

SidecarPro Alternator and Electronic Ignition Replacement Kit

Installation Manual

Introduction

Read this part first:

1. What bikes will this system work for?
 1. This manual is for the Chang Jiang M1M which has a side-valve 750cc engine and a 12-volt electrical system. It also applies to the Chang Jiang M1S which has an overhead-valve 750cc engine and a 12-volt electrical system.
 2. It does not apply to bikes with 6-volt electrical systems such as the Chang Jiang M1, the (Ural) M72, the BMW R71, or early Dnepr bikes.
2. Contents of this kit:
 1. Stator
 2. Rotor
 3. Rectifier Unit
 4. Computerised Ignition Unit
 5. Three stator-mounting screws
 6. One rotor bolt washer
 7. Rotor nut
 8. Wiring looms

If you are in a hurry

go to “Part A Removing Existing Parts”

else for details of new parts in kit

go to Appendix One: Photos and Descriptions of New Parts

else for further understanding and information

go to Appendix Two: Rest of Introduction

Notes:

- The kit that was fitted to this bike was supplied by Sidecar Pro – <http://www.sidecarpro.com>
- The kit was fitted by Brian Harmsworth and Phil Smith on Friday 14th November 2014
- Photography by Phil Smith
- Manual authored by Phil Smith (Doctor Disk)

A. Removing Existing Parts

1. Disconnect negative terminal from battery.
2. Drain and remove the fuel tank.
3. Remove front outer cover of crankcase (usually just two screws)
4. Remove stator (the part of the alternator that does not spin with the crankshaft)
 1. unplug all wires connecting to stator
 2. undo the three screws holding the stator to the front of the crankcase
 3. place stator with its screws and washers in discarded parts box
5. Remove rotor (the part of the alternator that spins with the crankshaft)
 1. Remove the Allen-headed rotor bolt which fastens the rotor to the crankshaft. This needs an 8mm Allen-key. Note that this bolt needs to be unscrewed three times during its removal. **Keep this bolt as you will need it again in Part B.**
 2. Remove the rotor.
 3. Place rotor in discarded parts box
6. Remove air-cleaner by unscrewing two grub screws; one on each side.
7. Remove black plastic housing which covers the starter relay, the voltage regulator and the rectifier (the rectifier is often termed the “diode board”) by undoing two screws; one each side.

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Part A continued from previous page ...

8. Looking across the airbox towards the rear of the bike, there are three items on the metal electrical parts board. The upper left black box is the starter relay (often termed the “solenoid”) which must remain where it is. The upper right black box is the voltage regulator (occasionally termed the “adjuster”) which will be removed. The lower central item is the rectifier (often termed the “diode board”) which will be removed.

1. Remove unwanted parts from parts board.

1. Undo wires from voltage regulator.
2. Remove voltage regulator (two screws; one above, one below)
3. Place voltage regulator in discarded parts box, but **keep the mounting screws and nuts as you will need these again in Part B.**
4. Undo all wires from the rectifier.
5. Place wiring loom from alternator to rectifier in discarded parts box.
6. You will notice one connector to the rectifier which joins the wiring loom to the headlight. **Leave it there as you will need this again in Part B.**
7. There is one other left-over piece of wire which connected the rectifier to the tab on the voltage regulator. This also may be placed in the discarded parts box.
8. Remove rectifier from parts board by removing one nut, long bolt and spacer.
9. Place rectifier, bolt, nut and spacer in discarded parts box. Note that it might be necessary to remove the parts board from the bike frame in order to get rid of this one long bolt; if so, note how to put it back later.

