

**INSTALLATION,  
OPERATION, &  
MAINTENANCE  
MANUAL**

**FOR**

**AQUA-JET AERATORS**

*Amanda - Parts & Service*

*PH 815 654 2501  
FAX 815-654-2508*

**Aqua-Aerobic Systems  
6306 N. Alpine Rd.  
Rockford, Ill. 61111**



<u>PROBLEM</u>	<u>POSSIBLE CAUSE</u>	<u>SUGGESTED PROCEDURE</u>
Unit fails to start	Faulty wiring at motor junction box or loose connections	Check wiring diagram on motor nameplate against connections in junction box and connectors
Unit fails to start	Faulty wiring at control panel or loose connections	Check wiring in control panel
Unit fails to start	Improper fuses or heaters	Check fuses and heater for proper sizes
Motor starts but very poor discharge	Miswired, either at panel or most likely at motor	Check wiring at motor and panel
Motor starts but very poor discharge	Wrong direction of rotation	Reverse any two of the three phases--not ground
Motor starts but very poor discharge	Something affecting propeller, such as debris	Reverse motor for 3-5 seconds, stop, reverse again for 3-5 seconds. Change to proper rotation and try to start again. No results--check unit physically and remove any debris--if any. KEEP BASIN CLEAN AND FREE FROM DEBRIS.
Motor heater trips out	Faulty wiring	Check all wiring for shorts and loose connections
Motor heater trips out	Wrong heaters in the starter	Check for proper sizing
Motor heater trips out	Debris affecting propeller	Proceed as in above section
Motor heater trips out	Overheated control panel	Apply ambient compensating heaters and ventilate panels. Protect panel from direct sunlight in non-ventilated area.
Motor heater trips out	Bearing going bad	Check motor bearings
Motor heater trips out	Lost intake cone	Check to see if cone is in place
Uneven discharge of liquid	Debris on propeller or on motor support up-rights	Reverse and jog on and off as in above procedure. No results--physically inspect unit.
Unit not floating level	Uneven tension on mooring cables	Adjust mooring cable evenly
Unit not floating level	Unnecessary pull on power cable	Reduce pull by adjusting power cable location as required
Unit moving around in its location	Debris on propeller	Reverse and jog on and off as in previous procedure
Unit moving around in its location	Mooring line too loose	Adjust lines to proper tension (just snug--not taut)

INDIVIDUAL AERATOR DATA.....	1
GENERAL.....	2
WARRANTY.....	3
1.0 RECEIVING AND HANDLING	
1.1 Receiving.....	4
1.2 Handling.....	4
2.0 ASSEMBLY	
2.1 Stainless Steel Aerators.....	4-5
2.1.1 Pre-Assembled Units.....	4
2.1.2 Sectional Units.....	4-5
2.2 TFNI Units.....	5-8
2.2.1 Subassemblies.....	5
2.2.2 TFNI Assembly Instructions.....	6-7
2.2.3 General Notes on TFNI Assembly.....	7-8
2.3 UFNI Units.....	8-10
2.3.1 Subassemblies.....	8
2.3.2 UFNI Assembly Instructions.....	8-10
3.0 MOORING UNIT INTO POSITION	
3.1 New Basin.....	10
3.1.1 Bottom Mooring Points.....	10
3.1.2 Shore Mooring Points.....	10
3.2 Existing Basin.....	10-11
3.2.1 Bottom Mooring Points.....	10-11
3.2.2 Shore Mooring Points.....	11
4.0 MOORING CABLES.....	11
5.0 ELECTRICAL CABLE.....	11
6.0 WIRING INSTRUCTIONS	
6.1 General.....	11-12
6.2 Wiring the Motor.....	12-13
7.0 INSTALLATION.....	13
8.0 ELECTRICAL CONNECTION AT THE CONTROL PANEL.....	13
9.0 STARTUP.....	13

