

8.2. FUNCTION OF COMPONENTS CHARGING CIRCUIT

Electrical malfunctions are expressed in the often in such a way that the battery often "empty". There may several re giving reasons. At first base, the battery is quite old and has be replaced, I do not want to continue . enter If, when standing The motor vehicle light switches, and it after a minute or two already marked- Lich is darker, should a new Buy battery.

That the battery is not correctly loaded the will, but there are two reasons:

There are too many consumers there, the Battery is discharged, which means that the battery if higher current is removed, as deliver him to the "light engine" in the Situation is.

According to our factory specification provides light-machine a current of 11 amps at a voltage of 14 volts at 2000 U / min of the engine. 14 volts are necessary necessary, since the charging voltage is slightly higher must exceed the battery voltage. 55/60 watt H4 bulb through a flows in the headlights turned on- a stream of running lights 55 watts - divided by 12 volts equal 4.6 amps. Added back light, Ignition, turn signals with two times 21 watts (Equivalent to 3.5 amps) and brake light

again with 21 watts. So if in an- NEM motorcycle that much traffic in the city moving with stop-and-go traffic, the battery is often empty, so is this not a defect but is due to the "light engine" of the XS 650 with the Requirements of today's road traffic traffic is simply overwhelmed.

In the seventies it was the pros-written yet, during the day with built-in to go off beam, and H4 was light was also not standard, but with 40/45 watt bulbs for High and low beams.

The question of the not yet 100-watt incandescent unnecessary legal thus certainly.

Old wiring harnesses tend that the Insulation becomes brittle, especially when wet can be very small short-circuit currents, which flow to secure not to "burn out" position, but the battery is discharged with the time.

Can the previously mentioned Green-de for a common "low battery" out-close, so you should use the Error the components of the "charging circuit" . looking To examine the components useful-to Fen, one should be with their Function deal.

8.2.1 THE LIGHT MACHINE

First, a few physical Grundlagen:

If one applies an electrical conductor a voltage (battery) and brings him in a magnetic field (horseshoe magnet, Fig 8-8), so he must be a certain force to hold power, or he moves out from the magnetic field (the principle the electric motor). If an electrical shear head (a piece of copper wire) a certain force through a magnetic field (horseshoe magnet) is moved, flowing him in a stream (the principle of "light-machine").

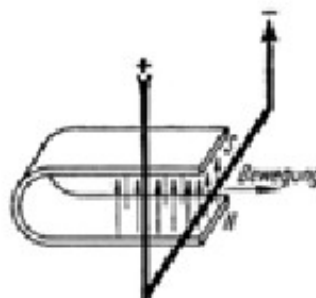


Figure 8-8: Induction

Head, but several conductor loops a "Coil" by the magnetic field move. The claim that arises, however, always a roller-current, in Figure 8-9 as the clarified-light, as more loops in the wire Magnetic field inside and out again be moved.

The current direction changes, depending on whether on whether the conductor in the magnetic field moves in or out. Natural Licht can not only be a single

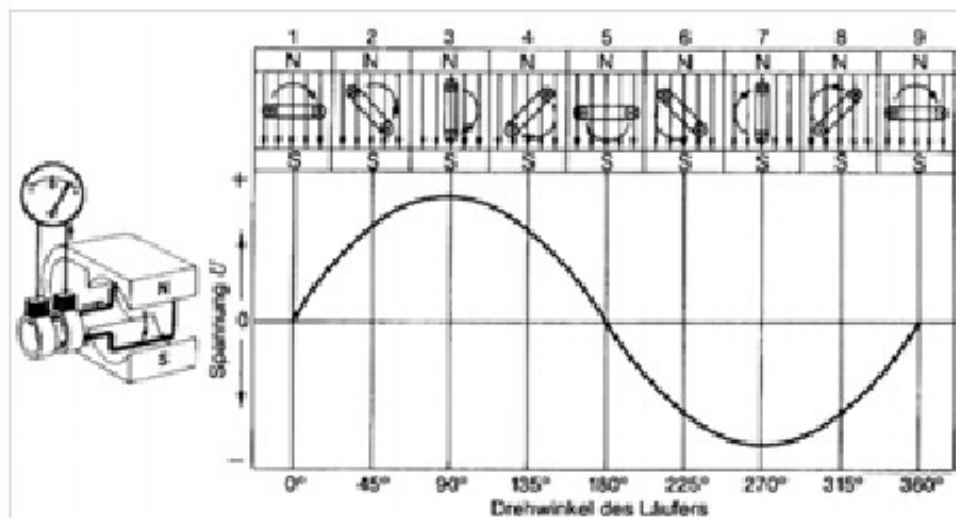


Figure 8-9: Induction (Source: Bosch)

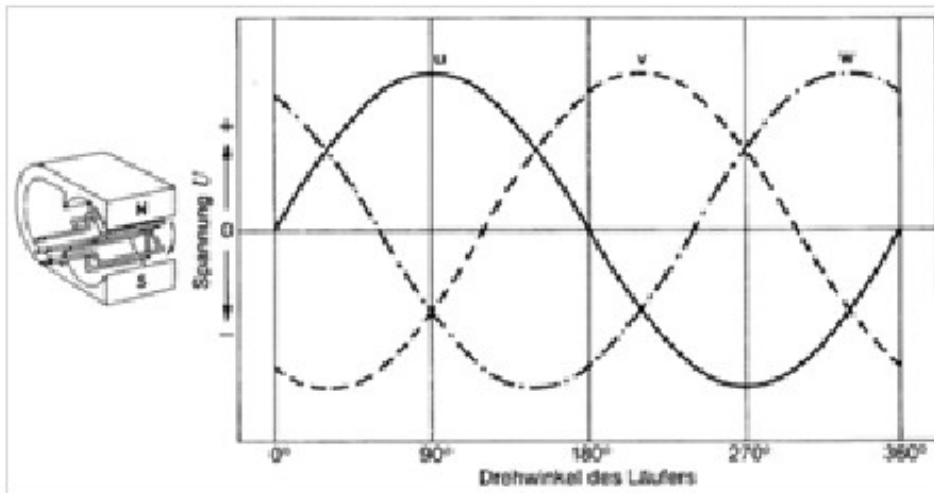


Figure 8-10: Induction (Source: Bosch)

If one moves through the magnetic field does of course not in a motorcycle GE a single winding, but three, the offset by 120° to each other- are arranged so that the Wirkprinzip of the three-phase alternator. At the "light engine" of the XS are 650 the ends of the three windings (coils) brought together and each other re side of the windings to the outside out. (The three white cables from the "Dynamo" come out).

The "light engine" as it relates to the left crankshaft stump-being det, consists of two components, ie, the Windings or coils, which are characterized by a magnetic field to move, and the construction part that generates the magnetic field.

A very simple "light machine" a bicycle dynamo. This rotates in Permanent magnet inside a coil. If you drive faster, the light-hel LER, you drive slower, it is dark-LER. Such a performance may be

need, the light must always be equal be bright, no matter whether you fast or long-sam goes, you want to by the other road users seen be. So, one needs a mag-magnetic field, that changed in intensity can countries.

The generator of the XS 650 is the Principle, a bicycle dynamo very like. The magnetic field generating Component rotates while the component in which the current due to the magnetic flow field is stationary. To which dre-is stationary component of the current necessary supply, is yet another component necessary, the carbon brushes.

Figure 8-11 shows the "light engine" of the XS 650 left after lifting Motor cover. In the manuals and Repair manuals, the component an alternator, which in operation stands still, so connected with the housing

the, than the "stand" refers to the Component, which rotates as the "lautre" for "or" rotor ". From these designations calculations is still not clear which Component has the function, the function- on to generate the magnetic field or, the electricity to charge the battery and

to produce for consumers. Ob- well I for these designations do not think very aptly, I will in the following descriptions use to those already in the workshop read manual on electrical have not to confuse.

