

# HALCYON

*DIR Dive Systems*

*Helios, Proteus & Apollo Lighting Systems*



# Halcyon HID & Halogen Primary Light Owner's Manual

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## Warnings, Cautions and Notes

Pay special attention to information provided in warnings, cautions, and notes, that is accompanied by these icons:



A **WARNING** indicates a procedure or situation that, if not avoided, could result in serious injury or death to the user.



A **CAUTION** indicates any situation or technique that could cause damage to the product, and could subsequently result in injury to the user.



**WARNING:** This manual provides essential instructions for the proper operation, inspection, and care of your new Halcyon lighting product. Because Halcyon's lighting systems utilize patented technology, it is very important to take the time to read these instructions in order to understand and fully enjoy the features that are unique to your specific model.

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## Halcyon Helios, Proteus & Apollo Lighting Systems

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Congratulations on your purchase of a Halcyon primary light. At Halcyon we appreciate the faith your choice places in our products. Like the rest of the Halcyon line, the Helios, Proteus and Apollo lights were created out of a very real need for a lighting instrument capable of withstanding the rigorous demands of exploration diving. Formed by some of the world's leading explorers, Halcyon is dedicated to establishing a link between active underwater explorers and the manufacture of precision diving equipment. Who better than leading explorers to design and test your life support equipment? We've spent more than a decade of careful refinement and real world testing in developing your Halcyon light, and we are proud to count you among our select group of demanding customers. It is an instrument that we would not hesitate to take from the storeroom shelf directly to the water for an exploration dive.

Every Halcyon primary light is individually inspected and pressure tested to over 400 feet/121 meters. Design prototypes are tested to more than 700 feet/212 meters; structural integrity calculations place the operational limit of our Helios line at a depth of 2,000 feet/606 meters.

Halcyon's three primary light lines meet the needs of every level diver and every imaginable dive environment. The Helios line utilizes advanced NiMH battery technology and tougher-than-steel Delrin to produce an exploration grade system that is the benchmark for underwater lighting instruments. The Proteus



line incorporates traditional sealed lead acid batteries and high-impact polymer canisters to create an affordable system that is as much at home at the back of a cave as on a Caribbean reef. Halcyon's Apollo line of video systems provides high-power HMI and HID illumination in combination with our indestructible Delrin canisters to complete your video, film or photographic package.

Helios, Proteus and Apollo light canisters are designed to be mounted on a diver's waist belt, while the hands-free Goodman-style light head allows you maximum dexterity during the dive. Manufactured from a single piece of black Delrin, the indestructible Goodman-style head allows for hands-free operation while sitting cleanly on top of the diver's hand. The fully adjustable handle is hard-coated aluminum and can be ordered with an optional reserve knife attached.

## Helios

- Canisters are milled from a solid rod of Delrin for exacting tolerances
- NiMH batteries provide more than 50% greater energy density than lead-acid counterparts, allowing light canisters that are a fraction of the size of conventional lights
- Environmentally Green: contain no cadmium, mercury or lead

## Proteus

- Traditional sealed lead acid batteries
- One-piece canister maintains maximum reliability

## Apollo

- All of the features of our Helios Systems
- HMI and HID light heads specifically crafted for video, film and photographic applications

All Halcyon Lights come standard with the following:

- Locking latches
- Stainless Steel fittings
- Lifetime warranty on canister
- 110 or 220 volt charger
- Depth rated to 500 feet/152 meters
- Hands-free Goodman handle (except specific Apollo Video Systems)



## HID Lighting Systems

High Intensity Discharge lamps produce a brilliant white light yet draws a fraction of the power of a halogen lamp. HID has quickly become the standard for exploration-grade lighting systems. Halcyon's Helios, Proteus, and Apollo lights require very little attention beyond the care given to a halogen light. Although it produces 5% of its output when first ignited, the HID light requires a few seconds (usually 15-20) to produce full output. Also, if power to the lamp is lost or turned off (such as with an underwater pluggable cord), the arc tube must cool to a given temperature before the arc can be re-struck and light produced. Halcyon HID lights only require a brief (15-30 second) cooling period.

The ballast in an HID lighting system provides the proper starting voltage to strike and maintain the arc, and it regulates the proper current to the lamp once the arc is established. Ballasts are not interchangeable among different types of HID lamps. A ballast design incorporates electronic circuitry to provide specific lamp/ballast operating characteristics.



## Special Considerations for HID Lighting Systems

The light emitted from the HID arc tube is intense and appropriate safety precautions relating to exposure protection are required. Metal halide bulbs operate at very high temperatures and pressures. The glass lamps should be handled with care giving special attention to the quartz arc tube. The Halcyon HID light is a DC lamp; proper electrical wiring polarity must be observed to prevent damage to the lamp. Only certified Halcyon repair technicians are authorized to work on Halcyon products; non-certified work voids your Halcyon warranty.



**CAUTION:** Ultraviolet, visible and infrared radiation is emitted from metal halide lamps. Possible skin or eye irritation can result from exposures exceeding 15 minutes. Do not stare at exposed lamp in operation. During operation, the bulb should be enclosed in a housing to prevent injury. Do

not remove bulb from equipment until it has cooled. Never handle the bulb when it is operating. Keep your face away from the light head during ignition and operation.



*18 watt HID Bulb*

Protect the quartz arc tube when handling the lamp. Keep the arc lamp clean. Do not touch the quartz tube, the inside surface of the reflector and the connecting wires. Contamination can degrade lamp performance or cause premature failures. If necessary, clean the lamp by wiping with a lint-free towel or swab immersed in denatured alcohol. Any interaction with the bulb should be conducted very carefully. Bulbs break very easily when handled and are not covered by warranty.

