






Chapter 5 Part A: Starting and charging systems

Contents

Alternator - removal and refitting	6	Electronic oil level sensor - general information	13
Alternator - testing and overhaul	7	General information and precautions	1
Auxiliary drivebelt check and renewal	See Chapter 1	Ignition switch - removal and refitting	11
Battery - removal and refitting	4	Oil pressure warning light switch - removal and refitting	12
Battery - testing and charging	3	Starter motor - removal and refitting	9
Battery, bulbs and fuses	See "Weekly checks"	Starter motor - testing and overhaul	10
Charging system - testing	5	Starting system - testing	8
Electrical fault finding - general information	2		

Degrees of difficulty

Easy , suitable for novice with little experience 	Fairly easy , suitable for beginner with some experience 	Fairly difficult , suitable for competent DIY mechanic 	Difficult , suitable for experienced DIY mechanic 	Very difficult , suitable for expert DIY or professional 
---	--	--	---	--

Specifications

System type	12-volt, negative earth
Battery	
Type	Low maintenance or "maintenance-free" sealed for life
Capacity	25 to 33 Ah (depending on model)
Charge condition:	
Poor	12.5 volts
Normal	12.6 volts
Good	12.7 volts

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). Information on the ignition system is covered in Part B of this Chapter.

The electrical system is of the 12-volt negative earth 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 energised. 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 renew the component concerned. The owner whose interest extends beyond mere component renewal should obtain a copy of the "Automobile Electrical & Electronic Systems 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 earthed 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.

If the engine is being started using jump leads and a slave battery, connect the batteries *positive-to-positive* and *negative-to-negative* (see "Booster battery (jump starting)"). 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 "flashing" the output lead to earth.

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.

The radio/cassette units fitted as standard or optional equipment may be equipped with a built-in security code to deter thieves. 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 negative terminal of the battery or remove the radio/cassette unit from the car. Refer to the Owner's Manual, or your Peugeot dealer for further information on security codes.

2 Electrical fault finding - general information

Refer to Chapter 12.

3 Battery - testing and charging

Standard and low maintenance battery - testing

1 If the vehicle covers a small annual mileage, it is worthwhile checking the specific gravity of the electrolyte every three months to determine the state of charge of the battery. Use a hydrometer to make the check and compare the results with the following table.

	Above 25°C (77°F)	Below 25°C (77°F)
Fully-charged	1.210 to 1.230	1.270 to 1.290
70% charged	1.170 to 1.190	1.230 to 1.250
Discharged	1.050 to 1.070	1.110 to 1.130

Note that the specific gravity readings assume an electrolyte temperature of 15°C (60°F); for every 10°C (50°F) below 15°C (60°F) subtract 0.007. For every 10°C (50°F) above 15°C (60°F) add 0.007.

2 If the battery condition is suspect, first check the specific gravity of electrolyte in each cell. A variation of 0.040 or more between any cells indicates loss of electrolyte or deterioration of the internal plates.

3 If the specific gravity variation is 0.040 or more, the battery should be renewed. If the cell variation is satisfactory but the battery is discharged, it should be charged as described later in this Section.

Maintenance-free battery - testing

4 In cases where a "sealed for life" maintenance-free battery is fitted, topping-up and testing of the electrolyte in each cell is not possible. The condition of the battery can therefore only be tested using a battery condition indicator or a voltmeter.

5 If testing the battery using a voltmeter, connect the voltmeter across the battery and compare the result with those given in the Specifications under "charge condition". The test is only accurate if the battery has not been subjected to any kind of charge for the previous six hours. If this is not the case, switch on the headlights for 30 seconds, then wait four to five minutes before testing the battery after switching off the headlights. All other electrical circuits must be switched off, so check that the doors and tailgate are fully shut when making the test.

6 If the voltage reading is less than 12.2 volts, then the battery is discharged, whilst a reading of 12.2 to 12.4 volts indicates a partially discharged condition.