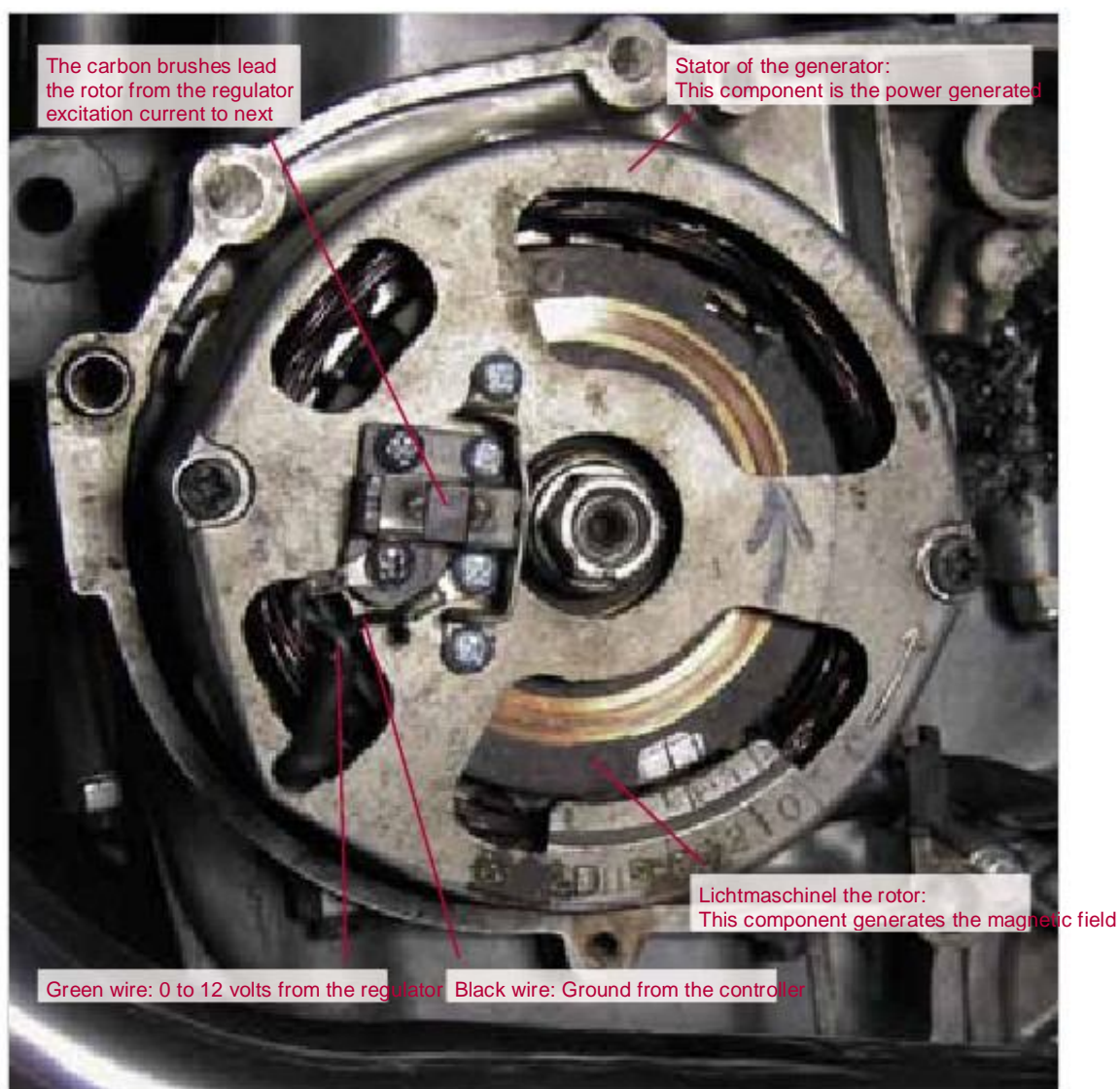
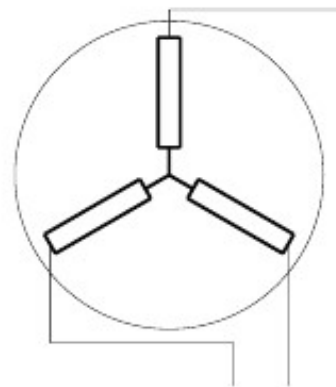


Figure 8-11: Alternator

8.2.2 THE STAND

Right is the circuit symbol for the Stand shown how to do it on the Schematics in the Workshop Manual is. The three at an angle of 120° rectangles arranged symbolisieren the three windings, the three-phase alternating current (AC) . produce On one side of the Wickments in each merged, the other side is brought out. These are the three white lines, the one for the motor connector is.



3 white lines

Additional information is found in the case of Still stand the brushes, the Connection to the rotor manufacture. With otherwise the stand they have actually nothing to do.

Since nothing is moving on the stand mechanical damage, except perhaps by vibration, this rather rare. If a stand has to be replaced it is because one or more windings gene "burned out" are.

A "blown" fuse tion can think of something for everyone. Since then, the thin wire, and it with today Flachsicherun- tween the two tabs is, become red-hot and the liquid metal of the wire is down dropwise. The connection between the Tabs is interrupted.

When one thinks of a winding with "Burn out" is different. In a SINGLE conductor loop is only one very small voltage induced. At a sufficiently high voltage to he- , one must keep multiple conductor loop Fen move through the magnetic field. As- with you the possible conductor loops can put together closely, used an insulating one, around which other contact conductor loops from each other the disconnect. The windings too hot, then the insulating-melting zen and the conductor loops have direct direct contact with each other. In such an- Ner contact point of the current does not flow through the loop takes longer but the shorter route through the contact points le. The resistance of the winding is so smaller, because the current from a End to the other a shorter path must travel. A winding is

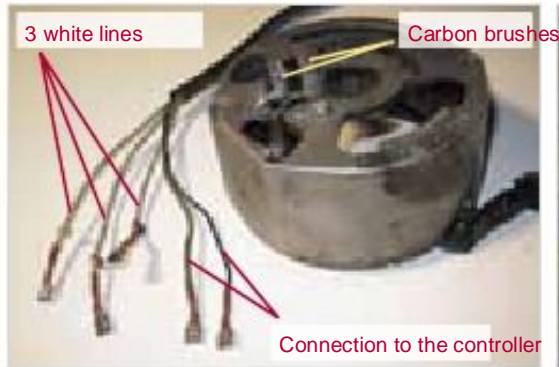


Figure 8-12: Stand outside

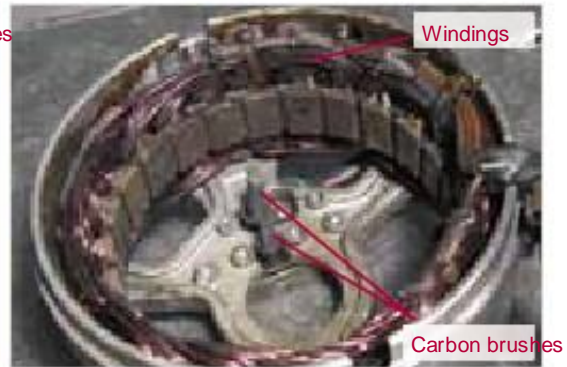
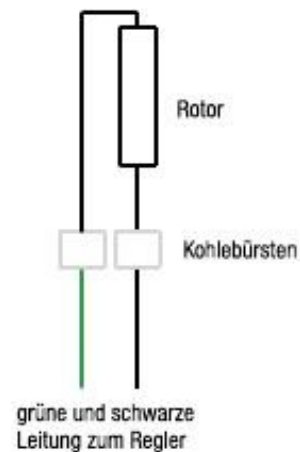


Figure 8-13: Stand inside

thus not immediately unusable, they can But after their performance.

