

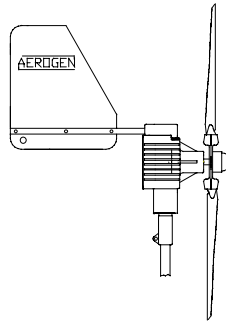
AERO4GEN OWNERS MANUAL

CE

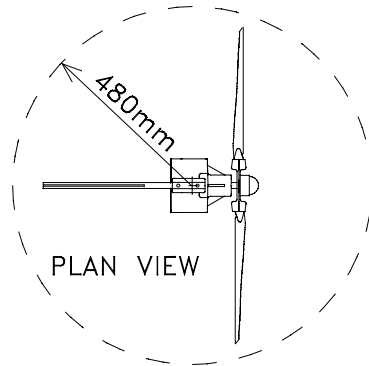
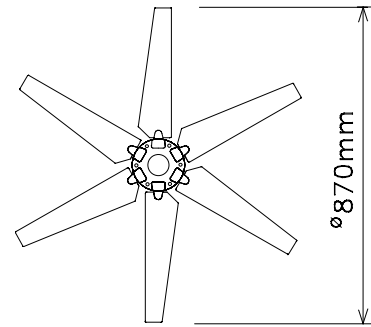
LVM 412 : 12 Volt LVM424 : 24 Volt

PARTS CHECK LIST

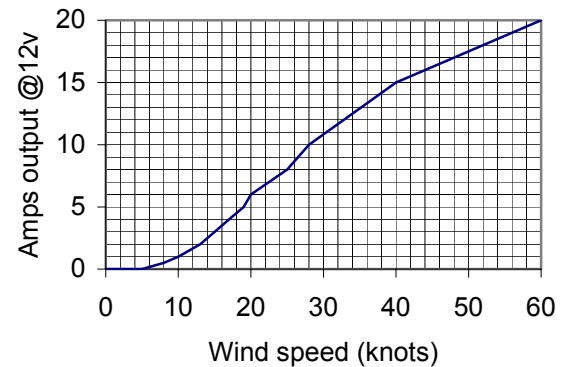
- 1 : Generator (M8 grub screws fitted)
- 1 : Tail Tube
- 1 : Tailfin
- 1 : Fan Hub Bossed
- 1 : Fan Clamp Plate
- 6 : Fan Blades
- 1 : Hub Cover
- 6 : M6 X 25 Stainless Steel Screws
- 6 : M6 Stainless Steel Nyloc Nuts
- 6 : M6 Stainless Steel Washers
- 3 : M4 X 25 Stainless Steel Screws
- 3 : M4 Stainless Steel Nuts
- 3 : M4 Stainless Steel Washers
- 1 : Allen Key 4 mm A/F
- 1 : Allen Key 5 mm A/F
- 1 : M6 X 20 Allen Bolt With Spring Washer
- 2 : Push fit connectors (Male)
- 2 : Push fit connectors (Female)
- 6 : M6 Black Nut Covers



WEIGHT 8.5 Kg



Aero4gen Performance



Note: Amps Output of a 24V model will be half shown above

Guarantee

Thank you for purchasing this product. It has been manufactured to exacting standards and LVM Products guarantees that should any defect in materials or workmanship occur within ONE YEAR of the date of purchase we will repair or replace the defective part free of charge.

Damage caused by misuse, failure to follow instructions, negligence, and modification or transit damage will not be warranted.

LVM Products will not be liable for any loss of revenue or any consequential loss or damage to property or persons from any cause whatsoever.

Retain your purchase invoice, as it will be needed in the event of a warranty claim.

What is Not Covered –

- Damage due to lightning
- Damage due to improper installation
- Damage due to improper wiring
- Damage from flying debris causing blade damage.

Please read the manual thoroughly. If you have any questions please contact us at –



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MOUNTING

This Aero4gen is fitted with an aluminium bronze mounting adaptor which is designed to clamp onto a tube diameter of

1" (25.4mm)

1.5" (38mm)

LVM Products manufactures several mounting kits in marine grade stainless steel details of which are included in these instructions.

A minimum turning radius of 480mm should be allowed when selecting a position to mount the Aero4gen.

Great care should be taken to site the unit to avoid personal injury from the rotating blades.

When constructing a mounting system for the Aero4gen make sure it can withstand the weight of the generator together with the additional wind forces shown in the table opposite.

If the Aero4gen is to be mounted on a yacht/boat care should be taken where to position it, as the Aero4gen will always produce a very slight magnetic cogging vibration when rotating and an electrical vibration whilst charging. This noise will obviously be greatly amplified if mounted on a very hollow section of a yacht/boat.

RADIO / RADAR / DECCA / SAT.NAV. INTERFERENCE

The Aero4gen should be mounted at least 1 Metres from any form of aerial to avoid air born interference. The output cable from the generator together with the dump regulator cables, if fitted, should be routed at least 1 Metre from aerial cables. It is most important, particularly on yacht installation, that the negative (-) return cable to the battery is clean and fully tightened. The safety cable fitted around a yacht/boat is tensioned by a bottle screw or turnbuckle and this cable has been known to cause interference. The remedy is to rope tension or use an insulated connector.

Description of wind	Mean velocity in knots	Force Lbs	Force Kg
Gentle breeze	9	0.5	0.3
Moderate breeze	13	1.3	0.6
Fresh breeze	19	2.5	1.5
Strong breeze	24	4.5	2
Moderate gale	30	7	3.2
Fresh gale	37	10.5	4.8
Strong gale	44	15	7
Whole gale	52	20.5	9.5
Storm	60	27	12.5
Hurricane	68	35	16

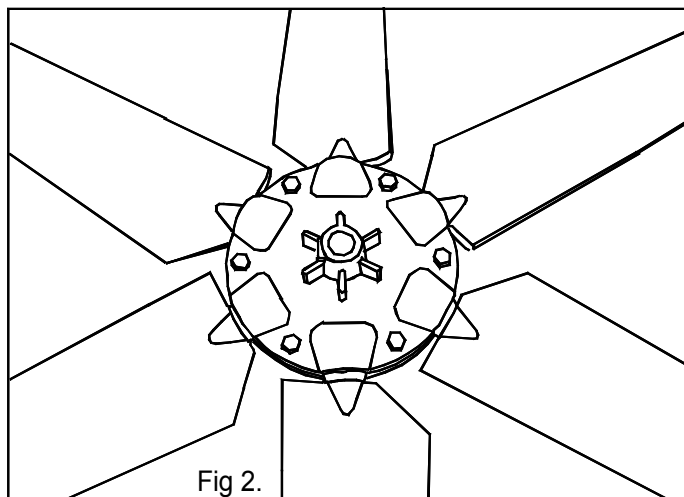
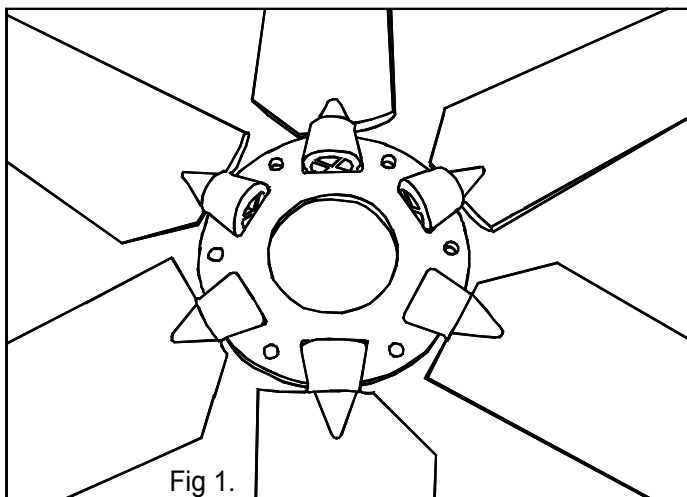
MIZZEN MAST MOUNTING – See page 9