if you are in a hurry

go to Part B: Installing New Parts

else for photos and more detail

go to Appendix Three: Photo Story of Removing Existing Parts

B. Installing New Parts

1. Fit the new alternator/magneto.
 1. The stator is the part with a circle of small copper coils all very neatly wired together – see photo and description in Appendix One.
 2. Fit the stator to the front of the crankcase using the three small screws from the kit. **Do NOT use the washers from the longer screws that mounted the old stator – see Appendix Seven: Minor Disaster Section.** The sender unit sticks out at an approximately two o'clock position.
 3. Fit the wiring loom from the stator through the slot in the crankcase where the old stator cables used to be.
 4. Fit the rotor to the crankshaft. Use the Allen-headed bolt you saved in Part A.
 1. Put the new washer from the kit next to the head.
 2. Put the new rotor on the bolt next to the washer.
 3. Screw the new rotor nut, tapered end first, over the threaded part of the bolt and slide it up into the new rotor.
 4. Fit the rotor assembly over the stator and screw the rotor bolt into the crankshaft. Note that this is a two-stage process: the rotor bolt will screw through some part in the engine, then slide freely, then screw into the crankshaft itself where it can be tightened.
5. Set the ignition timing.
 1. Remove the rubber grommet from the flywheel inspection hole on the left side of the engine near the engine-oil dipstick.
 2. Set the engine to Top Dead Centre TDC by aligning the “0” (zero) mark on the flywheel with the centre of the flywheel inspection hole. (Some bikes have a score-mark on the casing with which to line up the mark on the flywheel – my bike does not have this mark, so the centre of the hole will do). It can be easier to align the engine to TDC if the spark plugs have first been removed.
 3. Loosen the rotor bolt slightly and turn the rotor so that the paint line on the outside of the rotor aligns perfectly with the paint line on the sender unit. The sender unit is the part of the stator which is still visible in about a two o'clock position after the rotor has been fitted.
 4. With the paint lines aligned, fasten the rotor tightly to the crankshaft.
 5. Check that the TDC 0 mark is still in the centre of the flywheel inspection hole.
 6. The ignition timing is now set correctly.

Continued on the next page ...

Part B continued from previous page...

2. Fit the new rectifier.
 1. The new rectifier is the part with cooling fins on it. It has a three-pin connector, a thick red wire with a flat terminal, and another wire with a snap-fit terminal. My other wire is blue and white, but this may vary, according to photos I have seen of other kits.
 2. The new rectifier is fitted to the metal parts board in the position previously occupied by the voltage regulator. Use the voltage regulator mounting screws and nuts you saved in Part A.
3. Fit the new electronic ignition.
 1. The electronic ignition unit is a black box with wires leading to a two-pin connector, and two wires with flat round terminals to be fitted later using screws. Mine had a kind of rubber box around it having several slots by which it could be mounted.
 2. The new electronic ignition unit is fitted to the metal parts board in the position previously occupied by the rectifier.
 3. There is no obvious means of fitting it in this position. It could easily be fitted by using a zip cable tie through a hole or two in the metal parts board and through the two slots in the long sides of the rubber mounting box around the ignition unit. Instead, we opted to fit it by manufacturing a metal tab which we pop-riveted to the metal parts board and which the slot on the middle back of the rubber box slides neatly over.

if you are in a hurry

go to Part C: Hooking It All Together

else for photos and more detail

go to Appendix Four: Photo Story of Installing New Parts

C. Hooking It All Together

1. Starting at the stator, the two-pin connector is fitted to the two-pin connector from the electronic ignition unit.
2. The three-pin connector from the stator is connected to the three-pin connector from the rectifier.
3. The red wire from the ignition unit is connected to the + (positive) terminal of the ignition coil leaving in place the other wire that is already connected to this terminal.
4. The yellow wire from the ignition unit is connected to the – (negative) terminal of the ignition coil replacing the wire that comes from the points unit (often termed the “distributor”).
5. The original wire from the points unit to the negative terminal of the ignition coil may now be placed in the discarded parts box.
6. The red wire from the rectifier is connected to the left upper terminal of the starter relay where the positive wire from the battery is also connected.
7. The rectifier is earthed through the mounting of its body to the metal parts board.
8. The blue/white wire from the rectifier with the snap-fit connector must now be connected to the spade connector that is in the wiring loom from the headlight that we noticed and left there in Part A. As the connectors don't match, we cut them both off and joined the wires by crimping on a pair of brand new spade connectors. This wire connects the rectifier to the charging light in the headlight shell.

if you are in a hurry

go to Part D: Tidying It All Up

else for photos and more detail

go to Appendix Five: Photo Story of Hooking It All Together

D: Tidying it all up.

1. Since everything now works, use zip cable ties to fasten all wires neatly to the frame of the bike. We used black insulation tape to cover ugly bare wires adjacent to some of the connectors. Where parts of the new wiring loom had excess length, we simply made small loops between the upper frame tubes of the bike.
2. Replace the black plastic housing which covers the metal parts board to which are affixed the starter relay, the rectifier and the electronic ignition unit. Use the original two mounting screws.
3. Replace the front outer cover of the crankcase using its two screws.
4. Replace the fuel tank and fill it with petrol.
5. Ride!

