Parts General Information

Parts Illustrations

The linking of detailed, exploded diagrams and text in each section helps you note all of the affected parts. Those parts most likely to be damaged together are displayed together.

Part Numbers

Part numbers are included to facilitate estimating. It is recommended, however, that the year, make, model and VIN or model code information be given to dealership personnel for verification of application and most current pricing. There are often non-interchangeable right-hand and left-hand parts which have the same price and are similar in format. Those right and left part numbers are combined on one line, always listing the right part first (example: 4016306-7). This means the right number is 4016306 and the left number is 4016307. This applies whether the right number is the higher or the lower. If the right and left numbers differ widely, each is listed on a separate line.

Discontinued Parts

Occasionally parts are discontinued by manufacturers. Any discontinued parts that Mitchell can identify will continue to be carried in the *Guide*, but will be identified by a **"d"** preceding the part price. Any part number and part price listed with a preceding **"d"** should be considered to be the last available factory information.

Remanufactured Parts

Where possible, remanufactured parts are listed by vehicle manufacturer. From time to time, however, the manufacturer may supersede a new part to a remanufactured part and/or not identify a part as being remanufactured. Therefore, care should be exercised when ordering parts that are often remanufactured, including, but not limited to alternators, water pumps, starters, brake calipers, control modules, A/C compressors, air flow meters, ignition distributors, axle shafts, power steering pumps, radios, steering racks, and turbochargers. All known remanufactured parts will be identified by a **"R"** preceding the part price. Any part number and part price listed with a preceding **"R"** should be considered to be the last available factory information. These remanufactured parts may have a core charge in addition to the part price listed. Often, collision damage makes a core ineligible for return. Contact the dealer for policy clarification **before** remanufactured parts are purchased.

OEM Refinished Parts

Mitchell lists as many colors of OEM pre-painted, high impact parts as is practical. The manufacturer will sometimes, without notice, replace a pre-painted part with a part that requires refinishing. Dealer contact may be required for these items.

Non-Reusable Parts

Some attachment components may not be suitable for reuse (examples: plastic clips, fasteners, suspension bolts). Caution should be taken when estimating removal and/or replacement. It should be agreed upon as to what parts may require replacement even though not noticeably damaged.

Federal Motor Vehicle Theft Prevention Act

Federal Motor Vehicle Theft Prevention Action of 1984 mandates that high theft vehicles carry a VIN identification sticker on major components. This law also mandates replacement parts must carry this identification in the form of an R-DOT (Replacement-Department of Transportation) label. Penalties may apply to their removal or alteration. Contact NHTSA or the part manufacturer for further information.

Price General Information

Parts Prices

Each issue of the *Guide* reflects the latest pricing activity available from the vehicle manufacturers at time of printing. The prices shown in each issue are **MANUFACTURERS' SUGGESTED RETAIL PRICES. PRICES AND AVAILABILITY OF PARTS VARY FROM TIME TO TIME AND BY GEOGRAPHICAL AREA, AND ARE SUBJECT TO CHANGE WITHOUT NOTICE.**

Special Pricing

As described below, certain replacement parts are included in the General Motors Goodwrench Service Merchandising Parts (GSMP) Program or the Mopar Competitive Crash Parts Program. These parts are designated by either a "black box" or the "§" symbol in the parts price column.

General Motors Goodwrench Service Merchandising Parts (GSMP) Program: Parts included in this program may not have a manufacturer's suggested retail price. The price, if any, following this symbol is an approximation that you may find helpful. The actual price may be higher or lower, and can be determined by contacting your local dealer.

Mopar Competitive Crash Parts Program: Parts included in this program may be available with special pricing. Additional purchase discounts may apply. See your Chrysler Corporation dealership for availability and participation. Dealers are not required to adhere to suggested prices and are free to set their own prices for parts.

Glass Prices

There are instances where the vehicle manufacturer does not provide replacement glass. Therefore, both the manufacturers' and National Auto Glass Specifications (NAGS) prices are listed throughout the *Guide*. NAGS part numbers and prices are produced under license from NAGS INTERNATIONAL—All rights reserved.

Database Inquiries/Toll-Free Number

Your comments and suggestions are appreciated and invaluable to us. Call us toll-free at 800-854-7030 or 858-368-7000. You can also fax us toll-free at 888-256-7969 or 858-549-0629. Inquiries via email may also be sent to collisionproductsupport@mitchell.com. You will receive a prompt response to each inquiry.

Symbols

The following symbols are used throughout Mitchell Estimating information and are explained in detail in each section.

d — Discontinued Part: Refer to *Parts General Information* for full explanation.

§ or "black box" — Special Pricing: Refer to *Price General Information* for full explanation.

¶ — Part Footnote: Special part situations or requirements are denoted with a footnote symbol. The explanation follows as closely as possible to the part referenced.

(P) — Paint to Match: A designation that appears immediately after a part description or application to identify components that must be painted to match the exterior/interior color of the vehicle.

(R) — Remanufactured Part: Refer to *Parts General Information* for full explanation.

 # — Labor Footnote: Special labor situations or requirements are denoted with a footnote symbol. The explanation follows as closely as possible to the time referenced.

m — Mechanical Operation: A designation that appears in a separate text column to the left of the labor time column to identify components for which R&I or R&R is commonly considered to be a **mechanical** operation when performed in a collision repair environment.

s — Unibody Structural Component: A designation that appears in a separate text column to the left of the labor time column to identify unibody **structural** components—those which support the weight of the vehicle and absorb the energy of the impact as well as road shock.

Estimating Information

Guide Layout Sequence

Identify the Vehicle

Models are often combined in one service because there is enough similarity between them that a separate service for each is not necessary. Record all model identification information on the damage report. Paint code locations are found in the front of the *Guide* and/or the beginning of each service. This will save time in searching for refinish codes or touchup paint.

Use the Layout as a Guide

An alphabetized Section Index can be found at the beginning of each service. Arranged from front to rear and from outside the vehicle inward are about 30 sections for each service (example: grille, quarter panel, luggage lid). Most have illustrations in which the components are identified and described, and part numbers, part prices, and labor times are shown. The descriptions are carefully arranged to depict the most frequent kinds of collision damage.

Work Through the First Section

From the outside inward, note each part that is damaged and its attachments. For each part, list the part number, the price and the labor time.

Work Through Each Section

Use the sequence in the book as a guide and a reminder, and observe the notes that apply to specific situations. For the first few damage reports it is well worth reading through the *Procedure Explanations* to become thoroughly familiar with the approach used, and to know which parts and operations are included and which are not.

Complete the Damage Report

Add up all the labor times and calculate the total. Add up total part prices and material costs. Total, and you have a complete and accurate damage report.

Definitions

Bolted Parts and Assemblies

Refers to items bolted to inner structures, radiator supports, cowl and dash, etc., that **may** need to be removed for access. Due to the variety of these items and vehicles, time to remove and install or replace them is not included. Refer to the specific *Procedure Explanation* for examples of these items.

Disconnect & Connect

Disconnect a part or assembly by unbolting and/or unplug, and set it aside without physically removing it from the vehicle to gain access or removal of an adjacent part. The disconnected part or assembly is then reconnected during the assembly process.

High Strength Steels

Complete HSS information is not available from the vehicle manufacturers. When information is available, the components will be called out by the appropriate acronym (HSS/UHSS etc.) within the text after the name of the part identified. See *Abbreviations* in *Reference Information* for a list of acronyms and their definitions.

New Undamaged Part

Refers to a replacement part from the vehicle manufacturer without exterior or interior trim or attached parts.

Overhaul (O/H)

Remove an assembly, disassemble, clean and visually inspect it, replace needed parts, reassemble and reinstall on the vehicle making any necessary adjustments. Items which can only be changed by using the overhaul operation are shown by placing "IOH" (Included in Overhaul) in the column. There are other items which are included in the overhaul operation that may be replaced individually. These will have a time assigned for a stand-alone operation. For verification, refer to the *Procedure Explanation* for the operation being performed.

Overlap

If adjoining parts are being replaced (example: quarter and rear body panels), there is an overlap in that both individual operations include common welded surfaces or parts attached to both panels. A deduction must, therefore, be made from the total of the individual operations to compensate for the two or more repeated operations in each sub-task. Similarly, if a part has already been removed, it makes access to other parts easier.

Remove and Install (R&I)

Remove a part or assembly, set it aside and reinstall it later. The time shown includes the alignment that can be done by shifting the part or assembly.

Remove and Replace (R&R)

Remove a part or assembly identified as included within the *Procedure Explanation* and replace the part or assembly with a new one. The time shown includes the alignment that can be done by shifting the part or assembly.

Underhood Dimensions

Engine compartment views are shown as if you are above the vehicle looking down. A centerline is provided for measuring strut widths. The illustration is an exact view of the engine compartment showing all bolts, holes, supports and other structural components. Measurements can be duplicated with tape measure or with tram bar pointers set at equal lengths. Dimensions are given, whether symmetrical or non-symmetrical. All round holes are measured to center. Oval holes are usually measured to the front or rear center. Measurements are shown in millimeters. These dimensions are for estimating purposes only. See *Vehicle Dimension* topic in the *Mitchell Information Center*.

Order by Application

Many parts vary in usage according to differences in colors, materials, engines, transmissions, VIN, year and other factors. Where there are occasional variations regarding the part price, a representative part number at times is selected and the phrase "Order By Application" is footnoted to the part's description. Consult the dealer parts department for exact price and/or part number information.

Labor General Information

IMPORTANT REMINDER: Labor related notes in the text portion override the *Procedure Explanation* pages.

Aluminum

The labor times shown for aluminum panel R&R represent replacement according to the manufacturer's recommended procedures and guidelines. Within the published labor times Mitchell has also taken into consideration these commonly asked about items; **Remove and Replace:** Rivets, Drill and de-burr rivet holes, EMC screws, Flow drill screws, **Body pretreatment:** Flame coat treatment, Application of bonding adhesives, **Welding (if applicable):** Welding equipment set-up, "Run-on" or "Cold start" tabs.

NOTE: In addition, Aluminum panel replacement follows the guidelines outlined in specific applicable panel P-Pages. e.g. Aluminum Quarter Panel replacement follows Procedure 20, Quarter Panel R&R.

IMPORTANT REMINDER: The cost of aluminum panel replacement materials is not included in panel replacement R&R times. (example: Rivets, Panel bonding, Adhesives, Bonding primer, EMC screws, Flow drill screws etc.).

Labor Times

THE LABOR TIMES SHOWN IN THE *GUIDE* ARE IN HOURS AND TENTHS OF AN HOUR (6 MINUTES) AND ARE FOR REPLACEMENT WITH NEW, UNDAMAGED PARTS FROM THE VEHICLE MANUFACTURER ON A NEW, UNDAMAGED VEHICLE. Any additional time needed for collision **DAMAGE ACCESS, ALIGNMENT PULLS, NON-ORIGINAL EQUIPMENT or USED PARTS** should be agreed upon by all parties. Times for some operations are applicable after necessary bolted, attached or related parts have been removed. Exceptional circumstances, including all the sub-operations or extra operations, are indicated as notes throughout the text or are identified in the *Procedure Explanations*. The actual time taken by individual repair facilities to replace collision damaged parts can be expected to vary due to severity of collision, vehicle condition, equipment used, etc.

Labor Categories

The labor times shown in the *Guide* fall into various categories (for example, body, frame, mechanical) as determined by the repair facility's operating procedures. As a guide, components for which R&I or R&R is commonly considered to be a mechanical operation when performed in a collision repair environment are designated with the letter **"m"** in the text. These designations are only a guide. They are not necessarily all inclusive, nor do they suggest the application of a labor rate.

Welded Panels

Replacement labor times for new panels that are joined by welding include the necessary use of inserts and accepted sectioning guidelines developed by OEMs, I-CAR, and TECH-COR. The labor times for welded panels include grinding, filling and final sanding with up to 150 grit sandpaper to match the original panel contour. Labor times do Not-Include the Feather, Prime and Block refinish operation. *See Procedure 28* in *Procedure Explanation* section, for information on Feather, Prime and Block.

Adhesive Panel Bonding

Replacement labor times for panel bonding include all necessary weld applications identified by adhesive material manufacturers and OEM guidelines. Users should reference best practices procedures from bonding material manufacturers and/or OEM guidelines before selecting this replacement method option.

Shop Material

The labor times shown in the *Guide* do not take into account the cost of any materials, or the cost of hazardous materials recycling or disposal.

Disable and Enable Air Bag System

The labor times shown in the *Guide* represent the procedures necessary to disable and enable the air bag system in order to replace air bag system components and/or to perform repairs not related to the air bag system, e.g., welding. This procedure includes visually monitoring the air bag warning light to verify proper system functionality. The allowance does not include troubleshooting of the system if proper system functionality is not present.

Diagnose Air Bag System

The labor times shown in the *Guide* to diagnose air bag systems include system disable and enable, removal and installation of air bag module(s) (where required), installation of appropriate simulators, and retrieving and clearing of trouble codes. Time for specific troubleshooting of Diagnostic Trouble Codes (DTCs) is not included.

Glass Labor Times

The labor times shown in the *Guide* for glass listed with the NAGS part numbers are Mitchell times, not times from NAGS. Glass labor times are for remove and replace (R&R), i.e., removal of the existing glass and its replacement with new glass. Some glass labor times are also shown for removal and the later installation (R&I) of the same glass.

Stripes, Decals and Overlays

The labor times shown in the *Guide* for these items refer to installation only.

