EXPLORER
SPORT REBREATHER
USER MANUAL

REV. 6

This is the operations manual for the
HOLLIS EXPLORER

U.S.patents have been applied for; patents pending.

All information contained is subject to change. Contact the manufacturer for the latest information. www.hollisgear.com

The EXPLORER is manufactured in the USA by Hollis Inc.,
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Ph (510) 729-5100

CE
EC Type approved by SGS UK Ltd. Weston-super-Mare. BS22 6WA. Notified Body No. 0120.

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To ensure your user information is up to date. Please check www.hollisgear.com/support.asp for updates to this manual.

For warranty information see www.hollisgear.com/support_warranty.asp

DANGERS, WARNINGS, CAUTIONS, AND NOTES

Pay attention to the following symbols when they appear throughout this document. They denote important information and tips.

! **DANGERS:** are indicators of important information that if ignored would lead to severe injury or death.

! **WARNINGS:** are indicators of important information that if ignored could lead to severe injury or death.

! **CAUTIONS:** are indicators of information that if ignored may lead to minor to moderate injury.

! **NOTES:** indicate tips and advice that can inform of features, aid assembly, or prevent damage to the product.

Hollis®
EXPLORER
SPORT REBREATHER

WARNING:
Use of The Explorer manual

This user manual **does not, nor is it intended to** contain any information needed to safely dive with any type of SCUBA apparatus. It is designed as a guide for the proper setup, operation, maintenance, and field service of the Hollis Explorer only. It does NOT take the place of a recognized training agency instructor-led diver-training course or its associated training manual(s) and materials. This user manual is intended to be used only as a type specific addition to such training and materials, and as a user reference. This manual cannot be used as a substitute guide for any other type of Self Contained Underwater Breathing Apparatus (SCUBA).

EXPLORER DESIGN TEAM

Bob Hollis
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HollisExplorer
User Manual

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GENERAL SAFETY
STATEMENTS + WARNINGS

! WARNING:
GENERAL SAFETY

No person should breathe from, or attempt to operate in any way, a Hollis Explorer rebreather, or any component part thereof, without first completing an appropriate Hollis Certified user-training course.

Further, no Explorer diver should use a Hollis Explorer without direct Hollis instructor supervision until they have mastered the proper set-up and operation of the Hollis Explorer rebreather. This includes new Explorer divers as well as Explorer certified divers who have been away from diving for an extended period of time and would benefit from an instructor-led refresher course to regain skills and mastery of the Hollis Explorer. Failure to do so can lead to serious injury or death.

! WARNING:
NITROX STATEMENT

The EXPLORER equipment is classified as being suitable for use with nitrogen-oxygen (Nitrox) breathing gas mixtures containing up to 40% oxygen by volume without the need for special preparation, cleaning, or component parts.

If Explorer equipment is subsequently used with equipment, or connected to an air supply system, that is not rated for Oxygen Service, it can subsequently be used with Nitrox (32 - 40% O_2) as long as the equipment is maintained in accordance with the procedures and parts specified by Hollis.

The EXPLORER was designed for use with Nitrox (32 - 40% O_2). **DO NOT** use gas mixtures with a fraction of oxygen greater than 40% with your EXPLORER.

! WARNING:
CAUSTIC MATERIAL

The CO_2 absorbent used in the scrubber is caustic alkaline material. Take steps to protect yourself from direct lung and skin contact. Furthermore, poor management of the breathing loop could lead to water contact with the CO_2 absorbent, causing a “caustic cocktail” (very caustic liquid). This could lead to severe chemical burns and if inhaled - possible drowning. Proper handling procedures, pre-dive checks, dive techniques, and maintenance mitigates this risk.

! WARNING:
BATTERY WARNING

The Explorer relies on batteries to maintain a safe breathing gas content. Never dive the Explorer without a sufficient charge on the rechargeable batteries. See "Batteries" PART 2 Section 1 for further details.

! WARNING:
DESIGN AND TESTING

The Hollis Explorer has been designed and tested, both in materials and function to operate safely and consistently under a wide range of diving environments. You must not alter, add, remove, or re-shape any functional item of the Hollis Explorer. Additionally, **NEVER** substitute any part of the Hollis Explorer with third-party items which have not been tested and approved by Hollis for use with the Explorer.

This includes, but is not limited to, hoses, breathing assemblies, electronics, breathing gas delivery assemblies and their constituent parts, sealing rings, valves and their constituent parts and sealing surfaces, latches, buoyancy devices, inflation and deflation mechanisms and onboard alternate breathing devices.

Altering, adding, removing, re-shaping or substituting any part of the Hollis Explorer with non-approved parts can adversely alter the breathing, gas delivery or CO_2 absorption characteristics of the Hollis Explorer and may create a very unpredictable and dangerous breathing device, possibly leading to serious injury or death.

Non-approved alterations to functional parts of the Explorer will automatically void all factory warranties, and no repairs or service work will be performed by any Hollis service professional until the altered Explorer unit is brought back into factory specifications by a Hollis service professional at the owner's expense.

! WARNING:
COMPUTER / CONTROLLER-SPECIFIC WARNINGS

This computer is capable of calculating deco stop requirements. These calculations are predictions of physiological decompression requirements. Calculations are for contingency use only. The Explorer in this "sport" configuration is not intended for decompression use.

WARNING: HYPERCAPNIA, HYPOXIA, & HYPEROXIA RISKS

This device is designed to maintain a safe breathing gas under sport diving conditions. But like all machines it could fail. To mitigate risks, it is essential that a diver is trained and fully understands the risks of hypercapnia (CO_2 poisoning), hypoxia (oxygen starvation), and hyperoxia (oxygen poisoning). It is also critical to have adequate bailout gas for the planned depth.

Be aware that a well packed and well maintained Scrubber is key in achieving a life-support system. The Canister Duration Meter (CDM) is not a substitute for good system maintenance and Pre-Dive checks. Always use your training and discipline to ensure the sub-systems in the EXPLORER are operating correctly.

Critical components and potential failures are:
- The scrubber seal around the scrubber
- A poorly packed scrubber
- Used or out of date scrubber material

Proper training and education are your best insurance against an inconvenient situation becoming a deadly one.

WARNING: ALTITUDE

For the Explorer to accurately gauge altitude and the preceding dive depths, the Explorer must be turned on prior to diving. Additionally, diving at high altitude requires special knowledge of the variations imposed upon divers, their activities, and their equipment by the decrease in atmospheric pressures. Hollis recommends completion of a specialized Altitude training course by a recognized training agency prior to diving in high altitude lakes or rivers.

! WARNING:
COLD WATER

Diving rebreathers in frigid water requires special equipment, training, and preparation to prevent possible injury or death. Rebreathers present unique variables to cold water diving that are not a factor in open circuit diving in the same temperatures. Cold water diving is beyond the scope of this manual. There are many variables not listed here. It is essential and the responsibility of the diver to be aware of all issues. The diver must know how to best prepare their equipment, and how to best prepare themselves for the cold water environment. The diver must obtain further training beyond standard Explorer training or Open Circuit Ice Diver certification alone.

Cold Water Issues Include The Following:

- Changes in temperature may lead to expansion and contraction of CO_2 absorbent material possibly leading to channeling.

- Decreases in temperature effect the efficiency of the scrubber and greatly reduce the rated use times.

- Sensors are sensitive to extreme temperatures. Storage of Oxygen Sensors below 32° F (0°) or above 100° F (37.8° C) can damage or greatly shorten the life of the sensor.

- Mushroom valves may freeze open or closed if condensation is allowed to cool. Always perform the Pre-Dive Sequence and pre-breathe the unit before entering the water and before any subsequent dives. The diver should warm and visually inspect the mushroom valves between dives.

- Open circuit bailout must be rated and compatible with the environments dived in.

- Check the scrubber MSDS (Material Safety Data Sheet) for specific warnings about storage temperatures. Scrubber material should not be allowed to freeze inside or outside of the rebreather.

TABLE OF CONTENTS

YOUR NEW EXPLORER
REBREATHER LIFE SUPPORT SYSTEM RULES

! DANGER: Read and understand this list prior to using this unit. If you do not understand any or all of this section please contact your training agency or Hollis.

Rules for EXPLORER Diving

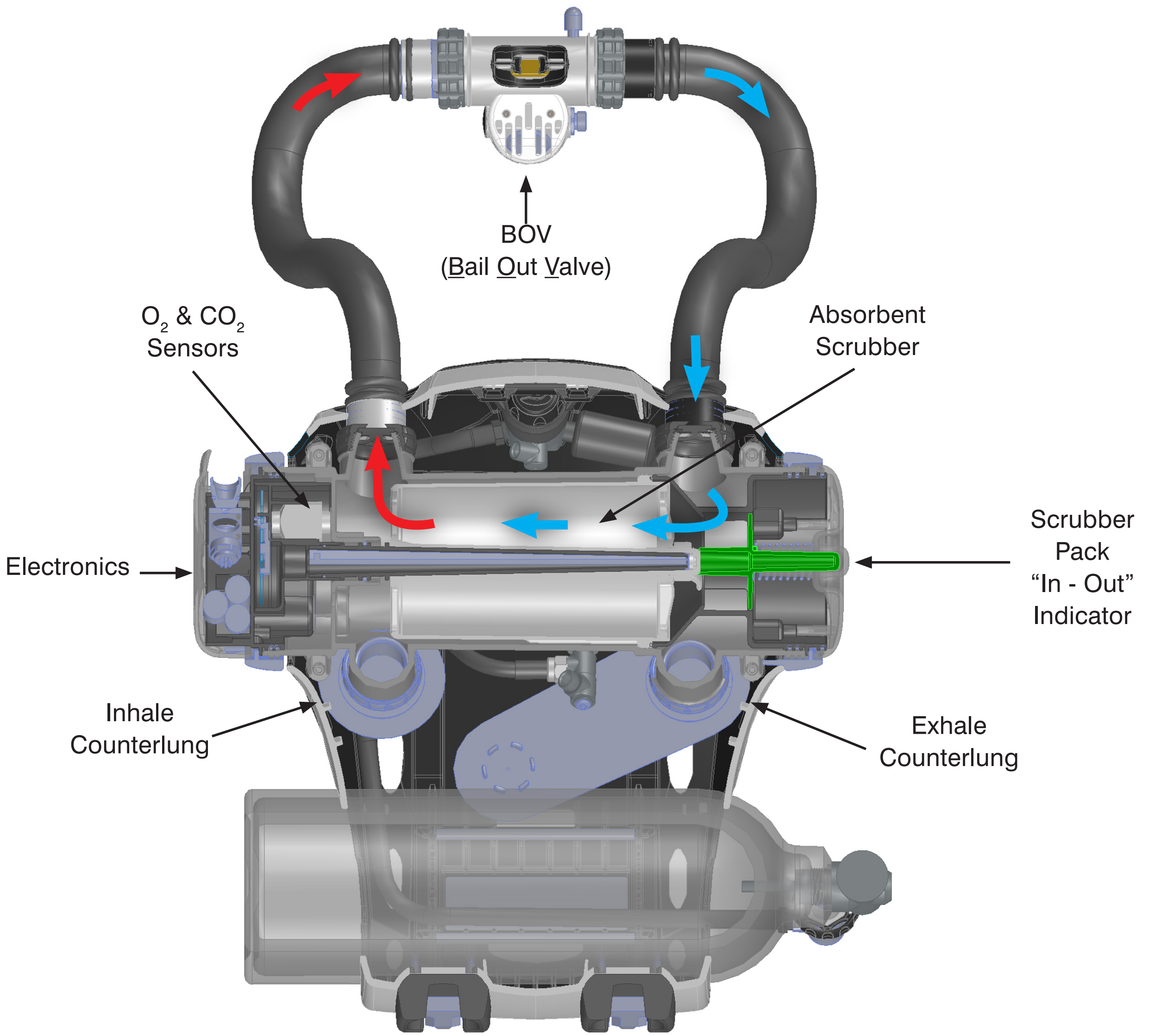
1. Always complete all pre-dive checks. Pay special attention to BOV mushroom valve tests.
2. Always pre-breathe the Explorer until the system passes its' tests.
3. Do not modify the Explorer without the manufacturer's written consent.
4. Do not use a full-face mask, unless approved by Hollis for use with the Explorer.
5. Always analyze your gas.
6. Never dive a unit you suspect is leaking and has not passed all the pre-dive tests.
7. Never leave your BOV open on the surface.
8. Ensure your BC is inflated at the surface.
9. Take time to adjust your weight correctly, do not dive over-weighted.
10. Always dive with buoyancy control and buoyancy inflation.
11. Practice a skill on every dive.
12. Avoid unnecessary mask clearing.
13. Regularly sanitize the unit.
14. Never exceed the CO_2 alarms.
15. Never hold your breath.
16. Never start a dive with a low battery alarm.
17. Always carry bailout gases of sufficient volume for the planned dive as per your training agency recommendations.

