

Instruction Manual

AV-1

apollo AV-1 scooter

apollo



Introduction

Congratulations on the purchase of your APOLLO SCOOTER. This APOLLO SCOOTER AV1 has been developed to increase your mobility and extend your underwater activities.

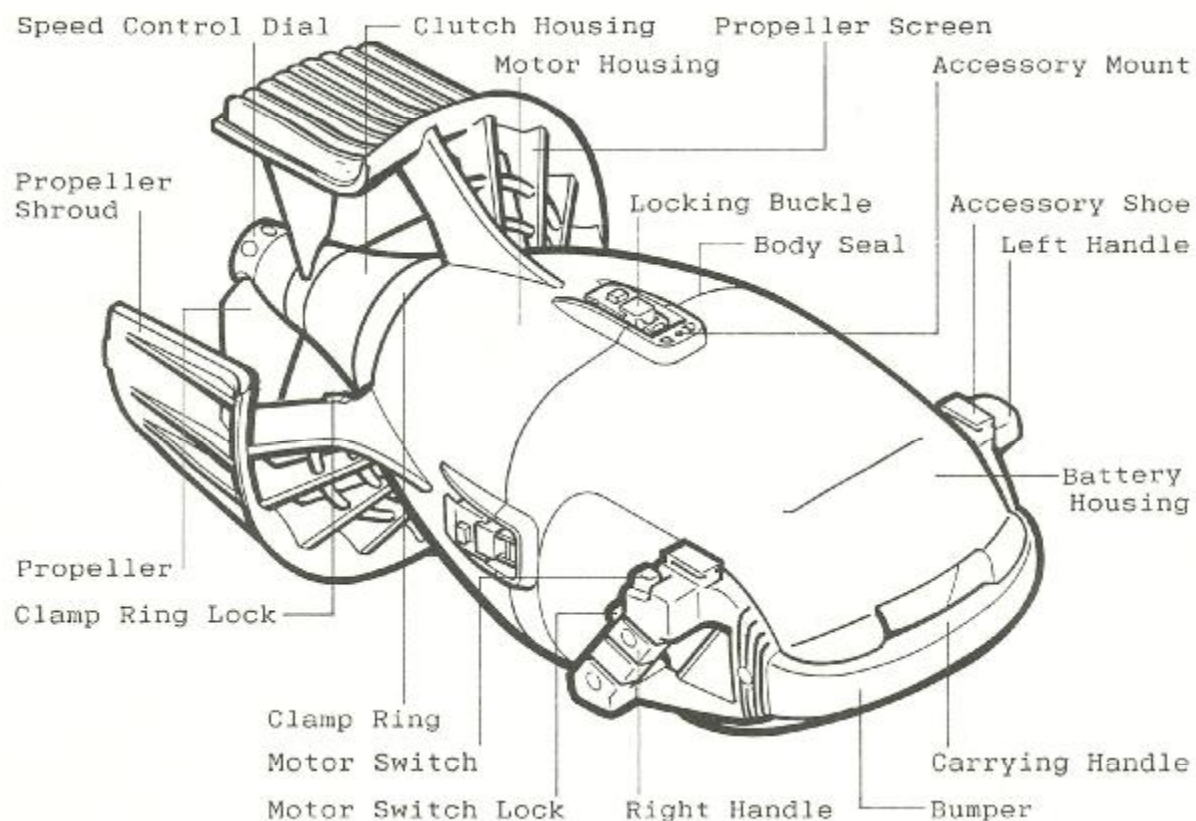
Compared to fins, it does not require a single kick. Therefore, your air consumption will drop by as much as 50%, and you will be able to travel 4 times faster and 8 times further than a diver equipped only with fins.

Based on fluid mechanics the scooter body was designed to lighter and more compact than other vehicles. And, a unique double seal water resistance system developed by APOLLO protects the motor and gear from possible water leakage.

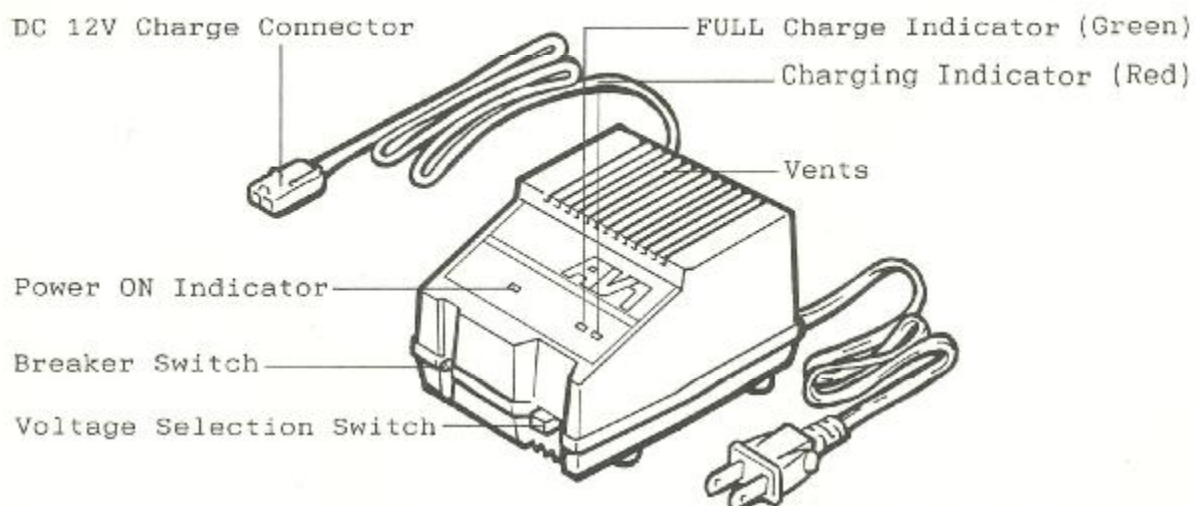
Please read this instruction manual in order to use, maintain, and store your APOLLO SCOOTER properly, and to enjoy your diving safely.

If you have any questions, please ask at the retail store where you purchased your scooter.

