SERVICE INFORMATION
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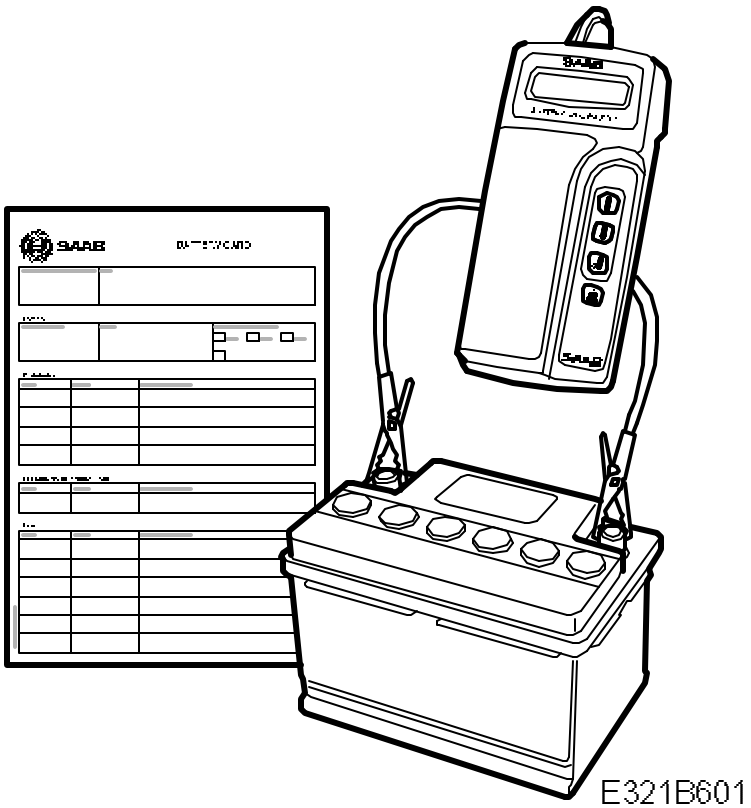
Date:.....DECEMBER 1998
Market: NOT SE

Battery maintenance program



Cars affected

9-3, 9-3CV and 9-5 from M1999 inclusive.

Background

This SI replaces SI 311-1773, SI 100-1482 and the points pertaining to battery maintenance in Service Manuals 1. Service and 3.1 Electrical System.

If a battery is left without maintenance for long periods, its level of charge will gradually drop. The rate at which the level of charge drops depends mainly on how much current is being used by the car's electrical system. There is a certain amount of self-discharge even when the battery has been disconnected. This will increase with the temperature.

If the battery is left with too low a level of charge for long periods, a chemical process will commence in which the battery acid gradually changes to water, corroding the battery plates. This corrosion process starts to be critical if the battery is left for about 2 weeks at a charge level below 65-75 % (corresponding to an unloaded battery voltage lower than approx. 12.4 volts). A battery with low charge level can freeze even at 0°C, which will also damage the battery plates.

The damage that is then caused is permanent and cannot be remedied with normal battery

recharging. As a result, the capacity **and** service life of the battery will be permanently impaired.

The objective of this maintenance program is to prevent this type of damage to the battery from ever arising and thereby increasing the service life of the battery and, above all, to ensure the customer receives a battery that is in perfect condition.

Parts required

Saab Battery Analyser 311.

The analyser is available in two language versions:

86 12 525	English (US), French (CA), Spanish, Portuguese, Italian, German
86 12 533	Swedish, Finnish, German, Dutch, French, English (UK)

Brief summary of the battery maintenance program

This program is a procedure for documenting the condition of the battery from the factory to the final customer.

Each car is provided with a battery card at the factory. After approving delivery, the battery is tested and the results entered on the battery card. The battery is tested using a new type of battery analyser that can measure and assess its current capacity as well as its voltage.

A similar analyser (Battery Analyser 311) is to be available at all dealers and at every important link in the distribution chain. This analyser provides a read-out of the test results as well as a test code containing all the test values.

The battery is tested once a month during the distribution phase from the factory to the dealer as well as when the car is in storage at the dealer. The results are entered on the battery card.

Demonstration cars (e.g. in showrooms, etc.) should be tested once a week.

