Service Manual

Bosch K1 Series
Alternators

Important Safety Information

Most accidents involving product operation, maintenance and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. A person must be alert to potential hazards. This person should also have the necessary training, skills and tools to perform these functions properly.

Read and understand all safety precautions and warnings before operating or performing lubrication, maintenance and repair on this product.

Basic safety precautions are listed in the “Safety” section of the Service or Technical Manual. Additional safety precautions are listed in the “Safety” section of the owner/operation/maintenance publication.
Specific safety warnings for all these publications are provided in the description of operations where hazards exist. WARNING labels have also been put on the product to provide instructions and to identify specific hazards. If these hazard warnings are not heeded, bodily injury or death could occur to you or other persons. Warnings in this publication and on the product labels are identified by the following symbol.

⚠ WARNING

Improper operation, lubrication, maintenance or repair of this product can be dangerous and could result in injury or death.
Do not operate or perform any lubrication, maintenance or repair on this product, until you have read and understood the operation, lubrication, maintenance and repair information.

Operations that may cause product damage are identified by NOTICE labels on the product and in this publication.

DAEWOO cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this publication and on the product are therefore not all inclusive. If a tool, procedure, work method or operating technique not specifically recommended by DAEWOO is used, you must satisfy yourself that it is safe for you and others. You should also ensure that the product will not be damaged or made unsafe by the operation, lubrication, maintenance or repair procedures you choose.

The information, specifications, and illustrations in this publication are on the basis of information available at the time it was written. The specifications, torques, pressures, measurements, adjustments, illustrations, and other items can change at any time. These changes can affect the service given to the product. Obtain the complete and most current information before starting any job. DAEWOO dealers have the most current information available.

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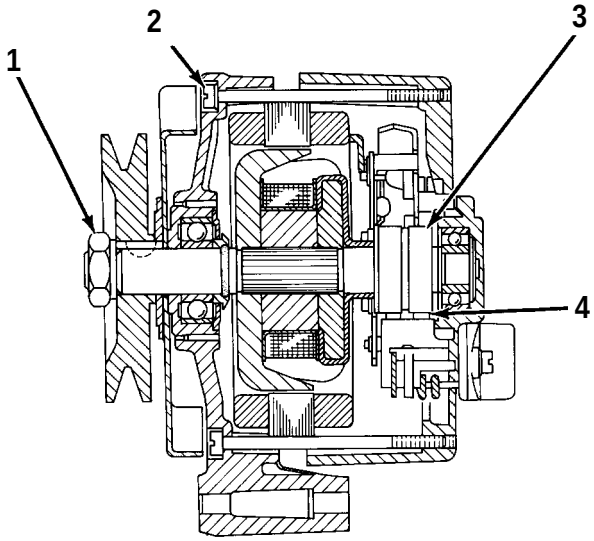
Bosch Alternator Coverage Chart			
DAEWOO Part Number	**Model Number**	**Voltage**	**Amperage**
8C5535	K1	12	32



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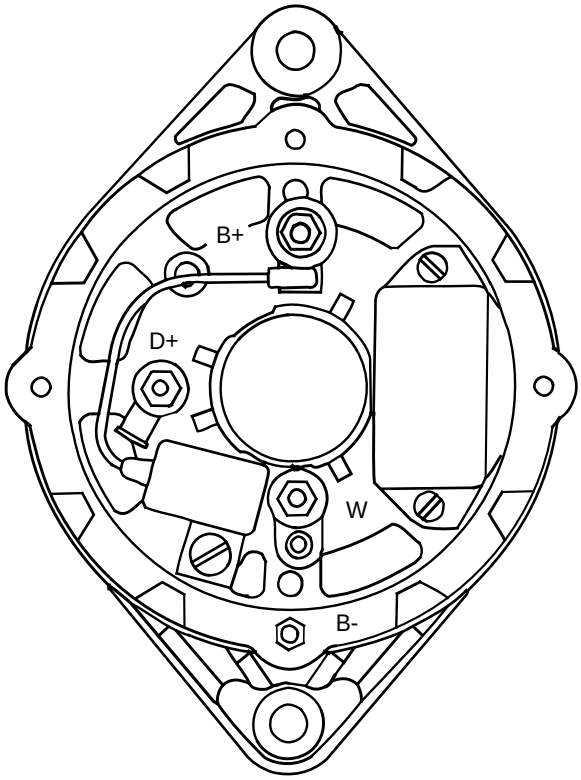
Alternator Sectional View



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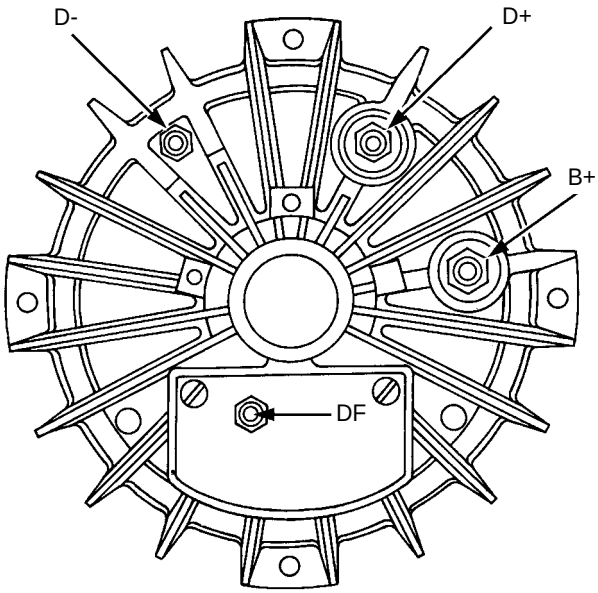
Alternator End View



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Alternator Enclosed End View

ALTERNATOR SPECIFICATIONS	
DAEWOO P/NO.	**8C5535**
Model Number	K1
Voltage Rating	12V
Polarity	Neg. Grd.
Rotation	CW
Test Speed	5000 rpm
Rated Output (Cold)	29A
Output Voltage	14.0 ± 0.5V
Rotor Field Winding Resistance	3.4 to 3.7 Ω
Field Current(@ 28.0V or 14.0V)	3.8 to 4.1A
Stator Winding Resistance	.14 to .15 Ω
Turn On Speed (Max.)	
Slip Rings (3): Maximum Runout (TIR)	0.03 mm (.001 in)
Minimum Diameter	27.00 mm (1.06 in)
Brush (4) Length: New	17.00 mm (.67 in)
Brush (4) Length: Minimum	11.5 mm (.45 in)
Brush Spring Force	2.0 to 3.8 N (.45 to .86 lb)

ALTERNATOR TIGHTENING SPECIFICATIONS	
DAEWOO P/NO.	**8C5535**
Pulley Nut (1) Torque	35 ± 10 N•m (25 ± 7 lb•ft)
Thru Bolts (2) Torque	4.1 to 5.5 N•m (36 to 49 lb•in)
Terminal Torques: B+	3.6 ± 0.8 N•m (32 ± 7 lb•in)
B-	-
D+	2.25 ± 0.25 N•m (20.0 ± 2.2 lb•in)
D-	2.25 ± 0.25 N•m (20.0 ± 2.2 lb•in)
DF	2.25 ± 0.25 N•m (20.0 ± 2.2 lb•in)
W	-

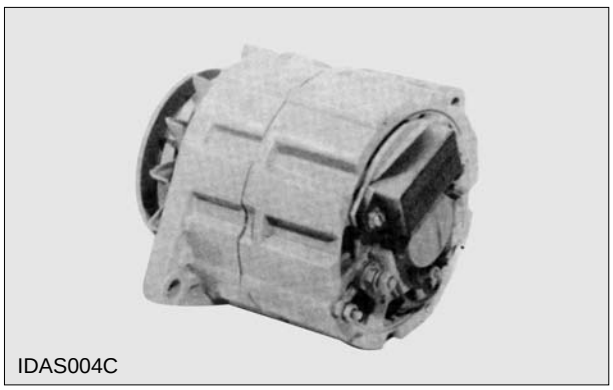
Systems Operation

Alternator

Introduction

The K1 Series Bosch Alternator has three phase, full wave, rectified output. It is the brush-type. See the Bosch Alternator Coverage Chart in Specifications for the list of alternators covered in this module.

Alternator Operation



Bosch Alternator

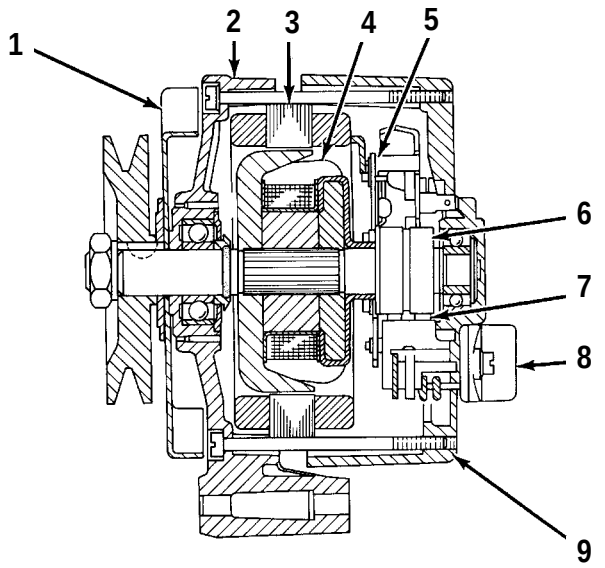
The alternator is an electrical and mechanical component driven by belt rotation from the engine. It is used to charge the storage battery during engine operation. The alternator is cooled by a fan that is part of the alternator. The fan pulls air through the back of the alternator. The air exits the front of the alternator, cooling it in the process.

