BMW 3- & 5-Series
Service and Repair Manual

A K Legg LAE MIMI and Larry Warren

(1948-256-11AA3)

Models covered

3-Series (E30)
316 (83 to 88), 316i (88 to 91), 318i (83 to 91), 320i (87 to 91), 325i (87 to 91).
Also Touring and Convertible versions of these models

5-Series (E28)
518 (81 to 85), 518i (85 to 88), 525i (81 to 88), 528i (81 to 88), 535i (85 to 88), M535i (85 to 88)

5-Series (E34)
518i (90 to 91), 520i (88 to 91), 525i (88 to 91), 530i (88 to 91), 535i (88 to 91)

Engines covered
1596 cc, 1766 cc, 1795 cc, 1990 cc, 2494 cc, 2788 cc, 2986 cc & 3430 cc

Does not cover Diesel, dohc or V8 engines, or four-wheel-drive models

ABCDE
FGHIJ
KLMNO
PQRST
1 2 3

A book in the **Haynes Service and Repair Manual Series**

ISBN **1 85960 236 3**

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library.

Printed by **J H Haynes & Co. Ltd, Sparkford, Nr Yeovil,Somerset BA22 7JJ, England**

Haynes Publishing
Sparkford, Nr Yeovil, Somerset BA22 7JJ, England

Haynes North America, Inc
861 Lawrence Drive, Newbury Park, California 91320, USA

Editions Haynes S.A.
147/149, rue Saint Honoré, 75001 PARIS, France

Haynes Publishing Nordiska AB
Box 1504, 751 45 Uppsala, Sweden

Contents

LIVING WITH YOUR BMW

Roadside Repairs

ROUTINE MAINTENANCE

Contents

Introduction to the BMW 3- and 5-Series

The E30 3-Series range first became available in the UK in March 1983, and continued in production until April 1991, when the revised E36 3-Series range (not covered by this manual) was introduced. Convertible and Touring (Estate) models were introduced for 1988, and these models have continued in E30 form to date.

The E28 5-Series models were introduced in October 1981, and were superseded in June 1988 by the revised E34 5-Series range, Touring versions of which became available from March 1992. Throughout this manual, E28 models are also referred to as "old-shape", while E34 models are designated "new-shape".

The models covered by this manual are equipped with single overhead cam in-line four- and six-cylinder engines. Early 316 and 518 models are fitted with carburettors, but all other models are fitted with fuel injection systems. Transmissions are a five-speed manual, or three- or four-speed automatic. The transmission is mounted to the back of the engine, and power is transmitted to the fully-independent rear axle through a two-piece propeller shaft. The final drive unit is bolted solidly to a frame crossmember, and drives the rear wheels through driveshafts equipped with inner and outer constant velocity joints.

The front suspension is of MacPherson strut type, with the coil spring/shock absorber unit making up the upper suspension link. The rear suspension is made up of coil spring-over-shock absorber struts, or coil springs and conventional shock absorbers, depending on model.

The brakes are disc type at the front, with either drums or discs at the rear, depending on model. Servo assistance is standard on all models. Some later models are equipped with an Anti-lock Braking System (ABS).

All models are manufactured to fine limits, and live up to the BMW reputation of quality workmanship. Although many of the models covered by this manual appear complex at first sight, they should present no problems to the home mechanic.

Note for UK readers

The greater part of this manual was originally written in the USA. Some of the photographs used are of American-market models, but the procedures given are fully applicable to right-hand-drive models (or have been amended where necessary).

Acknowledgements

Thanks are due to Champion Spark Plug, who supplied the illustrations showing spark plug conditions. Thanks are also due to Sykes-Pickavant Limited, who provided some of the workshop tools, and to all those people at Sparkford who helped in the production of this manual. Technical writers who contributed to this project include Robert Maddox, Mark Ryan and Mike Stubblefield.

We take great pride in the accuracy of information given in this manual, but vehicle manufacturers make alterations and design changes during the production run of a particular vehicle of which they do not inform us. No liability can be accepted by the authors or publishers for loss, damage or injury caused by any errors in, or omissions from, the information given.