While HID bulbs last considerably longer than halogen bulbs, you should be aware of several characteristics that indicate a bulb is approaching the end of its lifespan. Initial symptoms of end-of-life are characterized by low light output and/or intermittent starting. Visual signs include blackening at the ends of the arc tube and electrode tip deterioration. Note that HID bulbs contain metals, including mercury, that are harmful to the environment. Please be responsible in securing proper disposal of an HID bulb.

The bulb and ballast are sensitive to external operating temperature. Although Halcyon's HID light doesn't generate the amount of heat of a halogen light, it should be treated like any other dive light. The HID lamp should only be operated while in the water, to provide proper cooling for the lamp assembly. While transporting your HID light, please don't leave the light in direct sunlight or in a car's interior on a hot day.

### 18 watt HID Light Head

Halcyon's workhorse light, the 18 watt HID, allows full adjustability and easy bulb changes in a conventional test tube style design. Light output is similar to a 75 watt halogen light at a fraction of the power consumption.

### 10 watt HID Light Head

Where innovation meets practicality: Halcyon's fully-closed (and nearly indestructible) light head (patent pending) can be adjusted from a laser-like beam to a diffuse soft light with the mere twist of a dial.



## Halogen Light Head

Conventional halogen systems utilize a filament similar to that found in conventional light bulbs. Halogen lights have a color temperature that is considerably lower than HID (shifting the visually perceived color toward yellow-orange); halogen lights also have less penetration in the water column and a much shorter burn time than a HID lamp with the same battery pack. To their benefit, halogen bulbs are less expensive and easily replaced with bulbs available at traditional lighting supply stores.

## Video Light heads

Halcyon's Apollo series are available with dual/single lamp HID and HMI light heads. Dual head Apollo systems are ready for mounting on housing arms with standard hardware. The HMI lamp is truly an underwater motion picture studio lighting instrument, with the output of a 1,000 watt halogen burning at a solid 5,600K.



## 18 watt HID & Halogen Light Head Operation

The one-piece machined Delrin slug is temperature resistant and completely non-corrosive. The slug assembly consists of a bulb socket, bulb, test tube and cord. The bulb slug contains three O-rings. The two O-rings closest to the bulb actually provide the water-tight seal while the base ring cushions the glass tube.

The focus of your light may be set by loosening the locking screw on the Goodman Light head and moving the bulb slug assembly backward or forward in the light head. To avoid the potential of breaking the bulb covering, be careful not to tighten the screw down on the glass tube. The focus should be set so that the beam forms a tight circle several feet in front

of you, allowing for brightest illumination and more convenient signaling to one's dive buddy.

Never leave your light on while at the surface! Without the dissipating effect of the water, the heat generated by the bulb can accumulate in the light head, damaging the assembly's components. With a halogen light, the heat accumulation may result in a catastrophic failure; although HID lights do burn cooler than halogen, they can eventually generate enough heat to damage the light head given a long enough burn out of the water.

Should the bulb assembly become difficult to focus, make certain that the nylon adjustment screw is loose and not binding the assembly's movement. Dirt may become trapped along the focusing barrel, creating friction between the test tube and light head. To clean the dirt from the bulb assembly, simply loosen the locking screw and push the bulb assembly out toward the cord. Clean the light head and bulb assembly. Be careful not to pull a stuck assembly out by the cord while underwater as the tube may come free from the assembly, flooding the light. The groove on your light head's bulb assembly will prevent the unit from being accidentally pulled out from the light head by an entangled cord.

Should the bulb in your Halcyon 18 watt HID or halogen light become damaged, it can be easily replaced by following these simple steps:

1. Remove the Goodman handle and reflector assembly from the light head.
2. Carefully remove the lamp cover (test tube) from the slug assembly. Pull the cover straight off; a twisting action is more likely to break the glass tube. It is advisable to use a protective barrier such as a rag to protect your hand from a possible break in the glass lamp cover. Be especially careful with the 18 watt HID lamp cover. The bulb is longer and more care needs to be used to prevent breaking the tip of the bulb.
3. Visually inspect the bulb and filament (halogen) or capsule (HID) for damage. If jarred, bulbs occasionally come loose in the socket. If the halogen filament appears intact, use a clean, oil-free rag to adjust the position of the bulb; touching the bulb leaves natural skin oils on the bulb and can cause uneven heating and premature failure of the bulb. Press the bulb gently into the socket, making sure that both posts are securely seated. Check to see if the light is now working by turning the switch on while the battery is plugged in. Do not allow halogen lights to burn above water for more than one minute.



If the light now works, clean the assembly as discussed in step 5 and then continue to step 6.

4. If you discover that the filament of a halogen bulb is damaged, or find any broken parts or sections of the HID bulbs, remove the bulb from the bulb socket. Open the package containing the new bulb. Do not touch the new bulb with your fingers; using a cloth to hold the bulb, gently push it into the socket. If there is any doubt that the bulb may have been contaminated by your touch, you should clean the bulb before its first use. Take a clean cloth dipped in a small amount of rubbing/ isopropyl alcohol and gently brush off the bulb surface.
5. Wipe the bulb assembly O-rings clean with a cloth. Apply an extremely thin film of silicone lubricant to the bulb assembly O-rings. Wipe out any moisture that might have accumulated in the lamp cover.
6. After cleaning the bulb slug O-rings and the lamp cover, gently place the glass cover over the bulb slug and push it into place. Make sure that the lamp cover is seated all the way to the bottom O-ring on the slug assembly.
7. Place the bulb slug assembly back into the light head, focusing the light to a tight beam and locking down the screw. Do not allow halogen lights to burn above water for more than one minute.

## 10 watt HID Light Head Operation

Halcyon's 10 watt HID light head encases the bulb, lens, ballast and reflector in a very tough, focusable Delrin body. The daylight-quality HID bulb is attached directly to the ballast to increase positive ignition and bulb longevity. It has been engineered to allow quick and easy bulb changes, without the need for tools of any kind.