The alternator converts mechanical and magnetic energy to alternating current (AC) and voltage. This process is done by rotating a direct current (DC) electromagnetic field (rotor) inside a three phase stator assembly. The alternating current and voltage (generated by the stator) are changed to direct current (DC) by a three phase, full wave rectifier system. The rectifier system has six silicon rectifier diodes. DC current flows to the alternator output terminal. The rectifier also has three exciter diodes. They rectify the current needed to start the charging process.

A solid state regulator is installed on the back of the alternator. Two brushes conduct current, through two slip rings, to the rotor field. A capacitor, installed on some alternators, smooths alternator DC voltage.

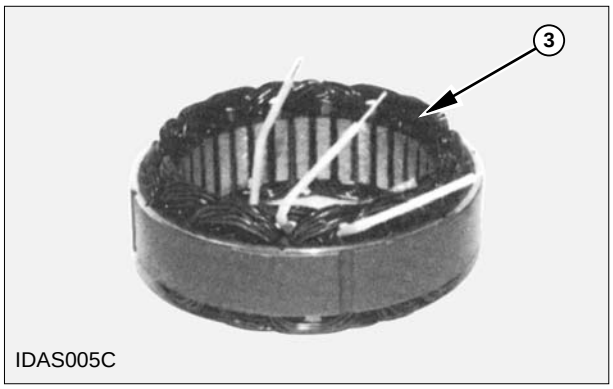
These alternators are self-exciting at high speed. That means they have residual magnetism in the rotor. The excitation circuit cannot start the charging process until the pre-excitation circuit produces the required breakdown voltage. The alternator is connected to the battery through the ignition or key start switch. This connection supplies the necessary current to the pre-excitation circuit. This current is available every time the ignition switch is turned on.

Alternator Components



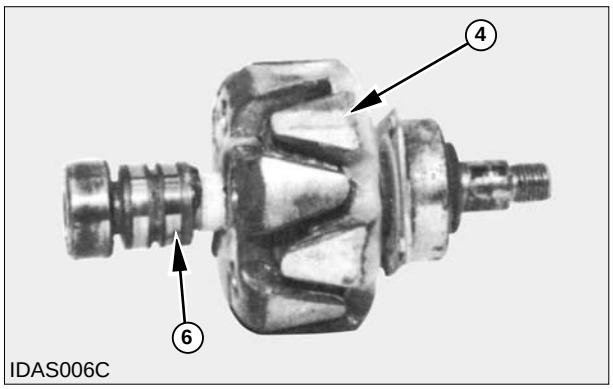
Alternator Components
(1) Fan. (2) Front frame assembly. (3) Stator. (4) Rotor.
(5) Rectifier. (6) Slip ring. (7) Brushes. (8) Regulator.
(9) Rear frame assembly.

The major components of the alternator are stator (3), rotor (4), rectifier (5), regulator assembly (8), brushes (7) and a capacitor (if equipped).



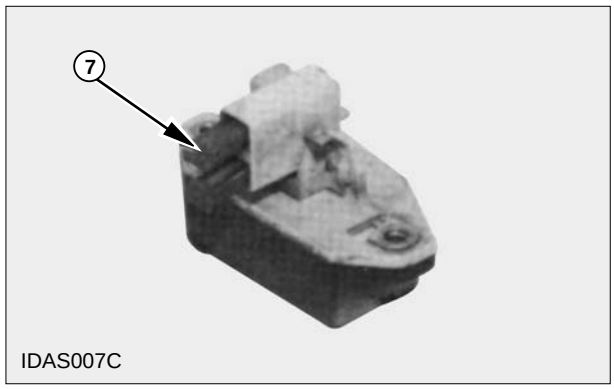
Stator
(3) Stator.

Stator (3) consists of a stator core and coils. As the rotor turns, its varying magnetic field causes the stator coil to produce three phase alternating current (AC).



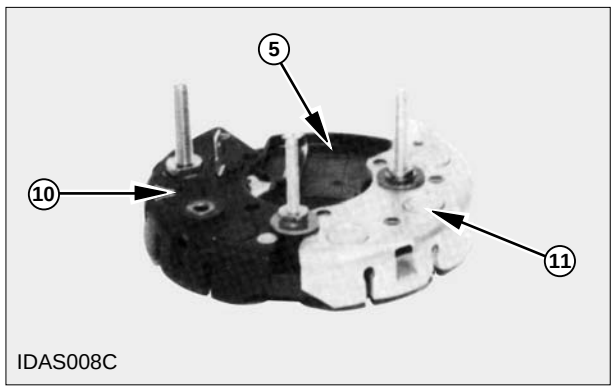
Rotor
(4) Rotor. (6) Slip ring.

Rotor (4) consists of a core, coils and slip ring (6). The rotor provides the magnetic field between the rotor field winding and the stator. Slip ring (6) provides the surfaces for brush contact.



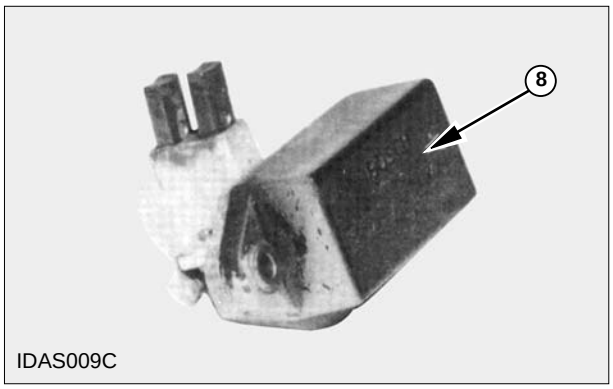
Brushes
(7) Brushes.

There are two brushes (7). They contact the two rotating slip rings on the rotor. Current flows to the rotor coil through the brushes and slip rings. There is one positive (+) and one negative (-) brush. The brush material is copper graphite.



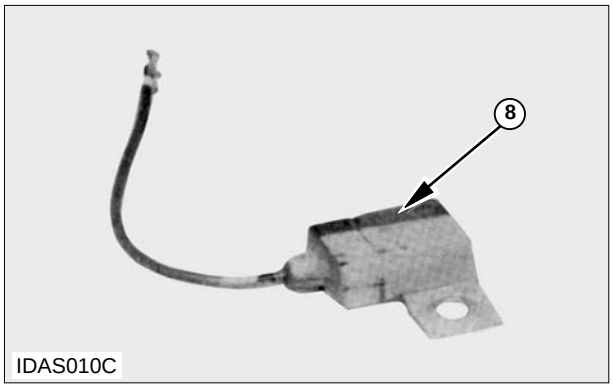
Rectifier
(5) Rectifier. (10) Positive (+) diodes. (11) Negative (-) diodes.

Rectifier (5) contains three positive diodes (10) and three negative (-) diodes (11). They form the full wave rectifier which is connected to the stator. Rectifier (5) changes or rectifies three phase AC to DC. The rectifier also provides excitation current through three exciter diodes (not shown).



Regulator
(8) Regulator.

Regulator (8) controls alternator output. It is mounted on the alternator rear frame assembly.

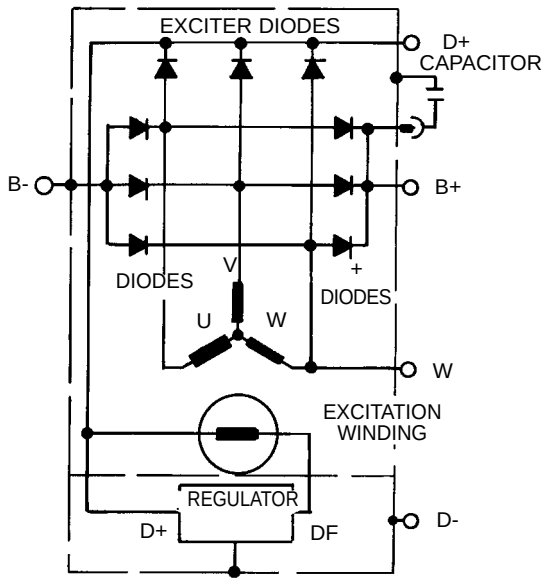


Capacitor
(12) Capacitor.

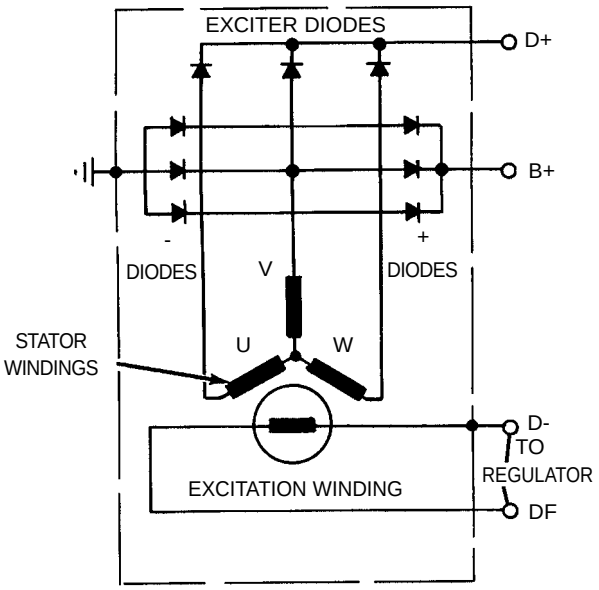
Capacitor (12) smooths alternator DC voltage. The capacitor is mounted on the back of the alternator.