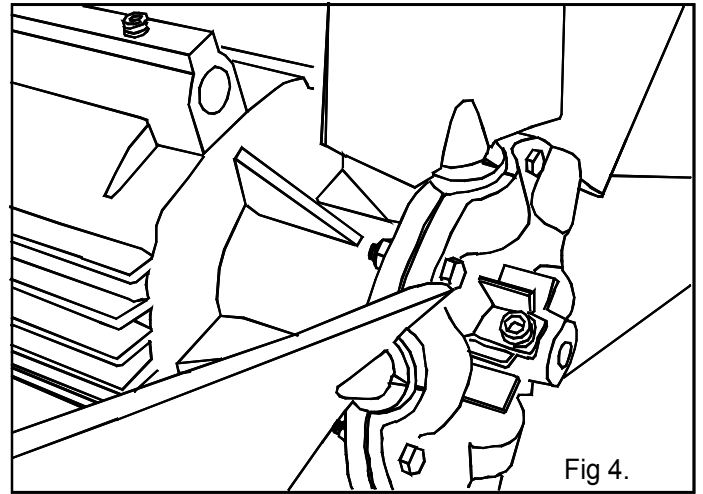
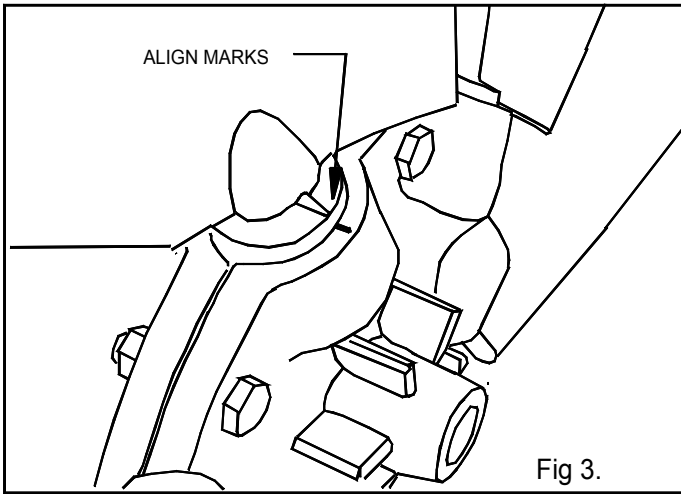
ASSEMBLY

FAN BLADE ASSEMBLY

Assemble the fan using the M6 X 25 screws, M6 Nyloc Nuts and M6 Washers. The best way to assemble the fan is to lay the Hub Clamp Plate on a flat surface, blade sockets upwards and then insert the 6 blades concave side (hollow side) upwards. See Fig. 1. Then place the Bossed Hub on top locating the blades in the sockets. Insert the 6 off M6 screws, washers and nuts, and at this stage only tighten the nuts sufficiently to lightly grip the blades. See Fig. 2. Turn each blade until the indicator marks on the blade and hub align; this sets the blade angle. See Fig. 3. Then finally fully tighten the nuts, and push on plastic nut covers.

NOTE: Do NOT install the fan assembly until the Aero4gen is mounted.





TAILFIN ASSEMBLY

Attach the tailfin onto the tail tube using the M4 X 25 long screws, washers, and M4 Nyloc nuts.

ELECTRICAL DATA

Aero4gen output wire colour Code - The Red output wire is POSITIVE (+) The Black output wire is NEGATIVE (-)
 Wire Rating - The output wires of the Aero4gen will require extending. Electrical systems lose energy from the resistance of the wire size used. The larger the wire size the smaller the loss, however larger cross sectional area wire can be costly and in some cases more difficult to source. The following table shows recommended wire sizes, they are based on a 3% and 5% energy loss at an average wind speed of 20knots. It is recommended a minimum wire size of 2.5 sq mm be used.

Single Wire Length

Voltage Drop (%)	0 – 5 Metres		6 – 10 Metres		11 – 20 Metres	
	3%	5%	3%	5%	3%	5%
12 volt Aero4gen	4.0 mm ²	2.5 mm ²	6 mm ²	4.0 mm ²	10 mm ²	6.0 mm ²
24 volt Aero4gen	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	4.0 mm ²	2.5 mm ²

Useful wire cross sectional area mm² conversion to AWG

2.5 mm² = 14 AWG 4.0 mm² = 12 AWG 6.0 mm² = 10 AWG 10.0 mm² = 8 AWG

If the Aero4gen is connected directly to the battery terminals we recommend a 20 Amp fuse for 12V Models and a 15 Amp fuse for 24v Models is fitted in the red (positive) wire from the generator to the battery, so that if a dead short occurred it would prevent serious damage to the wiring and the generator.

The RED OUTPUT WIRE output is connected to the POSITIVE + terminal of the battery.

The BLACK OUTPUT WIRE to the NEGATIVE – terminal of the battery.

VOLTAGE REGULATION

The output wires of the Aero4gen can be connected directly to the terminals of the battery that requires charging, as shown in Fig 5., however, if the terminal voltage of the battery is not continually monitored for over voltage (14.2v for 12v batteries) and (28.4v for 24v batteries) the battery can be seriously damaged. Fitting an LVM voltage regulator will protect the battery from becoming over charged. You may well have chosen a voltage regulator when purchasing the Aero4gen, but we would recommend you look at page 15 SELECTING THE CORRECT LVM VOLTAGE REGULATOR to make sure you have purchased the correct unit.

You may also consider installing an ammeter, voltmeter or an amphour meter – all are available from LVM Products part number as follows - (LVM66) 0 –5A Ammeter, (LVM67) 0 –20A Ammeter, (LVM68) 0-30A Ammeter), (LVM69) 0-15v dc Voltmeter (LVM200) Digital Amp Hour Meter

INSTALLATION

PLEASE FOLLOW THESE PRECAUTIONS DURING INSTALLATION

- Choose a calm day.
- Have someone available to help during installation.
- Do not install the blade assembly until the generator is mounted.

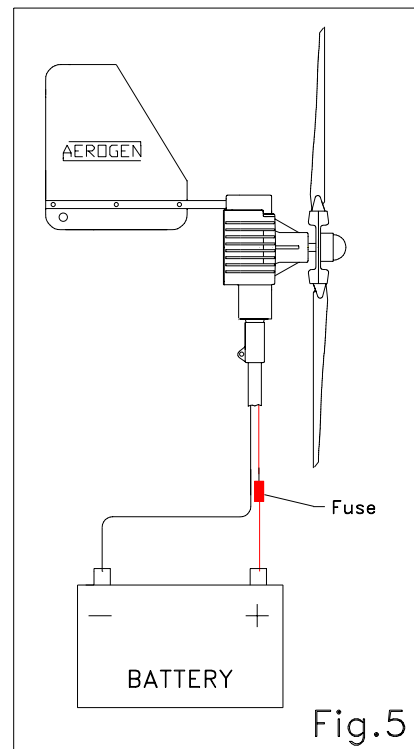
Whilst initially installing the generator, or carrying out future maintenance, it is important that the fan assembly is stationary.

1. Attach the push - on connectors and covers supplied to one end of your output cable. Observing polarity plug them into the generator's output connectors.
2. Thread the output cable carefully through the centre of your mounting tube. If the bottom of the tube is not accessible a hole must be drilled to enable the cable to be brought out. Be sure to leave enough slack in the cable so that if necessary the generator can be removed.
3. Locate the generator on top of your mounting tube, and then fully tighten the M8 clamp bolt nut on the adaptor.
4. The tail assembly can now be inserted into the hole at the top of the generator ensuring that the tailfin is positioned vertically and tighten the M8 grub screws.
5. Fitting the fan blade assembly onto the main shaft of the generator.
Grease fan hub bore then fit the fan assembly onto the generator main shaft aligning the M6 clearance hole in the fan hub boss with the M6 tapped hole in the main shaft. Fit the M6 spring washer under the head of the M6 x 20 Socket Cap Screw. Insert the bolt through the M6 clearance hole in the outer fan hub boss and fully tighten it into the main shaft using the Allen key supplied (best to increase the leverage on the allen key by fitting a tube or something similar to make sure it is fully tightened). See Fig. 4 the black hub cover is then pushed onto the hub boss.

6. The output wires are then connected to the battery. See Fig.5
The RED WIRE is connected to the POSITIVE + terminal and the BLACK WIRE to the NEGATIVE - terminal. We recommend a 20 Amp fuse for 12V Models and a 15 Amp fuse for 24v Models is fitted in the red (positive) cable from the generator to the battery, so that if a dead short occurred it would prevent serious damage to the wiring and the generator.

Note: Do NOT reverse the connections from the generator to the battery (ie. Generator Positive to battery Negative and generator Negative to battery Positive). Doing this will damage the rectifier and void your warranty.

