden Damage and Supplements
I.B.14 Recognize and apply overlap deductions. HP-I	35.3	3 Reading an Estimate/Repair Order and Blueprinting 120 Estimating System Line Notes and Overlaps 123 Hidden Damage and Supplements
I.B.15 Determine additional material and charges. HP-G	35.3	3 Reading an Estimate/Repair Order and Blueprinting 120 Estimating System Line Notes and Overlaps 123 Hidden Damage and Supplements
I.B.16 Determine refinishing material and charges. HP-G	30.3	3 Reading an Estimate/Repair Order and Blueprinting 120 Estimating System Line Notes and Overlaps 123 Hidden Damage and Supplements
I.B.17 Apply math skills to establish charges and totals. HP-G	35.3	3 Reading an Estimate/Repair Order and Blueprinting 123 Hidden Damage and Supplements
I.B.18 Identify procedures to restore corrosion protection; establish labor values, and material charges. HP-G	16.2	3 Reading an Estimate/Repair Order and Blueprinting 123 Hidden Damage and Supplements
I.B.19 Recognize the cost effectiveness of the repair and determine the approximate vehicle retail, and repair value. HP-G	35.3	3 Reading an Estimate/Repair Order and Blueprinting 123 Hidden Damage and Supplements

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Tasks	Textbook Sections	Shop Manual Related Jobs
I.B.20 Recognize that differences exist in estimating platforms when using different information provider systems. HP-G	35.2	3 Reading an Estimate/Repair Order and Blueprinting 123 Hidden Damage and Supplements
I.B.21 Verify accuracy of estimate compared to the actual repair and replacement operations. HP-G	35.2	3 Reading an Estimate/Repair Order and Blueprinting 3 Reading an Estimate/Repair Order and Blueprinting 123 Hidden Damage and Supplements
I.B.22 Identify vehicle safety recalls using the vehicle identification number (VIN). HP-I	21.4	123 Hidden Damage and Supplements
I.B.23 Review damage report and analyze damage to determine appropriate methods for overall repair; communicate with team members to verify accuracy and resolve discrepancies. HP-G	16.2	119 Identifying Direct, indirect, and Prior Damage 123 Hidden Damage and Supplements
I.C Vehicle Construction and Parts Identification		
I.C.1 Identify type of vehicle construction (unibody, body-over-frame). HP-G	4.1	123 Hidden Damage and Supplements 117 Identifying the Vehicle and its Options
I.C.2 Recognize the different collision damage between unibody and body-over-frame vehicles. HP-G	16.1	123 Hidden Damage and Supplements 119 Identifying Direct, indirect, and Prior Damage
I.C.3 Identify impact energy absorbing components. HP-G	4.3	123 Hidden Damage and Supplements 119 Identifying Direct, indirect, and Prior Damage
I.C.4 Identify different types and strengths of substrates (steel types, aluminum, magnesium, plastic, composites, etc.); determine repairability. HP-G	4.2	123 Hidden Damage and Supplements
I.C.5 Identify vehicle glass components and repair/replacement procedures. HP-G	14.2	123 Hidden Damage and Supplements
I.C.6 Identify add-on accessories. HP-G	9.4	123 Hidden Damage and Supplements
I.C.7 Recognize different vehicle joining/attaching methods (e.g., welding, adhesives, rivets, etc.). HP-G	18.2	123 Hidden Damage and Supplements
I.D Customer Relations and Sales Skills		
I.D.1 Introduce yourself, acknowledge and greet customer/client/visitor; offer assistance. HP-G	35.1	121 Customer Interaction and Selling the Repair
I.D.2 Listen to customer/client; collect information and identify customers/client's concerns, needs, and expectations. HP-G	35.1	121 Customer Interaction and Selling the Repair

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Tasks	Textbook Sections	Shop Manual Related Jobs
I.D.3 Establish cooperative attitude with customer/client. HP-G	35.1	121 Customer Interaction and Selling the Repair
I.D.4 Deal with dissatisfied customer/client; seek resolution. HP-G	35.4	121 Customer Interaction and Selling the Repair
I.D.5 Identify customer/client preferred communication method; follow up to keep customer/client informed about parts and the repair process. HP-G	35.2	121 Customer Interaction and Selling the Repair
I.D.6 Recognize basic claims handling procedures; explain to customer/client. HP-G	35.3	121 Customer Interaction and Selling the Repair
I.D.7 Project positive attitude and professional appearance. HP-G	35.1	121 Customer Interaction and Selling the Repair
I.D.8 Provide and review warranty information. HP-G	35.3	121 Customer Interaction and Selling the Repair
I.D.9 Provide and review technical and consumer protection information. HP-G	35.3	121 Customer Interaction and Selling the Repair
I.D.10 Estimate and explain duration of out-of-service time. HP-G	35.3	121 Customer Interaction and Selling the Repair
I.D.11 Demonstrate negotiation skills to obtain a mutual agreement. HP-G	35.4	121 Customer Interaction and Selling the Repair
I.D.12 Interpret and explain estimate to customer/client, including prior damage and recalls. HP-G	35.2	121 Customer Interaction and Selling the Repair
II. PAINTING AND REFINISHING **II.A Safety Precautions and Regulations**		
II.A.1 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.); take necessary precautions with hazardous operations and materials according to federal, state, and local regulations. HP-I	3.6	37 Refinishing Safety Precautions and Hazardous Material Handling 38 Respirator Types, Fitment, and Storage 36 Applying Corrosion Protection, Foams, and Sound Deadeners
II.A.2 Identify safety and personal health hazards according to OSHA guidelines and the "Right to Know Law," and SDS information. HP-I	3.5	37 Refinishing Safety Precautions and Hazardous Material Handling 38 Respirator Types, Fitment, and Storage

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Correlation of *Auto Collision Repair and Refinishing* to ASE Education Foundation Collision Repair and Refinish Task List —page 7

Tasks	Textbook Sections	Shop Manual Related Jobs
II.A.3 Inspect spray environment and equipment to ensure compliance with federal, state, and local regulations, and for safety and cleanliness hazards. HP-I	3.5	37 Refinishing Safety Precautions and Hazardous Material Handling
II.A.4 Select and use a NIOSH approved respiratory protection system (supplied air/fresh air make up recommended). Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation. HP-I	3.6	37 Refinishing Safety Precautions and Hazardous Material Handling 38 Respirator Types, Fitment, and Storage
II.A.5 Perform equipment and work area clean-up as per applicable federal, state, and local regulations. HP-I	3.5	37 Refinishing Safety Precautions and Hazardous Material Handling
II.A.6 Demonstrate knowledge of the process for tracking expelled VOCs. HP-G	3.1	37 Refinishing Safety Precautions and Hazardous Material Handling
II.A.7 Follow federal, state, and local regulations regarding the handling and disposal of refinishing waste products. HP-G	3.2	37 Refinishing Safety Precautions and Hazardous Material Handling
II.B Surface Preparation		
II.B.1 Inspect, remove, store, protect, and replace exterior trim and components necessary for proper surface preparation. HP-I	30.1	17 Removing and Installing Moldings
II.B.2 Soap and water wash entire vehicle; use appropriate cleaner to remove contaminants. HP-I	30.2	1 Vehicle Prewash
II.B.3 Inspect and identify type of finish, surface condition, and film thickness; develop and document a plan for refinishing using a total product system. HP-I	30.3	39 Preparing a Panel for Refinish
II.B.4 Identify location of area to be refinished relative to safety systems (ADAS); determine refinish procedure according to manufacturer guidelines. HP-G	32.6	39 Preparing a Panel for Refinish
II.B.5 Remove paint finish as needed. HP-I	30.5	39 Preparing a Panel for Refinish
II.B.6 Properly sand areas to be refinished. HP-I	30.5	39 Preparing a Panel for Refinish
II.B.7 Identify and select appropriate sandpaper to featheredge areas to be refinished. HP-I	30.5	40 Featheredging Techniques
II.B.8 Apply suitable metal treatment or primer in accordance with total product systems. HP-I	30.6	44 Mixing and Applying Primer Surfacer

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Tasks	Textbook Sections	Shop Manual Related Jobs
II.B.9 Mask and protect other areas that will not be refinished. HP-I	30.4	43 Preparing and Masking for Primer Surfacer Application 50 Masking For Refinish
II.B.10 Demonstrate different masking techniques (recess/back masking, foam door type, etc.). HP-I	30.4	43 Preparing and Masking for Primer Surfacer Application 50 Masking For Refinish
II.B.11 Mix primer, primer-surfacer and primer-sealer following paint manufacturers technical data sheet instructions. HP-I	30.6	44 Mixing and Applying Primer Surfacer
II.B.12 Identify a complementary color or shade of undercoat to improve coverage. HP-G	31.2	55 Mixing and Applying Primer Sealer
II.B.13 Apply primer onto surface of repaired area; demonstrating control of primer application by keeping the areas small as possible. HP-I	30.6	44 Mixing and Applying Primer Surfacer
II.B.14 Force curing and drying of primer and/or refinish coating following paint manufacturers technical data sheet. HP-I	30.6	46 Identifying and Correcting Repair Defects
II.B.15 Apply two-component finishing filler to minor surface imperfections. HP-I	30.6	44 Mixing and Applying Primer Surfacer
II.B.16 Apply guide coat and block sand area with correct grade/grit sandpaper to which primer-surfacer has been applied. HP-I	30.6	45 Block Sanding Primer Surfacer
II.B.17 Dry sand area to which two-component finishing filler has been applied. HP-I	30.6	46 Identifying and Correcting Repair Defects
II.B.18 Remove dust from area to be refinished, including cracks or moldings of adjacent areas. HP-I	30.7	39 Preparing a Panel for Refinish
II.B.19 Clean area to be refinished using a recommended final cleaning solution. HP-I	30.7	39 Preparing a Panel for Refinish
II.B.20 Remove, with a tack rag, any dust or lint particles from the area to be refinished. HP-I	30.7	39 Preparing a Panel for Refinish
II.B.21 Apply suitable primer sealer to the area being refinished. HP-I	30.6	55 Mixing and Applying Primer Sealer
II.B.22 Scuff sand to remove nibs or imperfections from a sealer. HP-I	30.7	55 Mixing and Applying Primer Sealer
II.B.23 Apply stone chip resistant coating. HP-G	27.4	51 Rock Guard Identification and Duplication