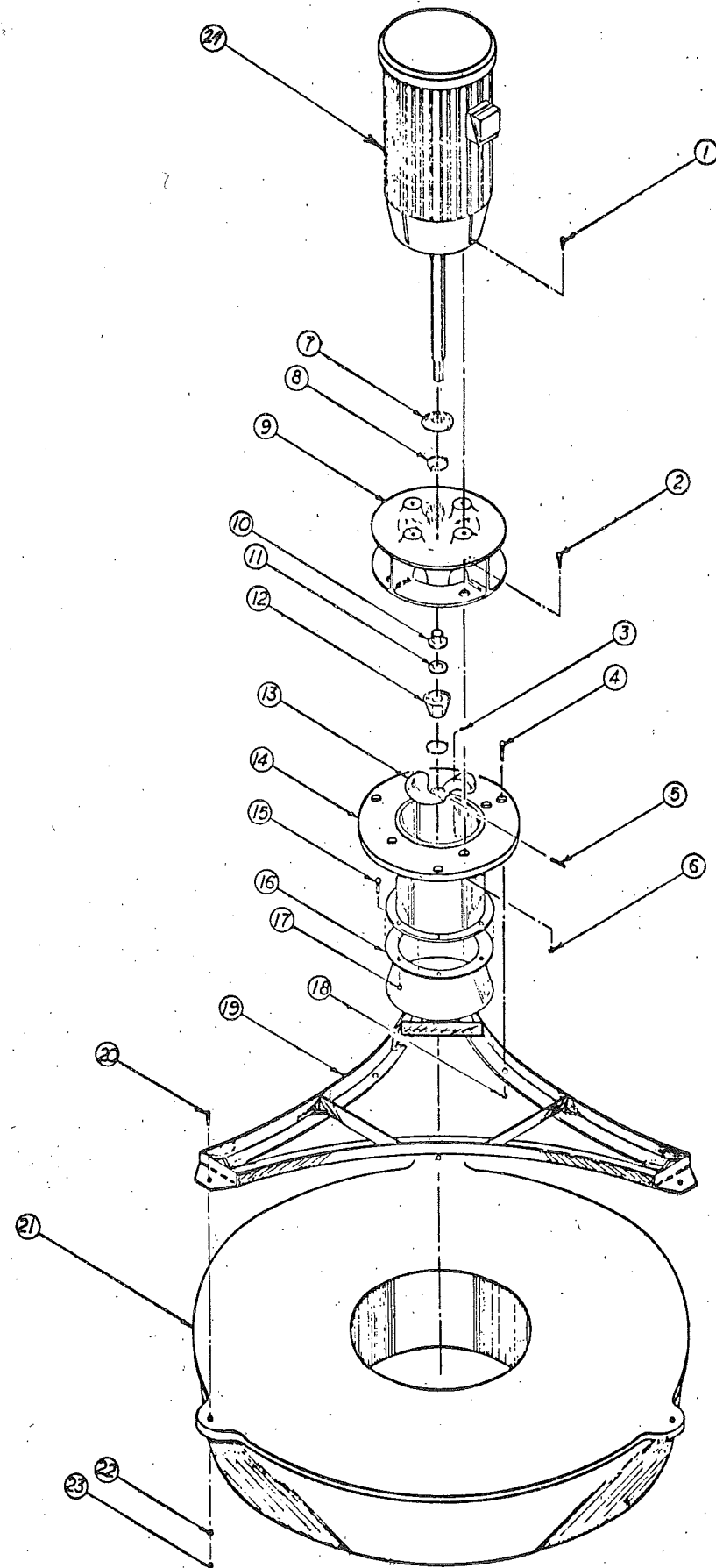
10.0	MOTOR AMPS (POWER CONSUMPTION).....	13-14
11.0	POWER SUPPLY (VOLTAGE).....	14
12.0	ENVIRONMENTAL DEBRIS.....	14
13.0	EFFECTS OF AMBIENT TEMPERATURE ON CONTROL PANEL.....	14-15
14.0	MAINTENANCE.....	15-16
15.0	REPAIR AND SERVICE	
15.1	Removing the Unit from the Basin.....	16
15.2	Disassembly of the Unit.....	16-17
15.3	Motor Service.....	17
15.4	Reassembly of the Unit.....	17-18
15.5	Factory Service Procedure.....	18
16.0	STORAGE	
16.1	Power Section.....	18
16.2	Complete Unit Storage.....	18
16.3	Space Heating.....	18-19
17.0	EXPLODED VIEW OF AERATORS	
17.1	Aqua-Jet Aerator.....	20
17.2	TFNI Aerator.....	21
17.3	UFNI Aerator.....	22
18.0	TROUBLE SHOOTING.....	23

MATERIALS LIST

AQUA-JET AERATOR - UFNI

<u>ITEM</u>	<u>QUANTITY</u>	<u>DESCRIPTION</u>
1	4	Motor Bolts
2	4	Diffusion Head Bolts
3	2	Set Screws
4	3	Volute Bolts
5	1	Propeller Pin
6	4	Diffusion Head Nuts
7	1	Labyrinth Seal Guard
8	4	Hose Clamps
9	1	Diffusion Head
10	1	Anti-Deflection Insert
11	1	Thrust Washer
12	1	Fluid Deflector
13	1	Propeller
14	1	Volute
15	6	Intake Cone Bolts
16	1	Intake Cone
17	6	Intake Cone Nuts
18	3	Volute Nuts
19	1	Support Angle Assembly
20	3	Hold-Down Bolts
21	1	Float
22	3	Washers
23	3	Hold-Down Nuts
24	1	Motor

# U.F.N.I. AQUA JET AERATOR



## AQUA-AEROBIC SYSTEMS

JOB LOCATION \_\_\_\_\_

PROJECT ENGINEER \_\_\_\_\_

CONTRACTOR \_\_\_\_\_

DATE OF SHIPMENT \_\_\_\_\_

SERIAL NUMBERS \_\_\_\_\_

INSPECTOR \_\_\_\_\_

GENERAL

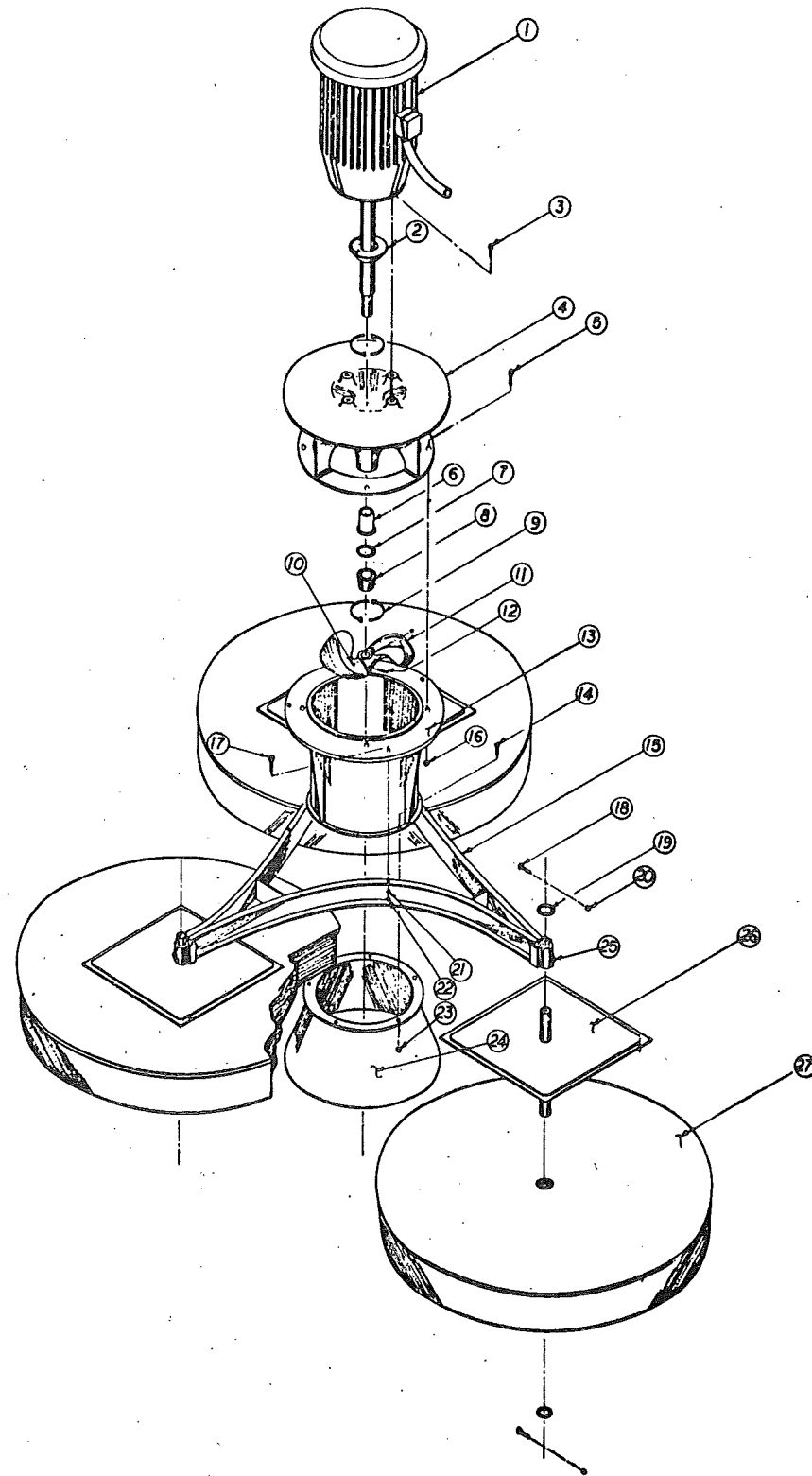
The floating axial-flow aerator is a dependable mechanical device capable of supplying oxygen required in a biological waste treatment system.

