



# MAINTENANCE INFORMATION

**MI18-16B**

DATE:	April 2018	SECTION: 06 ELECTRICAL
SUBJECT:	<b>BOSCH HD10 ALTERNATOR DIAGNOSTIC GUIDE</b>	

Revision: B

General revision

January 2022

## APPLICATION

Model	VIN	
All models	Vehicles equipped with Bosch HD10 <b>24V-120A</b> or <b>24V-150A</b> alternators <b><u>excluding</u></b> the vehicles equipped with the <b>Electric Fan Drive cooling system</b>	

## DESCRIPTION

To avoid replacement of alternators that are in fact in good working order, perform the steps which follow to help you perform a more precise diagnosis.

**NOTE: do not replace an alternator presumed to be defective without undertaking a diagnosis according to the instructions which follows.**

## Table of contents

PART 1: CHECKLIST.....	3
IDENTIFYING A DEFECTIVE ALTERNATOR .....	6
STEP 1 – CHECKING THE DRIVER INFORMATION DISPLAY .....	6
STEP 2 – CONFIRMING THE ALTERNATOR .....	7
CHECKING INPUT SIGNALS ON AN ALTERNATOR.....	8
PART 2: LOAD TEST – POWER CABLE .....	10
PART 3: LOAD TEST – JUMPER CABLE .....	14

## REQUIRED TOOLS

### CARBON PILE LOAD TESTER



### CURRENT METER



## PROCEDURE



### DANGER

Park vehicle safely, apply parking brake, stop the engine. Prior to working on the vehicle, set the ignition switch to the OFF position and trip the main circuit breakers equipped with a trip button. On Commuter type vehicles, set the battery master switch (master cut-out) to the OFF position.

## PART 1: CHECKLIST

1. If the vehicle is fitted with Bosch **150A** alternators, make sure that there is a flat washer between the pulley and the flange nut. This washer is absolutely required. Add a washer if missing.

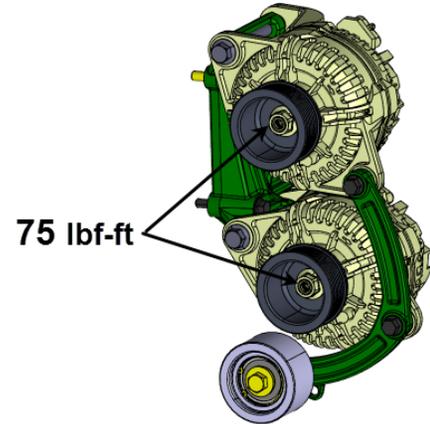
correct       incorrect

*Note: flat washer not required on the Bosch 120A alternator*



2. Make sure that the alternator pulleys do not slip. Make sure that the nuts are tight. **Correct if needed.**

correct       incorrect



3. Perform a visual inspection of the alternator belt.

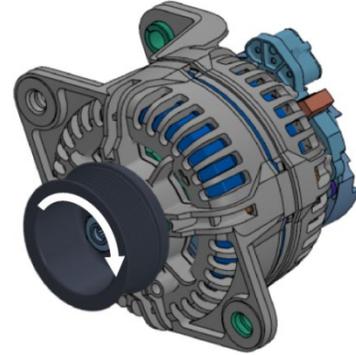
*Inspect for cracks or frayed material. Replace any drive belt that displays such obvious wear or defects.*

correct       incorrect

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4. Remove the belt. Check if the bearings are in good condition.

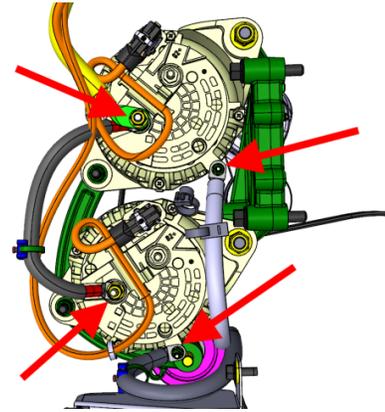
*Turn the pulley by hand. Check for a play in the bearings, noisy bearings, and if the rotation of the pulley seems normal. Check the alternator belt tensioner and idler similarly.*

correct       incorrect



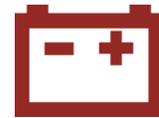
- 
5. Check for proper connection of the « power » & « ground » cables. Make sure that the cable lugs are tight, free of rust, discoloration and signs of overheating. Tighten if necessary (consult maintenance information MI16-17 for prescribed values). A bad connection between the lugs and the alternator studs may be the cause of the problem. **Tighten the nuts and clean the lugs if applicable.**

correct       incorrect



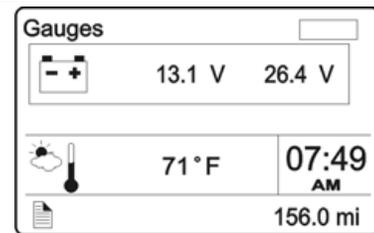
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6. With engine running, confirm if the charging system warning light is ON or turns ON intermittently.