TECH-COR Repair Information

The labor times shown in the *Guide* for TECH-COR repair procedures are supplied by Mitchell. TECH-COR does not endorse, sanction or otherwise approve such times. TECH-COR publications are copyrighted material. However, reproduction of TECH-COR bulletins is permitted as long as the bulletin is reproduced in its entirety, including source attribution. TECH-COR bulletins may be obtained by contacting: TECH-COR, Inc., Technical Communications Dept., 100 East Palatine Road, Wheeling, IL 60090; Phone: 847-667-2341.

Base Model Vehicle

Vehicle with the minimal level of equipment available from the manufacturer.

Types of Vehicles

The types of vehicles covered are regular production models only.

Comprehensive Labor Time

While completeness is strived for in each *Guide,* there will be instances, however, in which a labor time has not been established for an operation at the time of publication. If an item requires replacement and can be replaced as an individual item but shows no time, a time should be agreed upon among all parties and recorded on the damage report. It also should not be inferred that a component with no established Mitchell labor time has been included in another component's replacement allowance.

Procedure Reference

Throughout each vehicle "service" there are *Procedure Explanation* reference notes located immediately following the main section headings. Example: BUMPER/FRONT PANEL is followed by, "Use *Procedure Explanations 1, 3 and 28* with the following text." This indicates that the text portion and the *Procedure Explanations* for Front Bumper, Front Panel and Refinish should be used in conjunction with one another when writing a damage report. **LABOR RELATED NOTES IN THE TEXT PORTION OVERRIDE THE PROCEDURE EXPLANATION PAGES.**

Procedures

The *Procedure Explanations* on the following pages outline the operations which are or are not included in the labor time listed in each vehicle "service." You are encouraged to become familiar with these procedure pages to be sure you have a thorough understanding of the Mitchell approach to collision estimating.

The left **Included Operations** column means that the labor time shown in the *Mitchell Collision Estimating Guide* text includes that particular operation or operations.

The right **Not Included Operations** column means that the labor time in the text does not include that particular operation or operations. Performance of one or more of these operations may or may not be necessary as determined by the individual job requirements. If an add-on time has been established for any of these operations it will be shown in the text. If a time has not been established or if the add-on time is dependent on conditions that vary due to collision damage (example: access time, free up parts), the additional time should be recorded on the damage report. Labor times relating to the repair of a damaged panel or the use of used parts would come under this category.

Additions to Labor Times

Due to the wide range of collision damage and vehicle conditions, labor times for the following operations are **not included** in the *Guide*.

Access Time

Remove extensively damaged parts by cutting, pushing, pulling, etc.

Anti-Corrosion Rust Resistant Material

Remove and/or apply weldable zinc primers, wax, petroleum based coatings, undercoating or any type of added conditioning.

Broken Glass Clean Up

Clean vehicle of all broken glass.

Detail

Clean vehicle to pre-accident condition.

Drain & Refill

Fuel (see fuel tank)

Electronic Components

- Time to remove and install as necessary; includes wiring and/or wiring harness and computer module.
- Time to reset memory code function (example: seat position, radio presets) when battery has been disconnected to perform repairs.
- Time to complete computer relearn procedures for proper operation of vehicle systems (example: power sunroof, power window) when battery has been disconnected to perform repairs.

Estimating Information

Fabrication
Fabrication of reinforcements or inserts (new component not cut or manufactured from existing or new part, but from raw stock).

Free Up Parts
Time necessary to free up parts frozen by rust or corrosion.

Measure and Identify
Structural damage by comparing vehicle underbody, underhood, and upperbody reference points to accepted, OEM-based dimension specification to identify damage to unibody vehicles.

Plug and Finish Holes
Time to plug and finish unneeded holes on parts being installed.

Repair or Align
Parts or adjacent to parts being replaced.

Rework Parts
To fit a particular year or model (example: cutting holes for lamps, modifying a radiator support).

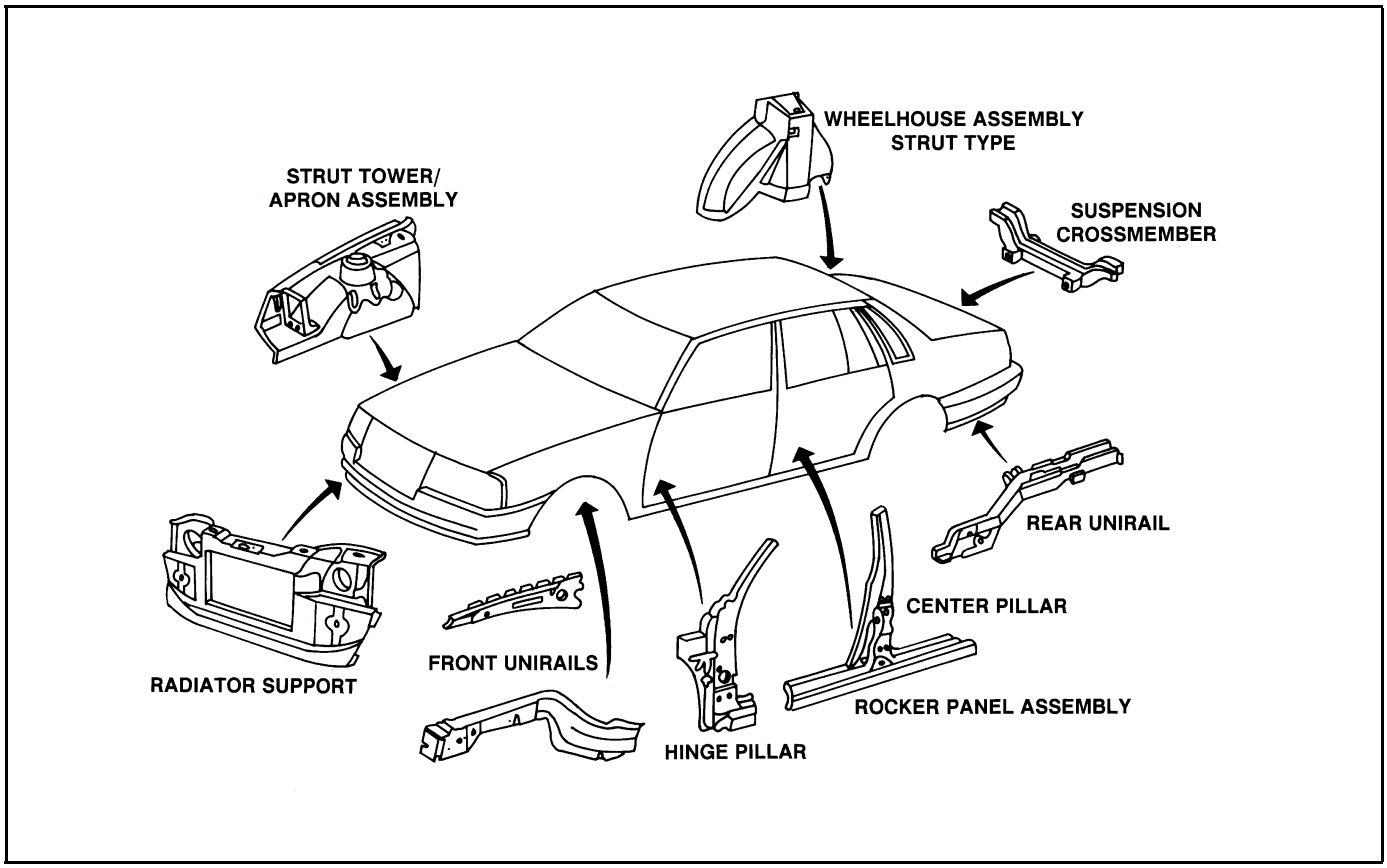
Tar and Grease
Removal of these or any other materials that would interfere with operation.

Transfer Time
For welded, riveted or bonded brackets, braces or reinforcements from old part to new part.

Unibody Structural Components

Unibody structural components are parts which support the weight of the vehicle and absorb the energy of the impact as well as road shock. These components are designated with the letter **"s"** in the text. The components are the radiator support, front and rear unirails, apron and wheelhouse (strut type) assemblies, rocker panel assemblies and suspension crossmembers. Body pillars, while not primary load-bearing structures, also require special treatment and are considered structural components.

Fig. 1: Component Identification & Illustration—Courtesy of TECH-COR, Inc.



Procedure 1—Front Bumper

Bumper Assembly R&I

Included Operations

- Remove assembly from frame, impact absorbers or mounting arms
- Reinstall assembly
- Adjust alignment to vehicle

Not Included Operations

- Refinish bumper
- Remove and install optional accessories (example: auxiliary lamps, brush guard, fog lamps, headlamp washer systems, laser/radar cruise control sensors, parking aid sensors, spoilers)

Bumper Assembly O/H

Included Operations

- Remove assembly from frame, impact absorbers or mounting arms
- Disassemble and replace damaged parts
- Assemble and install
- Adjust alignment to vehicle
- Remove and install or replace: License plate/bracket, Parklamp if so equipped

Not Included Operations

- Refinish bumper
- Remove and replace impact absorbers or mounting arms
- Remove and install or replace optional accessories (example: auxiliary lamps, brush guard, fog lamps, headlamp washer systems, laser/radar cruise control sensors, parking aid sensors, spoilers)
- Remove and install adhesive exterior trim; add to clean and retape
- Replace new adhesive exterior trim; deduct one-half of R&R time
- Install stripes, decals, transfers or overlays

Procedure 2—Front Bumper & Grille

Bumper/Grille Assembly R&I

Included Operations

- Remove assembly from frame, impact absorbers or mounting arms
- Reinstall assembly
- Adjust alignment to vehicle

Not Included Operations

- Refinish cover
- Aim lamps
- Remove and install optional accessories (example: auxiliary lamps, brush guard, fog lamps, headlamp washer systems, laser/radar cruise control sensors, parking aid sensors, spoilers)

Bumper/Grille Assembly O/H

Included Operations

- Remove assembly from frame, impact absorbers or mounting arms
- Replace or transfer parts attached except those listed in *Not Included* Section
- Disassemble and replace damaged parts
- Assemble and install
- Adjust alignment to vehicle
- Remove and install or replace: Grille, Headlamps as an assembly, License plate/bracket, Parklamp if so equipped

Not Included Operations

- Refinish bumper
- Aim lamps
- Overhaul or replace headlamp parts
- Remove and replace impact absorbers or mounting arms
- Remove and install or replace optional accessories (example: auxiliary lamps, brush guard, fog lamps, headlamp washer systems, laser/radar cruise control sensors, parking aid sensors, spoilers)
- Remove and install adhesive exterior trim; add to clean and retape
- Replace new adhesive exterior trim; deduct one-half of R&R time
- Install stripes, decals, transfers or overlays

Procedure 3—Front Panel

Front Panel R&R

Included Operations

- Remove and replace panel assembly
- Replace or transfer attached bolted parts
- Remove and install or replace: Grille, Headlamps as an assembly, Parklamp if so equipped
- Loosen fender(s) for access, if necessary
- Replace clip type moulding for base model vehicle

Not Included Operations

- Refinish front panel
- Aim lamps
- Overhaul or replace headlamp parts
- Remove and install: Front bumper unless noted otherwise, Fender(s) unless noted otherwise, Adhesive exterior trim; add to clean and retape
- Replace new adhesive exterior trim; deduct one-half of R&R time
- Install stripes, decals, transfers or overlays
- Drill holes for installing exterior trim

Procedure 4—Hood

Hood Panel R&R

Included Operations

- Remove and replace hood assembly
- Remove and install or replace: Parts attached to hood except those listed in *Not Included* Section
- Replace clip type moulding for base model vehicle
- Replace caulking for standard factory application if necessary

Not Included Operations

- Refinish hood panel
- Remove and install or replace: Hinges, Gas prop rod
- Remove and install adhesive insulator
- Remove and install adhesive exterior trim; add to clean and retape
- Replace new adhesive exterior trim; deduct one-half of R&R time
- Install stripes, decals, transfers or overlays
- Drill holes for installing exterior trim

Procedure 5—Cooling

Radiator Support R&R

Included Operations

- Remove and install or replace: Shroud when support is serviced by manufacturer as a one piece unit, Radiator assembly when support is serviced by manufacturer as a one piece unit, Impact absorbers or mounting arms if necessary to perform operation.

Not Included Operations

- Refinish radiator support
- Aim lamps if attached to support
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove and install: Front bumper, Hood panel if necessary, Front header panel, Front fenders, Wiring and/or wiring harness
- Remove and replace: Radiator hoses, Fan, pulley, fan clutch or belts, Decals (example: EPA, body identification, caution/danger)
- Remove and install or replace: Suspension assemblies, Bolted parts and assemblies (example: fluid reservoirs and coolers, vapor canister, cruise control, air conditioning components)

IMPORTANT REMINDER: Labor times for inner panels, rails or reinforcements are with outer panels removed.

NOTE: For Unibody type vehicles *see Procedure 8—Front Inner Structure - Unibody*.

Radiator R&R

Included Operations

- Remove and install or replace: Shroud, Electric fan if necessary
- Disconnect and connect: Hoses at radiator, Transmission coolant lines

- Drain, refill and check coolant
- Visual check for leaks

Not Included Operations

- Remove and install or replace: Fan, Pulley, Fan clutch, Belts, Hoses if necessary; add .1 hour for one, .2 hour for all hoses
- Pressure test system if necessary (example: check for damage due to collision); add .3 hour

Procedure 6—Air Conditioning

Air Conditioning R&R

Included Operations

- Each operation identified in the text is considered to be a stand-alone operation.

Not Included Operations

- Evacuate and recharge system
- Refrigerant recovery
- Remove and install or replace: Receiver drier
- Leak check

IMPORTANT REMINDER: If all refrigerant has been lost by collision damage, or if refrigerant lines have been opened and not immediately sealed, the receiver drier should be replaced. Replacement of collision damaged parts on a system that is still pressurized should not require replacement of receiver drier.