If the battery requires charging, Battery Analyser 311 will indicate this. The battery should be charged as soon as possible and then the battery card should be updated with new test values.

When the car is delivered to the final customer (delivery service), the battery status is registered in the customer's "Saab Service" book in the form of a code together with the odometer reading and date.

In the event of a warranty claim, the test code from Battery Analyser 311 must be entered for the claim to be approved.

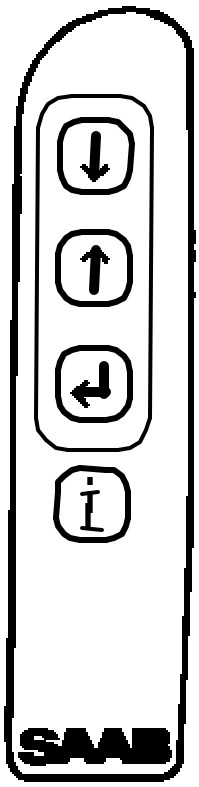
Battery Analyser 311

Battery Analyser 311 is manufactured by Midtronic Inc. in the USA and uses a patented method of measurement with the ability of measuring not only the battery voltage but also the current

capacity of the battery. Saab Automobile AB has judged this analyser to be the most suitable test instrument available on the market for this type of maintenance program. By using this analyser, a uniform battery test method can be achieved on Saab markets all over the world.

Battery Analyser 311 is available in two language versions (see Parts required), each with six languages to facilitate handling.

Handling is simple as only four keys are used:



E321B603

- two arrow keys for menu selections
- an -key to confirm selections
- an " i "-key to read the test code

Through a specially adapted Saab measuring program, the analyser presents the test results in the form of a test code consisting of 8 characters.

The analyser requires no power source of its own but is supplied by the battery it is connected to while testing.

Only 12 V starting batteries can be tested. The analyser can also be used to test batteries in the Saab 900 and 9000.

Saab Automobile AB guarantees the analyser for a period of one year. During this warranty period, a defective instrument can be sent to Parts Testing, Saab Automobile AB, Trollhättan.

A new analyser can be ordered through normal spare parts procedures.

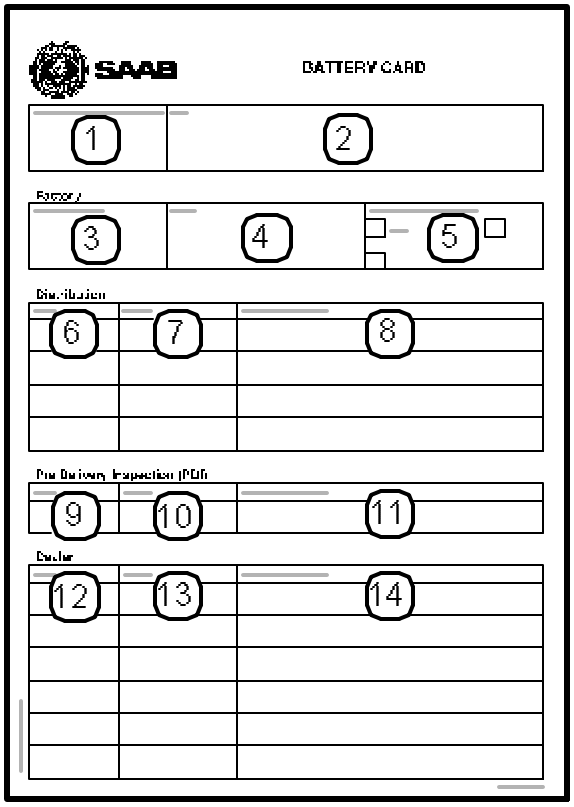
Important

Test cables must not be repaired or replaced with other cables as the instrument and its test cables have been calibrated as a unit.

Incorrect values will be obtained if other test cables are used, for example from another battery analyser.

If the test cables or the instrument are in need of repair, both items must be returned at the same time.

Battery card



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The objective of the battery card is to enable the condition of the battery to be documented from the factory to the final customer. The card is identified with the VIN (Vehicle Identification Number) and is placed in the glove compartment when the car leaves the assembly line. The first test is registered on the battery card after the car has been approved for delivery from the factory and then it accompanies the car until it reaches the final dealer. On delivery to the final customer, the car should be retained by the dealer together with the other vehicle documents.