Scooter AV-1



Battery Charger AV-300



Specifications

APOLLO SCOOTER AV-1

(): In/ft/lb/mi System

Width x Length: 34 x 61 cm. (13 x 24 in)	Body: High Impact ABS Resin
Total Weight: 18 kg. (40 lb)	Battery: GS. PE24A-12R Sealed 12V24AH Rechargeable
In Water: 650 g (1.4 lb)	Charge Time: 5~9 hours
Battery: 8.6 kg (19 lb)	Motor: DC12V Permanent Magnet Direct Drive
Speed: 1.8~4.0 km/h 1.1~2.5 (mph)	Reduction Gear: Planet Gear
Running Time: 25~60 min.	Speed Control: Variable Pitch Propeller
Static Thrust: 8~18 kg. (18~40 lb)	Safety Devices:
Range: 4 km (2.5 mi)	Thermal Cut-Off Switches (Housing & Motor)
Max. Depth: 50 m (160 ft)	Leakage Cut-Off Switch

- * Use only batteries designated by Apollo.
- * Use only the attached AV-300 Battery Charger.

BATTERY CHARGER AV-300

Size:	8.6 x 10.0 x 11.7 cm. (3.4 x 3.9 x 4.6 in)
Charging Voltage/Current:	DC 12V/2.5 A (Float Charging Function)
Voltage Supply:	AC 115V/230V 50Hz/60Hz
Indicators (LED):	Charging End of Charge (Full)
Safety Device:	Built-in Circuit Breaker

- * Do not use this charger to charge batteries other than those designated.

Accessories

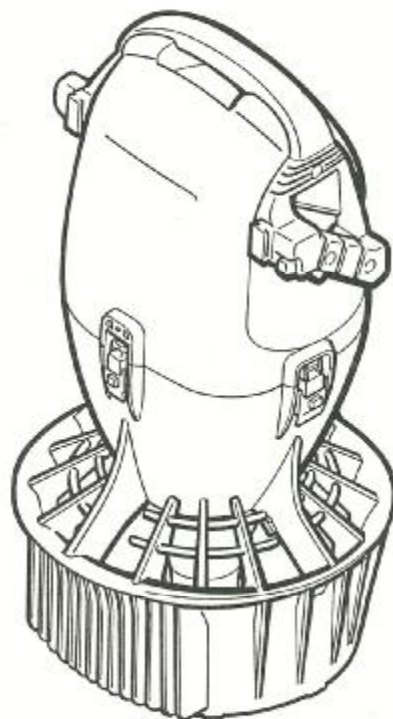
O-Rings (2)	
Silicone Grease	
Accessory Bracket	(Sold Separately)
Headlight	(Sold Separately)

Preparation

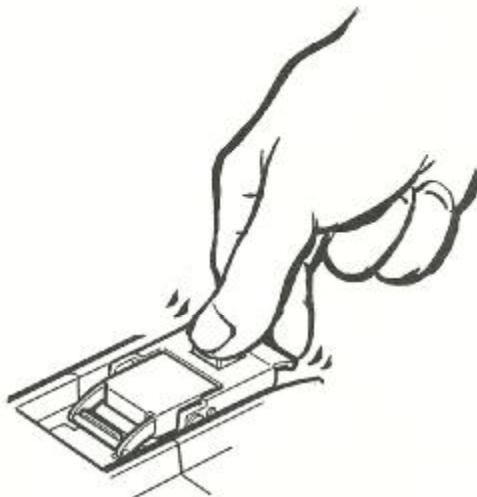
A Preparation for Charging

All batteries are shipped in an uncharged state and must be fully charged prior to first use.

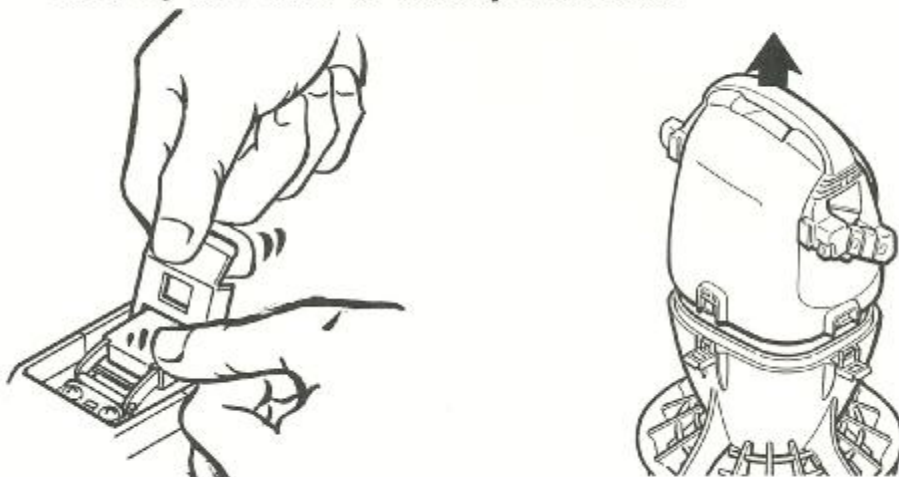
- 1) Stand the scooter upright on its propeller shroud in a clean area free of sand and dust if possible.



- 2) Unlock the 4 locking buckles located along the body seal. Because the buckles are designed to prevent accidental release, lift up the end of the buckle while pressing the button in the middle at the same time.

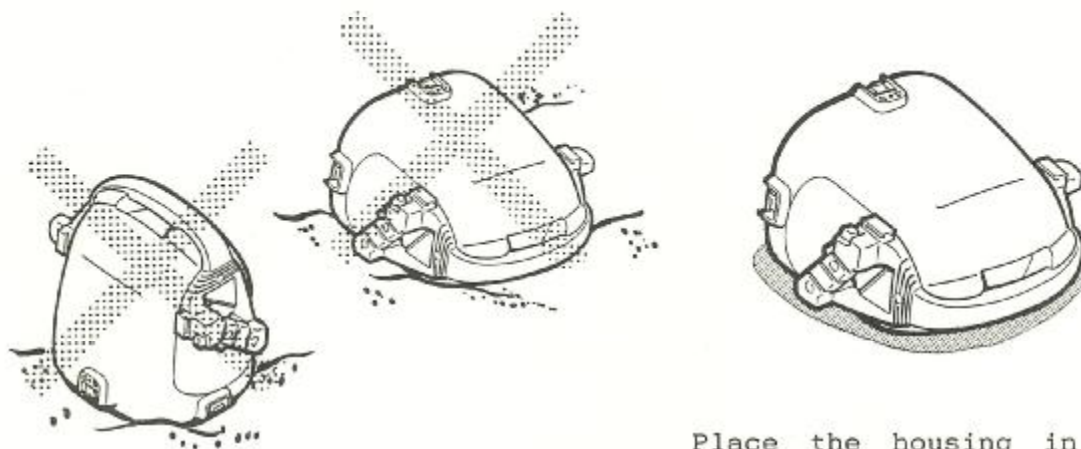


- 3) Detach the battery housing. The housing may not detach easily due to improper contact with the o-ring or due to a pressure imbalance caused by temperature differences between the outside and the inside of the scooter body. If such is the case, pull a locking buckle upward while pressing the buckle arm toward the close end of the hook as is shown below. The battery housing can then be easily detached.