Alternator Operation Schematics

The electrical schematics that follow indicate terminals and basic circuitry for the K1 series alternators.



K1 Series Alternator Schematic (12V)



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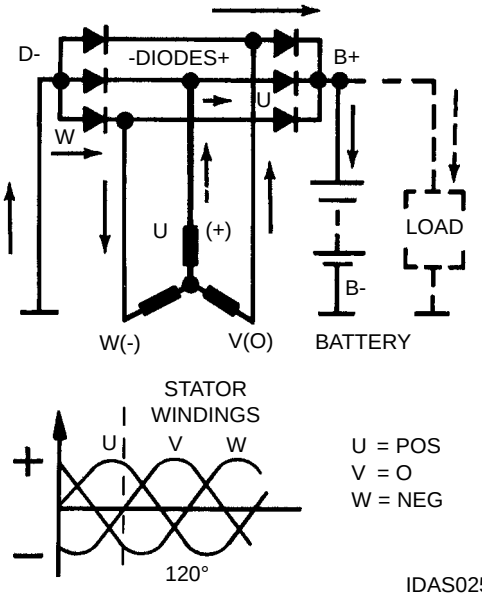
K1 Series Fully Enclosed Alternator Schematic (12V)

Charging Circuit

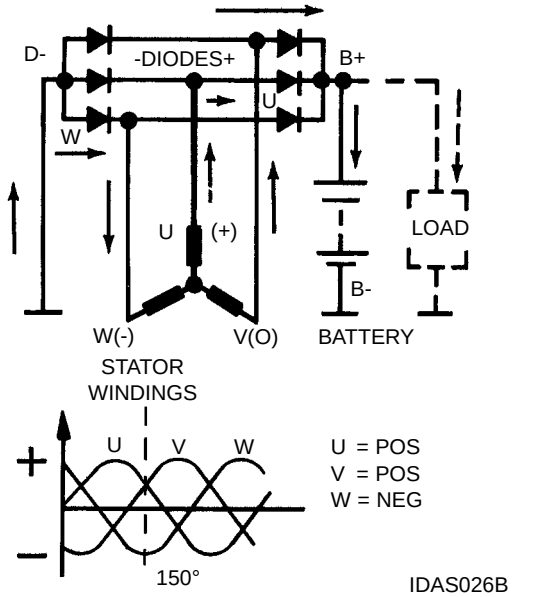
Current for battery charging and for the electrical accessories is taken from the B+ terminal of the alternator. The flow of current for battery charging and electrical accessories at an instant of time (120° phase angle) is shown in illustration Phase Relationships (120°)



Phase Relationships
Charging circuit with phase angle of phase U=120°

Voltage at the output of winding U is positive, while it is negative at W and zero at V (no voltage). The current path is as follows:

Output from winding U through positive diode U, alternator terminal B+, battery ground, alternator terminal D-, negative diode W, output of winding W to the neutral point.



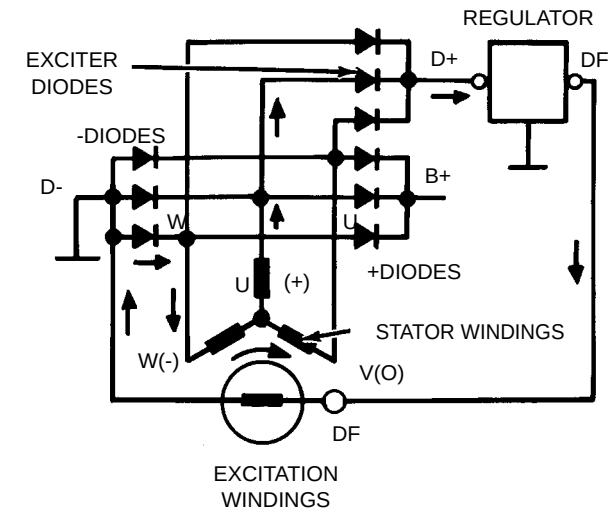
Phase Relationships
Charging circuit with phase angle of phase U=150°

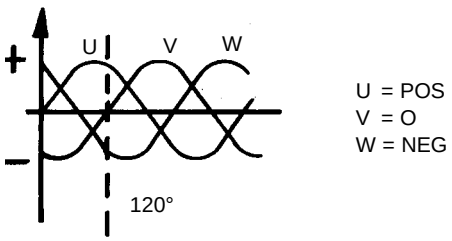
If another time instant is chosen (150° phase angle) where none of the voltages are zero, the current would flow as shown in illustration Phase Relationships (150°).

Equal currents flow from windings U and V to the respective positive diodes. They return to the neutral point through W winding negative diode and winding W. Note that not all the diodes belonging to the various phases are used at the instant of time examined in this example. This remains true of all the other instants of time which could be examined. Individual phase currents change in magnitude and polarity, while the output current to the battery or electrical accessories remains uniform.

Excitation Circuit

The exciting current for generation of the magnetic field is taken from the stator winding. It is rectified by three exciter diodes and the three negative power diodes. The exciting current follows the path shown in the illustration.





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Phase Relationships
Excitation circuit with phase angle of phase U=120°

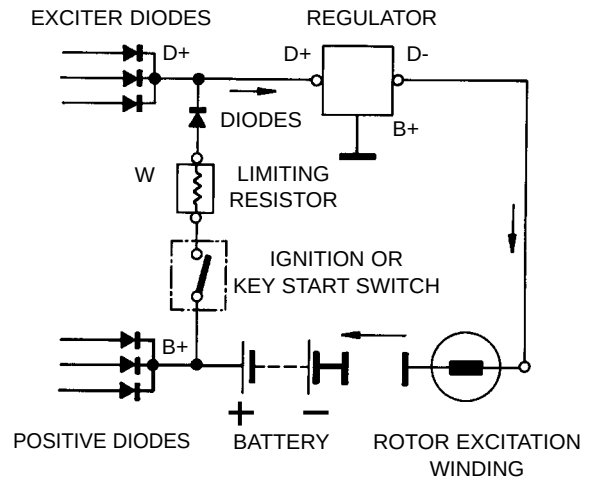
Current flows from the output of winding U (positive at this instant of time), through its corresponding exciter diode and the alternator D+ terminal to the regulator D+ terminal. When the regulator is turned on, current then flows to the regulator DF terminal to the excitation winding by the way of terminal DF of the alternator. Current then flows to the alternator terminal D- and the negative power diode to winding W (negative at this instant of time) completing its circuit at the neutral point.

Pre-excitation CiRcuit

When in operation at high speed, the alternator is self-excited. Excitation current for the magnetic field is obtained from the main current. However, when initially starting, the alternator depends on residual magnetism. When the current of an electromagnet is disconnected, the magnetic field does not disappear completely. The iron core remains slightly magnetic. This is called residual magnetism. There is enough residual magnetism in the core to induce a small voltage in the stator windings. This small voltage causes a weak current to flow through the closed circuit of the excitation winding. This current produces a weak magnetic field of its own. This is added to the residual magnetism of the core and slightly boosts the intensity of the exciter field. A boosted exciter field results in a higher voltage. The effect is cumulative, and the process repeats itself until the desired voltage, corresponding to the alternator speed, is reached.

The exciter circuit in the alternator contains three positive diodes, three negative diodes and three exciter diodes.

Alternator self-excitation cannot start until the pre-excitation circuit produces the breakdown voltage required by two of the diodes (one negative diode and one positive diode per phase) connected in series.



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Pre-excitation Circuit (Typical)

The existing residual magnetic field of the rotor generates this breakdown voltage only at high speed.

Therefore, the alternator has to be pre-excited during start-up. This is done by taking current from the battery through the ignition or key start switch, limiting resistor and on some alternators a diode assembly. When the ignition or key start switch is turned on, pre-excitation current flows from the positive (+) terminal of the battery through the ignition or key start switch, limiting resistor and diode assembly (if equipped) to the D+ terminal of the regulator. The current flows through the regulator to the excitation winding where it is grounded. It is then returned to the negative (-) side of the battery.

As current flows through the excitation winding, it produces a magnetic field strong enough to start self-excitation of the alternator.

Regulator Operation

The transistor regulator is the Bosch type EE. It is used on all K1 alternators except the K1 enclosed alternator. The EE will be used in describing the construction and operating of the regulator.