The battery card must be updated at each link in the distribution chain as described below. The number refers to the corresponding area on the battery card, see illustration.

1. **Vehicle (Dealer Reference No.)**

   For the dealer's use (Stock No., location, etc.).

2. **VIN**

   The Vehicle Identification Number printed at the factory.

   Factory

   This section is completed at the factory once the battery has been approved for delivery.

3. **Battery OK Date**

   The date the battery was checked and confirmed to be OK in the factory prior to delivery (Customer Care).

4. **Code**

   Battery test code according to the battery test conducted at the factory. Initially, this code will be replaced with the recorded CCA value. Once the second generation of test equipment has been introduced in the factory, this test code will fully correspond with the test code obtained from Battery Analyser 311.

5. **Battery type - CCA(SAE)**

   The marked box indicates the size of the Factory-fitted battery in CCA ("Cold Cranking Amps") according to the SAE standard.

   Distribution

   This section is used for battery tests carried out between the time that the car received delivery approval at the factory until the point in the distribution chain when the dealer takes over responsibility for maintaining the battery.

6. **Date**

   The date the battery was tested is entered here. Normally, the battery is tested once a month. Demonstration vehicles in showrooms or similar vehicles should be tested weekly.

7. **Code**

   The test code obtained from Battery Analyser 311 is entered here.

Note

The test code is required for warranty claims.

8. **Message - Action**

   The test message obtained from Battery Analyser 311 is entered here together with any action that has been taken.

Note

If charging is necessary - Test the battery and update the battery card when the battery has been charged.

Pre Delivery Inspection (PDI)

The result from the battery test when the dealer takes over responsibility for maintaining the battery is registered on this line. This stage in the distribution chain varies slightly depending on the market but normally takes place in connection with the pre-delivery inspection. (See also under the heading ”Pre Delivery Inspection (PDI)”.)

9. **Date**

   The date the battery was tested is entered here. Normally, the battery is tested once a month. Demonstration vehicles in showrooms or similar vehicles should be tested weekly.

10. **Code**

    The test code obtained from Battery Analyser 311 is entered here.

Note

The test code is required for warranty claims.

11. **Message - Action**

    The test message obtained from Battery Analyser 311 is entered here together with any action that has been taken.

Note

If charging is necessary - Test the battery and update the battery card when the battery has been charged.

Dealer

The result from each battery test carried out while the dealer is responsible for maintaining the battery is registered in this section, i.e. until the car is delivered to the final customer.

12. **Date**

    The date the battery was tested is entered here. Normally, the battery is tested once a month. Demonstration vehicles in showrooms or similar vehicles should be tested weekly.

13. **Code**

The test code obtained from Battery Analyser 311 is entered here.

Note

The test code is required for warranty claims.

14. **Message - Action**

The test message obtained from Battery Analyser 311 is entered here together with any action that has been taken.

Note

If charging is necessary - Test the battery and update the battery card when the battery has been charged.

Battery card filing system

Besides Battery Analyser 311 and the battery card, each dealer is required to have a system for keeping track of which cars require testing or charging respectively. We recommend a loose-leaf binder system with four sections marked as follows:

1. CHARGE

For battery cards from cars requiring charging according to the test message obtained from Battery Analyser 311.

2. SHOWROOM

For battery cards from cars standing in showrooms, etc. These cars have a noticeably higher current consumption and therefore require weekly testing.

3. UNEVEN MONTH 4. EVEN MONTH

These files are used for cars in storage. When the car has arrived at the dealer, the battery is tested and the result entered on the battery card, which is placed in the file corresponding to the next battery test (within one month).

It is important that every dealer has a functional system so that the car (and its respective key) containing the battery that is next in turn to test/charge can be found easily.

Test procedure

Use the arrow keys to select the correct alternative in each menu.

Use the key to enter or confirm a selection. Selections will be retained as menu defaults the next time the analyser is activated.

1. Check the electrolyte level and top up if necessary (especially on warm climate markets). If the battery has been used for a while with a low electrolyte level, it should be topped up and recharged before the battery test is performed.

Note

If the electrolyte level is too low for long periods, it will cause permanent damage and shorten the service life of the battery.