telltale ON/intermittent       telltale OFF



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7. With engine running, check the 12V & 24V voltage readings through the driver information display.

12V value: \_\_\_\_\_      24V value: \_\_\_\_\_



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8. Check if there are Diagnostic Troubleshooting Codes applicable to the electrical. Perform *IDENTIFYING A DEFECTIVE ALTERNATOR*.

Note if the fault is active or inactive, the DTC code and on which alternator (1 or 2)

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9. Check input signals on the defective alternator as described in [CHECKING INPUT SIGNALS ON AN ALTERNATOR](#).

correct       incorrect

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10. If there is no fault detected yet, proceed to PART 2: LOAD TEST – POWER CABLE & PART 3: LOAD TEST – JUMPER CABLE and note the poor performance of an alternator.

correct       incorrect

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## IDENTIFYING A DEFECTIVE ALTERNATOR

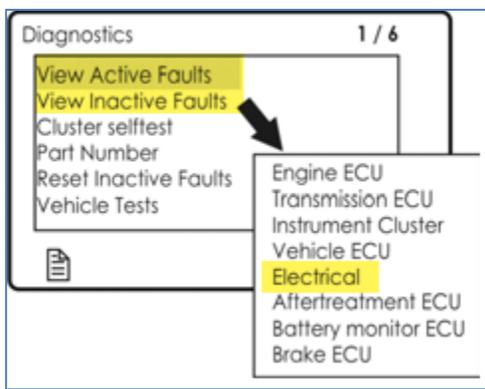
### STEP 1 – CHECKING THE DRIVER INFORMATION DISPLAY

To identify which alternator is defective, proceed as follows:

↑ upper alternator = ALTERNATOR 2

↓ lower alternator = ALTERNATOR 1

1. On the DID (Driver Information Display), select DIAGNOSTICS menu.
2. Select VIEW ACTIVE FAULTS and then ELECTRICAL.



3. The active electrical system faults will appear. Scroll through the active faults to find active faults related to the alternators, as shown below.

MID (188) ELECTRICAL SYSTEM  
PSID 34 ALTERNATOR 1  
FMI (5) OPEN CIRCUIT

MID (188) ELECTRICAL SYSTEM  
PSID 35 ALTERNATOR 2  
FMI (5) OPEN CIRCUIT

4. Repeat the previous steps for INACTIVE FAULTS.

*If there are no alternator fault codes, carry on with the checklist step 9.*

5. The result of this **defective alternator** (1 or 2) test might be erroneous. In fact, if both alternator 5-pin connectors have been interchanged during a previous servicing, the result of your test is wrong and doesn't show you the actual defective alternator. You must confirm which alternator is defective with [STEP 2 – CONFIRMING THE ALTERNATOR](#)

## STEP 2 – CONFIRMING THE ALTERNATOR

Confirm the **defective alternator** test (Step 1) before removing an alternator.

1. Make sure the parking brake is applied.
2. Start the engine.
3. On connector J1 of A49 multiplex module, back probe the pin of the alternator presumed in good working condition.