WARNING THE AERO4GEN SHOULD NOT BE ALLOWED TO RUN OPEN CIRCUIT. IN HIGH WINDS HIGH VOLTAGES WILL BE PRODUCED: THE SUPPRESSION CAPACITORS CAN BE DAMAGED: THE FAN WILL TURN FASTER SUFFERING UNNECESSARY STRESS



MAINTENANCE

The Aero4gen is designed to operate for long periods without needing any maintenance. The life of the generator and its performance will be enhanced if periodic inspection is carried out. For personal safety reasons before carrying out any inspection make sure you stop the generator from rotating.

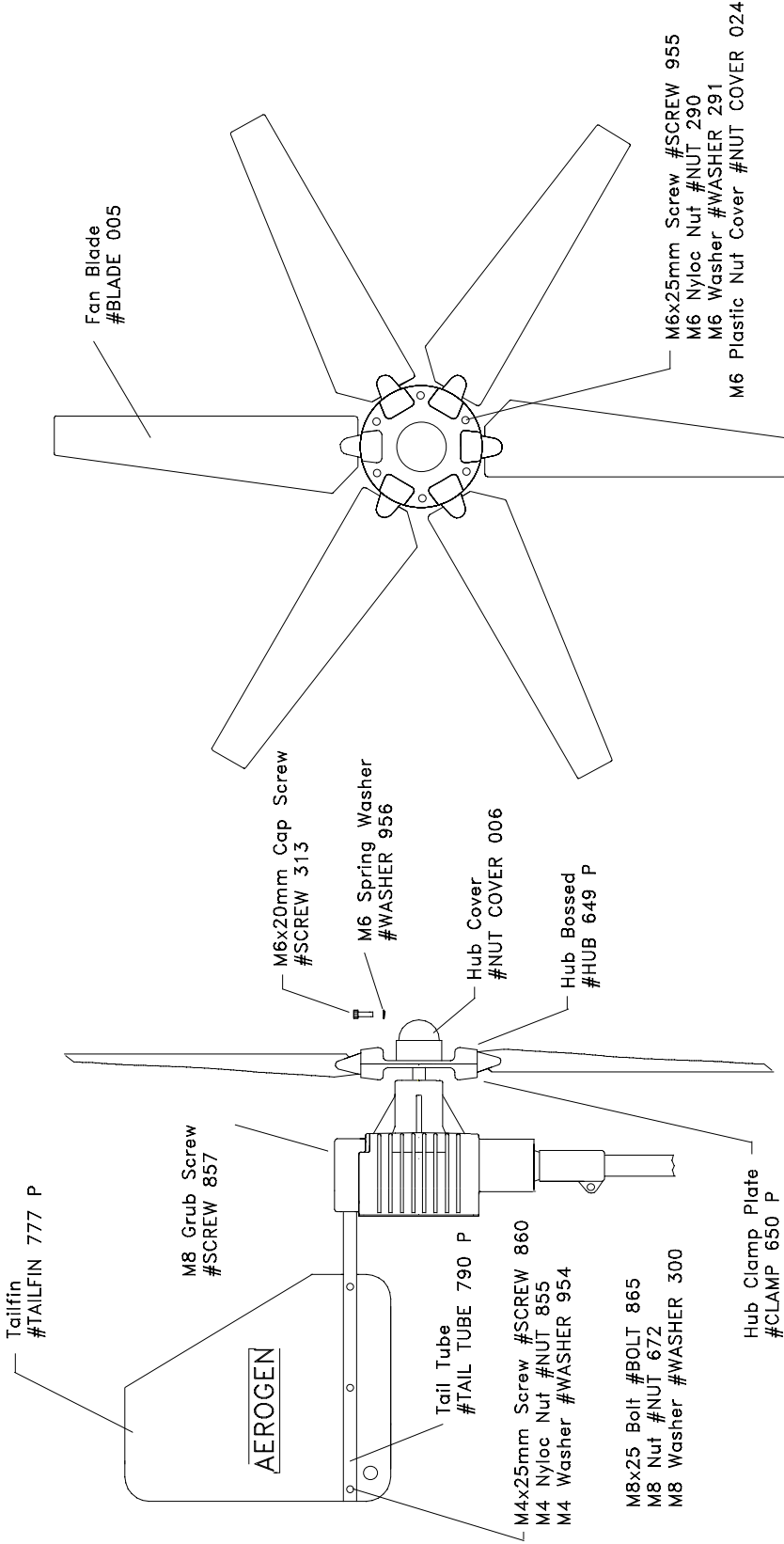
The following should be checked every 6 months.

- Check blades for damage and replace if necessary. Do not use the generator with damaged or unbalanced blades. This will cause unnecessary wear and possibly damage to the main bearings.
- Check the fan hub assembly for tightness.
- Check the mounting adaptor and your mounting system for tightness.
- Check all external electrical connections for tightness and corrosion.
- Wash down the generator with fresh clean water to remove debris and salt deposits that can build up.

If you experience a problem with your Aero4gen contact LVM Products to determine the nature of the problem, LVM Products will send you replacement parts and instructions needed to repair the generator. In the event that the generator is returned for repair/service you will be notified of the cost for carrying out the work and will incur the transport costs.

AERO4GEN PARTS LIST

FILE A4PARTS



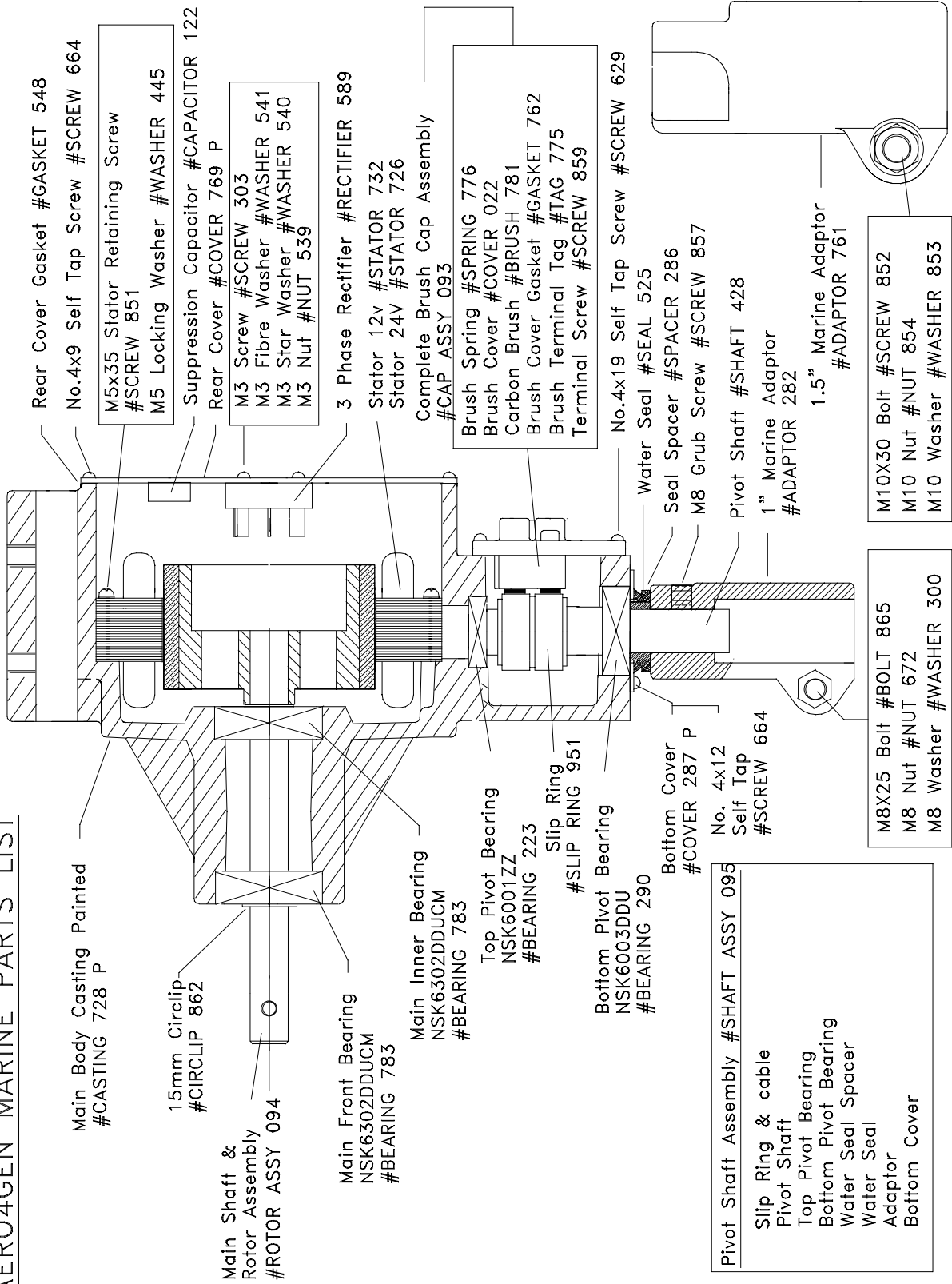
THE BLADES SUPPLIED WITH THE GENERATOR ARE A MATCHED SET.