Do not place the open end of the detached battery housing (body seal) on the ground. Instead, place it on the side width guard ribs.

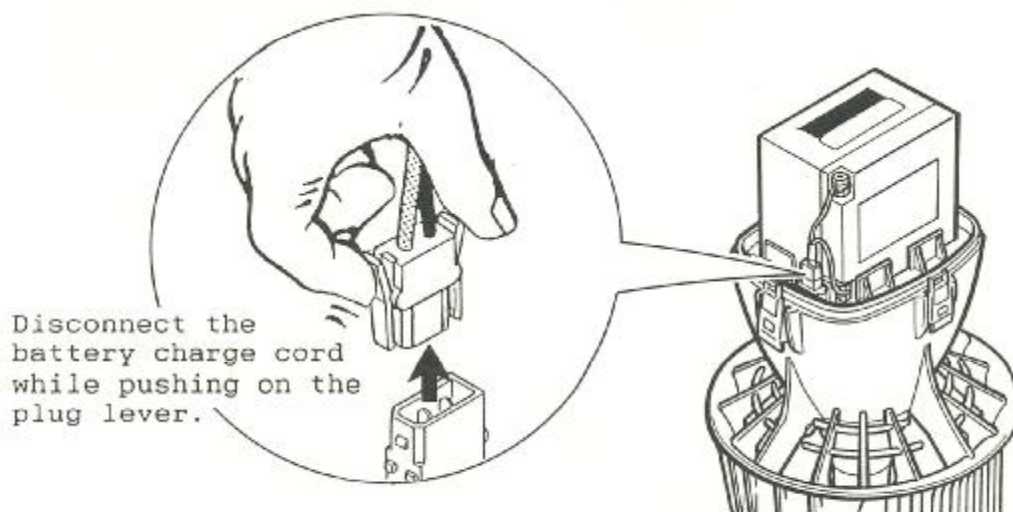
CAUTION: The battery housing seal is lubricated with silicone grease. Please keep this seal free of sand and dust which is the main cause of water leakage. After removing the batteries, reattach the housing immediately to the main body.



Avoid sand.

Place the housing in a clean area on the side with guard ribs.

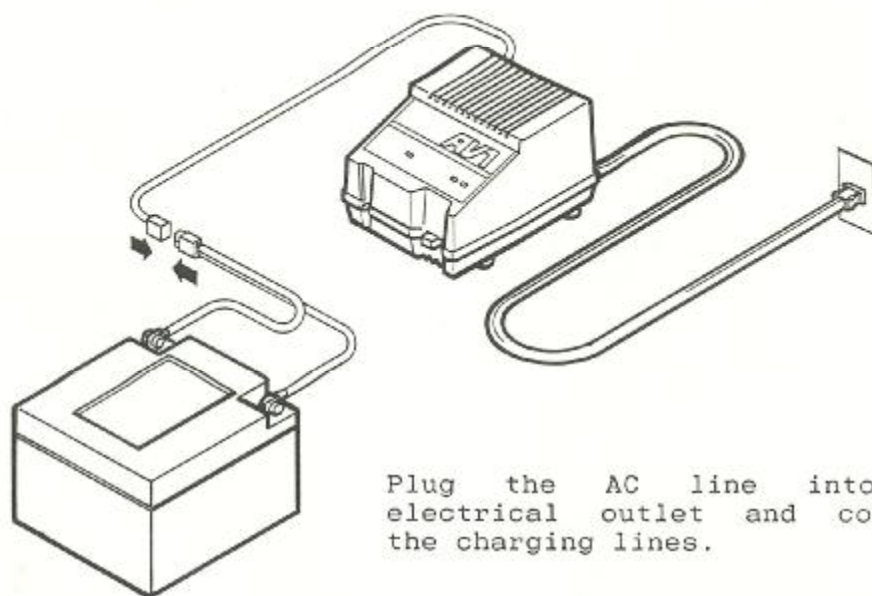
- 4) Remove the battery from the main body after first disconnecting the battery charge cord by pressing the lever on the battery connector plug.



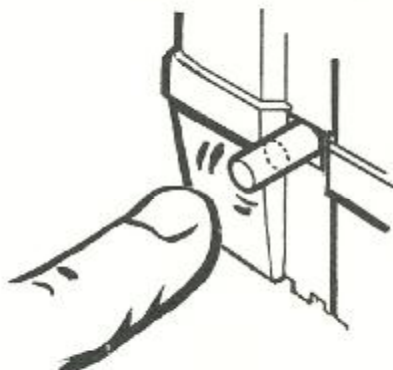
B Charging

- 1) Use the attached battery charger AV-300. First, set the charger to the local voltage (115 or 230 V), and then plug the AC line into an electrical outlet. Next, connect the charging cord from the charger to the charging line on the DC12V battery.

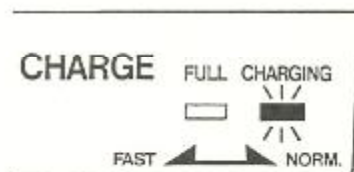
Note: Never detach the charging cord from the battery as the preinstalled one-way polarity in the cord is very important. Changing the wires will cause permanent damage to the battery and charger.



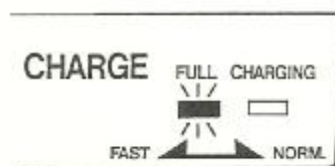
CAUTION: In possible cases of trouble such as during operation errors or excess current, the charger breaker will switch the power off. Check the battery charging lines and connectors to find any possible short circuits; then press the yellow breaker switch. If the breaker trips again, consult an authorized dealer for repair.



- 2) The red "Charging Indicator" lamp will light up while the battery is being charged. When the battery has been fully charged after approximately 5~9 hours, the green "FULL Charge" indicator will light to show that charging is complete. Because the battery charger is of the floating charge design, damage will not result to the battery if it is left connected to the charger for longer than the standard charge time of 5~9 hours. However, do not leave the battery connected to the charger for over 24 hours.



Charging



Fully charged

- 3) Upon completion of charging, unplug the AC line, and then disconnect the battery charging cord.