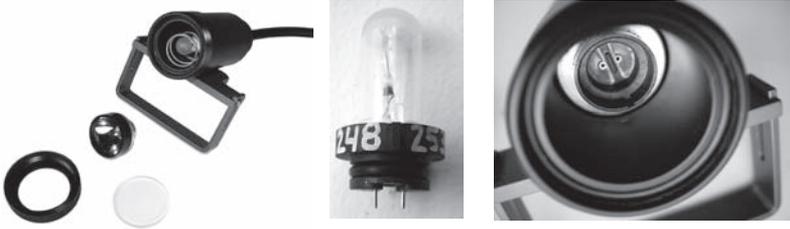
The 10 watt HID Light head is adjustable from a flood to a tight spot, or any spread in between. Beam focus is adjusted by the knurled, integrated knob at the back of the light head, eliminating the need for a lock-down screw. "Quick-set" focus settings are laser-etched into the Delrin light head to allow for a quick visual reference.

The entire range of focus requires less than 1.5 revolutions. Do not attempt to force the action past the designed limits, in either direction, as damage can occur.

Should the bulb in your Halcyon 10 watt HID Light become damaged, it can be easily replaced by following these simple steps:



1. Replace the bulb by removing the knurled lens retaining ring at the front of the light head. Simply unscrew the ring counterclockwise to access the lens.
2. Remove the lens. The reflector and bushings should spring up so it can be removed. Remove the spring to access the bulb.
3. Install the new bulb and reverse the procedure to reassemble the light head. Make sure to clean all appropriate parts before re-installing. **Be careful during reinstallation to ensure that the reflector and bushing are tightly seated - the lens should sit flat against the O-ring.**
4. Test for leakage in a vessel of water before diving.



*Disassembled 10w light head, above left; 10w bulb and bulb socket. Note the notch in the socket and the corresponding ridge on the bulb.*

*When reassembling the 10w light head, use your finger to hold the lens in place while screwing the retaining ring back on the light head body.*

*Warning: Failure to properly seat the lens against the O-ring will compromise the water-tight seal of the light-head.*



## Helios, Proteus and Apollo Canister and Lid



Take the time to inspect the O-ring on the canister lid before every dive. The O-ring should be free of grit or dirt and should not have any signs of damage. Remove the O-ring from the lid and wipe it down with a clean cloth before every dive. The O-ring groove on the lid should also be cleaned of any dirt or debris.

Be careful not to damage the sealing surface on the lid or canister. During transport, the lid should always be attached to the canister to prevent accidentally nicking either surface. However, you should store your light for extended periods of time with the lid off or the battery removed from the canister. Over time, and especially after discharge, the rechargeable batteries will off-gas potentially combustible gasses. While off-gassing has not proven

itself to be a common problem, you should be aware of the potential risk by not allowing the canister to sit over time with discharged batteries sealed inside.

## Light Canister



The light canister must keep the battery dry and protected while you are diving at depth. Halcyon lights use two locking latches to secure the lid to the canister. When opening or closing your light, work both latches simultaneously to avoid stressing any side of the lid unevenly.

The canister is configured for attaching to the diver's waist belt. The unique three-fold webbing attachment on your Halcyon Light is held in place by two stainless steel bands. The three-piece fold holds the light with more stability than conventional methods, and prevents the light from accidentally releasing from the diver's hip. The steel bands can be raised or lowered on the canister to balance the light on your hip; the canister should rest parallel to your body when mounted on your harness.

## Delrin and High-Impact Canisters

Halcyon mills Helios and Apollo canister out of a solid rod of Delrin. The one-piece design ensures a structural integrity not found in any other available dive light. Delrin shares the same characteristics of industrial metals such as aluminum and stainless steel. Some comparable properties include stiffness, dimensional stability, impact resistance, and structural strength. Material operational temperatures range from 180° F (82° C) to -100° F (-73° C). The one-piece Delrin canister is virtually indestructible under normal usage. Although the canister itself can withstand depths of over 3,000 feet/909 meters, the recommended working depth of the Halcyon Helios line is 450 feet/137 meters. Proteus Lights are milled from a solid rod of high-impact polymer plastic. Similar in toughness to the Helios and Apollo canisters, the Proteus canister also carries a Halcyon lifetime guarantee against failure.

All Helios, Apollo and Proteus lights feature high quality stainless steel fittings and new locking latches. The battery connects with a simple push connector; line up the color-coded connector and use firm pressure to plug and unplug the battery pack from the light lid or the Helios charger.

## Halcyon Power Systems

Halcyon carefully selects from among the finest batteries available, to provide enhanced performance and reliability for our lighting systems. Our Helios and Apollo NiMH battery packs provide extended burn times with the advantage of dramatically reduced size, while our Proteus Sealed Lead Acid (SLA) packs represent a decade's worth of research and experience with SLA systems. High quality batteries typically result in the maintenance of longer burn times over the life of the battery. Burn times for Halcyon's lights are listed in Appendix A.

### Battery Care and Maintenance

Rechargeable batteries can release small amounts of combustible gas that can become dangerous in a sealed environment. The release of gas is more prominent while the batteries are being over-charged or deeply discharged. Lights that have been discharged and then left sitting in a sealed canister over time should be opened prior to actuating the switch. While the risk of gas ignition is limited, the risk should be treated with respect.



**Warning:** To reduce the risk of gas accumulation, open the canister and allow the gas to vent before use. Venting the canister is especially important if you have left the light closed over time or for transport after a deep discharge.



### Charging the Battery

All of Halcyon's lights utilize the highest quality NiMH and SLA batteries, providing years of consistent use. However, even the best batteries are only as good as the manner in which they are maintained. Batteries should always

be charged as soon as possible after use and not left to sit for long periods in a discharged state. While NiMH and SLA batteries do not experience the reduced discharge effect known as “memory,” they can be damaged if left at low voltage levels. The charger provided with your light will charge the batteries up to capacity and then turn off automatically provide a maintenance charge.