The Aqua-Jet aerator is a simple machine. It has few moving parts. The materials of construction and the design of the unit contribute to many years of efficient and reliable service, when maintained in accordance with the manufacturer's recommendations.

The following is intended to provide the user with information that will help keep his equipment in good condition and running smoothly.

MATERIALS LIST  
AQUA-JET AERATOR  
TFNI

<u>Item</u>	<u>Quantity</u>	<u>Description</u>
1	1	Motor
2	1	Labyrinth seal guard
3	4	Motor bolts
4	1	Diffusion head
5	4	Diffusion head bolts
6	1	Anti-deflection insert
7	1	Thrust washer
8	1	Fluid deflector
9	4	Hose clamps
10	2	Set screws
11	1	Propeller
12	1	Propeller pin
13	1	Volute
14	6	Intake cone bolts
15	1	Support beam assembly
16	4	Diffusion head nuts
17	3	Volute bolts
18	6	Pressure plate bolts
19	6	Pressure plate washers
20	6	Pressure plate nuts
21	3	Bevel washer
22	3	Volute nuts
23	6	Intake cone nuts
24	1	Intake cone assembly
25	3	Anchor ring
26	3	Pressure plate assembly
27	3	Floats



WARRANTY

The Aqua-Jet Aerator is warranted to be free from defects in material and workmanship for a period of 18 months from date of original shipment from the factory, or 12 months from date of startup (whichever occurs first). Only Aqua-Aerobic Systems has the authority to honor and adjust all warranty claims and make the final decision pertaining to those claims. Only Aqua-Aerobic Systems' original customer is covered by this warranty. Claims made for unnecessary damage due to abuse or to other than normal service will not be honored. The following conditions will be considered a part of this warranty. The warranty is valid only if:

- (A) Aqua-Aerobic Systems is notified of the claim or problem immediately.
- (B) A report of failure or problem is written and mailed to Aqua-Aerobic Systems.
- (C) Repair or service work is done in accordance with specific instructions from Aqua-Aerobic Systems.
- (D) The unit serial number and the motor serial number is reported with claim and report.
- (E) Claim is accomplished by itemized invoices for repairs and/or service and currently dated.
- (F) Claims show Aqua-Aerobic Systems' "Authorization for Service" and/or repair purchase order number which authorized the repairs or service.

The warranty can be voided by Aqua-Aerobic Systems' decision if:

- (A) The equipment invoice has not been paid in full.
- (B) The equipment was damaged by faulty handling, misapplication, or accident.
- (C) The equipment has been altered or modified without Aqua-Aerobic Systems' approval.
- (D) The equipment was improperly maintained.
- (E) The equipment was not properly protected electrically or mechanically.
- (F) The equipment was damaged during disassembly by unauthorized personnel during the warranty period.
- (G) The equipment was returned by unauthorized method.
- (H) The owner/user/contractor fails to cooperate in determining the cause and/or extent of a failure.
- (I) The equipment is beyond the warranty period.

1.0 RECEIVING AND HANDLING

1.1 Receiving

When receiving Aqua-Jet aerators, the shipment should be checked to see that no transit damage has occurred. Secondly, all units and accessories (if any) should be checked off against the packing list and bill of lading to assure proper contents.

Should any damage or shortage exist, please notify the factory immediately with the complete details. Do not sign any receiving tickets or acceptance papers unless the shipment is in the proper condition and all accessories listed are accounted for.

1.2 Handling

Care must be taken when handling any type of heavy equipment. Careless handling can result in damage to equipment or injury to persons involved.

When loading and unloading on trucks or flatcars, a forklift truck of sufficient size should be used. The lift forks should extend under the float (all the way through), then carefully lift as required. When lifting by crane, pickup should be made via the vertical lift eyes of the motor. (The eyes should be checked to see that they are tight.) When lifting by the eyes, a long lift cable or chain should be used. Short cables and chains can put a cross shear on the lift eyes and break them off. Also, the lift must be equal and level.

2.0 ASSEMBLY

2.1 Stainless Steel Aerators

2.1.1 Pre-Assembled Units

Models 3901S through 3940S (1 HP through 40 HP) are shipped preassembled to the jobsite.