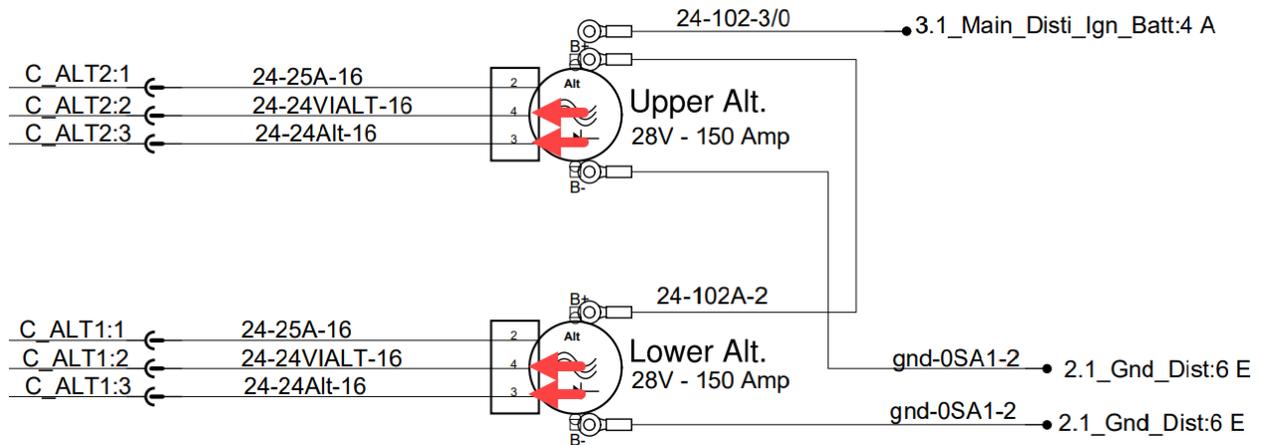
↑ upper alternator = pin 9 on J1 harness side

↓ lower alternator = pin 8 on J1 harness side

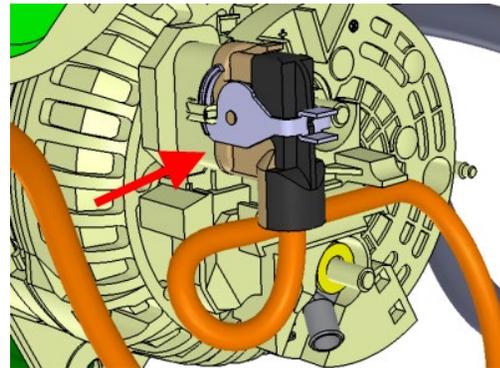
4. Connect the other cable of the voltmeter to a good ground (use ground stud in the compartment)
5. The voltmeter reading should be greater than 27 volts if the alternator is well and truly in good working condition.
6. If the voltmeter reading is 1-2 volts, the alternator is in fact defective. The 5-pin connectors have been interchanged.
7. If the voltmeter reading is 12 volts, the circuit wire between A49 and alternator pin 2 is open circuit.

## CHECKING INPUT SIGNALS ON AN ALTERNATOR

**Prior to the replacement of a defective alternator, it is important to confirm the input signals of the alternator (see the circuits identified on the following image) because the problem could simply be due to a broken signal wire, corroded, etc.**



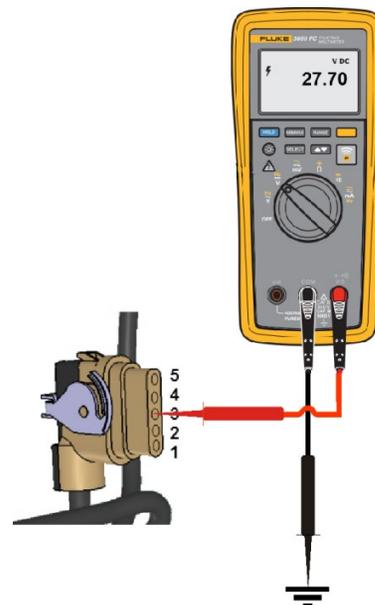
1. Shut the engine down. Unplug the connector of the defective alternator.
2. Put the ignition switch to the ON position.



3. Measure the voltage on pin 3. If the voltage reading  $\pm 0.5V$  is equal to the voltage of the batteries, then there is no problem with this circuit.

**If the voltage reading  $\pm 0.5V$  is different from the voltage of the batteries then check condition of the circuit (broken wire, corrosion, etc.).**

**Repair the circuit if applicable and check voltage once again.**



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4. Measure the voltage on pin 4. If the voltage reading  $\pm 0.5V$  is equal to the voltage of the batteries, then there is no problem with this circuit.