IF IN DOUBT BAIL OUT!

GAS FLOW

As the diver exhales gas flows through the hose (blue arrow) and over the right shoulder. It then enters the absorbent scrubber and flows across the Oxygen and CO_2 sensors in the Sensor Module and through the inhale hose (red arrow) and back to the mouthpiece.

Gas also naturally flows in and out of the exhale and inhale counterlungs.



MECHANICAL FEATURES

The EXPLORER is an electro-mechanical rebreather. Over time certain software, hardware, optional extras, and/or software upgrades will become available. Please check www.HollisGear.com for details.

HARNESS/BCD

EXPLORER uses a custom bolt fitting, backplate, Solo webbing harness, and Hollis C45LX Wing. There is an optional EXPLORER BCD available.

COUNTERLUNG

The EXPLORER comes complete with dual back-mounted counterlungs (BMCL). These are attached to the canister by a screw threaded O-ring fitting.

CYLINDER

EXPLORER uses a 5L/40cuft cylinder with a nitrox compatible inline valve. Dives over 18 m/60 ft requires that an additional bailout cylinder of a minimum capacity of 3 L/20 cuft be used in conjunction with the 5L/40 cuft cylinder.

! NOTE: All calculations presented in this manual assume the use of a 5 L/40 cuft cylinder.

<u>USA Only Cylinder Options Chart</u>

	Capacity		Working pressure	
Manufacturer	WC (L)	WC (CU/FT)	BAR	PSI
Any brand that is prepped for nitrox use. Typical sizes and pressures are shown.	5	41	232	3410
	4.9	40	204	3000
	4.3	35.26	204	3000
	5	41	232	3410
	6	49	232	3410

! NOTE: The Explorer can accomadate a maximum 14 cm/5.5 in diameter tank.

EU Only Cylinder Chart

	Capacity		Working pressure	
Manufacturer	WC (L)	WC (CU/FT)	BAR	PSI
Any CE approved	5	41	232	3410

OUTER CASE

The outer case is made from high impact plastic.

OVER-PRESSURE VALVES

EXPLORER uses a combined water release and balanced Loop Control Valve (LCV). The balanced valve ensures that the underwater release pressure is near constant in any orientation. When the unit vents, it also removes any water from the exhale counterlung. Water removal is best conducted in a heads up position.

In addition to the LCV there is a master (high flow) over pressure release valve that is set to 40 mbar to help control ascents.

BOV (BAILOUT VALVE)

EXPLORER comes with a BOV. The BOV is supplied by the onboard nitrox tank. The BOV is designed as the primary bail out (providing a sufficient/ planned volume is carried).

The BOV has two modes *(Fig. 1.1)*:
• OC (Open Circuit Position)
• CC (Closed Circuit Position)

When the BOV is open, the BOV is in the closed circuit position and when the BOV is closed it is in the open circuit position.

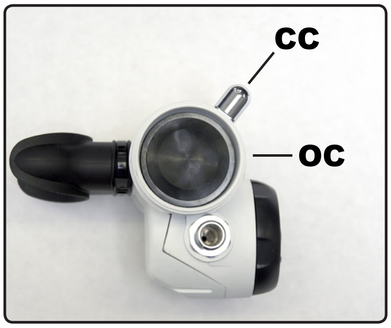


Fig. 1.1

INTELLIGENT HUD (HEADS UP DISPLAY) & BUD (BUDDY UNIVERSAL DISPLAY)

The Intelligent HUD (Heads Up Display) is attached to the BOV in the divers line of sight. There is also a BUD (Buddy Universal Display) in the EXPLORER LSS Module for Dive Buddy/Instructor use.

These displays give full alarm status at all times using a visual and a tactile alarm system.

SENSORS

The EXPLORER uses 3 oxygen sensors and a wireless HP sensor. It can also be equipped with an optional gaseous CO_2 sensor.

All sensors are automatically calibrated by the electronic control system.

UNPACKING YOUR NEW EXPLORER
BATTERIES

The EXPLORER uses Lithium Polymer batteries. These rechargeable batteries are very efficient and provide many years of reliable operation.

Rechargeable Lithium batteries can be recharged at any time and do not have a significant memory affect, which would otherwise cause unreliable battery operation. The batteries are UL listed (flight safe) and are double sealed to reduce the chance of leakage to a minimum.

As extra confidence, the LSS Module battery pack includes 3 separate batteries to ensure operation even under multiple battery failure scenarios.

During diving, the battery reserve alarm will indicate when there is still sufficient battery to allow a return to the surface with a small reserve. The LSS **MUST** then be charged prior to diving again.

The handset has its own battery which is automatically charged from the EXPLORER LSS module.

The user should keep the batteries fully charged to ensure there is always maximum battery charge for any dive. Additionally, the Optocon protective cap should be installed when the Explorer is not being charged.

A fully charged battery pack will display 900 minutes of battery life on the wrist display. See PART 3 Section 6 for directions on how to access the Battery Status Screen.

! **DANGER: The battery estimate is based on many variables. Changes in conditions (i.e. cold water) may shorten charge times. Plan dives accordingly, and always monitor the HUD and Wrist Displays for system operation status.**

! **NOTE: The EXPLORER must be fully charged before its first use.**

! **CAUTION: Always ensure the Optocon charge connector is dry before attaching the charging connector. Damage may result if this is not done.**

Check that all parts of the charger are kept dry and only used indoors. Battery level alarms will activate when the batteries get low and will be displayed on the Status screen.

! **WARNING: DO NOT dive with a battery level, that is less than twice your expected dive time for the next dive.**

! **NOTE: The battery discharges at a faster rate when the Sensor Module is separated from the LSS.**

INITIAL ASSEMBLY

INTRODUCTION

Your Explorer is assembled and tested at the factory. Some components are then removed to package the unit. When you receive your Explorer, the following components will need to be put together.

GENERAL NOTES ON ASSEMBLY

1. All O-rings should be lightly lubricated.
2. Inspect all O-rings for cracks and other damage during each assembly.
3. All breathing loop parts should be sanitized before diving. If assembling for a dive, see the following section "Complete Disassembly and Reassembly" for further instructions.

Fig. 2.1

Step 1. Remove all parts from the split top box *(Fig. 2.1)*.

Step 2. Open the Oxygen sensor and CO_2 sensor (optional) boxes. Remove the sensors from their boxes, and open up the airtight bags.

! DANGER: Only Hollis Explorer Oxygen sensors must be used with this unit. No other sensors are tested or approved. These are available from your Hollis Dealer.

! DANGER: All oxygen sensors must be allowed to sit in an AIR atmosphere for at least 24 hours prior to use in the EXPLORER. The Sensors can be immediately assembled into the Sensor Module but this module should not be fully installed for at least 24 hours after unsealing the sensors packages.

! WARNING: The sensors must be calibrated after the 24 hour acclimation period.

Step 3. Pull the Sensor Module straight out of the Canister.

Step 4. Push the three oxygen sensors onto their respective connection points as shown in the picture *(Fig. 2.2)*.

Fig. 2.2

! NOTE: Ensure the oxygen sensors are installed with the white membrane facing up, as shown.

Step 5. If using the optional CO_2 sensor accessory (part # 240.9001), install now.

! **WARNING: Before use, it is essential that you read and understand all maintenance and use information for the CO_2 sensor and cap. See the Explorer CO_2 Sensor User Manual, doc. # 12-4127 (available at http://www.hollis.com/support/manuals).**

! **DANGER: ONLY the Hollis CO_2 sensor may be used with this unit. No other CO_2 sensors are tested or approved.**

Step 6. Reinstall the Sensor Module.

Step 7. Undo the rubber latches at the base of the Case Front/Back assembly and lift up the Case Back until the hinge at the top is free *(Fig. 2.3)*. Place to one side.

Step 8. Inside the Explorer case you will find a zippered case containing the LSS (Life Support System). Remove the LSS from its case. Unscrew the Optocon charging/download connector protection cap.

Plug in the the power charger. You will need to rotate the cable end connector until the key way aligns. Then push it in and tighten the black lock ring clockwise *(Fig. 2.4)*. The lock ring will spin freely once the connector is fully assembled. Once connected and power is applied, a red light will appear on the LSS module.

When charging, a Red light appears on the LSS Module. It turns Green when the LSS Module if fully charged. A full charge takes approximately 10 hours.

! **NOTE: The Explorer could take up to 30 minutes for the red indicator light to illuminate if the battery has been completely drained.**

EXPLORER has 3 battery status displays with the charger connected:
1. Battery Charging (Empty) *(Fig. 2.5)*
2. Battery Charging *(Fig. 2.6)*
3. Battery Charged *(Fig. 2.7)*
To remove the optocon charger, unscrew the ring (which will rotate freely until pulled back to start the thread) and pull out the connector. Reinstall the Optocon charging/download connector protection cap.

