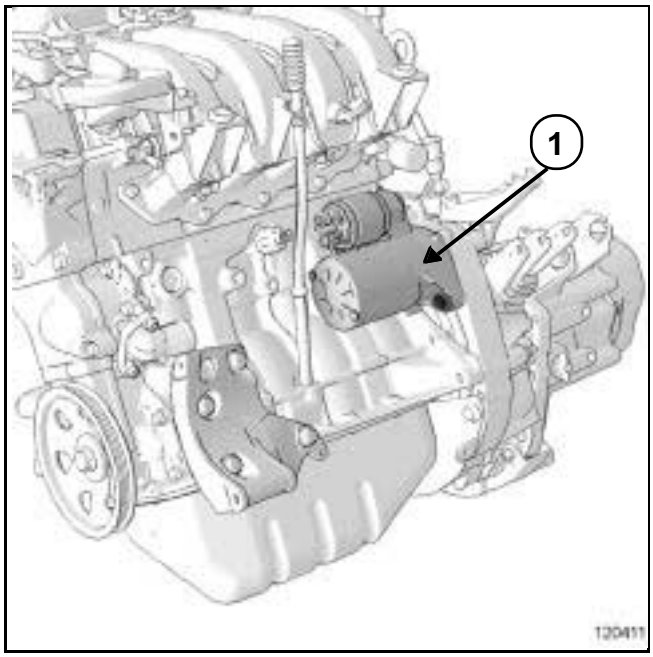
TWINGO

1 Engine and peripherals

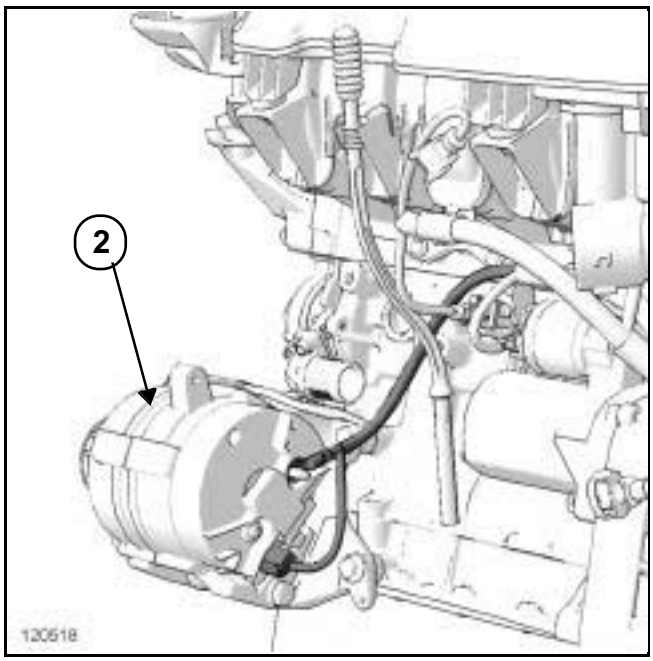
16A STARTING-CHARGING

New Twingo

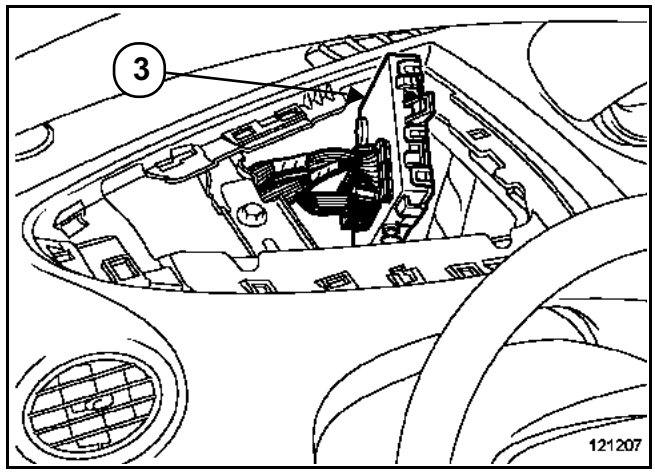
V2 **Edition Anglaise**



1 Starter motor



2 Alternator



3 Passenger compartment unit UCH

- **Battery**

The principal purpose of the battery is to provide the powerful current briefly required by the starter motor to start the engine. For optimum starting, the current supplied by the battery must be sent to the starter motor with minimum loss. To achieve this, the electrical connections (wires, terminals, connectors, etc.) must be in good condition.
When the engine is not running, the battery must feed the accessories that operate constantly, even with the ignition switched off, such as the alarm, radio codes, computers, etc.