2. Clean the battery terminals.

3. Connect the red cable clip to the positive terminal (+). (Reversed polarity will not damage the analyser.)

4. Connect the black cable clip to the negative terminal (-). When both clips are connected, the analyser will be activated automatically and a self-test will start. If the analyser is defective, the message “INTERNAL ERROR SERVICE REQUIRED”.

5. Make sure the cable clips are making good contact.

Note

The battery can also be tested when it is connected to the car’s electrical system. The ignition key must then be removed. If the analyser registers any interference from the car’s electrical system, the message “SYSTEM NOISE” will be displayed continuously until the source of interference has been removed. If the DICE/ICE control module (applies to 900, 9-3 and 9-5) is active, maxi fuse 2 in the maxi fuse box must be extracted. See also “Fault Diagnosis”.

6. Under “SELECT TEST”, there is the option of selecting whether the battery is connected to the car’s electrical system (“IN-VEHICLE”) or not (“OUT-OF-VEHICLE”).

7. Under “BATTERY TYPE”, select whether the battery is factory-fitted (“SAAB BATTERY”) or a replacement battery from another manufacturer (“NON-SAAB”).

8. Confirm with “SELECT TEST BY SAE(A)” if the battery’s cold starting current is specified according to CCA (SAE) standard. For batteries specified according to DIN, select and confirm with “SELECT TEST BY DIN (A)”.

Note

CCA(SAE) is always applicable for Saab’s factory-fitted batteries

The DIN standard can be selected when the analyser is used to test replacement batteries that are not specified according to SAE.

9. Enter the cold starting current for the battery in question.

   On Saab's factory-fitted batteries, this value can be found in large characters on the label on top of the battery from model year 1999 inclusive.

   The table below indicates the CCA (SAE) values that have been applied to factory-fitted batteries since model year 1994 and should be used when using Battery Analyser 311 to test the respective battery.

Make	**Part number**	**Car variant**	**Ah**	**CCA (SAE)**
Varta	4231775	900/9000	60	520 A
Varta	4813804	900/9000	60	520 A
Varta	4947065	900/9000 /9-5	60	520 A
Varta	4812921	900/9000 /9-3/9-5	60	580 A
Jungfer	4354908	900/9000	60	520 A
Bären	4813812	900/9000	60	600 A
Bären	4231783	900 V6 9000	70	570 A
Bären FIAMM	4813820	900 V6 9000/9-5	70	650 A
FIAMM	5107354	900 V6 9000/9-5	70	650 A

FIAMM	4584108	9-3 Diesel	85	760 A
FIAMM	5107370	9-3 Diesel	85	760 A

Note

If the battery specification for cold starting current cannot be identified, the following standard values should be used.

900, 9-3 (not diesel)	570 CCA (SAE)
9-3 Diesel	750 CCA (SAE)
9000 and 9-5 with A/C	640 CCA (SAE)
9000 and 9-5 without A/C	570 CCA (SAE)

After selecting and confirming a value, the actual battery test will start automatically.

The analyser may then request more information before presenting the results.

A. “BATTERY TEMP”

Under certain circumstances, the analyser may require information on whether the temperature of the **battery** is above or below 0C (32°F) so that it can assess the condition of the battery correctly. This can occur even if the battery is being tested at room temperature. By selecting and confirming the correct value, a new test will be started.

B. “SURFACE CHARGE DETECTED”

Under certain circumstances, the charge may be present only on the surface of the battery plates. This gives rise to a high voltage reading but no practical starting energy.

In order to correctly assess the battery on these occasions, the analyser will prompt the operator to turn the ignition key to the ON position and turn on the headlamps for a few seconds with the message "TURN KEY ON HEADLAMPS ON".

The analyser will then indicate when the load can be disconnected with "TURN KEY

OFF HEADLAMPS OFF". A new battery test will be started automatically once this has been done.

If the analyser does not detect that the load has been connected or disconnected, the message “WARNING” will be displayed and then "LOAD ON NOT DETECTED" or "LOAD OFF NOT DETECTED".

C. “SELECT MODE BEFORE CHARGE”

“SELECT MODE AFTER CHARGE”

Under certain voltage and conductance conditions, the analyser will require information on whether the test is being performed before or after the battery has been charged in order to assess it correctly.