The wire of the windings of the stator as measured on the an-Insulated NEN diameter of about 1 mm. This representing a cross section of about 0.75 mm^2 . According to Workshop Manual is the white between two cables measured resistance is about 0.8 to 1 Ohms. With a specific Resistance of 0.0185 ohms of copper mm^2 / m corresponds to 1 ohm resistor a line length of about 40 m, the the current from one end to the other must flow through. If we measure here a- NEN lower resistance, this means this, that the current lower Path must travel. More on this in Section 8.3, check the electrical system.

Winding of the rotor is the same as the stand of copper wire, which is provided with an insulating varnish. Has such a coil winding or na- of course not the only one with Ohm measurable resistance meter, but and an inductance - it should become a Ma- magnetic field are constructed. The term Inductance would explain this to wide lead. The correct symbols



8.2.3 THE ROTOR

The rotor consists of a winding, the ends of the slip rings to- are accessible. The circuit diagram of the rotor is a rectangle, which in the electrical technology represents a resistor. The

for a winding or coil, which in- ner and an ohmic resistance has a filled rectangle. I have here both for the windings of the

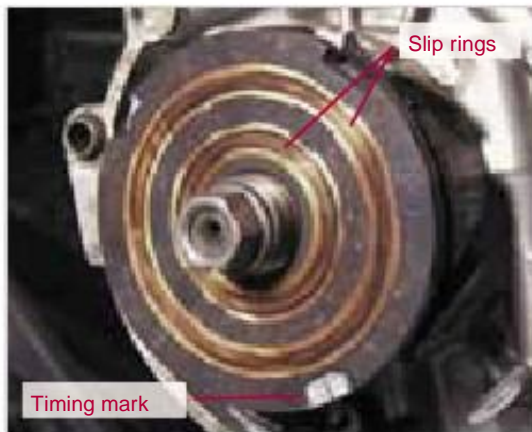


Figure 8-14: Rotor

Stator and rotor of a non-filled rectangle used to same chemical symbols in the manual to different . contact On the face of the rotor There is also the timing mark, but not with its function in to do the "light engine" has. At the The XS 650 rotor similar to Figure 8 - 15 the course of the field lines of the Magnetic field represented by arrows. One provides that the arrows in different Direction for installation.



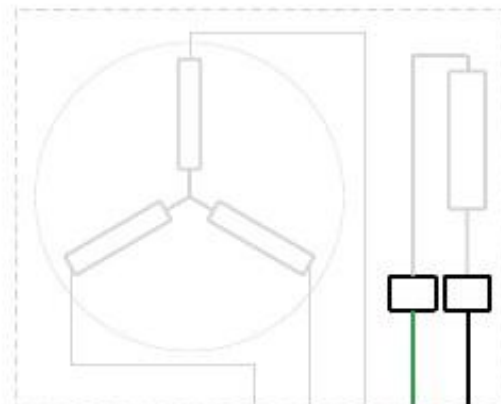
Figure 8-15: Rotor (Source: Bosch)

You can brush the coal from the Yamaha-dealer or purchased ready to Holder and the spring re-use. The graphite with the recessed portion Wire can be significantly less at parts-be procured dealers.

Carbon brushes are wear parts, which worn out after about 10,000 km, i.e. so briefly are that the pressure force of the Fe-no longer sufficient to ensure safe Cheren flow of current to the slip rings the rotor to ensure.

8.2.4 THE BRUSH

The brushes are graphite pencils with a length of 15 mm in new condition and a cross section of 4.5 x 5 mm and a copper-inlaid bel. Task of the brushes is the Excitation current to the rotating Transferred to the rotor. Figure 8-16 shows a carbon brush in new condition, a already used with soldered Hal-ter and a worn.



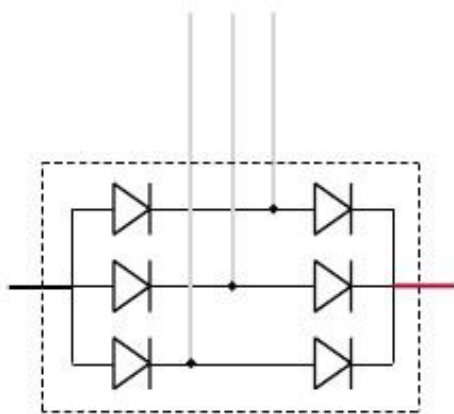
Carbon brushes



Figure 8-16: Carbon brushes

8.2.5 THE RECTIFIER

The "light engine" consisting of rotor and can stand from the outset



reasons described only change power supply that continuously its direction changes. With alternating current can be but can not load the battery, so This must be rectified. So

as non-return valve for liquids tile is that the liquid only in a Direction to pass through, there is the Power diodes, which it only in one direction allow the adhesive to flow and in the other Towards lock. Since our alternator machine has three windings, the with the three white lines out-out are three currents must also be rectified.

The picture left shows the switching times Chen of the rectifier, as seen in the diagrams found on 8-17 the standard rectifier, as he installed underneath the battery. Figure 8-19 shows a low-cost alternative to the right with attached heat sink, these are e.g. refer to Conrad electronics.

The circuit symbol shows the radiation as well. To make it even more To illustrate, I have six di-, oden as I also stand for the light-pear used in the headlights I (Chapter 8.1.1), a DC-assembled judges.

In Figure 8-18 are the three white-Lei obligations to see how they made the light-machine coming, the Red, which the ignition switch and battery plus pin sets and the blacks, by the Batterieminuspol comes. The currents in the three white lines of the windings change any settings depending on the rotation of the stand-number of the engine towards its more or less quickly. You will then either of the diodes in the "forward" branch

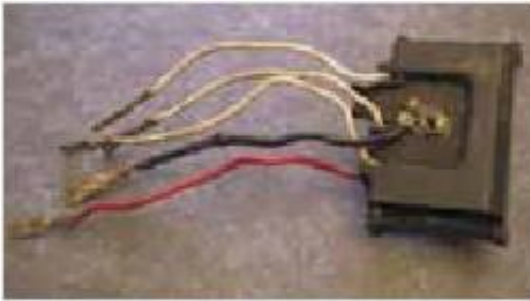


Figure 8-17: Rectifier

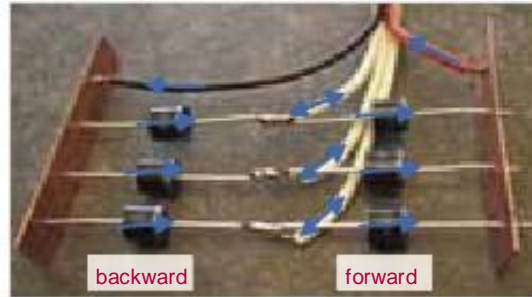


Figure 8-18: homemade rectifier

in the red wire passed through, or of the diode in "reverse" branch locked out. Flow through the red wire They then combined to consumers and from there through the black wire and the diode in "reverse" branch to