! **CAUTION: To avoid damage, the Optocon charging/download connector protection cap should be installed when not charging/downloading your Explorer.**

Fig. 2.3

Fig. 2.4

Fig. 2.5

Fig. 2.6

Fig. 2.7

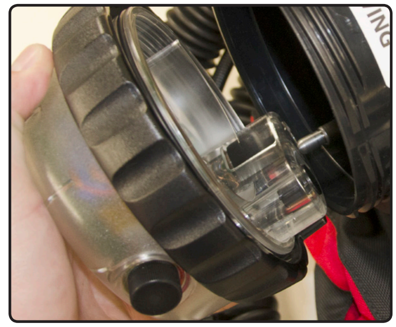


Fig. 2.8

Step 9. Once the LSS Module is charged, it may be installed on the inhalation side of the Explorer canister. First inspect the O-rings and sealing surfaces to ensure they are in good condition. The Explorer case has two notches on either side of the canister opening. Align the locking ring tab with the notch on the left side, when the Explorer case is laying on the harness side. Additionally, line up the solenoid, as shown *(Fig. 2.8)*. Then while pressing the LSS assembly into position, turn the the lock ring clockwise 180 degrees until the tab rests in the other notch on the Explorer case.

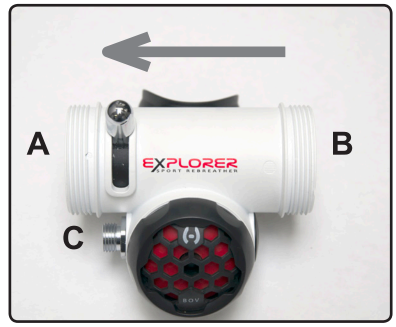


Fig. 2.9

Step 10. Adjust the included Harness or optional BCD for proper fit.

NOTE: See the Hollis Buoyancy Guide (doc. 12-4012) for instructions on the Harness and Wing fittment and proper use. It may be downloaded from http://hollisgear.com/support_manuals.asp.

Step 11. Inspect the mushroom valves in the BOV and make sure they are in place.

DANGER: Your Explorer must have proper mushroom valve function before every dive. See 'BOV Assembly' subsection in the "Complete Disassembly & Reassembly" PART 2 Section 3 of this manual for instructions on testing the mushroom valves.

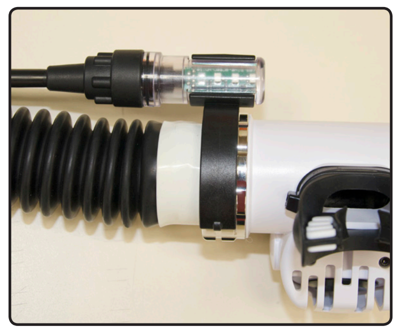


Fig. 2.10

Attach the regulator LP hose to the BOV and gently tighten the nut to the hose inlet (Fig. 2.9, item C). After inspecting the hose end O-rings, attach the breathing hoses to the BOV. Ensure the white hose end goes to the inhale side (Fig. 2.9, item B) of the BOV.

Attach the HUD Bracket to the inhalation side hose nut and snap the HUD into the HUD Bracket *(Fig. 2.10)*. The HUD Bracket is secured with an O-ring attached to the two tabs on the underside of the bracket.

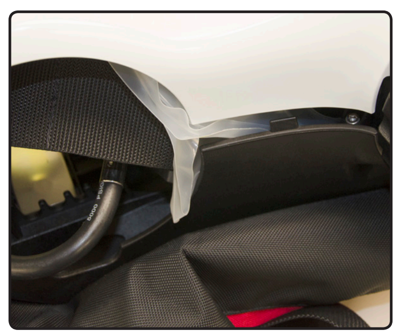


Fig. 2.11

Step 12. Ensure the counterlungs are correctly positioned where they will not get pinched, cut, or unecessarily restricted *(Fig. 2.11)*. Then refit the Case Back and secure the two clips at its base *(Fig. 2.12)*.

WARNING: Ensure that the counterlungs are not pinched during installation of the Case Back. Pinching counterlungs could puncture or cut the counterlungs, leading to flooding and risk of drowning.

NOTE: The Case Back will not fit or lock properly if the end cap lock rings are not in the correct orientation.

Fig. 2.12

COMPLETE DISASSEMBLY & REASSEMBLY

INTRODUCTION

The information below will enable complete disassembly, cleaning, rebuilding, and testing of the EXPLORER Rebreather. Further disassembly must be performed by a qualified Hollis EXPLORER Technician.

GENERAL NOTES ON ASSEMBLY

1. All O-rings should be lightly lubricated.
2. Inspect all O-rings for cracks and other damage during each assembly.
3. Sanitize all breathing loop parts.

! DANGER: Only Hollis Explorer Oxygen sensors must be used with this unit. No other sensors are tested or approved. These are available from your Hollis Dealer.

! DANGER: ONLY the Hollis CO_2 sensor may be used with this unit. No other CO_2 sensors are tested or approved.

! WARNING: All servicing beyond the user level must be performed by an approved Explorer service technician at a Hollis service facility.

BOV DISASSEMBLY

There are very few parts within the BOV assembly that should be removed by the user; since many parts (especially the second stage components) require additional setup by a trained Explorer technician.

• Turning counterclockwise, unscrew the breathing hose ends.
• Remove and inspect the hose end O-rings for damage.
• Using the rubberized end of a pencil or other blunt/soft instrument, insert the pencil through one of the mushroom valve carriers (moving the mushroom valve aside first) and gently push out the opposite carrier assembly.

! NOTE: DO NOT push on the center of the carrier. ONLY push on the outer edge.

• Remove the mushroom valve carrier O-rings *(Fig. 2.13)*.
• Gently pull out the mushroom valve *(Fig. 2.14)*.

Fig. 2.13

Fig. 2.14

BOV REASSEMBLY & CARE

• Clean the mushroom valve carrier O-ring and the groove around the mushroom valve carriers. Lightly lubricate and refit new O-rings.
• Inspect the mushroom valve and mushroom valve carrier for damage. Sanitize and remove any debris from the carrier.
• Clean the mushroom valve carrier O-ring and the groove around the mushroom valve carriers. Lightly lubricate and refit the O-rings.
• Refit the mushroom valves to the carriers.

! DANGER: DO NOT put lubricant on the mushroom valves.

• Having cleaned and sanitized the BOV; press the valve carriers into the BOV. Ensure the O-rings around the mushroom valve carriers have not extruded out of their grooves.

! DANGER: Check the flow in the BOV. It should be from the diver's left to diver's right (with the mouthpiece in the diver's mouth) *(Fig. 2.15)*.

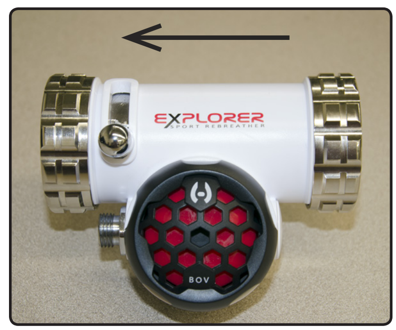


Fig. 2.15

• Inspect and clean the rubber mouthpiece. Ensure there are no pin holes or tears. Refit with a new cable tie, and tighten. Carefully, remove sharp edges from the cable tie.

BOV PRIMARY TEST

In closed circuit mode, block the right hand (exhale) side and blow (do not apply excessive force) into the mouthpiece. The inhale (diver's left side) mushroom valve should seal and no gas should exit out of the second stage exhaust or the front diaphragm.

<u>Faults:</u>
• Mushroom valve (inhale side) leak. Remove the carrier and inspect the mushroom valve and O-ring. Replace as needed.
• BOV barrel O-ring or activation handle O-ring leak. Replace O-ring.

In closed circuit mode, block the inhale (diver's left) side and suck into the mouthpiece.

Faults:
• Mushroom valve (right hand side) leak. Remove the carrier and inspect mushroom valve and O-ring. Replace as needed.
• BOV barrel O-ring or activation handle O-ring leak. Have the O-rings replaced.

Remove both hoses from the Canister (leave connected at the BOV). Put the BOV in open circuit mode. Block the exhale hose end and blow into the inhale hose end. Listen and observe for any signs of leaks from the mouthpiece, hose or hoses ends.

Faults:
• If a leak is detected from the mouthpiece outlet, then the barrel O-rings need replacing.
• If a leak is detected at the hose ends, then replace the hose end O-rings.
• If a leak is detected along the hoses, then refer to your Hollis dealer for hose replacement.

BOV SECONDARY TEST

In open circuit mode, with the second stage BOV (HP) gas turned OFF. Remove the breathing hoses. Block both inhale, exhale, ports, and the LP inlet to the second stage. Then inhale from the mouthpiece.

Faults:
• If a leak is heard, the exhaust valve or the diaphragm may need replacing. If a fault is found, Refer to a Hollis service center.

BREATHING HOSE ASSEMBLY

Clean and inspect the hose end O-rings. Then reassemble.

BREATHING HOSE ASSEMBLY TESTING

Block one end of the hose and blow into the other. Look for leaks along the hose while submerging it. Repeat for the other hose.

BOV/HOSE ASSEMBLY

• Connect the LP feed, which should be over the diver's right shoulder, to the BOV. Replace the LP hose end O-ring if required.
• Fit the breathing hose with the white silicone hose covers to the left hand side (inhalation side) of the BOV.
• Repeat for the right hand side (black) hose.

! NOTE: The BOV should be connected to the weighted side of the breathing hoses.

BOV/HOSE ASSEMBLY TESTING

In open-circuit mode, immerse the BOV. Block the exhalation hose end (black) and blow into the inhalation hose end (white).

Faults:
• If bubbles come out of the mouthpiece there may be a leak in the barrel/knob O-rings. They must then be replaced.

EXPLORER LSS MODULE - DISASSEMBLY/ASSEMBLY

• Remove the LSS Module by twisting the lock ring counterclockwise ½ turn.
• Inspect & clean O-ring and sealing surfaces, re-lubricate and refit the LSS Module sealing O-rings.
• Refit the LSS Module by lining up the solenoid post, pushing it into the Canister, and turning the lock ring clockwise by 180 degrees to 3 O'clock *(Fig. 2.16)*.

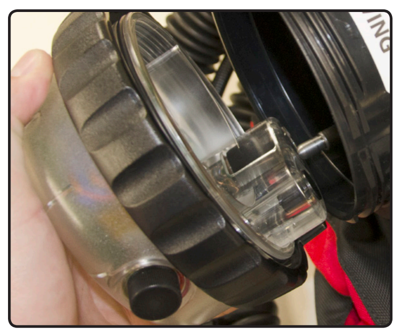


Fig. 2.16

! NOTE: Ensure the lock ring is in the 9 O'clock position for the threads to engage then twist it by 180 degrees to 3 O'clock to lock. The Case Back Cover will not fit correctly if the lock ring is in the wrong position.

SENSOR MODULE - DISASSEMBLY/ASSEMBLY – OXYGEN SENSOR MAINTENANCE/TESTING

• Remove the Sensor Module from the Canister *(Fig. 2.17)*.
• Remove all 3 oxygen sensors *(Fig. 2.18).*
• Inspect the Thermal Profile Monitor (TPM) body and O-ring for damage, and clean the TPM with warm soapy water. **NEVER** expose the sensors to water.
• Clean the sensor jack connectors with a soft cloth (look for damage and corrosion).