**if it is raining or you need more details,
go to Appendix Six: Photo Story of Tidying It All Up
else
go for a ride!**

Appendix One: Photos and descriptions of new parts:

Contents of this kit:

Stator: This is the part with a circle of small copper coils all very neatly wired together. It has a sender unit with a painted line on it that sticks out from the rest of the backing plate. Wires coming from the stator have one three-pin connector and one two-pin connector.



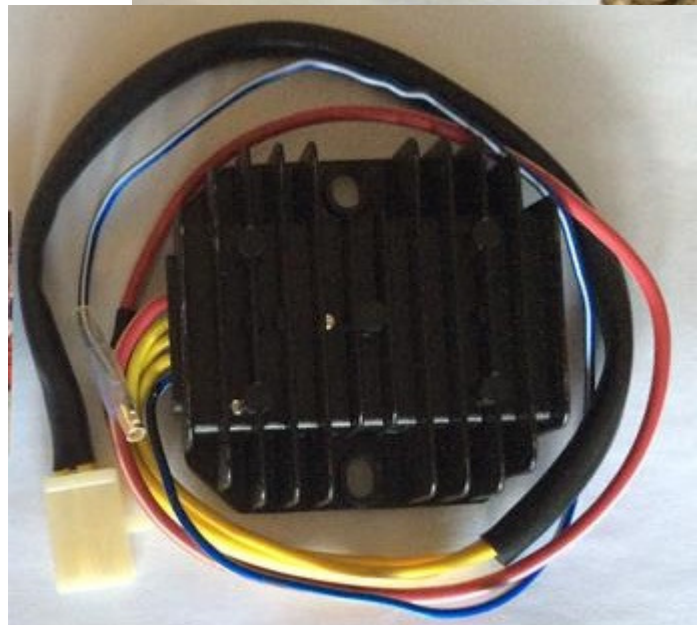
Rotor

This is the part that looks like an aluminium soup bowl with a black tube in the centre and various slots and holes and rivets in it.

Close examination shows a strip of magnetic material on the outside near the painted line, while various permanent magnets are encased within the casting of the aluminium outer rim.

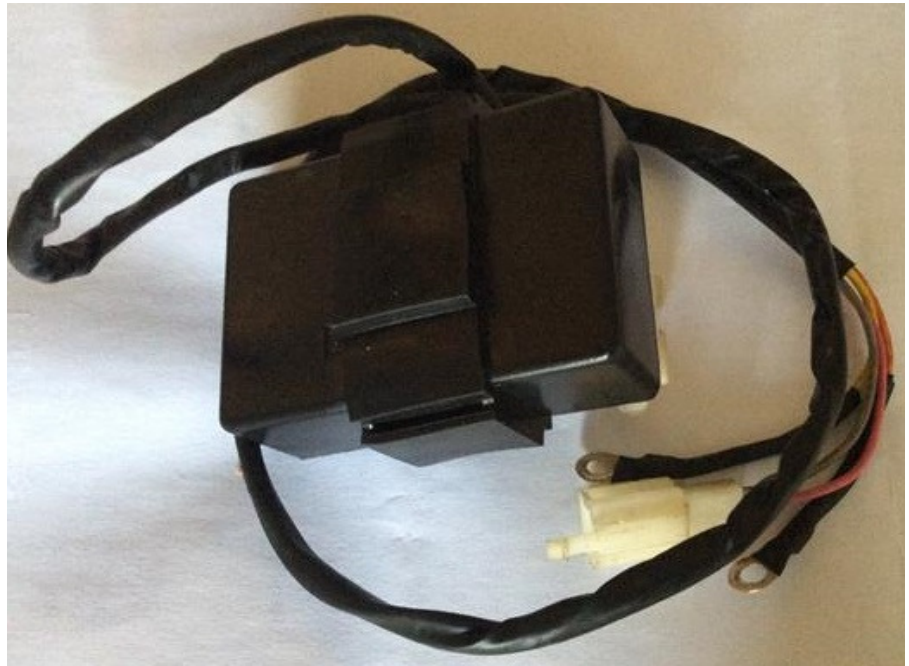


Rectifier Unit: The new rectifier is the part with cooling fins on it. It has a three-pin connector, a thick red wire with a flat terminal, and another wire with a snap-fit terminal. My other wire is blue and white, but the actual colour of this wire may vary, according to photos I have seen of other kits



Computerised Ignition

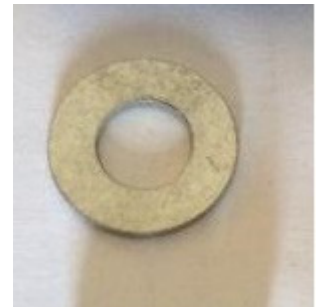
Unit: The new Computerised Ignition Unit is a black box with wires leading to a two-pin connector, and two wires with flat round terminals to be fitted later using screws. Mine had a kind of rubber box around it having several slots by which it could be mounted.