8.2.6 THE GOVERNOR

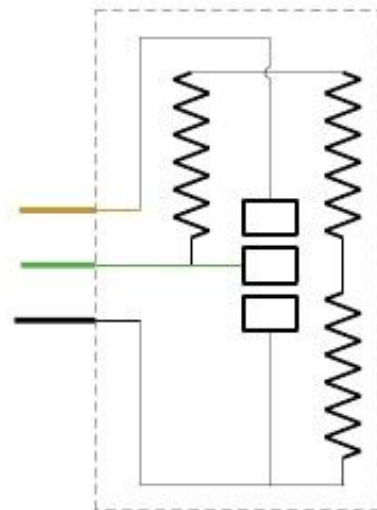


Figure 8-19: Rectifier from Conrad electronics

the windings in the stator back, where- with the circuit is closed. A Such a rectifier is still some bil- liger than that of Conrad and electronics electrically fully functional. But whether he is also in a position with the mechanical between loads during driving fer- TIG to be, I doubt it, But in an emergency is something some time . work

Just as with the speed of the Mon- tors not only the current direction in the Windings of the stand more or- niger can change rapidly, so does the Voltage with a higher engine speed to. To charge the battery you need but a nearly constant voltage tion, which some of the rated voltage the battery of 12 volts. Also The lighting needs a constant Voltage of 12 volts. For the reminder tion once the operation the generator: About the carbon brush-



Figure 8-20: Regulators closed

th and runs through the slip rings
The rotor winding, a current of one
Magnetic field generated. In the rotating
Magnetic field are the windings
gene of the stand, in which one, with
changing the motor speed, voltage
is induced. This voltage depends
But not only by the engine speed,
but also on the strength of the magnetic
from magnetic fields, from which by the ro-
tor flowing current is generated. The
Current flowing through the rotor - and
therefore the strength of the magnetic field - can
be
sen slightly influenced by the voltage
formance of which is applied to the carbon
brushes.
The task of the regulator is the voltage
to automatically activate the voltage of the
Stator windings of about 14 volts.

This is the voltage needed to load an-
Ner 12 volt battery is required.

Figure 8-20 shows the still closed
Regulator as under the left side
cover is installed. On the brown
Cable is the voltage on board - will
this is too small, such as Mo-standing
tor, then here is the battery voltage
at. Then at the green wire, the same
surface, at which time the highest, different-
availability of power in the electrical system in.
Shall

Now the engine started, and increases
themselves with an increasing engine speed, the
Board voltage, the voltage,
present at the green wire, reduced
, otherwise the board will voltage
too high. Thus, the alternator
overloaded, the battery may begin
to cook and the bulbs of the Be-
lighting to burn.

To the voltage at the green wire
applied, and the height of their strength
the magnetic field generated by the rotor
depends, to reduce, the green
Cable is no longer directly connected to the board-
network connected, but there are Wi-
resistors connected in between.

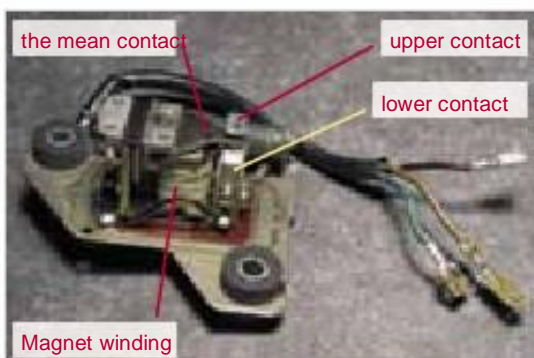


Figure 8-21: Regulator open

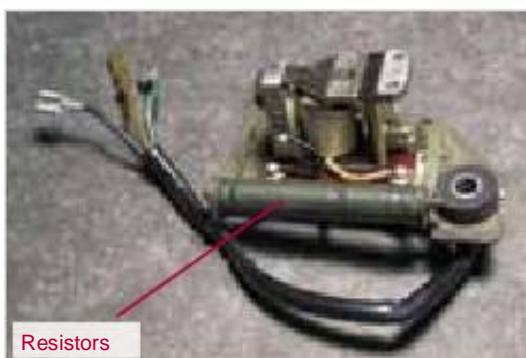


Figure 8-22: Regulator open

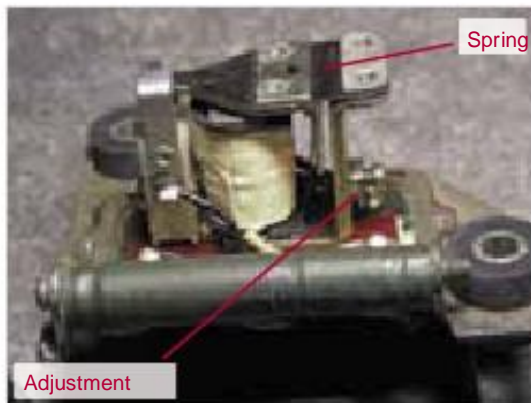


Figure 8-23: Regulators opened (details)

On the images of 8-21 and 8-22 Controller with the cover removed to see. As the diagram of the controller to see is the brown wire with the upper contact with the green center contact and the black-Kabel (mass) with the lower contact connected. In addition is the brown Cable to the solenoid coil. Is the Board voltage low, the middle-re contact by a spring against the the top down. The brown and the So green cable have direct connection. When voltage becomes greater board tion is of course the magnetic stronger and the magnetic field pulls the away from the upper middle contact. So- The average contact time between the other two is, the flows Electricity from the brown wire through the Resistance and the green wire to the rotor winding. Because the current only must pass through the resistance, the Voltage to the rotor winding natural as low as possible, which is a weaker magnetic field effects. Increases the on-board voltage continues to rise, the magnet attracts the regulator

affiliated with the green wire against the average contact with the black wires connected to the lower Contact. Now, both ends of the rotorwicklung to ground and there is no Magnetic field more. The on-board voltage drops out now and thus the voltage in the magnet coil in the controller. The Spring is now the center contact move away from the lower back, so that a power back from the brown wire through the resistor to the green-Kabel can flow. Now is built around the A magnetic field and rotor again is again in the stator windings induces a voltage. If the board-tension still remains off because decreases, for example, the engine speed or a consumer is connected, then the attraction of the magnet th low and the spring pushes the middle upper to the contact, so that now back to the rotor winding the highest at this time avail-higher voltage is applied.

This game is repeated in fracture share of a second. It is clear that the attraction of the magnet in the controller, restoring force of the spring and the resistance in each controller must be coordinated. The preload tion of the spring can be with the set-up screw change.

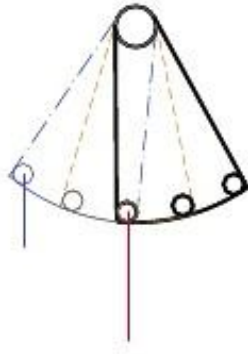
Since the winding of the magnet and currents flowing through the resistor values are calculated, these warm during operation.

When modifications one should always make sure that the regulator, as there

applies to all electrical components, enough
Receives cooling air. Of the known to-
accessory dealers are now one-
reliable electronic voltage regulator
offered learning.

8.2.7 THE IGNITION SWITCH

The ignition switch should be possible to
short way connected with the battery
be the. It is on one side
ensure that the vehicle does not
can be used without authorization, on the



other hand, it is the entire board-
network separate from the battery when
the vehicle is not used. When
you forget to turn off the light so
after some time is the worst
Battery empty. If you forget the ignition
turn, will flow through one of the
two coils, a current of the
Battery discharges and the ignition coil
can be warm, to break through what-
NEN can lead from windings. The
same applies to the magnetic coil in the
Knob.

If the harness older, mostly
the insulation brittle and it can
formed by moisture leakage,
the battery when the vehicle
unload. Such leakage should
at least when the vehicle
can not flow by the ignition
shut the battery from the vehicle's electrical
system

is separated. I have, therefore, the ignition
mounted directly under the battery and
thus a potential site for creep
currents, the cables in the area of the steering
head, turned off.