ANY REPLACEMENTS SHOULD BE ORDERED QUOTING PT. NO. BLADE 005 AND THE BLADE WEIGHT WHICH IS SHOWN BELOW. HOWEVER 2 BLADES OF THE SAME WEIGHT (ANY WEIGHT) CAN BE FITTED PROVIDING THEY ARE REPLACED OPPOSITE EACH OTHER. IN AN EMERGENCY FOLLOWING THE BREAKAGE OF ONE BLADE, REMOVE OPPOSITE BLADE AND THE UNIT WILL RUN BALANCED. THE FAN ASSEMBLY WILL RUN WITH 3 OR EVEN 2 BLADES.

BLADE WEIGHT (GRAMS)

AERO4GEN MARINE PARTS LIST

FILE NAME A4SECPN



- Rear Cover Gasket #GASKET 548
- No.4x9 Self Tap Screw #SCREW 664
- M5x35 Stator Retaining Screw #SCREW 851
- M5 Locking Washer #WASHER 445
- Suppression Capacitor #CAPACITOR 122
- Rear Cover #COVER 769 P
- M3 Screw #SCREW 303
- M3 Fibre Washer #WASHER 541
- M3 Star Washer #WASHER 540
- M3 Nut #NUT 539
- 3 Phase Rectifier #RECTIFIER 589
- Stator 12v #STATOR 732
- Stator 24V #STATOR 726
- Complete Brush Cap Assembly #CAP ASSY 093
- Brush Spring #SPRING 776
- Brush Cover #COVER 022
- Carbon Brush #BRUSH 781
- Brush Cover Gasket #GASKET 762
- Brush Terminal Tag #TAG 775
- Terminal Screw #SCREW 859
- No.4x19 Self Tap Screw #SCREW 629
- Water Seal #SEAL 525
- Seal Spacer #SPACER 286
- M8 Grub Screw #SCREW 857
- Pivot Shaft #SHAFT 428
- 1" Marine Adaptor #ADAPTOR 282
- 1.5" Marine Adaptor #ADAPTOR 761
- M10X30 Bolt #SCREW 852
- M10 Nut #NUT 854
- M10 Washer #WASHER 853

- Main Body Casting Painted #CASTING 728 P
- 15mm Circlip #CIRCLIP 862
- Main Shaft & Rotor Assembly #ROTOR ASSY 094
- Main Front Bearing NSK6302DDUCM #BEARING 783
- Main Inner Bearing NSK6302DDUCM #BEARING 783
- Top Pivot Bearing NSK6001ZZ #BEARING 223
- Slip Ring #SLIP RING 951
- Bottom Pivot Bearing NSK6003DDU #BEARING 290
- Bottom Cover #COVER 287 P
- No. 4x12 Self Tap #SCREW 664
- M8X25 Bolt #BOLT 865
- M8 Nut #NUT 672
- M8 Washer #WASHER 300

- Pivot Shaft Assembly #SHAFT ASSY 095
- Slip Ring & cable
- Pivot Shaft
- Top Pivot Bearing
- Bottom Pivot Bearing
- Water Seal
- Adaptor
- Bottom Cover

STOPPING AEROGENS

Your AeroGen is designed for continuous operation and to withstand storms. However, you may wish to stop the fan assembly from turning and then secure it with rope if violent storms are forecast as flying debris can cause blade breakage.

You can stop or slow down the fan assembly from turning manually or electrically.

MANUAL STOPPING

The Aero4gen and Aero6gen tailfin has a hole into which should be fixed a small rope loop. The unit can then be pulled out of the wind using a hook attached to a long handle. The blades will slow down. They should then be firmly secured with rope.

ELECTRICAL STOPPING

A double pole on/off/on switch should be fitted as shown in the wiring diagram below. This will short circuit the AeroGen output and the fan assembly will stop or slow down considerably. You should then firmly secure the blades with rope.

The switch can be left in the parked position whilst the blades are secured.

WARNING - THE BRAKE SWITCH SHOULD ONLY BE USED TO STOP/SLOW DOWN THE FAN ASSEMBLY PRIOR TO SECURING WITH ROPE - IT SHOULD NOT BE USED AS A PERMANENT PARKING MECHANISM.

The AeroGen should always be stopped and the blades secured, its output disconnected from the battery or regulator before carrying out maintenance working on it.

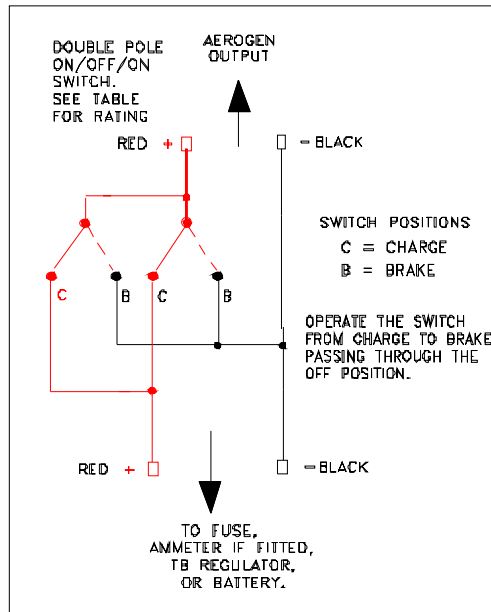
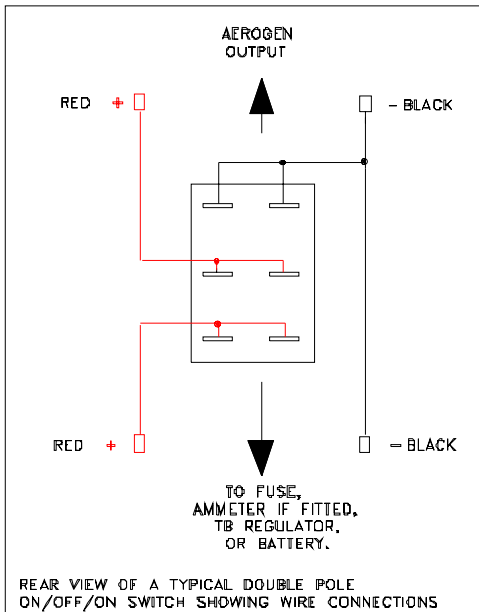
NOTE 1.

NEVER SIMPLY SHORT THE AEROGENS OUTPUT WIRES WITHOUT FITTING A DOUBLE POLE ON/OFF/ON SWITCH AS BATTERY CABLES COULD BE SHORTED BY MISTAKE. SERIOUS PERSONAL INJURY COULD RESULT, AND EQUIPMENT DAMAGED.

NOTE 2.

THE ON/OFF/ON SWITCH MUST NOT BE LEFT IN THE OFF POSITION. THE OFF POSITION IS ONLY REQUIRED TO GIVE THE SWITCH CONTACTS GOOD ELECTRICAL SEPARATION.