CAUTION: Wait at least 30 minutes before reinstalling the battery in your scooter. Hydrogen gas continues to be discharged even after the battery is fully charged.

C Precautions during Charging

- 1) Because batteries generate hydrogen gas while being charged, please follow the precautions listed below.

- Charge batteries only in a well-ventilated area.
- Avoid exposure to sunlight, heaters, radiators, and furnace rooms where air temperatures may rise above 40° C (105°F).
(Optimum temperature: 20 ~ 30° C (70 ~ 85°F))
- The necessary charging time is doubled if the temperature drops to 0° C (32°F).
- Do not smoke or allow open flame near the batteries.



Choose
well-ventilated
areas



Avoid sunlight
and high temperatures



Avoid smoke
and open flame

- 2) The battery charger will become very warm during the beginning stage of charging fully used batteries. However, the temperature will drop as the batteries are charged. Do not block the vents during charging as the battery charger may become damaged through being overheated.



Do not block charger vents

- 3) The battery charger is not waterproof; do not expose the charger to rain, seawater, or a saltwater atmosphere.



Do not expose to rain or saltwater.

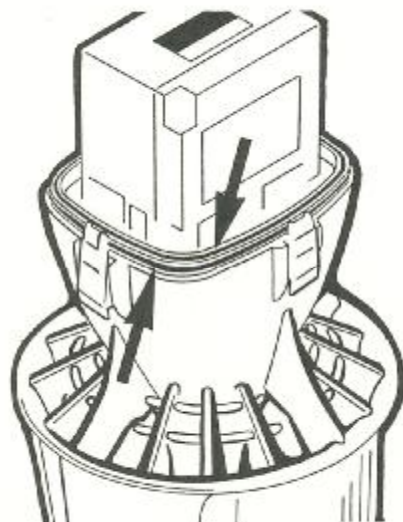
D Pre-Operation Checks

1) Batteries

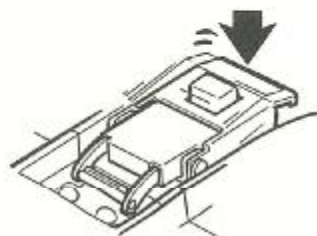
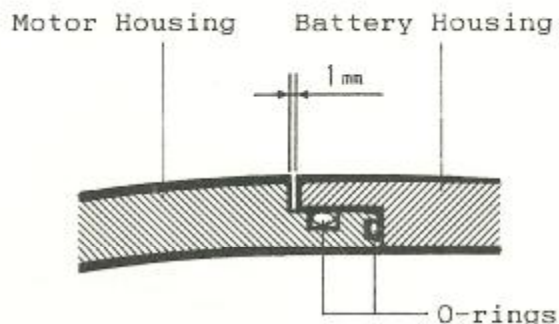
Make sure the "FULL Charge" indicator (green lamp) lights up after the scooter battery is charged with the AV-300 charger. The battery should be fully charged before use.

2) Body Seal

Check that both O-rings and O-ring slots are clean, free of flaws, and lightly lubricated with silicone grease. Confirm that both O-rings fit smoothly in their slots (the lack of a 1 mm gap between the battery and motor housings means that an O-ring is missing). In addition, confirm that all four locking buckles are firmly fastened.



Check 2 O-rings.



3) Clutch Housing

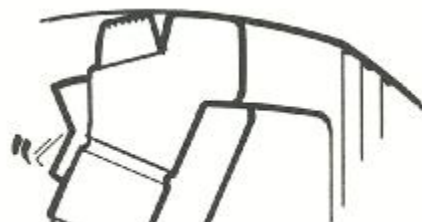
Make sure the clamp lock levers are firmly locked.



Check that the clamp lock levers do not stick out.

4) Motor Switch

- a. Release the motor switch lock by pressing the lower part of the motor switch lever against the right handle.



- b. Depress the motor switch in the right handle to activate the motor. Confirm there are no irregular noises coming from the motor or clutch housing. If you hear any strange noise, stop the motor immediately.

CAUTION Running of the motor out of water for over 10 seconds can cause damage to the propeller shaft seal. Also, NEVER put your hands or anything else near the moving propeller.



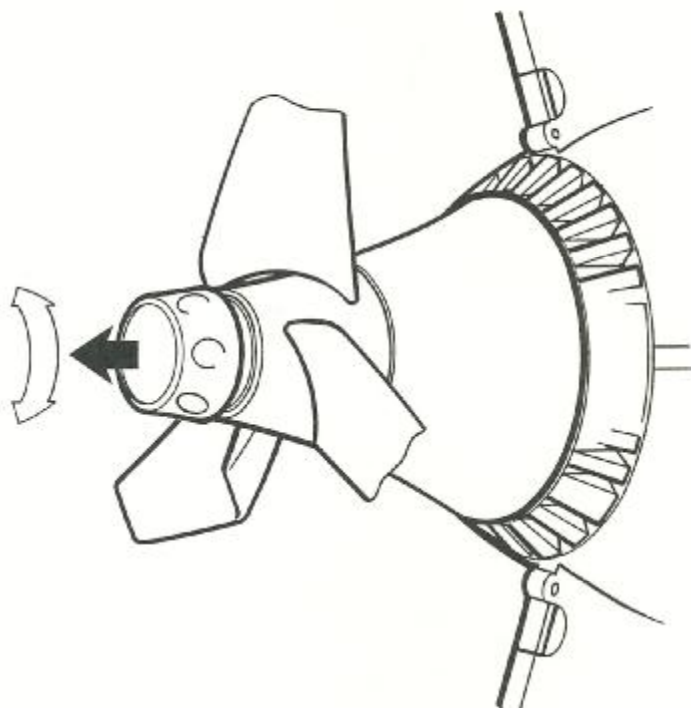
- c. Make sure the motor switch returns automatically to the OFF position when released.

CAUTION: Keep the motor switch locked before and after use to prevent accidents.



5) Speed Control Knob

You may adjust the scooter to one of three different speeds by changing the propeller pitch while the scooter is turned off. The number shown on the speed control knob corresponds to the speed.



Pull and rotate the speed control knob until it clicks into the slot for the desired speed

- 1 = Hi speed (more speed = less running time)
- 2 = Mid speed
- 3 = Lo speed (slower speed = more running time)

Adjust the speed to the desired number by pulling and rotating the speed control knob. Although the knob is spring loaded for automatic return, please check to see that the knob has returned to a locked position.

Operation

A PRECAUTIONS during Operation

Although learning to use your Apollo Scooter AV-1 takes very little time, you should always follow the precautions listed below.

