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IGNITION TIMING

The ECM is programmed with data (it contains ignition mappings) for optimum ignition timing under all operating conditions. Using engine operating conditions provided by the sensors, the ECM controls the ignition timing for optimum engine operation. There is no mechanical adjustment to perform.

SPARK PLUGS

DISASSEMBLY

First unscrew the spark plug 1 turn.

Clean the spark plug and cylinder head with pressurized air, then completely unscrew.

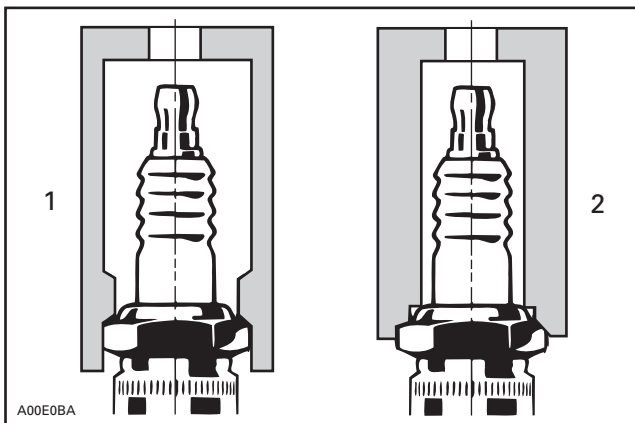
⚠ WARNING

Whenever using compressed air, always wear protective eye wear.

SPARK PLUG INSTALLATION

Prior to installation make sure that contact surfaces of the cylinder head and spark plug are free of grime.

1. Using a wire feeler gauge, set electrode gap according to TECHNICAL DATA.
2. Apply anti-seize lubricant (P/N 293 800 070) over the spark plug threads to prevent possible seizure.
3. Hand screw spark plug into cylinder head and tighten with a torque wrench and a proper socket.



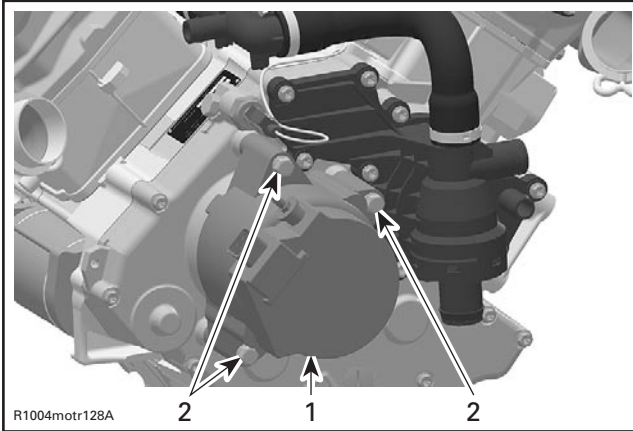
1. Proper socket
2. Improper socket

SPARK PLUG TIGHTENING TORQUE

MODEL	SPARK PLUGS	TORQUE N•m (lbf•in)
4-TEC	NGK DCPR8E	17 (150)

ALTERNATOR

The alternator is located on the ignition cover on the engine right hand side (alternator side).



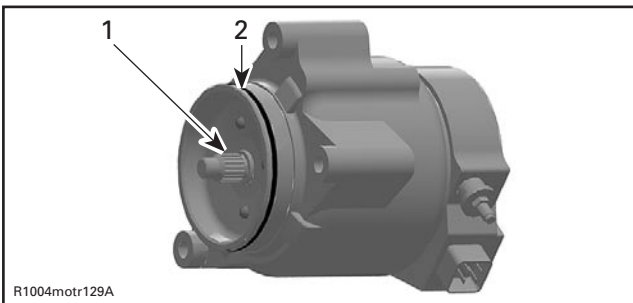
1. Alternator
2. Three screws

REMOVAL

Remove:

- alternator cable
- alternator plug
- alternator screws and pull alternator.

Inspection



1. Drive gear
2. O-ring

NOTE: The alternator does not require any maintenance and must not be opened for repair work.

Inspect the housing and the alternator drive gear for damage or wear. In case of damage, the alternator must be replaced. The alternator can only be replaced as a complete assembly.

Installation

The installation is the reverse of removal procedure. Pay attention to the following details.