- **Alternator**

The alternator only operates when the engine is running. Its function is to recharge the battery, and at the same time to supply the electrical power required to operate all the electrical accessories on the vehicle.
The alternator fitted to the New Twingo is a controlled alternator. The UCH controls the regulation by means of a serial connection (BSS).

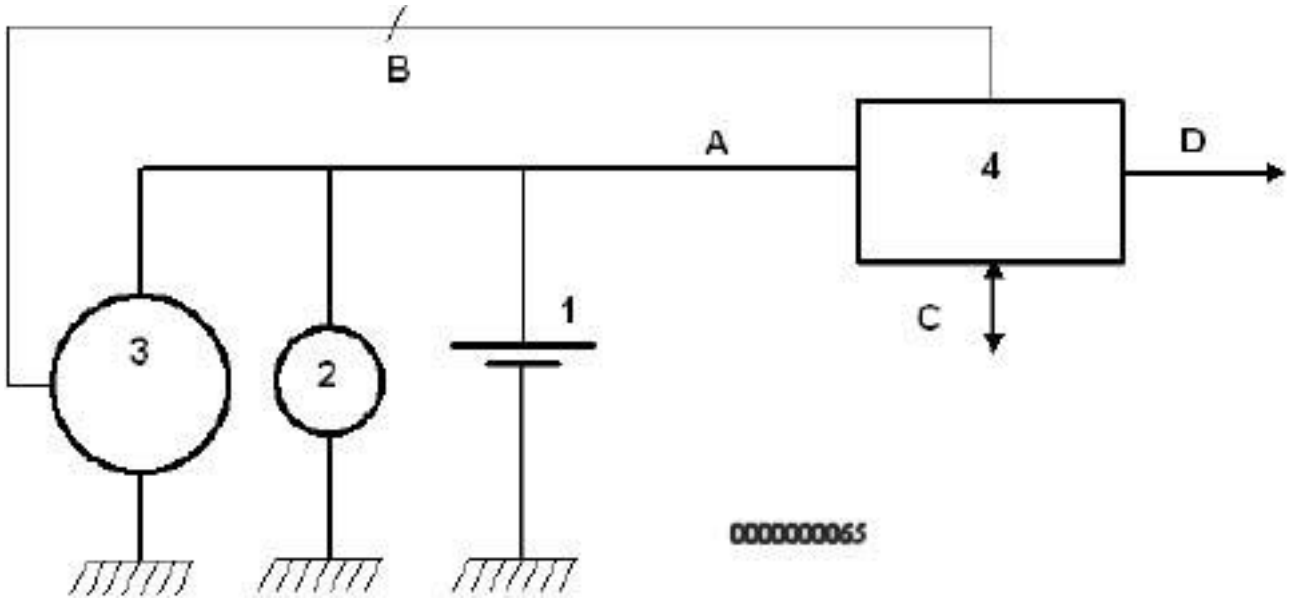
- **UCH**

The UCH is linked to the alternator by a serial connection (BSS connection). The UCH and the alternator communicate via this connection.
The UCH intelligently manages the alternator regulation voltage according to the engine phase, battery charge and temperature.

- **Starter**

This turns the engine over to make it start, and requires a very powerful electric current, which the battery must be able to supply.

STARTING - CHARGING FLOWCHART:



1 Battery (107)
2 Starter (163)
3 Alternator (103)
4 UCH (645)

A Supply and voltage measurement
B BSS connection (serial connection for communication between the alternator and the UCH)
C Starter control line

The function of the charging circuit is to:

- Ensure electrical energy is supplied to the vehicle whilst respecting the dynamic performance constraints of the engine and transmission assembly: the alternator resisting torques and the torque gradients measured must be managed.
- To control alternator loading and load shedding during engine management authorisation or variation of the electrical load.
- To ensure the quality of the on board network voltage in terms of the voltage level and variation (voltage gradient management).
- To optimise the battery charge by applying a voltage to its terminals correlating to its initial charge status (in sleep mode) and to its internal temperature.
- To inform the engine management about the mechanical power taken from the accessories pulley, the alternator charge rate and the rotor excitation current value.
- To run fault finding on the charging circuit: “Battery” warning light display.

The function of the starting circuit is to:

- Start the vehicle during a starting request with the ignition key if necessary.

STARTING

- **THE STARTER DOES NOT WORK** → **ALP1**
- **THE STARTER TURNS BUT DOES NOT ENGAGE** → **ALP2**
- **STARTER NOISY** → **ALP3**
- **LOW STARTER SPEED** → **ALP4**

ALP1	The starter does not work

NOTES	Test the condition of the battery (see **80A, Battery**). Test the condition of the power fuse (see TEST 2). Check that fuse F9 on component 1016 is in good condition. Check that the engine is not jammed.