- 1) Do not operate at a depth of over 40 m (130 ft).
- 2) Do not allow straps, hoses, hair, or hands to foul the propeller.
- 3) Do not operate the scooter out of water for longer than 10 seconds.
- 4) A change in the way the motor sounds or a reduction in power indicates that the battery has become fully discharged. Do not continue to operate the motor. Repetitive discharges reduce battery life. Please recharge the battery fully for further use.
- 5) Place your scooter on level ground or tether it to the surface in water when not in use. Lock the motor switch to prevent accidental running of the scooter.
- 6) Please pay special attention to the body and clutch housing seals.
- 7) When diving near the surface, be sure to submerge the shroud below the water. If the propeller emerges above the water, resistance to the moving propeller becomes unbalanced, and the propeller shaft will start to move unevenly, resulting in water leakage.

B Safe and Skillful Diving with your Scooter

Use of the Apollo Scooter AV-1 without kicking (use of fins) reduces air consumption by about 50%. For this reason, you may move to greater distances for longer time underwater when you dive with your scooter. However, this makes it more important for you to follow safe diving rules even more strictly than ever before.

- 1) Plan your dive before entering the water. Be familiar with the dive site or consult someone who knows the area well.
- 2) Do not dive alone.
- 3) Do not exceed a depth of 40 m (130 ft).
- 4) Do not ascend at a rate faster than 18 m/minute (60 ft/min), or make a descent faster than 22 m/minute (70 ft/min). Continue breathing regularly at all times when using the scooter. Always monitor your breathing when operating the scooter as changes in depth can be made easily without realization.

(One-Third Rule)

- 5) Always follow the "one-third" rule of safe diving: use 1/3 of your air to reach your destination, 1/3 to return, and 1/3 for reserve.

(Kelp Diving)

- 6) Do not dive through heavy vegetation (seaweed or kelp) when operating your scooter. Although a propeller screen can help prevent obstructions from entering the propeller, be careful to avoid trouble when diving in areas where kelp and other things could be sucked into the propeller. If you enter the water from a densely vegetated surface, you should haul your scooter to a clear area before operating the scooter.

Beach Diving

Hold your scooter by the handle when making an entry. When waist deep, you can submerge and operate your scooter but make sure the shroud is below the water to prevent propeller and thrust problems.

When exiting, operate the scooter to the shallowest depth, stop the motor, grasp the handle, and then stand up to bring your scooter to a point where you can safely set it down. Do not stand the scooter on its shroud in the sand. Instead, lay it on its side and take care not to let sand into the propeller section.

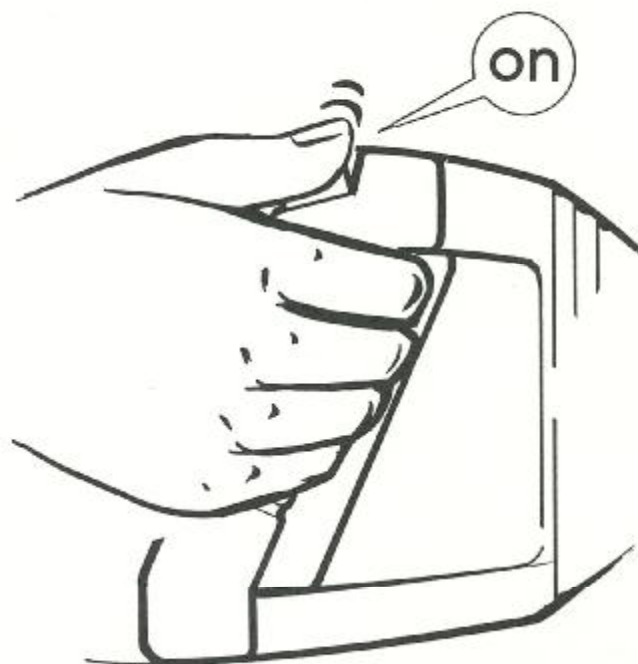
Boat Diving

Do not enter the water from a boat with your scooter in hand. Have it tethered with a rope before you dive, or have someone hand the scooter to you while you are in the water. If the scooter is handed to you, have it lowered into the water far enough so that you can comfortably grasp the carrying handle.

CAUTION: Never allow the scooter to be handed to a diver by the side handles. Accidental starting of the motor when handled in this manner could cause injury in addition to scooter damage.

C Switches

Operate the motor switch with your thumb. Depress the switch to the ON position, and then release your thumb from the motor switch or grip to turn the motor off.



CAUTION

If the motor switch does not move smoothly, check for sand or debris between the motor switch and handle. If present, flush with fresh water.

A strong magnet is built into the motor switch to activate the feed switch. The motor switch may not be operable when iron sand adheres to the magnet. In such case, contact a dive shop for service.

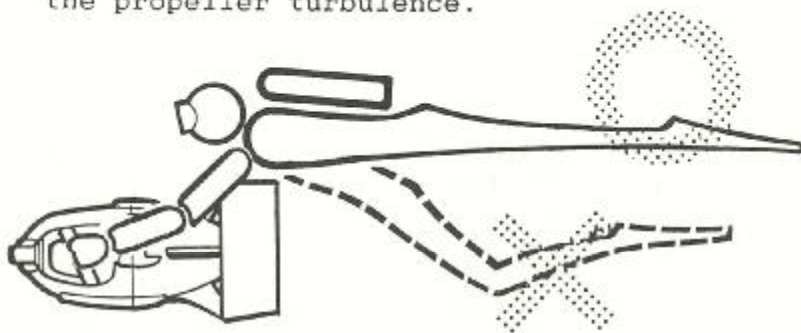
D Diver Position

To operate your scooter efficiently, position yourself to minimize drag, and maximize comfort during operation. Do not interrupt the water stream going into the propeller shroud with your arms and body.

1) Operate your scooter straight

Hold the scooter parallel to your body and stretch out your arms. The scooter must be slightly below your body to allow the thrust from the propeller to pass freely behind you. Keep your fins straight without kicking. Practice how to maintain the best position to minimize drag. The ideal position will prove less exhausting and give a steady speed.

CAUTION: Do not put the scooter directly in front of you. Your body will block the thrust, reducing speed and efficiency. And, you will become cold from the propeller turbulence.