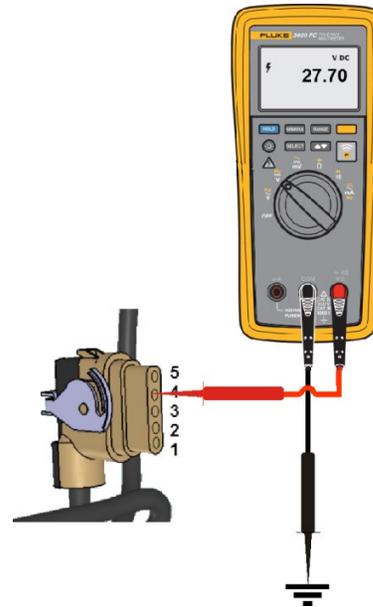
***If the voltage reading  $\pm 0.5V$  is different from the voltage of the batteries then check condition of the circuit (broken wire, corrosion, etc.)***

***Repair the circuit if applicable and check voltage once again.***

***If the voltage reading of the circuits (pin 3 & 4) is normal, then you can conclude that the alternator is defective. Replace the alternator.***

***DO not replace both alternators if only one of the two is defective.***

***You will find all the information necessary for the replacement of an alternator in maintenance information MI16-17.***

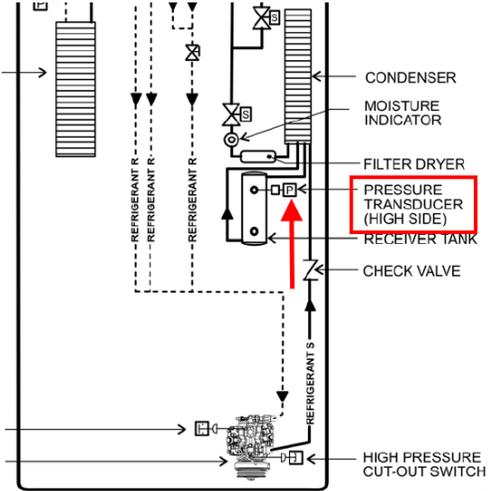
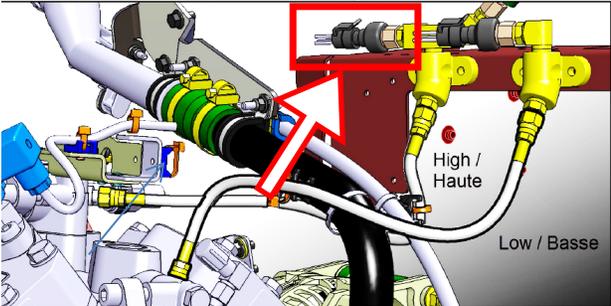


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5. Put the ignition key switch to the OFF position. Measure the voltage on pin 4. If the voltage reading is more than  $0 \pm 0.5 V$  then WB16-02 was not completed on this vehicle. Proceed to step 2.2 of the warranty bulletin.
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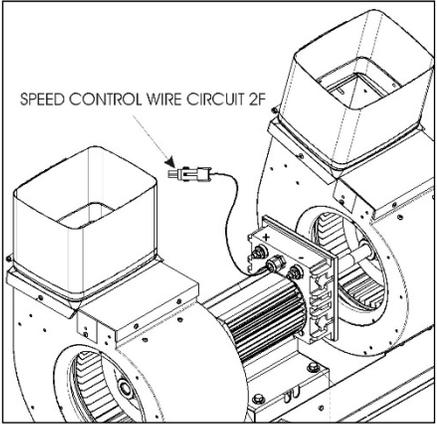
## PART 2: LOAD TEST – POWER CABLE

To perform the alternator load test, it is necessary to create a sufficiently high load (power demand). For this reason, the air conditioning system will be turned on at full power.

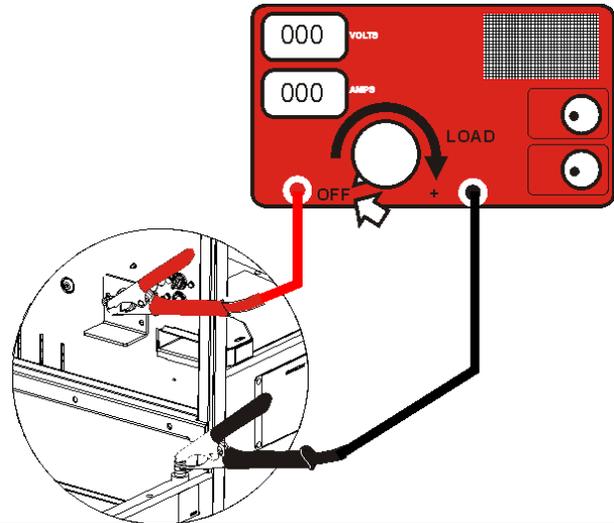
1. Disconnect the A/C system high-side pressure transducer. This transducer can be located near the A/C compressor (top image) or fixed to the refrigerant receiver tank (lower picture).