Project vehicles

The main project vehicle used in the preparation of this manual for the UK market was a 1988 BMW 318i with an M40/B18 engine.

BMW 320i Saloon (E30)

BMW 325i Touring (E30)

BMW 325i Convertible (E30)

BMW 518i (E28)

BMW 535i (E34)

Working on your car can be dangerous. This page shows just some of the potential risks and hazards, with the aim of creating a safety-conscious attitude.

General hazards

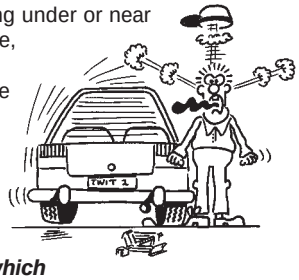
Scalding

• Don't remove the radiator or expansion tank cap while the engine is hot.
• Engine oil, automatic transmission fluid or power steering fluid may also be dangerously hot if the engine has recently been running.

Burning

• Beware of burns from the exhaust system and from any part of the engine. Brake discs and drums can also be extremely hot immediately after use.

Crushing

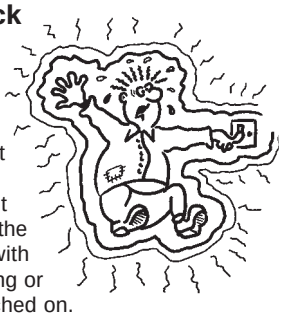


• When working under or near a raised vehicle, always supplement the jack with axle stands, or use drive-on ramps. ***Never venture under a car which is only supported by a jack.***
• Take care if loosening or tightening high-torque nuts when the vehicle is on stands. Initial loosening and final tightening should be done with the wheels on the ground.

Fire

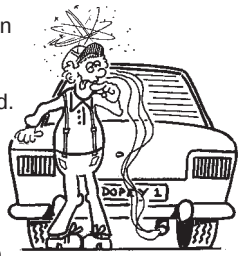
• Fuel is highly flammable; fuel vapour is explosive.
• Don't let fuel spill onto a hot engine.
• Do not smoke or allow naked lights (including pilot lights) anywhere near a vehicle being worked on. Also beware of creating sparks (electrically or by use of tools).
• Fuel vapour is heavier than air, so don't work on the fuel system with the vehicle over an inspection pit.
• Another cause of fire is an electrical overload or short-circuit. Take care when repairing or modifying the vehicle wiring.
• Keep a fire extinguisher handy, of a type suitable for use on fuel and electrical fires.

Electric shock



• Ignition HT voltage can be dangerous, especially to people with heart problems or a pacemaker. Don't work on or near the ignition system with the engine running or the ignition switched on.
• Mains voltage is also dangerous. Make sure that any mains-operated equipment is correctly earthed. Mains power points should be protected by a residual current device (RCD) circuit breaker.

Fume or gas intoxication



• Exhaust fumes are poisonous; they often contain carbon monoxide, which is rapidly fatal if inhaled. Never run the engine in a confined space such as a garage with the doors shut.
• Fuel vapour is also poisonous, as are the vapours from some cleaning solvents and paint thinners.

Poisonous or irritant substances

• Avoid skin contact with battery acid and with any fuel, fluid or lubricant, especially antifreeze, brake hydraulic fluid and Diesel fuel. Don't syphon them by mouth. If such a substance is swallowed or gets into the eyes, seek medical advice.
• Prolonged contact with used engine oil can cause skin cancer. Wear gloves or use a barrier cream if necessary. Change out of oil-soaked clothes and do not keep oily rags in your pocket.
• Air conditioning refrigerant forms a poisonous gas if exposed to a naked flame (including a cigarette). It can also cause skin burns on contact.

Asbestos

• Asbestos dust can cause cancer if inhaled or swallowed. Asbestos may be found in gaskets and in brake and clutch linings. When dealing with such components it is safest to assume that they contain asbestos.