7 If the battery is to be charged, remove it from the vehicle (Section 4) and charge it as described later in this Section.

Standard and low maintenance battery - charging

Note: *The following is intended as a guide only. Always refer to the manufacturer's recommendations (often printed on a label attached to the battery) before charging a battery.*

8 Charge the battery at a rate of 3.5 to 4 amps and continue to charge the battery at this rate until no further rise in specific gravity is noted over a four hour period.

9 Alternatively, a trickle charger charging at the rate of 1.5 amps can safely be used overnight.

10 Specially rapid "boost" charges which are claimed to restore the power of the battery in 1 to 2 hours are not recommended, as they can cause serious damage to the battery plates through overheating.

11 While charging the battery, note that the temperature of the electrolyte should never exceed 37.8°C (100°F).

Maintenance-free battery - charging

Note: *The following is intended as a guide only. Always refer to the manufacturer's recommendations (often printed on a label attached to the battery) before charging a battery.*

12 This battery type takes considerably longer to fully recharge than the standard type, the time taken being dependent on the extent of discharge, but it can take anything up to three days.

13 A constant voltage type charger is required, to be set, when connected, to 13.9 to 14.9 volts with a charger current below 25 amps. Using this method, the battery should

be usable within three hours, giving a voltage reading of 12.5 volts, but this is for a partially discharged battery and, as mentioned, full charging can take considerably longer.

14 If the battery is to be charged from a fully discharged state (condition reading less than 12.2 volts), have it recharged by your Peugeot dealer or local automotive electrician, as the charge rate is higher and constant supervision during charging is necessary.

4 Battery - removal and refitting

Note: *Make sure that you have a copy of the radio/cassette unit security code number (where applicable) before disconnecting the battery.*

Removal

1 The battery is located in the front left-hand corner of the engine compartment.

2 Slacken the clamp bolts and disconnect the clamp from the battery negative (earth) terminal.

3 Remove the insulation cover (where fitted) and disconnect the positive terminal lead(s) in the same way.

4 Release the battery clamp and lift the battery carefully from the engine compartment.

5 If required, the battery tray can be removed after undoing the retaining bolts.

Refitting

6 Refitting is a reversal of removal, but smear petroleum jelly on the terminals when reconnecting the leads, and always reconnect the positive lead first, and the negative lead last.

5 Charging system - testing

Note: *Refer to the warnings given in "Safety first!" and in Section 1 of this Chapter before starting work.*

1 If the ignition warning light fails to illuminate when the ignition is switched on, first check the alternator wiring connections for security. If satisfactory, check that the warning light bulb has not blown, and that the bulbholder is secure in its location in the instrument panel. If the light still fails to illuminate, check the continuity of the warning light feed wire from the alternator to the bulbholder. If all is satisfactory, the alternator is at fault and should be renewed or taken to an auto-electrician for testing and repair.

2 If the ignition warning light illuminates when the engine is running, stop the engine and check that the drivebelt is correctly tensioned (see Chapter 1) and that the alternator connections are secure. If all is so far satisfactory, have the alternator checked by an auto-electrician for testing and repair.

3 If the alternator output is suspect even though the warning light functions correctly, the regulated voltage may be checked as follows.

4 Connect a voltmeter across the battery terminals and start the engine.

5 Increase the engine speed until the voltmeter reading remains steady; the reading should be approximately 12 to 13 volts, and no more than 14 volts.

6 Switch on as many electrical accessories (eg, the headlights, heated rear window and heater blower) as possible, and check that the alternator maintains the regulated voltage at around 13 to 14 volts.

7 If the regulated voltage is not as stated, the fault may be due to worn brushes, weak brush springs, a faulty voltage regulator, a faulty diode, a severed phase winding or worn or damaged slip rings. The alternator should be renewed or taken to an auto-electrician for testing and repair.