Batteries tend to slowly discharge if left over time, especially if exposed to extremes of heat or cold. For example, SLA batteries can discharge up to 1% per day, or drop over 30% during a month of storage. Your Halcyon charger is designed to top the battery pack back to a full charge when left connected to the battery during storage. Halcyon recommends that you always store your battery pack connected to your battery charger if you plan to use your light within a few week’s time. If the battery is going to be left unused for several weeks or months, you should charge it up, disconnect the battery and charger, and top off the battery prior to the next use. If the battery is to be stored without use for a long period, top it off with a recovery charge every six months.

The Proteus 3 battery pack requires approximately 6 hours to reach full charge; the Proteus 6 requires 12 hours to reach full charge.

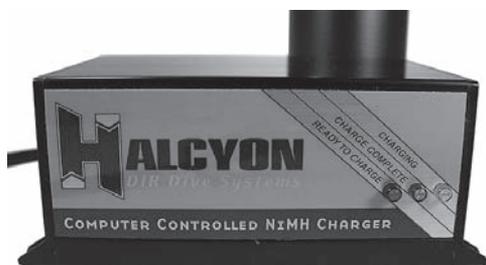
### Charging your Helios or Apollo battery pack (NiMH Batteries)

Proper charging of your Helios battery pack is essential to ensure a long NiMH battery life. If the charger is not properly designed and matched to the battery’s voltage, chemistry and configuration, the result can be poor performance of the battery due to insufficient charge, shortened battery life due to overheating of the battery, and the chance of fire or explosion of the battery from over-charging. Charger selection is so important to the life of your Helios battery pack that the use of any charger other than the Halcyon NiMH charger will void your Halcyon warranty. The Halcyon Helios charger has been specially designed to charge the Helios 4.5, 9 and 13.5 battery packs and should not be used with any other make or type of battery. The Helios charger cannot be used with Halcyon’s lead acid battery packs.

The charge proceeds in four three stages:

- Soft Start Charge. Current gradually increases over the first two minutes, helping to extend battery life through proper conditioning of the battery cells.
- Bulk Charge. Current is supplied to the battery pack at a rate programmed by Halcyon into the charger specifically for Helios and Apollo packs.
- Topping Charge. Current is supplied for two hours at a fraction of the bulk charge rate.
- Maintenance Charge. After a battery is fully charged, current is supplied

at a small percentage of the bulk charge for a maximum of ten hours or until the battery is disconnected from the charger.



If the charger is plugged in to a power source but no battery is connected, the red light will indicate that the charger is searching for a battery to charge. Once a battery is connected, the yellow light will indicate that the charger has entered the Soft Charge state. The yellow light will remain on through the completion of the Bulk Charge. Once the battery pack is completely charged, the green light will indicate that the system has entered its Topping Maintenance Charge state. After two hours of topping off the battery pack, the charger will enter the Maintenance Charge phase. The charger will cycle through the maintenance phase for ten hours, after which the charge current goes to zero. At this time all of the lights will go off and remain off until the battery is disconnected.

For a fully discharged battery, the complete charging process should take approximately 2.25 hours for a Helios 4.5 pack, 4.5 hours for either Helios/Apollo 9 pack, and 8 hours for a Helios/Apollo 13 pack.

## Recommended Storage Conditions

Store your Halcyon NiMH or SLA battery pack disconnected from the light to eliminate loaded storage effects, which in NiMH batteries can lead to increased self-discharge.

Any Nickel-Metal Hydride cell will off-gas hydrogen when subjected to excessive overcharge or overdischarge. Do not store your Helios light for extended periods of time with the battery pack in place and the lid closed. Always open the lid of your light to vent any ambient gasses after storage and before you operate your light.

## Battery Longevity

Your battery should provide you with years of trouble free performance. The anticipated life of a battery is measured in the number of charge and discharge cycles it can tolerate. The life of a battery will depend on many

factors, including the storage temperature, the discharge of the battery, and the charging efficiency.

Please see the recommendations below to establish other ways of increasing battery life.

1. Use only Halcyon replacement NiMH and SLA battery packs with your Halcyon light. It is very important with NiMH systems that the charger be matched with the battery.
2. Do not allow the batteries to discharge deeply (below about 9 volts).
3. Do not allow the batteries to sit in a discharged state.
4. Do not expose the batteries to extreme temperatures below  $-15^{\circ}\text{C}$  ( $5^{\circ}\text{F}$ ) or above  $50^{\circ}\text{C}$  ( $122^{\circ}\text{F}$ ).

To be sure that your battery is adequately charged reference the following considerations:

1. Plug in the charger and verify that it is receiving power. In chargers with status lights, verify that the green Red power light is on when you connect the charger to the battery pack on SLA packs and the Yellow light is on for NiMH battery packs.
2. Plug in the battery while making sure that the positive (red) charger lead is mated with the positive (red) battery receptacle and that the negative charger lead mates with the negative battery receptacle.
3. If the power light shuts off, it is likely the result of crossed charging wires. If this is the case, reference step 2. If you are charging the battery pack with a nonstandard charger, the charger may not have a reverse polarity control. You will ruin your battery if you charge it with crossed charging wires on a nonstandard charger. To prevent potential damage to your battery pack, always double-check the connection before leaving the pack to charge.
4. Allow the batteries to charge until the red “charged” “charging” light activates extinguishes on SLA packs and the green “Charge Complete” light activates on NiMH battery chargers (8 - 14 hours on average). You may verify the charge by using a voltmeter to gauge the battery voltage. However, this reading is only reliable if the battery is under a load, such as when the light is activated. To ensure that your charger is operating properly, place the light head in a pot of water and connect the batteries to the lid, leaving the light out of the canister. Do not let the light burn for more than a minute out of the water. While the light is discharging the batteries, use a voltmeter to gauge the voltage drop. If the pack is not properly charged, the voltage should drop rapidly (within one minute). A properly charged pack will slowly drop voltage from a high of around 13 to roughly 12 volts, and should hold 12 volts for about an hour.
5. The charger will turn off enter “Maintenance Charge” when a full charge

is reached, so it is possible to leave the battery connected to the charger for extended periods of time. If the battery is going to be left unused for several months, charge the battery, disconnect the battery and charger for the length of storage, and then top off the battery with a new charge prior to the next use. If the battery is to be stored without use for a long period it should be topped off with a recovery charge every six months.