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Tasks	Textbook Sections	Shop Manual Related Jobs
II.B.24 Restore caulking and seam sealers to repaired areas and replacement panels as required. HP-G	16.4	52 Seam Sealer Identification and Duplication
II.B.25 Prepare adjacent panels for blending using paint manufacturers procedures. HP-I	30.8	54 Preparing a Panel for Basecoat Blend/Clearcoat Only Application
II.B.26 Identify the types of rigid, semi-rigid or flexible plastic parts to be refinished; determine the materials needed, preparation, and refinishing procedures. HP-I	33.1	39 Preparing a Panel for Refinish 53 Setting Up Paint Stands For Part Mounting and Refinish
II.B.27 Identify metal parts to be refinished; determine the materials needed, preparation, and refinish procedures. HP-I	30.2	53 Setting Up Paint Stands For Part Mounting and Refinish
II.B.28 Identify chip resistant coatings and texture match. HP-G	27.4	51 Rock Guard Identification and Duplication
II.B.29 Identify caulking and seam sealers that may need replacement. HP-G	16.4	52 Seam Sealer Identification and Duplication
II.B.30 Identify refinishing guidelines for stationary glass flange areas to be refinished. HP-I	30.7	39 Preparing a Panel for Refinish
II.C Spray Gun and Related Equipment Operation		
II.C.1 Inspect, clean, and determine condition of spray guns and related equipment (air hoses, regulators, air lines, air source, spray environment, and filters). HP-I	26.3	41 Spray Gun Use, Settings, and Technique 42 Spray Gun Disassembly and Cleaning
II.C.2 Select spray gun setup (fluid needle, nozzle, and cap) for product being applied. HP-I	29.2	41 Spray Gun Use, Settings, and Technique 42 Spray Gun Disassembly and Cleaning
II.C.3 Test and adjust spray gun using fluid, air, and pattern control valves. HP-I	29.2	41 Spray Gun Use, Settings, and Technique 42 Spray Gun Disassembly and Cleaning
II.D Paint Mixing, Matching, and Applying		
II.D.1 Identify color code by manufacturer's vehicle information label. HP-I	28.1	47 Paint Code Identification, Formula Search, and Variant Selection 48 Mixing Basecoat
II.D.2 Shake, stir, reduce, catalyze/activate, and strain refinish materials. HP-I	28.2	48 Mixing Basecoat 49 Spray-Out Color Verification
II.D.3 Apply finish using appropriate spray techniques (gun arc, angle, distance, travel speed, and spray pattern overlap) for the finish being applied. HP-I	29.3	41 Spray Gun Use, Settings, and Technique

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Tasks	Textbook Sections	Shop Manual Related Jobs
II.D.4 Apply selected product on test or let-down panel; check for color match, properly store and maintain a color catalog. HP-I	31.3, 31.4	49 Spray-Out Color Verification
II.D.5 Understand the application of single stage topcoats. HP-G	29.2	60 Single-Stage Paint Mixing and Application
II.D.6 Apply basecoat/clearcoat for panel blending, panel refinishing and cut-ins. HP-I	32.2	56 Basecoat Application and Blending 58 Clearcoat Mixing and Application
II.D.7 Apply basecoat/clearcoat for overall refinishing. HP-G	32.2	56 Basecoat Application and Blending 58 Clearcoat Mixing and Application
II.D.8 Remove nibs or imperfections from basecoat. HP-I	30.6	56 Basecoat Application and Blending 57 Basecoat Application Defects and Corrections
II.D.9 Identify product expiration dates as applicable. HP-I	28.3	48 Mixing Basecoat
II.D.10 Refinish plastic parts. HP-I	33.1	56 Basecoat Application and Blending
II.D.11 Apply multi-stage coats for panel blending and overall refinishing. HP-G	32.2	61 Three-Stage and Two-Tone Application
II.D.12 Identify and mix paint using a formula. HP-G	28.2	47 Paint Code Identification, Formula Search, and Variant Selection 48 Mixing Basecoat
II.D.13 Identify poor hiding colors; determine necessary action. HP-G	31.4	49 Spray-Out Color Verification
II.D.14 Tint color using formula to achieve a blendable match. HP-G	31.4	48 Mixing Basecoat 49 Spray-Out Color Verification
II.D.15 Identify alternative color formula to achieve a blendable match. HP-I	31.3	47 Paint Code Identification, Formula Search, and Variant Selection
II.D.16 Identify the materials, equipment, and preparation differences between solvent and waterborne technologies. HP-G	27.1	47 Paint Code Identification, Formula Search, and Variant Selection
II.E Paint Defects – Causes and Cures		
II.E.1 Identify blistering (raising of the paint surface, air entrapment); correct the cause(s) and the condition. HP-G	30.5	57 Basecoat Application Defects and Corrections
II.E.2 Identify a dry spray appearance in the paint surface; correct the cause(s) and the condition. HP-I	32.4	57 Basecoat Application Defects and Corrections
II.E.3 Identify the presence of fish-eyes (crater-like openings) in the finish); correct the cause(s) and the condition. HP-I	32.5	57 Basecoat Application Defects and Corrections

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Tasks	Textbook Sections	Shop Manual Related Jobs
II.E.4 Identify lifting; correct the cause(s) and the condition. HP-G	30.5	57 Basecoat Application Defects and Corrections
II.E.5 Identify clouding (mottling and streaking in metallic finishes); correct the cause(s) and the condition. HP-I	31.3	57 Basecoat Application Defects and Corrections
II.E.6 Identify orange peel; correct the cause(s) and the condition. HP-I	32.4	57 Basecoat Application Defects and Corrections
II.E.7 Identify overspray; correct the cause(s) and the condition. HP-I	34.3	57 Basecoat Application Defects and Corrections
II.E.8 Identify solvent popping in freshly painted surface; correct the cause(s) and the condition. HP-G	30.5	57 Basecoat Application Defects and Corrections
II.E.9 Identify sags and runs in paint surface; correct the cause(s) and the condition. HP-I	32.4	57 Basecoat Application Defects and Corrections
II.E.10 Identify sanding marks or sand scratch swelling; correct the cause(s) and the condition. HP-I	30.4	57 Basecoat Application Defects and Corrections
II.E.11 Identify contour mapping/edge mapping; correct the cause(s) and the condition. HP-G	32.5	57 Basecoat Application Defects and Corrections
II.E.12 Identify color difference (off-shade); correct the cause(s) and the condition. HP-G	31.4	57 Basecoat Application Defects and Corrections
II.E.13 Identify tape tracking; correct the cause(s) and the condition. HP-G	30.5	57 Basecoat Application Defects and Corrections
II.E.14 Identify poor adhesion or clearcoat delamination; correct the cause(s) and the condition. HP-G	32.5	57 Basecoat Application Defects and Corrections
II.E.15 Identify paint cracking (shrinking, splitting, crow's feet or line-checking, micro-checking, etc.); correct the cause(s) and the condition. HP-G	30.5	57 Basecoat Application Defects and Corrections
II.E.16 Identify corrosion; correct the cause(s) and the condition. HP-G	24.3	57 Basecoat Application Defects and Corrections
II.E.17 Identify dirt or dust in the paint surface; correct the cause(s) and the condition. HP-I	34.3	57 Basecoat Application Defects and Corrections
II.E.18 Identify water spotting; correct the cause(s) and the condition. HP-G	34.5	57 Basecoat Application Defects and Corrections
II.E.19 Identify finish damage caused by bird droppings, tree sap, and other natural causes; correct the condition. HP-G	34.5	57 Basecoat Application Defects and Corrections

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Tasks	Textbook Sections	Shop Manual Related Jobs
II.E.20 Identify finish damage caused by airborne contaminants (acids, soot, rail dust, and other industrial-related causes); correct the condition. HP-G	34.5	57 Basecoat Application Defects and Corrections
II.E.21 Identify die-back conditions (dulling of the paint film showing haziness); correct the cause(s) and the condition. HP-G	32.5	57 Basecoat Application Defects and Corrections
II.E.22 Identify chalking (oxidation); correct the cause(s) and the condition. HP-G	34.5	57 Basecoat Application Defects and Corrections
II.E.23 Identify bleed-through (staining); correct the cause(s) and the condition. HP-G	30.5	57 Basecoat Application Defects and Corrections
II.E.24 Identify pin holing; correct the cause(s) and the condition. HP-G	30.5	57 Basecoat Application Defects and Corrections
II.E.25 Identify buffing-related imperfections (swirl marks, wheel burns); correct the condition. HP-I	34.4	57 Basecoat Application Defects and Corrections
II.E.26 Identify pigment flotation (color change through film build); correct the cause(s) and the condition. HP-G	31.4	57 Basecoat Application Defects and Corrections
II.F Final Detail		
II.F.1 Apply decals, transfers, tapes, stone guards, moldings, and emblems, etc. HP-G	34.4	59 Clearcoat Application Defects and Corrections 62 Buffing Preparation, Methods, and Techniques
II.F.2 Sand, buff, and polish fresh finish to remove defects and texture as required. HP-I	34.4	59 Clearcoat Application Defects and Corrections 62 Buffing Preparation, Methods, and Techniques
II.F.3 Sand, buff, and polish existing finish to match the repaired area. HP-I	34.5	59 Clearcoat Application Defects and Corrections 62 Buffing Preparation, Methods, and Techniques
II.F.4 Clean interior, exterior, and glass. HP-I	34.5	59 Clearcoat Application Defects and Corrections 62 Buffing Preparation, Methods, and Techniques
II.F.5 Clean body openings (door jambs, gaps, and edges, etc.). HP-I	34.5	62 Buffing Preparation, Methods, and Techniques
II.F.6 Remove overspray. HP-I	34.5	63 Buffing Defects and Corrections
II.F.7 Perform vehicle clean-up; complete quality control using a checklist. HP-I	29.4	59 Clearcoat Application Defects and Corrections
II.F.8 Measure and record film thickness before and after buffing. HP-I	30.6	59 Clearcoat Application Defects and Corrections
II.F.9 Perform nib sanding to remove small imperfections as required. HP-I	34.4	59 Clearcoat Application Defects and Corrections 62 Buffing Preparation, Methods, and Techniques

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Tasks	Textbook Sections	Shop Manual Related Jobs
III NON-STRUCTURAL ANALYSIS AND DAMAGE REPAIR (BODY COMPONENTS) **III.A Preparation**		
III.A.1 Perform a pre-scan; identify and document illuminated dash malfunction indicator lamp(s) (MIL) and stored diagnostic codes. HP-I	21.7	2 Vehicle Check-in and Pre-Scan
III.A.2 Review damage report and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan. HP-I	35.2	3 Reading an Estimate/Repair Order and Blueprinting
III.A.3 Inspect, remove, protect, label, store, inventory, and reinstall exterior trim and moldings. HP-I	30.1	5 Parts Storage and Organization 16 Removing and Installing Rocker Panel Moldings 17 Removing and Installing Moldings 20 Overhauling a Door Assembly
III.A.4 Inspect, remove, protect, label, store, inventory, and reinstall interior trim and components. HP-I	30.1	5 Parts Storage and Organization 18 Removing and Installing Interior Trim 20 Overhauling a Door Assembly
III.A.5 Inspect, remove, protect, label, store, inventory, and reinstall body panels and components that may interfere with or be damaged during repair. HP-I	9.2	5 Parts Storage and Organization 16 Removing and Installing Rocker Panel Moldings 17 Removing and Installing Moldings 18 Removing and Installing Interior Trim 20 Overhauling a Door Assembly
III.A.6 Inspect, remove, protect, label, store, inventory, and reinstall vehicle mechanical and electrical components that may interfere with or be damaged during repair. HP-G	21.2	5 Parts Storage and Organization
III.A.7 Protect panels, glass, interior parts, and other vehicles adjacent to the repair area. HP-I	30.3	20 Overhauling a Door Assembly 23 Preparing a Vehicle for Nonstructural Repairs
III.A.8 Soap and water wash entire vehicle; complete pre-repair inspection checklist. HP-I	30.2	1 Vehicle Prewash
III.A.9 Prepare damaged area using water-based and solvent-based cleaners. HP-I	30.2	23 Preparing a Vehicle for Nonstructural Repairs
III.A.10 Remove corrosion protection, undercoating, sealers, and other protective coatings as necessary to perform repairs. HP-I	27.5	23 Preparing a Vehicle for Nonstructural Repairs