Check that the following terminals are correctly tightened:
⇒ the battery
⇒ starter
⇒ engine earth
⇒ bodywork earth

Are the terminals correctly tightened?

NO → Retighten the terminals (see **MR 411, 80A, Battery, Battery: Removal - Refitting**).

YES ↓

Check that the following wires are in good condition:
⇒ the wire connecting the battery +, component 107, to terminal B+ of the starter, component 163,
⇒ the wire connecting the battery - to the bodywork earth,
⇒ the wire connecting the engine to the bodywork earth.

Are the wires in good condition?

NO → Repair the damaged wires and terminals. If the connection is faulty and if there is a repair procedure (see **Technical Note 6015A, repairing electrical wiring, wiring: Precautions for repair**), repair the wiring otherwise change the wiring.

YES ↓

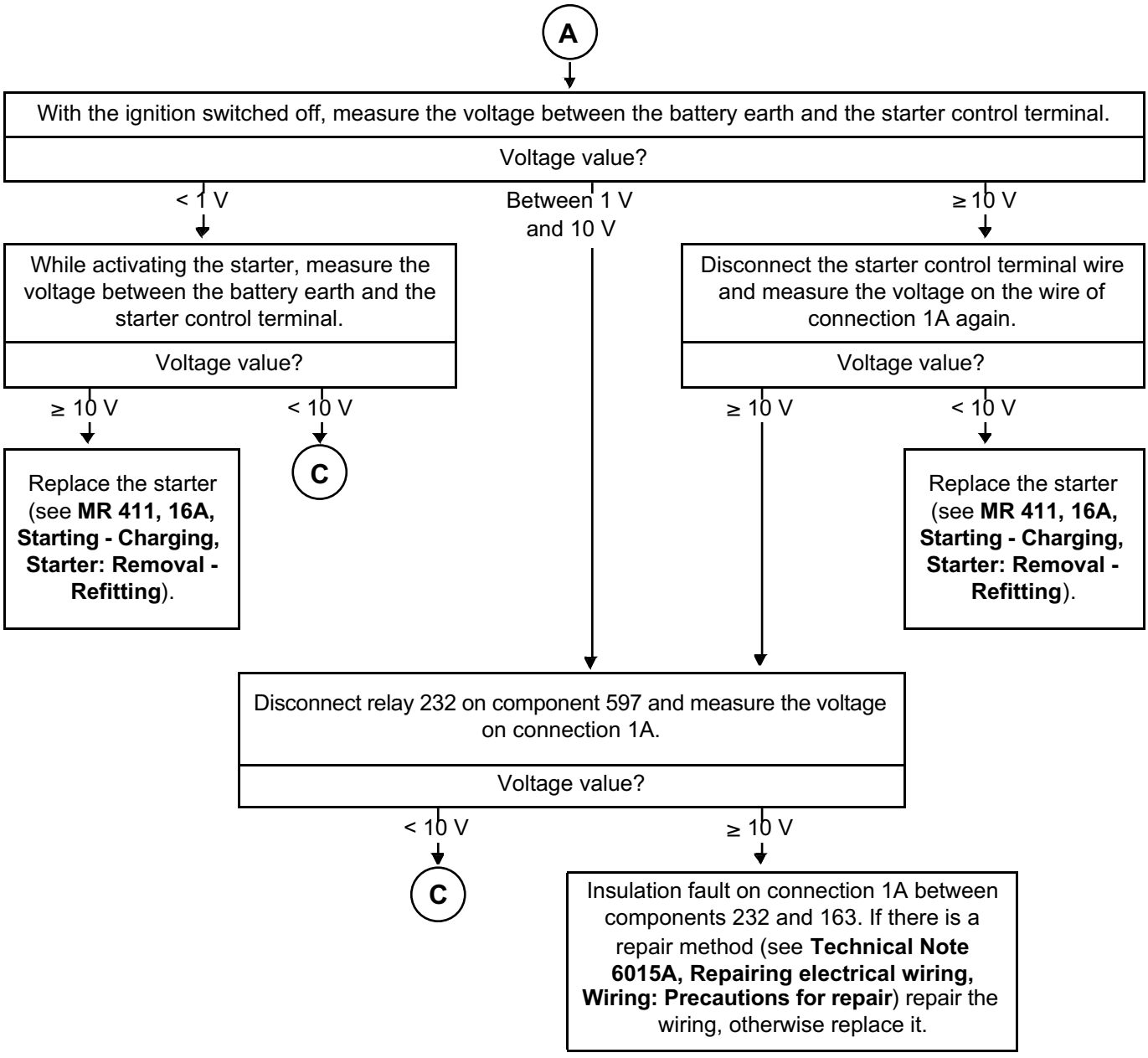
Try starting.