Special hazards

Hydrofluoric acid

• This extremely corrosive acid is formed when certain types of synthetic rubber, found in some O-rings, oil seals, fuel hoses etc, are exposed to temperatures above 400°C. The rubber changes into a charred or sticky substance containing the acid. *Once formed, the acid remains dangerous for years. If it gets onto the skin, it may be necessary to amputate the limb concerned.*
• When dealing with a vehicle which has suffered a fire, or with components salvaged from such a vehicle, wear protective gloves and discard them after use.

The battery

• Batteries contain sulphuric acid, which attacks clothing, eyes and skin. Take care when topping-up or carrying the battery.
• The hydrogen gas given off by the battery is highly explosive. Never cause a spark or allow a naked light nearby. Be careful when connecting and disconnecting battery chargers or jump leads.

Air bags

• Air bags can cause injury if they go off accidentally. Take care when removing the steering wheel and/or facia. Special storage instructions may apply.

Diesel injection equipment

• Diesel injection pumps supply fuel at very high pressure. Take care when working on the fuel injectors and fuel pipes.

Warning: Never expose the hands, face or any other part of the body to injector spray; the fuel can penetrate the skin with potentially fatal results.

Remember...

DO

• Do use eye protection when using power tools, and when working under the vehicle.

• Do wear gloves or use barrier cream to protect your hands when necessary.

• Do get someone to check periodically that all is well when working alone on the vehicle.

• Do keep loose clothing and long hair well out of the way of moving mechanical parts.

• Do remove rings, wristwatch etc, before working on the vehicle – especially the electrical system.

• Do ensure that any lifting or jacking equipment has a safe working load rating adequate for the job.

DON'T

• Don't attempt to lift a heavy component which may be beyond your capability – get assistance.

• Don't rush to finish a job, or take unverified short cuts.

• Don't use ill-fitting tools which may slip and cause injury.

• Don't leave tools or parts lying around where someone can trip over them. Mop up oil and fuel spills at once.

• Don't allow children or pets to play in or near a vehicle being worked on.

Anti-theft audio system

General information

Some models are equipped with an audio system having an anti-theft feature that will render the stereo inoperative if stolen. If the power source to the stereo is cut, the stereo won't work even if the power source is immediately re-connected. If your vehicle is equipped with this anti-theft system, do not disconnect the battery or remove the stereo unless you have the individual code number for the stereo.

Refer to the owner's handbook supplied with the vehicle for more complete information on this audio system and its anti-theft feature.

Unlocking procedure

1 Turn on the radio. The word "CODE" should appear on the display.

2 Using the station preset selector buttons, enter the five-digit code. If you make a mistake when entering the code, continue the five-digit sequence anyway. If you hear a "beep," however, stop immediately and start the sequence over again. **Note:** *You have three attempts to enter the correct code. If the correct code isn't entered in three tries, you'll have to wait one hour, with the radio on, before you enter the codes again.*

5 Once the code has been entered correctly, the word "CODE" should disappear from the display, and the radio should play (you'll have to tune-in and enter your preset stations, however).

6 If you have lost your code number, contact a BMW dealer service department.

Instrument panel language display

On some later models, disconnecting the battery may cause the instrument panel display to default to the German language (this does not usually apply to UK models). If it is necessary to reset the correct language after the battery is reconnected, proceed as follows. With all the doors shut and the ignition on (engine not running), press the trip reset button until the panel displays the desired language. There are eight languages available. If you wish to bypass a particular selection, release the reset button and press again - this will cause the display to advance to the next language. Once the correct language has been selected, continue holding the reset button until the display reads "I.O. Version 2.0". Continue holding the button until it reads "H.P. Version 3.4", then release the button.

Jacking, towing and wheel changing

Jacking and wheel changing

The jack supplied with the vehicle should be used only for raising the vehicle when changing a tyre or placing axle stands under the frame.

Warning**: **Never crawl under the vehicle or start the engine when this jack is being used as the only means of support.