Three stator-mounting screws:



One rotor bolt washer:



Rotor nut:



Wiring looms: In my kit, these were already attached to the various components to which they related.

Appendix Two: Rest of the Introduction

1. The Chang Jiang M1M and M1S are enjoyable bikes to own and ride but can have serious electrical issues:
 1. My original rectifier (often termed a “diode board”) failed when vibration caused an open circuit near one of the diodes.
 2. My original mechanical voltage regulator did not fail, but I know of other owners for whom this item has failed.
 3. My original ignition timing unit (often termed “distributor” even though it is not a distributor) has needed the points gap cleaned, the timing adjusted slightly, and the condenser replaced at different times during the past ten years of operation.
 4. My alternator has failed in two different ways at different times:
 1. The carbon brushes that deliver current to the field coils on the rotor via the commutator wore out once.
 2. Some of the field coil wires developed microscopic cracks where the wire was soldered to the commutator. With the motor stopped, the resistance of the field coils tested okay; with the motor spinning these microscopic cracks separated causing open circuits so that the alternator produced no current. This was so frustrating that after it occurred with a second rotor, I didn’t bother fixing it for nearly five years and just re-charged my battery before every ride!
2. How the new kit addresses these problems:
 1. The new part I have referred to as the “Rectifier” in this manual actually combines the functions of the diode-board rectifier, that is the rectification of the AC current to DC current, with the voltage regulation function of the original mechanical voltage regulator into one electronic unit with no moving parts. It is possible, but extremely unlikely to burn out the innards of the new unit. However, having said that, **it is important to have air flowing over the finned surface of this unit** to carry away the heat generated during normal operation.
 2. The new part I have referred to as the “Computerised Ignition Unit” or “Electronic Ignition Unit” is actually a small computer running the linux operating system. Like a tiny version of your desktop PC, it contains a CPU, some printed circuits and other hardware components, and software programs called “firmware” which are used to measure the RPM of your engine and send an electric signal to your ignition coil at the most optimal moment to fire your spark plugs. When your ignition switch is turned on, the linux operating system boots up and then loads the software which waits for the first signal to arrive from the sender unit on the stator.
 3. The new parts I have referred to as “stator” and “rotor” together form an alternator unit which has no brushes or commutator to wear out and no rotor field coils to crack or fail.

go to “Part A Removing Existing Parts”

Appendix Three: Photo Story of Removing Existing Parts

Part A, Point 1: Disconnect negative terminal from battery. This is to make sure we have no sparky surprises since we are about to operate on various electrical parts of the bike. Sadly, I saw an old bike totally burned by fire after a friend forgot to take this step.

Part A, point 2: drain and remove the fuel tank and place it safely out of the way where it won't cause problems if it leaks:



Part A, Point 3: Remove front outer cover of crankcase (usually just two screws) and place it on a protective surface where you won't walk on it or cause it to be damaged in any other way.

Part A, Point 4: Remove stator (the part of the alternator that does not spin with the crankshaft)

- unplug all wires connecting to stator
- undo the three screws holding the stator to the front of the crankcase
- place stator with its screws and washers in discarded parts box



Part A, point 5, sub-point 1: Remove the Allen-headed rotor bolt which fastens the rotor to the crankshaft. This needs an 8mm Allen-key. Note that this bolt needs to be unscrewed three times during its removal. (As you may note from the pictures, I actually did this before removing the stator – exact order is often not something to get pedantic about!) **Keep this bolt as you will need it again in Part B.**



Part A, Point 5, sub-point 2: Remove the rotor. The front of the engine should now look like this:



Part A, Point 6: Remove air-cleaner by unscrewing two grub screws; one on each side. Unfortunately I left this in place until later on, as you can see in some of the photos, and it kept getting in the road of the other work I was attempting to do. It is only thirty seconds to do, so learn from my mistake and do it now!