## Burn Testing

You should burn test your battery pack at least yearly in order to establish the actual burn time of your light. Frequent divers, or those who often rely on longer burn times, may choose to test their light more frequently. In order to conduct an effective test you will need the following equipment:

- Battery pack
- Discharge method: either the light head itself or a discharge array
- Volt meter
- Timer, preferably with an alarm
- Reservoir of water
- Paper to record time and voltage

The following steps will allow you to accurately determine your battery's burn time:

1. Make certain that the battery has been fully charged. For the best charge, burn the battery for ten minutes and then bring it back to a full charge.
2. Place the light head into the water. Make sure that there is enough water to prevent overheating. A one gallon basin or bucket is sufficient.
3. With the battery out of the canister, connect the light head to the battery.
4. Actuate the switch and measure the voltage. For NiMH battery packs, insert the volt meter probes far enough into the back side of the red and black connectors to make contact with the metal clamps.
5. Record the time and voltage every ten minutes until the pack reaches 10 volts. It is recommended that the timer have an alarm to alert you when an interval has ended. The alarm will prevent you from forgetting about the battery and discharging it completely. A complete discharge is practically certain to damage the battery's cells.
6. Stay near the pack to monitor the voltage decay as the 10 volt limit is approached. As the pack nears 10 volts, the voltage will drop more rapidly. Record the time when the battery reaches 10 volts. This time is the amount of time that your light battery can provide a useful light beam.
7. Record the burn time and date on the battery. Don't forget to update this

information with each subsequent test of your battery.

- Charge the battery immediately. Never discharge your battery below about 9 volts as it can damage the cells to experience deep discharge for any prolonged period. Any time the battery is discharged it should be recharged as soon as possible. A quick recharge is especially important when the battery is deeply discharged.



*To test the NiMH battery pack, your volt meter must have long enough probes to reach the middle of the connector assembly.*

*Keep a close eye on the volt meter as the discharging battery approaches 10 volts. You can damage your battery pack if the voltage drops below 9 volts, and the rate of discharge will increase rapidly below 10 volts.*



## Transporting Your Light

Your Halcyon light should be left unplugged during transport. You want to eliminate the possibility of activating the light while the unit is out of the water. Be sure to reconnect the battery prior to getting into the water and to disconnect the battery prior to travel.

## Troubleshooting Your Halcyon HID or Halogen Light

If you are experiencing problems with your HID light before the end of its expected lifespan, take a second to inspect the bulb and ballast assembly:

### Bulbs

- Inspect for broken arc tube or outer lamp jacket.
- Check connection where glass meets the base.
- Make a visual inspection of the bulb for broken or loose components in the lamp envelope.
- Inspect for arc tube end blackening.
- Inspect for deposits inside the outer glass envelope.

## Ballast and Capacitor points-of-failure

- Attempt ignition a second time after properly resetting the ballast by disconnecting, waiting 15 seconds, and then reconnecting the connectors attached to the lid.
- Are you using Halcyon replacement lamps? Your ballast will not work with incorrect wattage lamps.
- Avoid possible overheating due to ambient temperature.
- Inspect for miswiring/pinched wires.
- Inspect ballast housing and wiring for mechanical damage.

## What to do if your light does not work

1. Verify that the battery is properly connected, that all wire connections are secure, and that the battery is not completely drained. Use a volt meter to verify that the battery has at least some voltage. If you believe that your power pack has failed, test the questionable light head with a different battery.
2. Verify that the bulb is not damaged. For a halogen lamp, the filament may look burned or may be broken free entirely. Bulb filaments are especially likely to break if the light head is handled roughly during transport. If the bulb needs to be changed, please refer to the manual section on changing the bulb. Remember to be careful removing the lamp cover and to avoid touching the bulb with your bare hands.
3. Verify that the bulb is seated properly in the socket. Occasionally the bulb connection can be compromised if the light head is sufficiently bumped or jarred during transport. To check the bulb seating, the lamp cover must be removed. For a comprehensive discussion of this process please see the manual section on changing a bulb. In general, be sure that the bulb is not touched directly and that you are careful removing the lamp cover.
4. Verify that the switch is functioning properly. This test must be done by checking the continuity with a volt meter. Place the volt meter in continuity mode and verify by touching the two leads together. Place one lead at each solder point on the switch. If there is no continuity regardless of switch position, then there is an interruption in the current flow. The switch may have a damaged connection, the light bulb may be broken, or the connectors may be damaged. Please refer to the preceding steps to insure that the bulb is functioning properly. If the switch is suspect, the light head should be returned to Halcyon and the switch replaced.

## What to do with a light that works sporadically

If your halogen light flickers or only works sporadically, it is very likely to be

the result of a poor connection. It is possible that this weak connection is at the bulb and socket, or that wires leading to the battery are frayed. Please consult the troubleshooting section entitled “What to do if your light does not work” for more detail on correcting these problems.