NOTE: Refrigerant recovery is the removal of refrigerant from the vehicle A/C system as specified by SAE standard J-2209 and its transfer to a holding tank. The recovery operation does not include recycling of the used refrigerant.

Procedure 7—Front Fender

Front Fender R&R

Included Operations

- Remove and install or replace: Headlamp assembly if attached to fender, Cornering lamp if so equipped, Side marker lamp if so equipped, Turn indicator if so equipped, Parts attached to fender except those listed in *Not Included* Section
- Replace clip type moulding for base model vehicle

Not Included Operations

- Refinish front fender
- Aim lamps
- Remove and install front bumper
- Remove and install or replace: Front header panel, Skirt or liner, Wheel, Antenna, Rocker moulding
- Remove and install adhesive exterior trim; add to clean and retape
- Install stripes, decals, transfers or overlays
- Drill holes for installing exterior trim
- Cut holes for installing lamps

Procedure 8—Front Inner Structure - Unibody

Inner Structure Assembly R&R

Included Operations

- Remove and install: Cowl trim
- Remove and install or replace: Shroud and radiator assembly, Impact absorbers or mounting arms if necessary to perform operation, Cowl top panel if assembly includes dash panel
- Loosen and pull back carpet and insulation as required
- Remove and replace caulking for standard factory application

Not Included Operations

- Refinish radiator support, apron and/or front rail
- Aim lamps
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove and install: Front bumper, Hood panel, Front header panel, Front fenders, Engine, Wiring and/or wiring harness
- Remove and replace: Radiator hoses, Fan, pulley, fan clutch or belts, Decals (example: EPA, body identification, caution/danger)
- Remove and install or replace: Suspension assemblies, Bolted parts and assemblies (example: fluid reservoirs and coolers, vapor canister, cruise control, air conditioning components), Instrument panel and center console, Seat assemblies, Windshield and mouldings, Air safety bag
- Wheel alignment

IMPORTANT REMINDER: Labor times for inner panels, rails or reinforcements are with outer panels removed.

IMPORTANT REMINDER: Sectioning of a panel may or may not be recommended by vehicle manufacturer. This procedure should only be performed when a qualified and knowledgeable technician has determined that the operation does not jeopardize the integrity of the vehicle.

Radiator R&R

Included Operations

- Remove and install or replace: Shroud, Electric fan if necessary
- Disconnect and connect: Hoses at radiator, Transmission coolant lines
- Drain, refill and check coolant
- Visual check for leaks

Not Included Operations

- Remove and install or replace: Fan, Pulley, Fan clutch, Belts, Hoses if necessary; add .1 hour for one, .2 hour for all hoses
- Pressure test system if necessary (example: check for damage due to collision); add .3 hour

Radiator Support R&R

Included Operations

- Remove and install or replace: Shroud when support is being replaced as a complete unit, Radiator assembly when support is being replaced as a complete unit, Impact absorbers or mounting arms if necessary to perform operation
- Remove and replace caulking for standard factory application

Not Included Operations

- Refinish radiator support
- Aim lamps
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove and install: Front bumper, Hood panel if necessary, Front header panel, Front fenders, Wiring and/or wiring harness
- Remove and replace: Radiator hoses, Fan, pulley, fan clutch or belts, Decals (example: EPA, body identification, caution/danger)
- Remove and install or replace: Bolted parts and assemblies (example: fluid reservoirs and coolers, vapor canister, cruise control, air conditioning components)

IMPORTANT REMINDER: Sectioning of a panel may or may not be performed by vehicle manufacturer. This procedure should only be performed when a qualified and knowledgeable technician has determined that the operation does not jeopardize the integrity of the vehicle.

Apron Panel and/or Front Rail R&R

Included Operations

- Remove and install: Cowl trim
- Remove and install or replace: Impact absorbers or mounting arms if necessary to perform operation
- Loosen and pull back carpet and insulation as required
- Remove and replace caulking for standard factory application

Not Included Operations

- Refinish apron support and/or front rail
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove and install: Engine, Wiring and/or wiring harness
- Remove and install or replace: Front bumper, Front header panel, Front fender, Hood panel and Cowl top panel, Suspension assemblies, Upper reinforcement, Bolted parts and assemblies (example: fluid reservoirs and coolers, vapor canister, cruise control, air conditioning components),

Decals (example: EPA, body identification, caution/danger), Instrument panel and center console, Seat assemblies
- Wheel alignment

IMPORTANT REMINDER: Sectioning of a panel may or may not be recommended by vehicle manufacturer. This procedure should only be performed when a qualified and knowledgeable technician has determined that the operation does not jeopardize the integrity of the vehicle.

Engine Subframe/Crossmember R&R

Included Operations

- Suspend/Support assemblies (except if required to R&I for access): Engine, Suspension
- Remove and install assemblies: Exhaust, Hood, Steering gear
- Remove and install or replace: Engine mounts/absorbers (mounted on subframe), Engine undercovers, Stabilizer bar and brackets

Not Included Operations

- Remove and install assemblies: Engine, Suspensions
- Overhaul or replace: Exhaust system components, Hood, Steering gear components, Suspension components, Wheel alignment
- Bleed brakes if necessary

Procedure 9—Frame

Frame Assembly R&R

Included Operations

- Remove and install: Front and rear bumpers, Front sheet metal as an assembly, Hood, Body assembly, Pickup bed, Spare tire (when attached to frame), Mechanical assemblies (example: engine, transmission, suspension, fuel tank, differential and components)
- Remove and install or replace: Radiator, Wiring and/or wiring harness if necessary, Exhaust system, Fluid lines, Engine mounts/absorbers, Vapor canister, Clips and bolted brackets attached to frame

Not Included Operations

- Overhaul assemblies or replace parts of assemblies that are transferred
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove and install: Seats, Interior trim if necessary
- Remove and install or replace: Welded or riveted assemblies of the frame (*see Note*), Optional accessories (example: auxiliary lamps and fuel tanks, brush guard, trailer hitch, trailer connector)
- Wheel alignment
- Adjust control linkage
- Bleed brakes if necessary
- Evacuate and recharge Air Conditioning if so equipped and necessary
- Refrigerant recovery if necessary
- Pull back carpet as required

NOTE: Frame Assembly R&R requires planning. Proper preparation and job sequencing are key to performing this operation. Also, special equipment, additional work space and manpower may be needed.

NOTE: It may be necessary to transfer parts from the damaged frame or order new parts to use on the new frame. This cannot be determined until you see the new frame. The needed additional time for this operation must be estimated.

Front Suspension Crossmember R&R

Included Operations

- Remove and/or disconnect necessary attaching bolts and components to frame and raise front sheet as an assembly
- Loosen or remove and install: Suspension assemblies as necessary

Not Included Operations

- Remove and install front bumper
- Remove and install or replace: Steering gear
- Remove and install or suspend: Engine assembly
- Overhaul and replace suspension parts
- Wheel alignment
- Bleed brakes if necessary

Rear Crossmember R&R

Included Operations

- Remove and install: Rear gravel shield if necessary, Tailpipe or rear muffler if necessary

Not Included Operations

- Remove and install rear bumper
- Remove and replace fuel tank

Procedure 10—Wheel/Wheel Alignment

Wheel and Tire R&I

Included Operations

- Jack up and support vehicle
- Remove and install wheel and tire assembly on hub
- Remove and install or replace: Wheel cover or hub cap

Not Included Operations

- Refinish wheel
- Remove and install or replace: Valve stem, Locking type lugs, Locking type wheel covers
- Mount and balance tire

IMPORTANT REMINDER: Labor times with part numbers shown in the text are for Remove and Install (R&I) of the Wheel and Tire Assembly. When necessary to R&I a damaged Wheel and Tire Assembly for repair or sublet and substitute with the vehicle's existing spare wheel and tire for temporary mobility, an additional .2 hour is provided in the Wheel Section headnotes.

Adjust Front Alignment

Included Operations

- Position vehicle on alignment rack and check/adjust tire pressure
- Check ride height and adjust to vehicle manufacturer specifications
- Set-up gauges on all 4 wheels and check wheel run out and front suspension for wear
- Determine vehicle tracking by checking thrust angle to vehicle center line
- Center steering wheel
- Adjust front caster, camber and toe-in where applicable
- Perform vehicle manufacturer recommended shimming procedures if necessary
- Remove vehicle from alignment equipment
- Verify alignment by road test

Not Included Operations

- Diagnostic road test to determine if alignment operations are necessary
- Straighten or replace suspension parts and/or structural components
- Shift or align engine subframe/crossmember and/or axle housing
- Remove and install steering wheel
- Non-vehicle manufacturer shimming
- Adjust wheel bearings
- Adjust rear wheel alignment

NOTE: Labor times for Wheel Alignment are based on the use of Four Wheel Alignment equipment to ensure that a minimum Thrust Angle Alignment is provided in all instances where a Four Wheel Alignment cannot be performed. If other than Four Wheel Alignment equipment is used, some adjustment in labor times may be appropriate.

Adjust Four Wheel Alignment

Included Operations

- Position vehicle on alignment rack and check/adjust tire pressure
- Check ride height and adjust to vehicle manufacturer specifications
- Set-up gauges on all 4 wheels and check wheel run out and front suspension for wear
- Determine vehicle tracking by checking thrust angle to vehicle center line
- Center steering wheel
- Adjust front and rear caster, camber and toe-in where applicable
- Perform vehicle manufacturer recommended shimming procedures if necessary
- Remove vehicle from alignment equipment
- Verify alignment by road test

Not Included Operations

- Diagnostic road test to determine if alignment operations are necessary
- Straighten or replace suspension parts and/or structural components
- Shift or align engine subframe/crossmember and/or axle housing
- Remove and install steering wheel
- Non-vehicle manufacturer shimming
- Adjust wheel bearings

Adjust Rear Alignment

Included Operations

- Position vehicle on alignment rack and check/adjust tire pressure
- Check ride height and adjust to vehicle manufacturer specifications
- Set-up gauges on all 4 wheels and check wheel run out and front suspension for wear
- Determine vehicle tracking by checking thrust angle to vehicle center line
- Adjust rear caster, camber and toe-in where applicable
- Perform vehicle manufacturer recommended shimming procedures if necessary
- Remove vehicle from alignment equipment
- Verify alignment by road test

Not Included Operations

- Diagnostic road test to determine if alignment operations are necessary
- Straighten or replace suspension parts and/or structural components
- Shift or align rear suspension axle assembly carrier and/or housing
- Remove and install, or center steering wheel
- Non-vehicle manufacturer shimming
- Adjust wheel bearings
- Adjust front wheel alignment

NOTE: If Front Wheel Adjustment is necessary, cancel Adjust Rear Alignment procedure and use Adjust Four Wheel Alignment procedure.

Procedure 11—Front Suspension

Front Suspension Component R&R

Included Operations

- Each operation identified in the text is considered to be a stand-alone operation unless noted otherwise
- Remove and install wheel

Not Included Operations

- Wheel alignment
- Bleed brakes if necessary

Front Suspension O/H

Included Operations

- Remove and install wheel
- Disassemble and clean parts
- Visual check for damage
- Replace needed parts
- Assemble

Not Included Operations

- Replace steering linkage parts
- Remove and replace: Torsion or stabilizer bar, Drive axle parts
- Bleed brakes if necessary
- Wheel alignment

IMPORTANT REMINDER: Due to the design of suspension on unibody vehicles, it may be necessary to perform four wheel alignment.

Procedure 12—Engine/Fuel Tank

Engine & Transmission R&I

Included Operations

- Disconnect and connect: Necessary components to remove and install engine/transmission as an assembly
- Remove and install hood assembly

Not Included Operations

- Remove and install: Radiator if necessary, Any parts on engine if necessary
- Adjust linkage if adjustable type
- Evacuate and recharge air conditioning if so equipped and necessary

NOTE: Labor times shown in the text are only to remove and install the engine and/or transmission assembly in order to facilitate other work. The times are not for engine or transmission replacement.

Fuel Tank R&R

Included Operations

- Disconnect & Connect: Fuel Lines at tank, Wiring at tank
- Remove and install or replace: Fuel pump (tank mounted), Interior trim (if necessary), Sending unit, Stone shields/protectors, Tank straps

Not Included Operations

- Drain & Refill
- Remove & install or replace: Exhaust system, Suspension/drive train, Skid plates or specialty equipment

Procedure 13—Windshield

Windshield R&R

Included Operations

- Remove and replace: Reveal mouldings, Garnish mouldings, Wiper arms, Rear view mirror
- Replace weatherstrip if so installed
- Replace necessary adhesive/urethane
- Clean up old adhesive in opening area
- Test for leaks

Not Included Operations

- Remove and replace: Aftermarket window tint
- Broken glass clean up

IMPORTANT REMINDER: Urethane set glass may typically be considered a structural component. Refer to OEM replacement procedures for installation methods and materials necessary to restore structural integrity.

IMPORTANT REMINDER: No windshield or flush mounted reveal mouldings can be removed without the possibility of breakage or damage that will require replacement. Unintentional damage to glass that is considered a structural member by the vehicle manufacturer may occur when attempting alignment pulls to correct unibody collision damage. *Agree beforehand* who will incur the charge for damage occurring during normal R&R and R&I operations.