If the starter still does not turn, can a clicking noise be heard when the starter is activated?

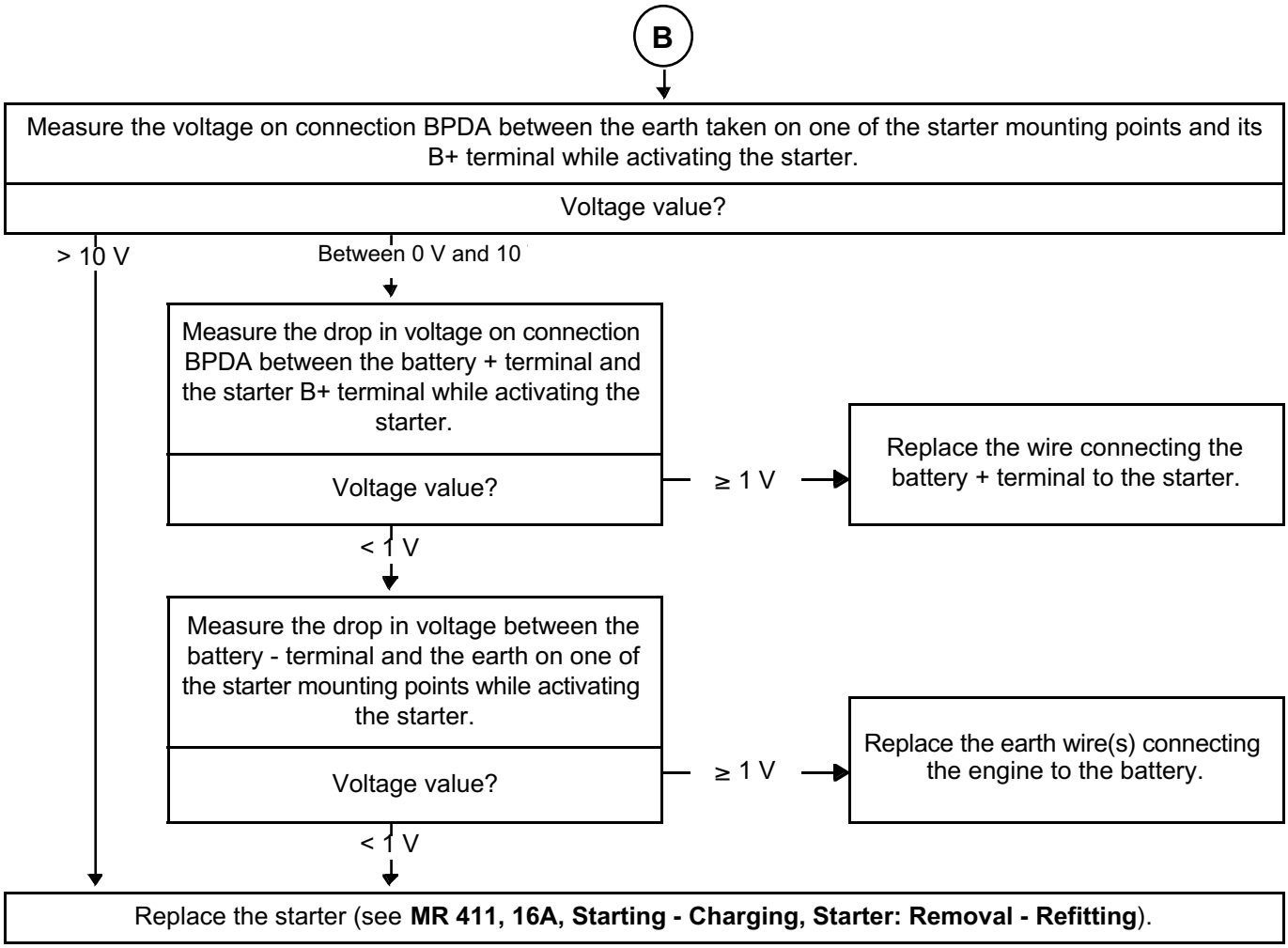
NO → A

YES → B

ALP1 CONTINUED 1



ALP1 CONTINUED 2



ALP1 CONTINUED 3

C

Use the diagnostic tool to check DEF 062 of the starter relay control circuit (see **87B, Passenger compartment connection unit, Interpretation of faults**).
Is the fault present?

YES → Fault on connection 1B between components **597 and 645** (see **87B, Passenger compartment connection unit, Interpretation of faults**). If there is a repair method (see **Technical Note 6015A, Repairing electrical wiring, Wiring: Precautions for repair**) repair the wiring, otherwise replace it.

NO

Check the starting conditions (see **87B, Passenger compartment connection unit, Interpretation of statuses**).
Is ET046 immobiliser active?