A sporadic light is more likely the result of a poor connection in the cord. Test for a poor connection or a kink in the cord by working the cord back and forth, starting by the light head and working back toward the canister, to see if the sporadic problem can be initiated. A kink in the cord is likely to eventually break the wire connections within the cord.

If your light is equipped with underwater pluggable connectors (E/O connectors), it is possible that this connection has become compromised. Over time, the female connection may widen out and not clamp securely over the male connector. A rather inelegant but effective method to rectify this problem is to gently tap the female connection with a hammer, carefully tightening the female receptacle. It is also possible that the switch has become damaged, perhaps with corrosion, resulting in sporadic operation. If you detect corrosion in the switch mechanism, the light should be returned to Halcyon and the switch replaced.

### What to do if your light turns itself on

A light that begins burning with the switch in the off position must have the switch replaced. This problem occasionally occurs in lights that have been previously flooded. A light that turns itself on should be disconnected immediately to prevent any damage from overheating.

Lights should always be disconnected while transported.

### What to do if your burn time is less than expected

For a halogen lamp, verify that your light contains the intended watt bulb and not some higher wattage bulb. Higher wattage bulbs will discharge the batteries much more rapidly. Bulbs usually have the wattage stamped on the side, making it easy to verify. Also, the filament on a higher watt bulb is larger and often fairly discernible. However, divers should not use a visual inspection of filament size as an accurate gauge in any situation where the light is mission critical.

For HID and halogen lamps, check the condition of the battery pack to confirm that the reduced burn time isn't the result of an error induced during charging. You can check a battery pack's condition with the following steps:

1. Verify that the charger is plugged into a properly functioning outlet. Be sure that this outlet is not controlled by a wall switch that may be shut off inadvertently.
2. Verify that the power light (if available on your charger) is activated

when the charger is plugged into an active outlet.

3. Verify that the light indicating “charged” is activated at the end of your charging cycle. Your Halcyon charger is designed to switch off when fully charged and start charging again when the voltage drops. Therefore it is common to see the “charged” light go on and off over time.
4. Verify that the charger is functioning by attempting to charge the battery a second time. Please note that your charger will only operate when put under a load, so a volt meter can't be used to establish charger output. The battery must be charged completely and then placed under a load with a volt meter, typically as part of a burn test. If the battery voltage drops rapidly below approximately 12 volts, the battery is not charged. The voltage should drop slowly to approximately 12 volts and then continue to drop slowly. Please refer to the manual section on burn testing your battery prior to enacting these suggestions. If you are attempting to verify the voltage drop, submerge the light head in water before activating.
5. Gauge the actual burn time with a battery test. Please consult the earlier section in the manual for instructions on conducting a burn time test. If the battery is charging properly but the test indicates a lower than expected discharge time, it is likely the symptom of an aging or inadequately maintained battery. Please review the section on battery longevity for tips on maximizing battery life.

## What to do if your light is leaking

This guide will provide instructions for identifying and repairing some possible leaks in your Halcyon light. If your light continues to leak after troubleshooting, contact Halcyon for instructions on returning your light for repair. If any doubt exists about potential damage, please contact Halcyon for consultation about possible repairs.

If the light has leaked into the lamp cover (test tube), the moisture will typically corrode the socket and continue to produce condensation. Any light or light head that has leaked should be opened up and allowed to dry completely. Please consult the manual section on replacing a bulb for more information on removing the lamp cover. Be careful not to twist the lamp cover while removing it and do not touch the bulb with bare hands.

Possible sites of water intrusion:

1. Typically, water leaks into the light as the result of dirty or damaged O-rings. Check the O-rings in the area of the leak. Replace the O-ring if it appears damaged. If it is dirty, clean the O-ring and the O-ring groove with a clean cloth.
2. Canister O-rings should be cleaned prior to every dive by removing the O-ring and cleaning the seating surface and O-ring thoroughly. Do not leave excess silicone on the O-ring; the lubricant will attract sand and

dirt, increasing the risk of leaking. It is a good practice to occasionally lubricate the O-ring with silicone, but any excess should be wiped off with a clean cloth.

3. Bulb slug O-rings are highly unlikely to leak unless either the lamp cover (test tube) or O-rings have been changed from the original factory installed set. Slight variations in the size of an O-ring can prevent the lamp cover from sealing properly. Gently torque the lamp cover while it sits on the bulb slug assembly; watch to see if either of the two sealing O-rings break contact with the test tube.

If the O-rings break contact with the cover, the lamp cover or O-rings must be replaced. There are occasionally slight variations in the size of lamp covers (test tubes). Halcyon manages this problem by using components that fall within exact specifications. Be cautious about purchasing nonstandard lamp covers from other manufacturers or suppliers.

4. Verify that there are no prominent nicks in either the lid or the top lip of the canister.

## Troubleshooting E/O Underwater Pluggable Connectors

Wetmates E/O cords are an available option that adds flexibility and modularity to any Halcyon lighting system and are a standard feature of Apollo video lights.

E/O cords offer great advantages in flexibility; however, they require some minor attention to ensure reliable service. Over time the rubberized connectors may loosen and weaken the connection. The problem is easily solved by placing the connector on a hard surface and firmly tapping it with a rubber mallet. This action will tighten the connector and prevent a sloppy connection. Another problem that might occur is a slight oxidation on the connector tip after several dives in salt water. A light sanding with extra fine sand paper will remove any oxidation and ensure a good connection.

When used with a halogen bulb, an improper E/O connection will cause the light to flicker. With an HID lamp, an improper connection will interrupt current, resulting in a loss of light. The effect is the same as if you had turned the light off with the switch: the ballast must reset itself and the bulb cool before restriking. If your light should go off because of a loose E/O connection, re-seat the connection, turn the switch to the off position, and wait ten to twenty seconds before restriking the lamp.

## Helios/Apollo NiMH Frequently Asked Questions

What are the number of charge/discharge cycles I can expect from NiMH batteries?