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Tasks	Textbook Sections	Shop Manual Related Jobs
III.A.11 Inspect, remove, and reinstall repairable plastics and other components for off-vehicle repair. HP-I	12.3	30 Repairing Cosmetic Damage on Plastic Parts 31 Repairing Tears and Breaks in Flexible Plastic Parts 32 Repairing Tears and Breaks in Semi-Rigid Plastic Parts 33 Repairing Cosmetic Damage in SMC Plastic Parts 34 Repairing Damage in Fiberglass Panels 29 Plastic Repair Identification and Preparation
III.B Outer Body Panel Repairs, Replacements, and Adjustments		
III.B.1 Inspect/locate direct, indirect, or hidden damage and direction of impact. HP-I	9.2	3 Reading an Estimate/Repair Order and Blueprinting
III.B.2 Inspect, remove, and replace welded steel panel or panel assemblies. HP-G	9.4	22 Removing and Replacing a Welded Nonstructural Panel
III.B.3 Determine the extent of damage to aluminum body panels; repair or replace. HP-G	9.4	3 Reading an Estimate/Repair Order and Blueprinting
III.B.4 Inspect, remove, replace, and align hood, hood hinges, and hood latch. HP-I	9.4	14 Removing, Installing, and Aligning a Hood and Hood Hinges
III.B.5 Inspect, remove, replace, and align deck lid, lid hinges, and lid latch. HP-I	9.4	15 Removing, Installing, and Aligning a Decklid, Liftgate, and Tailgate
III.B.6 Inspect, remove, replace, and align doors, latches, hinges, and related hardware. HP-I	9.4	19 Removing, Installing, and Aligning a Door Assembly 20 Overhauling a Door Assembly
III.B.7 Inspect, remove, replace, and align tailgates, hatches, and liftgates. HP-I	9.4	15 Removing, Installing, and Aligning a Decklid, Liftgate, and Tailgate
III.B.8 Inspect, remove, replace, and align sliding doors. HP-G	9.4	19 Removing, Installing, and Aligning a Door Assembly 20 Overhauling a Door Assembly
III.B.9 Inspect, remove, replace, overhaul, and align bumpers, covers, reinforcements, guards, impact absorbers, and mounting hardware. HP-I	9.4	8 Removing and Installing a Plastic Bumper Assembly 9 Overhauling a Plastic Bumper Assembly 10 Removing and Installing a Steel Bumper Assembly 11 Overhauling a Steel Bumper Assembly
III.B.10 Inspect, remove, replace and align fenders, and related panels. HP-I	9.4	12 Removing and Installing Light Assemblies 13 Removing, Installing, and Aligning a Fender
III.B.11 Restore corrosion protection during and after the repair. HP-I	9.3	21 Replacing an Outer Door Skin
III.B.12 Replace seam sealer to match OEM appearance. HP-I	9.3	21 Replacing an Outer Door Skin
III.B.13 Replace door skins. HP-G	9.4	21 Replacing an Outer Door Skin

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Tasks	Textbook Sections	Shop Manual Related Jobs
III.B.14 Restore sound deadeners and foam materials. HP-G	9.3	21 Replacing an Outer Door Skin
III.B.15 Perform panel bonding and weld bonding. HP-G	9.4	21 Replacing an Outer Door Skin
III.B.16 Diagnose and repair water leaks, dust leaks, and wind noise. HP-G	9.4	22 Removing and Replacing a Welded Nonstructural Panel
III.B.17 Identify one-time use fasteners. HP-G	9.1	7 Fastener Identification and Removal Techniques
III.B.18 Weld damaged or torn steel body panels; repair broken welds. HP-G	9.4	22 Removing and Replacing a Welded Nonstructural Panel
III.B.19 Inspect and identify labels/decals and replace as necessary. HP-G	9.4	64 Applying Pinstripes, Decals, Emblems, and Clear Stone Guards
III.B.20 Follow manufacturer guidelines when applying heat to non-structural components during repair. HP-G	9.4	4 Repair Procedure Research
III.C Metal Finishing and Body Filling		
III.C.1 Prepare a panel for body filler by abrading or removing the coatings; featheredge, refine scratches, and clean the surface before the application of body filler. HP-I	8.7	28 Preparing, Mixing, Applying, and Sanding Body Fillers
III.C.2 Locate and repair surface irregularities and straighten contours on a damaged body panel using power tools, hand tools, and weld-on pulling attachments. HP-I	8.2, 8.4	24 Identifying Panel Damage 25 Hammer-and-Dolly Technique 26 Dent Pulling Methods and Techniques
III.C.3 Demonstrate hammer and dolly techniques. HP-I	8.4	25 Hammer-and-Dolly Technique
III.C.4 Heat shrink stretched panel areas to proper contour. HP-G	8.3	27 Metal Shrinking Methods and Techniques
III.C.5 Cold shrink stretched panel areas to proper contour. HP-I	8.3	27 Metal Shrinking Methods and Techniques
III.C.6 Identify body filler defects; correct the cause and condition (pin holing, ghosting, staining, over catalyzing, etc.). HP-I	8.7	28 Preparing, Mixing, Applying, and Sanding Body Fillers 46 Identifying and Correcting Repair Defects
III.C.7 Identify different types of body fillers. HP-G	8.7	28 Preparing, Mixing, Applying, and Sanding Body Fillers
III.C.8 Shape body filler to contour; finish sand. HP-I	8.7	28 Preparing, Mixing, Applying, and Sanding Body Fillers

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Tasks	Textbook Sections	Shop Manual Related Jobs
III.C.9 Perform proper metal straightening techniques for aluminum. HP-G	8.8	25 Hammer-and-Dolly Technique 26 Dent Pulling Methods and Techniques 35 Aluminum Repair
III.C.10 Perform proper application of body filler to aluminum. HP-G	8.8	28 Preparing, Mixing, Applying, and Sanding Body Fillers 35 Aluminum Repair
III.C.11 Locate and repair surface irregularities and straighten contours on a damaged panel using Glue-Pulling Dent Repair (GPDR). HP-G	8.2, 8.5	24 Identifying Panel Damage 26 Dent Pulling Methods and Techniques
III.C.12 Mix and apply body filler. HP-I	8.7	28 Preparing, Mixing, Applying, and Sanding Body Fillers
III.D Moveable Glass and Hardware		
III.D.1 Inspect, adjust, overhaul, repair, or replace window regulators, run channels, glass, power mechanisms, and related controls. HP-I	13.2	20 Overhauling a Door Assembly
III.D.2 Inspect, adjust, repair, remove, reinstall, or replace weather-stripping. HP-G	13.2	20 Overhauling a Door Assembly
III.D.3 Inspect, remove, repair, or replace, and adjust removable power operated roof panel and hinges, latches, guides, handles, retainer, and controls of sunroofs. HP-G	13.5	22 Removing and Replacing a Welded Nonstructural Panel 124 Testing and Adjusting Sunroofs and Convertible Tops
III.D.4 Inspect, remove, reinstall, and align convertible top and related mechanisms. HP-G	13.5	22 Removing and Replacing a Welded Nonstructural Panel 124 Testing and Adjusting Sunroofs and Convertible Tops
III.D.5 Identify or recalibrate electrical components that may need to be initialized. HP-G	13.2	20 Overhauling a Door Assembly
III.E Plastics, Adhesives, and Welding		
III.E.1 Identify the types of plastics; determine repairability. HP-I	12.1	29 Plastic Repair Identification and Preparation
III.E.2 Identify location of damage relative to safety systems (ADAS); determine repairability according to manufacturer repair procedures. HP-G	12.3	29 Plastic Repair Identification and Preparation
III.E.3 Clean and prepare the surface of plastic parts; identify the types of plastic repair procedures. HP-I	12.3	29 Plastic Repair Identification and Preparation

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Tasks	Textbook Sections	Shop Manual Related Jobs
III.E.4 Repair rigid, semi-rigid, and flexible plastic panels. HP-I	12.2, 12.3	31 Repairing Tears and Breaks in Flexible Plastic Parts 32 Repairing Tears and Breaks in Semi-Rigid Plastic Parts 33 Repairing Cosmetic Damage in SMC Plastic Parts
III.E.5 Remove, replace, or repair damaged areas of rigid exterior composite panels. HP-G	12.3	33 Repairing Cosmetic Damage in SMC Plastic Parts 34 Repairing Damage in Fiberglass Panels
III.E.6 Replace bonded rigid exterior composite body panels; straighten or align panel supports. HP-G	12.3	33 Repairing Cosmetic Damage in SMC Plastic Parts
III.E.7 Repair plastic parts by welding (nitrogen or airless). HP-I	12.2	31 Repairing Tears and Breaks in Flexible Plastic Parts 32 Repairing Tears and Breaks in Semi-Rigid Plastic Parts
III.E.8 Perform a single-sided adhesively bonded cosmetic repair. HP-I	12.2	30 Repairing Cosmetic Damage on Plastic Parts
III.E.9 Perform a double-sided adhesively bonded repair. HP-I	12.2	31 Repairing Tears and Breaks in Flexible Plastic Parts 32 Repairing Tears and Breaks in Semi-Rigid Plastic Parts
III.E.10 Perform an adhesively bonded or welded tab repair. HP-I	12.2	32 Repairing Tears and Breaks in Semi-Rigid Plastic Parts 31 Repairing Tears and Breaks in Flexible Plastic Parts
III.E.11 Shape and reform damaged plastic. HP-G	12.4	30 Repairing Cosmetic Damage on Plastic Parts
IV. WELDING, CUTTING, AND JOINING **IV.A Metal Welding, Cutting, and Joining**		
IV.A.1 Identify the considerations for cutting, removing, and welding various types of steel, aluminum, and other metals. HP-G	10.1, 10.5	80 MIG Welding Lap Joints and Destructive Testing 81 MIG Welding Open-Butt Joints and Destructive Testing 82 MIG Welding Butt Welds with Backing Joints and Destructive Testing 83 MIG Welding Plug Welds and Destructive Testing 85 MIG Welding Aluminum 86 Silicon Bronze Welding 88 Cutting Methods and Techniques
IV.A.2 Determine the correct GMAW welder type, electrode/wire type, diameter, and gas to be used in a specific welding situation. HP-I	10.3	79 Welder Tuning and Troubleshooting