NOTE: At assembly replace the O-ring of the alternator. Grease the drive gear and the O-ring before assembly using multi purpose grease. This will ease assembly and prevent displacement of the gasket during installation.

If it is not possible to move the alternator into the guide, this is due to the position of the drive gear. Pull the alternator out once more, slightly rotate the drive gear and try again.

Torque alternator screws to 23 N•m (17 lbf•ft).

BATTERY

GENERAL

Sealed valve regulated lead acid (VRLA) battery (YTX24HL-BS, P/N 515 175 895) is used for the 4-TEC models. Sealed VRLA battery is sealed, non-spillable and maintenance reduced — no electrolyte level to be checked and readjusted. No ventilation tube is attached to the battery.

REMOVAL

WARNING

Never charge or boost battery while installed on vehicle.

Open the hood.

Unfasten the strap and remove battery guard.

Slide away the rubber boot from the RED cable connection.

Disconnect RED positive cable from the battery post.

WARNING

Do not touch anything else with the wrench than the positive connection.

Slowly lift the battery to expose BLACK negative cable connection.

Disconnect the BLACK negative cable from battery post.

Remove the battery.

CAUTION: In case of any electrolyte spillage, immediately wash off with a solution of baking soda and water to prevent damage to vehicle components.

CLEANING

Clean the battery, battery casing, cables and battery posts using a solution of baking soda and water.

Remove corrosion from battery cable terminals and battery posts using a firm wire brush. Battery top should be cleaned by soft brush and any grease-cutting soap or baking soda solution.

INSPECTION

Visually inspect battery casing for cracks, leaks or other possible damage. Discoloration, warping or raised top, indicates that battery has overheated or been overcharged. If casing is damaged, replace battery and thoroughly clean battery tray and close area with water and baking soda.

WARNING

Should the battery casing be damaged, wear a suitable pair of non-absorbent gloves when removing the battery by hand.

Inspect battery posts for security of mounting.

BATTERY CHARGE TESTING

Voltmeter Test

The sealed and maintenance free battery has to be tested with a voltmeter.

Battery testing requires a voltmeter that can measure DC voltage. Connect a voltmeter parallel to the circuit being tested, observing polarity; otherwise, wrong voltmeter reading will appear.

There are two types of battery tests: unload and load.

An unload test is made on a battery without discharging current. It is the simplest and most commonly used method.

An load test is more accurate.

Unload Test

Check charge condition by using a voltmeter. Voltmeter readings appear instantly to show the state of charge.

WARNING

Connect the positive lead to the battery's positive terminal, and the negative lead to the negative terminal.

Section 06 ELECTRICAL

Subsection 05 (BATTERY)

STATE OF CHARGE	VOLTAGE READING
100%	12.8 - 13.0 V
75% - 100%	12.5 - 12.8 V
50% - 75%	12.0 - 12.5 V
25% - 50%	11.5 - 12.0 V
0% - 25%	11.5 V or less

Load Test

This is the best test of battery condition under a starting load. Use a load testing device that has an adjustable load.

Apply a load of 3 times the ampere-hour rating of the battery. At 14 seconds into the test, check battery voltage; if battery is in good condition, it will have at least 10.5 Vdc.

BATTERY STORAGE

Disconnect and remove battery from the vehicle.

The battery must always be stored in fully charged condition.

Clean battery terminals and cable connections using a wire brush. Apply a light coat of dielectric grease (P/N 293 550 004) or petroleum jelly on terminals.

Clean battery casing using a solution of baking soda and water. Rinse battery with clear water and dry well using a clean cloth.

Charge the battery every month if stored at temperature **below** 15°C (60°F).

Charge the battery every two week if stored at temperature **above** 15°C (60°F).

ACTIVATION OF A NEW BATTERY

Refer to the instructions provided with the battery.

BATTERY CHARGING

Voltage reading should be a minimum of 12.8 - 13.0 volts after charging. If open circuit voltage reading (with voltmeter) is not 12.8 volts or more - repeat charging cycle.

The following table shows the charging time of the battery require.