Note

Make a practice of also checking the electrolyte level before testing the battery. This is especially important in warm climates.

After answering the question/s, the analyser will display the result of the test in one of the following ways:

Message	**Signification**
GOOD BATTERY	Fully charged. No action needed.
GOOD - RECHARGE	Recharge the battery, connect and put in operation.
CHARGE & RETEST	Charge the battery and then repeat the test (see also under heading ”Battery charging”). If the message remains after charging - replace the battery.
REPLACE BATTERY	Replace the battery.
BAD CELL-REPLACE	Replace the battery.

When the messages “GOOD BATTERY” and “GOOD - RECHARGE” are shown, the display alternates between the message and the degree of charge in steps of 25%, e.g. “STATE OF CHARGE: 0-25%”. This value provides a clear indication of the current state of the battery.

If the analyser indicates that the battery must be replaced within the warranty period, we recommend performing an additional test with the battery removed from the car. The test code from this test should then be attached to the warranty claim (see also Warranty Policy).

Note

Test the replacement battery also with Battery Analyser 311 before fitting it in the car. If the cold starting current of the replacement battery is not specified according to SAE standard, the test can be performed to DIN in step 7 above.

Fault diagnosis

1. If the display does not light up:

   - Check the battery connections and polarity.

   - If the battery voltage is below 5.5 volts, the battery analyser will not start. Charge the battery and then retest.

2. If the message "CHECK CONNECTION" is displayed:

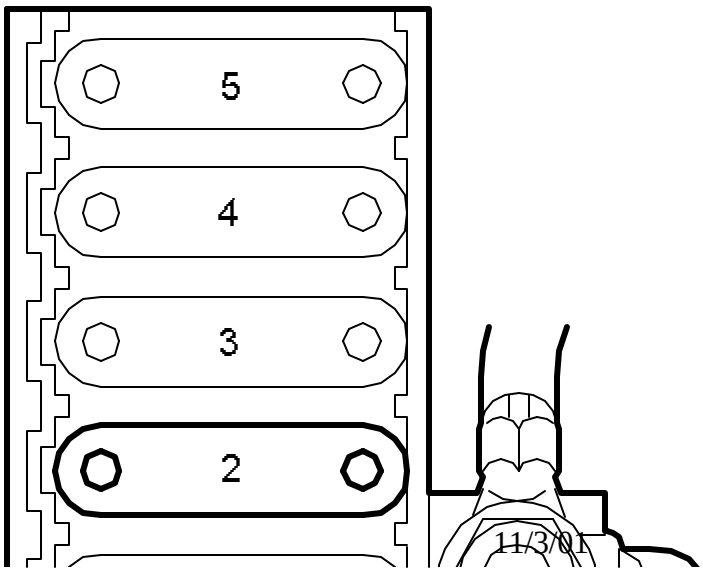
   Make sure both halves of the respective connecting clip have good contact with the battery terminal.

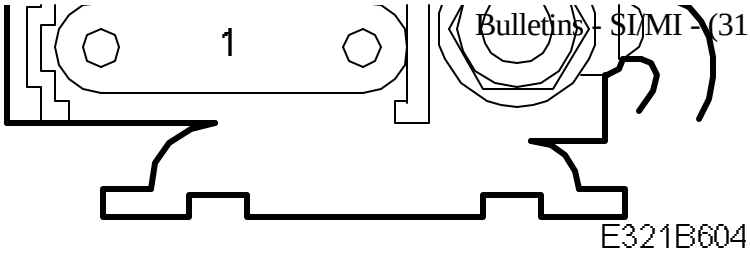
3. If the test message "SYSTEM NOISE CHECK LOADS" is displayed:

   This message can be displayed while testing in-vehicle when the analyser has detected some kind of interference signal from the car's electrical system that is affecting the test result.

   This message is displayed for the 9-3/9-5 principally when the DICE control module is active. The DICE control module has a run-on time of 20 minutes after the ignition has been switched off and is woken up when a door is opened.

   The DICE control module is de-energized by extracting maxi fuse 2 in the maxi fuse box. Maxi fuse 2 is always the second fuse from the +30 connection screw.





The maxi fuse holder in the 9-3 is located by the battery.