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Tasks	Textbook Sections	Shop Manual Related Jobs
IV.A.3 Set up, attach work clamp (ground), and adjust the GMAW welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the substrate being welded. HP-I	10.3, 10.4	79 Welder Tuning and Troubleshooting
IV.A.4 Store, handle, and install high-pressure gas cylinders; test for leaks. HP-I	10.8	77 MIG Welder Setup and Troubleshooting
IV.A.5 Determine the proper angle of the gun to the joint and direction of gun travel for the type of weld being made. HP-I	10.3	80 MIG Welding Lap Joints and Destructive Testing 81 MIG Welding Open-Butt Joints and Destructive Testing 82 MIG Welding Butt Welds with Backing Joints and Destructive Testing 83 MIG Welding Plug Welds and Destructive Testing
IV.A.6 Protect adjacent panels, glass, vehicle interior, etc. to prevent damage from welding and cutting operations. HP-G	10.1	76 Welding and Cutting Safety 78 Protecting the Vehicle and Preparing for Welding
IV.A.7 Identify hazards, foam coatings, and flammable materials prior to welding/cutting procedures. HP-G	10.1	76 Welding and Cutting Safety 78 Protecting the Vehicle and Preparing for Welding
IV.A.8 Protect computers and other electronics/wires prior to welding procedures. HP-G	10.1	76 Welding and Cutting Safety 78 Protecting the Vehicle and Preparing for Welding
IV.A.9 Clean and prepare the metal to be welded, assure good metal fit-up, apply weld-through primer if necessary, and clamp or tack as required. HP-I	10.2, 10.3	80 MIG Welding Lap Joints and Destructive Testing 81 MIG Welding Open-Butt Joints and Destructive Testing 82 MIG Welding Butt Welds with Backing Joints and Destructive Testing 83 MIG Welding Plug Welds and Destructive Testing
IV.A.10 Determine the joint type (butt weld with backing, lap, etc.) for weld being made. HP-I	10.2	80 MIG Welding Lap Joints and Destructive Testing 81 MIG Welding Open-Butt Joints and Destructive Testing 82 MIG Welding Butt Welds with Backing Joints and Destructive Testing 83 MIG Welding Plug Welds and Destructive Testing
IV.A.11 Determine the type of weld (continuous, stitch weld, plug, etc.) for each specific welding operation. HP-I	10.2	80 MIG Welding Lap Joints and Destructive Testing 81 MIG Welding Open-Butt Joints and Destructive Testing 82 MIG Welding Butt Welds with Backing Joints and Destructive Testing 83 MIG Welding Plug Welds and Destructive Testing

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Tasks	Textbook Sections	Shop Manual Related Jobs
IV.A.12 Perform the following welds: plug, butt weld with and without backing, and fillet etc., in the flat, horizontal, vertical, and overhead positions. HP-I	10.5	80 MIG Welding Lap Joints and Destructive Testing 81 MIG Welding Open-Butt Joints and Destructive Testing 82 MIG Welding Butt Welds with Backing Joints and Destructive Testing 83 MIG Welding Plug Welds and Destructive Testing
IV.A.13 Perform visual evaluation and destructive test on each weld type. HP-I	10.6	80 MIG Welding Lap Joints and Destructive Testing 81 MIG Welding Open-Butt Joints and Destructive Testing 82 MIG Welding Butt Welds with Backing Joints and Destructive Testing 83 MIG Welding Plug Welds and Destructive Testing
IV.A.14 Identify the causes of various welding defects; make necessary adjustments. HP-I	10.6	84 Weld Defect Identification and Correction
IV.A.15 Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments. HP-G	10.6	84 Weld Defect Identification and Correction
IV.A.16 Identify cutting process for different substrates and locations; perform cutting operation. HP-I	10.9, 10.11	88 Cutting Methods and Techniques
IV.A.17 Identify different methods of attaching structural components (squeeze type resistance spot welding (STRSW), structural adhesive, MIG bronze, weld bonding, etc.). HP-G	10.8	86 Silicon Bronze Welding 87 STRSW Welding and Weld Bonding
IV.A.18 Perform rivet bonding procedures. HP-I	10.8	75 Rivet Bonding Methods
IV.A.19 Dress/grind weld as needed. HP-I	10.5	85 MIG Welding Aluminum 86 Silicon Bronze Welding
V. STRUCTURAL ANALYSIS AND DAMAGE REPAIR **V.A Frame Inspection and Repair**		
V.A.1 Measure and diagnose structural damage using a metric tape measure and a tram gauge. HP-I	14.3	65 Tram Gauge Measuring
V.A.2 Properly clamp/anchor vehicle to a frame bench/rack. HP-G	14.1	68 Full-Frame Tiedown
V.A.3 Analyze, straighten, and align mash (collapse) damage. HP-G	14.2	66 Frame Specification Sheets, Measuring Planes, and Point Identification 67 Centerline Gauges 70 Computerized Measuring

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Tasks	Textbook Sections	Shop Manual Related Jobs
V.A.4 Analyze, straighten, and align sag damage. HP-G	14.2	66 Frame Specification Sheets, Measuring Planes, and Point Identification 67 Centerline Gauges 70 Computerized Measuring
V.A.5 Analyze, straighten, and align side sway damage. HP-G	14.2	66 Frame Specification Sheets, Measuring Planes, and Point Identification 67 Centerline Gauges 70 Computerized Measuring
V.A.6 Analyze, straighten, and align twist damage. HP-G	14.2	66 Frame Specification Sheets, Measuring Planes, and Point Identification 67 Centerline Gauges 70 Computerized Measuring
V.A.7 Analyze, straighten, and align diamond frame damage. HP-G	14.2	66 Frame Specification Sheets, Measuring Planes, and Point Identification 67 Centerline Gauges 70 Computerized Measuring
V.A.8 Remove and replace damaged structural components. HP-G	14.2	71 Structural Construction Material Identification and Repair Procedures 72 Structural Component Sectioning/Replacement 73 Frame Sectioning Preparation and Setup
V.A.9 Remove and replace protective coatings; restore corrosion protection to repaired or replaced frame areas and anchoring locations. HP-G	27.5	71 Structural Construction Material Identification and Repair Procedures 72 Structural Component Sectioning/Replacement 73 Frame Sectioning Preparation and Setup
V.A.10 Analyze and identify misaligned or damaged steering, suspension, and powertrain mounting points and components. HP-G	19.3	65 Tram Gauge Measuring
V.A.11 Align or replace misaligned or damaged steering, suspension, and powertrain mounting points and components. HP-G	19.3	74 Frame Straightening Techniques
V.A.12 Identify heat limitations and monitoring procedures for structural components. HP-G	14.2	04 Repair Procedure Research
V.A.13 Demonstrate an understanding of structural foam applications. HP-G	16.2	36 Applying Corrosion Protection, Foams, and Sound Deadeners
V.A.14 Measure and diagnose structural damage using a three-dimensional measuring system (mechanical, electronic, laser), etc. HP-G	14.3	67 Centerline Gauges 70 Computerized Measuring

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Tasks	Textbook Sections	Shop Manual Related Jobs
V.A.15 Determine the extent of the direct and indirect damage and the direction of impact; document the methods and sequence of repair. HP-I	14.2	04 Repair Procedure Research 71 Structural Construction Material Identification and Repair Procedures 72 Structural Component Sectioning/Replacement 73 Frame Sectioning Preparation and Setup
V.A.16 Analyze and identify crush/collapse zones. HP-I	16.1	71 Structural Construction Material Identification and Repair Procedures 72 Structural Component Sectioning/Replacement 73 Frame Sectioning Preparation and Setup
V.A.17 Follow manufacturers guidelines when applying heat to structural components during repair. HP-G	14.2	4 Repair Procedure Research 74 Frame Straightening Techniques
V.B Unibody and Unitized Structure		
V.B.1 Analyze and identify misaligned or damaged steering, suspension, and powertrain mounting points that can cause vibration, steering, and chassis alignment problems. HP-G	19.3	72 Structural Component Sectioning/Replacement
V.B.2 Align or replace misaligned or damaged steering, suspension, and powertrain mounting points that can cause vibration, steering, and chassis alignment problems. HP-G	19.3	72 Structural Component Sectioning/Replacement
V.B.3 Measure and diagnose unibody damage using a metric tape measure and tram gauge. HP-I	16.1	65 Tram Gauge Measuring
V.B.4 Measure and diagnose unibody vehicles using a dedicated/universal (fixture) measuring system. HP-G	16.1	67 Centerline Gauges
V.B.5 Diagnose and measure unibody vehicles using a three-dimensional measuring system (mechanical, electronic, laser, etc.). HP-G	16.1	67 Centerline Gauges 70 Computerized Measuring
V.B.6 Determine the extent of the direct and indirect damage and the direction of impact; plan and document the methods and sequence of repair. HP-I	16.1	71 Structural Construction Material Identification and Repair Procedures 72 Structural Component Sectioning/Replacement 73 Frame Sectioning Preparation and Setup
V.B.7 Attach anchoring devices to vehicle; remove or reposition components as necessary. HP-G	16.2	69 Unibody Tiedown

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Tasks	Textbook Sections	Shop Manual Related Jobs
V.B.8 Straighten and align roof rails/headers and roof panels. HP-G	16.2	66 Frame Specification Sheets, Measuring Planes, and Point Identification 67 Centerline Gauges 70 Computerized Measuring
V.B.9 Straighten and align rocker panels and pillars. HP-G	16.2	66 Frame Specification Sheets, Measuring Planes, and Point Identification 67 Centerline Gauges 70 Computerized Measuring
V.B.10 Straighten and align vehicle openings and floor pans. HP-G	16.2	66 Frame Specification Sheets, Measuring Planes, and Point Identification 67 Centerline Gauges 70 Computerized Measuring
V.B.11 Straighten and align quarter panels, wheelhouse assemblies, and rear body sections (including rails and suspension/powertrain mounting points). HP-G	16.2	66 Frame Specification Sheets, Measuring Planes, and Point Identification 67 Centerline Gauges 70 Computerized Measuring
V.B.12 Straighten and align front-end sections (aprons, strut towers, upper and lower rails, steering, and suspension/powertrain mounting points, etc.). HP-G	16.2	66 Frame Specification Sheets, Measuring Planes, and Point Identification 67 Centerline Gauges 70 Computerized Measuring
V.B.13 Determine structural repair component or replacement recommendations. HP-G	16.2	4 Repair Procedure Research
V.B.14 Identify proper cold stress relief methods. HP-I	16.2	71 Structural Construction Material Identification and Repair Procedures 72 Structural Component Sectioning/Replacement 73 Frame Sectioning Preparation and Setup 74 Frame Straightening Techniques
V.B.15 Determine sectioning procedures of a steel body structure. HP-I	16.2	71 Structural Construction Material Identification and Repair Procedures 72 Structural Component Sectioning/Replacement 73 Frame Sectioning Preparation and Setup 74 Frame Straightening Techniques
V.B.16 Remove and replace damaged structural components. HP-G	16.2	71 Structural Construction Material Identification and Repair Procedures 72 Structural Component Sectioning/Replacement 73 Frame Sectioning Preparation and Setup