YES → Starting conditions fault (see **87B, UCH, Interpretation of statuses**).

NO

With the ignition on, check for 12 V between connections AP29 and 1B of the relay connector, component 232, located on the engine relay box, component 597.
Is there 12 V?

NO → Check the continuity and/or the insulation of connections 1B between components 232 and 645, or of connection AP29 of components 232 and 1016.
If the connection is faulty and if there is a repair procedure (see **Technical Note 6015A, repairing electrical wiring, wiring: Precautions for repair**), repair the wiring otherwise change the wiring.

YES

Check for **12 V** on relay 232 between connection **D** of component **232** and a chassis **earth** when starting is requested.
Is there 12 V?

NO → Check the continuity and/or the insulation of connection **D** between components **232** and **104**.
If the connection is faulty and if there is a repair procedure (see **Technical Note 6015A, repairing electrical wiring, wiring: Precautions for repair**), repair the wiring otherwise change the wiring.

YES

D

ALP1 CONTINUED 4

D

YES

Check for **12 V** on relay 232 between connection 1A of component **232** and a chassis **earth** when starting is requested. Is there 12 V?

NO → Replace the starter relay (see **MR 411 Mechanical, 81C, FUSES, Engine compartment fuse and relay box: List and location of components**).

YES

Continuity and/or insulation fault on connection **1A** between components **232** and **163**. If there is a repair method (see **Technical Note 6015A, Repairing electrical wiring, Wiring: Precautions for repair**) repair the wiring, otherwise replace it.

ALP2	The starter turns but does not engage

NOTES	**Special notes:** Disconnect the battery earth before handling.

Remove the starter (see **MR 411 Mechanical, 16A, Starter: Removal - Refitting**).

↓

Check that the ring gear of the flywheel is in good condition.

Are the ring gear teeth damaged?

YES ↓

Replace the flywheel (see **MR 411, Mechanical, 10A, Flywheel: Removal - Refitting**).

↓

Check the condition of the starter (broken teeth or worn gears).

Is the starter in good condition?

NO → Replace the starter (see **MR 411 Mechanical, 16A, Starter: Removal - Refitting**).

YES ↓

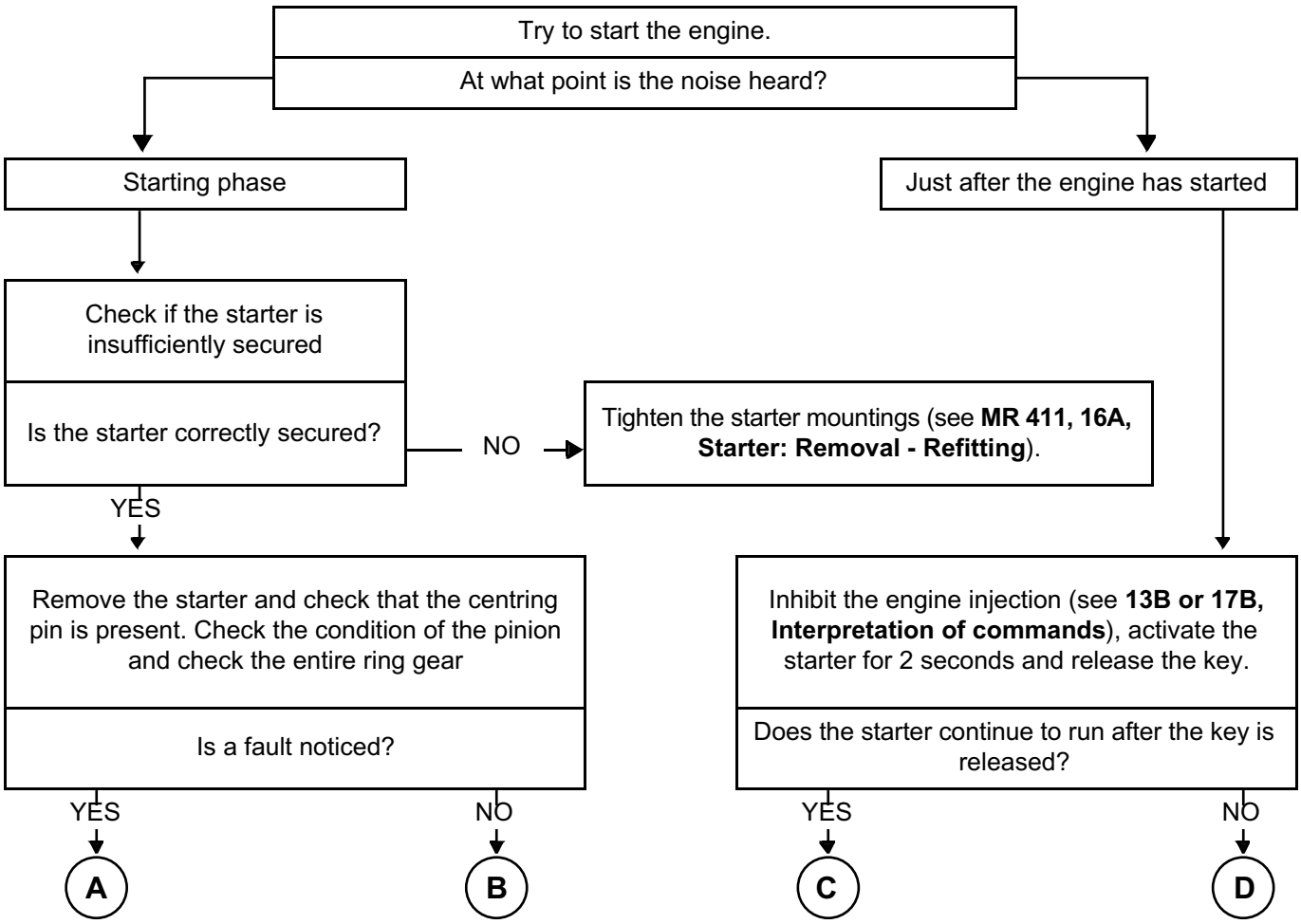
Refit the starter (see **MR 411 Mechanical, 16A, Starter: Removal - Refitting**).