When ignition switch, a simple
Key switch in which one of the
Key in the off state
can pull off (which requires the law-
employer). It is advantageous if the ignition
has completed at least three positions:
In the first, it disconnects the battery from
Wiring: The ignition key can be completed
be covered. Have all in the second
Consumers and regulators to the
Driving voltage lighting. This will accommodate
Start the engine. Once the motor is connected
is skipped, you can with the second
Position of the headlights on. At the
Three ignition cable is present,
a red as input from the battery,
switched to a brown Plus (position
1) and a blue one for the driving lights (position
ment 2) In position 2, the red wire
Passage to the brown and the
blue cable, only one in the position to
brown. The original ignition switch has
a fourth position with a fourth
Cable, but which is not used here.

8.3 Testing OF COMPONENTS CHARGING CIRCUIT

If a vehicle's battery often empty is, there are three reasons: the Firstly, I will not comment further: the battery has with increasing age to replace lost capacity and should be.

lies in the power supply. The search requires leakage to more profit patience and intuition, since the leakage current not always occur must, but e.g. only at a certain steering angle impact or when wet.

Then there are two other reasons:

The battery is removed more power supplies as the alternator.

The additional loads such as Be heated grips, with the alternator machinery of modern motorcycles, their Capacity between 300 and 700 watts are to be completed. The alternator The XS 650 with only 168 watts nominal power processing but is so overwhelmed. By-scrubbed insulation of cables can wet-leakage current approvals sen, which still have no short-circuit different , so the causes of the fuse-that can burn but the battery additional burden and driving La-destrom cost.

8.3.1 REQUIRED METERS

To the electrical system of a vehicle on error learning, one needs to check in each Measuring case. Previously, there were special Gauges for the automotive sector in Ver- and sand-houses Autozubehörhan to buy del. Once the electrical Systems of cars today far complicated or liabilities and less prone gewor-the are, these devices are now hardly available.

The final reason for a frequently empty battery is that the alternator is easy does not provide as much electricity as actual Lich should, if all components in order would.

There are now quite inexpensive In many cases, to buy gauges that many-les can see what we have for the vehicle-lektrik not need, but some- ges on to what is for maintenance of automotive electrical systems really does not need can. Because these devices are very cheap, one can safely assume in the purchase. The device on the Figure 8-24 have I bought at Aldi for €3.99 and it basically has everything we need.

In the search for faulty components can be quite a systematic approach and is then sure, you should al-les are properly tested, not the fault



Figure 8-24: A multimeter (voltmeter, ohmmeter)

Such a device should in any case in be capable of voltages up to 20 volts, an-reasonably accurate measure niger, i.e. one Have measuring range of 0 to 20 volts. At the resistance of the windings Rotor and stator, and the resistance measure the system's controller may need one one-ohm range, the so-small as possible. The nominal value of Stator windings is 0.8 to 1 ohm. With a measuring range from 0 to 200 ohms, as it has the gauge Aldi, is

Such a measurement quite unusual-exactly, but more expensive instruments by Conrad for example, have no small neren range.

To detect leakage, ranging However, this is not enough. The measur-advises on Figure 8-25 there is here in the GE-showed simplest form for about € 10 to buy in stores. It has an internal battery and can be lines to check for continuity. If the conductors between the test probes ze and the alligator clip to the current from the built-in battery through so hear a beep sound and the green LED lights up when you presses the red button.

The device shows very sensitive. At disconnected battery should be between the connecting lines do not pass be detectable if all consumers are turned off. Nevertheless, said the Device here sometimes, although not Error was seen on the one Indicating leakage.

8.3.2 TEST Leakage



Figure 8-25: Continuity tester

There are hints in many publications, how leakage currents which, in operation and when the vehicle battery discharged slowly tracking can. I do not want to go too far out because this is a description of the construction parts of electrical equipment and a guide to Review of the components of the charging current

circuit should be. A description of all Opportunities to the leakage may result would be here with security unit too large. In order to find to be reasonably successful, it should you simply hold to the fact- th that a leakage current is a current the bypassing of the actual Consumer or the battery positive, from the fuse box or switch to Mass flows and is so small that the fuse does not respond. In this Circuit must be switched off Consumers a "pass" ascertainable be, or a resistance that is less than "Infinite" - for "infinite" indicates nothing on the meter, or, in a analog meter is, the pointer on End of the scale. The smaller the resistance, the greater the current flowing there- and insert the battery is discharged.

In order to find, such a "leak" to, you can first, the only assurance tion or the fuses of each Consumers through an annealing lamp (start with 21 watts) . replace Glows in this off consumers / Consumers, it is in this district a place where a small stream at the Consumers over the mass can flow. The search is effectively if the Ver- consumers, as mentioned be- wrote individually fused has. Next, you build the battery, and includes

instead of a battery or ohmmeter a continuity tester on. This is- te is sometimes the handlebars back and forth move because cable like in the area of Steering head and then rub through only at certain steering angles of Rest mass.

8.3.3 VERIFICATION OF CHARGING CIRCUIT

As mentioned in Section 8.2 above, provides our generator at 2000 r / min 14 Volts as specified in the workshop manual. At lower speeds, idling at 1200 to 1500 rev / min, it delivers less ger. Therefore, the light is traveling at idle darker than at engine speeds, the higher ago as 2000 rev / min are. The simplest Test, therefore, is with the headlight fer to illuminate a wall and the gas a little turn up. The light must here are brighter. If it does not,



Figure 8-26: Examination of the charging current

in the charging circuit is not something in-order-
 tion and one must expect to
 the next trip with an empty battery
 remain to be. You could take this well
 in the "stop-and-go" traffic in the city,
 yes more often consumed in the current
 , will deliver as the alternator can
 . watch The light shines on its own
 the rear of the standing before an au-
 tos. If you approach, the motor turns
 min usually above 2000 U / and the light
 will be brighter. Even more effective is of course
 one in the cockpit built-in voltmeter,
 on the basis of one of the displayed
 Voltage always has to check whether
 the battery is charged or not. But
 Many instruments are certainly not
 for everyone. Who is in Chapter
 8.2 on the first function of the components
 the charging circuit has informed the
 know that the alternator to generate electricity
 to produce electricity first
 needs. When the engine is
 this from the battery. The nominal voltage
 the battery voltage is so high that when they
 low speeds, the alternator
 if energized to its rated voltage
 of 14 volts at 2000 rev / min to deliver.

First you should check that this voltage
 tion even at the carbon brushes in-
 is. With the standard cabling
 ling has the power from the battery via
 the steering head to the ignition switch and to
 return flow to the engine. In this way
 may lose a few tenths of volts
 go - but no more than it should be.
 So first we measure the battery voltage

tion directly to the battery terminals and
 then at the carbon brushes in Fig
 Showed 8-26. The displayed value should
 separated by no more than 0.5 volts
 are. Now, start the engine. To
 about 2000 r / min, the battery voltage
 voltage applied. If the voltage used to
 off, the battery is only at higher
 Speeds loaded. For someone who
 usually at higher speeds on country-
 roads and highways is underway
 So less of a problem. If the voltage
 tion only at higher speeds,
 the alternator is overloaded. Here
 does the interaction between
 And non-magnetic spring in the regulator. More
 See chapter 8.3.8 "Examination of the Reg-
 manufacturer ".

8.3.4 VERIFICATION OF ROTORS

The rotor is the component in the load current
 circular, which precipitates most often.
 In principle, the rotor is very easy
 to examine. The rotor consists of a
 Winding, the resistance of 5 ohms
 should be. Due to wear, i.e.
 Can "burn out" of windings
 the resistance will only be smaller, because
 then the isolation between two win-
 tions "burned out", and the
 Power on a shorter route from an-
 NEM slip ring to reach other
 can. So do you measure a higher
 Resistance than 5 ohms, so this is in
 each case, a measurement error. Can cause



Figure 8-27: Examination of the rotor

be that the slip rings are oxidized and thus represent a resistance. You will also have the measure. Therefore should the slip rings before the measurement in any case thoroughly. This can be done with an abrasive paper Of 600 grit or fine steel wool . use

To measure should be the Ständerge- Remove the housing. The ohmmeter can a current to be measured by the Resistance to flow. The current that different-simplifies coming back saying, is a Measure of the magnitude of the resistance.