2. In the evaporator compartment, disconnect the white speed control wire connected to the central stud terminal (identified circuit 2F on the image at right) of the blowers motor. Doing this will keep the blowers in high speed.

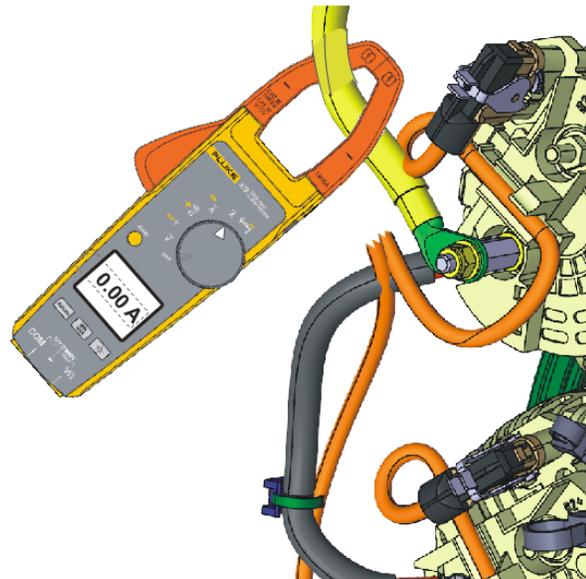


3. Connect a carbon pile load tester to the booster block terminals but do not activate the load circuit on the load tester (keep the load knob at OFF).



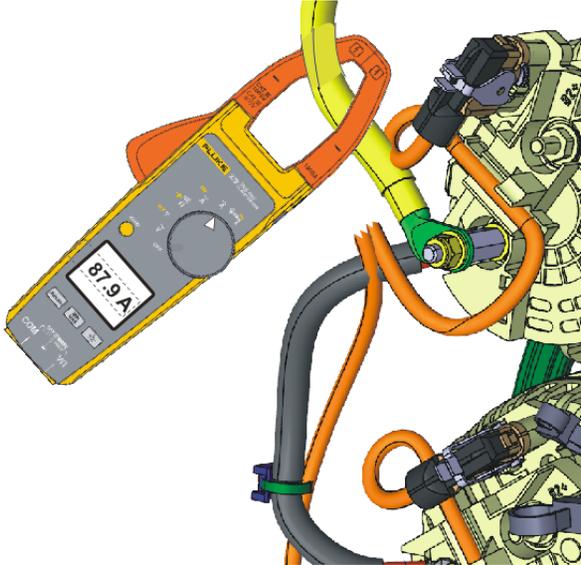
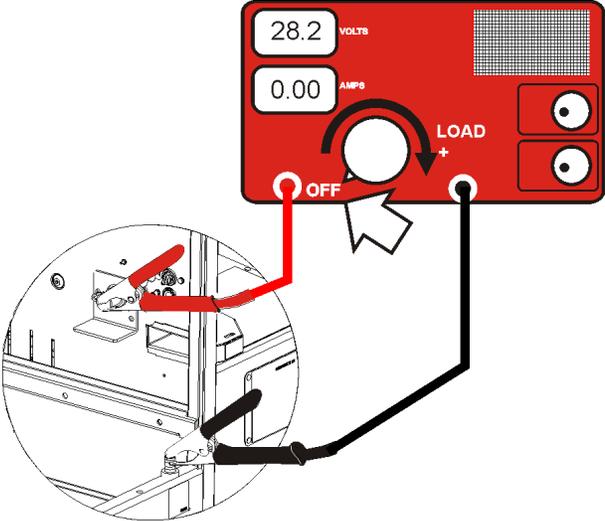
4. Place a current meter in order to read the current in the “power” cable (circuit 102-2/0) connected to the top alternator.

***Important, there must be no other cable or wire into the current meter clamp.***



5. Make sure that the vehicle battery charger is **not** powered or in use.
6. Start the engine.
7. Using the dashboard switch put the engine in fast idle speed.
8. Turn on the high beams.
9. Turn on all the interior lighting (lighting in the passenger section, light above the driver).
10. Turn on the air conditioning.