6 Alternator - removal and refitting

Removal

1 Disconnect the battery negative lead.

2 Remove the auxiliary drivebelt as described in Chapter 1.

3 Where necessary, refer to Chapter 4 and move the relevant air cleaner components to one side for increased access.

4 Disconnect the wiring from the alternator (see illustration).

5 Unscrew the pivot and adjustment bolts and lift the alternator from the engine. On certain models note that the alternator front bracket is slotted to allow the pivot bolt to remain in the bracket on the engine.

Refitting

6 Refitting is a reversal of removal, but tension the drivebelt, as described in Chapter 1.



6.4 Alternator wiring connections

7 Alternator - testing and overhaul

If the alternator is thought to be suspect, it should be removed from the vehicle and taken to an auto-electrician for testing. Most auto-electricians will be able to supply and fit brushes at a reasonable cost. However, check on the cost of repairs before proceeding as it may prove more economical to obtain a new or exchange alternator.

8 Starting system - testing

Note: Refer to the precautions given in "Safety first!" and in Section 1 of this Chapter before starting work.

1 If the starter motor fails to operate when the ignition key is turned to the appropriate position, the following possible causes may be to blame.

- The battery is faulty.
- The electrical connections between the switch, solenoid, battery and starter motor are somewhere failing to pass the necessary current from the battery through the starter to earth.
- The solenoid is faulty.
- The starter motor is mechanically or electrically defective.

2 To check the battery, switch on the headlights. If they dim after a few seconds, this indicates that the battery is discharged - recharge (see Section 3) or renew the battery. If the headlights glow brightly, operate the ignition switch and observe the lights. If they dim, then this indicates that current is reaching the starter motor, therefore the fault must lie in the starter motor. If the lights continue to glow brightly (and no clicking sound can be heard from the starter motor solenoid), this indicates that there is a fault in the circuit or solenoid - see following paragraphs. If the starter motor turns slowly when operated, but the battery is in good condition, then this indicates that either the starter motor is faulty, or there is considerable resistance somewhere in the circuit.

3 If a fault in the circuit is suspected, disconnect the battery leads (including the earth connection to the body), the starter/solenoid wiring and the engine/transmission earth strap. Thoroughly clean the connections, and reconnect the leads and wiring, then use a voltmeter or test lamp to check that full battery voltage is available at the battery positive lead connection to the solenoid, and that the earth is sound. Smear petroleum jelly around the battery terminals to prevent corrosion - corroded connections are amongst the most frequent causes of electrical system faults.

4 If the battery and all connections are in

good condition, check the circuit by disconnecting the wire from the solenoid blade terminal. Connect a voltmeter or test lamp between the wire end and a good earth (such as the battery negative terminal), and check that the wire is live when the ignition switch is turned to the "start" position. If it is, then the circuit is sound - if not the circuit wiring can be checked as described in Chapter 12.

5 The solenoid contacts can be checked by connecting a voltmeter or test lamp between the battery positive feed connection on the starter side of the solenoid, and earth. When the ignition switch is turned to the "start" position, there should be a reading or lighted bulb, as applicable. If there is no reading or lighted bulb, the solenoid is faulty and should be renewed.

6 If the circuit and solenoid are proved sound, the fault must lie in the starter motor. In this event, it may be possible to have the starter motor overhauled by a specialist, but check on the cost of spares before proceeding, as it may prove more economical to obtain a new or exchange motor.