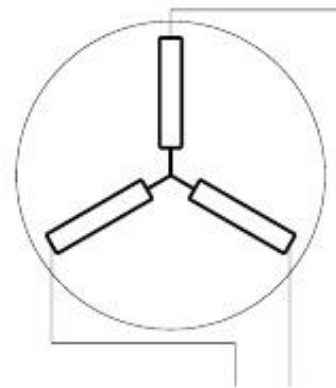
Via the carbon brushes in a Defect in the controller or in-durchgescheu AGAINST cables, a current flow, the an-NEN pretending to low resistance. Is it safe now, in the measurement al-les have to be done properly and is you have a fixed resistance, the significantly below 5 ohms is, or is it a Passage from one of the slip rings

for fixed mass, one should Replace the rotor. Between tweek a slip ring and the mass must Ohmme-ter an infinitely large Show value, i.e. a Meter is the Pointer on the right scale er, a digital instrument shows nothing. One can also one-Durchgangspü-fer as described in Section 8.3.1 be-advertised use. He may do not respond. Substitute for when it is defective rotors XS650 parts dealers.

A lower resistance than 5 Ohms means that the insulation between Some coils are blown. The remaining convolutions can no longer such a strong natural Magnetic field in the alternator on-to build as the required performance would be necessary. Compensates for the-ses only once by the fact that different-lasting a long time between turns Excitation current flows through them. The Of course it takes more than con-constructively and provided they are also warmer, which again leads to the fact that the Insulation melts (blows), and still fewer coils available are. The damage progresses to be-accelerated away and the rotor should soon be replaced.

8.3.5 THE STAND

In Figure 8-28 is the case with stand grown carbon brushes to see. The Carbon brushes make the connection by the controller to represent rotor and have with nothing to stand . do The diagram at right shows that the three windings of the stator in the co- are merged. The other Ends of the three white-cables gene accessible.



3 white lines

To check for operability the resistance between two white lines measured - as to- total of three measurements. The ohmmeter must 0.8 to 1.0 ohm . View

individual white lines and the mass one pass is available. How to that is because I'm in the examination of Rotor described.

The yellow cable (not shown here), must in any case of mains power; separates, otherwise you measure more than the resistance of the windings.

8.3.6 TEST CARBON BRUSHES

One can imagine that a sol- surface measurements with a measuring range 000-200 ohms, as it most Gauges as the smallest measuring range are not very accurate. Finally is still under consideration, whether between the one-

Task of the brushes is the Power from the controller to turn the in- transferred to the rotor. It therefore triggers the connector from the regulator - it is one sure from the on-resistance measurement set, multiple measurement device or from the continuity tester com- Mende power is really only through the brush to flow. A test tip is on a slip ring and the on the other end of the green or black cord set. The outer Slip ring belongs to the green wire (+ from the controller) and the black inner- zen cable (ground)



Figure 8-28: Stand with carbon brushes



Figure 8-29: Carbon brushes

The ohmmeter is now possible show little resistance, or the Continuity tester should address.

Is this not the case, can there-
ran lie that the brush in their
Leadership stuck, then you can be locked
seek to make them consistent - or they
is so far worn out that they no longer
rests on the slip ring. Then you have

the corresponding carbon brushes replaced
be. The left picture shows a new
Brush, with an even more useful
soldered holder and spring, and
a worn.

8.3.6.1 ORIGINAL COAL CORRECT INSTALLATION (Count by Stephan)

The correct installation of carbon saved
Anger and helps in an emergency. Here is a small
ne instructions. The original coal-who
mounted in the holder as shown in Figure 8-30
to see. The braid is around the leaf
Chen led around. This looks at the
Coal in the expired state maximum
to see as far out as in Figure 8-31.
This prevents the coal too far
comes out, jammed and ro-
tor as well as carbon holder destroyed.



Figure 8-30: Carbon brushes



Figure 8-31: Carbon brushes



Figure 8-32: Carbon brushes



Figure 8-33: Carbon brushes

8.3.6.2 BREAKDOWN RECOVERY

(Count by Stephan)

Now it is so beautiful in Sardinia Back country road, but suddenly XS begins to buck, has Zündaus-translator, is no longer around. If the Light is off, it's back.

Clear case: battery is empty, no more loaded. Now it takes only one Phillips screwdriver, a look at the Coals expired!

Now, coal is reinstalled, But the strand wrong way, as shown in Figure To see 8-32. This extends the coal about 2mm further out, good to see the comparison between Figure 8-31 and 8-33, which is good for about 5000 km and enough for a carefree journey home should be.



Figure 8-34: Original and replica coal



Figure 8-35: Damaged slip rings



Figure 8-36: Carbon replica

8.3.6.3 NACHBAU COAL CORRECT soldering

(Count by Stephan)

First very important:

The strands of imitation coals are mostly too long. In Figure 8-34 is the comparison between an original coal (upper) and Replica coal seen (below). When this coal is being operated such uses they are too far off. When does the first Copper contact with the rotor, which damage the slip rings (Figure 8-35). They are wedged in there even longer and destroyed carbon holder and rotor.

In Figure 8-36 is a replica of coal to see. The dimension of the spring edition until the end of the strand is 31mm. This is too long. Before soldering should the wire may be cut, that this Mass is 27mm.

The soldering should be clean with a small solder point on the edge of the leaf. Chen's done, as in Figure 8-30 to see.

8.3.7 VERIFICATION OF RECTIFIER

The rectifier is a very easy-to-examine. The best suited for this is the Continuity tester, as here, the current from the built-in battery to examine the above-Fende component and the alligator clip flows back to the unit. The ohmmeter shows a numerical value which conducted in-angrichtung the diode is zero or Reverse direction of the diode infinity (no indicator). Here it must be ohm, that the right way ohmmeter is connected.

To make things clearer, I am demonstrating the test model (Figure 8-37). The Figure 8-38 shows the audit-examination on the original rectifier.

The current flows from the three-from stator of the alternator further ahead need lines on the right diodes in Figure 8-37 to the red line Electrical system (battery)

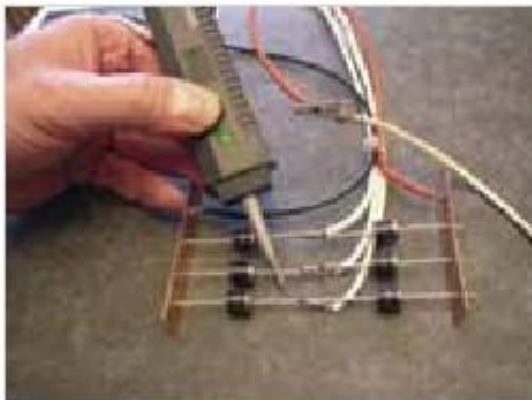


Figure 8-37: Examination of the rectifier to the model



Figure 8-38: Examination of the original rectifier

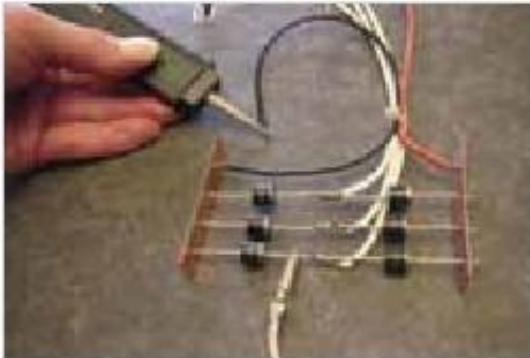


Figure 8-39: Examination of the rectifier to the model

So we checked each of white line of whether the passage is to the red. Then rotate the Durchgangsprüfer to. From red to white each Line may present no passage be. Now you have the right three diodes tested.