Under normal conditions you can expect anywhere from 800 - 1000 charge/

discharge cycles from your NiMH batteries. Cycle life is dependent upon usage conditions. Severe over-discharge of your NiMH can shorten the lifespan of your pack. Over-discharge is difficult with the 18, 24, 50 and 200 watt HID lights; these lights have a regulated ballast that will terminate light output as the voltage reaches the lower part of the operational spectrum. Using either a 10 watt HID (which operates with an unregulated ballast) or a halogen lamp, you should shut down your light when the light begins to dim, but before you run the pack to complete discharge (a minimum of 10 volts).

**Do Halcyon NiMH batteries lose any capacity during their useful life?**

All battery types lose some capacity over their life, but it is normally very gradual. Our NiMH batteries are designed to have a much longer cycle life and lower rate loss than older generation NiMH or lead acid batteries. You can expect battery capacity to decrease 10 to 15% after 300 - 400 cycles.

**My battery pack fell off the bench and hit the deck of the dive boat. Now that battery does not want to take a charge. Is it possible that by dropping it I damaged it somehow?**

Yes, by dropping this battery you have probably caused some internal damage. All batteries can be degraded by impact damage. If you do drop your battery pack, we recommend replacement. Even if no damage is apparent, the battery could later develop a short or a leak while in the equipment and then cause even more damage, not to mention the possible inconvenience of a light failure during a dive.

**Do I have to use the Halcyon charger with my Helios or Apollo battery pack?**

The Halcyon Helios charger has been designed to ensure adequate return of charge while minimizing overcharge. Effective control of overcharge exposure, time and charge rate are all the most important factors in prolonging the life of your NiMH battery pack. Use of any charger other than the Halcyon Helios/Apollo charger can damage your battery pack and will void your warranty. Failure to use the proper Halcyon charger may also result in overcharge and possible explosion.

**My light was accidentally turned on while in transit and the battery has been fully discharged. Have I damaged my NiMH battery?**

Maintaining a load on a NiMH battery past the point of full discharge may eventually cause irreversible changes in the cell chemistry and promote life-limiting phenomena such as creep leakage. If you have over-discharged your NiMH battery pack, recondition the battery by taking it through at least three complete discharge/charge cycles.

## Can I remove the plastic shrink-wrapping from my Helios/Apollo battery pack?

If you remove the protective white plastic shrink-wrapping from your NiMH battery pack, you will void your Halcyon warranty. The wrapping helps to ensure the structural integrity of the battery pack. There are no user-serviceable parts within the pack; if you think that your battery pack might be damaged within the wrapping, please return the light to your Halcyon dealer for a warranty inspection.

## Do I need to take any special precautions in shipping and handling my Helios battery?

Shipping and handling of NiMH batteries is straightforward. The following suggestions ensure maximum performance, reliability and safety in working with the cells:

- Provide proper packaging, considering the weight of the battery pack, to avoid transit damage.
- Do not store cells or batteries under load or in a shorted condition.
- Avoid excessive handling of charged cells and batteries outside the Helios canister.



*Apollo HMI Video Lighting System*

## Appendix 1: Burn Times for Proteus, Helios, and Apollo Lights

| Lighting System | System Specifications                                  | 50 watt halogen | 10 watt HID | 18 watt HID |
|-----------------|--|-----------------|-------------|-------------|
| Proteus 3       | 3.4" OD/ 8.5" L<br>Weight 4.25 lbs<br>Buoyancy -2lbs   |                 | 120 min     |             |
| Proteus 6       | 4.2" OD/ 12" L<br>Weight 10 lbs<br>Buoyancy -3 lbs     | 45 min          | 270 min     | 120 min     |
| Helios 4.5      | 2.5" OD/9.5" L<br>Weight 3.5<br>Buoyancy -2.5 lbs      |                 | 240 min     |             |
| Helios 9        | 2.75" OD/10.5" L<br>Weight 5 lbs<br>Buoyancy -2.25 lbs | 120 min         | 8 hours     | 240 min     |
| Helios 13       | 3.5" OD/10.5" L<br>Weight 6 lbs<br>Buoyancy -2.25 lbs  | 360 min         | 12 hours    | 390 min     |

| Video Lighting System | System Specifications                                       | Single 24 watt HID | Dual 24 watt HID | Single 50 watt HID | Dual 50 watt HID | Single 200 watt HMI |
|-----------------------|---|--------------------|------------------|--------------------|------------------|---------------------|
| Apollo Video 4.5      | 2.5" OD<br>9.5" L<br>Weight 3.5<br>Buoyancy -2.5 lbs        | 120 min            |                  |                    |                  |                     |
| Apollo Video 9        | 2.75" OD<br>10.5" L<br>Weight 5 lbs<br>Buoyancy -2.25 lbs   |                    | 120 min          | 90 min             |                  |                     |
| Apollo Video 13.5     | 3.5" OD<br>10.5" L<br>Weight 6.25 lbs<br>Buoyancy -3.25 lbs |                    |                  |                    | 65 min           |                     |
| Apollo HMI            | 5" OD/13.5" L<br>Weight 18 lbs<br>Buoyancy -6 lbs           |                    |                  |                    |                  | 45 min              |

## Appendix 2: Warranty Information

**All warranty requests must be accompanied by proof of original purchase from an Authorized Halcyon Dealer.**

HALCYON warrants, to the original purchaser only, that HALCYON's primary and video lighting systems will be free of defects in materials and/or craftsmanship under normal diving use for one year from the date of purchase, provided proper care is performed on all materials as described within this manual. Should your HALCYON light prove to be defective for any reason (other than those listed in the limitations section below) it will be repaired or replaced (at HALCYON's discretion) free of charge excluding shipping and handling charges. HALCYON Apollo, Helios, and Proteus canisters carry a lifetime warranty, to the original purchaser only, under normal diving use and provided proper care is performed as described within this manual. All correspondence concerning this warranty must be accompanied by a copy of the original sales receipt. Repair or replacement are HALCYON's only responsibilities and your only remedy under this warranty. Contact HALCYON at [techservices@halcyon.net](mailto:techservices@halcyon.net) to receive an RMA before sending any products back to the manufacturer.