Part A, Point 7: Remove black plastic housing which covers the starter relay, the voltage regulator and the rectifier (the rectifier is often termed the “diode board”) by undoing two screws; one each side.



Part A, Point 8: Looking across the airbox towards the rear of the bike, there are three items on the metal electrical parts board. The upper left black box is the starter relay (often termed the “solenoid”) which must remain where it is. The upper right black box is the voltage regulator (occasionally termed the “adjuster”) which will be removed. The lower central item is the rectifier (often termed the “diode board”) which will also be removed.



In this photo we see a better view of the voltage regulator above and the diode-bridge rectifier (often termed “diode board”) below which must both be removed.



Part A, Point 8, sub-point 1: Remove unwanted parts from parts board.

1. Undo wires from voltage regulator.
2. Remove voltage regulator (two screws; one above, one below)
3. Place voltage regulator in discarded parts box, but **keep the mounting screws and nuts as you will need these again in Part B.**
4. Undo all wires from the rectifier.
5. Place wiring loom from alternator to rectifier in discarded parts box.
6. You will notice one connector to the rectifier which joins the wiring loom to the headlight. **Leave it there as you will need this again in Part B.**
7. There is one other left-over piece of wire which connected the rectifier to the tab on the voltage regulator. This also may be placed in the discarded parts box (It's the twin red wire in this photo – not yet chucked).
8. Remove rectifier from parts board by removing one nut, long bolt and spacer.
9. Place rectifier, bolt, nut and spacer in discarded parts box. Note that it might be necessary to remove the parts board from the bike frame in order to get rid of this one long bolt; if so, note how to put it back later. The board should now look like the picture.
Note that by this stage I had gotten sick of the air cleaner blocking my access and had also removed the metal parts board from the bike frame for easier working.



go to Part B: Installing New Parts

Appendix Four: Photo Story of Installing New Parts

Part B, Point 1: Fit the new alternator/magneto.

Sub-point 1: The stator is the part with a circle of small copper coils all very neatly wired together – see photo and description in Appendix One.

Sub-point 2: Fit the stator to the front of the crankcase using the three small screws from the kit. The sender unit sticks out at an approximately two o'clock position. **Do not use the washers from the screws that held the old stator, or you will encounter a minor disaster!** (see Appendix Seven: Minor Disaster Section for how we stuffed it up!)

Sub-point 3: Fit the wiring loom from the stator through the slot in the crankcase where the old stator cables used to be.



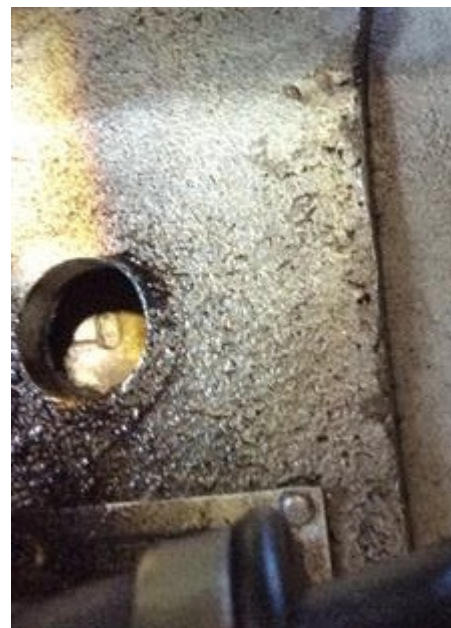
Sub-point 4: Fit the rotor to the crankshaft. Use the Allen-headed bolt you saved in Part A.

- Put the new washer from the kit next to the head.
- Put the new rotor on the bolt next to the washer.
- Screw the new rotor nut, tapered end first, over the threaded part of the bolt and slide it up into the new rotor.
- Fit the rotor assembly over the stator and screw the rotor bolt into the crankshaft. Note that this is a two-stage process (three-stage, if you count screwing it through the rotor nut first): the rotor bolt will screw through some part in the engine, then slide freely, then screw into the crankshaft itself where it can be finally be tightened.



Sub-point 5: Set the ignition timing.

- Remove the rubber grommet from the flywheel inspection hole on the left side of the engine near the engine-oil dipstick.
- Set the engine to Top Dead Centre TDC by aligning the “0” (zero) mark on the flywheel with the centre of the flywheel inspection hole. (Some bikes have a score-mark on the casing with which to line up the mark on the flywheel – my bike does not have this mark, so the centre of the hole will do). It can be easier to align the engine to TDC if the spark plugs have first been removed.