Thus the circuit is closed, have the power from the electrical system in the stator windings flow back can. To check this, you hold the tip of the continuity tester to the black wire. One by one at all white cables tested, whether through-input is present. Then the audit-examination in the other direction again-outdated. Here may the continuity tester do not respond. So are now The left three diodes tested.

It has been noted that at a diode flows in the forward direction, no current one or the other way round in the reverse Current can flow, so the light-machine, if it is to the-same white line belonging to Dio-the one is only a third of their Power supply into the electrical system.

8.3.8 VERIFICATION OF GOVERNOR

To test the controller, we need the ohmmeter. The controller consists of one switch (Two positions gene, three ports), resistors, rising through the excitation current at the board voltage to the rotor and a Magnet winding flows. Is measured in the three positions of the AC circuit ters. Before the measurement should be the The switch contacts cleaned thoroughly gene, since a transfer resistance at the Contacts inaccurate measuring results and of course the function of the Reg-impairs's instructions.

For cleaning you can sandpaper use with the grain 600th

If the measured resistance was worth approximately the target values, if the controller is electrically in-order tion. That does not necessarily that he also satisfactory functional is functioning. With the engine running, changing speed and changing Performance decrease from the dynamo- ne of the medium changes its contact Position between the upper and lower Ren often in fractions of a second. At voltage of the electrical system which he is in which position depends on the interaction between the spring from which the center contact against the upper and attracts the power of Magne- th, which draws him towards the bottom. If the spring force decreases, pulls the

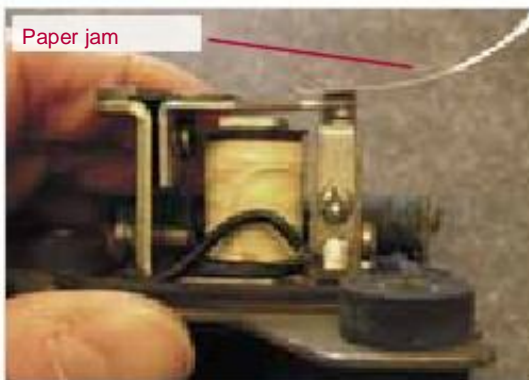


Above average contact

In this position, the winding of the magnet is tested and the passage from the brown wire to the green wire (current flow) from the electrical system

to the rotor. The solenoid coil is a resistor standing by 36-38 ohms have - measured between the brown and black Cable.

Between brown and green Cable to the Resistance should be as small as possible, so 0 ohms be.

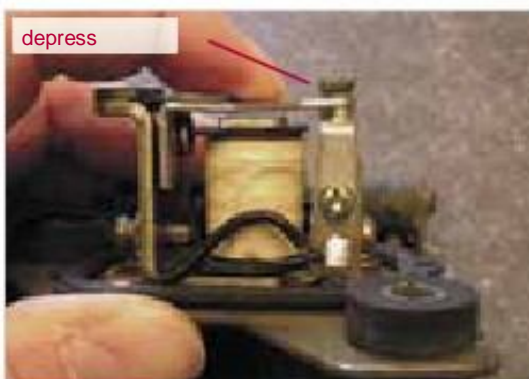


Average contact center

In this position, the resistance will be tested through which the current from the electrical system at increasing

gender Board power flows when the magnetic developed so much power that he the average contact pulls away from the top.

Between brown and green Cable is now a resistance of 10.7 Ohm be measurable.



Below the mean contact

In this position, the resistance will be tested through which the current from the electrical system at maxi-

painter Board power flows when the magnet so lot of power designed to be the central contact presses against the bottom.

Between brown and green Cable is now a resistance of 8.4 Ohm be measurable.

Figure 8-40 to 8-42: Regulator

Contact the magnetic medium to early i.e. in case of low voltage electrical system away from the top. One can find this by running on Monitor, the voltage at the brushes measures. You should be at least to about 2000 U / of Battery voltage and correspond only then be lower. On the battery the voltage is measured at 2500 U / approx 14.5 to 15 volts. At the Setting the bias of spring But one should in any case only little change, if you are sure that all other components are in order.

second key position power, then is the driving lights on.

On the following defects may be occurring : men

The contacts in the ignition are oxidized: they ask for an electricity-NEN resistance represents a portion of the Performance of the alternator is already here converted into heat and thus consumers and the battery is not more is available.

You can check this with the ohmmeter, connected sequentially between between the red and brown and the blue cable into the corresponding Key position. The measured resistance stand should be as small as possible, to no case more than 1 ohm.

8.3.9 VERIFICATION OF IGNITION SWITCH

Flows through the ignition of the entire Current in the electrical system. Errors can therefore affect basically everywhere. I describe the functional test of the Ignition switch as I did in the different-simplified circuit diagram I used. The ignition switch has an input (the red wire) to the power of the Battery arrives. In the first key selstellung the current is to brown Cable (electrical system, switched plus) soft-forwarded. The blue cable into the

A loose connection in the ignition can for example responsible for misfires or a solid fuel, according to which in a broader Ignition circuit investigated in vain. Such a loose connection can u.U, only certain rotational speeds of the engine on- . enter Has to deal with unexplained To do ignition problems, one should tentatively a cable directly from Battery-Plus on the orange cable set of coils and see if even the misfires occur.



Figure 8-43: Below the ignition side cover

The cable must immediately but in any case be removed, because the ignition coil- len under otherwise constant current, so they can be damaged and the battery is discharged.

8.4 The ignition circuit

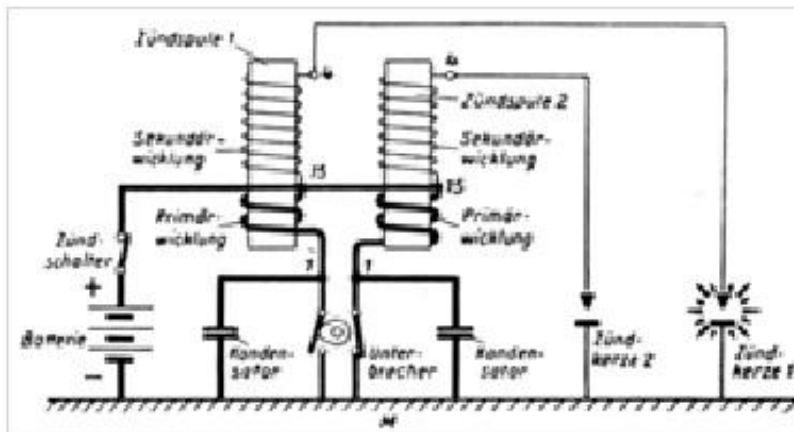


Figure 8-44: Ignition circuit

The structure of the ignition circuit is as seen on Figure 8-44, quite simple: From the battery positive leads a cable from the ignition switch to the two orange cables of the ignition coil. The brown wire of each ignition coil leads to the loose part of their contact pair and the condenser. The fixed part of each contact pair is the same as the housing the capacitor with the vehicle-

mass associated whereby the current-closed circular is. The third, central connection the coil is on the spark plug wire with the spark plug connected, which also with different mass-is connected.