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Tasks	Textbook Sections	Shop Manual Related Jobs
V.B.17 Determine the extent of damage to aluminum structural components; repair, weld, or replace. HP-G	16.2	71 Structural Construction Material Identification and Repair Procedures 72 Structural Component Sectioning/Replacement 73 Frame Sectioning Preparation and Setup 74 Frame Straightening Techniques
V.B.18 Analyze and identify crush/collapse zones. HP-I	16.1	71 Structural Construction Material Identification and Repair Procedures 72 Structural Component Sectioning/Replacement 73 Frame Sectioning Preparation and Setup
V.B.19 Remove and replace protective coatings on anchoring locations/pinch welds. HP-G	27.5	71 Structural Construction Material Identification and Repair Procedures 72 Structural Component Sectioning/Replacement 73 Frame Sectioning Preparation and Setup
V.B.20 Follow manufacturer guidelines when applying heat to structural components during repair. HP-G	16.2	74 Frame Straightening Techniques
V.C Stationary Glass		
V.C.1 Identify considerations for removal, handling, one time use parts, and installation of advanced glass systems (comfort and safety features). HP-G	13.2	—
V.C.2 Remove and reinstall or replace modular glass using recommended materials, procedures, and curing times. HP-G	13.3	—
V.C.3 Check for water leaks, dust leaks, and wind noise. HP-G	13.5	124 Testing and Adjusting Sunroofs and Convertible Tops
V.C.4 Identify considerations for pre-scan, post-scan, and recalibration procedures. HP-G	21.6	111 ADAS Identification and Post-Repair Research
VI. MECHANICAL AND ELECTRICAL COMPONENTS **VI.A Suspension and Steering**		
VI.A.1 Perform visual inspection and measuring checks to identify steering and suspension collision damage. HP-G	19.5	94 Steering and Suspension Damage Identification
VI.A.2 Identify one–time use fasteners. HP-I	19.4	94 Steering and Suspension Damage Identification 95 Removing and Installing a Strut Assembly 96 Removing and Installing Tie-Rods

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Tasks	Textbook Sections	Shop Manual Related Jobs
VI.A.3 Clean, inspect, and prepare reusable fasteners. HP-I HP-G	19.4	94 Steering and Suspension Damage Identification 95 Removing and Installing a Strut Assembly 96 Removing and Installing Tie-Rods
VI.A.4 Remove, replace, inspect, or adjust power steering pump, pulleys, belts, hoses, fittings, and pump mounts. HP-G	19.4	94 Steering and Suspension Damage Identification
VI.A.5 Remove and replace power steering gear (non-rack and pinion type). HP-G	19.4	96 Removing and Installing Tie-Rods
VI.A.6 Inspect, remove, and replace power rack and pinion steering gear and related components. HP-G	19.4	94 Steering and Suspension Damage Identification 96 Removing and Installing Tie-Rods
VI.A.7 Inspect and replace parallelogram steering linkage components. HP-G	19.4	94 Steering and Suspension Damage Identification 96 Removing and Installing Tie-Rods
VI.A.8 Inspect, remove, and replace upper and lower control arms and related components. HP-G	19.5	94 Steering and Suspension Damage Identification
VI.A.9 Inspect, remove, and replace steering knuckle/spindle/hub assemblies (including bearings, races, seals, etc.). HP-G	19.5	94 Steering and Suspension Damage Identification
VI.A.10 Inspect, remove, and replace front suspension system coil springs and spring insulators (silencers). HP-G	19.5	94 Steering and Suspension Damage Identification 95 Removing and Installing a Strut Assembly
VI.A.11 Inspect, remove, replace, and adjust suspension system torsion bars, and mounts. HP-G	19.5	94 Steering and Suspension Damage Identification 95 Removing and Installing a Strut Assembly
VI.A.12 Inspect, remove, and replace stabilizer bar bushings, brackets, and links. HP-G	19.5	94 Steering and Suspension Damage Identification 95 Removing and Installing a Strut Assembly
VI.A.13 Inspect, remove, and replace MacPherson strut or assembly, upper bearing, and mount. HP-G	19.5	94 Steering and Suspension Damage Identification 95 Removing and Installing a Strut Assembly
VI.A.14 Inspect, remove, and replace rear suspension system transverse links, control arms, stabilizer bars, bushings, and mounts. HP-G	19.5	94 Steering and Suspension Damage Identification
VI.A.15 Inspect, remove, and replace suspension system leaf spring(s) and related components. HP-G	19.5	94 Steering and Suspension Damage Identification
VI.A.16 Inspect axle assembly for damage and misalignment. HP-G	19.5	94 Steering and Suspension Damage Identification

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Tasks	Textbook Sections	Shop Manual Related Jobs
VI.A.17 Inspect, remove, and replace shock absorbers. HP-G	19.5	94 Steering and Suspension Damage Identification 95 Removing and Installing a Strut Assembly
VI.A.18 Diagnose, inspect, adjust, repair, or replace active suspension systems and associated lines and fittings. HP-G	19.5	94 Steering and Suspension Damage Identification
VI.A.19 Measure vehicle ride height and wheelbase according to manufacturer specifications. HP-I	19.5	94 Steering and Suspension Damage Identification
VI.A.20 Inspect, remove, replace, and align front and rear frame (cradles/subframe). HP-G	19.5	94 Steering and Suspension Damage Identification
VI.A.21 Diagnose and inspect steering wheel, steering column, and components. HP-G	19.4	94 Steering and Suspension Damage Identification
VI.A.22 Verify proper operation of steering systems including electronically controlled, hydraulic and electronically assisted steering systems. HP-G	19.4	94 Steering and Suspension Damage Identification
VI.A.23 Diagnose front and rear suspension system noises and body sway problems; determine necessary action. HP-G	19.5	94 Steering and Suspension Damage Identification
VI.A.24 Diagnose vehicle wandering, pulling, hard steering, bump steer, memory steering, torque steering, and steering return problems; determine necessary action. HP-G	19.5	94 Steering and Suspension Damage Identification
VI.A.25 Demonstrate an understanding of wheel, suspension, and steering alignments (caster, camber, toe, SAI etc.). HP-G	19.5	94 Steering and Suspension Damage Identification
VI.A.26 Inspect tires; identify tire wear patterns, direction of rotation and location; check tire size, identify nitrogen or air, check tire pressure monitoring system (TPMS), and adjust air pressure. HP-I	19.5	92 Removing and Installing a Wheel and Tire Assembly 93 Tire Identification and Damage Inspection
VI.A.27 Diagnose wheel/tire vibration, shimmy, tire pull (lead), wheel hop problems; determine needed repairs. HP-G	19.5	92 Removing and Installing a Wheel and Tire Assembly 93 Tire Identification and Damage Inspection
VI.A.28 Measure wheel, tire, axle, and hub runout; determine needed repairs. HP-I	19.5	93 Tire Identification and Damage Inspection
VI.A.29 Reinstall wheels and tighten lug nuts to manufacturer spec using torque wrench. HP-I	19.5	91 Torque Wrench Operation 92 Removing and Installing a Wheel and Tire Assembly 93 Tire Identification and Damage Inspection

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Tasks	Textbook Sections	Shop Manual Related Jobs
VI.A.30 Perform initialization or calibration procedures for steering angle sensor (SAS) following suspension and/or steering system repairs. HP-G	21.6	92 Removing and Installing a Wheel and Tire Assembly 93 Tire Identification and Damage Inspection
VI.A.31 Perform a tire pressure monitoring system (TPMS) recalibration. HP-G	21.6	92 Removing and Installing a Wheel and Tire Assembly 93 Tire Identification and Damage Inspection
VI.A.32 Lift the vehicle for inspection, service, and repair by properly raising and supporting the vehicle. HP-G	3.2	89 Mechanical and Electrical Safety 90 Lift Types and Operation 93 Tire Identification and Damage Inspection
B. Electrical		
VI.B.1 Demonstrate an understanding of Ohm's Law. HP-I	21.1	107 Ohm's Law
VI.B.2 Check for available voltage, voltage drop and current, and resistance in electrical wiring circuits and components with a DMM (digital multimeter). HP-I	21.3	106 Identifying Electrical System Damage 108 Digital Volt-Ohm Meter Operation
VI.B.3 Repair wiring and connectors. HP-G	21.5	106 Identifying Electrical System Damage 109 Wire Repair Methods and Techniques
VI.B.4 Inspect, test, and replace fusible links, circuit breakers, and fuses. HP-I	21.2	106 Identifying Electrical System Damage 108 Digital Volt-Ohm Meter Operation
VI.B.5 Perform battery state-of-charge test and slow/fast battery charge. HP-I	21.6	106 Identifying Electrical System Damage 108 Digital Volt-Ohm Meter Operation 110 Testing, Charging, and Jumpstarting Batteries
VI.B.6 Inspect and clean, or replace battery, battery cables, connectors, and clamps. Remove, replace, and recharge battery. HP-I	21.6	106 Identifying Electrical System Damage 110 Testing, Charging, and Jumpstarting Batteries
VI.B.7 Dispose/recycle batteries according to local, state, and federal requirements. HP-G	21.6	89 Mechanical and Electrical Safety 110 Testing, Charging, and Jumpstarting Batteries
VI.B.8 Identify programmable electrical/electronic components and check for malfunction indicator lamp (MIL) and fault codes; record data (pre-scan) for reprogramming before disconnecting battery; perform post-scan after repairs are completed. HP-I	21.6	106 Identifying Electrical System Damage
VI.B.9 Inspect alignment, adjust, remove, and replace alternator (generator), drive belts, pulleys, and fans. HP-G	21.6	106 Identifying Electrical System Damage

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Tasks	Textbook Sections	Shop Manual Related Jobs
VI.B.10 Check operation and aim headlamp assemblies and fog/driving lamps; determine needed repairs. HP-G	21.6	106 Identifying Electrical System Damage
VI.B.11 Inspect, test, and repair or replace switches, relays, bulbs, sockets, connectors, and ground wires of interior and exterior light circuits. HP-I	21.5	106 Identifying Electrical System Damage 108 Digital Volt-Ohm Meter Operation
VI.B.12 Remove and replace horn(s); check operation. HP-I	21.6	108 Digital Volt-Ohm Meter Operation
VI.B.13 Check operation of wiper/washer systems; determine needed repairs. HP-I	21.6	106 Identifying Electrical System Damage 108 Digital Volt-Ohm Meter Operation
VI.B.14 Check operation of power windows; determine needed repairs. HP-I	21.6	106 Identifying Electrical System Damage 108 Digital Volt-Ohm Meter Operation
VI.B.15 Check operation of motorized sliding doors, lift gates, tailgates, running boards, etc.; determine needed repairs. HP-G	21.6	106 Identifying Electrical System Damage 108 Digital Volt-Ohm Meter Operation
VI.B.16 Inspect, remove, and replace power seat, motors, linkages, cables, etc. HP-G	21.6	106 Identifying Electrical System Damage
VI.B.17 Inspect, remove, and replace components of electric door and hatch/trunk lock. HP-G	21.6	106 Identifying Electrical System Damage
VI.B.18 Inspect, remove, and replace components of keyless lock/unlock devices and alarm systems. HP-G	21.6	106 Identifying Electrical System Damage
VI.B.19 Inspect, remove, and replace components of electrical sunroof and convertible/retractable hard top. HP-G	21.6	106 Identifying Electrical System Damage 124 Testing and Adjusting Sunroofs and Convertible Tops
VI.B.20 Check operation of electrically heated mirrors, windshields, back lights, panels, etc.; determine needed repairs. HP-I	21.6	106 Identifying Electrical System Damage 108 Digital Volt-Ohm Meter Operation
VI.B.21 Demonstrate self-grounding procedures (anti-static) for handling electronic components. HP-I	21.6	89 Mechanical and Electrical Safety
VI.B.22 Check for module communication errors using a scan tool. HP-G	21.6	106 Identifying Electrical System Damage
VI.B.23 Use wiring diagrams, component location, and diagnostic flow charts during diagnosis of electrical circuit problems. HP-G	21.5	106 Identifying Electrical System Damage 108 Digital Volt-Ohm Meter Operation 109 Wire Repair Methods and Techniques