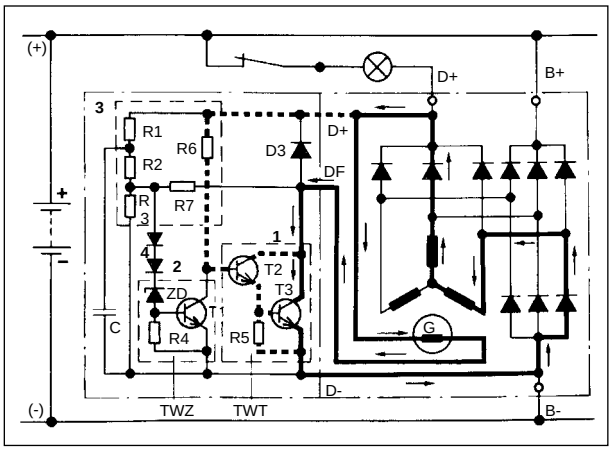
The most important part of the regulator is formed by two integrated assemblies:

1. TWZ which includes transistor T1, resistor R4 and uni-directional breakdown diode ZD. This is the control stage.

2. TWT which includes transistor T2, resistor R5 and transistor T3. This is the output stage.

The following circuit diagrams show what happens in the regulator when the excitation current is switched ON and OFF. The actual value of the alternator voltage between terminals D+ and D- is detected by a voltage divider which is formed by resistors R1, R2 and R3. Connected in parallel with R3 is a unidirectional breakdown diode ZD. This diode determines the system charging voltage at the regulator. A partial voltage is constantly applied to this diode. This voltage is proportional to the alternator voltage.

Regulator Switched ON



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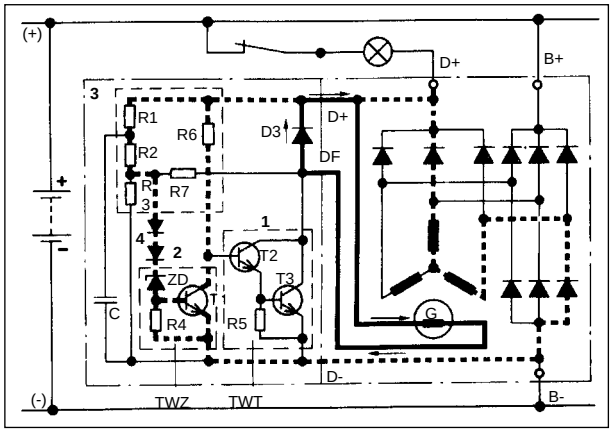
Regulator Circuit Diagram (Switched On)
(1) Output stage. (2) Control stage. (3) Voltage divider.
(4) Temperature compensation diodes. (C) Capacitor.

As long as the actual voltage is below the set alternator voltage, the breakdown voltage of diode ZD is not yet reached. No current flows through the branch of the circuit containing diode ZD. No current flows to the base of transistor T1. Transistor T1 is in a non-conducting state.

With transistor T1 in the non-conducting state, control current can flow from the exciter diodes and terminal D+ through resistor R6 to the base of transistor T2. This current switches transistor T2 on. Transistor T2 now makes the connection between terminal DF and the base of transistor T3. Therefore, if transistor T2 conducts, so does transistor T3. The excitation current now flows through transistor T3. Current also flows through the excitation winding and increases during on time, causing the alternator voltage to rise. At the same time, there is a voltage rise across the voltage divider and diode ZD.

Regulator Switched OFF



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Regulator Circuit Diagram (Switched OFF)
(1) Output stage. (2) Control stage. (3) Voltage divider.
(4) Temperature compensation diodes. (C) Capacitor.

When the system voltage finally exceeds the regulator set value, diode ZD starts to conduct when the breakdown voltage is reached. Current now flows from D+ through resistors R1, R2 and diode ZD to the base of transistor T1 which now conducts. Now the voltage across the base of transistor T2 drops and the base current stops flowing. Transistors T2 and T3 are turned off. The excitation circuit is now interrupted. The alternator excitation is suppressed and the output voltage drops again. The interruption of the excitation current now generates a turn-off voltage spike as a result of the induction in the excitation winding (stored magnetic energy) which could destroy transistors T2 and T3.

To prevent this, the decaying excitation current is discharged through free wheeling diode D3, which is connected in parallel with the excitation winding. As soon as the alternator voltage has dropped below the set value and diode ZD has returned to the non-conducting state, the excitation winding is switched on again. This cycle (in which the excitation winding is alternately supplied with voltage or is short-circuited through diode D3) is repeated in periodic sequence. The on/off ratio depends on the rotational speed of the alternator and the load current requirements of the system.

Capacitor (C) smooths the DC voltage. Resistor R7 insures the fast, precise switching of transistor T2 and T3. Resistor R7 also reduces switching losses.

Temperature compensation diodes (4) adjust system voltage according to ambient temperature. The charging voltage must be higher in cold weather than in hot weather.

Testing And Adjusting

Troubleshooting

Troubleshooting can be difficult. Following is a list of possible problems. To make a repair to a problem, make reference to the probable cause.

This list of problems and probable causes will only give an indication of where a possible problem can be and what repairs are needed. Sometimes more or other repair work is needed beyond the recommendations in the list. Remember that a problem is not normally caused by one part, but by the relation of one part with other parts. This list cannot give all possible problems and probable causes. The serviceman must find the problem and its source, then make the necessary repairs.

Troubleshooting Problem List

1. Alternator Does Not Charge.

2. Alternator Charge Rate Is Low Or Not Regular.

3. Alternator Charges Too Much.

4. Alternator Is Noisy.

Troubleshooting Problems

Problem 1: Alternator Does Not Charge.

Probable Cause:

1. Loose Drive Belt For Alternator:
Adjust the alternator drive belt.

2. Loose Alternator Drive Pulley:
Check the key groove in the pulley for wear. If the groove is worn, install a new pulley. Tighten the pulley nut to the correct torque. See Specifications.

3. Charging Or Ground Return Circuit Or Battery Connections Are Defective:
Inspect all cables and connections. Clean and tighten all connections. Replace defective parts.

4. Rotor Field Winding Or Regulator Is Defective:
Install a new rotor or regulator assembly.

Problem 2: Alternator Charge Rate Is Low Or Not Regular.

Probable Cause:

1. Loose Drive Belt For Alternator:
Adjust the alternator drive belt.

2. Loose Alternator Drive Pulley:
Check the key groove in the pulley for wear. If the groove is worn, install a new pulley. Tighten the pulley nut to the correct torque. See Specifications.

3. Charging Or Ground Return Circuit Or Battery Connections Defective:
Inspect all cables and connections. Clean and tighten all connections. Replace defective parts.

4. Regulator Is Defective:
Install a new regulator assembly.

5. Rectifier Is Defective:
Install a new rectifier.

6. Brushes Are Worn Or Dirty:
Install new brushes.

Problem 3: Alternator Charges Too Much.

Probable Cause:

1. Alternator Or Regulator Has Loose Connections:
Tighten all connections to the alternator or regulator.

2. Regulator Is Defective:
Install a new regulator assembly.

Problem 4: Alternator Is Noisy.

Probable Cause:

1. Drive Belt For Alternator Is Worn Or Defective:
Install a new drive belt for the alternator.

2. Loose Alternator Drive Pulley:
Check the key groove in the pulley for wear. If the groove is worn, install a new pulley. Tighten the pulley nut to the correct torque. See Specifications.

3. Drive Belt And Drive Pulley For Alternator Are Not In Alignment:
Make an adjustment to put the drive belt and drive pulley in correct alignment.

4. Alternator Bearings Are Worn:
Install new bearings in the alternator.

Alternator Output Test

FAULT CONDITIONS AND POSSIBLE CAUSES			
Current At Start-Up	**Voltage After About 10 Min. Is Below Spec.**	**Voltage After About 10 Min. Is In Spec.**	**Voltage After About 10 Min. Is Above Spec.**
Below Specification.	Repair alternator (defective regulator, open stator phase, and/or rectifier)	Turn on all accessories. If voltage drops below spec., repair alternator (open rectifier and/or stator phase).	
Reached Specification and then tapered off.	Repair alternator (defective regulator).	Alternator and battery in spec. Turn on all accessories to verify. Voltage must stay in spec.	Repair alternator (shorted regulator).
Exceeds Specification and stays high.	Check battery. Do alternator test again if necessary	Alternator in spec. Check battery.	Repair alternator (shorted regulator). Also check battery for possible damage.

NOTE: The proper drive pulley is required for the correct alternator output.

Tools Needed	
Digital Multimeter or Equivalent	1
AC/DC Clamp-On Ammeter	1

Machine Test

1. Put the multimeter positive (+) lead on the B+ terminal of the alternator. Put the negative (-) lead on the negative (-) terminal or frame of the alternator. Put the clamp-on ammeter around the positive output wire of the alternator.

2. Turn off all electrical accessories. With the fuel off, crank the engine for 30 seconds. Wait two minutes to let the starting motor cool. If the system appears to operate at the specifications, crank the engine again for 30 seconds.

NOTE: Cranking the engine for 30 seconds partially discharges the batteries in order to do a charging test. If batteries are already low in charge, skip this step. Jump-start engine or charge batteries as required.

3. Start the engine and run at full throttle.

NOTE: Full throttle approximates the required drive pulley speed of 5000 rpm.

4. Immediately check output current. When operating correctly, this initial charging current is equal to or greater than the full output current shown below:
8C5535..... 29A

5. The alternator output should stabilize within approximately 10 minutes at full throttle (possible longer, depending upon battery size, condition and alternator rating). When operating correctly, the alternator output voltage is:
12V System ..... 14.0 $\pm$ 0.5V

If the alternator is NOT performing within specifications, see the Fault Condition and Possible Causes chart.