**ALL WARRANTIES, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED IN DURATION TO A PERIOD ENDING ONE YEAR FROM THE DATE OF PURCHASE.**

By purchasing the product, you agree and understand that in no event will HALCYON, its distributors or retailers, be held liable for any personal injuries resulting from its operation, or for any other damages whether direct, indirect, incidental, or consequential even if HALCYON is advised of such damages. Some states in the U.S. and certain foreign countries do not allow limitations on the duration of implied warranties, so this may not apply to you. This warranty gives you specific legal rights. You may have rights which vary from state to state and country to country.

**HALCYON MANUFACTURING DISCLAIMS AND EXCLUDES ANY LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. SOME STATES IN THE U.S. AND CERTAIN FOREIGN COUNTRIES DO NOT ALLOW EXCLUSIONS OR LIMITATIONS OF LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THIS MAY NOT APPLY TO YOU.**

**The following restrictions apply to this warranty:**

1. Warranty does not cover damage from accident, abuse, battery leakage, tampering, or lack of proper care and maintenance.
2. Warranty does not extend to batteries or light bulbs. Halcyon NiMH and SLA battery packs carry a 90 day conditional warranty, starting at the date of original purchase.
3. Modifications or repair by anyone other than an authorized Halcyon service agent will void the warranty.
4. Cosmetic damage, such as scratches, fraying, and nicks are not covered by this warranty.
5. This warranty does not extend to equipment used for rental, commercial, governmental or military purposes.
6. This warranty covers products purchased in the United States. For warranties that may apply elsewhere, please contact your local representative.
7. Failure to meet any of the above requirements will render the warranty null and void.

## Appendix 3: Halcyon Replacement Parts

### Halcyon Field Repair Kits

All field repair kits include: all o-rings, bulb, lamp cover, and switch boot

|            |   |        |
|------------|---|--------|
| 24.214.018 | Helios 13.5/18W HID field repair kit                                      | 227.00 |
| 24.209.018 | Helios 9/18W HID field repair kit<br>(Also fits Apollo 9/24W video light) | 227.00 |
| 24.209.010 | Helios 9/10W HID field repair kit   | 117.00 |
| 24.205.010 | Helios 4.5/10W HID field repair kit                                       | 117.00 |
| 24.106.018 | Proteus 6/18W HID field repair kit  | 227.00 |
| 24.106.010 | Proteus 6/10W HID field repair kit  | 117.00 |
| 24.103.010 | Proteus 3/10W HID field repair kit  | 117.00 |
| 24.010.200 | Apollo HMI field repair kit   | 396.00 |
| 24.013.100 | Apollo 13.5/50W HID field repair kit                                      | 396.00 |
| 24.009.050 | Apollo 9/50W HID field repair kit   | 396.00 |
| 24.009.048 | Apollo 9/24W HID field repair kit   | 227.00 |
| 24.005.024 | pollo 4.5/24W HID field repair kit  | 227.00 |

### Halcyon Replacement Bulbs

|            |                                 |        |
|------------|---------------------------------|--------|
| 27.200.200 | 200watt HMI bulb                | 349.00 |
| 27.200.050 | 50watt HID bulb                 | 349.00 |
| 27.200.018 | 18/24watt HID bulb              | 197.00 |
| 27.200.010 | 10watt HID bulb                 | 97.00  |
| 27.100.100 | 100watt halogen bulb            | 18.00  |
| 27.100.050 | 50watt halogen bulb             | 18.00  |
| 27.100.030 | 30watt halogen bulb-extra white | 54.00  |

### Halcyon Lamp Covers

|            |   |       |
|------------|---|-------|
| 23.040.004 | HMI lamp cover                                  | 40.00 |
| 23.040.005 | 50watt HID lamp cover (test tube)               | 32.00 |
| 23.040.001 | 8/24watt HID and halogen lamp cover (test tube) | 20.00 |

### Halcyon Replacement Batteries and Chargers

|             |   |        |
|-------------|---|--------|
| 25.024.009  | 9amp/24volt NiMH battery pack             | 647.00 |
| 25.012.1351 | 3.5amp NiMH battery pack, for Helios 13.5 | 560.00 |
| 25.012.090  | 9amp NiMH battery pack, for Helios 9      | 400.00 |
| 25.012.045  | 4.5amp NiMH battery pack, for Helios 4.5  | 240.00 |
| 25.012.003  | 3amp Sealed Lead Acid battery pack        | 78.00  |
| 25.012.006  | 6amp Sealed Lead Acid battery pack,       | 128.00 |
| 25.015.100  | 12v temp. controlled NiMH charger         | 180.00 |
| 25.015.024  | 3amp 24volt battery charger               | 90.00  |
| 25.013.110  | 12v, 0.6amp charger, 110v input           | 24.00  |
| 25.013.220  | 12v, 0.6amp charger, 220v input           | 24.00  |

**Find out more about Halcyon...**

Halcyon Dealer Network: [www.halcyon.net/dealers/](http://www.halcyon.net/dealers/)

Fair Trade Pricing: [www.halcyon.net/ftp/](http://www.halcyon.net/ftp/)

Product Information: [www.halcyon.net/](http://www.halcyon.net/)

DIR Gear FAQs: [www.halcyon.net/dir/](http://www.halcyon.net/dir/)

Manuals: [www.halcyon.net/manuals/](http://www.halcyon.net/manuals/)

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