2.1.2 Sectional Units

Models #3950S through 39150S (50 HP through 150 HP) are shipped as subassemblies. Shipment of these units consists of three crated items--the power section, the flotation section, and the intake cone. The intake cone should be bolted to the float section and securely tightened all around the flange. Jam nuts should be applied to lock the regular nuts into position.

It is then necessary to place the float section in an upright (normal) position and lower the power section into position on the

MATERIALS LIST  
AQUA-JET AERATOR

<u>Item</u>	<u>Quantity</u>	<u>Description</u>
1	1	Motor
2	1	Labyrinth seal guard
3	4	Stainless steel bolts
4	1	Diffusion head
5	1	Anti-deflection insert
6	1	Fluid deflector
7	1	Float assembly
8		Foam
9	1	Propeller
10	4	Anchor line bracket
11	2	Set screws
12	1	prop pin
13	4	Stainless steel bolts
14	1	Intake cone
15	1	Anti-erosion assembly (optional)
	1	Plate
	1	Fastener kit
	4	Brackets



float. Be sure to center the propeller in the volute and slowly lower the unit until it sets flush on the parting surface. The float section has an index (male) that engages with the I.D. of the motor base (diffuser). When this fit is made, it is perfectly aligned. Place the base bolts in the holes, tighten them, and safety wire the bolts in place. (The bolt heads are drilled for safety wiring.)

Once the unit is assembled, it is handled in the same fashion as a pre-assembled unit, which was described previously. The units should be lifted in and out of the water by the motor lift eyes. Once they are in the water, they can be floated into place and moored off.

## 2.2 TFNI Units

### 2.2.1 Subassemblies

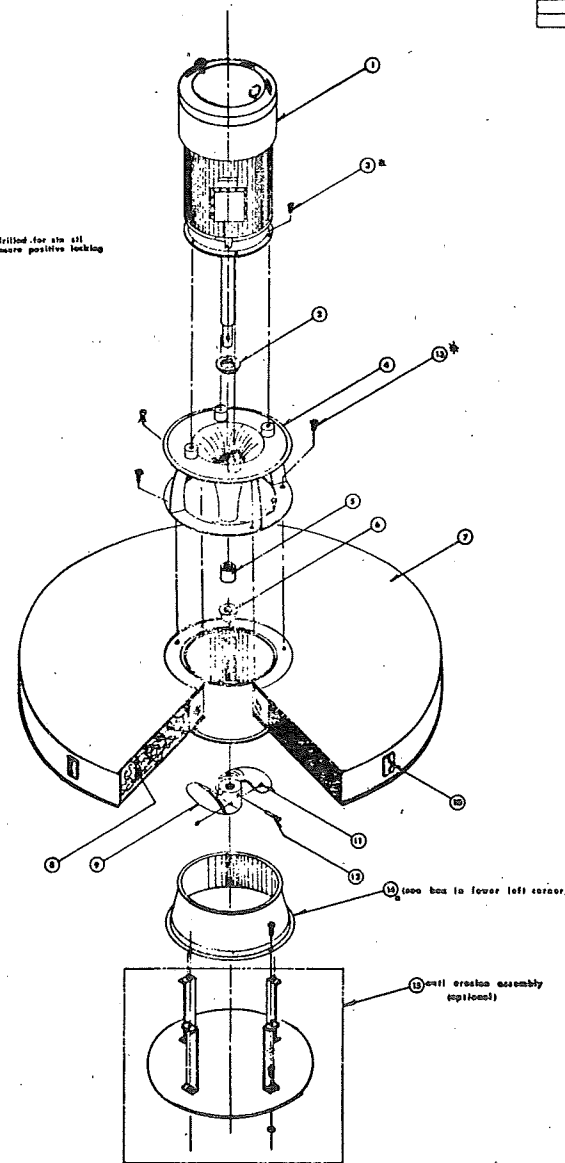
Your TFNI unit will be shipped to you in several subassemblies. Each unit will consist of:

- a) A crated power section/volute assembly bolted together to form one subassembly. You can easily recognize this, as it is the most weighty piece of material included in the package and consists of a motor and two nodular iron castings.
- b) The support beam assembly. This can be recognized by its triangular shape consisting of a triangle formed from channels and/or angles. There will be one beam support assembly per unit.
- c) There will be three pressure plate assemblies for each aerator which are easy to recognize in that they consist of 1/2" plates with the bottom side covered by rubber. Each plate has a short-length pipe welded to the pressure plate extended through the middle of the plate.
- d) Each unit requires three round fiberglass floats.
- e) There will be a flanged intake cone for each unit that is to be bolted to the bottom on the power section and volute assembly.
- f) There will be a box of fasteners--nuts, bolts, washers, etc.--for each unit.

Immediately upon receiving shipment, you should ascertain that you have indeed received the number of items per unit as mentioned above.

ITEM	QTY	PART NO	DESCRIPTION
1	1		motor
2	1		labyrinth seal guard
3	4		sta. stl. bolts
4	1		diffuser head
5	1		anti-diffusion insert
6	1		float diffuser
7	1		float assembly
8	1		flange
9	1		propeller
10	4		anchor line bracket
11	3		set screw
12	1		prop pin
13	4		sta. stl. bolts
14	1		float cone
15	1		anti-erosion assembly (optional)
16	1		plate
17	4		bracket
18	1		fastener box

\* NOTE: bolt heads are drilled for sta. stl. safety wire, to insure positive locking



UNIT	DIFFER	CONSTR	VARIATIONS	CONSTRUCTION
1000	1100	1200	1300	1400
1500	1600	1700	1800	1900
2000	2100	2200	2300	2400
2500	2600	2700	2800	2900

AQUA-AEROBIC SYSTEMS, INC.	
DESIGN: NONE	DRAWN BY: J. J. JONES
DATE: 10/1/77	SCALE: AS SHOWN
PICTORIAL	
TYPICAL AERATOR	QTY NO 2200000

### 2.2.2 TFNI Assembly Instructions

- a) The three pressure plate assemblies should be mounted on the float sections. Each float receives one pressure plate assembly.