BRAKE SWITCH WIRING DIAGRAM



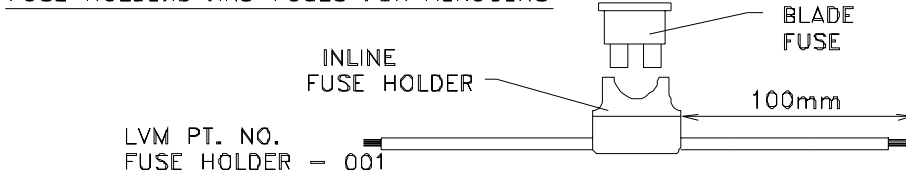
SWITCH RATING TABLE

AEROGEN MODEL	RATING
212	5A @12V DC
224	3A @24V DC
412	15A @12V DC
424	10A @24V DC
412F	15A @12V DC
424F	10A @24V DC
612	20A @12V DC
624	15A @24V DC
612F	20A @12V DC
624F	15A @24V DC

NOTE - A BRAKE SWITCH MUST ONLY BE USED IN THE AIR MODE WHEN FITTED TO THE AQUA4EROGEN. NEVER FIT A BRAKE SWITCH TO AN AQUAGEN IN WATER TOW MODE.

A 20 AMP DOUBLE POLE ON/OFF/ON SWITCH SUITABLE FOR ALL AEROGEN MODELS
LVM PT. NO. SWITCH-020

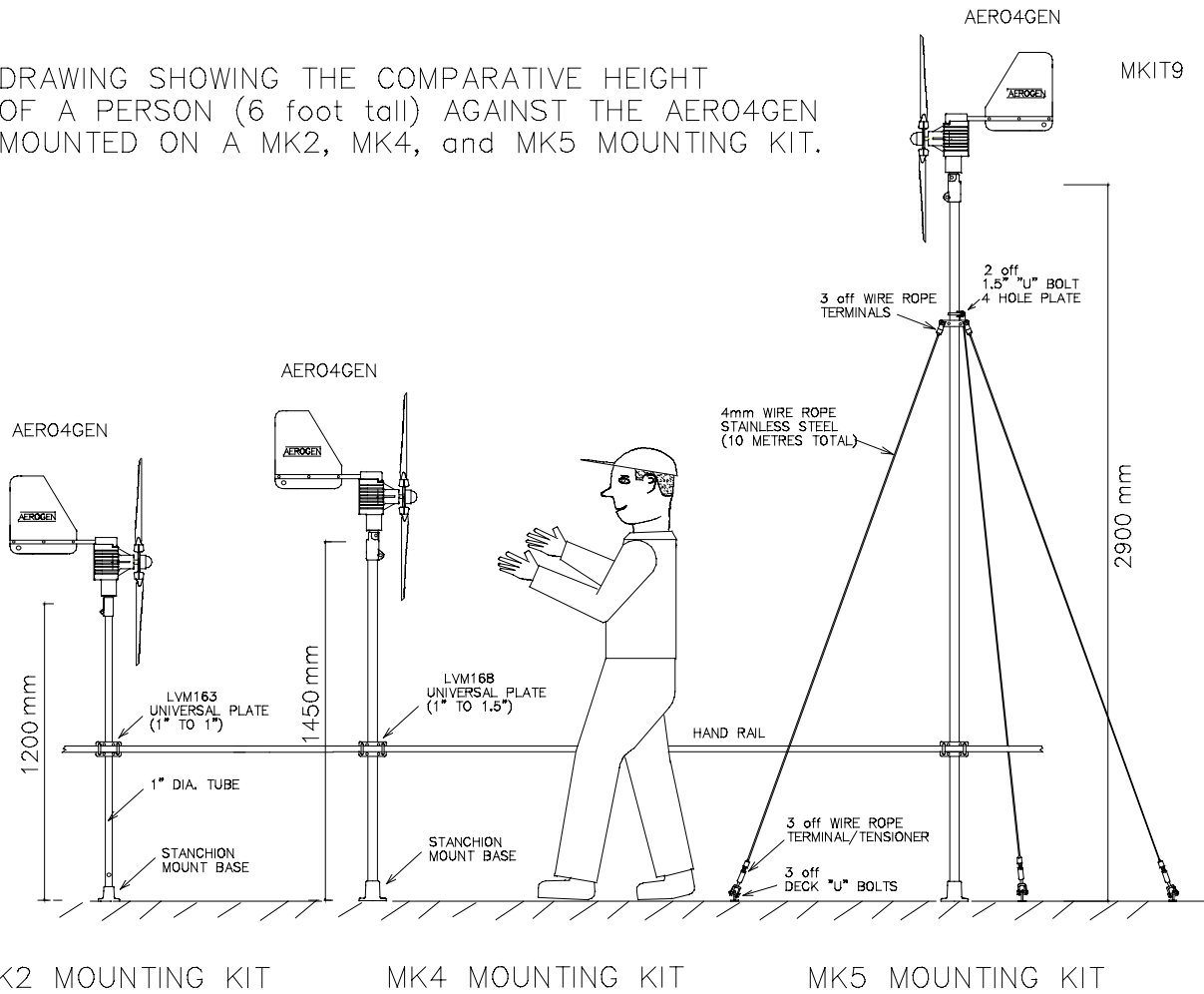
FUSE HOLDERS AND FUSES FOR AEROGENS



FUSE RATING	LVM PT.NO.
5 Amp	FUSE - 005
15 Amp	FUSE - 015
20 Amp	FUSE - 020
30 Amp	FUSE - 030

Aero4gen mounting kits

DRAWING SHOWING THE COMPARATIVE HEIGHT OF A PERSON (6 foot tall) AGAINST THE AERO4GEN MOUNTED ON A MK2, MK4, and MK5 MOUNTING KIT.



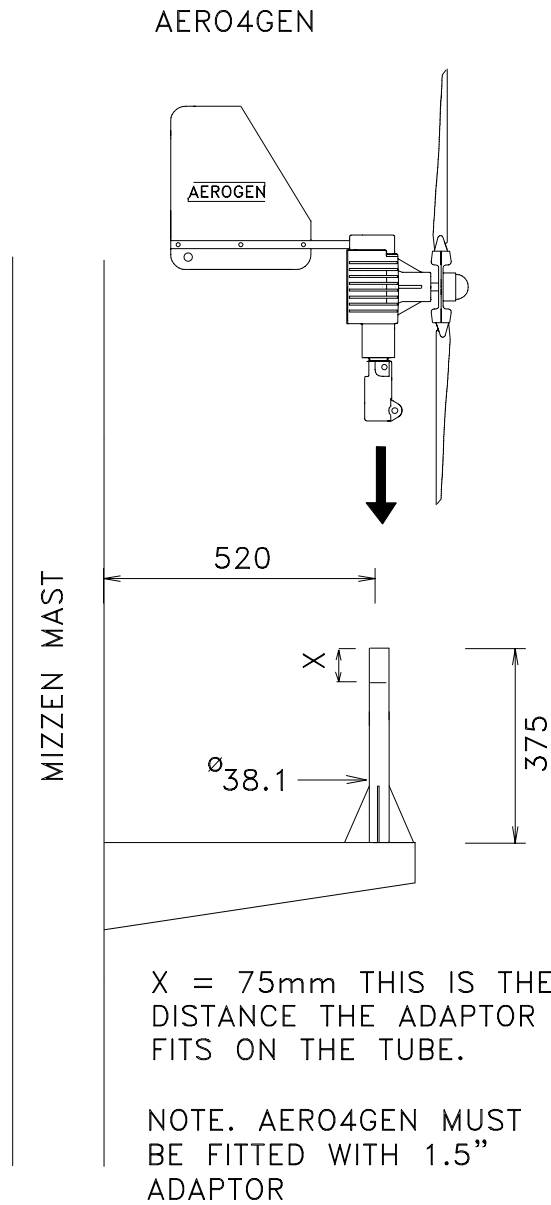
NOTE : THE AERO4GEN MUST BE FITTED WITH A 1.5 inch ADAPTOR.

Mk2 Mounting kit includes –
 1x 1" O.D. Stainless steel tube 1200mm long
 1 x 1" Stanchion mount base
 1 x 1" to 1" Universal plate

Mk4 Mounting kit includes –
 1 x 1.5" Stainless steel tube 1450mm long
 1 x 1.5" Stanchion mount base.
 1 x 1" to 1.5" Universal plate

Mk6 Mounting kit includes --
 1 x 1.5" O.D. Stainless steel tube 2,900mm long
 1 x 1.5" Stanchion mount base
 1 x 1" to 1.5" Universal plate
 10 Metres of 4mm Dia. Stainless steel wire rope
 3 x Wire rope terminal/tensioners
 3 x Wire rope terminals
 3 x Deck 'U' bolts
 2 x 1.5" U bolts
 1 x 4 hole plate

KEY DIMENSIONS WHEN CONSTRUCTING A MIZZEN MAST MOUNTING



TROUBLE SHOOTING

The AERO4GEN is design to give many years of reliable service as it contains really only two moving parts and one electronic component; they are the permanent magnet rotor, the slipring brush assembly and a rectifier. The only parts that can wear are: Main bearing ball races, pivot shaft ball races, and the carbon brushes which make contact with the sliprings. For safety reasons fan blades are designed to brake off if by accident an arm or hand is caught in the fan.

