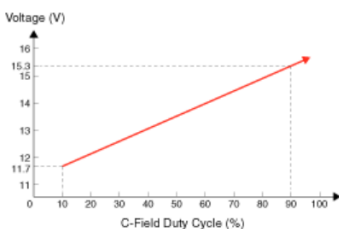


Specifications from Hyundai Charging system info website.

Alternator [Non-ISG type]

Item		Specification
Rated voltage		13.5V, 90A
Speed in use		1,000 ~ 18,000 rpm
Voltage regulator		IC Regulator built-in type
Regulator Setting Voltage	External mode	Refer to below graph
	Internal mode	$14.55 \pm 0.3V$
Temperature Gradient	External mode	$0 \pm 3 \text{ mV} / ^\circ\text{C}$
	Internal mode	$-3.5 \pm 2 \text{ mV} / ^\circ\text{C}$



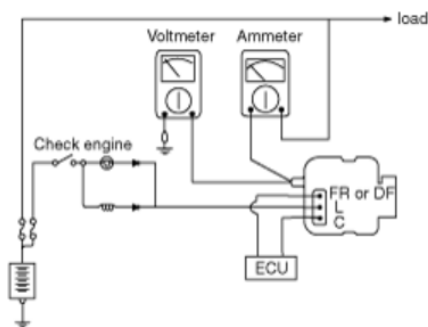
※ Regulator Setting Voltage (External mode)

3. Regulated Voltage Test

The purpose of this test is to check that the electronic voltage regulator controls voltage correctly.

(1) Preparation

- A. Prior to the test, check the following items and correct if necessary.
Check that the battery installed on the vehicle is fully charged. The battery checking method is described in the section "Battery".
Check the alternator drive belt tension. The belt tension check method is described in the section "Inspect drive belt".
- B. Turn ignition switch to "OFF".
- C. Disconnect the battery ground cable.
- D. Connect a digital voltmeter between the "B" terminal of the alternator and ground. Connect the (+) lead of the voltmeter to the "B" terminal of the alternator. Connect the (-) lead to good ground or the battery (-) terminal.
- E. Disconnect the alternator output wire from the alternator "B" terminal.
- F. Connect a DC ammeter (0 to 150A) in series between the "B" terminal and the disconnected output wire. Connect the (-) lead wire of the ammeter to the disconnected output wire.
- G. Attach the engine tachometer and connect the battery ground cable.



(2) Test

- A. Turn on the ignition switch and check to see that the voltmeter indicates the following value.

Voltage: Battery voltage

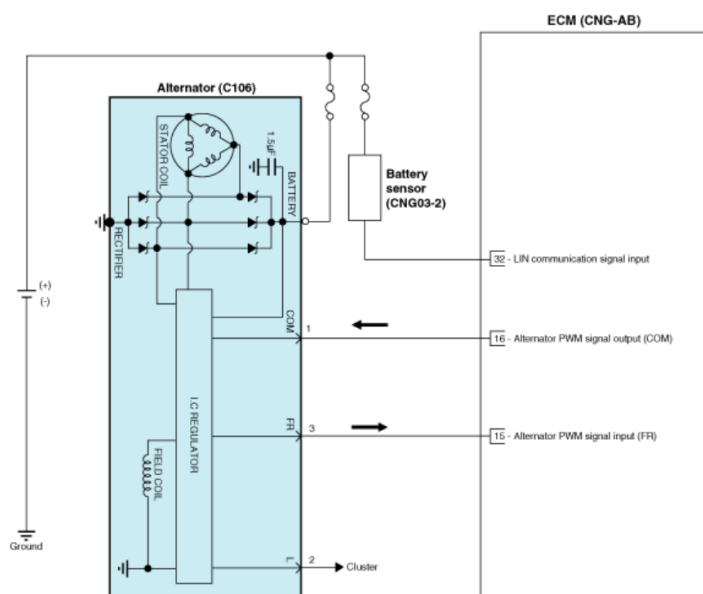
If it reads 0V, there is an open circuit in the wire between the alternator "B" terminal and the battery and the battery (-) terminal.