Procedure 14—Cowl & Dash

Hinge and/or Windshield Pillar R&R

Included Operations

- Remove and install: Front door
- Remove and install or replace: Sun visor, if replaced at roof, Sill plates, Jamb switches
- Loosen and pull back: Front area of cloth type headliner, Carpet and insulation as required
- Remove and replace caulking for standard factory application

Not Included Operations

- Refinish pillar
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove and install: Front fender
- Remove and install or replace: Windshield and mouldings, Instrument panel assembly, Door hinges, Air conditioning and heater parts that interfere, Wiring and/or wiring harness
- Remove and install preformed or molded type headliner
- Broken glass clean up

IMPORTANT REMINDER: No windshield or flush mounted reveal mouldings can be removed without the possibility of breakage or damage that will require replacement. Unintentional damage to glass that is considered a structural member by the vehicle manufacturer may occur when attempting alignment pulls to correct unibody collision damage. *Agree beforehand* who

will incur the charge for damage occurring during normal R&R and R&I operations.

IMPORTANT REMINDER: Sectioning of a panel may or may not be recommended by vehicle manufacturer. This procedure should only be performed when a qualified and knowledgeable technician has determined that the operation does not jeopardize the integrity of the vehicle.

NOTE: FULL PANEL REPLACEMENT PROCEDURE - Labor times are for replacement at factory seams if feasible. However, many windshield pillars cannot be replaced at roof seams because the roof panel overlaps the pillar. If a windshield pillar is designed in this manner and a section time is not listed, the time in the text represents replacement of the panel at the most practical area—usually below the roof seam. This method is considered a full panel replacement.

Cowl & Dash R&R

Included Operations

- Remove and install or replace: Cowl top panel, Cowl trim, Weathercords and weatherstrips
- Loosen and pull back carpet and insulation as required
- Remove and replace caulking for standard factory application

Not Included Operations

- Refinish cowl and dash
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove and install: Engine, Front door assemblies, Front fender assemblies
- Remove and install or replace: Windshield and mouldings, Air safety bag, Instrument panel assembly, Air conditioning and heater parts that interfere, Wiring and/or wiring harness, Bolted part and assemblies (example: wiper components, master cylinder)
- Broken glass clean up

Instrument Panel R&R

Included Operations

- Disconnect and connect: Necessary wiring, hoses and cables
- Remove and install: Instrument cluster, Standard gauges, switches and lamps, Trim and attached parts (example: glove box), Heater/Air Conditioning controls if so equipped, Release levers (example: brake, hood, fuel door, trunk)
- Remove and install or replace: Passenger air bag, Crash pad, Standard audio system, Attached brackets and reinforcements (non-welded type)
- Loosen steering column for access
- Test all necessary functions of electrical components for correct operation and reset as required

Not Included Operations

- Refinish instrument panel or crash pad
- Remove and install: Front seats, Steering column, Main wiring harness
- Remove and install or replace: Windshield, Optional equipment (example: electronic components, center console, cruise control), Control cables (example: hood release, remote mirrors), Remote mirrors
- Repair/Rework parts (example: cut holes for modification)
- Drill holes for installing trim
- Broken glass clean up

Center Console R&R

Included Operations

- Disconnect and connect: Necessary wiring, hoses and cables
- Remove and install: Shift lever if necessary (includes adjust neutral safety switch), Standard gauges, switches and lamps, Front seats if necessary, Trim and attached parts, Heater/Air Conditioning controls if so equipped, Release levers (example: seat belt)
- Remove and install or replace: Standard audio system if so equipped, Attached brackets and reinforcements (non-welded type)
- Test all necessary functions of electrical components for correct operation and reset as required

Not Included Operations

- Refinish console or compartment door
- Remove and install: Main wiring harness
- Remove and install or replace: Optional equipment (example: electronic components, air cond. ducts)
- Repair/Rework parts (example: cut holes for modification)
- Drill holes for installing trim

Driver Air Bag Module R&R

Included Operations

- Remove and install or replace: Driver air bag module, Switches attached to steering wheel, if necessary

Not Included Operations

- Remove and install or replace: Impact sensors, Control modules, Wire harness, Steering column
- Disable and enable air bag system
- Diagnose air bag system
- Deployed air bag residue clean-up

Clockspring R&R

Included Operations

- Remove and install or replace: Clockspring, Steering wheel, Driver air bag module

Not Included Operations

- Remove and install or replace: Impact sensors, Control modules, Wire harness, Steering column
- Disable and enable air bag system
- Diagnose air bag system
- Deployed air bag residue clean-up

Passenger Air Bag Module R&R

Included Operations

- Remove and install or replace: Passenger air bag module, Instrument panel, if necessary, Glove box, if necessary

Not Included Operations

- Remove and install or replace: Impact sensors, Control modules, Wire harness, Windshield
- Disable and enable air bag system
- Diagnose air bag system
- Deployed air bag residue clean up

Knee Air Bag Module R&R

Included Operations

- Remove and replace: Knee air bag module

Not Included Operations

- Remove and install or replace: Impact sensors, Control modules, Wire harness, Glove box assembly, Instrument panel grilles, Instrument panel trim panels
- Disable and enable air bag system
- Diagnose air bag system
- Deployed air bag residue clean up

Seat Air Bag Module R&R

Included Operations

- Remove and replace: Seat air bag module

Not Included Operations

- Remove and install or replace: Impact sensors, Control modules, Wire harness, Seat assembly, Seat cover
- Disable and enable air bag system
- Diagnose air bag system
- Deployed air bag residue clean up

Door Air Bag Module R&R

Included Operations

- Remove and replace: Door air bag module

Not Included Operations

- Remove and install or replace: Impact sensors, Control modules, Wire harness, Door glass, Trim panel
- Disable and enable air bag system
- Diagnose air bag system
- Deployed air bag residue clean up

Side Curtain Air Bag Module R&R

Included Operations

- Remove and replace: Side curtain air bag module

Not Included Operations

- Remove and install or replace: Impact sensors, Control modules, Wire harness, Headliner
- Disable and enable air bag system
- Diagnose air bag system
- Deployed air bag residue clean up

IMPORTANT REMINDER: Vehicle manufacturer's recommended service and repair procedures must be followed when servicing any Supplemental Restraint/Air Bag System. Certain safety precautions and disabling procedures must be observed when performing repairs.

Procedure 15—Rocker Panel/Side Body Panel/Center Pillar

Rocker Outer Panel R&R

Included Operations

- Remove and install: Quarter trim at sill
- Remove and install or replace: Cowl trim, Center pillar trim, Sill plates, Rear seat cushion
- Loosen and pull back carpet and/or insulation as required
- Remove and replace caulking for standard factory application

Not Included Operations

- Refinish rocker panel
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove and install: Front or rear doors
- Remove and replace: Hinge pillar, Center pillar, Lock pillar, Quarter panel
- Remove and install or loosen rear edge of front fender
- Remove and install or replace: Rocker moulding, Wiring and/or wiring harness, Control cables (example: latch release), Fluid lines
- Drill holes for installing trim

NOTE: FULL PANEL REPLACEMENT PROCEDURE - Labor times are for replacement at factory seams if feasible. However, many rocker panels cannot be replaced at factory seams because the hinge pillar, center pillar, lock pillar and/or quarter panel overlaps the rocker panel. If a rocker panel is designed in this manner and a section time is not listed, the time in the text represents replacement of the panel at the most practical area. This reduces repair damage to overlapping panels and is considered a full panel replacement.

IMPORTANT REMINDER: Sectioning of a panel may or may not be recommended by vehicle manufacturer. This procedure should only be performed when a qualified and knowledgeable technician has determined that the operation does not jeopardize the integrity of the vehicle.

IMPORTANT REMINDER: Labor times for inner panels, rails or reinforcements are with outer panels removed.

NOTE: Deduct 1.0 hour each for hinge, center and lock pillar if these items are also replaced.

Side Body Panel R&R

Included Operations

- Remove and install: Front door, Rear door, Front seat, Rear seat, Parcel shelf trim, Quarter trim, Plastic wheelhouse liner, Luggage compartment trim, Rear lamp assemblies, Rear bumper, Filler panel, stone deflector, or rear lower valance
- Remove and install or replace: Non urethane set glass (Windshield and moulding, Back window and moulding), Quarter window and moulding, Sun visor, if replaced at roof, Roof rail moulding, if replaced at roof, Cowl top panel, Cowl trim, Weathercords and weatherstrips, Pillar trim, Sill plates, Jamb switches, Lock striker, Bolt-on extension
- Remove and replace urethane set glass: Windshield and mouldings, Back window and moulding, Quarter window and moulding
- Loosen and pull back: Cloth type headliner as required, carpet and/or insulation as required
- Remove and replace caulking for standard factory application
- Replace clip type moulding for base model vehicle

Not Included Operations

- Refinish side body panel
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove and install: Front fender, Preformed or molded type headliner, Fuel tank
- Remove **undamaged** urethane set glass: Windshield and moulding, Back window and moulding, Quarter window and moulding
- Remove and install or replace: Instrument panel assembly, Door hinges, Air conditioning and heater parts that interfere, Wiring and/or wiring harness, Control cables (example: latch release), Fluid lines, Decals (example: EPA, body identification, caution/danger), Rocker moulding, Wheel, Antenna
- Remove and replace inner panels
- Replace sound deadening
- Remove and install adhesive exterior trim; add to clean and retape
- Replace new adhesive exterior trim; deduct one half of R&R time
- Install stripes, decals, transfers or overlays
- Drill holes for installing trim
- Cut holes for installing lamps
- Broken glass clean up

IMPORTANT REMINDER: Labor times for inner panels, rails or reinforcements are with outer panels removed. Also, no windshield, back or quarter glass (if applicable), or flush mounted reveal mouldings can be removed without the possibility of breakage.

Side Body Sectioning Explanation: *See Procedure 20—Quarter Panel*.

SPECIAL NOTE: Procedure Number 15 includes removal of damaged urethane set glass and replacement with new glass. The Procedure does not include allowances for necessary precautionary measures to remove undamaged urethane set glass, nor clean up of the old adhesive on the glass. If the existing urethane set glass is undamaged and will be reused, the labor time difference between the glass R&R and R&I represents the not included allowance.

Example: A Side Body Panel allowance includes a Back Glass R&R of 2.0 hr. The R&I of the back glass is 2.3 hr. The difference of .3 hr. between Back Glass R&R (2.0 hr.) and R&I (2.3 hr.) has not been factored into the Side Body Panel allowance.

Door Opening Panel R&R

Included Operations

- Remove and install: Front door, Rear door, Front seat, Rear seat, Quarter trim
- Remove and install or replace: Sun visor, if replaced at roof, Roof rail moulding, if replaced at roof, Cowl top panel, Cowl trim, Weathercords and weatherstrips, Pillar trim, Sill plates, Jamb switches, Lock striker
- Remove and replace urethane set glass: Windshield and mouldings
- Loosen and pull back: Cloth type headliner as required, Carpet and/or insulation as required
- Remove and replace caulking for standard factory application

Not Included Operations

- Refinish door opening panel
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove and install: Front fender, Preformed or molded type headliner
- Remove **undamaged** urethane set glass: Windshield and moulding
- Remove and install or replace: Instrument panel assembly, Door hinges, Air conditioning and heater parts that interfere, Wiring and/or wiring harness, Control cables (example: latch release), Fluid lines, Decals (example: EPA, body identification, caution/danger), Rocker moulding, Antenna
- Remove and replace inner panels
- Replace sound deadening
- Remove and install adhesive exterior trim: add to clean and retape
- Replace new adhesive exterior trim: deduct one half of R&R time
- Install stripes, decals, transfers or overlays
- Drill holes for installing exterior trim
- Broken glass clean up

IMPORTANT REMINDER: Labor times for inner panels, rails or reinforcements are with outer panels removed. No windshield, back or quarter glass (if applicable), or flush mounted reveal mouldings can be removed without the possibility of breakage or damage that will require replacement. Unintentional damage to glass that is considered a structural member by the vehicle manufacturer may occur when attempting alignment pulls to correct unibody collision damage. *Agree beforehand* who will incur the charge for damage occurring during normal R&R or R&I operations.

IMPORTANT REMINDER: Sectioning of a panel may or may not be recommended by vehicle manufacturer. This procedure should only be performed when a qualified and knowledgeable technician has determined that the operation does not jeopardize the integrity of the vehicle.

SPECIAL NOTE: Procedure Number 15 includes removal of damaged urethane set glass and replacement with new glass. The Procedure does not include allowances for necessary precautionary measures to remove undamaged urethane set glass, nor clean up of the old adhesive on the glass. If the existing urethane set glass is undamaged and will be reused, the labor time difference between the glass R&R and R&I represents the not included allowance.

Example: A Door Opening Panel allowance includes a windshield R&R of 2.0 hr. The R&I of the windshield is 2.3 hr. The difference of .3 hr. between windshield R&R (2.0 hr.) and R&I (2.3 hr.) has not been factored into the Door Opening Panel allowance.

Center Pillar R&R

Included Operations

- Remove and install: Rear door, Front seat
- Remove and install or replace: Pillar trim, Lock striker, Sill plates
- Loosen and pull back: Carpet and/or insulation as required, Cloth type headliner at pillar
- Remove and replace caulking for standard factory application

Not Included Operations

- Refinish center pillar
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove and install preformed or molded type headliner
- Remove and install or replace: Door hinges, Wiring and/or wiring harness, Decals (example: EPA, body identification, caution/danger)
- Drill holes for installing exterior trim

NOTE: Deduct 1.0 hour if roof also replaced.

NOTE: FULL PANEL REPLACEMENT PROCEDURE - Labor times are for replacement at factory seams if feasible. However, many center pillars cannot be replaced at factory seams because the roof panel overlaps the center pillar. If a center pillar is designed in this manner and a section time is not listed, the time in the text represents replacement of the panel at the most practical area - usually below the roof seam. This method is considered a full panel replacement.