11. Turn on the load tester but do not activate the load circuit (keep the load knob at OFF).
12. The voltage reading on the load tester should be greater than 27 V.
13. Reading of the current flowing in the power cable should be greater than 80A (the load tester "load circuit" must not be activated, keep the load knob at OFF).



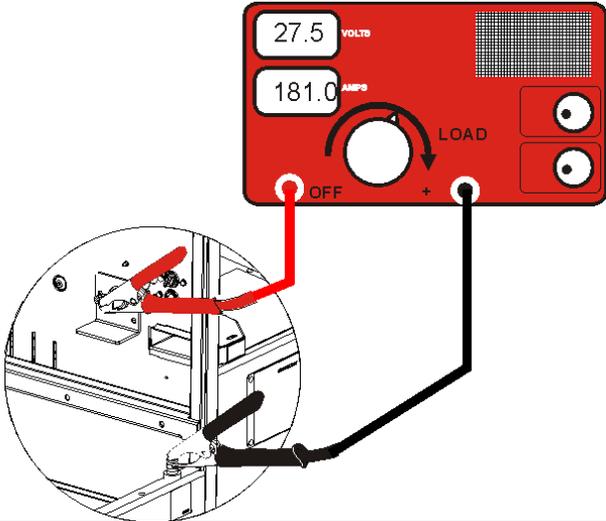
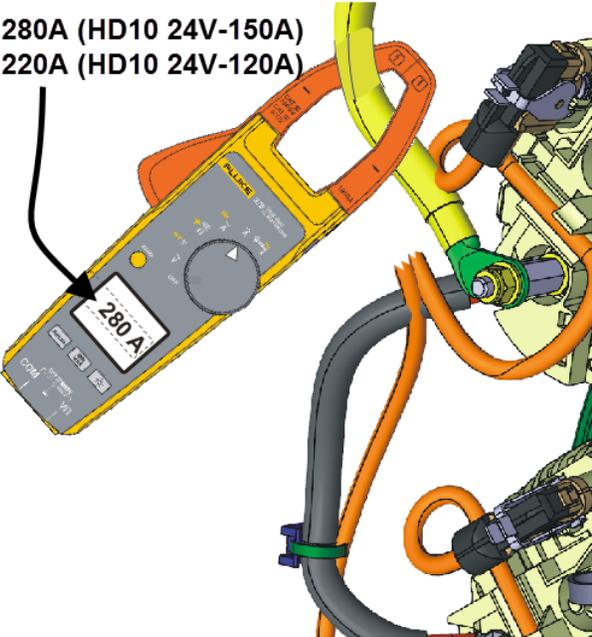
14. Turn the load knob (not more than 5 to 10 seconds) in order to get the following reading on the current meter:

- 280 amps (Bosch HD10 24V-150A)
- 220 amps (Bosch HD10 24V-120A)

**If the alternators are able to deliver 280 amps (or 220 amps depending on the type of alternator) and the voltage remains above 27 V, then the alternators are in good condition. No replacement is necessary.**

correct                       incorrect

**If it's not the case, go to Part 3**



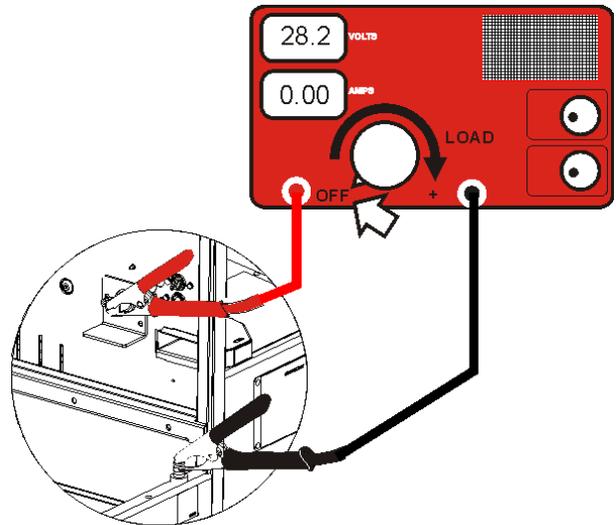
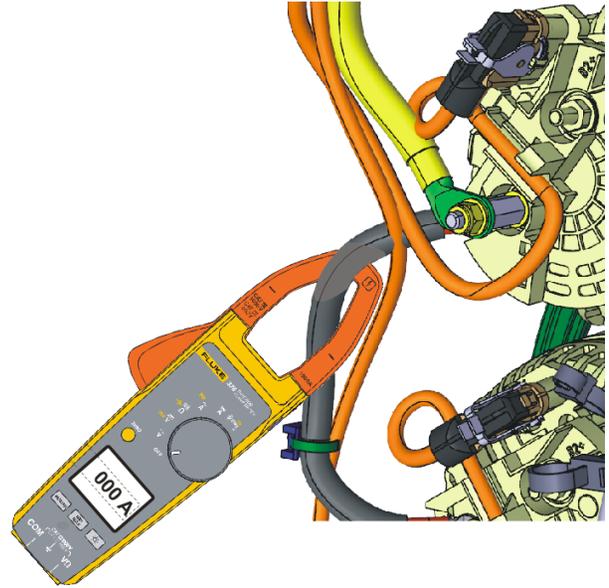
## PART 3: LOAD TEST – JUMPER CABLE