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Tasks	Textbook Sections	Shop Manual Related Jobs
VI.B.24 Seal/protect connector ends of disconnected wiring harness. HP-G	21.5	89 Mechanical and Electrical Safety 106 Identifying Electrical System Damage 109 Wire Repair Methods and Techniques
VI.C. Brakes		
VI.C.1 Inspect brake lines, hoses, and fittings for damage or wear; tighten fittings and supports; replace brake lines (double flare and ISO types). HP-G	22.2	112 Brake System Damage Identification
VI.C.2 Identify, handle, store, and fill with appropriate brake fluids. HP-G	22.2	89 Mechanical and Electrical Safety
VI.C.3 Bleed (manual, pressure, or vacuum) hydraulic brake system. HP-G	22.3	113 Brake Line and Hose Replacement and System Bleeding
VI.C.4 Pressure test brake hydraulic system; determines necessary action. HP-G	22.2	112 Brake System Damage Identification
VI.C.5 Adjust brake shoes; remove and reinstall brake drums or drum/hub assemblies. HP-G	22.3	114 Inspecting and Adjusting Brakes
VI.C.6 Remove, clean, and inspect caliper and rotor assembly and mountings for wear and damage; reinstall. HP-I	22.3	112 Brake System Damage Identification
VI.C.7 Inspect parking brake system operation; repair or adjust as necessary; verify operation. HP-G	22.2	112 Brake System Damage Identification
VI.C.8 Identify the proper procedures for handling brake dust. HP-G	22.2	114 Inspecting and Adjusting Brakes
VI.C.9 Check for bent or damaged brake system components. HP-G	22.2	112 Brake System Damage Identification
VI.C.10 Demonstrate an understanding of various types of advanced braking systems (ABS, electronic parking brake, hydraulic, electronic, traction and stability control). HP-G	22.2	112 Brake System Damage Identification
VI.C.11 Place vehicle in service mode as needed before servicing brake system. HP-G	22.2	89 Mechanical and Electrical Safety
VI.D Air Conditioning		
VI.D.1 Identify and comply with environmental regulations relating to refrigerants and coolants. HP-G	23.3	89 Mechanical and Electrical Safety 97 Identifying Cooling and A/C System Damage 98 Removing and Installing a Radiator, Condenser, and Fan Assembly 99 Removing and Installing an A/C Compressor

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Tasks	Textbook Sections	Shop Manual Related Jobs
VI.D.2 Maintain and verify correct operation of certified refrigerant recovery and recharging equipment. HP-G	23.3	89 Mechanical and Electrical Safety 97 Identifying Cooling and A/C System Damage 98 Removing and Installing a Radiator, Condenser, and Fan Assembly 99 Removing and Installing an A/C Compressor
VI.D.3 Locate and identify A/C system service ports. HP-I	23.3	97 Identifying Cooling and A/C System Damage 98 Removing and Installing a Radiator, Condenser, and Fan Assembly 99 Removing and Installing an A/C Compressor
VI.D.4 Review procedures for recovering, labeling, and recycling refrigerant from an A/C system in accordance with EPA section 609 guidelines. HP-G	23.3	89 Mechanical and Electrical Safety 97 Identifying Cooling and A/C System Damage 98 Removing and Installing a Radiator, Condenser, and Fan Assembly 99 Removing and Installing an A/C Compressor
VI.D.5 Select refrigerant, evacuate, and recharge A/C system. HP-G	23.3	97 Identifying Cooling and A/C System Damage 98 Removing and Installing a Radiator, Condenser, and Fan Assembly 99 Removing and Installing an A/C Compressor
VI.D.6 Select oil type and install correct amount in A/C system. HP-G	23.3	97 Identifying Cooling and A/C System Damage 98 Removing and Installing a Radiator, Condenser, and Fan Assembly 99 Removing and Installing an A/C Compressor
VI.D.7 Inspect, adjust, and replace A/C compressor drive belts; check pulley alignment. HP-G	23.3	97 Identifying Cooling and A/C System Damage 98 Removing and Installing a Radiator, Condenser, and Fan Assembly 99 Removing and Installing an A/C Compressor
VI.D.8 Remove and replace A/C compressor; inspect, repair, or replace A/C compressor mount. HP-G	23.3	99 Removing and Installing an A/C Compressor
VI.D.9 Inspect, repair, or replace A/C system mufflers, hoses, lines, fittings, orifice tube, expansion valve, and seals. HP-G	23.3	97 Identifying Cooling and A/C System Damage 98 Removing and Installing a Radiator, Condenser, and Fan Assembly
VI.D.10 Inspect, test, and replace A/C system condenser and mounts. HP-G	23.3	97 Identifying Cooling and A/C System Damage 98 Removing and Installing a Radiator, Condenser, and Fan Assembly
VI.D.11 Inspect and replace receiver/drier or accumulator/drier. HP-G	23.3	97 Identifying Cooling and A/C System Damage 98 Removing and Installing a Radiator, Condenser, and Fan Assembly

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Tasks	Textbook Sections	Shop Manual Related Jobs
VI.D.12 Inspect and repair A/C component wiring. HP-G	23.3	97 Identifying Cooling and A/C System Damage 98 Removing and Installing a Radiator, Condenser, and Fan Assembly 99 Removing and Installing an A/C Compressor
VI.D.13 Inspect and protect open A/C system components from contaminants during repairs. HP-G	23.3	97 Identifying Cooling and A/C System Damage 98 Removing and Installing a Radiator, Condenser, and Fan Assembly 99 Removing and Installing an A/C Compressor
VI.D.14 Verify and document air temperature at dash vents following repair. HP-G	23.3	97 Identifying Cooling and A/C System Damage 98 Removing and Installing a Radiator, Condenser, and Fan Assembly 99 Removing and Installing an A/C Compressor
VI.E Cooling Systems		
VI.E.1 Check engine cooling and heater system hoses and belts; determine necessary action. HP-I	23.1	97 Identifying Cooling and A/C System Damage 98 Removing and Installing a Radiator, Condenser, and Fan Assembly
VI.E.2 Inspect, test, remove, and replace radiator, pressure cap, coolant system components, and water pump. HP-G	23.1	97 Identifying Cooling and A/C System Damage 98 Removing and Installing a Radiator, Condenser, and Fan Assembly
VI.E.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 regulations. HP-G	23.1	89 Mechanical and Electrical Safety 98 Removing and Installing a Radiator, Condenser, and Fan Assembly
VI.E.4 Remove, inspect, and replace fan (both electrical and mechanical), fan sensors, fan pulley, fan clutch, and fan shroud; check operation. HP-G	23.1	97 Identifying Cooling and A/C System Damage 98 Removing and Installing a Radiator, Condenser, and Fan Assembly
VI.E.5 Inspect, remove, and replace auxiliary oil/fluid coolers; check oil levels. HP-G	23.1	97 Identifying Cooling and A/C System Damage 98 Removing and Installing a Radiator, Condenser, and Fan Assembly
VI.E.6 Verify and document air temperature at floor vents following repair. HP-G	23.2	97 Identifying Cooling and A/C System Damage 98 Removing and Installing a Radiator, Condenser, and Fan Assembly
VI.F Drive Train		
VI.F.1 Remove, replace, and adjust shift or clutch linkage as required. HP-G	24.3	—
VI.F.2 Remove and replace electronic sensors, wires, and connectors. HP-G	21.5	—

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Tasks	Textbook Sections	Shop Manual Related Jobs
VI.F.3 Remove and reinstall powertrain assembly; inspect, replace, and align powertrain mounts. HP-G	24.3	—
VI.F.4 Remove and replace drive axle assembly. HP-G	24.3	—
VI.F.5 Inspect, remove, and replace half shafts and axle constant velocity (CV) joints. HP-G	24.3	—
VI.F.6 Inspect, remove, and replace drive shafts and universal joints. HP-G	24.3	—
VI.G Fuel, Intake, and Exhaust Systems		
VI.G.1 Inspect, remove, and replace exhaust pipes, mufflers, converters, resonators, tail pipes, and heat shields. HP-G	24.4	—
VI.G.2 Inspect, remove, and replace fuel/DEF tank, tank filter, cap, filler hose, pump/sending unit, and inertia switch; inspect, depressurize, and replace fuel lines and hoses. HP-G	24.4	—
VI.G.3 Inspect, remove, and replace air intake components. HP-G	24.4	—
VI.G.4 Inspect, remove, and replace canister, filter, vent, and purge lines of fuel vapor (EVAP) control systems. HP-G	24.4	—
VI.H Restraint Systems		
VI.H.1 Inspect, remove, and replace seatbelt and shoulder harness assembly and components. HP-G	25.2	100 Identifying Restraint System Damage 101 Replacing Restraint Systems Post-Deployment 105 Removing and Installing a Seatbelt Assembly
VI.H.2 Inspect restraint system mounting areas for damage; repair as needed. HP-G	25.2	100 Identifying Restraint System Damage 101 Replacing Restraint Systems Post-Deployment 105 Removing and Installing a Seatbelt Assembly
VI.H.3 Inspect the operation of the seatbelt system. HP-I	25.2	100 Identifying Restraint System Damage 101 Replacing Restraint Systems Post-Deployment 105 Removing and Installing a Seatbelt Assembly
VI.H.4 Disable and enable Supplemental Restraint System (SRS). HP-G	25.3	102 Disarming the Restraint System
VI.H.5 Inspect, protect, remove, and replace Supplemental Restraint Systems (SRS) sensors and wiring; ensure sensor orientation. HP-G	25.3	102 Disarming the Restraint System

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Tasks	Textbook Sections	Shop Manual Related Jobs
VI.H.6 Verify that Supplemental Restraint System (SRS) is operational. HP-I	25.3	100 Identifying Restraint System Damage 101 Replacing Restraint Systems Post-Deployment
VI.H.7 Inspect, remove, replace, and dispose of deployed and non-deployed airbag(s) and pretensioners following federal, state, and local regulations. HP-G	25.3	103 Removing and Installing Driver Side Airbag 104 Removing and Installing Head/Curtain Airbag
VI.H.8 Use Diagnostic Trouble Codes (DTC) to diagnose and repair the Supplemental Restraint System (SRS). HP-G	25.3	100 Identifying Restraint System Damage 101 Replacing Restraint Systems Post-Deployment
VI.H.9 Demonstrate an understanding of advanced restraint and occupant classification systems (OCS). HP-G	25.4	100 Identifying Restraint System Damage 101 Replacing Restraint Systems Post-Deployment
VI.H.10 Identify components of Supplemental Restraint Systems (SRS). HP-I	25.1	100 Identifying Restraint System Damage 101 Replacing Restraint Systems Post-Deployment
VI.I ADAS		
VI.I.1 Identify types of ADAS systems (such as speed control, collision avoidance, lane departure warning and assist, and camera systems) on the vehicle being repaired. HP-G	21.5	111 ADAS Identification and Post-Repair Research
VI.I.2 Research operation of ADAS systems, sensors, and actuators, and static and/or dynamic recalibration procedures on the vehicle being repaired. HP-G	21.5	89 Mechanical and Electrical Safety 111 ADAS Identification and Post-Repair Research
VI.I.3 Prepare vehicle and ensure service area is appropriate for static ADAS system recalibration. HP-G	21.5	111 ADAS Identification and Post-Repair Research
VI.I.4 Perform static/dynamic ADAS recalibration procedures. HP-G	21.5	111 ADAS Identification and Post-Repair Research
VI.I.5 Diagnose failed ADAS recalibrations, identify needed repairs. HP-G	21.5	111 ADAS Identification and Post-Repair Research
VI.J Hybrid/Electric Vehicle Service		
VI.J.1 Locate procedures for safe disabling and re-enabling of high voltage systems on hybrid/electric vehicles. HP-I	20.8	89 Mechanical and Electrical Safety 115 Hybrid and xEV Safety 116 Hybrid and xEV De-Energization
VI.J.2 Identify potential safety and materials handling concerns associated with high voltage hybrid/electric vehicle battery systems. HP-G	20.7	89 Mechanical and Electrical Safety 115 Hybrid and xEV Safety