NO ↓

Replace the starter (see **MR 411 Mechanical, 16A, Starter: Removal - Refitting**).

ALP3	The starter is noisy when starting

NOTES	Test the condition of the battery (see **MR 413, 80A, Battery**). Check that the noise is actually coming from the starter.



ALP3 CONTINUED

A
YES

Fit a centring pin, or replace the flywheel (see **MR 411, Mechanical, 10A, Flywheel: Removal - Refitting**), or replace the starter (see **MR 411, 16A, Starter: Removal - Refitting**).

B
NO

Replace the starter (see **MR 411, 16A Starter: Removal - Refitting**).

C
YES

Starter control fault, check the entire starter control line (see ALP1 continued 3 "C").

D
NO

Make several attempts, waiting for 5 minutes after 5 attempts (let the starter cool). If the result is still the same after several attempts, replace the starter (see **MR 411, 16A, Starter: Removal – Refitting**).

ALP4	**The starter rotates slowly from the outset. The rotation speed of the starter decreases rapidly. The starter causes the warning lights on the instrument panel to become very dim**

Applicability: All types

NOTES	Test the wiring (TEST3). Test the status of the battery (see **80A, Battery**).

If the fault is still present, replace the starter (see **MR 411, 16A, Starting - Charging, Starter: Removal - Refitting**).

NOTES	Perform this test only after running complete fault finding on the UCH using the diagnostic tool (see **87B, UCH**). Because the UCH houses the CHARGING CIRCUIT function (sub-function: alternator) and checks the alternator via a serial connection (BSS).

CHARGING

ALTERNATOR SUPPLY TEST **TEST1**

TEST1	Alternator supply test

NOTES	Test the condition of the battery (see **80A, Battery**).

Measure the voltage at the battery terminals with the engine warm and running at idle speed for 2 minutes and with all consumers switched off.

Voltage value?

< 14.8V

> 14.8V

Replace the alternator (see **MR 411, 16A, Starting - Charging, Alternator: Removal - Refitting**).
Visually inspect the consequences (battery condition, corrosion, etc.).

With the engine at idle speed, connect a current clamp to the alternator B+ wire, connection BPDA, with all consumers switched off.

Current < 5 A

Replace the alternator (see **MR 411, 16A, Starting - Charging, Alternator: Removal - Refitting**).

Current between 5 A and 35 A

Keep the engine speed at 3000 rpm and still with no consumers switched on.

Value of measured current? (i 1)