To mount this assembly, first tip the float on edge so that you are standing facing the top of the float. The top of the float can be identified as the side that is flanged. The pressure plate assembly should be pushed through the hole in the center of the float so that the long end of the pipe protruding through the pressure plate assembly extends completely through the float and protrudes from the bottom of the float. Working now from the bottom side of the float, a large washer (furnished in the box of fasteners) is placed around the protruding end of the pressure plate assembly pipe on the bottom side of the float; and a bolt (again from the box of fasteners) is installed through the hole drilled in the end of the pipe of the pressure plate assembly and is secured with a lockwasher and a nut (also furnished in the box of fastener materials). The float should then be tipped back on the ground (top side up), i.e. so the pressure plate is on the top (or up) side of the float. Repeat these same operations with the other two floats.

The next step is to fasten the support beam assembly to the flange located approximately half way up the power section/volute assembly. This is done by hoisting the motor/volute assembly approximately 6-8" off the ground so that the support beam assembly can be slid underneath the power section/volute assembly such that the volute assembly casting is located immediately above the center of the support beam assembly. The support beam assembly can then be lifted up and bolted to the flanges. This arrangement is designed to bolt to the underneath side of the large, circular flange of the volute assembly so that the flange is setting on top of the channel or angle construction such that the support beam assembly (once it is attached to the floats) will carry the entire weight of the unit when the unit is placed into the water. Special attention is directed

when the motors are not running. Float-type aerators will require an extra two-conductor cable out to the float to carry the space heater current.

If extra cable is not feasible, the motor windings can be protected from condensation by applying low voltage single-phase power to the line leads when the motor is shut down.

Transformer sizing can be obtained by using the following information:

	Motor Voltage Connection	Transformer Voltage
Thru 100 HP 4-, 6-, & 8-pole Motors	230	16V single phase
	460	32V single phase

Single-phase current on low voltage space heating will be approximately 25% of rated full load current and power factor approximately 25%. When the motor is turned off, low voltage single-phase power can be automatically applied so the motor line leads by suitable control. This maintains the temperature of the windings about 5 to 10 degrees above ambient conditions and prevents condensation of moisture on the windings.

Space heating should be utilized at all times when aerator motors are not operating.

be done with a ball peen hammer. This will keep the pin securely in place during operation.

Carefully lower the power section into the float and see that the float pilot is engaged into the I.D. of the motor support casting (diffuser). With the power section in place and flush at the parting surface, bolt it into position and affix the safety wire in the bolt heads. Rotate the motor shaft by hand to see that nothing hits or rubs.

The unit can now be placed back into service following the preceding operations suggested in the handling portion of this manual.

#### 15.5 Factory Service Procedure

All factory service inquiries should be directed to Aqua-Aerobic Systems' customer service manager at 815/877-2501.

### 16.0 STORAGE

#### 16.1 Power Section

Stored standby power sections should be placed in a vertical position. A rack made of 2 x 4's and saw horses will serve very well. If the unit is stored out of doors, the entire power section should be covered with a good canvas tarp or a heavy gauge plastic sheet.

Any unit placed into service after 30 days' storage (or more) should be greased by thoroughly flushing the old grease out of both motor bearings until bright new grease appears from the open relief port. Failure to comply with this recommendation may result in warranty cancellation.

#### 16.2 Complete Unit Storage

Indoor storage during prolonged periods of shutdown is preferable. If this is not possible, the units may be left in the water; but a canvas or plastic tarp should be lashed securely over the motor.

Any unit being returned to service following 30 days' (or more) storage or shutdown should be regreased by thoroughly flushing the old grease from both motor bearings until bright new grease appears at the open relief port. Failure to comply with this recommendation may result in warranty cancellation.

#### 16.3 Space Heating

For extended storage of the unit, it is recommended that some method of space heating be utilized to prevent condensation of moisture on the windings

to the fasteners required for this operation.

There will be furnished three channel washers or bevel washers, bolts, nuts and lockwashers to make this attachment.

- c) While the unit is suspended from the crane, or whatever hoist is being used, the entire unit should be lifted higher --enough that the intake cone can be bolted onto the bottom flange of the power section/volute assembly. The fasteners are included for this operation (and, again, lockwashers and nuts are included to make this attachment secure). This entire unit is designed to rest on the intake cone. When this operation has been completed, the unit can be set down on the intake cone on a level solid base. If you are working under field conditions, especially if in soft soil, it is recommended that either a sheet of plywood or sufficient 2 x 4's, etc., be used to prevent the sharp edges of the intake cone from cutting into the earth and consequently tipping over.
- d) The remaining operation consists of attaching the floats to the major assembly that has been constructed thus far. This can be readily done by having two men pick up a float (again with the pressure plate up) and maneuvering the float into a position such that the center of the float, which is now denoted by the pipe column through the pressure plate, is immediately under a socket on the end of the support beam assembly. This pipe should be inserted from the bottom side into this pipe socket and pushed completely through. At this point, a large diameter washer should be placed over the pipe column and a bolt inserted through the hole drilled in the pipe column. Once this is done, a lockwasher and nut should be utilized to secure the bolt in place. Repeat this same operation for the two remaining floats, and the unit is assembled.

#### 2.2.3 General Notes on TFNI Assembly

The unit will appear to be loose and floppy; i.e., the floats will be suspended from the support beam assembly. This situation will correct itself once the unit is placed in

the water and the pressure from the floats is brought to bear against the pressure plates and the support beam assembly, and the unit will float true and level in the water. This design allows for movement of the floats as might be produced by extreme wave action to occur naturally without unduly stressing the floats or structure of the unit. Should you run into any special problems during assembly or installation of the units, don't hesitate to call our factory for immediate assistance and guidance.