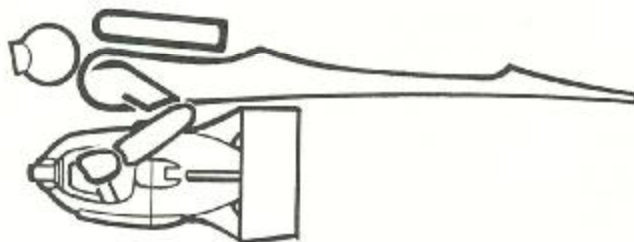


2) Diver Position to Minimize Exhaustion

Keep the scooter parallel to and below your body. Bend your arms at the elbows and lightly rest your abdomen on the upper part of the shroud.

NOTE: If you hold the scooter too close, the flow of water entering the propeller may be disturbed, reducing the thrust and efficiency of operation.

Take care to prevent your gauges, octopus, and B.C. belts from fouling the propeller. (Before operating the scooter, tuck your work slate and dive tables, etc. into the pockets of your B.C.)



* Changing Directions

Changing directions can be easily done just by pointing the scooter where you want to go. When changing depths, be sure you do not exceed safe rates of descent and ascent. STOP immediately if you feel any discomfort while attempting to equalize pressure in your ears. To make wide, sweeping turns to the right or left, slightly roll your body toward that direction. To make a quick turn, hold the scooter away from your body and point it where you want to go.

* Adjusting Speed

If you want to change speed or running time during your dive, STOP operation to adjust the propeller switch. Adjustment can be done by setting the speed control knob at the desired number. The variable pitch propeller becomes even more efficient when your buddy also dives with a scooter. You and your buddy can travel at the same speed by adjusting the pitches of your propellers to compensate for differences in body size and equipment drag.

E Trouble During Operation

1) Changes in the Sound of the Motor

The sound of the motor becomes lower when the battery is weak. If you continue to operate the scooter, the battery will be deeply discharged which results in a shorter battery life. In addition, when a deeply discharged battery is later charged, dangerous levels of hydrogen gas will be generated. Accordingly, when you hear the sound of the motor change, STOP the motor at that point and return to the shore, carrying the scooter by its carrying handle. The Apollo Scooter AV-1 is designed to minimize water resistance and to be lightweight underwater. Therefore, the scooter is easily handled when returning to the shore.

2) The Motor Runs But the Propeller Does Not Turn

A safety clutch is incorporated to disengage the propeller automatically from the drive system when there is excessive resistance. Should this occur, the propeller will stop but the motor will continue. STOP the motor immediately and remove the obstruction causing the excess resistance. After the obstruction is removed, the clutch will re-engage automatically.

CAUTION: If the motor continues to run without the propeller after all obstructions have been removed, STOP the motor immediately and bring the scooter to the surface by the carrying handle. Check the troubleshooting guide for subsequent procedures.

3) The Motor Does Not Move

Safety devices in the forms of heat and water leakage sensors have been built into your scooter to help protect the scooter and divers from injury.

a) Heat Sensor A

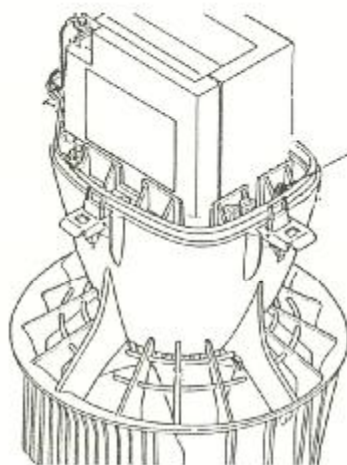
When the battery becomes hot (above 70°C (160°F)) due to high external temperatures or bright sunlight, the possibility of explosive hydrogen gas being generated from the battery is very high. Accordingly, when the scooter temperature reaches 70°C (160°F), a heat sensor switch functions to interrupt the motor circuit and prevents the motor from running.

b) Heat Sensor B

To prevent the motor from burning up when the internal temperature of the motor reaches above 110° C, a thermal sensor inside the motor interrupts the circuitry and stops the motor. (Normally, the motor temperature will not reach 110° C from the use of one battery. However, if the battery is changed and the scooter run continuously, the sensor will stop the motor.) If the motor stops, the motor must be given time to cool down before further use. (After cooling the motor for 30 minutes in the shade, you should be able to operate the scooter.)

c) Water Leak Sensor

If for some reason, water should leak into the motor or battery chambers, an Apollo designed water leakage sensor on the inside of the scooter will activate to interrupt the motor circuit. In addition, a warning lamp on an interior bulkhead of the scooter will indicate the presence of a water leak.



Water Leak
Warning Lamp

NOTE: Always keep your scooter in the shade when not in use. Prolonged exposure to sunlight or a hot car will increase the scooter temperature dangerously in addition to causing the heat sensor to interrupt the motor circuit and prevent operation.

If the motor will not run after having been cooled down, check the troubleshooting section for further procedures.

Maintenance

A Care After Use (Rinsing with Fresh Water)

1) Protection Against Salt Corrosion

Wash your scooter with fresh water after every dive. Especially, flush the propeller, motor switch, and locking buckles thoroughly with running water to get rid of sand and debris. Even better, if possible, immerse your scooter in a tub of fresh water. After draining, dry the scooter by standing it upright on its shroud in a shady ventilated area. Also, charge the battery fully within 24 hours of use.



Prevent salt corrosion



Rinse with running water

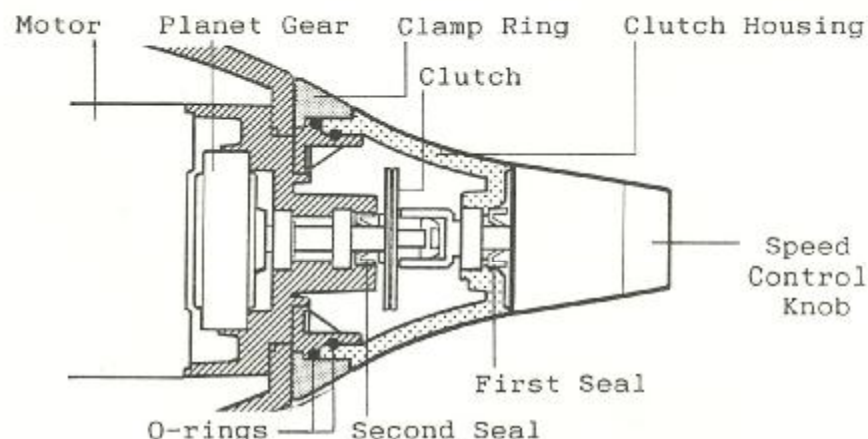


Dry in a shady ventilated area

2) Clutch Housing

Water has often leaked into the clutch housings of other vehicles through the propeller shafts. Following initial leakage, the motor housings have become soaked with saltwater, resulting in corrosion and damage.