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Tasks	Textbook Sections	Shop Manual Related Jobs
VI.J.3 Demonstrate knowledge of special multimeters, insulated tools, and other test equipment required for use in high voltage/electric vehicle circuits. HP-G	20.3, 20.8	115 Hybrid and xEV Safety
VI.J.4 Demonstrate knowledge of personal protective equipment (PPE) required for use in high voltage/electric vehicle circuits. HP-I	20.1	89 Mechanical and Electrical Safety 115 Hybrid and xEV Safety 116 Hybrid and xEV De-Energization
VI.J.5 Demonstrate knowledge of the use of a live-dead-live/zero potential test to verify isolation of the high voltage traction battery. HP-G	20.8	115 Hybrid and xEV Safety 116 Hybrid and xEV De-Energization
VI.J.6 Demonstrate knowledge of the testing and verification of ground circuit isolation between vehicle chassis ground and the high voltage circuits and components. HP-G	20.8	—
VI.J.7 Demonstrate an understanding of safe handling procedures associated with high voltage A/C compressors and wiring. HP-G	20.4	89 Mechanical and Electrical Safety 115 Hybrid and xEV Safety 116 Hybrid and xEV De-Energization
VI.J.8 Demonstrate an understanding of hybrid/electric cooling systems. HP-G	20.5	115 Hybrid and xEV Safety
VI.J.9 Demonstrate an understanding of safe handling procedures associated with high voltage powertrain components. HP-G	20.4	89 Mechanical and Electrical Safety 115 Hybrid and xEV Safety 116 Hybrid and xEV De-Energization
VI.J.10 Demonstrate knowledge of recommendations/requirements for the storage of high voltage batteries removed from vehicles and replacement of high voltage batteries. HP-G	20.7	89 Mechanical and Electrical Safety 115 Hybrid and xEV Safety 116 Hybrid and xEV De-Energization
VII. COLLISION REPAIR AND REFINISH FUNDAMENTALS **VII.A Damage Analysis**		
VII.A.1 Identify components to be removed to gain access to damaged areas. HP-G	9.2	119 Identifying Direct, indirect, and Prior Damage
VII.A.2 Analyze damage to determine appropriate repair methods in accordance with manufacturer's recommendations and guidelines. HP-G	16.1	119 Identifying Direct, indirect, and Prior Damage
VII.A.3 Determine the direction, point(s) of impact, and extent of direct, indirect, and inertia damage. HP-G	16.1	119 Identifying Direct, indirect, and Prior Damage

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Tasks	Textbook Sections	Shop Manual Related Jobs
VII.A.4 Perform visual inspection of non-structural components. HP-I	9.2	119 Identifying Direct, indirect, and Prior Damage
VII.A.5 Determine parts, components, material type(s), and procedures necessary for a proper repair. HP-I	35.2	119 Identifying Direct, indirect, and Prior Damage
VII.A.6 Identify suspension, electrical, and mechanical component physical damage. HP-G	19.1	119 Identifying Direct, indirect, and Prior Damage
VII.A.7 Identify single (one time) use components. HP-G	19.2	119 Identifying Direct, indirect, and Prior Damage
VII.B Damage Analysis and Estimating: Estimating		
VII.B.1 Determine and record customer/vehicle owner information. HP-i	35.1	117 Identifying the Vehicle and its Options
VII.B.2 Identify and record vehicle identification number (VIN) information, including nation of origin, make, model, restraint system, body type, production date, engine type, build data, and assembly plant. HP-I	35.1	117 Identifying the Vehicle and its Options
VII.B.3 Identify and record vehicle mileage and options, including trim level, paint code, transmission, accessories, and modifications. HP-I	35.1	117 Identifying the Vehicle and its Options
VII.B.4 Identify safety systems; determine precautions, inspections, and replacement items as required. HP-G	25.1	117 Identifying the Vehicle and its Options
VII.B.5 Apply appropriate estimating and parts nomenclature (terminology). HP-I	35.2	3 Reading an Estimate/Repair Order and Blueprinting
VII.C Vehicle Construction and Parts Identification		
VII.C.1 Identify type of vehicle construction (unibody, body-over-frame). HP-G	4.1	117 Identifying the Vehicle and its Options
VII.C.2 Recognize the different collision damage between unibody and body-over-frame vehicles. HP-G	4.2	117 Identifying the Vehicle and its Options
VII.C.3 Identify impact energy absorbing components. HP-G	4.3	117 Identifying the Vehicle and its Options
VII.C.4 Identify different types and strengths of substrates (steel types, aluminum, magnesium, plastic, composites, etc.). HP-G	4.4	117 Identifying the Vehicle and its Options

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Tasks	Textbook Sections	Shop Manual Related Jobs
VII.C.5 Identify vehicle glass components and repair/replacement procedures. HP-G	13.2	117 Identifying the Vehicle and its Options
VII.C.6 Identify add-on accessories. HP-G	35.2	117 Identifying the Vehicle and its Options
VII.C.7 Recognize different vehicle joining/attaching methods (e.g., welding, adhesives, rivets, etc.). HP-G	4.5	117 Identifying the Vehicle and its Options
VII.D Refinishing: Safety Precautions and Regulations		
VII.D.1 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.); take necessary precautions with hazardous operations and materials according to federal, state, and local regulations. HP-I	2.3	37 Refinishing Safety Precautions and Hazardous Material Handling 39 Preparing a Panel for Refinish
VII.D.2 Identify safety and personal health hazards according to OSHA guidelines, the "Right to Know Law," and SDS information. HP-I	2.2	37 Refinishing Safety Precautions and Hazardous Material Handling
VII.D.3 Inspect spray environment and equipment to ensure compliance with federal, state, and local regulations, and for safety and cleanliness hazards. HP-I	26.4	37 Refinishing Safety Precautions and Hazardous Material Handling
VII.D.4 Select and use a NIOSH approved respiratory protection system (supplied air/fresh air make up recommended). Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulations. HP-I	2.3	37 Refinishing Safety Precautions and Hazardous Material Handling 38 Respirator Types, Fitment, and Storage
VII.D.5 Perform equipment and work area clean-up as per applicable federal, state, and local regulations. HP-I	26.7	37 Refinishing Safety Precautions and Hazardous Material Handling
VII.D.6 Demonstrate knowledge of the process for tracking of expelled VOCs. HP-G	27.6	37 Refinishing Safety Precautions and Hazardous Material Handling
VII.D.7 Follow federal, state, and local regulations regarding the handling and disposal of refinishing waste products. HP-G	27.6	37 Refinishing Safety Precautions and Hazardous Material Handling
VII.E Refinishing: Surface Preparation		
VII.E.1 Inspect, remove, store, protect, and replace exterior trim and components necessary for proper surface preparation. HP-I	30.1	5 Parts Storage and Organization 17 Removing and Installing Moldings

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Tasks	Textbook Sections	Shop Manual Related Jobs
VII.E.2 Soap and water wash entire vehicle; use appropriate cleaner to remove contaminants. HP-I	30.2	1 Vehicle Prewash
VII.E.3 Remove paint finish as needed. HP-I	30.5	40 Featheredging Techniques
VII.E.4 Properly sand areas to be refinished. HP-I	30.5, 30.7	40 Featheredging Techniques
VII.E.5 Identify and select appropriate sandpaper to featheredge areas to be refinished. HP-I	30.5, 30.7	40 Featheredging Techniques
VII.E.6 Apply suitable metal treatment or primer in accordance with total product systems. HP-I	30.6	44 Mixing and Applying Primer Surfacer
VII.E.7 Mask and protect other areas that will not be refinished. HP-I	30.4, 30.7	43 Preparing and Masking for Primer Surfacer Application 50 Masking for Refinish
VII.E.8 Demonstrate different masking techniques (recess/back masking, foam door type, etc.). HP-I	30.4	44 Mixing and Applying Primer Surfacer 50 Masking for Refinish
VII.E.9 Mix primer, primer-surfacer following paint manufacturers technical data sheet instructions. HP-I	30.6	44 Mixing and Applying Primer Surfacer
VII.E.10 Apply primer onto surface of repaired area, demonstrating control of primer application by keeping the areas as small as possible. HP-I	30.6	44 Mixing and Applying Primer Surfacer
VII.E.11 Force curing and drying of primer coating following paint manufacturers technical data sheet. HP-I	30.6	44 Mixing and Applying Primer Surfacer 45 Block Sanding Primer Surfacer
VII.E.12 Apply two-component finishing filler to minor surface imperfections. HP-I	30.6	45 Block Sanding Primer Surfacer 46 Identifying and Correcting Repair Defects
VII.E.13 Apply guide coat and block sand area with correct grade/grit sandpaper to which primer-surfacer has been applied. HP-I	30.6, 30.7	45 Block Sanding Primer Surfacer 46 Identifying and Correcting Repair Defects
VII.E.14 Dry sand area to which two-component finishing filler has been applied. HP-I	30.6	45 Block Sanding Primer Surfacer 46 Identifying and Correcting Repair Defects
VII.E.15 Remove dust from area to be refinished, including cracks or moldings of adjacent areas. HP-I	30.7	39 Preparing a Panel for Refinish