Fig. 2.17

! DANGER: After sensor replacement you must ensure the unit is calibrated by completing a full pre-dive sequence.

! DANGER: It is important that oxygen sensors are maintained and cared for. Avoid excessive moisture. Some moisture will always form during a dive but if the rebreather has been flooded the sensors MUST be replaced. DO NOT touch the white sensor face with anything in an attempt to dry the sensor.

Fig. 2.18

CANISTER END CAP - DISASSEMBLY/ASSEMBLY

• Remove the Right Hand end cap by twisting the lock ring counter-clock wise ½ turn.
• Inspect and clean the O-ring and sealing surfaces. Lubricate and refit the end cap sealing O-rings *(Fig. 2.19, A)*.
• Refit the end cap by aligning the locking ring tab with the notch in the Explorer case on the left side, while pushing the end cap into the canister. Then turn the lock ring clockwise by 180 degrees to the opposite notch in the Explorer case.

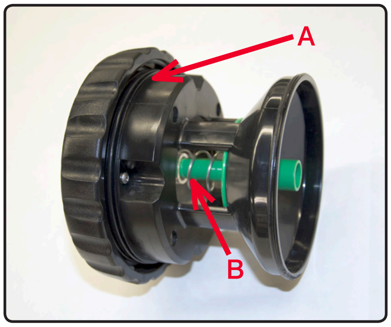


Fig. 2.19

! NOTE: The Diver's Right Side End Cap contains the Go/No Go Device. This is the green stem in the picture *(Fig. 2.19, B)* surrounded by a spring.

! DANGER: If you do not insert an absorbent scrubber pack, the device greatly restricts breathing on the loop. This is to force you off the breathing loop until the issue is remedied. You must not dive without a CO_2 scrubber pack fitted.

CANISTER – DISASSEMBLY/ASSEMBLY

• Remove the counterlungs and hoses by unscrewing the hose lock rings, counterclockwise. Clean and inspect the sealing face for each end cap seal, hose ends, and counterlung ports.
• Disconnect the LCV balance cap and tube from the exhale counterlung to the Canister at the counterlung *(Fig. 2.20)*. This is a 1/2 turn (counter-clockwise) unlock. Release the locking tabs, as shown *(Fig. 2.21)*.
• Inspect the LCV counterlung mushroom valve and cap sealing ring for damage *(Fig. 2.22)*. Replace/re-lubricate as required.
• In normal diving operations the canister should be flushed with fresh water, rinsed with sanitizing solution, and wiped clean.

Fig. 2.20

Fig. 2.21

STANDARD ABSORBENT SCRUBBER PACK - DISASSEMBLY/ASSEMBLY

! **WARNING: Filling a scrubber improperly could lead to a hypercapnia incident and possible death.**

• Disassemble and discard the absorbent material as per local regulations. Wash the scrubber pack in warm soapy water to remove absorbent debris. Sanitize as required.
• Inspect the scrubber pack for damage, especially around the Quad ring sealing surface.
• Inspect the quad ring seal before every dive. It must be replaced at the first sign of wear or damage.

Fig. 2.22

! **DANGER: The quad ring seal is extremely important, and it should be regularly cleaned and inspected. It is vital in preventing CO_2 bypass. Additionally, it must be replaced at the first sign of wear or damage.**

! **DANGER: The quad-ring is not a standard O-ring. It must not be replaced with anything else.**

• Inspect the cannister and lid mesh for damage.
• Place a Dust Filter inside at the base of the scrubber canister *(Fig. 2.23)*. It should lay smoothly against the metal screen bottom with the tabs along the radial edge folded upwards. Ensure that the tabs lay smoothly against the inner walls of the scrubber canister.

Fig. 2.23

! **NOTE: The Dust Filter must be replaced if it begins to show signs of deterioration or becomes torn.**

• Fill with CO_2 absorbent (as per PART 4 Section 2 in this manual) and refit the lid, dust filter, spring, and top nut.

COUNTERLUNG - DISASSEMBLY/ASSEMBLY

• Remove the counterlungs by unscrewing the connectors
• Remove the exhale counterlung LCV mushroom valve cap (1/2 turn counterclockwise to unlock).
• Sanitize and inspect the counterlungs.

COUNTERLUNG TESTING

• Attach the BOV exhale side (diver's right side) of the mouthpiece to the exhale counterlung canister port.
• Block the LCV port cap hose by folding it on itself to cut off gas flow.
• With the BOV in CC mode, Fully inflate the counterlung
• Immerse and look for leaks.
• Repeat for inhale counterlung (there is no LCV cap to cap off).

REGULATOR WIRELESS HP TRANSMITTER TESTING

• Connect a diving cylinder
• Turn on the wrist display and complete the pre-dive sequence
• During the Pre-dive HP gas test sequence, if the first stage transmitter battery is low, a warning will appear *(Fig. 2.24)* or if low at the start or end a yellow warning *(Fig. 2.25)* will appear.

! NOTE: The HP Sender must be pressurized to activate. A closed tank valve could result in a HP Sender battery low indication

! DANGER: If you are in doubt as to the HP readings on EXPLORER, you must check it by attaching a normal gauge and hose to the HP post.

PUTTING ASSEMBLIES TOGETHER

• Fit the Sensor Module, EXPLORER Module and Right Hand end cap along with a new absorbent scrubber pack.
• Fit the LP hose to the ADV
• Fit the counterlungs and the LCV port cap to the exhale counterlung *(Fig. 2.26)*.
• Fit the hoses to the BOV
• Fit the cylinder and the DIN wheel

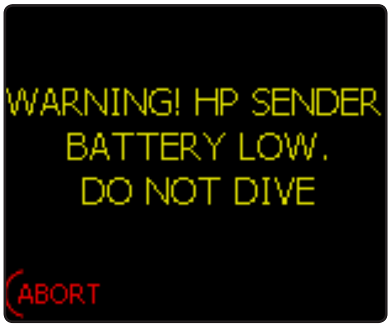


Fig. 2.24

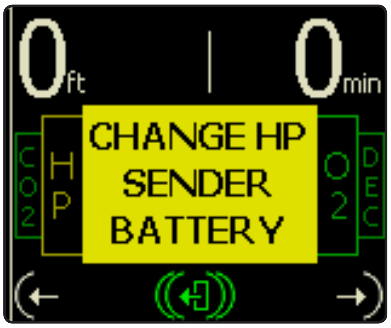


Fig. 2.25

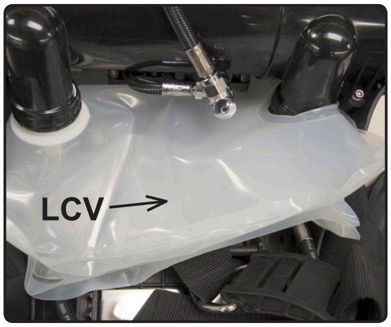


Fig. 2.26

• Connect the LP hose to the BCD inflator

COMPLETE EXPLORER TEST

Follow the on-screen pre-dive sequence. See PART 4 Section 2. If the unit fails the negative or HP leak test and the fault is not easily recognizable. Follow these steps:

• Remove the LCV hose from the Canister or restrict the hose to stop the counterlung venting through the LCV

• Turn on the gas.

• Put the BOV into closed circuit mode.

• Inflate the counterlungs by blowing into the loop until it is full then put the BOV in open circuit mode.

• Fully submerge the unit and look for leaks.

! **NOTE: The OPV situated under the Canister will vent some bubbles. THIS IS NORMAL. Look for other leaks.**

! **WARNING: Complete all gear prep and pre-dive sequence checks before diving.**

LIFE SUPPORT SYSTEM (COMPUTER)
GENERAL OPERATION

The EXPLORER Life-Support System (LSS) is designed around a breathing loop, high pressure gas sources and electronics control system - all highly integrated to give an intelligent but simple display of status to the diver while providing life-support.

This integration gives the user a simple "Check-and-Dive" functionality that makes the EXPLORER the easiest Rebreather to prepare for diving, while ensuring system integrity and improving safety.

The software and hardware uses intelligent monitoring and design experience to determine the appropriate tests and checks that the diver needs to perform to get the EXPLORER ready for use.

Any problems are described clearly on the STATUS screen with the required action.

The integrated system design means that failures or problems with any part of the system are communicated to the diver, either in pre-dive checks and procedures, or as data values/graphics or instructions. There is significant background analysis that produces a warning system sensitive to changes in expected levels but intelligent enough to not overload the diver with information and situations that may be routine during a dive. These electronic alarms combined with varying levels of mechanical user controls ensure safe operation of the Explorer in all conditions.

Example:
• PO_2 changes that may normally cause PO_2 alarms to be triggered are inhibited if they are of the correct characteristic expected during a descent or setpoint change.

THE HEADS UP DISPLAY

The Heads Up Display (HUD) feature gives a simplified and quick to follow view of the status of the EXPLORER. The HUD has 3 main warning levels:

• Flashing Red plus vibration alarm - warning is activated when a dive should be aborted on open circuit or not started.
• If diving, the diver should switch to the bailout gas.
• The HUD vibration alarm will vibrate every second for 5 seconds, then repeat the 5 second alarm every 30 seconds, or if the source of the alarm changes.

• Flashing Green and Blue lights - warning is activated when a manageable error situation is in place. Refer to the wrist display, and take the indicated action. If the issue can not be immediately remedied, the correct response is to ascend slowly on the breathing loop while monitoring the wrist display for escalating risk factors.
• Solid Green - means there are no detected problems

! **WARNING: If any other light sequence or a 'no light' scenario is experienced, then the diver should refer to the wrist display for information, and abort the dive.**

! **WARNING: If no wrist display is seen, the diver MUST switch to open circuit and ascend.**

The LED states are configured for color blind as well as highly stressed divers. The positions of the LED's along with the flashing or solid state of the lights provide conditions that cannot be confused with one another.

PRE-DIVE CHECKS

With current technology, not all aspects of the safety and working nature of the EXPLORER system can be performed or determined automatically. Therefore, when turning on the EXPLORER, there are a series of pre-dive checks that must be performed. The EXPLORER gives guidance in performing these checks. These checks are displayed in sequence on the EXPLORER wrist display. Some of these checks rely completely on the diver to perform them correctly – i.e. Close/open BOV. Other tests can be performed by the electronics control system and the user needs to confirm that these are OK to dive with – i.e. that the high pressure cylinder is adequately filled.

Information regarding the current status of EXPLORER and all available resources can be reviewed prior to conducting Pre-Dive Checks using the STATUS screen.

DATA LOGGING

EXPLORER has a sophisticated data logging system that not only records all the units' sensors (depth, time, PO_2; etc.) but also records any alarms and error messages. This information can be retrieved through the data download.

Users can obtain dive download software from http://hollis.com/support.asp.

STATUS SCREEN

The EXPLORER has two levels of detailed information available to the diver. The primary method is via the STATUS screen. There is an additional set of STATUS screens in service mode, described in the PART 3 Section 6 of this chapter.