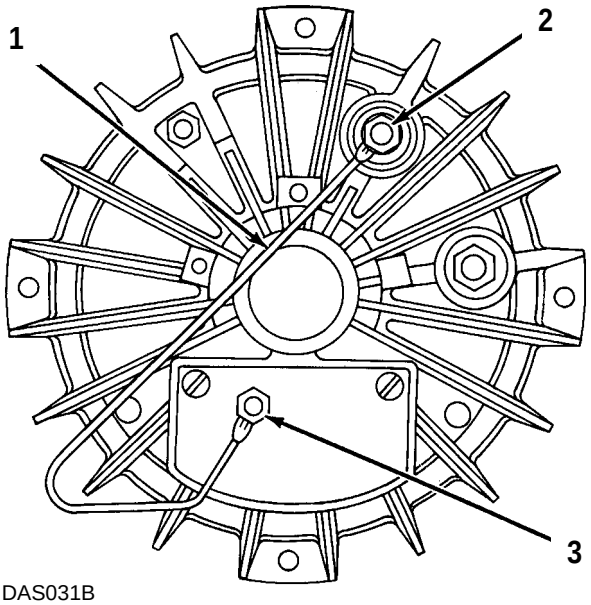
6. The charging current during this period should taper off the less than approximately 10 amps, depending again upon battery and alternator capacities. If the charging current does NOT decrease as specified, see the Fault Conditions and Possible Causes chart.

7. The K1 alternators are self-excited at high speeds. For this reason, they are turned on by the battery, through the ignition or key start switch, to start the charging process at low speed. They are turned on any time the ignition or key start switch is either in the ON or START position.

8. On lift trucks, check the alternator light to make sure its working properly. Also, if a machine is jump started because the battery is too low, the alternator may not have any output. This is because the battery may be too low to send current to the alternator. The alternator needs current to start the charging process.

Regulator Test

If the alternator does not have the correct output, the field can be grounded on the 8C5535 alternators. This can be done on the machine to determine if the regulator is bad. Do the procedure that follows:



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Alternator
(1) Jumper wire. (2) D+ terminal. (3) DF terminal.

1. Repeat Steps 1-3 of Machine Test. Ground the field by connecting jumper wire (1) from D+ terminal (2) to DF terminal (3) as shown. This calls for full alternator output.

2. If output is now within 10 amps of rated output, the regulator is bad and must be replaced.

3. If output is not within 10 amps of rated output, the alternator must be disassembled for component testing. See Alternator Component Tests.

Bench Test

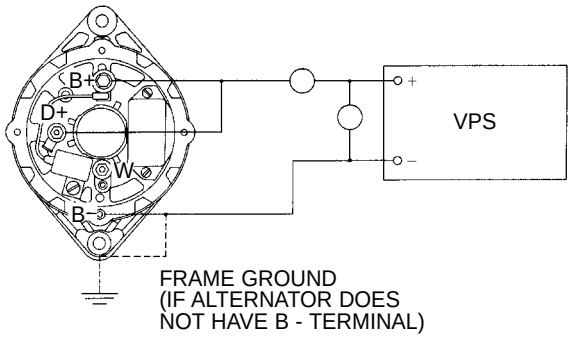
Put the alternator on an alternator test bench. The maximum current output and regulated voltage should be the same as shown in the machine test.

Alternator Component Tests

Tools Needed	
Digital Multimeter or Equivalent	1

Regulator Test

TEST EQUIPMENT CHART		
Quantity	**Symbol**	**Description**
1	VPS	0 to 40V, 6A Variable Power Supply
2	V, A	Digital Multimeter Or Equivalent



IDAS032B

Test circuit For Regulator Test (K1 Shown)

This test can be performed to determine an alternator or regulator malfunction. This test does not cover all of the failure possibilities, but verifies a few common problems. See the Test Equipment Chart for the equipment needed for this test.

Alternator output voltage is regulated by controlling field coil current. The regulator senses output voltage. If the voltage is low, the regulator allows field current flow and the voltage builds. When output voltage exceeds the upper limit, field current is turned off. The output voltage of a properly functioning alternator and regulator is:

12V System ..... 14.0 ± 0.5V

The voltage should not vary more than approximately 0.3V during this process. This test measures voltage when the regulator turns field current on and off and determines if there is an open or short in the diode trio (exciter diodes), field coil or regulator.

1. Connect variable power source (VPS) positive (+) lead to the alternator B+ and D+ terminals as shown. Connect VPS negative (-) lead to the alternator B- terminal or frame ground.

2. Adjust the voltage of the VPS until ammeter (A) first indicates current draw. Measure voltage (V) and write this measurement down as turn-on voltage. When correctly operating, the turn-on voltage is:

12V System ..... 14.0 ± 0.5V

3. Ammeter (A) reads field current. When correctly operating, the field current is: See Specifications for the K1, 12V alternators.

8C5535, Alternators ..... 3.8 to 4.1A at 14.0V

NOTE: Divide the voltage that first indicates field current by rotor field winding resistance as shown in specifications. This will give the correct field current that should be seen on ammeter (A).

4. If ammeter (A) indication is zero amps, the rectifier or field coil or regulator are open. If ammeter (A) indication is too high (see Step 2), the field coil may be shorted. The regulator is also bad if the turn-on voltage is not:

12V System ..... 14.0 ± 0.5V

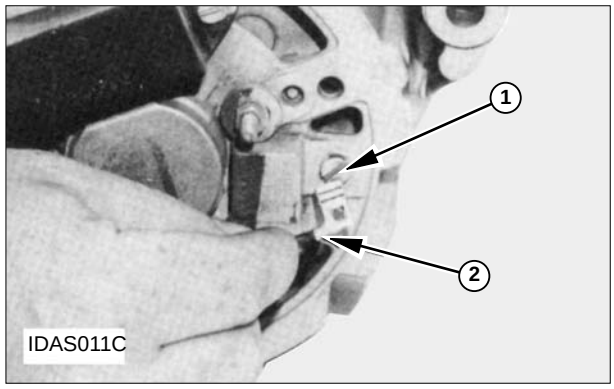
5. If the measurements in Steps 3 and 4 are correct, go to Step 6. If they are not correct, the alternator and/or regulator are bad.

6. Adjust VPS to the turn-on voltage as measured in Step 2. Slowly increase the voltage until ammeter (A) indicates zero amps. Write this voltage down as turn-off voltage.

7. The difference between the turn-off and turn-on voltages must be no more than 0.3V. A larger value indicates a regulator malfunction. Also, ammeter (A) should drop sharply to zero amps. If not, the regulator is faulty.

8. If the alternator and regulator meet all test requirements and there is still a problem, do the additional component tests that follow.

Capacitor Test

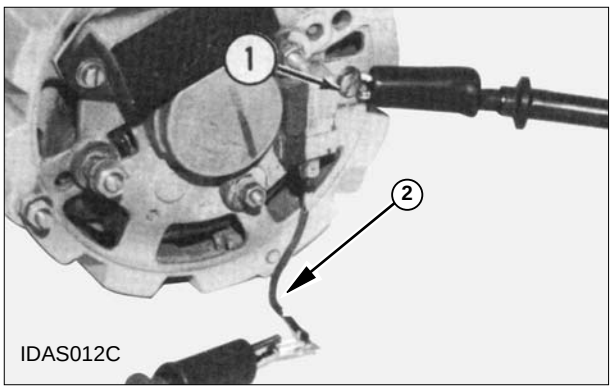


Discharging Capacitor
(1) Capacitor mounting screw. (2) Capacitor lead.

1. Disconnect capacitor lead (2) from its terminal on the back of the alternator. Remove the plastic housing from lead (2) that surrounds the clip.

2. Touch lead (2) to the capacitor mounting screw (1). This discharges the capacitor.

NOTE: Each time this test is done, the capacitor must be discharged.



Capacitor Test
(1) Capacitor mounting screw. (2) Capacitor lead.

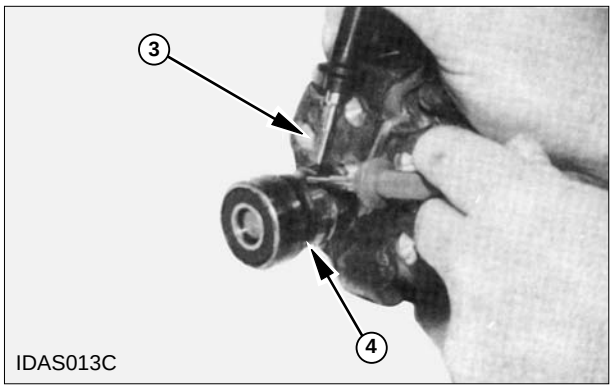
3. Put the multimeter on the 20M resistance (Ω) scale. Connect one multimeter lead to capacitor lead (2). Touch the other lead to capacitor mounting screw (1).

4. There should be a very low resistance for a short period of time. Then resistance should stabilize above 100,000 ohms (meter reading 0.10 or greater).