- B. Start the engine. Keep all lights and accessories off.
- C. Run the engine at a speed of about 2,500 rpm and read the voltmeter when the alternator output current drops to 10A or less

(3) Result

- If the voltmeter reading doesn't agree with the standard value, the voltage regulator or the alternator is faulty.
- Upon completion of the test, reduce the engine speed to idle, and turn off the ignition switch.
- Disconnect the battery ground cable.
- Remove the voltmeter and ammeter and the engine tachometer.
- Connect the alternator output wire to the alternator "B" terminal.
- Connect the battery ground cable.

Circuit Diagram



Hyundai Elantra: Removal

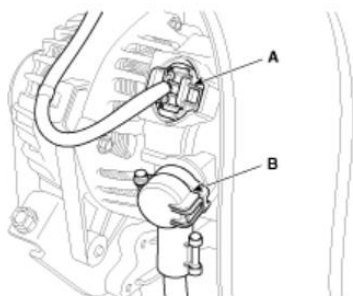
Fifth generation (MD/UD; 2010–present) / Hyundai Elantra MD 2010-2019 Service manual / Engine Electrical System / Charging System / Alternator. Repair procedures / Removal



1. Disconnect the battery negative (-) cable.
2. Remove the drive belt.
(Refer to Engine Mechanical System - "Timing Chain")
3. Disconnect the alternator connector (A) and the cable from the alternator "B" terminal (B).

Tightening torque :

9.8 ~ 14.7 N.m (1.0 ~ 1.5 kgf.m, 7.2 ~ 10.9 lb-ft)

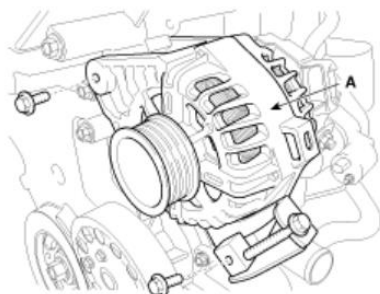


4. Remove the alternator (A) after removing the bolts.

Tightening torque :

[12 mm bolt] 21.6 ~ 32.4 N.m (2.2 ~ 3.3 kgf.m, 15.9 ~ 23.9 lb-ft)

[14 mm bolt] 29.4 ~ 41.2 Nm (3.0 ~ 4.2 kgf.m, 21.7 ~ 30.4 lb-ft)



Hyundai Elantra: Battery Sensor. Description and Operation

Fifth generation (MD/UD; 2010–present) / Hyundai Elantra MD 2010-2019 Service manual / Engine Electrical System / Charging System / Battery Sensor. Description and Operation



Description

Vehicles have many control units that use more electricity. These units control their own system based on information from diverse sensors. It is important to have a stable power supply as there diverse sensors giving a variety of information. Battery sensor (A) is mounted on battery (-) terminal. It transmits battery voltage, current, temperature information to ECM. ECM controls generating voltage by duty cycle based on these signals.

Hyundai Elantra: Installation

Fifth generation (MD/UD; 2010–present) / Hyundai Elantra MD 2010-2019 Service manual / Engine Electrical System / Charging System / Battery Sensor. Repair procedures / Installation



1. Install in the reverse order of removal.

Battery sensor cable installation bolt: 10.8 ~ 13.7 N.m (1.1 ~ 1.4 kgf.m, 8.0 ~10.1 lb-ft)

Battery (-) terminal I tightening nut: 3.9 ~ 5.9 N.m (0.4 ~ 0.6 kgf.m, 2.9 ~ 4.3 lb-ft)

NOTE

- After reconnecting the battery negative cable, AMS and ISG function does not operates until the system is stabilized, about 4 hours.
If disconnecting the negative (-) battery cable from the battery during repair work for the vehicle equipped with ISG function, Battery sensor recalibration procedure should be performed after finishing the repair work.
(Refer to Battery Sensor Recalibration Procedure)

NOTE

- For the vehicle equipped with a battery sensor, be careful not to damage the battery sensor when the battery is replaced or recharged.
1. When replacing the battery, it should be same one (type, capacity and brand) that is originally installed on your vehicle. If a battery of a different type is replaced, the battery sensor may recognize the battery to be abnormal.
 2. When installing the ground cable on the negative post of battery, tighten the clamp with specified torque. An excessive tightening torque can damage the PCB internal circuit and the battery terminal .
 3. When recharging the battery, ground the negative terminal of the booster battery to the vehicle body.