When changing a wheel, the vehicle should be on level ground, with the handbrake firmly applied, and the wheels chocked. Select reverse gear (manual transmission) or Park (automatic transmission). Prise off the hub cap (if equipped) using the tapered end of the wheel brace. Loosen the wheel bolts half a turn, leaving them in place until the wheel is raised off the ground.

Position the head of the jack under the side of the vehicle, making sure it engages with the pocket made for this purpose (just behind the front wheel, or forward of the rear wheel). Engage the wheel brace handle and turn it clockwise until the wheel is raised off the ground. Unscrew the bolts, remove the wheel and fit the spare.

Refit the wheel bolts and tighten them finger-tight. Lower the vehicle by turning the wheel brace anti-clockwise. Remove the jack and tighten the bolts in a diagonal pattern to the torque listed in the Chapter 1 Specifications. If a torque wrench is not available, have the torque checked by a BMW dealer or tyre fitting specialist as soon as possible. Refit the hubcap.

Towing

Vehicles with manual transmission can be towed with all four wheels on the ground, if necessary. Automatic transmission-equipped vehicles can only be towed with all four wheels on the ground providing that the speed does not exceed 35 mph and the distance is not over 50 miles, otherwise transmission damage can result. For preference, regardless of transmission type, the vehicle should be towed with the driven (rear) wheels off the ground.

Proper towing equipment, specifically designed for the purpose, should be used, and should be attached to the main structural members of the vehicle, not to the bumpers or bumper brackets. Sling-type towing equipment must **not** be used on these vehicles.

Safety is a major consideration while towing. The handbrake should be released, and the transmission should be in neutral. The steering must be unlocked (ignition switch turned to position “1”). Remember that power-assisted steering (where fitted) and the brake servo will not work with the engine switched off.

Jump starting

HAYNES HiNT ***Jump starting will get you out of trouble, but you must correct whatever made the battery go flat in the first place. There are three possibilities:***

1 The battery has been drained by repeated attempts to start, or by leaving the lights on.

2 The charging system is not working properly (alternator drivebelt slack or broken, alternator wiring fault or alternator itself faulty).

3 The battery itself is at fault (electrolyte low, or battery worn out).

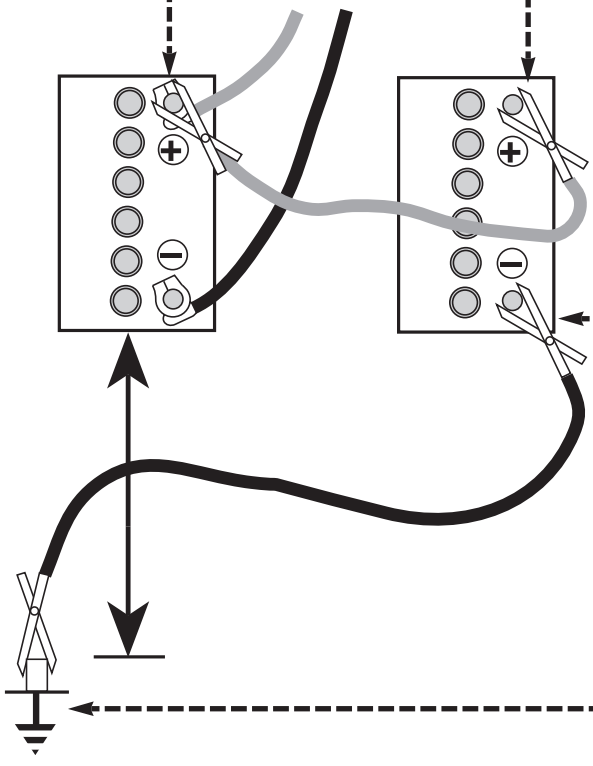
When jump-starting a car using a booster battery, observe the following precautions:

- ✔ Before connecting the booster battery, make sure that the ignition is switched off.
- ✔ Ensure that all electrical equipment (lights, heater, wipers, etc) is switched off.
- ✔ Make sure that the booster battery is the same voltage as the discharged one in the vehicle.
- ✔ If the battery is being jump-started from the battery in another vehicle, the two vehcles MUST NOT TOUCH each other.
- ✔ Make sure that the transmission is in neutral (or PARK, in the case of automatic transmission).