5. If the reading is not correct, replace the capacitor.

Rotor Field Winding Tests

Rotor Field Winding Continuity Test



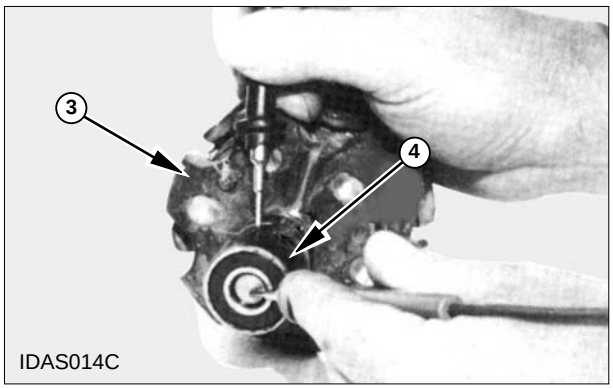
Rotor Field Winding Continuity Test
(3) Rotor. (4) Slip ring.

1. Put the multimeter on the 200 ohm resistance (Ω) scale. Touch the meter leads to each slip ring (4) on rotor (3) as shown.

2. The resistance values should be as follows. See specifications for the K1, 12V alternators.
8C5535, Alternators ..... 3.4 to 3.7 ohms

3. If the resistance is not correct, the rotor is open or shorted and must be replaced.

Rotor Field Winding Ground Test



Rotor Field Winding Ground Test
(3) Rotor. (4) Slip ring.

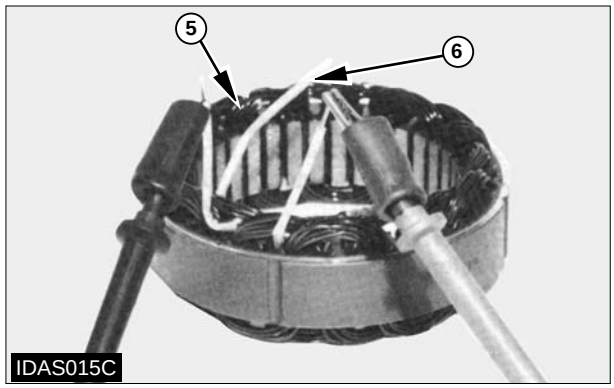
1. Put the multimeter on the 20M resistance (Ω) scale. Touch the meter leads between each slip ring (4) and the rotor shaft.

2. Both readings should be 100,000 ohms or greater (meter reading 0.10 or greater).

3. If the meter reading is low, the rotor is grounded and must be replaced.

Stator Tests

Stator Winding Continuity Test



Stator Winding Continuity Test
(5) Stator. (6) Stator leads.

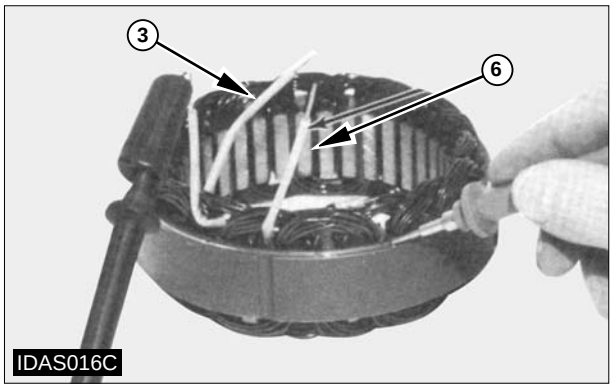
Tools Needed	
Ohmmeter capable of measuring less than 0.1 ohms.	1

1. Put the multimeter on the 200 ohm resistance (Ω) scale. Connect the meter leads between each pair of stator leads (6) of stator (5) for a total of three readings.

2. The resistance values should be as follows. See Specifications for the K1, 12V alternators
8C5535 Alternators ..... 14 to 15 ohms

3. If the resistance is not correct, the stator is open or shorted and must be replaced.

Stator Winding Ground Test



Stator Winding Ground Test
(5) Stator. (6) Stator leads.

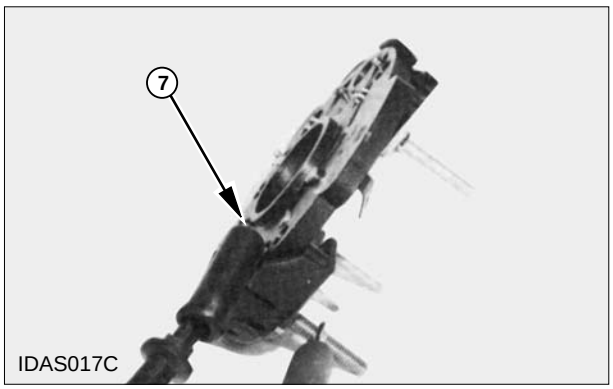
1. Put the multimeter on the 20M resistance (Ω) scale. Connect one meter lead to each stator lead (6) and touch the other meter lead to the stator frame.

2. The resistance value should be 100 000 ohms or greater (meter reading 0.10 or greater).

3. If the meter reading is low, the stator is grounded and must be replaced.

Rectifier Tests

Positive Diode Check



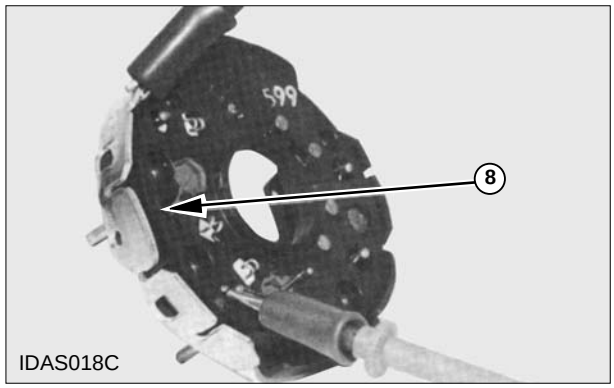
Positive Diode Check
(7) Positive (+) diode.

1. Put the multimeter on the diode scale. Connect the meter leads between each positive (+) diode (7) and the B+ stud. The positive diodes are black.

2. Note the meter reading and reverse the meter leads.

3. One reading should be OL and the other .4 to .9 volts. If both readings are OL or low (0 to .1 volts), the diode is open or shorted and the rectifier must be replaced.

Negative Diode Check



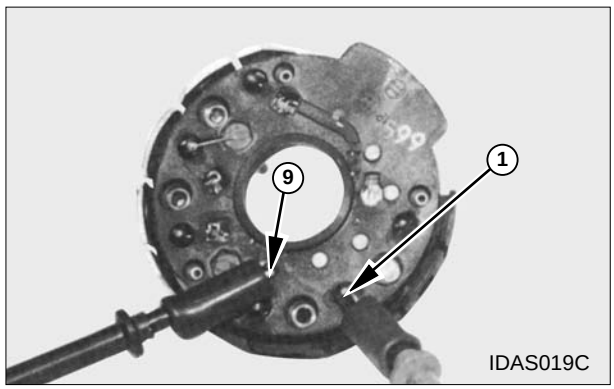
Negative Diode Check
(8) Negative (-) diode.

1. Put the multimeter on the diode scale. Connect the meter leads between each negative (-) diode (8) and the surface of the rectifier that is not painted. The negative diodes are silver.

2. Note the meter reading and reverse the meter leads.

3. One reading should be OL and the other .4 to .9 volts. If both readings are OL or low (0 to .1 volts), the diode is open or shorted and the rectifier must be replaced.

Exciter Diode Check



Exciter Diode Check
(7) Positive (+) diode. (9) Exciter diodes connection.

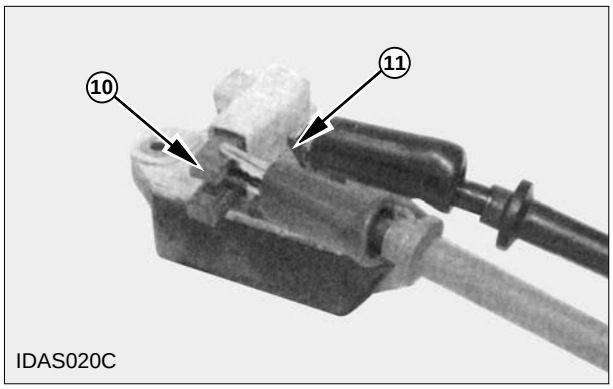
1. Put the multimeter on the diode scale. Connect the meter leads between exciter diodes connection (9) and each positive (+) diode (7) (three of them).

2. Note the meter reading and reverse the meter leads.

3. One reading should be OL and the other .4 to .9 volts. If both readings are OL or low (0 to .1 volts), the exciter diode is open or shorted and the rectifier must be replaced.

Brush Tests

Brush Continuity Test

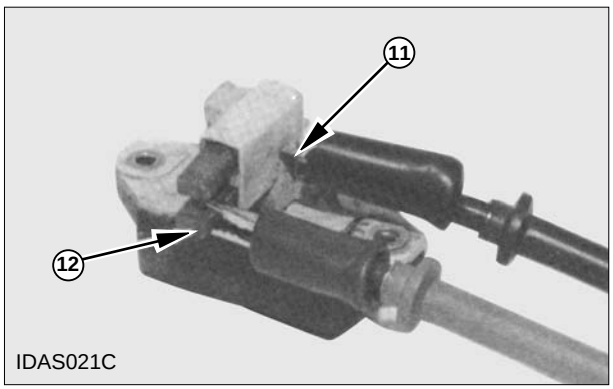


Brush Continuity Test
(10) Positive (+) brush. (11) Terminal.