The STATUS screen shows as soon as the EXPLORER is turned on *(Fig. 3.1)*.

In addition, Status screens can be viewed at any point in the dive by pressing any button and selecting STAT from the pop-up menu using a short push of the right button.

Once in the STATUS screen, a short press of the left or right button scrolls through the information options. These are:

a. PO_2 (average of the 3 sensors)
b. CO_2 sensor
c. HP gas
d. Battery life
e. No Decompression Limit (NDL)
f. Decompression Information
g. Filter (CO_2 scrubber)
h. CNS
i. A general Warnings Window (the ACTION Panel) detailing any alarm in progress. This mostly displays 'SYSTEM OK' or 'DO PREDIVE as in the above example unless there is another fault to report.

Fig. 3.1

SERVICE MODE

Service mode is accessed in the Setup Menu.

With this mode activated, each pre-dive screen shows additional text information relevant to the test being performed.

Also, it enables an extra (blue) STAT button on the Startup screen *(Fig. 3.2)*, which if selected with a long push of both buttons (not indicated), will allow access to detailed service sub-screens. Your Hollis dealer will use information on these screens to assist with any servicing required. A short push of STAT will display the STATUS screen and relevant resources as during a dive.

To enable fault diagnosis, put the EXPLORER into Service Mode. Having selected STAT with a long hold of both buttons from the Startup screen you will access two extra screens *(Fig. 3.3, 3.4)* (plus alarm and metric screens, not shown).

During Pre-dive, additional information will be displayed on each Pre-dive screen, such as the PO_2 and internal loop pressure *(Fig. 3.5)*.

STATUS SCREEN COLORS

There are four color states of the STATUS screen. Each color provides additional information. The four color states are:

Green - No problem with the information.

Yellow - The system is informing you of a low level alarm such as low HP gas supply. The STATUS Screen's Action Panel will give information regarding the warning or action to be taken and in the case of the low HP gas example, the value in the HP window will also be in yellow. This will result in a flashing Green and Blue on the HUD/BUD.

Magenta - indicates unreliable data on the reading being taken. This could be caused by a failed sensor (such as a low wireless HP battery). This will be coupled with an action to be taken displayed on the STATUS Screen's Action Panel. This will result in a flashing green and blue or red signal on the HUD/BUD.

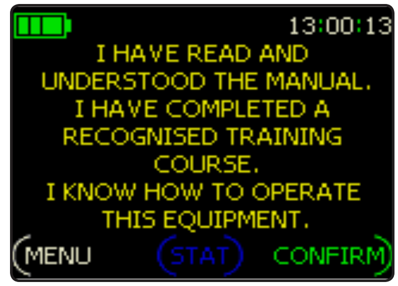


Fig. 3.2

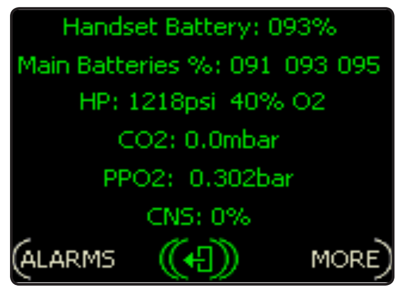


Fig. 3.3

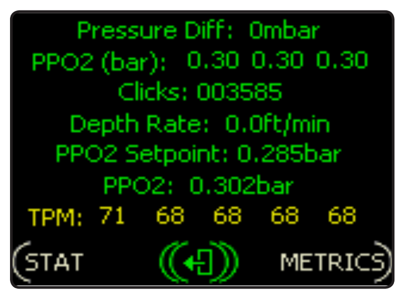


Fig. 3.4

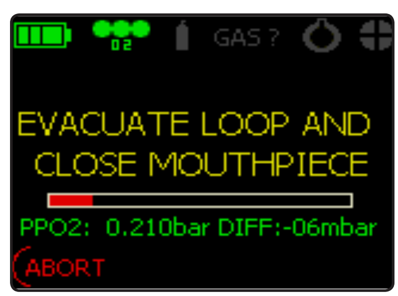


Fig. 3.5

Red - A major alarm indicating that information/resource has now become critical forcing an open circuit bailout or no dive condition. OC Bailout will be displayed on the STATUS Screen's Action Panel and the HUD will flash red and a vibrating alarm will activate on the HUD.

From the Main Dive Screen, two short presses of the right button will bring up the STATUS screen *(Fig. 3.6)* so that the user can determine at a glance the status of the system while doing a system check.

Fig. 3.6

AUTOMATIC TURN ON

FAILSAFE FEATURE

Normal practice and training is for the user to turn the EXPLORER on by depressing any button on the wrist display and going through the pre-dive checks. The following failsafe additions are to reduce the chance of accidental injury or death by breathing on an EXPLORER that is in off/sleeping state.

EXPLORER uses detection of a diver breathing the loop to automatically turn the unit on.

BREATHING DETECTION TURN ON RULES

The EXPLORER will turn on if the loop PO_2 drops to 0.17bar. Therefore even with the unit incorrectly assembled (gas not turned on), the system will detect the fall in PO_2 and will activate. It will then alarm and require the user to properly complete the pre-dive sequence.

Once turned on, the LSS unit will attempt to maintain a breathable PO_2 based on the DCP (Dive Control Parameter) setting and the supply gas expected.

If sensors are removed or read 0.00 then the unit will only turn on with depth or by the user pressing a switch. This feature is included to conserve battery power when the user takes out O_2 sensors for storage or during transport. Other errors such as failing to turn on cylinders, etc. are much more likely, and should be reduced by proper training and the intelligent alarm systems as in the EXPLORER.

If the diver does not have HP gas turned on, alarms on the HUD/BUD and Wrist display will occur as soon as auto turn-on occurs. Hence this method provides increased warnings whenever the loop is breathed on with the unit turned off.

Breathing the loop, in all circumstances where the unit is breathable and O_2 sensors operative, will trigger an automatic turn on.

! **DANGER: The additional safety features described in this section should NEVER be used as routine. The user should ALWAYS turn on the unit and complete pre-dive checks as required in training and the operations manual.**

DISPLAY SYMBOLS

Most screen commands (soft buttons) are actually the written word (in English) but movement commands are expressed using icons.


Moves the cursor to the next field to the right to edit or moves the STATUS display one window to the right.

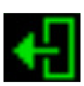

Moves the cursor to the next field to the left to edit or moves the STATUS display one window to the left.


A single bracket indicates a short push of the button to perform the action (in this case move left)


A double bracket indicates a short push of both buttons to perform the action (in this case move to left)


Moves the cursor up to the next option (as in a menu list). In this case a short push of the left button. A down arrow moves the cursor down.


A short push increments the information by 1 digit. A long push increments the information in multiples. A minus sign (-) decrements the digit.


EXITS to the previous page and SAVES the information.


ENTERS the selected item/page


Two sets of brackets around a function indicates a long push of both buttons. In this case to exit the page.

SCREEN ICONS

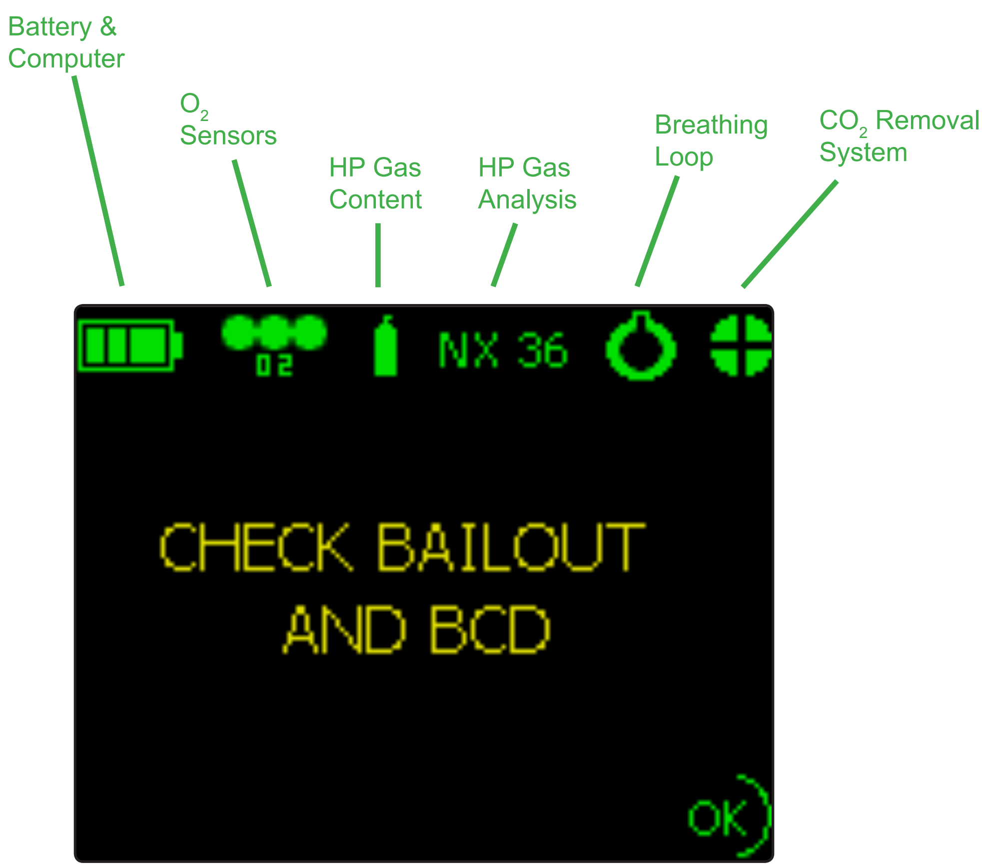
During the Pre-dive tests, icons appear across the top of the screen starting on the left.

As each level of Pre-dive is completed successfully, a green icon appears indicating the test has passed successfully.

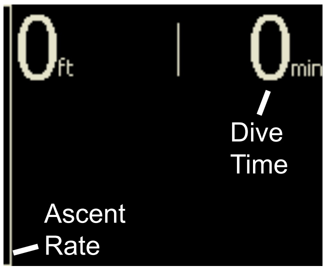
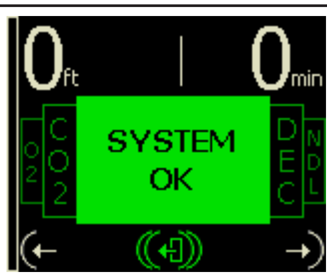
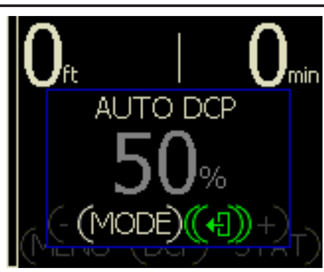
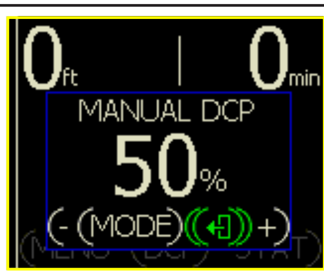
Note that all icon colors, as with any numerical displays, match the alarm severity – yellow indicates a low-level alarm and coincides with a blue/green HUD/BUD state. In addition, a grey icon indicates a test not yet performed.