## 2.3 UFNI Units

### 2.3.1 Subassemblies

Your UFNI unit will be shipped to you in several subassemblies. Each unit will consist of:

- a) A crated power section/volute assembly bolted together to form one subassembly. You can easily recognize this, as it is the most weighty piece of material included in the package and consists of a motor and two nodular iron castings.
- b) The support beam assembly which can be recognized by its triangular shape consisting of a triangle formed from channels and angles. There will be one beam support assembly per unit.
- c) Each unit requires one round fiberglass float.
- d) There will be a flanged intake cone for each unit that is to be bolted to the bottom of the power section and volute assembly.
- e) There will be a box of fasteners--nuts, bolts, washers, etc., for each unit.

Immediately upon receiving shipment, you should ascertain that you have indeed received the number of items per unit as mentioned above.

### 2.3.2 UFNI Assembly Instructions

- a) The first step is to fasten the support beam assembly to the flange located approximately half way up the power section/volute assembly. This is done by hoisting the motor/volute assembly approximately 6-8" off the ground so that the support beam assembly can be slid underneath the power section/volute assembly such that the volute assembly casting is

Remove the motor base bolts from the motor base. The motor can now be hoisted out of the diffuser (motor support casting). Dress the remaining portion of the motor shaft and slide off the neoprene slinger which is below the lower motor bearing. The power unit is now disassembled except for the power cable, unless it was removed previously.

### 15.3 Motor Service

For motor service work, it will probably be necessary to take the motor to a factory authorized service shop, after you have contacted Aqua-Aerobic Systems. Aqua-Aerobic Systems will see that you are directed to a service shop near you that can carefully rebuild the motor to its original condition. Always mention the horsepower rating, voltage, model, and serial numbers when requesting service information. This data is found on the stainless steel nameplate on the motor frame. REPAIRS NOT AUTHORIZED BY AQUA-AEROBIC SYSTEMS VIA OUR P.O. # WILL BE AT YOUR EXPENSE.

### 15.4 Reassembly of the Unit

To reassemble the unit, simply reverse the disassembly procedure. Don't force any fits.

When reassembling the power section, check the neoprene slinger and fluid deflector. If they are loose or worn, they should be replaced. Also, the anti-deflection insert in the motor support casting (diffuser) should be replaced if it appears worn or damaged.

When lowering the extended shaft of the motor into the motor support casting, slowly and carefully align the shaft in the bore of the anti-deflection portion of the diffuser. Once the shaft has cleared the bore, lower the motor onto the support pads and be certain the base is down flush on all pads. NOTE: The motor end bell and the motor support pads must be flush at the parting surface. If they are not flush, check to see if something is under the motor bell or if the pilot is off center. You can now bolt the motor to the support casting. Also, be sure the safety wire is affixed in place.

When reassembling the propeller onto the motor shaft, be sure the shaft and propeller is free from burrs. A NEW PIN, SPECIAL ALLOY 17-4 PH STAINLESS STEEL, IS REQUIRED EVERY TIME THE PROPELLER IS REMOVED FROM THE MOTOR SHAFT. These are available by air express from Aqua-Aerobic Systems.

Continue assembly by putting the prop back on the motor shaft, and be sure the propeller set screws are tight and slightly swell the ends of the solid drive pin in the propeller hub. This can easily

<u>G.E. Motors</u>	<u>Reliance Motors</u>	<u>U.S. Motors</u>
Shell Alvania #2*	Shell Alvania #2*	Chevron BRB-2
Shell Alvania #3	Shell Alvania #3	
Atlantic 54-GL	Andoc-C	
Texaco Regal AFB2	Beacon #325	
	Dow Corning #44	
	Chevron BRB-2	

(\*Recommended)

The only other preventative maintenance that is advised is a periodic check to see that the mooring lines are secure and an amperage reading check of the motors to see that they are running normally.

## 15.0 REPAIR AND SERVICE

The Aqua-Jet aerator is relatively simple to service. Should it become necessary to repair or replace worn or damaged parts, service work should be done with care. If you do not have maintenance facilities with competent personnel, you should contact our plant in Rockford, Illinois, to make arrangements to return your unit or power section to the factory for service.

### 15.1 Removing the Unit from the Basin

When removing the unit from the basin (or tank), follow the same procedures as described in the handling section.

### 15.2 Disassembly of the Unit

To disassemble the Aqua-Jet unit, first be sure it is setting on a solid and stable surface. Remove the safety wire from the motor support (diffuser) bolts. Remove the bolts from the base where it bolts to the float. Slowly and carefully lift the power section out and away from the float. The power section should be carefully placed in a horizontal position, or set vertically on a stable platform. Place the power section in an upright (vertical) position for removing the motor.

Loosen the set screws in the propeller hub, back them all the way out. Dress one end of the propeller pin with a file or hand grinder, as the pin has been peened to prevent its accidental displacement. Carefully drive the drive pin out of the propeller hub. When removing the propeller pin, one should "back up" the propeller when driving out the pin. This will prevent possible shaft or bearing damage due to the blows of the hammer. Slide the propeller off the shaft. DON'T BEAT IT OFF. If it is a snug fit, use a pulley puller to pull it off. The prop should not be forced off. Clean the shaft and dress it with a fine grain emery cloth. Apply a light oil, and slide the fluid deflector down and off.

Remove the safety wire from the motor base bolts.

located immediately above the center of the support beam assembly. The support beam assembly can then be lifted up and bolted to the flanges. This arrangement is designed to bolt to the underneath side of the large, circular flange of the volute assembly so that the flange is setting on top of the channel or angle construction such that the support beam assembly (once it is attached to the float) will carry the entire weight of the unit when the unit is placed into the water. Special attention is directed to the fasteners required for this operation.

There will be furnished three lock washers, bolts, and nuts to make this attachment. The bolt is installed through the volute flange then through the beam assembly.