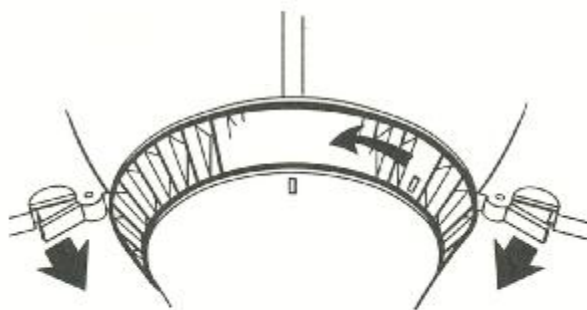
The Apollo Scooter has been greatly improved in this area. The propeller shaft has been double sealed with O-rings, and additional space and an extra barrier in the form of the clutch housing have been put between the double seals. If water should leak in through the first seal, only a small amount will remain in the clutch housing. The second seal will protect the motor housing from water damage.



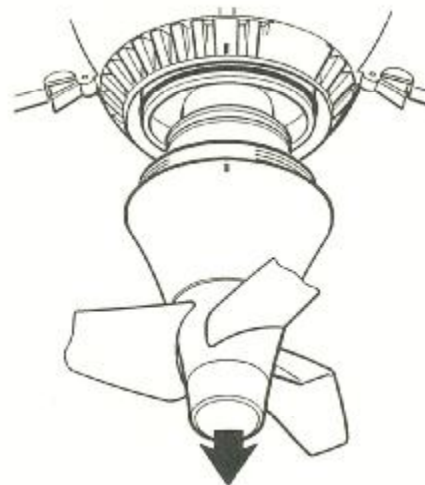
Check inside the clutch housing for any water leakage. If there is any indication of leakage, detach the clutch housing and rinse it with fresh water to prevent saltwater corrosion.

a. Removing the Clutch Housing

Detach the clutch housing by first lifting the left and right clamp levers. Release the clamp ring lock and then rotate the clamp ring counterclockwise. Match the marks on the clutch housing and clamp ring, then detach the clutch housing.

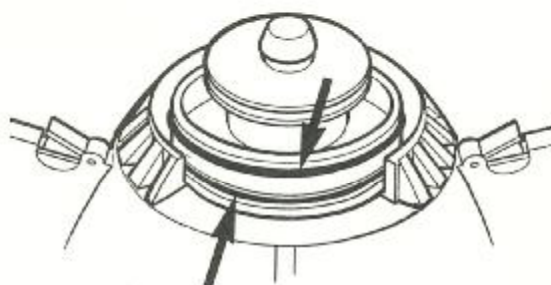


Rotate clamp ring after lifting clamp lock levers

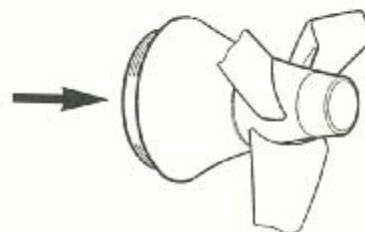


b. Installation of the Clutch Housing

After rinsing the clutch housing, dry it, and then replace it on the scooter body after confirming that the O-rings, O-ring slots, and grooved slot are clean, free of flaws, and lightly lubricated with silicon grease.

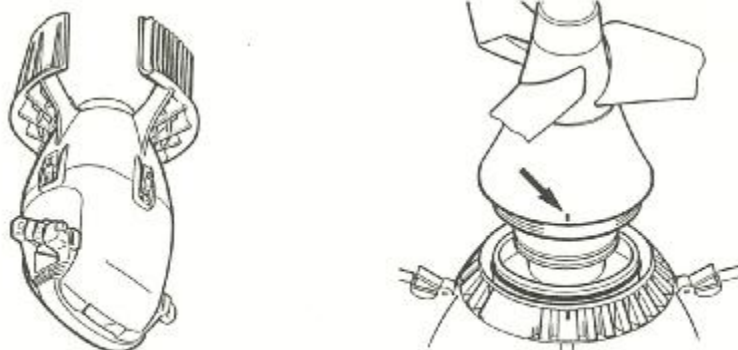


Check the two O-rings

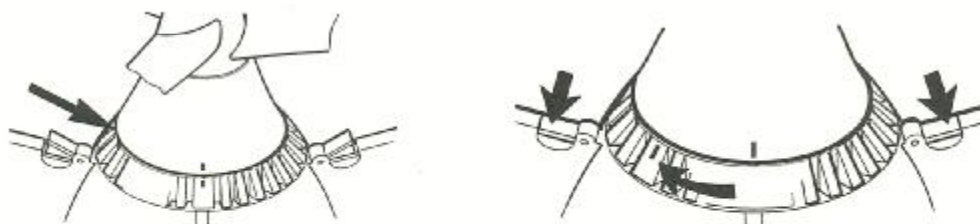


Make sure the O-ring slots and groove are free of flaws

Place the scooter upside down on its bumper to install the clutch housing.



Put the clutch housing onto the scooter body with the dot facing upward, and then align the dot with the dot on the clamp ring. When matching the dots together, push the pitch hub down while rotating the propeller until you feel the shaft click into position. Then, while continuing to push down on the hub, tighten the clamp ring. Be sure not to leave any opening between the propeller and hub.



After positioning the housing, lock the clamp ring securely into place with the two lock levers. Confirm that the lock levers will not spring out of position.

CAUTION: If the locks and clutch housing are not secured properly, the following may result:

- * Less thrust
- * Noise from the clutch housing
- * The propeller may contact the propeller shroud (and cause damage)
- * Water leakage into the housing
- * Motor power may not be transmitted to the propeller, causing the propeller to rotate strangely

****** Irreparable damage may result to the clutch if the scooter is used when the clamp locks and clutch housing are not securely set into position.

B O-Rings

Two separate O-rings are used for the clutch housing and motor housing seals. These O-rings prevent water leakage to the clutch housing, and thus protect the motor housing. Careful maintenance of these O-rings is always required.

- 1) Always make sure that the O-rings, O-ring slots, and grooved slots are clean and free of sand and debris. If an O-ring slot or grooved slot is flawed, coat the damaged areas with plastic putty, and then smooth down the coated areas with sand paper (No. 600 ~ 1200). Replace damaged O-rings.
- 2) To remove an O-ring, do not use a sharp tool such as a screwdriver. Use something dull that will not damage the O-ring. When replacing O-rings, after first lightly lubricating the O-ring, O-ring slot, and grooved slot with silicone grease, wipe away any extra grease with a soft cloth or tissue.