! **WARNING. A red icon means a failure of the test/alarm which if ignored would make EXPLORER unsafe to dive.**

The icons are:



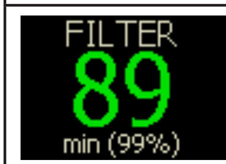
DIVE SCREENS

Screen	Description
	Dive Screen (when ascent rate bar is ½ full then rate is 30 ft/min *10 m/min*)
	Dive Screen with menu bar (accessed by a single push of any button)
	Status Screen (accessed by a short double push of the right button)
	DCP Auto Mode (short push of both buttons to change modes)
	DCP Manual Mode (short push both buttons to change modes, 1% increment change by short push of either button, 10% increment change by long push of either button)

STATUS SCREENS

The Status (STAT) screens show all key resources in a simple format. The screen is accessed from the main screen by a short double push of the right button, and then a short push of either the left or the right button moves around the screen. The Status screen also incorporates a color coded Action Panel to give instructions.

The items that can be displayed are:

Screen	Description	Screen	Description
	Battery time in minutes		No Decompression Limit in minutes
	High pressure nitrox gas supply remaining in minutes, at current depth and workload		CNS oxygen toxicity time in minutes
	Carbon dioxide absorbent filter (scrubber) estimated remaining time		Partial pressure of oxygen in bars
	Any decompression information		Partial pressure of carbon dioxide in millibars

! NOTE: The Status screen disappears after 5 seconds of inactivity (if no alarms) or 30 seconds if an alarm is present. Alternatively a long press of both buttons will 'Hide' the screen.

MAIN MENU

MAIN MENU SCREEN *(FIG. 3.7)*

The EXPLORER has a simple menu system which is available while at the surface. To access the Main Menu short press any button.

Fig. 3.7

MENU NAVIGATION

Action	Button Press
Enter Highlighted Menu Item	Short push both buttons
Exit	Long push both buttons
Scroll Down	Short push right button
Scroll Up	short push left button

MAIN MENU OPTIONS

SETUP

Setup is a basic settings menu. See the following Setup Menu section for further details.

Fig. 3.8

NDL PLAN

It is a dive planner based on current tissue state, surface interval, and a DCP setting for the next dive *(Fig. 3.8)*.

PC LINK

Fig. 3.9

This screen is a gateway to updating the internal software and downloading the log information to a PC *(Fig. 3.9)*. Further details can be found in the Internet Reprogramming PART 3 Section 21 of this manual.

LOG BOOK

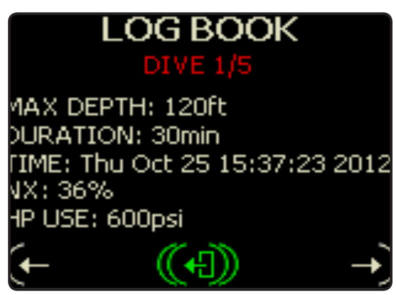


Fig. 3.10

The Log Book screen is where you access recorded information on previously completed dives *(Fig. 3.10)*.

ABOUT

This screen shows information about the software installed in the EXPLORER, the serial number of each connected element, and information that may be required by your service center. Software updates for the EXPLORER are available from http://hollis.com/support.asp. Please check regularly for updates. Once a new update has been installed, this screen will report the new version of software installed *(Fig. 3.11)*.

Fig. 3.11

TURN OFF

This selection shuts down the Explorer electronics.

SETUP MENU

SETUP MENU SCREEN *(FIG. 3.12)*

The Setup Menu is accessed via the Main Menu.

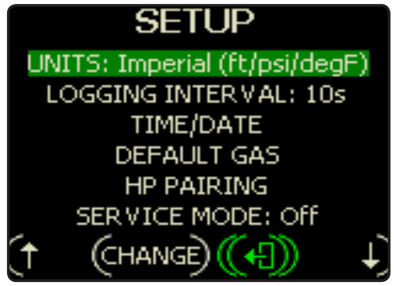


Fig. 3.12

MENU NAVIGATION

Action	Button Press
To Make A Change (enter the modification screen)	Short push both buttons
Exit The Menu	Long push both buttons
Scroll Down	Short push right button
Scroll Up	short push left button

SETUP MENU OPTIONS

UNITS

This option allows for the switching between metric and imperial unit modes.

LOGGING INTERVAL

This option allows for the selection of how frequently (1s., 10 s., or 1 min.) the computer takes a snapshot of dive data, stored for later download. Using a shorter interval results in more data points per dive and fewer stored dives for download data respectively. Longer data intervals result in fewer data points (less detail) but the space to store more dives.
Example: 2 hour dives using a 10 s. logging interval, the storage limit is 5 dives. For increasingly shorter dives, the logbook limit will increase to 28 (for dives < 10min).

TIME/DATE

This is the clock and calendar setting *(Fig. 3.13)*.

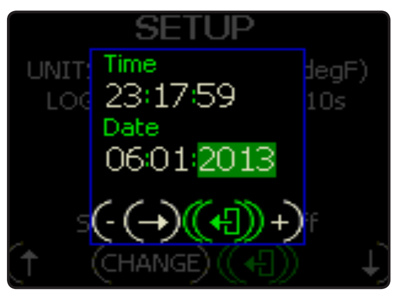


Fig. 3.13

! NOTE: When the EXPLORER is first powered up from a discharged battery you will be asked to update the date and time.

DEFAULT GAS *(FIG. 3.14)*

Set this to your analyzed dive gas. During the Pre-dive checks, if EXPLORER analyzes a different gas, it will alarm and ask you to recheck the analysis. For further detail on the proper use of this function, see the following section "Bailout and Gas Configuration."

Fig. 3.14

HP PAIRING

To pair the HP transmitter, first press SEARCH. Any transmitters within range of the LSS will be displayed. Once the system finds the transmitter, press PAIR. The word PAIRED will appear *(Fig. 3.15)*.

Fig. 3.15

! **WARNINGS: The transmitter ID is written on the transmitter attached to the first stage in your EXPLORER (Fig. 3.16). Confirm this is the correct transmitter before proceeding.**

! **NOTE: The HP transmitter MUST have pressure applied to it to activate and be seen by the system. If the regulator is not pressurized the the transmitter will be off and not sending a signal.**

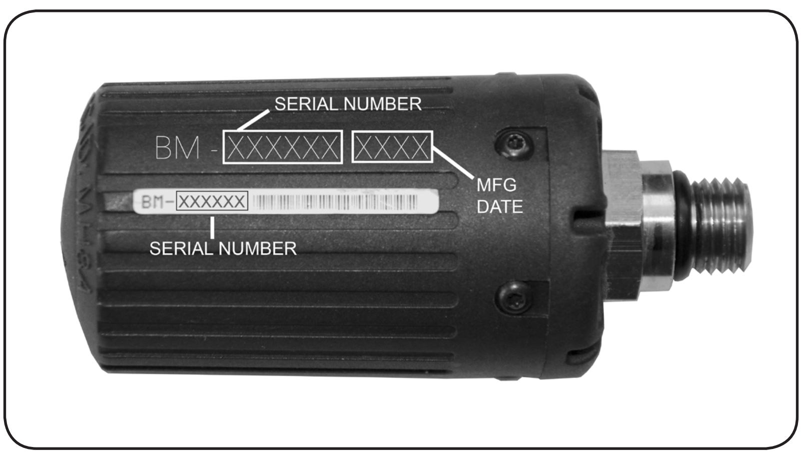


Fig. 3.16

SERVICE MODE

Service Mode is used by Explorer service technicians performing diagnostics. The settings are off/on. The default setting is off.

BAILOUT AND GAS CONFIGURATION

DEFAULT GAS SETTING

The EXPLORER has the capability to analyze the dive gas attached to the system. If this gas differs significantly from what the EXPLORER expects (the programmed Default Gas), then a warning will be given during the pre-dive sequence. This is to help protect against absent or faulty gas analysis by the gas supplier and user.

To change the Default Gas when the unit turns on, go to the SETUP menu screen and highlight Default Gas. Then a short push of both left and right buttons to select *(Fig. 3.17)*. The gas can now be set. On this screen you can also input the cylinder size.

Fig. 3.17

! DANGER: It is important that the correct cylinder size is entered for EXPLORER to correctly calculate the remaining resource times.

The Default Gas information is used to drive bailout gas calculation (using cylinder size) and hence gas time remaining. During the Pre-Dive Sequence the Explorer performs gas analysis checks.

If the gas analyzed does not match the programmed default gas but is still usable (within 5%), you can simply start the dive without having to change the Default Gas setting. If the gas analyzed does not match the programmed default gas, the user will be brought back to the begining of start up and required to change the Default Gas setting. If the Explorer's gas analysis seems incorrect, you should re-analyze the gas and/or check the oxygen sensor calibration.

BAILOUT GAS

It is not necessary to set a bailout gas. Whether the bailout is undertaken using the onboard (attached) gas or an external gas supply, all dive table calculations are completed assuming the diver is breathing air. (21% oxygen, 79% nitrogen). This makes all calculations as conservative as possible.

DCP (DIVE CONTROL PARAMETER)

DYNAMIC PO_2

The EXPLORER is a dynamic PO_2 controller. This means it can vary the PO_2 that it maintains based on the value of certain resources. A higher DCP (Dive Control Parameter) value means less tissue loading (higher PO_2) but more gas usage and a lower PO_2 is the opposite. For a set DCP the actual PO_2 will vary throughout the dive profile.

The DCP can be set to AUTO or MANUAL mode.

AUTO MODE

AUTO mode automatically adjusts the DCP throughout the dive to give the best compromise between maximum NDL time and minimum gas usage *(Fig. 3.19)*. This defaults to 50% each time the unit is switched on.