CONSTANT CURRENT CHARGER (1.0 A)	
STATE OF CHARGE	CHARGING TIME (hours)
100%	None
75% - 100%	3 - 6
50% - 75%	5 - 11
25% - 50%	13 - 15
0% - 25%	20

BATTERY CHARGER (1.5 A) (P/N 529 035 772)	
STATE OF CHARGE	CHARGING TIME (hours)
100%	None
75% - 100%	1 - 3
50% - 75%	2 - 5
25% - 50%	5 - 10
0% - 25%	10 - 15

CAUTION: If battery gets hot to the touch, stop charging and allow it to cool before continuing.

Allow battery to rest 1 - 2 hours after charging before checking voltage reading.

TIPS FOR CHARGING A USED BATTERY

CAUTION: Prior to charging the battery, always remove it from the vehicle to prevent electrolyte spillage on the vehicle.

For best results, battery should be charged when the electrolyte and the plates are at room temperature. A battery that is cold may not accept current for several hours after charging began.

Do not charge a frozen battery. If the battery charge is very low, the battery may freeze. If it is suspected to be frozen, keep it in a heated area for about 2 hours before charging.

WARNING

Do not place battery near open flame.

The time required to charge a battery depends on some factors such as:

- **Battery temperature:** Charging time is increased as the temperature goes down. The current accepted by a cold battery will remain low. As the battery warms up, it will accept a higher rate of charge.

- **Type of charger:** Battery chargers vary in the amount of voltage and current that they can supply. Therefore, the time required for the battery to begin accepting measurable current will also vary.

Charging a Very Flat or Completely Discharged Battery

Unless this procedure is properly followed, a good battery could needlessly be replaced.

- Measure the voltage at the battery posts with an accurate voltmeter. If it is below 10 volts, the battery will accept current at very low rate, in terms of milliamperes. It could take some time before the charging rate increases. Such low current flow may not be detectable on some charger ammeters and the battery will seem to accept no charge.
- Only for this particular case, set the charger to a high rate.

NOTE: Some chargers have a polarity protection feature that prevents charging unless the charger leads are connected to the correct battery terminals. A completely discharged battery may not have enough voltage to activate this circuitry, even though the leads are connected properly. It will seem like the battery does not accept a charge. Follow the charger manufacturer's instructions on how to bypass or override this circuitry so that the charger will turn on and charge a low-voltage battery.

- Since the battery chargers vary in the amount of voltage and current they provide, the time required for the battery to accept measurable charger current might be up to approximately 10 hours or more.
- If the charging current is not up to a measurable amount at the end of about 10 hours, the battery should be replaced.
- If the charging current is measurable before the end or at the end of about 10 hours, the battery is good and charging should be completed in the normal manner as specified in ACTIVATION OF A NEW BATTERY.
- It is recommended that any battery recharged by this procedure be load tested prior to returning it to service.

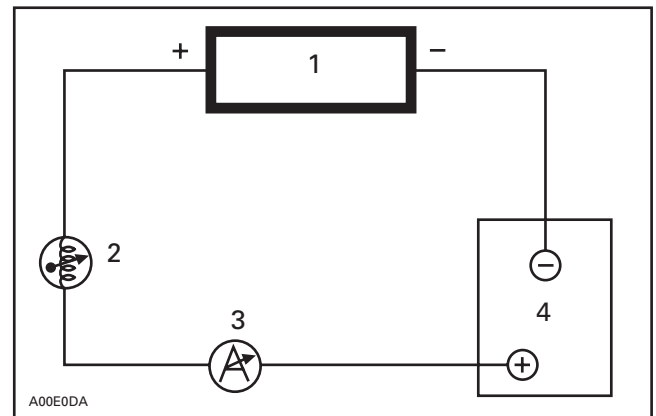
BATTERY CHARGING EQUIPMENT

The battery charger should have an adjustable charging rate. Variable adjustment is preferred, but a unit which can be adjusted in small increments is acceptable.

The battery charger must be equipped with an ammeter capable of accurately measuring current of less than one ampere.

If the present charger is not adjustable to the proper current values, a rheostat can be connected in series with the battery to provide adjustment. 12 ohm, 50 watt rheostat, such as OHMITE — 0314 or MALLORY 50K 12P, are available from electronic parts supply shops and they are suitable for use with most chargers if the peak current is to be held below 2 A.