IMPORTANT REMINDER: Sectioning of a panel may or may not be recommended by vehicle manufacturer. This procedure should only be performed when a qualified and knowledgeable technician has determined that the operation does not jeopardize the integrity of the vehicle.

Center Pillar & Rocker Panel R&R

Included Operations

- Remove and install: Rear door, Front seat, Quarter trim at sill
- Remove and install or replace: Cowl trim, Pillar trim, Lock striker, Sill plates, Rear seat cushion
- Loosen and pull back: Carpet and/or insulation as required, Cloth type headliner at pillar
- Remove and replace caulking for standard factory application

Not Included Operations

- Refinish center pillar and rocker panel
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove and install: Front door, Preformed or molded type headliner
- Remove and replace: Hinge pillar, Lock pillar, Quarter panel
- Remove and install or loosen rear edge of front fender
- Remove and install or replace: Door hinges, Wiring and/or wiring harness, Rocker moulding, Decals (example: EPA, body identification, caution/danger), Control cables (example: latch release), Fluid lines
- Drill holes for installing trim

NOTE: FULL PANEL REPLACEMENT PROCEDURE - Labor times are for replacement at factory seams if feasible. However, many center pillars/rocker panels cannot be replaced at factory seams because the hinge pillar, lock pillar, quarter panel and/or roof overlaps the panel. If a panel is designed in this manner and a section time is not listed, the time in the text represents replacement of the panel at the most practical area. This reduces repair damage to overlapping panels and is considered a full panel replacement.

IMPORTANT REMINDER: Sectioning of a panel may or may not be recommended by vehicle manufacturer. This procedure should only be performed when a qualified and knowledgeable technician has determined that the operation does not jeopardize the integrity of the vehicle.

IMPORTANT REMINDER: Labor times for inner panels, rails or reinforcements are with outer panels removed.

NOTE: Deduct 1.0 hour each for hinge pillar, lock pillar and roof if these items are also replaced.

Procedure 16—Front/Rear or Back Door

Door Shell R&R

Included Operations

- Remove and install trim panel
- Remove and install or replace: Lock cylinder, Water/dust barrier
- Replace or transfer parts attached to door (example: outside handle, glass, run channels, regulator, vent assembly, weatherstrip)
- Replace caulking for standard factory application if necessary
- Replace clip type moulding for base model vehicle (example: window surround moulding, belt moulding)

Not Included Operations

- Refinish door panel
- Replace channels attached to glass; add .2 hour for lower and .3 hour for upper and lower
- Replace sound deadening
- Remove and install or replace: Rear view mirror, Hinges, Hinge anchor plates, Decals (example: EPA, body identification, caution/danger)
- Recode lock cylinder

Remove and install adhesive exterior trim: deduct one-half of R&R time
- Install stripes, decals, transfer or overlays
- Drill holes for installing trim
- Broken glass clean up

IMPORTANT REMINDER: Labor times for reinforcements are with outer panels removed.

Door Repair Panel R&R

Included Operations

- Remove and install: Door assembly, Trim panel
- Remove and replace caulking for standard factory application
- Remove and install or replace: Outside handle, Lock cylinder, Water/dust barrier, Weatherstrip on door edge, Belt moulding/weatherstrip
- Replace clip type moulding for base model vehicle

Not Included Operations

- Refinish door panel
- Remove and/or apply: Anti-corrosion rust resistant materials
- Replace sound deadening
- Remove and install or replace: Glass, hardware, mirror and channels
- Recode lock cylinder
- Remove and install adhesive exterior trim; add to clean and retape
- Replace new adhesive exterior trim; deduct one-half of R&R time
- Install stripes, decals, transfers or overlays
- Drill holes for installing trim
- Broken glass clean up

IMPORTANT REMINDER: Sectioning of a panel may or may not be recommended by vehicle manufacturer. This procedure should only be performed when a qualified and knowledgeable technician has determined that the operation does not jeopardize the integrity of the vehicle.

Door Glass R&R

Included Operations

- Remove and install: Trim panel, Garnish mouldings
- Remove and install or replace: Belt moulding if necessary, Outside rear view mirror if necessary, Parts attached to glass, Water/dust barrier
- Replace weatherstrip if so attached
- Replace necessary adhesive/urethane
- Clean up old adhesive in opening area
- Align glass
- Test for leaks

Not Included Operations

- Remove and install or replace: Glass regulator and motor
- Remove and replace: Aftermarket window tint
- Broken glass clean up

Procedure 17—Roof

Roof Panel R&R

Included Operations

- Remove and install: Rear or lift gate, Front and rear seats (Passenger/Pickup vehicles), Front seats (Van/Utility vehicles), Quarter trim
- Remove and replace: Windshield and mouldings, Back window and mouldings, Quarter windows and mouldings if necessary, Sunroof assembly
- Remove and install or replace: Headliner (all types), sun visors, dome lamps, grip handles and coat hooks
- Replace clip type moulding for base model vehicle (example: roof rail, drip rail)
- Remove and replace caulking for standard factory application

Not Included Operations

- Refinish roof panel
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove and install or replace: Luggage rack, Roof cap and/or vinyl cover, Wiring and/or wiring harness, Sound deadening material, Non-base model interior trim and/or rear seating (Van/Utility vehicles)
- Replace new adhesive exterior trim; deduct one-half of R&R time
- Install stripes, decals, transfers or overlays
- Broken glass clean up

IMPORTANT REMINDER: No windshield, back or quarter glass (if applicable), or flush mounted reveal mouldings can be removed without the possibility of breakage or damage that will require replacement. Unintentional damage to glass that is considered a structural member by the vehicle manufacturer may occur when attempting alignment pulls to correct unibody collision damage. *Agree beforehand* who will incur the charge for damage occurring during normal R&R or R&I operations.

Headliner R&R

Included Operations

- Remove and install or replace: Rear seat, Sun visors, dome lamp, grip handles and coat hooks, Inside mouldings that interfere

Procedure 18—Pickup Cab Panels

Lock Pillar, Side or Corner Panel

Included Operations

- Remove and install: Sill plates, Front and/or rear seats
- Remove and replace urethane set glass: Quarter window and moulding
- Remove and install or replace: Non urethane set glass (Quarter window and moulding), Lock striker
- Remove and replace caulking for standard factory application
- Loosen and pull back carpet and/or insulation as required
- Replace clip type moulding for base model vehicle

Not Included Operations

- Refinish pillar, side or corner panel
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove and install bed assembly
- Remove and install or replace: Back window and moulding, Interior trim
- Remove **undamaged** urethane set glass: Quarter window and moulding
- Replace sound deadening
- Remove and install adhesive exterior trim; add to clean and retape
- Replace new adhesive exterior trim; deduct one-half of R&R time
- Install stripes, decals, transfers or overlays
- Drill holes for installing exterior trim
- Broken glass clean up

IMPORTANT REMINDER: No back or quarter glass (if applicable), or flush mounted reveal mouldings can be removed without the possibility of breakage or damage that will require replacement. *Agree beforehand* who will incur the charge for damage occurring during normal R&R and R&I operations.

Side or Corner Panel Sectioning Explanation: *See Procedure 20—Quarter Panel*.

IMPORTANT REMINDER: Sectioning of a panel may or may not be recommended by vehicle manufacturer. This procedure should only be performed when a qualified and knowledgeable technician has determined that the operation does not jeopardize the integrity of the vehicle.

Quarter Glass R&R

Included Operations

- Remove and install: Rear Seat if necessary
- Remove and install or replace: Parts attached to glass
- Replace weatherstrip if so attached
- Replace necessary adhesive/urethane
- Clean up old adhesive in opening area
- Align glass
- Test for leaks

Not Included Operations

- Remove and install: Trim panel
- Remove and replace: Aftermarket window tint
- clean up

Back Panel R&R

Included Operations

- Remove and install: Front and/or rear seats
- Remove and replace urethane set glass: Back window and moulding
- Remove and install or replace: Non urethane set glass (Back window and moulding)
- Remove and replace caulking for standard factory application
- Loosen and pull back carpet and/or insulation as required

Not Included Operations

- Refinish back panel
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove and install bed assembly
- Remove and replace: Interior trim
- Remove **undamaged** urethane set glass: Back window and moulding
- Remove and install or replace: Headliner (all types)
- Replace sound deadening
- Remove and install adhesive exterior trim; add to clean and retape
- Remove and install adhesive exterior trim; deduct one-half of R&R time
- Install stripes, decals, transfers or overlays
- Drill holes for installing exterior trim
- Broken glass clean up

Procedure 19—Back Window

Back Window R&R

Included Operations

- Remove and replace: Reveal mouldings, Garnish mouldings, Wiper arm if so equipped
- Replace weatherstrip if so installed
- Replace necessary adhesive/urethane
- Clean up old adhesive in opening area

- Test for leaks

Not Included Operations

- Remove and install or replace: High mount stop lamp
- Remove and replace: Aftermarket window tint
- Broken glass clean up

IMPORTANT REMINDER: Urethane set glass may typically be considered a structural component. Refer to OEM replacement procedures for installation methods and materials to restore structural integrity.

IMPORTANT REMINDER: No back glass or flush mounted reveal mouldings can be removed without the possibility of breakage or damage that will require replacement. Unintentional damage to glass that is considered a structural member by the vehicle manufacturer may occur when attempting alignment pulls to correct unibody collision damage. *Agree beforehand* who will incur the charge for damage occurring during normal R&R and R&I operations.

Procedure 20—Quarter Panel

Quarter Outer Panel R&R

Included Operations

- Remove and install: Rear seat, Parcel shelf trim, Quarter trim, Plastic wheelhouse liner, Luggage compartment trim, Weatherstrip attached to panel, Rear lamp assemblies, Rear bumper, Filler panel, store deflector or rear lower valance
- Remove and replace urethane set glass: Back window and moulding, Quarter window and moulding
- Remove and install or replace: Non urethane set glass (Back window and moulding, Quarter window and moulding), Water/dust barrier, Lock striker, Sill plates, Bolt-on extension
- Loosen and pull back: Cloth type headliner as required, Carpet and/or insulation as required
- Loosen convertible top at quarter
- Remove and replace caulking for standard factory application
- Replace clip type moulding for base model vehicle

Not Included Operations

- Refinish quarter panel
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove and install: Preformed or molded type headliner, Fuel tank
- Remove **undamaged** urethane set glass: Back window and moulding, Quarter window and moulding
- Remove and replace inner panels
- Remove and install or replace: Wheel, Antenna
- Replace sound deadening
- Replace channels attached to glass; add .2 hour for lower and .3 hour for upper and lower
- Remove and install adhesive exterior trim; add to clean and retape
- Remove and install adhesive exterior trim; deduct one-half of R&R time
- Install stripes, decals, transfers or overlays
- Drill holes for installing exterior trim
- Cut holes for installing lamps
- Broken glass clean up

IMPORTANT REMINDER: Procedure Number 20 includes removal of damaged urethane set glass and replacement with new glass. The Procedure does not include allowances for necessary precautionary measures to remove *undamaged* urethane set glass, nor clean up of the old adhesive on the glass. If the existing urethane set glass is undamaged and will be reused, the labor time difference between the glass R&R and R&I represents the not included allowance.

Example: A Quarter Panel allowance includes a Back Glass R&R of 2.0 hr. The R&I of the back glass is 2.3 hr. The difference of .3 hr. between Back Glass R&R (2.0 hr.) and R&I (2.3 hr.) has not been factored into the Quarter Panel allowance.

IMPORTANT REMINDER: Labor times for inner panels, rails or reinforcements are with outer panels removed. No back, quarter glass (non-movable) or flush mounted reveal mouldings can be removed without the possibility of breakage or damage that will require replacement. Unintentional damage to glass that is considered a structural member by the vehicle manufacturer may occur when attempting alignment pulls to correct unibody collision damage. *Agree beforehand* who will incur the charge for damage occurring during normal R&R or R&I operations.

FULL PANEL REPLACEMENT PROCEDURE: Labor times are for replacement at factory seams if feasible. However, many quarter panels cannot be replaced at roof seams because the roof panel overlaps the quarter. If a quarter panel is designed in this manner and a section time is not listed, the time in the text represents replacement of the panel at the most practical area - usually below the roof seam. This method is considered a full panel replacement provided the back glass and, if applicable, the quarter glass is removed for splicing in the pillar/sail areas.

Quarter Panel Section

The time for this operation is for a horizontal cut at belt and below quarter and back window unless described otherwise. The **Included** and **Not Included** operations are the same as for a full panel except the removal and installation or replacement of the quarter and back glass is not included.

Important Reminder: Sectioning of a panel may or may not be recommended by vehicle manufacturer. This procedure should only be performed when a qualified and knowledgeable technician has determined that the operation does not jeopardize the integrity of the vehicle.

Quarter Glass R&R

Included Operations

- Remove and install: Trim panel, Rear Seat if necessary
- Remove and install or replace: Parts attached to glass, Water/dust barrier
- Replace weatherstrip if so attached
- Replace necessary adhesive/urethane
- Clean up old adhesive in opening area
- Align glass
- Test for leaks

Not Included Operations

- Remove and replace: Aftermarket window tint
- Broken Glass clean up

Important Reminder: Urethane set glass may typically be considered a structural component. Refer to OEM replacement procedures for installation methods and materials necessary to restore structural integrity.

Procedure 21—Pickup Bed

Bed Assembly R&R

Included Operations

- Remove and install: Rear lamp assemblies, Plastic wheelhouse liners, Fuel door, Rear bumper, Tailgate
- Remove and replace: Rear fender, Running board, Fuel filler pipe
- Remove and replace caulking for standard factory application

Not Included Operations

- Refinish bed assembly
- Remove and install or replace: Wheel, Optional accessories (example: bed liner, camper shell, fender flare)
- Remove and install adhesive exterior trim; add to clean and retape
- Replace new adhesive exterior trim; deduct one-half of R&R time
- Install stripes, decals, transfers or overlays
- Drill holes for installing exterior trim
- Cut holes for installing lamps

IMPORTANT REMINDER: Labor times for inner panels, rails or reinforcements are with outer panels removed.