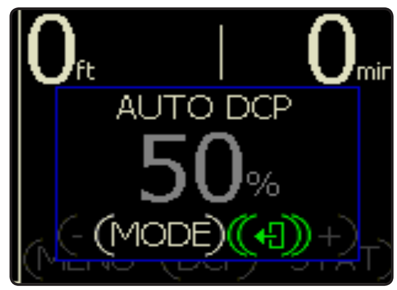


Fig. 3.18

! NOTE: Auto Mode is the default. If on a dive where Manual Mode has been selected and you then surface and complete the dive, Auto Mode will be the default at the start of the next dive.

continued

HOW AUTO MODE WORKS

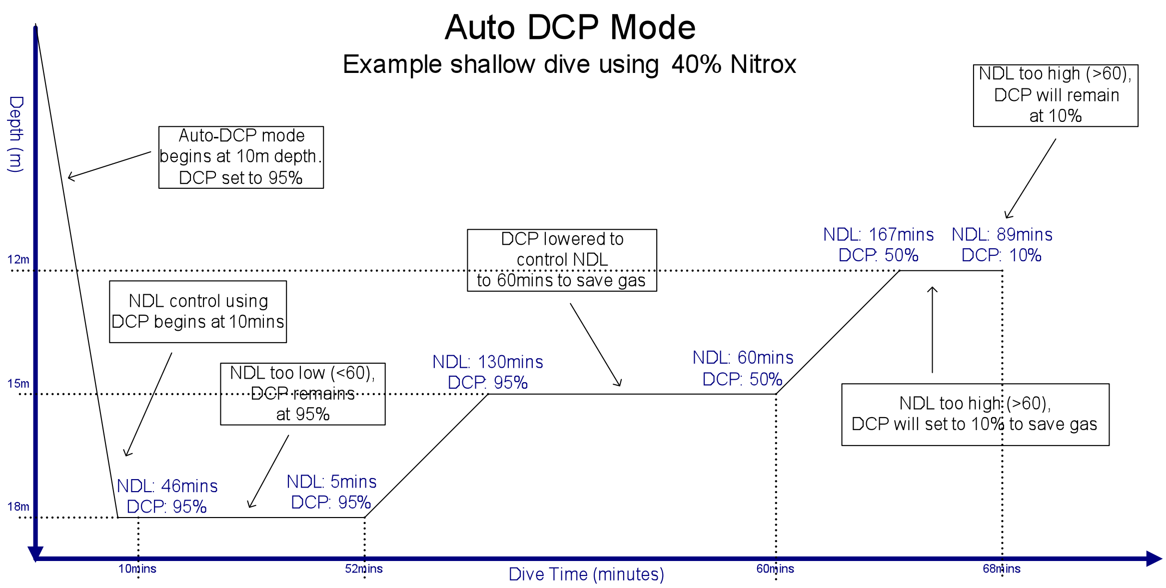
By setting 'Auto' DCP prior to diving the following events occur.

1. The DCP will automatically be set to 95% for the first 10 minutes of the dive but only after the diver exceeds 10 m of depth.

2. If the NDL is then less than 60 minutes the DCP will stay set to 95% to maximize the NDL.

3. If at any point on the ascent the NDL is in excess of 60 minutes then the DCP will reduce to save gas and maintain the NDL at 60 minutes.

4. The minimum DCP is 10%. If the DCP is 10% and the NDL exceeds 60 minutes, the DCP will not decrease.



MANUAL MODE

In manual mode the diver can set the DCP using the screen shown *(Fig. 3.19)*. A long hold of either the + or - button will jump the DCP value by 10.

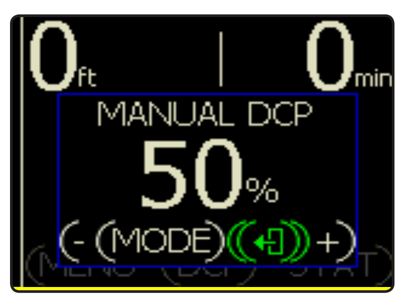


Fig. 3.19

RMS (RESOURCES MANAGEMENT SYSTEM)

The control of PO_2 is the prime function for EXPLORER. In addition it monitors a range of dive resources. The LSS is able to make advanced decisions based on available resources in order to modify the PO_2 and provide for the longest possible dive.

The unit constantly monitors all resources such as available gas, scrubber duration, etc. and keeps the dive within parameters that allows for a safe bailout ascent. The unit uses a forward-looking algorithm to determine the best PO_2 at any given time to avoid or reduce decompression, allow for a safe open circuit ascent and stay within safe battery and scrubber durations.

Resources monitored include;

- Depth
- NDL
- PO_2
- PCO_2
- Battery
- HP gas
- CNS (Oxygen toxicity)
- Filter (CO_2 scrubber)

Resources are generally expressed in minutes and are noted in the center of the dive screen *(Fig. 3.20)*.

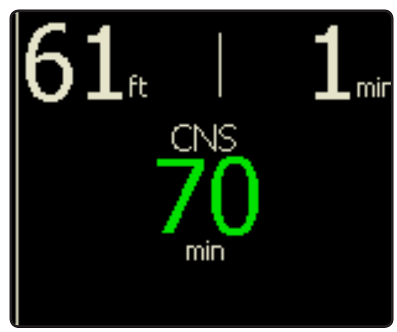


Fig. 3.20

The controlling (most critical) resource is shown. This can change throughout the dive and another resource may take its place. Alarms will be activated when resources reach certain levels as defined in the Alarm Tables.

In addition, should a resource alarm be triggered for any reason the STATUS screen will appear. This will not only note the resource level but can also tell the user of the direct action required, i.e. ASCEND NOW.

OXYGEN SENSOR CALIBRATION

The EXPLORER is able to perform accurate calibration of the Oxygen (PO_2) sensors in ambient air. This has particular importance on the ease and accuracy of achieving calibrated sensors.

The EXPLORER is able to measure atmospheric pressure during calibration and make the appropriate calibration adjustments for the sensors. When performing sensor calibrations, it is important that the calibration gas and ambient pressure are known. **By using ambient air as the calibration gas this is known accurately.**

Calibration Errors

When Oxygen sensors are new or completely dry and a calibration is undertaken, a small difference will be noted when another calibration is done after a dive. This is because the humidity inside a unit post-dive affects the sensor membranes permeability to a small (safe) degree.

In general, it is good practice to calibrate a unit in an as-dived state i.e. with humidity in the loop. This is performed naturally during the Pre-Dive Check sequence.

The EXPLORER uses advanced empirical techniques to ensure the accuracy of the ambient air calibration.

! **WARNING: When refitting an oxygen sensor or after calibration of the sensors, a full Pre-Dive sequence MUST be completed.**

The user can cause the largest error in oxygen sensor calibration. If the calibration is not done in ambient air, the sensors will not give the correct readings after calibration. Therefore do not execute a manual calibration without ensuring the sensors are exposed to air at ambient pressure.

The unit's testing for good and bad oxygen sensor calibration is determined from the sensor mV level detected during calibration. At 1000 mbar atmospheric pressure the range the unit can calibrate for is approximately 5mV to 15mV. However, if a sensor that would normally show 7.5 mV in air has an enriched gas (40% Oxygen) applied to it during calibration, then the sensor will give 14.28 mV. The calibration will pass but the sensor readings will be dangerously inaccurate.

Recommendations

- Never store sensors for long periods of time before use; they have expiration dates.
- Never subject sensors to high temperatures i.e. (inside cars, garages etc.).
- Never freeze sensors (left in cars overnight).
- Never subject sensors to physical shocks.
- Never subject sensors to vacuum.
- Never submerge sensors in liquids.
- Never attempt to open a sensor. They contain a caustic chemical.
- Sensors deteriorate very slowly and near the end of their useful life may show a drift soon after calibration.
- The oxygen sensors must be replaced every 12 months or at their 'do not use after' date or sooner depending on the pp02 they are stored in and the hours of use.
- Oxygen sensor usage temperatures are:

- Operating temperature range 0 – 40 °C / 32 - 104 °F
- Storage temperature -20 to +50 °C / -4 - 122 °F
- Recommended storage temperature +5 to +15 °C / 41 °F to 59 °F

! DANGER: Always be careful when doing manual calibrations. The oxygen sensors must be exposed to air and NO OTHER GAS.

Oxygen sensor calibrations conducted once a week should be more than sufficient, unless the EXPLORER has been transported to different climates, locations, or significantly different ambient conditions.

Prior to starting a pre-dive sequence it is advisable to check the oxygen and CO_2 sensor (if equipped) calibration by opening the EXPLORER Module and removing it and the Sensor Module. Place the two together and turn the unit on. Then go to the STATUS screen and view the PO_2 and CO_2 readings.

! WARNING: If the PO_2 is not 0.21 and the CO_2 (if equipped) is not 0.3-0.4, then a calibration must be performed.

In general, Oxygen and CO_2 sensors do not drift excessively. Constant calibration (every dive) is not required. Instead, frequently check sensors for accuracy with a known gas (air) as previously described on the preceding page. If possible keep sensors dry between dives, especially during storage.

! **WARNING: Performing calibration before every single dive may mask other potential problems.**

CONDUCTING AN O_2 SENSOR CALIBRATION

During the Pre-dive sequence you have the option to calibrate the oxygen and CO_2 sensors from the Calibration screen. Selecting O_2, will display another series of screens that will guide you through the calibration. Please see descriptions later in the manual for calibrating the optional CO_2 sensor.

SUMMARY OF DO'S AND DON'TS OF OXYGEN SENSOR CALIBRATION

When calibrating sensors there are two factors that the EXPLORER takes into account:
1. Ambient pressure
2. Ambient AIR oxygen content

These two factors multiply to determine the partial pressure of the oxygen exposed to the Oxygen sensor.

Example:

20.9% oxygen at 1000 mbar = 0.209 mbar partial pressure of oxygen

20.9% oxygen at 750 mbar = 15.675 mbar partial pressure of oxygen

The EXPLORER uses ambient air as the calibrating gas, because its composition is accurately known. This is in contrast to say a cylinder of compressed oxygen that can vary from supplier to supplier, as well as around the world, from at least 94% to 100%.

To achieve a good calibration some basic rules must be observed:

1. The Oxygen sensors must be exposed to the pure calibrating gas. So for an air calibration, the sensors must be flushed with air. Just taking the hoses off is NOT sufficient, as pockets of gas can be enveloping the sensors.

2. DO NOT execute calibrations to remedy a rebreather whose PO_2 accuracy is drifting over short periods of time. Some other problem is likely to be the cause in this instance. Possible causes include:

- **Oxygen sensors have become wet**
- **Current gas exposed to the Oxygen sensors is not what you think it is.**
- **The mini-jack connection is corroded**

Check the readings on the STATUS screen (average) or Service Mode STATUS Screen (all 3 sensors).

If a sensor is reading incorrectly, first remove it and clean the mini-jack connector. This can be done with Hollis approved electrical contact cleaner or simply by wiping the connector with a lint free cloth. DO NOT scratch the connector with a metal instrument. Then look for droplets of moisture on the sensor membrane. Use a rolled tissue to gently wick any moisture droplets from the sensor WITHOUT making contact with the sensor membrane itself. Pushing on the sensor membrane face can destroy the sensor.

If neither of these corrects the reading, then the sensor should be replaced.

The Oxygen sensors vary only slightly over time. Temperature, atmospheric pressure and moisture have far greater short-term effects on the readings. Calibrations carried out once a week should be more than sufficient, unless the EXPLORER has been transported to different climates or significantly different ambient conditions.

3.12

So, calibration checks, not actual calibrations, should be carried out regularly to ensure the oxygen PO_2 sensing system is performing correctly. Calibrations should be done more sparingly, as it takes time to ensure sensors are exposed to the correct conditions. Often a bad calibration causes more confusing problems than small errors due to temperature change. User error caused by failure to use the appropriate ambient gas (air) is a big source of sensor errors.