If you need an accurate ammeter, we recommend the use of: SHURITE — 5202 (0 to 3 A) or — 5203 (0 to 5 A) available from electronic parts supply shops.



1. Charger
2. Rheostat 12 Ω 50 W
3. Ammeter
4. Battery

For a service application and a permanent installation, both ammeter and rheostat can be built into a small box adjacent to your charger.

CAUTION: Adequate ventilation **MUST** be provided to cool the rheostat.

Section 06 ELECTRICAL

Subsection 05 (BATTERY)

INSTALLATION OF BATTERY

Connect BLACK negative cable to battery negative post.

Apply silicone dielectric grease (P/N 293 550 004) on battery negative connection.

Install the battery in its support with the battery posts facing rearward.

Connect RED positive cable to positive battery post.

⚠ WARNING

Do not touch anything else with the wrench than the positive connection.

⚠ WARNING

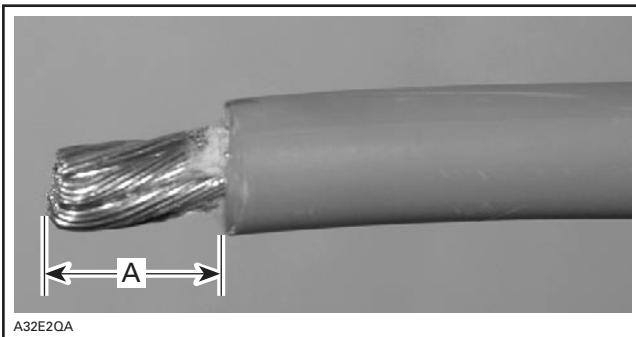
Never charge or boost battery while installed on vehicle.

Apply silicone dielectric grease (P/N 293 550 004) on battery positive connection.

Cover the RED positive connection with rubber boot.

CABLE TERMINAL INSTALLATION

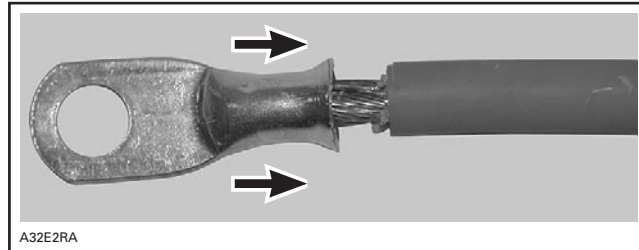
Carefully strip the wire approximately to 12 mm (1/2 in) in length, using a wire stripping tool or sharp blade/knife.



A. 12 mm (1/2 in)

NOTE: Make sure not to cut wire strands while stripping the wire.

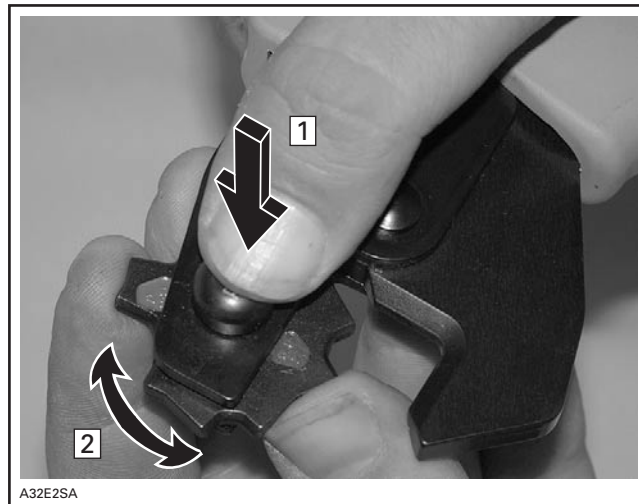
Install the appropriate terminal on the wire according to the requirement. Refer to appropriate parts catalog.



INSTALLATION OF TERMINAL

Follow the instructions provided with the crimp plier (P/N 529 035 730) to select the proper position of the tool.

NOTE: Different wires require different crimp plier settings, so make sure to follow the instruction supplied with the tool.