- b) While the unit is suspended from the crane, or whatever hoist is being used, the entire unit should be lifted high --enough that the intake cone can be bolted onto the bottom flange of the power section/volute assembly. The fasteners are included for this operation (nuts and lockwashers are included to make this attachment secure). This entire unit is designed to rest on the intake cone. When this operation has been completed, the unit can be set down on the intake cone on a level solid base. If you are working under field conditions, especially if in a soft soil, it is recommended that either a sheet of plywood or sufficient 2 x 4's, etc., be used to prevent the sharp edges of the intake cone from cutting into the earth and consequently tipping over.
- c) The remaining operation consists of attaching the float to the major assembly that has been constructed this far.
- d) The float should be substantially blocked off the working surface (6" on 3 through 7.5 HP and 8" on 10 through 75 HP) with the three external ears on the cover to the top. The completed power section is then hoisted and positioned over the float center. Do not let all the weight rest on the blocked float.

Next, rotate the support beam assembly to align with the drilled holes in the float ears. Place a bolt (furnished in the box of fasteners) through the sup-

port beam assembly and through the float ear. To fasten, use a flat washer, then the lockwasher and nut (also in the box of fasteners) to secure.

The assembly is completed and can again rest on the intake assembly.

### 3.0 MOORING UNIT INTO POSITION

The Aqua-Jet aerator can be moored by many different arrangements. The most common method, and the method to be discussed here, is the three-point and four-point tie off.

#### 3.1 New Basin

When a new basin exists and no liquid is in the basin, shore points or bottom points can be selected where desired.

##### 3.1.1 Bottom Mooring Points

When mooring the unit to the bottom, four-point mooring should be used. The mooring anchors should be located at an angle 30° (or less) from the basin bottom to the final position of the aerator. Enough mooring cable should be provided to allow the vertical movement required by the system. If more than one foot of liquid level variation is expected, weights should be placed at the midpoints of the mooring lines to take up the cable slack at the low level point of operation. It is good practice to provide float buoys on the unit end of the mooring cable. These will keep the mooring cables afloat should it be necessary to disconnect the cables from the unit. Stainless steel mooring cable and hardware should be used to assure corrosion protection.

##### 3.1.2 Shore Mooring Points

In selecting shore mooring points, three-point or four-point mooring is satisfactory. Cable length should be sufficient to allow variation in vertical movement of the aerator with liquid level change.

NOTE: Aerator mooring lines need not be taut nor should they be excessively loose unless weights are placed at midpoints on the cables. All mooring cable and hardware should be stainless steel.

#### 3.2 Existing Basin

##### 3.2.1 Bottom Mooring Points

On placement of floating aerators in existing

compensating heaters can be used. It is also advisable to place a cover over the panel to minimize the amount of heat due to sunlight.

### 14.0 MAINTENANCE

Very little maintenance will be required with the Aqua-Jet equipment. The simplicity of the unit's design eliminates the need for extensive maintenance programs. However, preventative maintenance is suggested as follows.

The different type and frame size motors used on Aqua-Jet aerators are not lubricated identically. This is basically due to the various casting and production technique utilized by the different electric motor manufacturers. However, two basic types of lubrication fittings and techniques are employed.

#### Type A

Normal alemite fittings are provided for grease-through type lubrication. This fitting is found on the outer frame of the motor at both the top and bottom motor bearings. Just opposite, or 90°, from the fitting is the relief plug or cap. To lubricate this type motor, one simply removes the plug or cap and greases the fitting until the new grease appears at the relief opening. Replace the plug and you are finished.

#### Type B

The second type of fitting used is called a keystone fitting. (This type is common on Reliance motors.) This is a fitting which relieves itself at the same location where it is greased. Also, the fitting will be found on the outer frame near the top and bottom bearings. The keystone type fitting is identified by its "hex" appearance. The outer perimeter of the hex has three (3) holes for relief. The grease fitting is inserted (threaded) into the center of the hex. When lubricating the keystone type fitting, one simply snaps the grease gun onto the zerk fitting and begins pumping the grease. After several strokes, grease should begin to appear in the relief holes in the hex's perimeter. Stop pumping in grease, wipe off excess grease, and you are finished.

NOTE: NEVER OVERGREASE BEARINGS!

Motors from 1 HP through 25 HP should be lubricated once every six months. Larger motors should be lubricated once every four months.

The following grease should be used to lubricate the Aqua-Jet aerator motor bearings:

NOTE: On older basins that have been used for settling ponds or oxidation ponds that have been converted to aerated lagoons, it is possible to experience abnormally high current readings on startup. Sometimes the heater elements will disengage the starter due to overload.

Allow the unit to cool for about five minutes, reset the starter, and restart the unit. If it drops out again, repeat. The previous condition is due to past buildup of sludge or fibrous concentrations that change the character of the liquid being pumped. This problem will solve itself after a few hours of operation, as the solids and/or fibers will be dispersed and their concentration will be lowered.

#### 11.0 POWER SUPPLY (VOLTAGE)

Today's power suppliers offer 230/460 volt service as standard. It is unlikely that your voltage will be exactly one or the other. Motor manufacturers allow a + or - 10% variation in the operation of their motors. Motor manufacturers and/or Aqua-Aerobic Systems will not be responsible for motor failure due to voltage more or less than the allowable tolerance. Also, neither will be responsible for motor failure due to unbalanced voltage of the three phases. If you have a high, low or unbalanced voltage problem, make sure you correct it before connecting any motors to it. Specially wound motors are available if power source cannot be corrected.

#### 12.0 ENVIRONMENTAL DEBRIS

The Aqua-Jet aerator is a powerful, high-volume pump. It has great suction capacity and will ingest any waterlogged or submerged materials that get near its intake. Its rugged construction allows most material to pass through its non-clog design. However, large growth of aquatic plants (rushes, seaweed), logs, tree stumps, and branches, bed sheets, wire, rope, burlap and plastic sacks, and similar objects can cause problems. They may even clog or damage the unit. These are environmental problems of the waste treatment systems. They should be kept out of the system. Damage resulting from abnormal operational hazards such as above are not covered in the warranty on Aqua-Jet equipment.

