

0 General Data and Maintenance

- 010 General
- 020 Maintenance

1 Engine

- 100 Engine—General
- 110 Engine Removal and Installation
- 113 Cylinder Head Removal and Installation
- 116 Cylinder Head and Valvetrain
- 117 Camshaft Timing Chain
- 119 Lubrication System
- 120 Ignition System
- 121 Battery, Starter, Alternator
- 130 Fuel Injection
- 160 Fuel Tank and Fuel Pump
- 170 Radiator and Cooling System
- 180 Exhaust System

2 Transmission

- 200 Transmission—General
- 210 Clutch
- 230 Manual Transmission
- 240 Automatic Transmission
- 250 Gearshift Linkage
- 260 Driveshaft

3 Suspension, Steering and Brakes

- 300 Suspension, Steering and Brakes—General
- 310 Front Suspension
- 320 Steering and Wheel Alignment
- 330 Rear Suspension
- 331 Final Drive
- 340 Brakes
- 370 Integrated Suspension Systems

4 Body

- 400 Body—General
- 410 Fenders, Engine Hood
- 411 Doors
- 412 Trunk Lid

5 Body Equipment

- 510 Exterior Trim, Bumpers
- 512 Door Windows
- 513 Interior Trim
- 515 Central Locking
- 520 Seats
- 540 Sunroof

6 Electrical System

- 600 Electrical System—General
- 610 Electrical Component Locations
- 611 Wipers and Washers
- 612 Switches and Electrical Accessories
- 620 Instruments
- 630 Exterior Lighting
- 640 Heating and Air Conditioning
- 650 Radio

7 Equipment and Accessories

- 720 Seat Belts
- 721 Airbag System (SRS)

Electrical Wiring Diagrams

Vehicle Identification and VIN Decoder

Vehicle Identification Number (VIN), decoding

Some of the information in this manual applies only to cars of a particular model year or range of years. For example, 1988 refers to the 1988 model year but does not necessarily match the calendar year in which the car was manufactured or sold. To be sure of the model year of a particular car, check the Vehicle Identification Number (VIN) on the car.

The VIN is a unique sequence of 17 characters assigned by BMW to identify each individual car. When decoded, the VIN tells the country and year of manufacture; make, model and serial number; assembly plant and even some equipment specifications.

The BMW VIN is on a plate mounted on the top of the dashboard, on the driver's side where the number can be seen through the windshield. The 10th character is the model year code. The letters I, O, Q and U are not used for model year designation for US cars. Examples: J for 1988, K for 1989, L for 1990, M for 1991, etc. The table below explains some of the codes in the VIN for E32 cars.

Sample VIN: **WBA GD83 2XRDE91004**
position 1 2 3 4 5 6 7 8 9 10 11 12-17

VIN position	Description	Decoding information	
1	Country of Manufacture	W	Germany
2	Manufacturer	B	BMW AG
3	Manufacturing division	A S	BMW BMW Motorsport
4-7	Series, model	GB43 GC43 GD43 GD83 GC83	735i, 6-cylinder 3.5 liter (M30) 735iL, 6-cylinder 3.5 liter (M30) 740i, 8-cylinder 4.0 liter (M60) 740iL, 8-cylinder 4.0 liter (M60) 750iL, 12-cylinder 5.0 liter (M70)
8	Restraint system	0 1 2	Manual belts Manual belts with supplemental restraint Manual belts with dual SRS airbags
9	Check digit		0-9 or X, calculated by NHTSA
10	Model year	J K L M N P R S	1988 1989 1990 1991 1992 1993 1994 European model
11	Assembly plant	A, F, G, K B, C, D E, J	Munich, Germany Dingolfing, Germany Regensburg, Germany
12-17	Serial number		Sequential production number for specific vehicle

010 General

GENERAL	010-1	TOOLS	010-13
HOW TO USE THIS MANUAL	010-2	Basic Tool Requirements	010-13
Warnings, Cautions and Notes	010-3	Jack Stands	010-16
GETTING STARTED	010-3	Oil Change Equipment	010-16
Safety	010-4	Torque Wrench	010-16
Lifting the Car	010-5	Feeler Gauges	010-17
Raising car safely	010-6	Digital Multimeter	010-17
Working under car safely	010-6	BMW Special Tools	010-17
ADVICE FOR THE BEGINNER	010-7	EMERGENCIES	010-18
Planning Ahead	010-7	Changing a Tire	010-18
Cleanliness	010-7	Car Will Not Start	010-18
Non-reusable Fasteners	010-7	Jump Starting Car	010-19
Tightening Fasteners	010-8	Overheating	010-21
Gaskets and Seals	010-9	Low Oil Pressure	010-22
Electrical Testing	010-10	Brake Fluid Level	010-22
Wire Repairs	010-10	Check Engine Light	010-22
BUYING PARTS	010-11	Dim Lights	010-22
Genuine BMW Parts	010-11	Towing	010-23
Non-returnable Parts	010-11	Spare Parts Kit	010-24
Information You Need to Know	010-12		
SERVICE	010-13		

TABLES

- a. General Bolt Tightening Torques
in Nm (max. permissible) 010-9

GENERAL

Although the BMW is a sophisticated and complex machine, basic maintenance can be accomplished by an interested owner with mechanical skills and the right information. Most of the preventive maintenance that is required in the lifetime of the average BMW is well within the capabilities of the do-it-yourselfer.