- Loosen the rotor bolt slightly and turn the rotor so that the paint line on the outside of the rotor aligns perfectly with the paint line on the sender unit. The sender unit is the part of the stator which is still visible in about a two o'clock position after the rotor has been fitted.
- With the paint lines aligned, fasten the rotor tightly to the crankshaft.
- Check that the TDC 0 mark is still in the centre of the flywheel inspection hole.
- The ignition timing is now set correctly.



Part B, Point 2: Fit the new rectifier.

- The new rectifier is the part with cooling fins on it. It has a three-pin connector, a thick red wire with a flat terminal, and another wire with a snap-fit terminal. My other wire is blue and white, but this may vary, according to photos I have seen of other kits.
- The new rectifier is fitted to the metal parts board in the position previously occupied by the voltage regulator. Use the voltage regulator mounting screws and nuts you saved in Part A.



Part B, Point 3: Fit the new electronic ignition unit.

- The electronic ignition unit is a black box with wires leading to a two-pin connector, and two wires with flat round terminals to be fitted later using screws. Mine had a kind of rubber box around it having several slots by which it could be mounted.
- The new electronic ignition unit is fitted to the metal parts board in the position previously occupied by the rectifier.
- There is no obvious means of fitting it in this position. It could easily be fitted by using a zip cable tie through a hole or two in the metal parts board and through the two slots in the long sides of the rubber mounting box around the ignition unit. Instead, we opted to fit it by manufacturing a metal tab which we pop-riveted to the metal parts board and which the slot on the middle back of the rubber box slides neatly over.
- The completed metal parts board should now look like this picture:



go to Part C: Hooking It All Together

Appendix Five: Photo Story of Hooking It All Together

1. Starting at the stator, the two-pin connector is fitted to the two-pin connector from the electronic ignition unit.
2. The three-pin connector from the stator is connected to the three-pin connector from the rectifier.
3. The red wire from the ignition unit is connected to the + (positive) terminal of the ignition coil leaving in place the other wire that is already connected to this terminal. In my case the red wire was more of a pale pink or orange in colour as can be seen in the photo:
4. The yellow wire from the ignition unit is connected to the – (negative) terminal of the ignition coil replacing the wire that comes from the points unit (often termed the “distributor”). In my case the yellow wire was more of a greenish-yellow in colour; unfortunately it is hidden in the photo except for a very small portion to the right of the pink and blue wires at the very top of the photo:
5. The original wire from the points unit to the negative terminal of the ignition coil may now be placed in the discarded parts box.
6. The red wire from the rectifier is connected to the left upper terminal of the starter relay where the positive wire from the battery is also connected.
7. The rectifier is earthed through the mounting of its body to the metal parts board.
8. The blue/white wire from the rectifier with the snap-fit connector must now be connected to the spade connector that is in the wiring loom from the headlight that we noticed and left there in Part A. As the connectors don't match, we cut them both off and joined the wires by crimping on a pair of brand new spade connectors. This wire connects the rectifier to the charging light in the headlight shell.



go to Part D: Tidying It All Up

Appendix Six: Photo Story of Tidying It All Up

1. Since everything now works, use zip cable ties to fasten all wires neatly to the frame of the bike. We used black insulation tape to cover ugly bare wires adjacent to some of the connectors. Where parts of the new wiring loom had excess length, we simply made small loops between the upper frame tubes of the bike.



2. Replace the black plastic housing which covers the metal parts board to which are affixed the starter relay, the rectifier and the electronic ignition unit. Use the original two mounting screws.
3. Replace the front outer cover of the crankcase using its two screws.
4. Replace the fuel tank and fill it with petrol.
5. Ride!



Appendix Seven: Minor Disaster Section

We stuffed it!

And the photo below shows the result:



This photo shows the damage which resulted when we added washers from the old screws which mounted the old stator under the heads of the new smaller screws which were to mount the new stator.

The resulting lack of clearance caused the rotor to contact the stator screws instantly rotating the rotor from its painted lines aligned position to a random position causing instant loss of ignition timing.

The symptom when we attempted to start the bike was that it fired powerfully just once on one cylinder then was totally devoid of any spark and refused to start at all no matter how much we cranked it.

We removed the washers, re-installed the rotor with correct alignment, and the motor ran beautifully from the very first kick.