C Care of the Scooter Body

The scooter body is made of a high impact ABS resin which offers strength, durability, and an excellent appearance. However, some chemicals can remove the shine from the body surface and cause cracking. Use the following guidelines:

- 1) Avoid gasoline, oils, petroleum greases (including vaseline), alcohols, toluene, ketones, acetone, and strong detergents. Clean your scooter with warm water and a mild detergent such as a dive cleaner suitable for most diving equipment.



- 2) Use pure silicon grease to lubricate the O-rings, rubber and plastic parts. On the plastic body, use only a silicone spray designated for use on plastic.

D Battery Maintenance

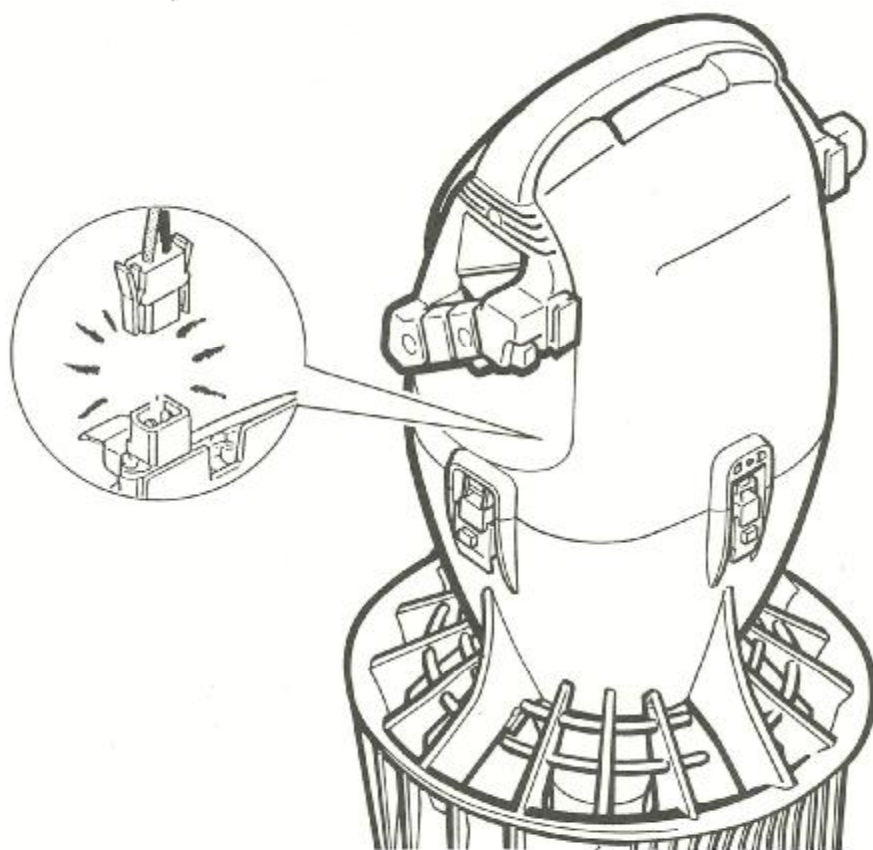
To obtain maximum performance, please maintain your Apollo battery according to the following guidelines.

- 1) Heat is detrimental to batteries. Do not place batteries near sources of heat such as direct sunlight, heaters, radiators, the trunk of a hot car, or furnace room.
- 2) Recharge batteries fully within 24 hours of use.
- 3) Complete discharges (until the motor does not run) can dramatically reduce battery life. STOP scooter operation when the sound of the motor changes, and recharge the battery as soon as possible.
- 4) Undercharging can also reduce battery life. Please recharge batteries fully.
- 5) Do not use chargers other than the supplied battery charger AV-300. Use of other chargers can cause undercharge or deep discharge in addition to making batteries impossible to use. The use of other chargers will void your warranty.
- 6) Do not expose your charger to rain, seawater, or a salt atmosphere.
- 7) Do not smoke or allow an open flame near batteries.
- 8) Do not use chargers in (unventilated) closed areas, or block vents.
- 9) Batteries should be replaced after 200 discharge/recharge cycles. Batteries must not be recharged over 200 times due to the possible generation of hydrogen gas to a dangerous level when batteries are recharged further.

Storage

A Unplug the Battery Charging Cord

Unplug the battery charging cord whenever you transport your scooter or keep it in storage.



B Keep the Packing Case

Do not throw away the styrene and cardboard box in which your scooter was packed. If you need factory service, use of the original box and packing is required to insure adequate shipping protection. An inadequate return shipment will void your warranty.

Troubleshooting Guide

Problem	Cause	Remedy
A) Motor does not run	1) Rise in housing temperature 2) Disconnected or defective battery connection 3) Socket sleeve terminals dirty or defective. 4) Battery at end of life cycle 5) Discharged battery 6) Defective reed switch or relay	a) Decrease housing temperature b) Check battery connection c) Check if battery housing reversed. Match upper and lower fins on scooter housings. d) Insert blade between switch terminals to check contact. If motor turns, clean switch terminals. e) Recharge or replace battery f) Return for repair
B) Motor runs but propeller does not turn	1) Propeller obstructed 2) Defective clutch (broken pin or clutch slips)	a) Remove obstruction b) Return for repair
C) Motor runs but gives strange noise	1) Defective motor or planet gear 2) Bearing obstructed 3) Propeller shaft bearing and/or seal obstructed or corroded	a) Return for repair
D) Clutch housing flooded	1) O-rings flawed or dirty 2) Propeller shaft seal obstructed 3) Propeller shaft or bearing corroded	a) Clean and lubricate O-rings, slots, and grooves. Replace damaged O-ring. b) Return for repair
E) Battery housing flooded	1) O-rings flawed or dirty 2) Body case, body O-ring, slot, and/or groove flawed or damaged 3) Loose lock buckles	a) Clean and lubricate O-rings, slots, and grooves. Replace damaged O-ring. b) Return for repair
F) Battery does not charge	1) Battery at end of life 2) Defective charger 3) Battery fully discharged	a) Replace battery b) Return for repair



NOTE: You may have to pay for repair to a battery damaged by exposure to saltwater even though your warranty may still be valid.

Do not disassemble your scooter. Disassembly by an unauthorized repairman will void the warranty.



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