1. Put the multimeter on the 200 ohm resistance (Ω) scale. Touch the meter leads between positive (+) brush (10) and terminal (11).

2. The meter reading should be .1 to .3 ohms. If the resistance is not correct, the positive (+) brush is open or shorted and the brushes must be replaced.

Brush Ground Test

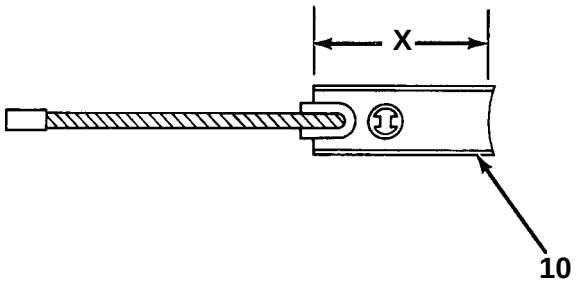


Brush Ground Test
(11) Terminal. (12) Negative (-) brush.

1. Put the multimeter on the 20M resistance (Ω) scale. Touch the meter leads between negative (-) brush (12) and terminal (11).

2. The meter reading should be 100,000 ohms or greater (meter reading 0.10 or greater). If the resistance is low, the brush is grounded and the brushes must be replaced.

Brush Length Check



Brush Length Check
(10) Brush. (X) Brush length.

1. Measure the length of brushes (10) on the longest side. Brush length (X) should be as follows.

New length:
K1, 12V alternators ....17.0 mm (.67 in)

Minimum length:
K1, 12V alternators .....11.5 mm (.45 in)

2. If the brushes are worn near or below the minimum length, replace them.

Disassembly and Assembly

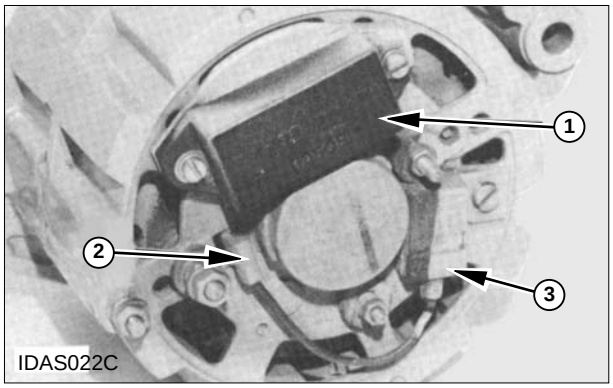
Alternator

NOTE: The disassembly and assembly that follows is of a K1, 12V alternator. The other alternators are similar.

Disassemble Alternator

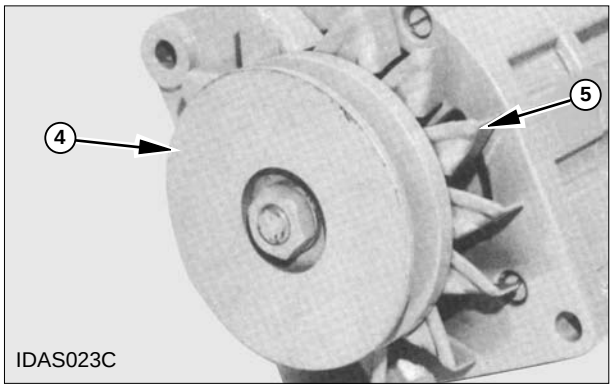
Start By:

a. remove alternator

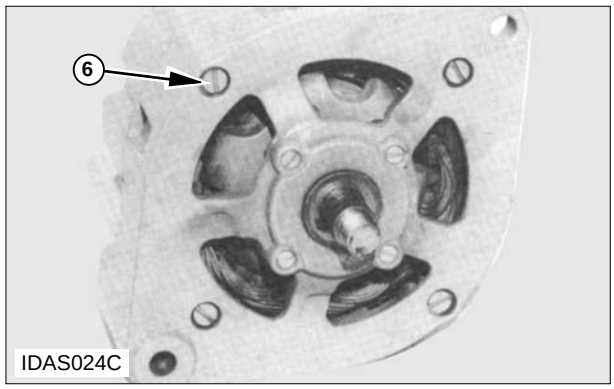


1. Remove the two screws and regulator (1).

2. Disconnect capacitor lead (2) from the back of the alternator. Remove the screw and capacitor (3).

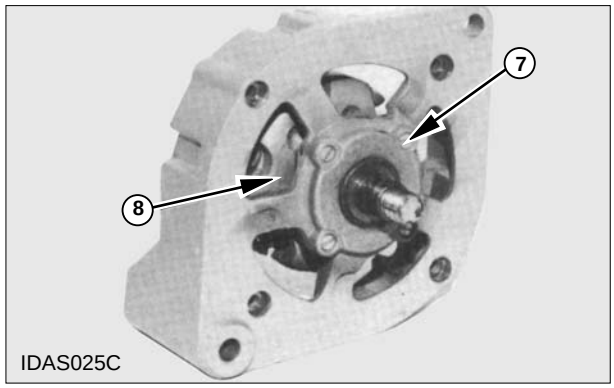


3. Remove the pulley nut, washer, pulley (4), fan (5) and the key from the rotor shaft.

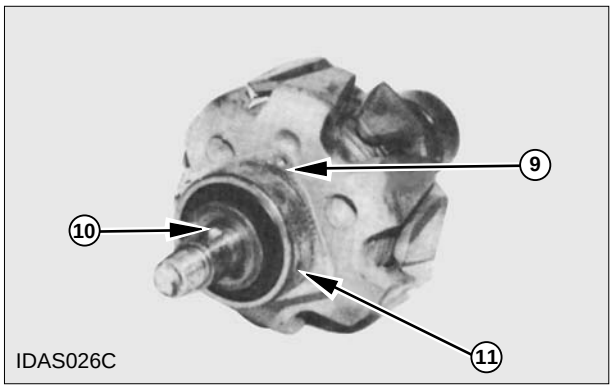


4. Mark the front and rear frame assemblies for proper assembly. Remove four screws (6) (one has a nut on it on the back of the alternator).

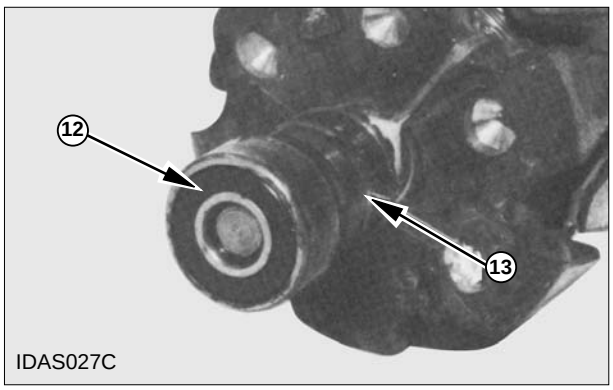
5. Separate the front frame and rotor assembly from the rear frame and stator assembly. Watch for the wave washer, at the back of the rear frame assembly, to fall out.



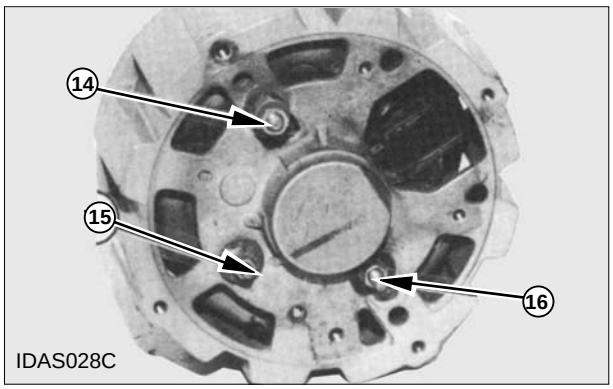
6. Remove four screws (7) and rotor (8) from the front frame.



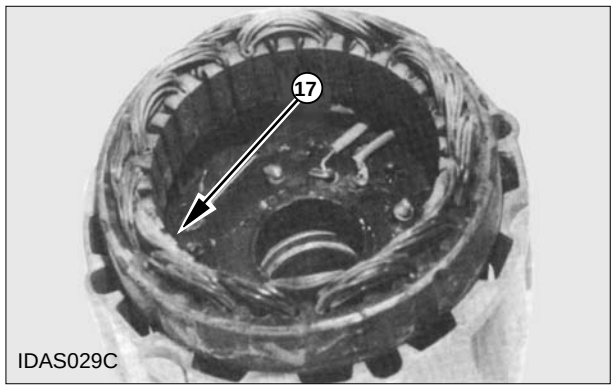
7. Remove spacer (10) and front bearing (11), with a suitable puller. Remove bearing cover (9) from the rotor.



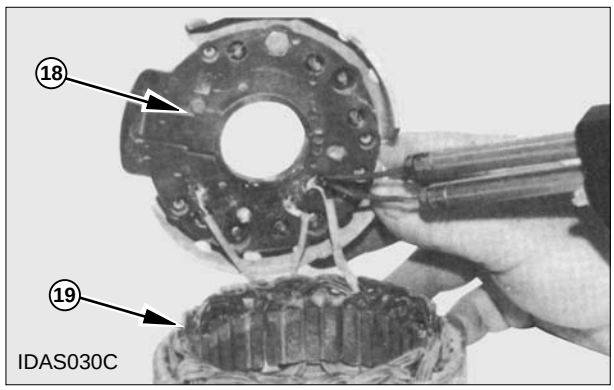
8. Remove rear bearing (12) with a suitable puller. Unsolder both rotor winding leads from slip ring (13). Remove slip ring (13) with a suitable puller.