13. Install the drive belt.

- (1) Preassemble the alternator (A) temporarily.



- (2) Install the drive belt (B).

- (3) Adjust the tension by turning the tension adjusting bolt (A) clockwise. (Refer to EE group – “Alternator”)

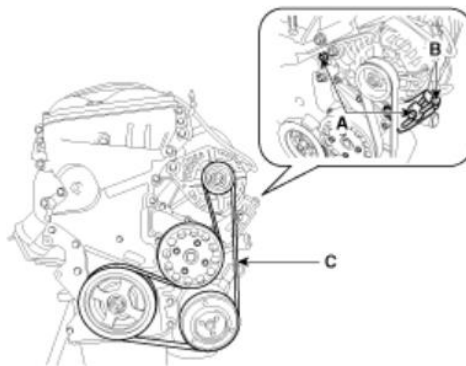
Belt tension

New belt:

637.4 ~ 735.5 N (65 ~ 75 kgf, 143.3 ~ 165.3 lbf)

Used belt:

441.3 ~ 539.4 N (45 ~ 55 kgf, 99.2 ~ 121.3 lbf)



- (4) Tighten the alternator mounting bolts with the specified torque.

Tightening torque

M10 bolt:

29.4 ~ 41.2 N.m (3.0 ~ 4.2 kgf.m, 21.7 ~ 30.4 lb-ft)

M8 bolt:

21.6 ~ 32.4 N.m (2.2 ~ 3.3 kgf.m, 15.9 ~ 23.9 lb-ft)

2012 Hyundai Elantra charging system initial Status:

Noise coming from Alternator bearing area; audible from within the car. Belt was loosened to help minimize noise. Day 1 Sunday, Battery voltage dash light has not come on. Battery voltage measurement has not been taken. Day 3 Tuesday, Noise worsened and alternator was replaced with a refurbished one from Advance Auto Parts; Carquest brand.

Alternator replacement status:

From memory and not taking notes the initially the alternator read **14.3 volts or 13.3V** upon installation and first start on Day 3 Tuesday. Within 5 miles of driving, the battery dash light lit up and the vehicle operated badly.

Day 5 Friday, part was returned and exchanged with AAP for same refurbished model. From memory, battery voltage was reading appx **12.5 volt**. Upon engine start Alternator was maintaining voltage less than **13 volts**. Part was returned Day 6 Saturday. Voltage drop was done on positive side and negative side with the positive side being 0 volts and the negative side having the largest drop be .002 volts.

Day 7 Sunday, 3rd refurbished alternator was obtained from Pep Boys model from Wilson Alternators. Battery Was charged overnight. Battery Voltage key off was **13.5 V**. Alternator Voltage car off was **12.98V**. Upon Start Battery voltage was maintained at **14.5 volts**. Car turned off and ON and same reading upon start. Drove car for 2 miles and battery voltage maintained **14.5 V**. at mile 2 while driving Voltage changed to **12.5V**. Since then, less than 7 miles city driving, alternator maintaining voltage at **12.0 volts** no load and under load voltage has been as low as **11.5 volts**. Turning car off battery voltage sets to **12.0 volts**.

Day 8 Monday, drove car 1 mile and within a mile noticed headlights seemed dimmer, steering was slightly stiffer; did not have voltage meter connected. At mile 3, with car in idle and minimum load, battery voltage was 9.5V. Turned car off and battery was at 11.5V. Leaving batter on trickle charge and continue trouble shooting.

2012 Elantra charging system questions and notes:

-Charging System is to maintain 13.5V, range from graph 11.7V to 15.3V

-If there is an alternator clutch, how does it work in respects to affecting voltage regulating?

-What part can be the culprit if not the Alternator, the regulator on the Alternator, not the battery nor battery sensor, nor any connections?