POSITIONING THE CRIMP PLIER

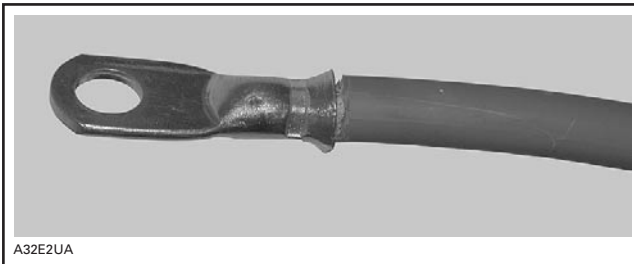
Step **1**: Press

Step **2**: Rotate

After positioning the crimp plier, crimp the terminal already installed on wire.



CRIMPING OF WIRE



PROPERLY CRIMPED WIRE

To verify, if the wire is properly crimped, hold the wire with one hand and the terminal with the other and pull with some force.

CAUTION: Never weld the wire to the terminal. Welding can change the property of the wire and it can become brittle and break.

Install the protective heat shrink rubber tube (P/N 278 001 692) on the terminal. Heat the heat shrink rubber tube using the heat gun so that it grasps the wire and the terminal.

CAUTION: Make sure that the protective heat shrink rubber tube has been properly installed and no part of wire is exposed.

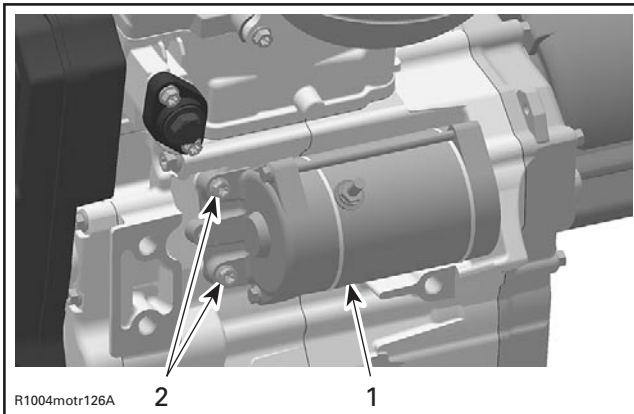
ELECTRIC STARTER

REMOVAL

- Disconnect BLACK (-) cable from battery.
- Disconnect RED (+) cable from battery.

⚠ WARNING
Always disconnect BLACK (-) cable first and connect last.

The starter is located below the second cylinder in the crankcase.



1. Electric starter
2. Two screws

Removal

Remove:

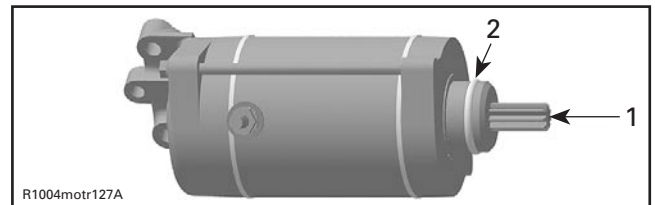
- starter cable
- starter screws and pull starter.

INSTALLATION

The installation is the reverse of removal procedure. Pay attention to the following details.

NOTE: During assembly replace the O-ring of the starter. Grease the drive gear and the O-ring before assembly using multi purpose grease. This will simplify assembly and prevent displacement of the O-ring during installation.

If it is not possible to move the starter into the guide, this is due to the position of the drive gear. Pull the starter out once more, slightly rotate the drive gear and try again.



1. Drive gear
2. O-ring

Torque starter screws to 9 N•m (80 lbf•in).

TESTING PROCEDURE

INSPECTION OF HEATING ELEMENTS

All measurements must be performed at 21°C (70°F).

Throttle Lever Element

Current Measurement

HIGH INTENSITY	BROWN wire BLACK wire	0.83 A minimum
LOW INTENSITY	BROWN/YELLOW wire BLACK wire	0.64 A minimum

Handlebar Grip Heating Element

Resistance Measurement

LOW INTENSITY	YELLOW/BLACK wire ORANGE/VIOLET wire	17.1to 20.9 ohms
HIGH INTENSITY	YELLOW/BLACK wire ORANGE wire	8.7 to 10.5 ohms

HEADLIGHT AND ACCESSORIES SYSTEMS TESTING

Connect VCK (P/N 529 035 676). In B.U.D.S. click on the relay 2 (R2) button to supply headlight and accessories systems with 12 volts.

Use the wiring diagram in WIRING DIAGRAM section to troubleshoot headlight system and accessories system.