The maxi fuse holder in the 9-5 is located behind the main fuse box in the engine bay.

When TWICE is programmed for transport mode (9-3/9-5 only), a door can be opened without up DICE.

If the message "SYSTEM NOISE" remains after several test attempts, disconnect the negative battery cable and perform a new test. In this case, the parasitic current draw should also be tested as the fault symptom indicates there is an electric consumer still active.

Note

The same test message can be displayed when testing the battery in a Saab 900, especially when the ICE control module is active.

The ICE control module has a run-on time of 20 minutes after the ignition has been switched off and is woken up when a door is opened.

The ICE control module can be de-energized by extracting maxi fuse 2 in the maxi fuse box.

Test code

Saab's battery test code can be displayed at any time while the test results are being read by pressing the "i" button.

The test code consists of 8 characters and contains all the information obtained from the battery test in encrypted form. The code is required for all warranty claims. The code can be interpreted for warranty and quality control purposes using special software.

This test code (together with the VIN and test date) will also be used to chart the condition of the battery from the factory to the final customer and how the distribution chain can be further optimized in the future.

Return to the test results by pressing the "i" button once again.

Note

The test code can only be obtained if the test type "SAAB BATTERY" has been selected. Otherwise, the message "NON-SAAB BATTERY TEST" will be displayed.

Note

To continuously trickle charge batteries in display cars, a specially adapted charger should be used with a lower voltage. If the voltage is too high, the charger will damage the battery due to overcharging.

Charge code

The button can be pressed at any time while reading the test results to obtain a charge code. This code is for future use and can then be entered into a special, intelligent battery charger for automatic and specially adapted charging of the battery.

Charging

Warning

Never charge a severely discharged battery that has been left in the cold, as the electrolyte will consist mostly of water and may have frozen. If a frozen battery is charged without first being thawed out, the battery casing can crack.

The battery must be charged if the battery analyser displays any of the following test messages:

“GOOD - RECHARGE"

"CHARGE & RETEST"

Use a battery charger with a charging current approx. 10-20 % of the battery’s rated capacity, i.e. 7-14 amps for a 70 Ah battery. Normal charge time is 4-12 hours, depending on the condition of the battery and the charging current.

Important

So-called quick-chargers with high charging current must not be used!

Always check the level of electrolyte before and after charging and top up as necessary.

The battery need not be disconnected and the caps can remain closed when the charging rates recommended above are used.

Perform a new test after charging and enter the result on the battery card.

Note

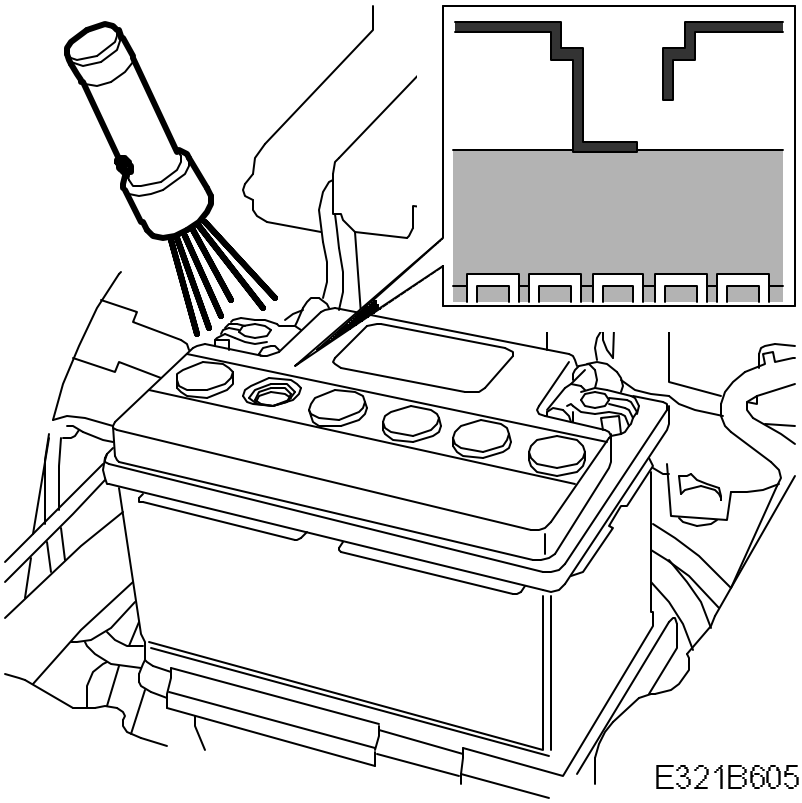
The test should not be performed directly after charging as the gases created during charging form a coating on the battery plates, which results in the capacity reading being too low. The coating can easily be removed in one of the following ways:

- Leave the battery to rest for 2 hours before performing the test.
- When testing a disconnected battery:

  Shake the battery by alternately lifting up the ends of the battery max. 2 centimetres and then releasing it.
- When testing a connected battery:

  Load the battery, e.g. with dipped headlights or similar load, for about 10 seconds.

Checking the battery electrolyte level



Always check the level of the electrolyte in all the cells before and after recharging the battery by removing the battery caps with a suitable screwdriver. A flashlight can be used to see the electrolyte level more clearly.

Top up with distilled or deionized water to the maximum level mark. Each cell has its own maximum mark.

Important

Never use tap water.

Normal tap water can contain salts and minerals that increase the rate of corrosion of the battery plates and greatly decrease the service life of the battery.

Fit the caps and tighten them securely when finished.

Important

Never top up above the maximum level mark. This may cause the electrolyte to leak.

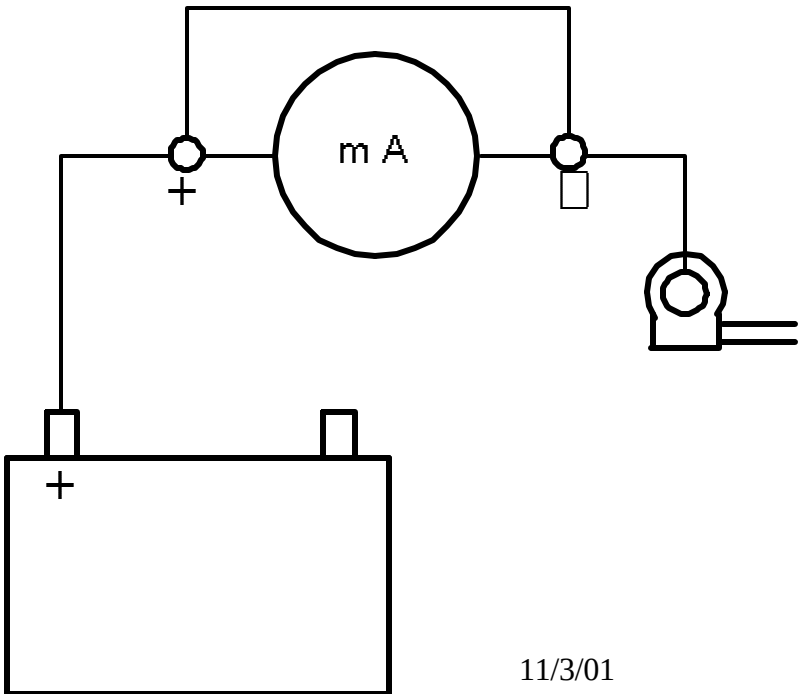
Measuring parasitic current draw

If the capacity of the battery has severely deteriorated while the car has been parked for a few days, the cause may be that current consumption from the car's electrical system has been abnormally high while the car was turned off. If there is the slightest suspicion that this can be the cause of the inferior battery performance, the parasitic current draw must be measured.

Note

Always make sure the customer has noted any codes for the radio or other accessories before disconnecting the battery.

1.



Important

To protect the ammeter (multimeter), connect a jumper lead between the instrument's negative and positive terminals before connecting it.

Disconnect the positive battery cable and connect the ammeter between the positive cable and the positive battery terminal. Connect the positive instrument cable to the battery and its negative cable to the car's positive cable.

