

**Haynes**
shows you how

BMW 3-Series (92-98) & Z3 (96-98) Haynes Online Manual

1 General information and precautions

General information

The engine electrical system consists mainly of the charging and starting systems. Because of their engine-related functions, these components are covered separately from the body electrical devices such as the lights, instruments, etc. (which are covered in [Chapter 12](#)). Refer to Part B for information on the ignition system.

The electrical system is of the 12-volt negative ground type.

The battery is of the low maintenance or “maintenance-free” (sealed for life) type and is charged by the alternator, which is belt-driven from the crankshaft pulley.

The starter motor is of the pre-engaged type incorporating an integral solenoid. On starting, the solenoid moves the drive pinion into engagement with the flywheel ring gear before the starter motor is energized. Once the engine has started, a one-way clutch prevents the motor armature being driven by the engine until the pinion disengages from the flywheel.

Precautions

Further details of the various systems are given in the relevant Sections of this Chapter. While some repair procedures are given, the usual course of action is to replace the component concerned. The owner whose interest extends beyond mere component replacement should obtain a copy of the “*Automotive Electrical Manual*” , available from the publishers of this manual.

It is necessary to take extra care when working on the electrical system to avoid damage to semi-conductor devices (diodes and transistors), and to avoid the risk of personal injury. In addition to the precautions given in “*Safety first!*” at the beginning of this manual, observe the following when working on the system:

Always remove rings, watches, etc. before working on the electrical system. Even with the battery disconnected, capacitive discharge could occur if a component’s live terminal is grounded through a metal object. This could cause a shock or nasty burn.

Do not reverse the battery connections. Components such as the alternator, electronic control units, or any other components having semi-conductor circuitry could be irreparably damaged.

Ambient temperature above 77°F

Fully-charged	1.210 to 1.230
70% charged	1.170 to 1.190
Fully-discharged	1.050 to 1.070

Ambient temperature below 77°F

Fully-charged	1.270 to 1.290
70% charged	1.230 to 1.250
Fully-discharged	1.110 to 1.130

If the engine is being started using jump leads and a remote battery, connect the batteries *positive-to-positive* and *negative-to-negative* (see “Jump starting”, at the beginning of this manual). This also applies when connecting a battery charger.

Never disconnect the battery terminals, the alternator, any electrical wiring or any test instruments when the engine is running.

Do not allow the engine to turn the alternator when the alternator is not connected.

Never “test” for alternator output by “shorting” the output lead to ground.

Never use an ohmmeter of the type incorporating a hand-cranked generator for circuit or continuity testing.

Always ensure that the battery negative lead is disconnected when working on the electrical system.

Before using electric-arc welding equipment on the car, disconnect the battery, alternator and components such as the fuel injection/ignition electronic control unit to protect them from the risk of damage.

If a radio/cassette unit with a built-in security code is fitted, note the following precautions. If the power source to the unit is cut, the anti-theft system will activate. Even if the power source is immediately reconnected, the radio/cassette unit will not function until the correct security code has been entered. Therefore, if you do not know the correct security code for the radio/cassette unit **do not** disconnect the battery or remove the radio/cassette unit from the vehicle.