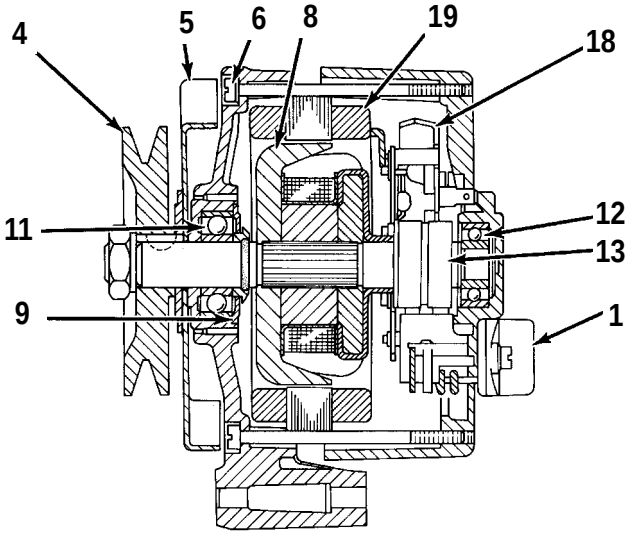
9. Remove terminal nuts (14), (15) and (16). Remove all of the washers and insulators.



10. Remove three screws (17). Remove the stator and rectifier assembly from the rear frame. Remove the remaining insulators from the terminal studs.



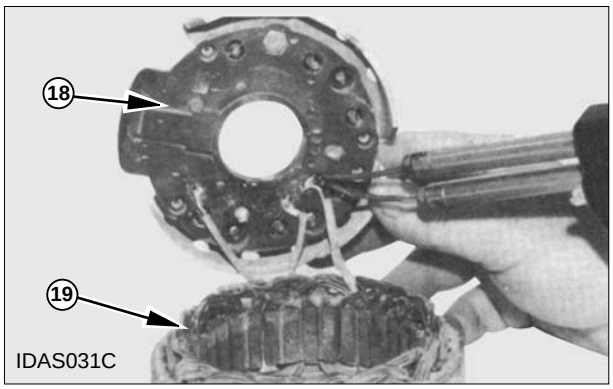
11. Unsolder the three stator leads and separate rectifier (18) from stator (19).



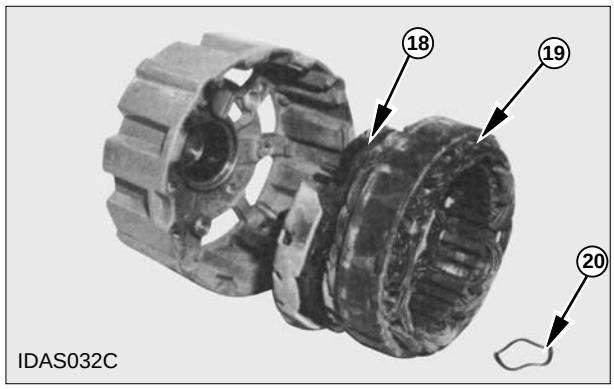
IDAS034B

K1 Alternator
(1) Regulator. (4) Pulley. (5) Fan. (6) Screws. (8) Rotor.
(9) Bearing cover. (11) Front bearing. (12) Rear bearing.
(13) Slip ring. (18) Rectifier. (19) Stator.

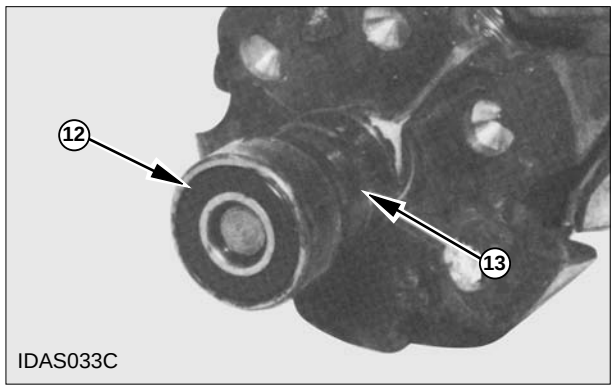
Assemble Alternator



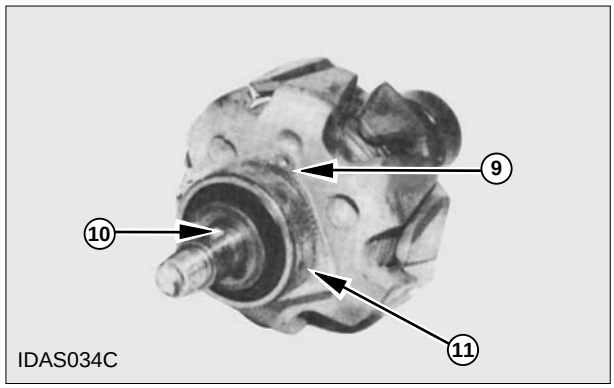
1. Connect and solder stator (19) leads to the positive (+) diodes of rectifier (18).



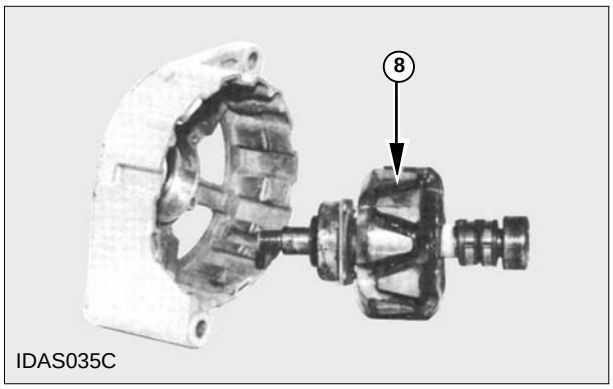
2. Position the insulators on the rectifier terminal studs. Position rectifier (18) and stator (19) into the rear frame, and install the three screws. Install the terminal insulators, washers and nuts. Position wave washer (20) into the bearing bore of the rear frame.



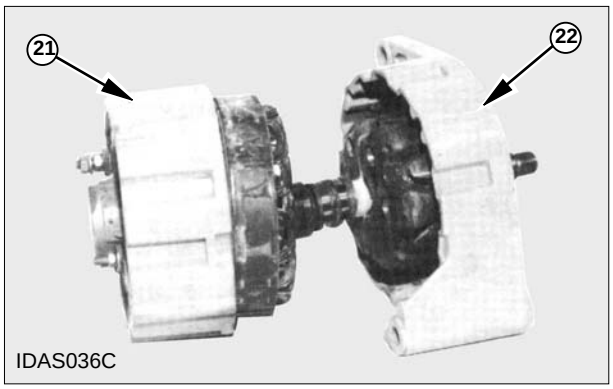
3. Install slip ring (13) on the rotor. Connect and solder the rotor leads to the slip ring. Install rear bearing (12).



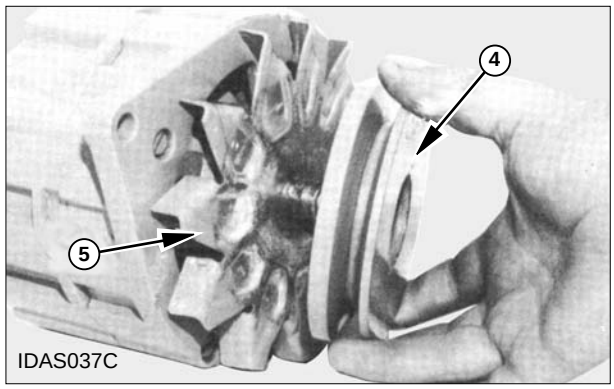
4. Install bearing cover (9), front bearing (11), and spacer (10) on the rotor.



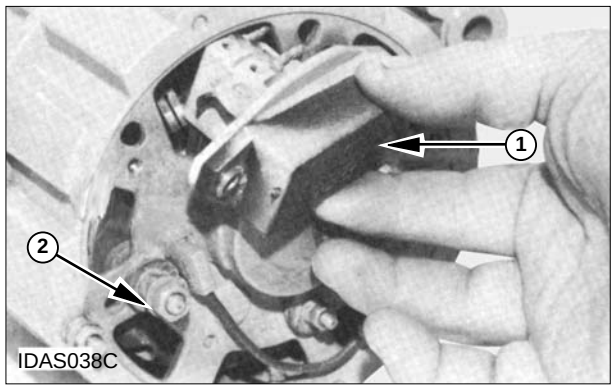
5. Install rotor (8) and the four screws into the front frame.



6. Assemble front frame and rotor assembly (22) into rear frame and stator assembly (21). Make sure the wave washer is in the rear frame bearing bore. Align the front and rear frame marks made at disassembly for correct assembly.
Install the four screws.



7. Install the key, fan (5), pulley (4), washer and pulley nut.



8. Install the capacitor and connect capacitor lead (2) to the back of the alternator.

9. Install regulator (1).

End By:

a. install alternator