WARNING —

Do not use this manual unless you are familiar with basic automotive repair procedures and safe workshop practices. This manual illustrates the workshop procedures required for most service work; it is not a substitute for full and up-to-date information from the vehicle manufacturer or for proper training as an automotive technician. Note that it is not possible for us to anticipate all of the ways or conditions under which vehicles may be serviced or to provide cautions as to all of the possible hazards that may result.

WARNING—

Your common sense and good judgment are crucial to safe and successful service work. Read procedures through before starting them. Think about whether the condition of your car, your level of mechanical skill, or your level of reading comprehension might result in or contribute in some way to an occurrence that might cause you injury, damage your car, or result in an unsafe repair. If you have doubts for these or other reasons about your ability to perform safe repair work on your car, have the work done at an authorized BMW dealer or other qualified shop.

This section of the manual is intended to help the beginner get started. To begin with there is a discussion on **How To Use This Manual**. Tips on mechanic's skills and workshop practices that can help the beginner do a faster and more thorough job can be found under **Getting Started**. The basic tools needed to do most of the procedures in this manual are found under **Tools**. The section ends with a quick reference guide to **Emergencies**, including basic troubleshooting and information on how to gauge the seriousness of a problem.

HOW TO USE THIS MANUAL

The manual is divided into nine sections:

0 GENERAL DATA AND MAINTENANCE**1 ENGINE****2 TRANSMISSION****3 SUSPENSION, STEERING AND BRAKES****4 BODY****5 BODY EQUIPMENT****6 ELECTRICAL SYSTEM****7 EQUIPMENT AND ACCESSORIES****ELECTRICAL WIRING DIAGRAMS**

0 GENERAL DATA AND MAINTENANCE covers the recommended maintenance schedules and service procedures needed to perform BMW scheduled maintenance work. Also within this section is the **010 General** section, which contains basic instructions, tips and helpful hints for do-it-yourself maintenance and repair.

The next seven sections (1 through 7) are repair based and are further broken down into three digit repair groups. Each major section begins with a **General** repair group, e.g. **100 Engine-General**. These "00" (double zero) groups are mostly descriptive in nature, covering topics such as theory of operation and troubleshooting. The remainder of the repair groups contain the more involved repair information. The last major section contains detailed electrical wiring diagram schematics.

A master listing of the 9 major sections and the corresponding individual repair groups can be found on the inside front cover.

Each repair group begins with a Table of Contents listing the major subject headings within the group. Page numbers throughout the manual are organized according to the repair group system. For example, you can expect to find repair information on brakes (Repair Group **340**) beginning on page **340-1**. A comprehensive index can be found at the back of the manual.

Warnings, Cautions and Notes

Throughout this manual are many passages with the headings **WARNING**, **CAUTION** or **NOTE**. These very important headings have different meanings.

WARNING—

The text under this heading warns of unsafe practices that are very likely to cause injury, either by direct threat to the person(s) performing the work or by increased risk of accident or mechanical failure while driving.

CAUTION—

A caution calls attention to important precautions to be observed during the repair work that will help prevent accidentally damaging the car or its parts.

NOTE—

A note contains helpful information, tips that will help in doing a better job and completing it more easily.

Please read every **WARNING**, **CAUTION** and **NOTE** at the front of the manual and as they appear in repair procedures. They are very important. Read them before you begin any maintenance or repair job.

Some **WARNINGS** and **CAUTIONS** are repeated wherever they apply. Read them all. Do not skip any. These messages are important, even to the owner who never intends to work on the car.

GETTING STARTED

Most of the necessary maintenance and minor repair that an automobile will need can be done with ordinary tools, even by owners with little or no experience in car repair. Below is some important information on how to work safely, a discussion of what tools will be needed and how to use them.