SIMPLE TEST

A simple test to prove there is an output voltage from the generator can be carried out whilst the generator is in it's working position. Disconnect the generators output cable from the battery, or the TB regulator if fitted. With the fan turning in the wind and the two output leads open circuit, allow the fan to build up speed, then touch the two output leads together (shorting them) the fan should noticeably slow down and act as a brake. If this does not happen, check that your extension wire connection from the actual generators output cables are not corroded or have become disconnected. If there is a fuse fitted in the output cable check it has not blown.

The above test can also be carried out by turning the generators main shaft by hand (any direction) to check the braking action.

Note: Although the instruction sheets supplied with the generator warns you not to run the generator in an open circuit condition the tests can be carried out safely at wind speeds of up to 20 knots.

(The reasons we do not recommend generators be left in an open circuit condition is that at very high wind speeds the suppression capacitors maximum voltage may be exceeded and destroy them.

The following tools and equipment will be needed to carry out tests and repairs to the generator.

A multimeter which can read 0 - 100 volts DC, measure resistance, have a diode test, and a continuity (buzzer test).

Pozi drive screwdriver.

Circlip pliers.

Soldering iron and solder.

Hammer.

Piece of hardwood, and a brass rod 12mm diameter X 250mm long or similar.

For pivot bearing replacement, a bench vice will be required.

MEASURING OUTPUT VOLTAGE

With the generator in its operating position, disconnect the generators output cable from the battery or the TB regulator if fitted, and attach a multimeter set on 0 - 100 volts dc range to the two output leads.

The following open circuit voltages should be obtained at the wind speeds shown below. It is most important that the wind speed is measured at the same height the wind generator is mounted.

12v Model

6 knots = 12v 10 Knots = 25v 15 knots = 35v 20 knots = 47v

24v Model

6 knots = 24v 10 Knots = 50v 15 knots = 70v 20 knots = 94v

If you have a lathe or some other means of turning the main shaft at a known RPM a 12v model produces 0.06v per rev. and a 24v model 0.12v per rev.

If no voltage is present, check that your extension wire connection from the actual generators output cables are not corroded or have become disconnected. If there is a fuse fitted in the output cable check it has not blown. Check output voltage again at the generators actual output cable. If there is still no voltage output, go to the instructions and tests listed under heading NO OUTPUT.

REDUCED OUTPUT

Check blades are set at the correct angle, and the concave side (hollow side) of the blade faces the wind.

The main shaft of the generator should turn freely, however there will always be a slight resistance, which is called the cogging effect. To check the starting torque/cogging effect of the generator is correct Sellotape 2 - 3 pound coins. (20 - 30 grams) on the tip of a blade. Set this blade by turning the fan till it is horizontal, let go of the blade and the fan should just start to turn. If the fan turns ok as described above, then follow instructions under heading NO OUTPUT, with particular attention to the rectifier test. If the fan did not turn as described in the test above, follow the instructions and tests listed under headings KNOCKING/SCRAPING SOUND ONCE PER REVOLUTION, GENERAL MECHANICAL CONTINUOUS NOISE, and NO OUTPUT.

NO OUTPUT

Remove the generator from mounting, taking off the tailfin and fan assembly. Remove the rear cover (6 off screws) and hinge back cover. A component called a rectifier that converts the 3 Phase A/C output voltage of the stator into D.C volts is mounted on the inside of the cover. (Note later models have also suppression capacitors soldered to the rectifier.) Disconnect the 3 push fit connectors (output wires from stator) which are attached to the centre terminals of the rectifier. No need to remember which order or terminal they come from, as they can fit on any of the 3 centre terminals. Using a multimeter set on resistance measurement (ohms) check the resistance in turn of the of 3 output wires (in pairs) from the stator. They should read 1.6 ohms 12v model, 6.5 ohms 24v model.

CHECKING A/C OUTPUT VOLTAGE OF STATOR

Set the multimeter to read A/C volts, attach test leads to the 3 off stator output wires (in pairs) then turn the main shaft of the generator by hand (any direction) small voltage should be indicated on the multimeter. Check the stator and suppression capacitors do not look burnt or overheated. Check tightness of stator retaining screws. If at any time the generators output leads have ever been connected to battery terminals the wrong way round, or the generator has been struck by lightning then the rectifier may be have been damaged.

RECTIFIER TEST

Readings taken of a Good Rectifier.

Set a multimeter to diode test, then check: -

1. Disconnect all connectors from the rectifier.
2. Attach the red test lead from multimeter to the + plus terminal of the rectifier, attach the black test lead to the - negative terminal. RESULT No Reading.
3. Reverse the test leads i.e. attach the red test lead to the - negative terminal of the rectifier then the black test lead to the + plus terminal. RESULT 0.8 - 0.9 volts
4. Connect the test leads to the 3 centre terminals of the rectifier in pairs. RESULT No Reading.

Readings taken of a Faulty Rectifier.

1. Disconnect all connectors from the rectifier.
2. Attach the red test lead from multimeter to the + plus terminal of the rectifier, attach the black test lead to the - negative terminal. RESULT 0 Volts
3. Reverse the test leads ie. attach the red test lead to the - negative terminal of the rectifier then the black test lead to the + plus terminal. RESULT 0 Volts
4. Connect the test leads to the 3 centre terminals of the rectifier in turn in pairs. RESULT 0 Volts

If in doubt about the condition of the rectifier, replace with a new one. Refit the 3 off 3 phase stator output leads to the centre terminals of rectifier.

Set the multimeter to read DC. volts. Attach the red test lead of the multimeter onto the + plus terminal of the rectifier, then the black test lead onto the - negative terminal. Turn the main shaft of the generator by hand (any direction) this should indicate a voltage on the multimeter. Refit Red and Black DC. output leads from the rectifier. Refit rear cover using a new gasket make sure all wires are clear of the rotor.

CHECKING SLIPRINGS AND BRUSHES

Remove the brush cover assembly (4 screws). Hinge back brush cover assembly leaving the red and black wires attached. Check the condition of the sliprings and clean them if necessary. Check the spring-loaded carbon brushes are clean and are free to move in the brush holder. Set a multimeter to continuity check (buzz test). Check there is continuity between the top carbon brush and the positive + terminal of the rectifier, then check there is continuity between the bottom carbon brush and the negative terminal of the rectifier.

Check there is continuity between the top slipring and the red output cable of the generator.

Then check there is continuity between the bottom slipring and the black output cable of the generator.

If no continuity is found on one or both output leads, check the soldered joint on the slipring. Resolder if necessary.

Set multimeter to read 0-15 volts DC connect test leads of multimeter to the brushes top brush is (Positive +) bottom brush is (Negative -) turn generator main shaft by hand in any direction. If a voltage is present then refit brush cover using a new gasket. Attach the test leads of the multimeter to the output wires of the generator, then turn main shaft again to check a voltage is present.

KNOCKING/SCRAPING SOUND ONCE PER REVOLUTION

Whilst the generator is in it's working position, check that the M6 allen screw which retains the fan assembly to the main shaft is fully tightened. Also check tightness of all other fasteners on the fan assembly, mounting adaptor and tailfin.

Remove rear cover and check the condition of the rotor, it may be rubbing on the stator.

Inner main bearing could be worn, check for axial and radial movement. Check the tightness of the 4 off M5 stator retaining screws, this can cause a noise if slightly loose.

GENERAL MECHANICAL CONTINUOUS NOISE

Remove fan and check axial and radial play in the main front bearing. Remove rear cover and check inner main bearing in the same manner. If large amount of play is found replace main bearings.

Follow instructions listed REPLACING MAIN BEARINGS.