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Tasks	Textbook Sections	Shop Manual Related Jobs
VII.E.16 Clean area to be refinished using a recommended final cleaning solution. HP-I	30.7	39 Preparing a Panel for Refinish
VII.E.17 Prepare adjacent panels for blending using paint manufacturers procedures. HP-I	32.3	39 Preparing a Panel for Refinish
VII.E.18 Identify the types of rigid, semi-rigid or flexible plastic parts to be refinished; determine the materials needed, preparation, and refinishing procedures. HP-I	33.1	39 Preparing a Panel for Refinish
VII.E.19 Identify metal parts to be refinished; determine the materials needed, preparation, and refinish procedures. HP-I	30.2, 30.8	39 Preparing a Panel for Refinish
VII.E.20 Identify refinishing guidelines for stationary glass flange areas to be refinished. HP-I	30.7	39 Preparing a Panel for Refinish
VII.F Refinishing: Spray Gun and Related Equipment Operation		
VII.F.1 Inspect, clean, and determine condition of spray guns and related equipment (air hoses, regulators, air lines, air source, spray environment, and filters). HP-I	26.3	41 Spray Gun Use, Settings, and Technique 42 Spray Gun Disassembly and Cleaning
VII.F.2 Select spray gun setup (fluid needle, nozzle, and cap) for product being applied. HP-I	29.3	41 Spray Gun Use, Settings, and Technique 42 Spray Gun Disassembly and Cleaning
VII.F.3 Test and adjust spray gun using fluid, air, and pattern control valves. HP-I	29.3	41 Spray Gun Use, Settings, and Technique 42 Spray Gun Disassembly and Cleaning
VII.G Non-Structural Repair: Preparation		
VII.G.1 Inspect, remove, protect, label, store, inventory, and reinstall exterior trim and moldings. HP-I	9.2	5 Parts Storage and Organization 17 Removing and Installing Moldings
VII.G.2 Inspect, remove, protect, label, store, inventory, and reinstall interior trim and components. HP-I	9.2	5 Parts Storage and Organization 17 Removing and Installing Moldings
VII.G.3 Inspect, remove, protect, label, store, inventory, and reinstall body panels and components that may interfere with or be damaged during repair. HP-I	9.2	5 Parts Storage and Organization
VII.G.4 Inspect, remove, protect, label, store, inventory, and reinstall vehicle mechanical and electrical components that may interfere with or be damaged during repair. HP-I	21.5	5 Parts Storage and Organization

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Tasks	Textbook Sections	Shop Manual Related Jobs
VII.G.5 Protect panels, glass, interior parts, and other vehicles adjacent to the repair area. HP-I	1.4	23 Preparing a Vehicle for Nonstructural Repairs
VII.G.6 Soap and water wash entire vehicle; complete pre-repair inspection checklist. HP-I	30.2	1 Vehicle Prewash
VII.G.7 Prepare damaged area using water-based and solvent-based cleaners. HP-I	30.2	23 Preparing a Vehicle for Nonstructural Repairs
VII.G.8 Remove corrosion protection, undercoating, sealers, and other protective coatings as necessary to perform repairs. HP-I	27.5	23 Preparing a Vehicle for Nonstructural Repairs
VII.G.9 Inspect, remove, and reinstall repairable plastics and other components for off-vehicle repair. HP-I	33.1	29 Plastic Repair Identification and Preparation
VII.H Non-Structural Repair: Outer Body Panels		
VII.H.1 Inspect, remove, replace, and align hood, hood hinges, and hood latch. HP-I	9.2	14 Removing, Installing, and Aligning a Hood and Hood Hinges
VII.H.2 Inspect, remove, replace, and align deck lid, lid hinges, and lid hatch. HP-I	9.2	15 Removing, Installing, and Aligning a Decklid, Liftgate, and Tailgate
VII.H.3 Inspect, remove, replace, and align doors, latches, hinges, and related hardware. HP-I	9.2	19 Removing, Installing, and Aligning a Door Assembly
VII.H.4 Inspect, remove, replace, and align tailgates, hatches, and liftgates. HP-I	9.2	15 Removing, Installing, and Aligning a Decklid, Liftgate, and Tailgate
VII.H.5 Inspect, remove, replace, and align sliding doors. HP-G	9.2	19 Removing, Installing, and Aligning a Door Assembly
VII.H.6 Inspect, remove, replace, overhaul, and align bumpers, covers, reinforcements, guards, impact absorber, and mounting hardware. HP-I	9.4	8 Removing and Installing a Plastic Bumper Assembly 10 Removing and Installing a Steel Bumper Assembly
VII.H.7 Inspect, remove, replace, and align fenders and related panels. HP-I	9.2	13 Removing, Installing, and Aligning a Fender
VII.H.8 Restore corrosion protection during and after the repair. HP-I	27.5	36 Applying Corrosion Protection, Foams, and Sound Deadeners
VII.H.9 Replace seam sealer to match OEM appearance. HP-I	27.5	52 Seam Sealer Identification and Duplication
VII.H.10 Restore sound deadeners and foam materials. HP-G	27.6	36 Applying Corrosion Protection, Foams, and Sound Deadeners
VII.H.11 Identify one-time use fasteners. HP-I	9.3	7 Fastener Identification and Removal Techniques
VII.H.12 Inspect and identify labels/decals and replace, as necessary. HP-G	33.1	64 Applying Pinstripes, Decals, Emblems, and Clear Stone Guards

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Tasks	Textbook Sections	Shop Manual Related Jobs
VII.H.13 Follow manufacturer guidelines when applying heat to non-structural components during repair. HP-G	16.1	23 Preparing a Vehicle for Nonstructural Repairs 71 Structural Construction Material Identification and Repair Procedures
VII.I Non-Structural Repair: Metal Finishing and Body Filling		
VII.I.1 Prepare a panel for body filler by abrading or removing the coatings; featheredge, refine scratches, and clean the surface before the application of body filler. HP-I	8.3	23 Preparing a Vehicle for Nonstructural Repairs
VII.I.2 Locate and repair surface irregularities and straighten contours on a damaged body panel using power tools, hand tools, and weld-on pulling attachments. HP-I	8.2	24 Identifying Panel Damage
VII.I.3 Demonstrate hammer and dolly techniques. HP-I	8.4	25 Hammer-and-Dolly Technique
VII.I.4 Heat shrink stretched panel areas to proper contour. HP-G	8.2	27 Metal Shrinking Methods and Techniques
VII.I.5 Cold shrink stretched panel areas to proper contour. HP-I	8.2	27 Metal Shrinking Methods and Techniques
VII.I.6 Identify body filler defects; correct the cause and condition (pin holing, ghosting, staining, over catalyzing, etc.). HP-I	8.3	28 Preparing, Mixing, Applying, and Sanding Body Fillers
VII.I.7 Identify different types of body fillers. HP-G	27.5	28 Preparing, Mixing, Applying, and Sanding Body Fillers
VII.I.8 Shape body filler to contour; finish sand. HP-I	8.3	28 Preparing, Mixing, Applying, and Sanding Body Fillers
VII.I.9 Perform proper metal straightening techniques for aluminum. HP-G	7.2	35 Aluminum Repair
VII.I.10 Perform proper application of body filler to aluminum. HP-G	7.2	35 Aluminum Repair
VII.I.11 Locate and repair surface irregularities and straighten contours on a damaged panel using Glue-Pulling Dent Repair (GPDR). HP-G	34.2	26 Dent Pulling Methods and Techniques
VII.I.12 Mix and apply body filler. HP-I	8.3	28 Preparing, Mixing, Applying, and Sanding Body Fillers
VII.J Non-Structural Repair: Moveable Glass and Hardware		
VII.J.1 Inspect, adjust, overhaul, repair, or replace window regulators, run channels, glass, power mechanisms, and related controls. HP-I	13.2	20 Overhauling a Door Assembly

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Tasks	Textbook Sections	Shop Manual Related Jobs
VII.J.2 Inspect, adjust, repair, remove, reinstall, or replace weather-stripping. HP-G	13.2	20 Overhauling a Door Assembly
VII.J.3 Inspect, remove, repair, or replace, and adjust removable power operated roof panel and hinges, latches, guides, handles, retainer, and controls of sunroofs. HP-G	13.3	20 Overhauling a Door Assembly 124 Testing and Adjusting Sunroofs and Convertible Tops
VII.K Non Structural Repair: Plastics, Adhesives, and Welding		
VII.K.1 Identify the types of plastics; determine repairability. HP-I	12.1	29 Plastic Repair Identification and Preparation
VII.K.2 Identify location of damage relative to safety systems (ADAS); determine repairability according to manufacturer repair procedures. HP-G	12.1	29 Plastic Repair Identification and Preparation
VII.K.3 Clean and prepare the surface of plastic parts; identify the types of plastic repair procedures. HP-I	12.2	29 Plastic Repair Identification and Preparation
VII.K.4 Repair rigid, semi-rigid, and flexible plastic panels. HP-I	12.2	29 Plastic Repair Identification and Preparation
VII.K.5 Remove, replace, or repair damaged areas of rigid exterior composite panels. HP-G	12.3	30 Repairing Cosmetic Damage on Plastic Parts 31 Repairing Tears and Breaks in Flexible Plastic Parts 32 Repairing Tears and Breaks in Semi-Rigid Plastic Parts 33 Repairing Cosmetic Damage in SMC Plastic Parts 34 Repairing Damage in Fiberglass Panels
VII.K.6 Repair plastic parts by welding (nitrogen or airless). HP-I	12.2	30 Repairing Cosmetic Damage on Plastic Parts 31 Repairing Tears and Breaks in Flexible Plastic Parts 32 Repairing Tears and Breaks in Semi-Rigid Plastic Parts 33 Repairing Cosmetic Damage in SMC Plastic Parts 34 Repairing Damage in Fiberglass Panels
VII.K.7 Perform a single-sided adhesively bonded cosmetic repair. HP-I	12.2	30 Repairing Cosmetic Damage on Plastic Parts 31 Repairing Tears and Breaks in Flexible Plastic Parts 32 Repairing Tears and Breaks in Semi-Rigid Plastic Parts 33 Repairing Cosmetic Damage in SMC Plastic Parts 34 Repairing Damage in Fiberglass Panels

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Tasks	Textbook Sections	Shop Manual Related Jobs
VII.K.8 Perform a double-sided adhesively bonded repair. HP-I	12.2	30 Repairing Cosmetic Damage on Plastic Parts 31 Repairing Tears and Breaks in Flexible Plastic Parts 32 Repairing Tears and Breaks in Semi-Rigid Plastic Parts 33 Repairing Cosmetic Damage in SMC Plastic Parts 34 Repairing Damage in Fiberglass Panels
VII.K.9 Perform an adhesively bonded or welded tab repair. HP-I	12.2	30 Repairing Cosmetic Damage on Plastic Parts 31 Repairing Tears and Breaks in Flexible Plastic Parts 32 Repairing Tears and Breaks in Semi-Rigid Plastic Parts 33 Repairing Cosmetic Damage in SMC Plastic Parts 34 Repairing Damage in Fiberglass Panels
VII.K.10 Shape and reform damaged plastic. HP-I	12.4	30 Repairing Cosmetic Damage on Plastic Parts
VII.L Mechanical and Electrical Components: Suspension and Steering		
VII.L.1 Reinstall wheels and tighten lug nuts to manufacturers spec using a torque wrench. HP-I	19.5	91 Torque Wrench Operation 92 Removing and Installing a Wheel and Tire Assembly
VII.M Mechanical and Electrical Components: Electrical		
VII.M.1 Remove, replace, and recharge battery. HP-I	21.4	110 Testing, Charging, and Jumpstarting Batteries
VII.M.2 Check operation and aim headlamp assemblies and fog/driving lamps. HP-G	21.5	13 Removing, Installing, and Aligning a Fender
VII.M.3 Remove and replace horn(s); check operation. HP-I	21.5	106 Identifying Electrical System Damage
VII.M.4 Check operation of wiper/washer systems. HP-I	21.6	106 Identifying Electrical System Damage
VII.N Mechanical and Electrical Components: Fuel, Intake, and Exhaust Systems		
VII.N.1 Remove and replace air intake components. HP-G	24.2	—

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