2. Turn the ignition key to the ON position but **do not start the engine** - the instrument will otherwise be damaged.

3. Turn the ignition key to the OFF position after 10 seconds, remove the key and close all the doors.

4. Wait for 25 minutes (due to the run-on time of certain electronic units), disconnect the jumper lead across the milliammeter and read off the parasitic current draw. Normally, it should not exceed the following guideline values (provided no accessories have been fitted, e.g. a telephone):

Car model	Transport mode	Customer mode
9-3/9-5	5 mA	16 mA
900	7 mA	20 mA
9000	10 mA	30 mA

Transport mode: Maxi fuse 1 in the maxi fuse box extracted **and** the TWICE control module programmed to transport mode.

If these guideline values are exceeded, the source must be localized by removing the fuses one by one.

As can be seen in the table, it is of great importance to the service life of the battery that the car is left in transport mode for as long as possible.

Battery manufacture date

A manufacturing code has been stamped on top of the negative battery terminal on all factory-fitted batteries and all batteries supplied as Saab original spare parts. This code indicates the calendar week the battery was activated at the manufacturer. It specifies the year and week as follows:

25 98 alternatively 8 25 = year 1998, week 25.

Pre-delivery inspection (PDI)

This SI replaces the directions for pre-delivery inspection pertaining to the battery in Service Manual 1 Service.

In connection with pre-delivery inspection (or at the stage in the distribution chain when the dealer takes over maintenance responsibility), the battery must be tested using Battery Analyser 311 and the result entered into fields 9 - 11 in the section ”Pre Delivery Inspection (PDI)” on the battery card.

Charge the battery if necessary. (See “Charging”).

Important

So-called quick-chargers with high charging current must not be used!

Storage care

This SI replaces the directions for storage care pertaining to the battery in Service Manual 1 Service

Each time the car is put in storage, the battery must be tested monthly with Battery Analyser 311.

Check also the battery electrolyte level on each occasion (see “Checking the battery electrolyte level”). This is especially important on warm climate markets.

Charge the battery if necessary. (See “Charging”).

Important

So-called quick-chargers with high charging current must not be used!

Note

If the car is to be stored for longer periods than one month, the negative battery cable can be disconnected. This will increase the maintenance service interval to 3 months on condition that the battery has been approved after testing with Battery Analyser 311. Make a note of this measure on the battery card.

After reconnecting the battery, the time and language must be set in SID.

Delivery service

This SI replaces the directions for delivery service pertaining to the battery in Service Manual 1 Service.

Test the battery with Battery Analyser 311 as the first step in the delivery service before fitting the transport fuse and programming the TWICE control module to customer mode.

Note

In case of warranty claims, it is important that the test code obtained from the delivery service is made available.

The test code must be entered in the customer's Saab Service Book together with the mileage and date under the heading "Remarks". The result should also be registered on the battery card.

The battery card should be kept together with the other vehicle documents at the dealer, so that the rest result is available in case the "Saab Service" book is lost. The test code must also be registered in the dealer's computer system on markets where the "Saab Service" book does not accompany the car.

Note

Do not fit the transport fuse (maxi fuse 1) or program the TWICE control module to customer mode until the delivery service. This does not apply to demonstration cars, etc.

Maintenance service (Saab Original Service)

Test the condition of the battery with Battery Analyser 311 on each service occasion and enter the test code and date in the "Remarks box" in the "Saab Service" book. From model year 2000, the Saab Service book will have a special box with the heading "Battery Test Code". The battery electrolyte level must also be checked on each service occasion (see "Checking the battery electrolyte level").

Warranty Information

Battery claims will no longer be accepted by Saab Automobil AB without prior authorization as follows:

When a battery has been ascertained as being defective after testing with Battery Analyser 311, a "Special Consideration Request" (SCR) must be sent to the warranty claims department in Trollhättan via the respective importer.

The fault description must include the current battery test code **and** previous test codes as follows:

A. If a warranty claim is made during the period prior to the car being delivered to the first customer, the test codes (including test dates) from the preceding fields on the battery card including the dates of the battery tests must be attached.

B. If a warranty claim is made after delivery to the first customer, the test code (including test date) that was entered into the customer's Saab Service book in connection with the delivery must be attached with the warranty claim.

Warranty claims for battery testing and charging will not be accepted

Each market must establish a procedure between the importer and dealers for approving warranty claims and following up the maintenance program.

Warranty/Time Information

The measures described in this SI are established in Pre Delivery Inspection, Storage Care, Delivery Service and Maintenance Service.

Time differences are established in STM, edition 99-1.