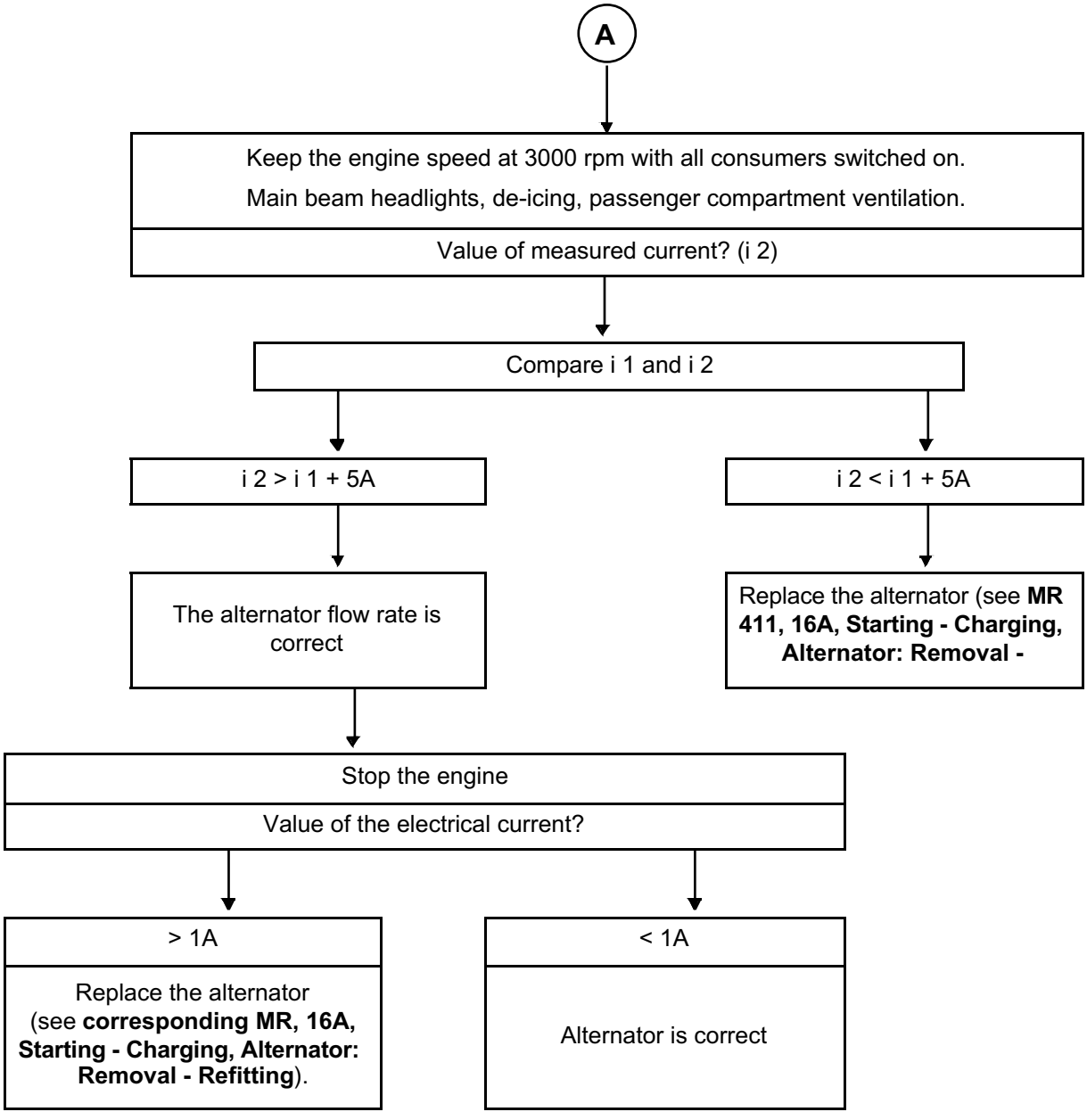
A

Current > 35A

Check that there are no electrical components consuming an abnormal amount of current.
Disconnect the fuses one by one to identify the consumer.

To be examined

TEST1 CONTINUED 1	



TEST2	Test the condition of the power fuse and the cause of its fault

NOTES	Check that the engine is not locked

With the ignition off, measure the voltage between the negative battery terminal and the power fuse output.

Is the voltage greater than or equal to 10V?

YES → The power fuse is sound

NO → The power fuse is faulty

With the battery disconnected, measure the resistance between the negative battery terminal and the power fuse output.

Is the resistance ≥ 10 Ohms?

NO → Disconnect the alternator + terminal and then measure the resistance between the negative battery terminal and the power fuse output.

Is the resistance ≥ 10 Ohms?