GENERAL ELECTRICAL VIBRATION NOISE

It is normal for the Aero4gen to produce a very slight magnetic cogging vibration when rotating, and an electrical vibration whilst charging. This noise will be greatly amplified if the Aero4gen is mounted on a very hollow section of a yacht/boat. If mounted directly over sleeping quarters it may well be necessary to stop the Aero4gen at night.

Well-known methods that can reduce vibration noise are listed below.

1. Rubber mount as many fixings within the system as possible.
2. Insert round insulation material (the type you fit around cold water pipes to stop them freezing during winter) into the bore of the 1.5" mounting tube. (15mm pipe sized insulation normally fits just perfect).
3. Coil a length of rope around the outside diameter of the mounting tube (full length).

SLIGHT ELECTRIC SHOCK FROM HAND RAIL

Remove the generator from mounting, taking off the tailfin and fan assembly. Remove the rear cover (6 off screws) and hinge back cover. Using a multimeter set on continuity/buzzer test, check the 3 Phase output wires from the stator assembly do not have continuity with the main casting.

i.e. The casting/main housing of the generator should be totally isolated from the electrical output of the generator.

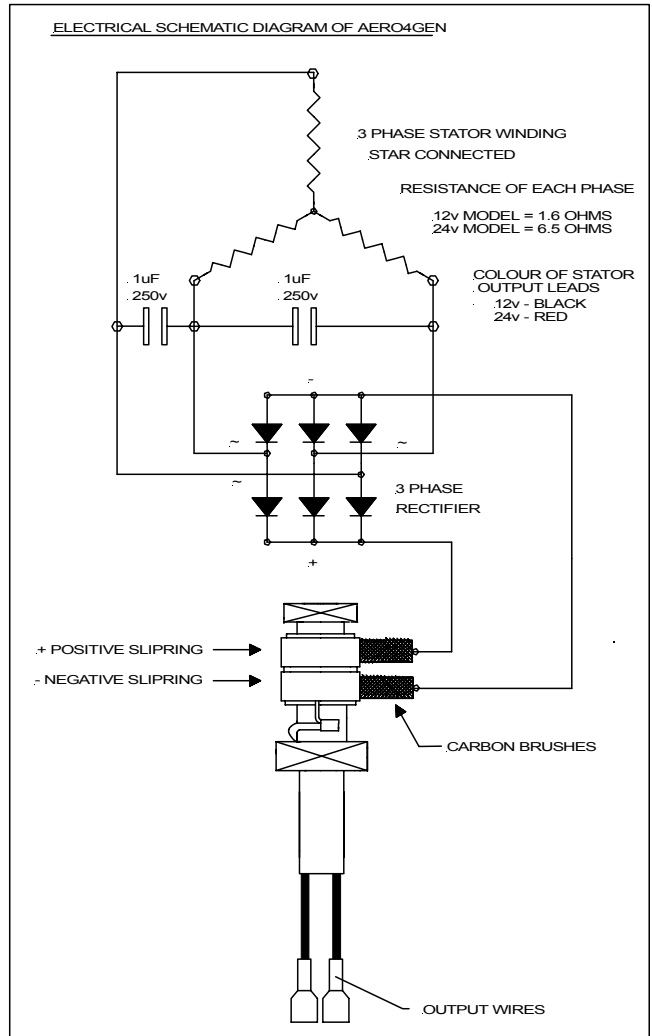
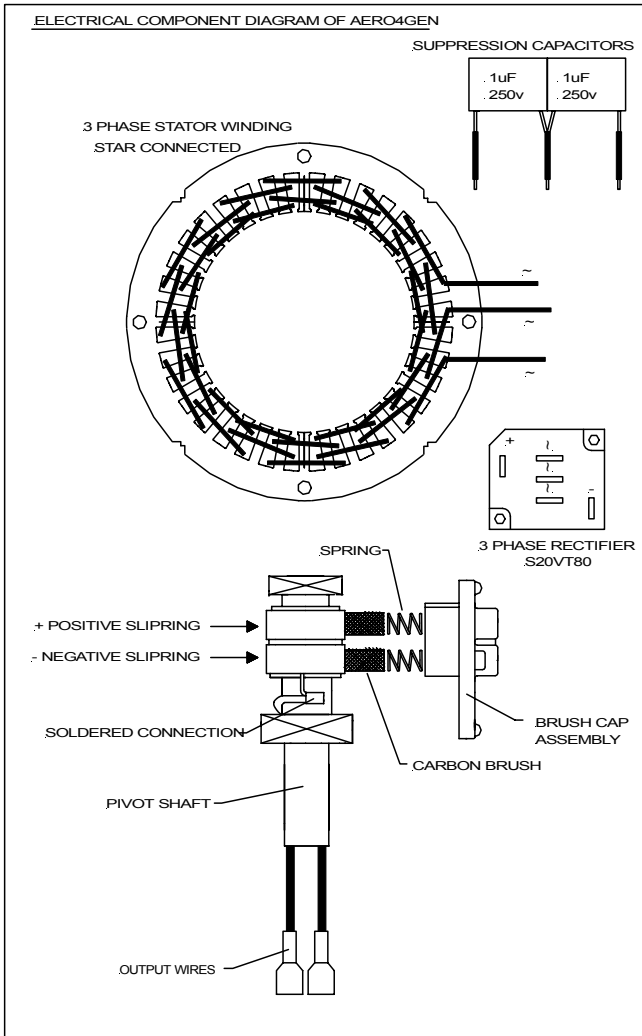
If they do have continuity a new stator assembly must be fitted - contact LVM.

REPLACING PIVOT BEARINGS

Remove the generator from it's mounting, taking off the tailfin and fan assembly. Remove adaptor (M8 grub screw), and brush cover. Remove bottom cover (2 screws).

Clamp the pivot shaft in a vice, using jaw protectors so as not to damage the pivotshaft. Then using a hammer against a piece of wood to protect the casting paintwork, tap out pivotshaft assembly by hitting the base of the casting.

The bearings can now be removed from the pivotshaft. Use Loctite bearing fit when refitting the new bearings to the pivot shaft, and to the generator housing. Apply silicone sealant to the bottom cover, and the output wires within the adaptor when reassembling the pivot shaft assembly. Refit brush cover using a new brush cover gasket.



INSTRUCTIONS FOR REMOVING AND REPLACING MAIN BEARINGS (AERO4GEN)

Parts required:

2 off - Main bearings	LVM Part No. Bearing 783
1 off - Rear cover gasket	LVM Part No. Gasket 548
2 off - Circlips 15mm	LVM Part No. Circlip 862
6 off - Rear cover retaining screws	LVM Part No. Screw 664
1 off - Small amount of Loctite 638 in tube.	

Tools required: Hammer, Circlip pliers, Pozi drive screwdriver, Piece of hardwood, and a brass rod 12mm diameter X 250mm long or similar.

1. Disconnect output leads, and remove generator from mast. Remove fan, and tailfin assembly.
2. Remove the front circlip on the main shaft.
3. Remove 6 off self-tapping screws retaining the rear cover.
4. Place a piece of hard wood on a concrete floor. Holding the generator with the rear cover held back and main shaft downwards, lift and force downwards the generators main shaft onto the piece of hard wood. This should displace the main shaft inwards. Alternatively the main shaft can be pressed out, or hammered out, but take care not to bruise the end of main shaft.
5. The main shaft/ rotor assembly should now have moved inwards into the main housing.
6. Using a piece of brass rod, or similar, so as not to damage the end of the main shaft - tap the shaft through both the bearings and remove rotor assembly from the rear of the main housing.
7. Having removed the rotor from casting. Check the main shaft for wear, particularly the areas the main bearings are positioned. If the shaft wear is found to be excessive a new shaft will have to be fitted. Contact LVM Ltd.
8. Using the brass rod and a hammer knock out the main bearings from the casting.
9. Refit new main bearings using a little Loctite Bearing Fit smeared on the O.D. of the bearings.
10. Clean the main shaft, then clean the rotor magnet with sellotape (sticky side) to remove small pieces of steel pickup.
11. Smear a little Loctite Bearing Fit onto the main shaft close to the rotor, and in the bore of the outer main bearing.
12. Insert the main shaft/rotor assembly into the generator main bearings. **WARNING!** The rotor magnets are very powerful and will quickly draw the assembly into the stator. When the main shaft/rotor assembly is fully inserted check it rotates without rubbing.
13. Smear a little Loctite Bearing Fit on the outer main bearing inner race to shaft. i.e. between the O.D. of the shaft and the I.D. of the inner race. Push the main shaft in and out a little to spread the Loctite between the outer main bearings bore and the main shaft.
14. Fit new circlip
15. Refit rear cover using a new gasket, make sure all internal wiring is clear of the rotor.