1 Connect one end of the red jump lead to the positive (+) terminal of the flat battery

2 Connect the other end of the red lead to the positive (+) terminal of the booster battery.

3 Connect one end of the black jump lead to the negative (-) terminal of the booster battery



4 Connect the other end of the black jump lead to a bolt or bracket on the engine block, well away from the battery, on the vehicle to be started.

5 Make sure that the jump leads will not come into contact with the fan, drive-belts or other moving parts of the engine.

6 Start the engine using the booster battery, then with the engine running at idle speed, disconnect the jump leads in the reverse order of connection.

Identifying leaks

Puddles on the garage floor or drive, or obvious wetness under the bonnet or underneath the car, suggest a leak that needs investigating. It can sometimes be difficult to decide where the leak is coming from, especially if the engine bay is very dirty already. Leaking oil or fluid can also be blown rearwards by the passage of air under the car, giving a false impression of where the problem lies.

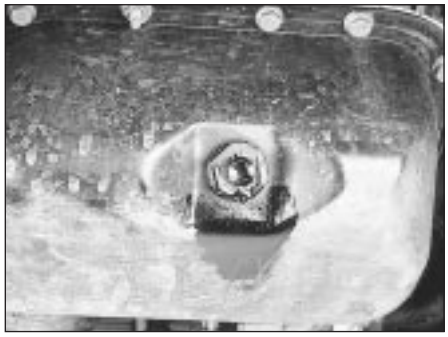
Warning: Most automotive oils and fluids are poisonous. Wash them off skin, and change out of contaminated clothing, without delay.

HAYNES HiNT

The smell of a fluid leaking from the car may provide a clue to what's leaking. Some fluids are distinctively coloured. It may help to clean the car carefully and to park it over some clean paper overnight as an aid to locating the source of the leak.

Remember that some leaks may only occur while the engine is running.

Sump oil

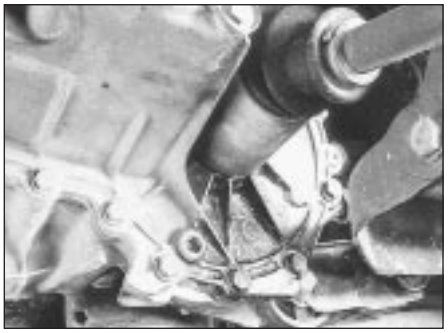


Engine oil may leak from the drain plug...

Oil from filter

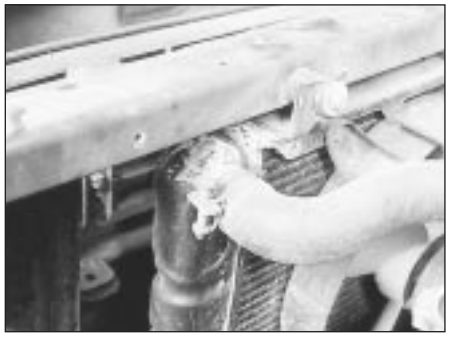
...or from the base of the oil filter.

Gearbox oil



Gearbox oil can leak from the seals at the inboard ends of the driveshafts.

Antifreeze

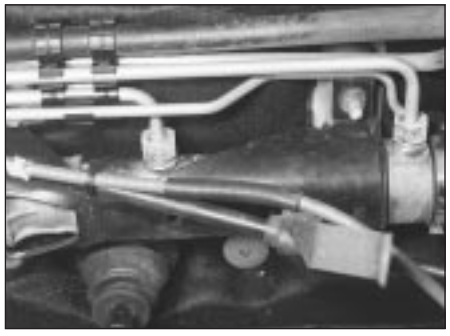


Leaking antifreeze often leaves a crystalline deposit like this.

Brake fluid

A leak occurring at a wheel is almost certainly brake fluid.

Power steering fluid



Power steering fluid may leak from the pipe connectors on the steering rack.