It leads at this point too far, all construction parts of the ignition circuit in detail in to describe their function. On the following pages I will, however, different-looking for, as far as to describe the components ben, that everyone should be able to To wire the ignition circuit, the Ignition and possible errors to discontinue . recognize A defective ignition coil can one by means that one Usually a se are available, not recognize



Figure 8-45: Governor expanded



Figure 8-46: Governor installed

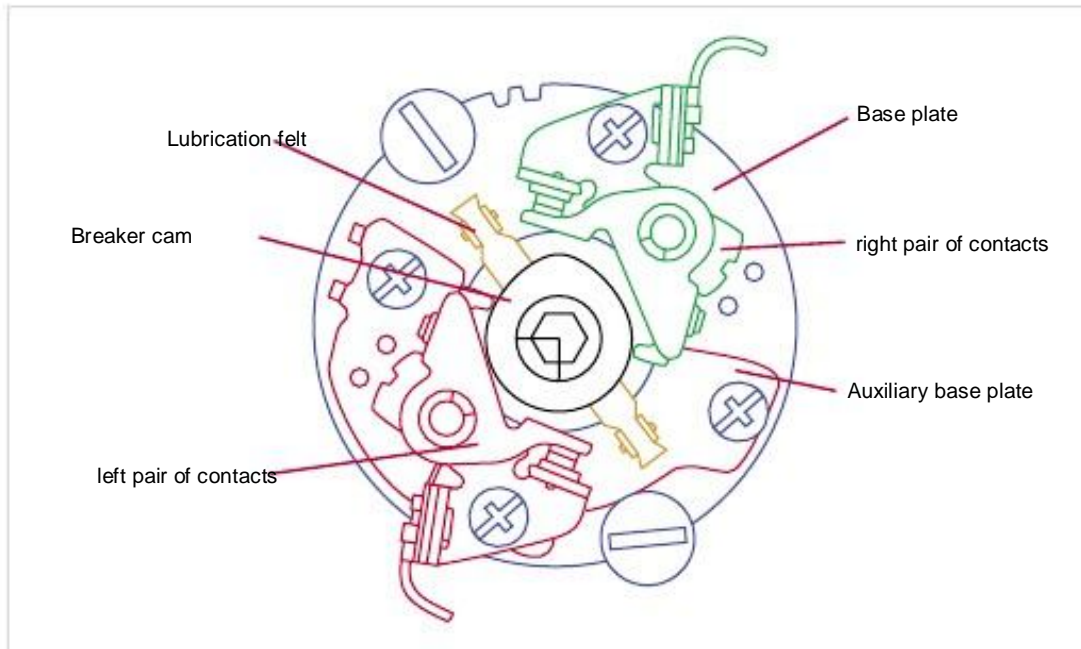


Figure 8-47: Contact set

. NEN The same applies to the capacitor tor. It only helps the corresponding Component for another, hopefully functioning exchange. When The problem is then solved, was the Component of the cause.

The "heart" of the Zündelektrik under the little chrome cover housed in the cylinder head on the left Contact with the base-Zündkon contacts for both the right and left The cylinder. For the right and the left



Figure 8-48: Contact pairs

I have the motor characteristic colors **green** (Right) and **red** (Left) is used. The **base plate** with the contact pair is for the right cylinder right in Zy-cylinder head fixed, while the with the pair of contacts for **the left cylinder** on the base plate is attached. Therefore, you must first put the contact pair for the right cylinder to be adjusted. As the ignition is the set time is later described. The contact pairs themselves, as shown on Figure 8-48, are wear parts, the regular one- must be placed in larger and Intervals are to be replaced. The red and green paint mark left in the picture has no meaning, both Kontaktpaa- re the same. However, be the contact pairs, leading to the Ka-



Figure 8-49: Capacitors

bel also color-code, as in See Figure 8-46. Both pistons rise simultaneously up and down, with the one in the power stroke and the other in up Is the exhaust stroke. If one reverses the Connection of the cable-Kontaktpaa Ren to the ignition coil so the ignition is spark in the exhaust stroke, the motor can thus Of course not start and there is loud backfires.

Parallel to the contact pairs in Figure 8-49 to seeing the condensation tors, which in the XS-650 for couples to sammengebaut are. Nothing can be reversed - the cable are each charged with a brown cable Coils connected.

In order to generate a spark, is a very high voltage of about Require 12 000 to 20,000 volts. Since the electrical system in the existing DC transforming power can not be used, to the effect that in a conductor, the is moved through a magnetic field, a electric voltage is produced. In the Ignition coil, the magnetic field is not moves, but the voltage changes

be. The figure 8-50 shows the Prinzipiel- len development of an ignition coil. It consists of two coils around an iron- is nuclear and thus established principle like a transformer. They put on the Winding with few turns of thick wire (primary winding) a AC voltage, so come to the Wick- ment with many turns of thin Wire (secondary winding), a higher AC out. The ratio nis depends on the ratio of the voltages nis the number of turns off.

When a DC voltage of the current-carrying coil with we- Nigen turns of thick wire first generates a magnetic field only in which the other winding is located. Suspends the current in one of the first Winding, this magnetic field breaks abruptly together. Due to this very

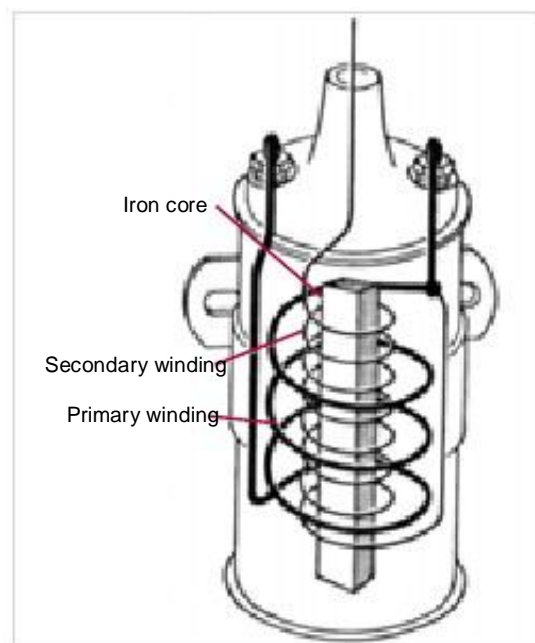


Figure 8-50: Function of an ignition coil (source: Bosch)

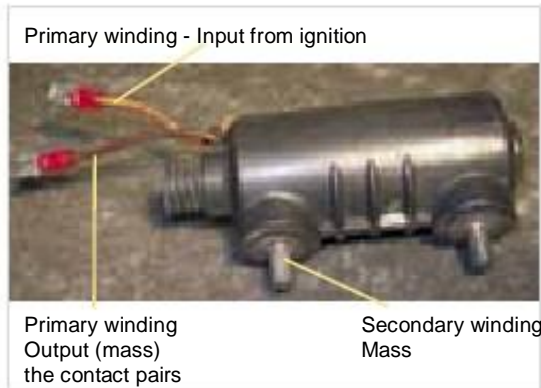


Figure 8-51: Ignition coil

rapid change of the magnetic field corresponding to the primary winding has a very high voltage at the spark plug. The current in the primary winding is interrupted by the contact pairs. The moment in which the contact pair will open.

The capacitor has here the task to prevent sparking between the contact pairs for the respective cylinders to prevent and to save energy. Contact burned areas indicate therefore a defective capacitor through.

The contacts must be exactly in the open moment in which the piston in the compression stroke just before the upper dead center is dead. To the flask the cylinder, which will ignite, just in the position in which the ignition skip to spark, is on the Rotor, a mark exists, the side cover to cover those who brought the need. The timing mark is on the image of 8-53 marked by an arrow. Should be in this position the contact pair of the right cylinder (Colored green) to open just before, when the crankshaft on the hexagon



Figure 8-52: Construction of the interrupter and the centrifugal governor