Side Panel R&R

Included Operations

- Remove and install: Rear lamp assemblies, Plastic wheelhouse liner, Fuel door, Rear bumper, Tailgate, Bed assembly
- Remove and replace: Rear fender, Running board, Fuel filler pipe
- Remove and replace caulking for standard factory application

Not Included Operations

- Refinish side panel
- Remove and/or apply: Anti-corrosion rust resistant materials

- Remove and install or replace: Wheel, Optional accessories (example: bed liner, camper shell, fender flare)
- Remove and install adhesive exterior trim; add to clean and retape
- Replace new adhesive exterior trim; deduct one-half of R&R time
- Install stripes, decals, transfers or overlays
- Drill holes for installing exterior trim
- Cut holes for installing lamps

Procedure 22—Van Utility Vehicle Side Panel

Side Panel R&R

Included Operations

- Remove and install: Side door, Rear door or tailgate, Rear bumper, Rear lamp assemblies, Plastic wheelhouse liner, Filler panel, stone deflector or rear lower valance
- Remove and replace urethane set glass: Side windows and mouldings
- Remove and install or replace: Non urethane set glass (Side windows and mouldings), Water/dust barrier, Lock striker, Sill plates
- Loosen and pull back cloth type headliner as necessary
- Remove and replace caulking for standard factory application

Not Included Operations

- Refinish side panel
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove and install: Preformed or molded type headliner, Interior trim, Fuel tank
- Remove **undamaged** urethane set glass: Side windows and mouldings
- Remove and install or replace: Wheel, Seat assemblies, Inner panels
- Replace sound deadening
- Remove and install adhesive exterior trim; add to clean and retape
- Replace new adhesive exterior trim; deduct one-half of R&R time
- Install stripes, decals, transfers or overlays
- Drill holes for installing exterior trim
- Cut holes for installing lamps
- Broken glass clean up

SPECIAL NOTE: Procedure Number 22 includes removal of undamaged urethane set glass and replacement with new glass. The Procedure does not include allowances for necessary precautionary measures to remove undamaged urethane set glass, nor clean up of the old adhesive on the glass. If the existing urethane set glass is undamaged and will be reused, the labor time difference between the glass R&R and R&I represents the not included allowance.

Example: A Side Panel allowance includes a Quarter Glass R&R of 1.5 hr. The R&I of the quarter glass is 1.7 hr. The difference of .2 hr. between Quarter Glass R&R (1.5 hr.) and R&I (1.7 hr.) has not been factored into the Side Panel allowance.

SIDE PANEL SECTIONING EXPLANATION: *See Procedure 20—Quarter Panel*.

IMPORTANT REMINDER: Sectioning of a panel may or may not be recommended by vehicle manufacturer. This procedure should only be performed when a qualified and knowledgeable technician has determined that the operation does not jeopardize the integrity of the vehicle.

IMPORTANT REMINDER: Labor times for inner panels, rails or reinforcements are with outer panels removed. No quarter glass (non-movable) or flush mounted reveal mouldings can be removed without the possibility of breakage or damage that will require replacement. *Agree beforehand* who will incur the charge for damage occurring during normal R&R or R&I operations.

Quarter Glass R&R

Included Operations

- Remove and install or replace: Parts attached to glass, Water/dust barrier
- Replace weatherstrip if so attached
- Replace necessary adhesive/urethane
- Clean up old adhesive in opening area
- Align glass
- Test for leaks

Not Included Operations

- Remove and install: Trim panel, Rear seat
- Remove and replace: Aftermarket window tint
- Broken glass clean up

Important Reminder: Urethane set glass may typically be considered a structural component. Refer to OEM replacement procedures for installation methods and materials necessary to restore structural integrity.

Procedure 23—Rear Suspension

Rear Suspension Component R&R

Included Operations

- Each operation identified in the text is considered to be a stand-alone operation
- Remove and install wheel

Not Included Operations

- Wheel alignment
- Bleed brakes if necessary

Rear Suspension O/H

Included Operations

- Remove and install wheel
- Disassemble and clean parts
- Check parts
- Replace needed parts
- Assemble

Not Included Operations

- Replace rear axle parts
- Remove and replace stabilizer bar
- Bleed brakes if necessary
- Wheel alignment

Important Reminder: Due to the design of suspension on unibody vehicles, it may be necessary to perform four wheel alignment.

Procedure 24—Luggage Lid

Luggage Lid R&R

Included Operations

- Remove and install or replace: Parts attached to luggage lid except those listed in *Not Included* section
- Replace clip type moulding for base model vehicle
- Replace caulking for standard factory application if necessary

Not Included Operations

- Refinish luggage lid
- Remove and install or replace: Hinges, Gas prop rod, Luggage rack, Spoiler, Decals (example: jacking instructions, caution/danger)
- Recode lock cylinder
- Replace new adhesive exterior trim; deduct one-half of R&R time
- Install stripes, decals, transfers or overlays
- Drill holes for installing exterior trim

Procedure 25—Rear/Lift Gate

Gate Shell R&R

Included Operations

- Remove and install trim panel
- Remove and install or replace: Non urethane set glass and mouldings, Lock cylinder, Water/dust barrier, Lamp assemblies and wiring harness attached to gate
- Replace urethane set glass and mouldings
- Replace or transfer parts attached to gate (example: outside handle, glass run channels, regulator, weatherstrip, license plate/bracket, lamp assemblies)
- Replace caulking for standard factory application if necessary
- Replace clip type moulding for base model vehicle

Not Included Operations

- Refinish gate
- Remove undamaged urethane set glass
- Remove and install or replace: Wiper and washer, Hinges, Hinge anchor plates, Gas prop rod, Spoiler
- Recode lock cylinder
- Remove and install adhesive exterior trim; add to clean and retape
- Replace new adhesive exterior trim; deduct one-half of R&R time
- Install stripes, decals, transfers or overlays
- Drill holes for installing exterior trim
- Broken glass clean up

IMPORTANT REMINDER: No back glass or flush mounted reveal mouldings can be removed without the possibility of breakage or damage that will require replacement. *Agree beforehand* who will incur the charge for damage occurring during normal R&R or R&I operations.

Gate Repair Panel R&R

Included Operations

- Remove and install: Gate assembly, Trim panel
- Remove and install or replace: Non urethane set glass and mouldings, Lock cylinder, Water/dust barrier
- Replace or transfer parts attached to gate (example: outside handle, glass run channels, regulator, weatherstrip, license plate/bracket, lamp assemblies)
- Remove and replace: Urethane set glass and mouldings
- Remove and replace caulking for standard factory application
- Remove clip type moulding for base model vehicle

Not Included Operations

- Refinish gate
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove undamaged urethane set glass
- Remove and install or replace: Wiper and washer, Spoiler
- Recode lock cylinder
- Remove and install adhesive exterior trim; add to clean and retape
- Replace new adhesive exterior trim; deduct one-half of R&R time
- Install stripes, decals, transfers or overlays
- Drill holes for installing exterior trim
- Broken glass clean up

Glass R&R

Included Operations

- Remove and install: Trim panel, Garnish mouldings
- Remove and install or replace: Belt moulding if necessary, Parts attached to glass, Water/dust barrier
- Replace weatherstrip if so attached
- Replace necessary adhesive/urethane
- Clean up old adhesive in opening area
- Align glass
- Test for leaks

Not Included Operations

- Remove and install or replace: Glass regulator and motor
- Remove and replace: Aftermarket window tint
- Broken glass clean up

Procedure 26—Rear Body

Rear Body Lower Panel R&R

Included Operations

- Remove and install: Rear bumpers, Filler panel, applique/finish panel, stone deflector or lower valance, Weatherstrip attached to panel, Rear lamp assemblies
- Remove and install or replace: Impact absorbers or mounting arms if necessary to perform operation, Lock cylinder attached to panel, Latch attached to panel, Lock striker attached to panel, Rear body interior trim
- Remove and replace caulking for standard factory application
- Remove clip type moulding for base model vehicle

Not Included Operations

- Refinish rear body panel
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove and install fuel tank assembly
- Remove and install or replace: Quarter panel interior trim, Wiring and/or wiring harness
- Recode lock cylinder
- Remove and install adhesive exterior trim; add to clean and retape
- Replace new adhesive exterior trim; deduct one-half of R&R time
- Install stripes, decals, transfers or overlays
- Drill holes for installing exterior trim
- Cut holes for installing lamps

IMPORTANT REMINDER: Sectioning of a panel may or may not be recommended by vehicle manufacturer. This procedure should only be performed when a qualified and knowledgeable technician has determined that the operation does not jeopardize the integrity of the vehicle.

IMPORTANT REMINDER: Labor times for inner panels, rails or reinforcements are with outer panels removed.

Rear Rail R&R

Included Operations

- Remove and install or replace: Impact absorbers or mounting arms if necessary to perform operation
- Loosen and pull back carpet and/or insulation as required
- Remove and replace caulking for standard factory application

Not Included Operations

- Refinish rear rail
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove and install: Rear bumper, Wiring and/or wiring harness, Fuel tank
- Remove and install or replace: Suspension assemblies, Seat assemblies, Luggage compartment trim
- Wheel alignment

IMPORTANT REMINDER: Labor times for inner panels, rails or reinforcements are with outer panels removed.

IMPORTANT REMINDER: Sectioning of a panel may or may not be recommended by vehicle manufacturer. This procedure should only be performed when a qualified and knowledgeable technician has determined that the operation does not jeopardize the integrity of the vehicle.

Rear Floor Pan R&R

Included Operations

- Loosen and pull back: Carpet and/or insulation as required
- Remove and replace caulking for standard factory application

Not Included Operations

- Refinish floor plan
- Remove and/or apply: Anti-corrosion rust resistant materials
- Remove and install: Rear bumper, Fuel tank, Wiring and/or wiring harness
- Remove and install or replace: Suspension assemblies, Seat assemblies, Luggage compartment trim

IMPORTANT REMINDER: Labor times for inner panels, rails or reinforcements are with outer panels removed.

IMPORTANT REMINDER: Sectioning of a panel may or may not be recommended by vehicle manufacturer. This procedure should only be performed when a qualified and knowledgeable technician has determined that the operation does not jeopardize the integrity of the vehicle.

Procedure 27—Rear Bumper

Bumper Assembly R&I

Included Operations

- Remove assembly from frame, impact absorbers or mounting arms
- Reinstall assembly
- Adjust alignment to vehicle

Not Included Operations

- Refinish bumper
- Remove and install or replace optional accessories (example: trailer hitch, trailer connector)

Procedure Explanation

Bumper Assembly O/H

Included Operations

- Remove and install assembly
- Disassemble and replace damaged parts
- Replace or transfer parts attached except those listed in *Not Included* Section
- Remove and install or replace: License plate/bracket
- Assemble and install
- Adjust alignment to vehicle

Not Included Operations

- Refinish bumper
- Remove and replace impact absorbers or mounting arms
- Remove and install or replace optional accessories (example: trailer hitch, trailer connector)
- Remove and install adhesive exterior trim; add to clean and retape
- Replace new adhesive exterior trim; deduct one-half of R&R time
- Install stripes, decals, transfers or overlays

Procedure 28—Refinish Procedure

Refinish General Information

Complete Refinish

Refinish times in this *Guide* pertain to **NEW, UNDAMAGED PARTS** and are not intended for calculating complete vehicle refinish—single- or multi-stage. An estimate of this nature would suggest all new panels have been fitted to the vehicle.

Lifetime Refinish Warranty/Clear Coat

The major paint manufacturers listed below have provided the following information: "Major refinish paint manufacturers recommend that when performing refinish warranty repairs on an OEM multi-stage or basecoat/clearcoat finish, you must extend the application of clear to the nearest panel edge or breakpoint to qualify for lifetime warranty." **AKZO — DuPont — Sherwin Williams — BASF — PPG**

Repaired/Used Panels

Labor times related to repaired and/or used panels—example: Remove and install or masking of glass, outside handles or exterior trim, feather prime & block, masking for primer surfacer application—are not included in refinish time. The steps required for refinishing a repaired and/or used panel may vary from those required for a new panel depending on the condition of the repaired and/or used panel.

Feather, Prime & Block

Is the Not-Included refinish operation that completes bodywork repair from 150 grit smoothness to the condition of a new undamaged panel, and the point at which refinish labor time begins. The labor and materials associated with feather, prime and block may vary depending upon the size of the repair area, and should be evaluated when determining the work to be performed. See *Welded Panels under Estimating Information*.

SPOT REPAIR/BLEND ADJACENT PANEL

Spot Repair

Spot repair is defined as applying color to the repaired area of a damaged panel to obtain full coverage of undercoats, and blending that color into the original panel finish so that no transition can be detected. The goal is to keep the actual repair as small as possible to avoid having newly applied color directly next to an undamaged adjacent panel(s). Clear coat is then applied to the entire panel. This refinish process minimizes color mismatch.

Blend for Color Match

Blending is defined as applying color, without necessity to cover undercoats, to less than the full surface area of an adjacent undamaged panel. Paint manufacturers recommend blending adjacent panels when a panel is replaced, or repaired and color applied to the full surface areas, or to the area that borders the adjacent undamaged panel(s). Clear coat is then applied to the entire blended panel.