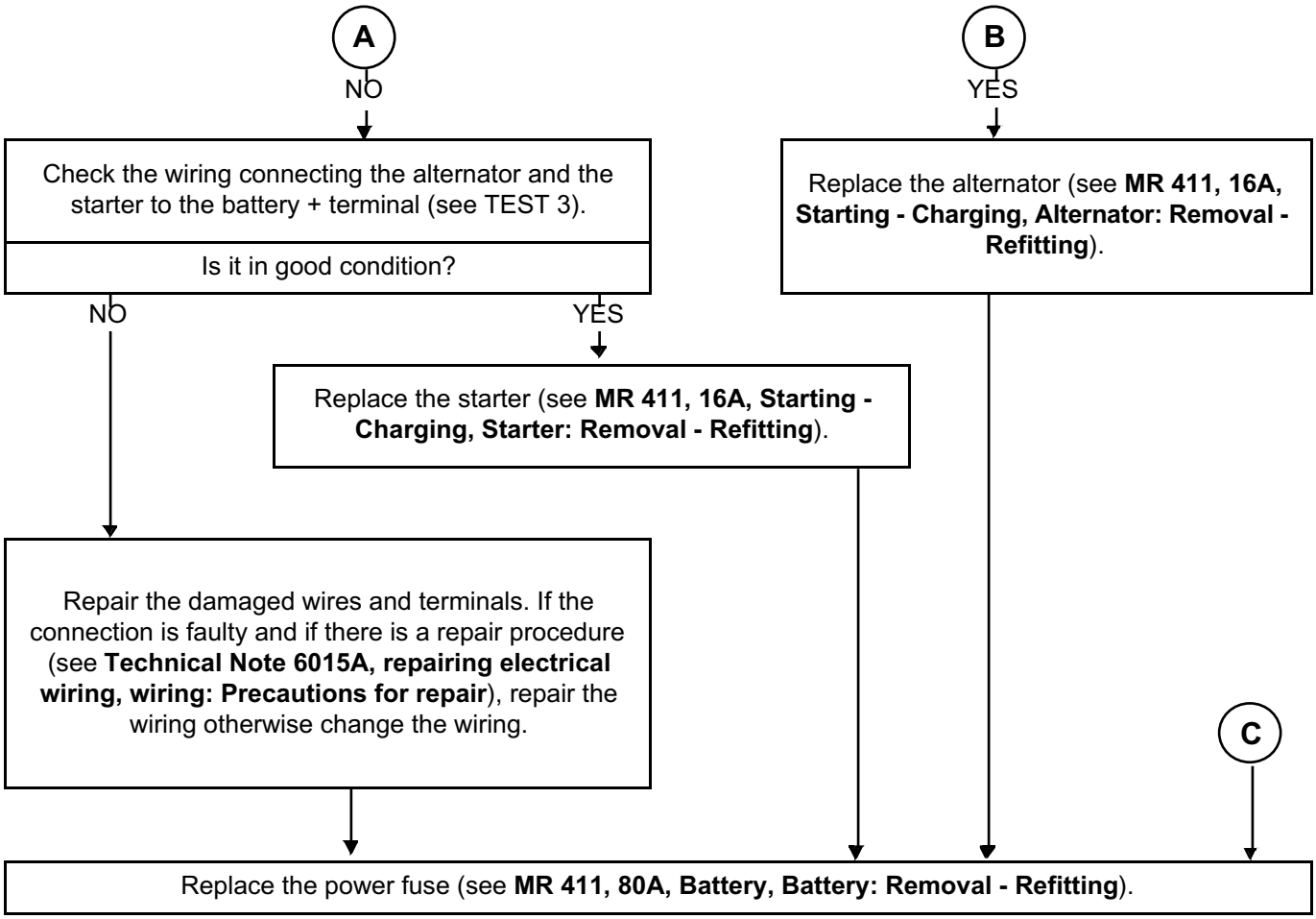
NO → A

YES → B

YES → Possible external causes:
use of a "starter charger", excessively long use of starter (e.g.: activate the starter, gear engaged for driving the vehicle) etc.

→ C

TEST2 CONTINUED 1



TEST3	Wiring test

Check the condition of the battery terminals. Check that there is no corrosion on the battery terminals. Check that the terminals are correctly tightened and secure (see **MR 411 Mechanical, 80A, Battery, Battery: Removal - Refitting**).

Are the terminals and posts in good condition and not corroded?

NO → Clean the terminals and posts or replace them, if necessary.

YES ↓

Check that there are no electrolyte leaks from the battery (cracks or breakage).

Check that the mechanical mounting of the battery is sound (see **MR 411, Mechanical, 80A, Battery, Battery: Removal - Refitting**).

Is the battery in good condition?

NO → Change the battery and clean the surrounding area on the vehicle if necessary.

(see **MR 411, Mechanical, 80A, Battery, Battery: Removal – Refitting**).

YES ↓

Inhibit the engine injection (see **13B or 17B, Interpretation of commands)**.

With the starter activated, measure the voltage on connection BPDA between the + terminal of the battery, component 107, and the B+ of the starter, component 163.

Is the voltage > 1 V?

YES → Repair the damaged wires and terminals. If the connection is faulty and if there is a repair procedure (see **Technical Note 6015A, Electrical wiring repair, Wiring: Precautions for repair**), repair the wiring, otherwise replace the wiring

NO ↓

A

TEST3 CONTINUED