1. Place an ammeter in order to read the current in the jumper” cable (circuit 102A) connecting both alternators together.

***Important, there must be no other cable or wire into the clamp of the ammeter.***

2. Make sure that the load knob is at OFF.

***Without any additional load on the load tester, it is normal to have a reading of 0 amps on the current meter, but the voltage reading should be greater than 27 V.***



3. Turn the load knob (not more than 5 to 10 seconds) on the load tester in order to get the following reading:

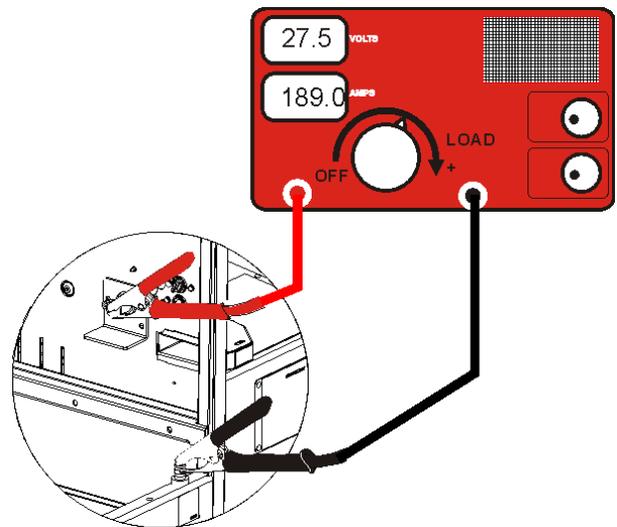
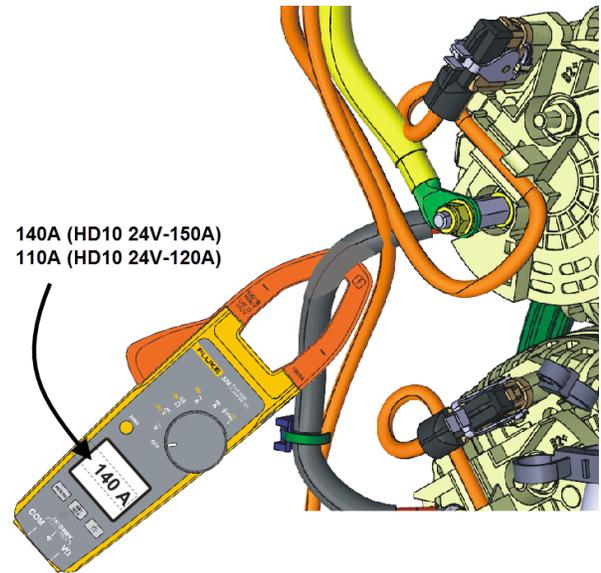
- 140 amps (HD10 24V-150A) on the current meter.
- 110 amps (HD10 24V-120A) on the current meter.

**Diagnostic**

**1) if the voltage is below 27 V before having increased the load with the load knob, check both alternators as described in [Checking Input Signals on An Alternator](#)..**

**2) If the lower alternator is able to deliver 140 amps (or 110 amps depending on the type of alternator), so the lower alternator is in good condition. Therefore, check the upper alternator as described in [Checking Input Signals on An Alternator](#).**

**3) If the lower alternator can't deliver 140 amps (or 110 amps depending on the type of alternator), check the lower alternator as described in [Checking Input Signals on An Alternator](#).**



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