SELECTING THE CORRECT LVM VOLTAGE REGULATOR

The output of the Aero4gen can be simply connected directly to the terminals of the battery that requires charging, however, if the terminal voltage of the battery is not continually monitored for over voltage (14.2v for 12v batteries) and (28.4v for 24v batteries) the battery can be seriously damaged. Fitting an LVM voltage regulator will protect the battery from becoming over charged.

TEMPERATURE COMPENSATION - This additional feature is available on all LVM regulators. If the battery is located in a building where the ambient temperature is always around 20 deg.C then standard regulators can be used. However if you intend to locate a battery where temperatures may go down to freezing and perhaps rise to tropical temperatures then you should install a regulator that is fitted with a temperature compensation circuit. This automatically allows the battery to be charged at a higher voltage as the temperature drops, and a lower voltage if the temperature increases. Simply add (-T) after the LVM Product No. ie. 4SB12 -T.

There are two types of regulator suitable for the Aero4gen –

1. **Single battery regulator** - LVM Product No. 4SB12, 4SB24 - These units are simply connected to the battery terminals, and if the battery voltage reaches 14.2v (12v systems) or 28.4 (24v systems) the regulator diverts power to a high wattage wire wound dump resistor. This regulator should NOT be used if you have any other form of charging system connected to the battery ie. Mains charger/ shore power, engine driven alternator.
THESE REGULATORS ARE NOT SUITABLE FOR YACHT INSTALLATIONS.
 Note: These regulators draw a continuous small standby current of around 10mA – 15mA.

2. **Twin battery regulators** – LVM product No. 4TB12, 4TB24 - These units are connected between the output of the Aero4gen, Aquagen or Solargen module and the battery terminals. They control the actual output voltage of Aero4gen, Aquagen or Solargen by diverting power to a high wattage wire wound dump resistor when their output voltage reaches 14.2v (12v systems) or 28.4 (24v systems). They have two schottky blocking diodes built into the regulator which enables them to monitor and control the charge to two batteries totally independent of each other, therefore making it ideal for separate charging of engine starting and domestic batteries. The battery with the lowest terminal voltage will be charged first, then gradually when both batteries become fully charged the Aero4gen, Aquagen or Solargen modules output is automatically diverted to the dump resistor, this does two things it stops the batteries over charging and keeps the generator always on load.
 Note: These regulators draw NO standby current from the battery.
THESE REGULATORS ARE SUITABLE FOR YACHT INSTALLATIONS

Also available from LVM Products - Diode Units – LVM product No. 4DU, 6DU

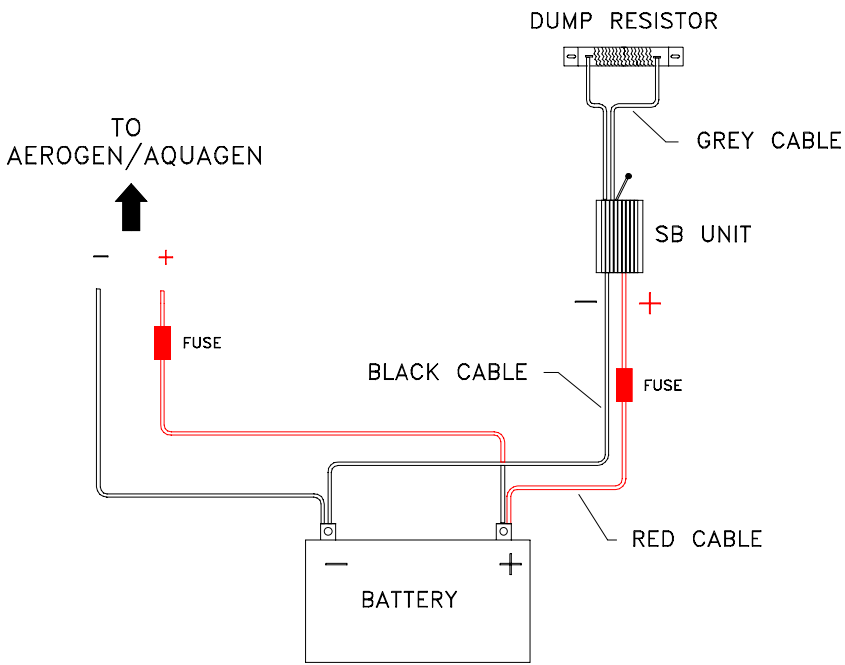
The 4DU when combined with a 2TB or 4TB regulator enables one additional battery to be charged.

The 6DU when combined with a 4TB regulator enables two additional batteries to be charged.

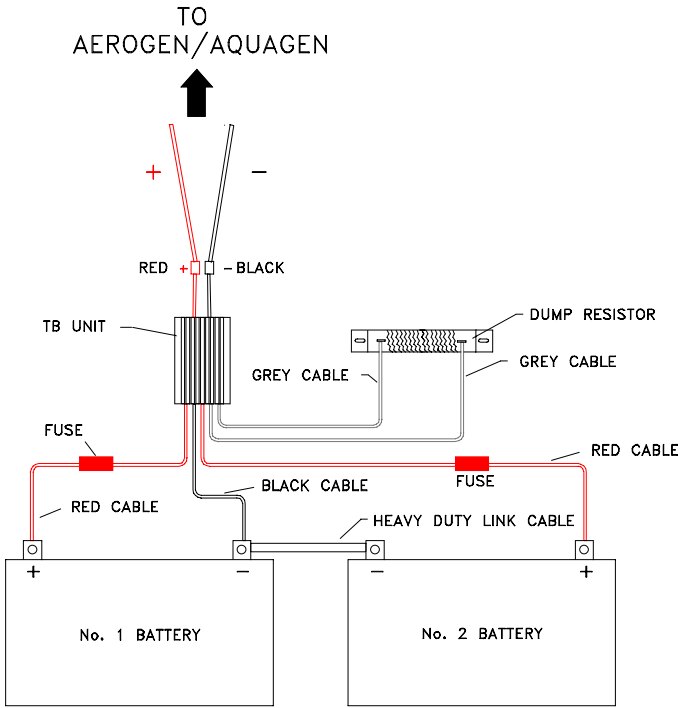
The Aero4gen and a Solargen modules output may often be combined, the table below shows the recommended regulator for various systems. Note: Two batteries wired in parallel are classed as one independent battery. Having selected the recommended regulator model from the table simply add the voltage required ie. 4TB12 for a 12v system or 4TB24 for a 24v system. Basic wiring diagrams are shown on page 18. If you cannot find your particular system or application within the table or require full wiring diagrams please check our web site www.lvm-ltd.com or call our sales office who will e-mail, fax or post you copies.

VOLTAGE REGULATOR TABLE

SYSTEM	Number of independent batteries to be charged			
	1	2	3	4
1 x Aero4gen	4SB or 4TB	4TB	4TB + 4DU	4TB + 6DU
1 x Aero4gen + 5w Solargen panel	4SB or 4TB	4TB	4TB + 4DU	4TB + 6DU
1 x Aero4gen + 10w Solargen panel	4SB or 4TB	4TB	4TB + 4DU	4TB + 6DU
1 x Aero4gen + 17w Solargen panel	4SB or 4TB	4TB	4TB + 4DU	4TB + 6DU
1 x Aero4gen + 25w Solargen panel	4SB or 4TB	4TB	4TB + 4DU	4TB + 6DU
1 x Aero4gen + 25w+10w Solargen panel	4SB or 4TB	4TB	4TB + 4DU	4TB + 6DU
1 x Aero4gen + 25w+25w Solargen panel	4SB or 4TB	4TB	4TB + 4DU	4TB + 6DU
1 x Aero4gen + up to 60w Solargen panels	4SB or 4TB	4TB	4TB + 4DU	4TB + 6DU



SINGLE BATTERY VOLTAGE REGULATOR WIRING DIAGRAM



TWIN BATTERY VOLTAGE REGULATOR WIRING DIAGRAM