#### 13.0 EFFECTS OF AMBIENT TEMPERATURE ON CONTROL PANEL

The heating elements in the motor starter are set to trip out at approximately 15% above the full-load amperage. Normal running of the motor generates heat in the conductor strips or alloy in the heater. When ambient temperature is high, especially when a panel is placed in direct sunlight, the additional temperature can be enough to exceed the 15% extra of the heater element and will trip out at this point. To correct this problem, ambient

basins and using bottom mooring points, follow the same instructions as described in New Basins previously. The only difference is the need to attach the mooring line to the mooring block before it is lowered into the basin. These blocks should be spaced the same as the blocks in New Basins. The desired aerator location is chosen, and mooring block locations are established so that a 30° angle (or less) is formed from the unit's final position to the basin bottom.

#### 3.2.2 Shore Mooring Points

Same as New Basin.

#### 4.0 MOORING CABLES

The selection of mooring cables should be in accordance with the manufacturer's suggested standards. These standards are published in the literature furnished by Aqua-Aerobic Systems (Bulletin #200, pages 14-15).

New mooring cables can stretch; and after the units have been installed and operating for approximately one month, the cables should be checked to see that they are not too loose. Liquid level change can also affect the tension on mooring cables. Mooring cables must be securely fastened on each end so they do not get loose and tangle up in the unit. This could cause considerable damage to the motor or propeller and shaft.

#### 5.0 ELECTRICAL CABLE

The power cable for the Aqua-Jet aerators should be factory attached and sealed into the junction box. For units that are field wired, a good grade of jacketed cable should be used. Some waste water conditions require the use of special cable jackets because of chemicals and solvents. However, PVC or neoprene is usually an acceptable type of cable jacket material. A good quality copper-stranded, 4-conductor cable should be used for the power supply. When selecting a cable, the line loss should be carefully checked to assure the full voltage requirements at the motor. Low voltage can severely shorten the life of a motor.

The power cable should be attached to one of the mooring cable lines to prevent any unnecessary pull on the junction box.

#### 6.0 WIRING INSTRUCTIONS

##### 6.1 General

The wiring of the Aqua-Jet aerator is a very important step in the installation of the unit. Faulty

wiring will cause premature failure of the unit.

Aqua-Jet units shipped from our factory prewired are warranted to be free from defects in materials and workmanship for a period of 18 months from date of shipment or 12 months from date of startup (whichever occurs first). Units wired in the field must be wired in accordance with these instructions, or the warranty of the unit is void. Aqua-Aerobic Systems will assume no responsibility in regard to liability for personal or property damage resulting from improper wiring.

## 6.2 Wiring the Motor

When wiring an Aqua-Jet dual voltage (230/460 volts) aerator motor, wire for high or low voltage in accordance with the motor nameplate. Select a cable suitable to the National Electrical Manufacturer's Association's ratings for the voltage, amperage, and environmental conditions that exist or may arise. Remember, light cables and the resultant voltage drop may shorten life of a motor considerably. (See bulletin #200, page 23.)

On all Aqua-Jet aerators, the color green is used to indicate the ground or "neutral" conductor of the conduit. If, for any reason, any other color is used for ground, it should be clearly marked in the control panel at the motor starter and in the junction box of the motor frame.

The junction box is threaded to receive an N.P.T. fitting for a watertight connector. All Aqua-Jet units that are prewired at the factory are fitted with taper-lock fittings. Field-wired units must be also fitted with watertight fittings to seal the cable entrance to the junction box. Without fittings of this type, no warranty will be extended by Aqua-Aerobic Systems.

"STA-KON" closed-eye connectors should be used to provide "bolt and nut" type connectors from the motor leads to the power supply leads. A secure connection is important at this point. Following this, rubber insulated tape should be used to wrap each set of leads. After several wraps of rubber insulated tape, several wraps of plastic insulated tape (Scotch 3M, Type 33 or equal) should be applied. After wrapping the leads with the two types of tape, push the leads back into the junction box. Apply butyl rubber sealer or silicone type sealer to the parting lines of the junction box.

Bolt lid evenly in place, and be certain all screws or bolts are firmly secure. The box lid should be flush all along the parting lines. After the box lid is in place, a layer of sealer should be placed around the parting line of the box. For boxes with gaskets, the same type sealer should

be applied to both sides of the gasket and sealed in the same manner as previously described.

Any time the junction box seal is broken, resealing is mandatory prior to starting the unit again.

## 7.0 INSTALLATION

After the unit is uncrated and ready to place in the basin, it should be carefully hoisted into the basin by the motor lifting eyes on top of the motor. As described in the "Receiving and Handling" section, a vertical pull must be applied to the lift eyes. Do not allow the lift eyes to pull inward (lifting with a short chain or cable will cause an inward pull), as the lift eyebolts can shear off. They are designed for tensile (vertical lift) loading.

When the unit is in the basin, it should be moored into position as described in the mooring section.

## 8.0 ELECTRICAL CONNECTION AT THE CONTROL PANEL

The electrical connection in the control panel should be made to the proper starter. Also, the ground lead must be firmly connected to a good ground lug. Finally, the heaters and fuses should be checked for proper sizes and application.

## 9.0 STARTUP

After all necessary wiring and mooring is finished, the unit should be started. Immediately observe the flow of the unit. If a good continuous discharge is noticed, the unit can be checked for running amperage. If a sloshing and splashing is noted, but little or no flow is produced, stop the unit at once! It is in reverse!

To correct this, simply throw the main disconnect in starter box, and reverse any two of the three power leads--NOT THE GROUND. Restart the unit, and check the amperage.

## 10.0 MOTOR AMPS (POWER CONSUMPTION)

The full load current required by electric motors varies slightly from one manufacturer to another. When installing the Aqua-Jet units, read the nameplate current (amps) at the corresponding voltage, and write it inside the starter control panel door. Using an accurately calibrated amprobe, check all three phases of the unit. Anything other than normal should be reported to the factory at once. If the unit is pulling normal current, recheck it 30 minutes after it has been started. This will allow the motor sufficient warm-up time. The reading you obtain should be the reading of the unit's normal operating range.