Safety

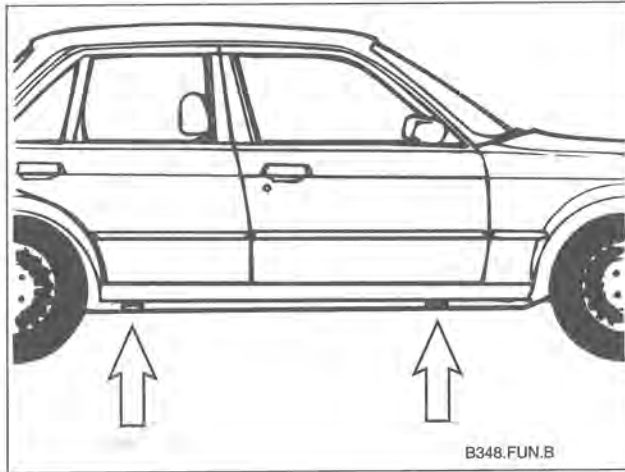
Although an automobile presents many hazards, common sense and good equipment can help ensure safety. Many accidents happen because of carelessness. Pay attention and stick to these few important safety rules.

WARNING—

- *Never run the engine in the work area unless it is well-ventilated. The exhaust should be vented to the outside. Carbon monoxide (CO) in the exhaust kills.*
- *Remove all neckties, scarfs, loose clothing, or jewelry when working near running engines or power tools. Tuck in shirts. Tie long hair and secure it under a cap. Severe injury can result from these things being caught in rotating parts.*
- *Remove rings, watches, and bracelets. Aside from the dangers of moving parts, metallic jewelry conducts electricity and may cause shorts, sparks, burns, or damage to the electrical system when accidentally contacting the battery or other electrical terminals.*
- *Disconnect the battery negative (-) cable whenever working on or near the fuel system or anything that is electrically powered. Accidental electrical contact may damage the electrical system or cause a fire.*

WARNING—

- *Never work under a lifted car unless it is solidly supported on jack stands that are intended for that purpose. Do not support a car on cinder blocks, bricks, or other objects that may shift or crumble under continuous load. Never work under a car that is supported only by the lifting jack.*
- *Fuel is highly flammable. When working around fuel, do not smoke or work near heaters or other fire hazards. Keep an approved fire extinguisher handy.*
- *Illuminate the work area adequately and safely. Use a portable safety light for working inside or under the car. A fluorescent type light is best because it gives off less heat. If using a light with a normal incandescent bulb, use rough service bulbs to avoid breakage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.*
- *Keep sparks, lighted matches, and any open flame away from the top of the battery. Hydrogen gas emitted by the battery is highly flammable. Any nearby source of ignition may cause the battery to explode.*
- *Never lay tools or parts in the engine compartment or on top of the battery. They may fall into confined spaces and be difficult to retrieve, become caught in belts or other rotating parts when the engine is started, or cause electrical shorts and damage to the electrical system.*
- *The fuel system is designed to retain pressure even when the ignition is off. When working with the fuel system, loosen the fuel lines slowly to allow the residual pressure to dissipate gradually. Take precautions to avoid spraying fuel.*



Lifting the Car

◀ BMW jacking points (arrows).

- For those repairs that require raising the car, the proper jacking points should be used to raise the car safely and avoid damage. There are four jacking points from which the car can be safely raised. The jack supplied with the car by BMW can only be used at the four side points—just behind the front wheel or just in front of the rear wheel.

WARNING—

- When raising the car using a floor jack or a hydraulic lift, carefully position the jack pad to prevent damaging the car body. A suitable liner (wood, rubber, etc.) should be placed between the jack and the car to prevent body damage.
- Watch the jack closely. Make sure it stays stable and does not shift or tilt. As the car is raised, the car may roll slightly and the jack may shift.



B1103B

Raising car safely

- Park car on flat, level surface.
- Place jack fully into position under jacking point. Make sure jack is resting on flat, solid ground. Use board or other support to provide a firm surface for jack, if necessary.
- Raise car slowly while constantly checking position of jack and car.
- Once car is raised, block wheel that is opposite and farthest from jack to prevent car from unexpectedly rolling.

WARNING—

- Do not rely on the transmission or the emergency brake to keep the car from rolling. They are not a substitute for positively blocking the opposite wheel.
- Never work under a car that is supported only by a jack. Use jack stands that are properly designed to support the car. See **Tools**.

Working under car safely

- Disconnect negative (–) battery cable. See **020 Maintenance**.

CAUTION—

Prior to disconnecting the battery, read the battery disconnection cautions given at the front of this manual on page viii.

- Raise car slowly as described above.
- Use at least two jack stands to support the car. A jack is a temporary lifting device and should not be used alone to support the car while you are under it. Use jack stands designed for the purpose of supporting a car. For more information on jack stands, see **Tools** below.

WARNING—

Do not use wood, concrete blocks, or bricks to support a car. Wood may split. Blocks or bricks, while strong, are not designed for that kind of load, and may break or collapse.

- Place jack stands on firm, solid surface. If necessary, use a flat board or similar solid object to provide a firm footing.
- Lower car slowly until its weight is fully supported by jack stands. Watch to make sure that the jack stands do not tip or lean as the car settles on them.
- Observe all jacking precautions again when raising car to remove jack stands.