Major Panels

Major panels are those listed: **FRONT HEADER, FENDER, HOOD, COWL TOP, DOOR, ROCKER, ROOF, PICKUP CAB CORNER, PICKUP CAB BACK, QUARTER, PICKUP BED FRONT, PICKUP BED SIDE, VAN SIDE, VAN REAR CORNER, ENGINE LID, LUGGAGE LID, LIFT GATE, REAR RATE, TAIL GATE, REAR BODY**

Overlap

Deduct .4 hour from refinish time for each **ADJACENT MAJOR PANEL** and deduct .2 hour from time for each **NON-ADJACENT MAJOR PANEL**. There is no overlap deduction taken for the first major panel.

Adjacent major panel example: Right front fender 2.5 hours (full time) and right front door 2.5 hours minus .4 hour overlap for a total of 4.6 hours.

Non-adjacent major panel example: Right front fender 2.5 hours (full time) and left front fender 2.5 hours minus .2 hour overlap for a total of 4.8 hours.

No overlap deductions for valance panel, pillars, door jambs, underside of hood, underside of luggage lid or underside of gate, inner panels, filler panels, soft bumper covers or bolt-on finish panels.

NOTE: Refinish times are for outside surfaces only unless stated otherwise in text (example: add for underside, add to edge).

Included Operations

- Solvent wash
- Scuff panel and clean
- Mask adjacent panels up to 36 inches or substitute with cover vehicle (bag) complete
- Prime or seal as required
- Final sanding and clean
- Mix materials
- Adjust spray equipment
- Apply color
- Clean equipment

Not Included Operations

- Blending into adjacent panel and/or panels, or nearest breaking point
- Color match or tinting
- Applying anti-corrosion rust resistant materials
- Additional application of soft chip primers or anti-chip undercoats
- Finish sand and buff
- Subsequent vehicle bagging when required: add .2 hour for each application & removal
- Mask interior to prevent overspray damage
- Removal of protective coatings
- Removal of release agent from OEM raw plastic components (example: non-primed bumper covers) See formula under *Raw Substrate Prep*
- Feather, Prime & Block paint damage to adjacent panel and/or panels joined by welding due to burn damage (see Feather, Prime & Block definition under *Refinish General Information*)
- Gravel guard refinish; add .5 hour for the first major panel and .3 hour for each additional panel.

NOTE: The included operation of mask adjacent panels is inclusive of any necessary back tape masking to prevent overspray.

IMPORTANT REMINDER: Refinish times are for **NEW, UNDAMAGED PARTS** without exterior or interior trim or attached components. Refinish times may vary depending on individual procedures, product and/or weather conditions.

A small percentage of colors are identified by the paint manufacturers as highly transparent. These colors may require additional application coats to achieve visual hiding. In instances where four or more color coats are necessary to achieve adequate hiding, some adjustment in refinish times may be appropriate.

IMPORTANT REMINDER: The cost of paint and materials is not included in refinish time.

NOTE: Gravel Guard application and appropriate refinish may be necessary beyond the actual replacement area to achieve a "texture" match.

It may be necessary to tint or otherwise modify non-exterior colors applied to undersides, edges and/or jambs for which there is no paint color formula to achieve a color match. When necessary, reference "color match or tinting" listed above in *Not Included Operations*.

Raw Substrate Prep

Allow .2 per refinish hour (20%) for plastic components that come from the manufacturer/supplier in a raw/un-primed state.

Included Operations

- Detergent wash
- Alcohol/plastic cleaner wash
- Additional solvent wash
- Application of specialized adhesion promoter
- Clean Equipment

Clear Coat/Two Stage Refinish

First major panel or soft bumper/fascia cover: Add .4 **per** refinish hour (40%), then add .4 **per** refinish hour for jamb, jamb and interior, edge panel, and/or underside (when necessary).

Included Operations

- Mix material
- Clean and tack surface
- Apply material
- Clean equipment

NOTE: Some OEMs now utilize a matte clear coat on non-exterior colors applied to undersides, edges, and/or jambs.

Additional panel(s) and/or other refinish area(s): Deduct overlap (if applicable); add .2 **per** refinish hour (20%), then add .2 **per** refinish hour for jamb, jamb and interior, edge panel, and/or underside (when necessary).

Included Operations

- Clean and tack surface
- Apply material

NOTE: For **NEW, UNDAMAGED PARTS**, a total of no more than 2.5 hours should be necessary to perform the four Clear Coat Refinish Included Operations listed above. This calculation DOES NOT APPLY to bumper covers, ground effects, special package equipment, interior edges, jambs, entryways, undersides and additional time that may be required for repaired and/or used panels. It DOES NOT APPLY to complete vehicle refinish. *It is not intended to determine the quantity or cost of materials required for the application of clear*.

Three Stage Refinish

First major panel or soft bumper/fascia cover: Add .7 **per** refinish hour (70%), after time has been added for jamb, jamb and interior, edge panel, and/or underside (when necessary).

Included Operations

- Mix pearl/mica toner
- Apply toner to test panel
- Mix clear
- Clean and tack surface
- Apply clear to test panel
- Repeat application to surface being refinished
- Clean equipment

Additional panel(s) and/or other refinish area(s): Deduct overlap (if applicable); add .4 **per** refinish hour (40%), after time has been added for jamb, jamb and interior, edge panel, and/or underside (when necessary).

Included Operations

- Apply pearl/mica toner
- Clean and tack surface
- Apply clear

NOTE: With three stage paints, it may be necessary to blend into larger areas of adjacent panels or complete sides of vehicles, otherwise known as zone painting.

NOTE: Some OEMs now utilize a matte clear coat on non-exterior colors applied to undersides, edges, and/or jambs.

Two Tone Refinish

First major panel: Add .5 **per** refinish hour (50%)

Included Operations

- Mask panel
- Scuff panel
- Mix material
- Apply material
- Clean equipment

Additional panel(s) and/or other refinish area(s): Deduct overlap (if applicable); add .3 **per** refinish hour (30%)

Included Operations

- Mask panel
- Scuff panel
- Apply material

Blend Adjacent Panel(s)

With some colors, it may be necessary to blend color into adjacent panels to obtain an acceptable color match.

A blend labor time formula is provided should it be necessary to perform this operation. The performance of this operation is NOT INCLUDED in the Mitchell refinish labor time.

The blend times are for **existing undamaged adjacent surfaces**. The blend labor time includes the application of clear coat to the entire panel on which color is blended. On some panels, the clear may be stopped at natural body lines or be blended into acceptable design configuration areas.

Single Stage/Two Stage Colors

Blend adjacent panel(s): Allow .5 **per** refinish hour (50%) for each panel(s)/refinish area(s) blended.

Included Operations

- Detergent/solvent wash
- Wet sand, scuff (ScotchBrite) or rubout (compound) panel and clean for preparation
- Mask existing adjacent panels to 36"
- Apply bonding material - if required
- Apply color
- Clean and tack surface
- Apply clear material

Not Included Operations

- Repair existing surface imperfections
- Remove and install or mask attached components, trim, stripes or decals on blended panel/area
- Finish, sand, and buff

NOTE: Blend labor time does not apply to two-tone refinish or custom non-OEM refinish. **No overlap deduction applies to blended panel(s)/refinish area(s)**.

NOTE: When calculated, the estimate will allocate 20% from the total blend time and apply it to the clear coat line item. The total sum of the blend line and the amount allocated to the clear coat line will total 50% of the exterior refinish time for the panel being blended.

Example: A panel refinish time is 2.0 hrs. When blended, the refinish time for that panel will be displayed as 1.0 (.5 per refinish hour). Once calculated, the refinish blend line will be displayed as .8 and .2 (20%) will be allocated to the clear coat line.

Three Stage Colors

Blend adjacent panel(s): Allow .7 **per** refinish hour (70%) for each panel(s)/refinish area(s) blended.

Included Operations

- Detergent/solvent wash
- Wet sand, scuff (ScotchBrite) or rubout (compound) panel and clean for preparation
- Mask existing adjacent panels to 36"
- Apply bonding material - if required
- Apply color
- Clean and tack surface
- Apply pearl/mica toner
- Clean and tack surface
- Apply clear material

Not Included Operations

- Repair existing surface imperfections

Procedure Explanation

- Remove and install or mask attached components, trim, stripes or decals on blended panel/area
- Finish, sand, and buff

NOTE: Blend labor time does not apply to two-tone refinish or custom non-OEM refinish. **No overlap deduction applies to blended panel(s)/refinish area(s)**.

NOTE: When calculated, the estimate will allocate 40% from the total blend time and apply it to the three stage line item. The total sum of the blend line and the amount allocated in the three stage line will total 70% of the exterior refinish time for the panel being blended.

Example: A panel refinish time is 2.0 hrs. When blended, the refinish time for that panel will be displayed as 1.4 (.7 per refinish hour). Once calculated, the refinish blend line will be displayed as .8 and .6 (40%) will be allocated to the three stage line.

Extension of Clear Coat

In some applications, it may be required to extend the application of clear to the nearest panel edge or breakpoint.

The performance of this operation is NOT INCLUDED in the Mitchell refinish labor time.

The extension of clear coat formula is intended to be calculated as a percentage of base refinish hours excluding overlap.

It DOES NOT APPLY to edges, jambs, and undersides. No deduction for overlap should be taken.

This formula DOES APPLY to the 2.5 hours maximum clear coat allocation. Should this operation be necessary, the following formula is provided:

Extend Clear to Adjacent Panel(s)

Extend clear to adjacent panel(s): Allow .5 **per** refinish hour (50%) for each panel(s)/refinish area(s) cleared.

Included Operations

- Detergent/solvent wash
- Wet sand, scuff (ScotchBrite) or rubout (compound) panel and clean for preparation
- Mask existing adjacent panels to 36"
- Apply bonding material - if required
- Clean and tack surface
- Apply clear material

Not Included Operations

- Repair existing surface imperfections
- Remove and install or mask attached components, trim, stripes or decals on extended clear panel/area
- Finish, sand, and buff
- Nib sand and finesse

Finish Sand & Buff

A labor time formula is provided **should it be necessary to perform this operation**. This procedure includes the removal of orange peel and any blemishes that affect paint texture in order to produce a smooth finish to the entire panel surface. This process is not limited to "nib sanding" or "finessing" which is the removal of isolated dirt/dust particles only. The performance of this operation is NOT INCLUDED in the Mitchell refinish labor time.

The finish sand and buff formula is intended to be calculated as a percentage of the base refinish hours excluding overlap and clear coat. It DOES NOT APPLY to edges, jambs, and undersides. For blended panels, the formula should be applied to the full panel refinish time. No deduction for refinish overlap should be taken.

Finish sand and buff outside surface area(s): Allow .3 **per** refinish hour (30%) to finish sand and buff each surface area(s).

De-nib & Finesse

A labor time formula is provided **should it be necessary to perform this operation**. This procedure includes the removal of small isolated dust particles (nibs) and the application of a finishing glaze.

The performance of this operation is NOT INCLUDED in the Mitchell refinish labor time.

The de-nib and finesse formula is intended to be calculated as a percentage of the base refinish hours excluding overlap and clear coat. It DOES NOT APPLY to edges, jambs, and undersides. For blended panels, the formula should be applied to the full panel refinish time. No deduction for refinish overlap should be taken.

De-nib and finesse outside surface area(s): Allow .2 **per** refinish hour (20%) to de-nib and finesse each surface area(s).

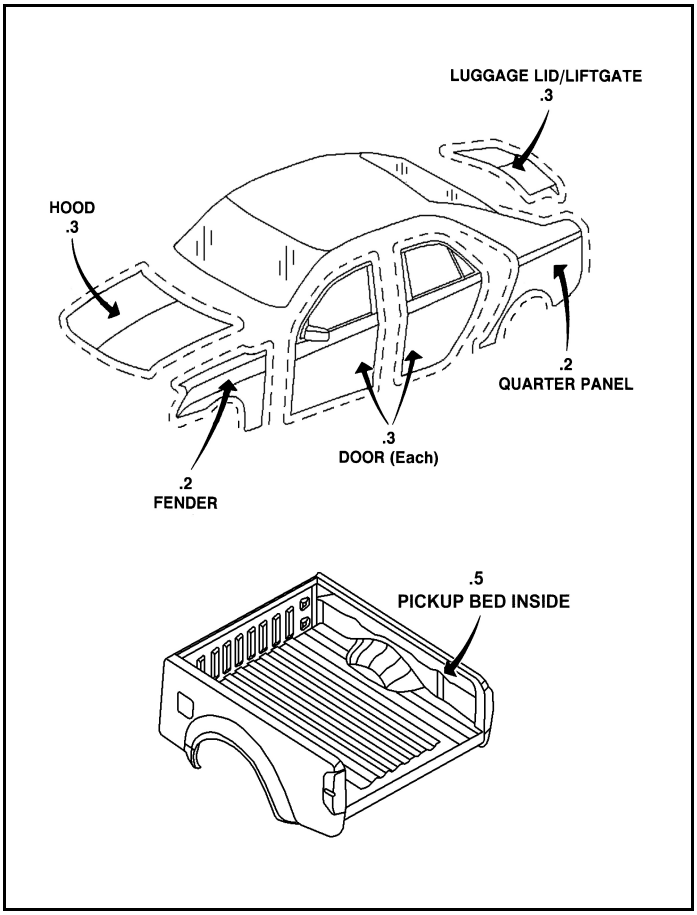
Mask Vehicle to Prevent Overspray Damage

The following refinish information is provided should it be necessary to perform these operations as determined by individual job requirements:

MASK INTERIOR, ENTRYWAYS, ENGINE COMPARTMENT AND TRUNK OPENINGS

Interior masking may be necessary when refinishing exterior surfaces to stop overspray damage that is not prevented by adjacent panel perimeter masking which includes back taping or application of foam tape. Interior masking may also be used when exterior panels (door, hood, etc.) are removed while applying refinish material. The performance of this operation is NOT INCLUDED in the Mitchell refinish labor time.