9 Starter motor - removal and refitting

Removal

1 Disconnect the battery negative lead.

2 Where necessary, refer to Chapter 4 and move the relevant air cleaner components to one side for increased access.

3 On GTI models, remove the inlet manifold, with reference to the relevant Part of Chapter 4.

4 Disconnect the wiring from the solenoid (see illustration).

5 Unscrew the bolts securing the brush end bracket to the engine (see illustration).

6 Unscrew the mounting bolts at the flywheel end (see illustration).

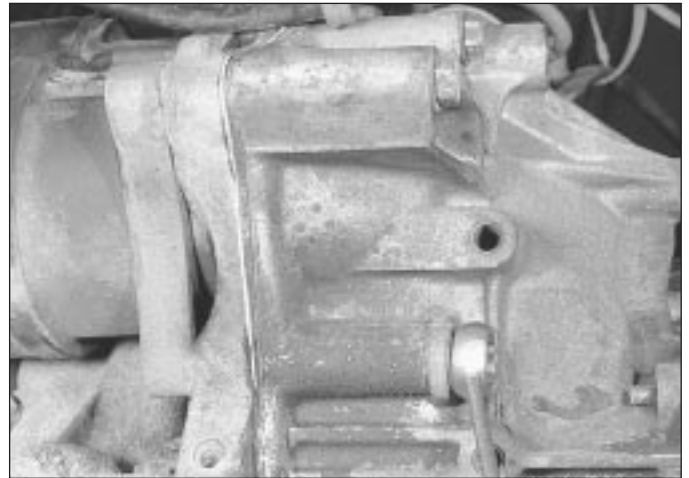
7 Withdraw the starter motor from the engine.



9.4 Starter motor solenoid wiring



9.5 Starter motor brush end bracket retaining bolts on XV, XW and XY series engines



9.6 Removing the starter motor mounting bolts on XV, XW and XY series engines

Refitting

8 Refitting is a reversal of removal, but first insert all mounting bolts finger tight, then tighten the flywheel end bolts followed by the brush end bolts.

10 Starter motor - testing and overhaul



If the starter motor is thought to be suspect, it should be removed from the vehicle and taken to an auto-electrician for testing. Most auto-electricians will be able to supply and fit brushes at a reasonable cost. However, check on the cost of repairs before proceeding as it may prove more economical to obtain a new or exchange motor.

11 Ignition switch - removal and refitting



The ignition switch is integral with the steering column lock, and can be removed as described in Chapter 10.

12 Oil pressure warning light switch - removal and refitting



Removal

- 1 The switch is located at the front of the cylinder block, above the oil filter mounting. Note that on some models access to the switch may be improved if the vehicle is jacked up and supported on axle stands so that the switch can be reached from underneath (see *"Jacking and vehicle support"*).
- 2 Disconnect the battery negative lead.
- 3 Remove the protective sleeve from the wiring plug (where applicable), then disconnect the wiring from the switch.
- 4 Unscrew the switch from the cylinder block, and recover the sealing washer. Be prepared for oil spillage, and if the switch is to be left removed from the engine for any length of time, plug the hole in the cylinder block.

Refitting

- 5 Examine the sealing washer for signs of damage or deterioration and if necessary renew.
- 6 Refit the switch, complete with washer, and tighten it securely. Reconnect the wiring connector.
- 7 Lower the vehicle to the ground then check and, if necessary, top-up the engine oil as described in *"Weekly checks"*.

13 Electronic oil level sensor - general information

- 1 Some 1985 XU series engine models have an oil level sensor fitted to the engine sump, together with a warning lamp on the instrument panel. The system was only fitted on the 1985 model year, and has been deleted from later models.
- 2 The sensor incorporates a high-resistance wire, which varies in conductivity depending on whether it is immersed in or above the oil. An electronic control unit mounted under the right-hand side of the facia monitors the conductivity, and operates the warning lamp when necessary.
- 3 It should be noted that the system only functions accurately if the car is on a level surface. When the ignition is initially switched on, the warning lamp should light for two seconds. If the oil level is correct, the lamp will then go out, but if it starts to flash the oil level is low.
- 4 To prevent the system functioning unnecessarily after the engine has started, the control unit is earthed through the oil pressure switch. The level check is made before starting the engine. Some early models are not earthed through the oil pressure switch and on these, the warning lamp may flash if for instance the engine is temporarily stalled and the oil has not returned to the sump.