Fig. 1: IDENTIFYING INTERIOR MASKING LOCATIONS



NOTE: The times shown in the illustration are for interior masking of that panel and/or opening. Labor time includes all pillars, jambs, weatherstrips, edges, entryways and openings as necessary. Deduct .1 hour overlap for each interior masked adjacent panel and/or opening.

The Mitchell *REFINISHING MATERIALS GUIDE* has the Latest Available Costs for Materials Used in Single and Multi-Stage Refinishing, and is an Accurate Source for Determining Costs.

Procedure 29—Special Caution

Computer Modules

When working with vehicles equipped with on-board computers, manufacturers recommend removal if temperatures are likely to exceed 176°F (80°C). Do not apply heat from a torch or weld in the immediate vicinity of computers without protecting them. Remove if necessary.

Many vehicles have multiple computers such as: Electronic Control Modules (ECM), Body Control Modules (BCM), individual computers for Anti-Lock Brake Systems and Electronic Suspension systems. All of these computers should be protected or removed before exposing them to high heat. Never connect or disconnect these units with ignition switch on, or charge a battery with battery cables connected. Before servicing, ground yourself and ground the work area to discharge stored static electricity.

Computer control information is listed in the *Electrical* Section of all *Mitchell Collision Estimating Guides*. There is a footnote below the listing or an illustration describing the location of each unit.

Structural Glass

Windshields, back windows and other glass that was originally installed by vehicle manufacturer utilizing urethane, should be reinstalled with urethane. The urethane bonds the glass to the vehicle and makes the glass part of the vehicle's structure. Ensure that the vehicle manufacturer and/or I-CAR recommended installation is followed, and that the urethane is properly cured before returning the vehicle to service.

Supplemental Restraint/Air Bag System

Vehicle manufacturer's recommended service and repair procedures must be followed when servicing any Supplemental Restraint/Air Bag System. Certain safety precautions and disabling procedures must be observed when performing repairs.

See Mitchell's *Air Bag Service & Repair Manual* for system description and operation checks, precautions, disabling and activating procedures, component removal and installation procedures, and diagnosis and testing information. Refer to *Air Bag/SRS Component Inspection & Replacement Tables*.

Seat Belts

Many vehicle manufacturer's advise replacement of seat belts when stressed by occupants in a collision. Refer to vehicle manufacturer or service manual for specific clarification.

Rev. 02-10

Abbreviations

Table 1: Identifying Abbreviations

Abbreviation	Description
1BC	1 Barrel Carburetor
2-4BC	2-4 Barrel Carburetors
2BC	2 Barrel Carburetor
2WD	2 Wheel Drive
2WS	2 Wheel Steering
3-2BC	3-2 Barrel Carburetors
4BC	4 Barrel Carburetor
4WD	4 Wheel Drive
4WS	4 Wheel Steering
6BC	6 Barrel Carburetor
A/C	Air Conditioning
AAM	All Active Module
AAS	Automatic Adjusting Suspension
ABC	Active Body Control
ABS	Antilock Braking System
ACE	Active Cornering Enhancement
Add'l	Additional
Adj	Adjust
ADS	Adaptive Damping System
AFS	Adaptive Front Lighting System
ALB	Antilock Braking System
ALD	Auto Locking Differential
Alt	Alternator
Alum	Aluminum
Alum/Steel	Aluminum/steel
Amp	Amperage
AOT	Automatic Overdrive Trans
AQCS	Air Quality Control System
ASC	Auto Stability Control
ASC&T	Auto Stability Control plus Traction Control
ASCD	Automatic Speed Control Device
ASR	Automatic Slip Control
Assy	Assembly
ATC	Automatic Temp Control
Auto	Automatic
Aux	Auxiliary

Table 1: Identifying Abbreviations (continued)

Abbreviation	Description
AWD	All Wheel Drive
BAS	Brake Assist System
BBC	Bumper to Back of Cab
BC	Barrel Carburetor
BLIS	Blind Spot Information System
BOC	Back of Cab
Boron Stl	Boron Steel
BPMV	Brake Pressure Modulator Valve
BPT	Back Pressure Transducer
Brg	Bearing
Brkt	Bracket
Brkts	Brackets
BSC	Battery Safety Clamp
BTSI	Brake Trans Shift Interlock
Cast Alum	Cast Aluminum
CB	Citizens Band Radio
cc	Cubic Centimeters
CCC	Computer Command Control
CCT	Computer Controlled Timing
CD	Compact Disc
C Fiber	Carbon Fiber
CFI	Central Fuel Injection
Ch	Chassis
Cig	Cigarette
cm	Centimeter
CMBS	Collision Mitigation Braking System
CNG	Compressed Natural Gas
COE	Cab Over Engine
Com	Composite
Comb	Combination
Comp	Compressor
Compt	Compartment
Cond	Condenser
Cont	Control
Conv	Convertible
CPI	Central Port Injection
CRSSS	Cold Rolled Sheet Structural Steel
Ctr	Center

Table 1: Identifying Abbreviations (continued)

Abbreviation	Description
CV	Constant Velocity
CVVT	Continuously Variable Valve Timing
CWBS	Collision Warning w/Brake Support
Cyl	Cylinder
d	Discontinued
D&A	Disassemble & Assemble
D&C	Disconnect & Connect
DEFI	Digital Electronic Fuel Injection
Defl	Deflector
DERM	Diagnostic Energy Reserve Module
Dia	Diameter
Diaph	Diaphragm
Diff'l	Differential
Dist	Distribution
DME	Digital Motor Electronics
DOD	Displacement on Demand
DOHC	Dual Over Head Cam
DOT	Department of Transportation
DPF	Diesel Particulate Filter
DPMS	Driving Position Memory System
DPS	Dual Phase Steel
DRL	Daytime Running Lights
DSC	Dynamic Stability Control
DSTC	Dynamic Stability Traction Control
DVD	Digital Versatile Disc
EATC	Electronic Auto Temperature Control
EATX	Electronic Automatic Transmission Control
EBCM	Electronic Brake Control Module
EBTC	Electronic Brake and Traction Control
ECM	Electronic Brake and Traction Control
ECS	Electronic Crash Sensor
EDC	Electronic Dampening Control
EEC	Electronic Engine Control
EFC	Electronic Fuel Control
EFE	Early Fuel Evaporation
EFI	Electronic Fuel Injection
EGR	Exhaust Gas Recirculation
EGS	Elect Trans Gear System

Table 1: Identifying Abbreviations (continued)

Abbreviation	Description
EHSS	Extra High Strength Steel
Elec	Electric
Elect	Electronic
Eng	Engine
EPR	Evaporator Pressure Regulator
EPS	Electrical Power Steering
Equip	Equipment
ESC	Electronic Stability Control
ESP	Electronic Stability Program
EST	Electronic Spark Timing
ETR	Emergency/Energy Tension Reactor
ETS	Electronic Traction System
Ev-Em	Evaporative Emission Control
Evap	Evaporator
Exh	Exhaust
Ext	Extension
FFV	Flex Fuel Vehicle
F-Glass	Fiber Glass
FI	Fuel Injection
Frt	Front
FWD	Front Wheel Drive
Fwd	Forward
g	Gram
Galv Steel	Galvanized Steel
GDO	Garage Door Opener
GPS	Global Positioning System
Gskt	Gasket
GVW	Gross Vehicle Weight
H/Lamp	Headlamp
H/Lamps	Headlamps
H/Perf	High Performance
HCU	Hydraulic Control Unit
HD	Heavy Duty
HEI	High Energy Ignition
HFM	Hot Film Management
HFS	Hydroformed Steel
HICAS	High Capacity Suspension
HID	High Intensity Discharge

Reference Information

Table 1: Identifying Abbreviations (continued)

Abbreviation	Description
HO	High Output
Horiz	Horizontal
HP	Horsepower
Hsg	Housing
HSLA	High Strength Low Alloy Steel
HSLA/Com	High Strength Low Alloy Steel Composite
HSS	High Strength Steel
HUD	Head Up Display
HVAC	Heater Ventilation Air Conditioning
Hvy	Heavy
Hyd	Hydraulic
Hz	Hertz
ICC	Interstate Commerce Commision
ID	Inside Diameter
Ign	Ignition
Illum	Illuminated
IMA	Integrated Motor Assisted
Info	Information
Inr	Inner
Inst	Instrument
Inter	Intermediate
IOH	Included in Overhaul
IPU	Intelligent Power Unit
ITS	Inflatable Tubular Structure
IVD	Interactive Vehicle Dynamics
Kg	Kilogram
Kgs	Kilograms
KHz	Kilchertz
km	Kilometer
KPH	Kilometers Per Hour
KW	Kilowatt
L	Litre or Left
Lb	Pound
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LEV	Low Emission Vehicle
Lic	License
LSD	Limited Slip Differential

Table 1: Identifying Abbreviations (continued)

Abbreviation	Description
LSM	Laminated Sheet Metal
Lwr	Lower
MAF	Mass Air Flow
MAG	Magnesium
Man	Manual
MAP	Manifold Absolute Pressure
MAT	Manifold Air Temperature
Mbr	Member
MCU	Microprocessor Control Unit
MD	Medium Duty
MDM	Motor Drive Module
Mech	Mechanical
Med	Medium
Mfg	Manufacturer
MFI	Multi-Fuel Injection
MHz	Megahertz
Mldg	Moulding
Mldgs	Mouldings
MHSS	Mega Hard Strength Steel
mm	Millimeter
MMC	Manifold Mount Converter
MPFI	Multi-Port Fuel Injection
MPH	Miles Per Hour
MPI	Multi-Port Injection
MST	Manifold Surface Temperature
Mtd	Mounted
Mtg	Mounting
MTV	Manifold Tuning Valve
N.A.	Not Available
Nav	Navigation
No	Number
NOx	Nitrogen Oxide Emission Control
O/D	Overdrive
O/H	Overhaul
OBD	On-Board Diagnostics
OCS	Occupant Classification System
OD	Outside Diameter
OE	Original Equipment

Table 1: Identifying Abbreviations (continued)

Abbreviation	Description
OEM	Original Equipment Manufacturer
OHC	Over Head Cam
OHV	Over Head Valve
OPDS	Occupant Position Detector Sensor
Opng	Opening
Opt	Option
OPVR	On-Board Refueling Vapor Recovery
Otr	Outer
OVRS	Onboard Vapor Recovery System
Ozs	Ounces
P/S	Power Steering
PAIR	Pulse Air Injection Reactor
Pass	Passenger
PCM	Powertrain Control Module
PCU	Power Control Unit
PDCC	Porsche Dynamic Chassis Control
PDU	Power Drive Unit
Perf	Performance
Pkg	Package
Pnl	Panel
Pos	Position
PPD	Passenger Presence Detection
PTO	Power Take Off
PVC	Positive Ventilation Crankcase
Pwr	Power
PZEV	Partial Zero Emission Vehicle
Qtr	Quarter
Qty	Quantity
R	Right
R&I	Remove & Install
R&R	Remove & Replace
R/L	Right/Left
Rad	Radiator
Rect	Rectangular
Refrig	Refrigeration
Reg	Regulator
Reinf	Reinforcement
Reinfs	Reinforcements

Table 1: Identifying Abbreviations (continued)

Abbreviation	Description
Resv	Reservoir
RPM	Revolutions Per Minute
RPO	Regular Production Option
Rr	Rear
RTV	Room Temperature Vulcanized
RWD	Rear Wheel Drive
SAM	Signal Acquisition Module
SBA	Set Back Axle
SBEC	Single Board Engine Control
SCRS	Selective Catalyst Reduction System
SDM	Sesning & Diagnostic Module
SEFI	Sequential Electronic Fuel Injection
SFA	Set Forward Axle
SFI	Sequential Fuel Injection
SHO	Super High Output
SIPS	Side Impact Protect System
SIR	Supplemental Inflatable Restraints
SISM	Side Impact Sensing Module
SLS	Self-Leveling Suspension
SMC	Sheet Molded Compound
SOHC	Single Over Head Cam
Spec	Specifications
Speedo	Speedometer
SPI	Single Port Injection
SRS	Supplemental Restraints System
Stab	Stabilizer
STC	Stability Traction Control
Std	Standard
Stpd	Stamped
SULEV	Super Ultra Low Emissions Vehicle
Strg	Steering
Supt	Support
Susp	Suspension System
Sys	System
Tach	Tachometer
TBI	Throttle Body Injection
TCS	Traction Control System
TDC	Top Dead Center

Table 1: Identifying Abbreviations (continued)

Abbreviation	Description
TDI	Turbo Direct Injection
Temp	Temperature
TEMS	Toyota Electronic Modulated Suspension
TH	Turbo Hydra-Matic
THRU	Through
TLEV	Transitional Low Emission Vehicle
TP	Thermoplastic
TPI	Tuned Port Injection
Trac	Traction
Trans	Transmission
UHSS	Ultra High Strength Steel
ULEV	Ultra Low Emission Vehicle
Upr	Upper
Vac	Vacuum
Veh	Vehicle
Vert	Vertical
VHHS	Very High Strength Steel
VIN	Vehicle Identification Number
VTR	Valve in Receiver
VTEC	Valve Timing Electronic Control
VTM-4	Variable Torque Management -4WD System
w/	With
w/o	Without
W/S	Windshield
W/Strip	Weatherstrip
WB	Wheel Base
Whlhse	Wheelhouse
X-Cool	Extra Cooling
Xmbr	Crossmember
ZLEV	Zero Level Emissions Vehicle