1. Don't mask problems with excessive calibrations.
2. If something seems wrong, check everything. Do not just execute a calibration to fix the reading. You could be making matters worse.
3. Keep sensors dry.
4. When doing a calibration, ensure the sensors are exposed to air by following all on screen handset instructions.
5. Just removing hoses is not enough to get air to the sensors. Either the breathing routine described in the Pre-Dive sequence must be used or the Sensor Module should be removed from the EXPLORER and sensors allowed to stabilize in ambient air.
6. If the EXPLORER has had a change in climate or significant ambient conditions, these are good reasons to check calibration.
7. The readings from the oxygen sensors change with temperature. If you are diving in warmer or colder water than normal, PO_2 readings will vary. Ensure calibrations take place at a temperature as close to diving conditions as possible.

OXYGEN SENSOR VOTING

VOTING METHOD

The EXPLORER has a method of automatically removing Oxygen sensors from the PO_2 averaging and entering a fail-safe mode when it is not possible to resolve an inaccurate PO_2 reading.

! **NOTE: It is never wrong to bailout in response to a misunderstood unit failure. "When in doubt, bail out." Proper bailout planning can save your life.**

Rules:
1. If a single sensor is below 0.15 bar or above 3.00 bar, then it will be removed from the averaging — a 'BAD CELL! DO NOT DIVE' alarm will be displayed if not diving, or 'ASCEND! BAD CELL' if diving.

Mandatory Diver Action: Ascend on rebreather.
Preferred Diver Action: Open circuit Bailout to surface.

2. If a sensor is less than 7 mV then it will be removed from the averaging — a 'BAD CELL! DO NOT DIVE' alarm will be displayed if not diving, or 'ASCEND! BAD CELL' if diving.

Mandatory Diver Action: Ascend to surface on the rebreather.
Preferred Diver Action: Open circuit Bailout, ascend to surface.

3. If one sensor is +/- 0.2 bar away from the two remaining sensors then it will be removed from the averaging — a 'BAD CELL! DO NOT DIVE' alarm will be displayed if not diving, or 'ASCEND! BAD CELL' if diving.

Mandatory Diver Action: Ascend to surface on the rebreather.
Preferred Diver Action: Open circuit Bailout, ascend to surface.

4. If all three cells are removed from the averaging for the same reason (i.e., all low or all high), then all cells will be used in the averaging (superseding rules 1, 2 and 3) — a 'BAD CELLS! DO NOT DIVE' alarm will be displayed if not diving, or 'ASCEND! BAD CELLS' if diving.

Mandatory Diver Action: Ascend to surface on the rebreather unless superceded by rule 7.
Preferred Diver Action: Open circuit Bailout, ascend to surface.

5. If the difference between the highest sensor and the lowest is greater than 0.5bar then the system will inject gas for 1 second out of every 3 as a fail-safe. This will cause an ASCEND NOW alarm.

Mandatory Diver Action: Ascend to surface on the rebreather. Rebreather switches to Fail-Safe Mode.
Preferred Diver Action: Open circuit Bailout, ascend to surface.

6. If the average of all sensors (not removed from the averaging by rules 1, 2, 3 or 4) is greater than 1.6 bar when diving then an ASCEND NOW alarm will be displayed.

Mandatory Diver Action: Ascend to surface on the rebreather.
Preferred Diver Action: Open circuit Bailout, ascend to surface.

7. If the average of all sensors is less than 0.17 or greater than 2.0 when diving then a BAILOUT alarm will display.

! NOTE: This alarm will supersede those in rules 1, 2, 3, 4, 5 and 6.

Mandatory Diver Action: Open circuit Bailout to surface

8. If two or more sensors are removed from the averaging (because of rules 1, 2, 3 or 4) then the system will inject gas for 1 second out of every 3 as a fail-safe. This will cause an ASCEND NOW alarm.

Mandatory Diver Action: Ascend to surface on the rebreather. Rebreather switches to Fail-Safe Mode.
Preferred Diver Action: Open circuit Bailout, ascend to surface.

EXAMPLES

1. Sensor 1 = 0.65bar, sensor 2 = 0.60bar, sensor 3 = 0.70bar.

→ All sensors used

2. Sensor 1 = 0.3bar, sensor 2 = 0.60bar, sensor 3 = 0.70bar.

→ Sensors 2 and 3 still used

3. Sensor 1 = 0.3bar, sensor 2 = 0.60bar, sensor 3 = 0.9bar.

→ Failsafe – inject for 1 second out of every 3. {Sensors are greater than 0.5 apart across all 3 sensors (0.3 to 0.9)}.

CDM (CANISTER DURATION METER)

The EXPLORER Canister Duration Meter (CDM) is comprised of three main parts:
1. A patented, absorbent temperature profile duration meter.
2. A Nitrox Injection Meter (based on CE tested durations).
3. An optional gaseous CO_2 sensor accessory.

The CDM combines information from these three features to determine the appropriate state of the scrubber. The STATUS combines and displays this information as 'Filter minutes.' The Nitrox Injection Meter minutes are reset when the absorbent is replaced and confirmed in the Pre-Dive Sequence.

The duration of the Scrubber depends mainly on the amount of CO_2 being produced by the diver and the depth of the dive. The readings from all of these devices together can be used to report a high confidence status regarding the state of the Scrubber. However, user experience and training should also be used to determine the validity of the readings given. Scrubbers are a key element of a rebreather. Great care should be taken when determining if a dive can be safely performed with the scrubber in its current state. Flooding, extended storage between uses, improper assembly, and improper packing can all contribute to the canister duration meter reporting false readings. Use great care in assembling the Explorer and in completing pre-breathe checks on the breathing loop. The CDM is a useful feature as an aid to predicting absorbent duration.

! **WARNING: NEVER dive a partially used Scrubber beyond 24 hours of its initial packing or opening irrespective of the CDM meter reading. This includes partially used scrubbers that have been stored in a sealed loop or container.**

TPM (TEMPERATURE PROFILE MONITOR)

This meter relies upon the heat producing reaction of the CO_2 absorbent. Utilizing multiple temperature sensors, the system detects a complex reaction heat wave front through the absorbent as it is being used.

! **DANGER: The TPM will not detect breakthrough conditions of a poorly packed Scrubber or failing seal. Therefore Pre-breathe checks must always be carried out to ensure CO_2 is being absorbed correctly by the scrubber.**

The TPM contains 5 temperature sensors arranged longitudinally through the canister absorption path. The readings from these 5 temperature sensors are logged and analyzed by the system. The following describes some of the limitations of the TPM are as follows.

The CO_2 absorbent produces heat when CO_2 is absorbed. However, there is also a temperature rise even when incomplete absorption of the CO_2 in the breathing gas is achieved. This is a potentially dangerous situation, as the system appears to be working correctly as there is still a measurable temperature rise and wavefront in the system. The human body is tolerant to only approximately 5 to 10 mbar of CO_2 (ref. CE standards for a life support system). A well-packed fresh Absorbent Scrubber absorbs all the exhaled CO_2 for a period of time until an amount of CO_2 starts to creep through. When this level reaches 5 mbar it is assumed there is no life left in the scrubber. However even at 5 mbar there is still considerable thermal activity within the scrubber.

! **DANGER: Be aware that a well packed and well maintained Scrubber is key in achieving a life-support system. The CDM is not a substitute for good system maintenance and Pre-Dive checks. Always use your training and discipline to ensure the sub-systems in the EXPLORER are operating correctly.**

Critical components and potential failures are:
- The scrubber seal around the scrubber
- A poorly packed (standard pack only) scrubber
- Used or out of date scrubber material

Although the algorithm that analyzes the thermistor curve is adequately accurate during diving, if the scrubber is not being breathed on, the thermistor's curve will be abnormal. It also takes time for the absorbent to rise to normal operating temperatures. Therefore for routine use, the addition of the nitrox injection meter (described in the next subsection) is used to report the filter (scrubber) percentage remaining to the user.

NITROX INJECTION METER

The CO_2 created by the diver is in direct proportion to the oxygen breathed. The oxygen metabolized by the body is replaced by the oxygen component of nitrox injected into the breathing loop. By knowing the volume and composition of gas injected, the amount of metabolized oxygen and therefore the amount of CO_2 created can be estimated. From tests, the duration of the scrubber types has been determined and the corresponding volume of CO_2 absorbed before the absorbent begins to reduce its effectiveness.

Using these principles, the system measures the amount of gas injected by the solenoid valve and converts it to a percentage of minutes remaining at CE CO_2 rates. Although the displayed minutes are at CE CO_2 generation standards, the minutes will tick down more slowly if the diver is breathing at a reduced rate. This will be the most common scenario. However, in the unusual condition of CO_2 generation at an elevated rate compared to 1.6 l/min then the minutes will tick off more quickly. If the diver knows a particularly strenuous dive is ahead, they should allow extra conservatism in the minutes remaining counter for that dive.

! **WARNING: The CO_2 Absorbent Scrubber Alarm consists of a Filter reading of 0 minutes, blue/green HUD warning, and an ascent warning. It will activate while there is still sufficient duration to allow a controlled ascent to the surface. At such time, the diver should immediately end the dive and safely ascend to the surface on the breathing loop.**

! **WARNING: If the CO_2 Absorbent Scrubber Alarm is triggered during a dive, the scrubber time may increase during the ascent. This does not mean that the scrubber is now safe to reuse. Discard the scrubber material, and refill with new scrubber material before additional dives.**

! **DANGER: If in doubt of the condition of the CO_2 scrubber, replace the absorbent and perform full pre-dive checks. Filter (scrubber) time remaining must exceed the planned dive time.**

OPERATION AND INTERACTION OF TEMPERATURE PROFILER AND NITROX INJECTION METER

The thermistor bar chart of the temperature profile through the scrubber is shown to give the diver information on the activity of absorbent inside the scrubber. This should have a peak when the scrubber is being breathed on. From cold it will take about 5 minutes for the CO_2 reaction to cause a visible spike. This spike should then continue and grow higher. The temperature bars fill from the left to the right as the scrubber is being used. This screen is in the Pre-dive sequence.

If there is no peak, then there is a problem with the scrubber. This could be caused by:

1. Flooded scrubber
2. Scrubber pack not installed
3. Scrubber pack empty
4. Scrubber material exhausted or gone bad

During pre-breathe, the unit needs to be breathed on to see a change in the thermal profile. This does not guarantee correct operation, but has a high likelihood of correct operation. Any sense of dizziness, nausea or other CO_2 symptoms should also be used to alert the diver that the scrubber is not operating correctly. A small bypass due to a badly fitted scrubber or CO_2 seals could give a scenario of a good peak, but an excessive amount of CO_2 could still bypass the scrubber. If this occurs, stop breathing on the EXPLORER. This will be indicated (and alarmed for) by the optional Gaseous CO_2 sensor accessory. Replace the absorbent and/or check scrubber packing and seating.

! **CAUTION: Pre-breathing any rebreather should be done in a safe seated position, with their nose plugged, where the diver can monitor displays and any potential symptoms of CO_2 poisoning. Pre-breathing should never be conducted while walking or standing in a place where the diver could fall into the water or injure him or herself.**

The actual minutes remaining number displayed to the diver comes from the Nitox Injection Monitor. This gives a consistent and reliable reading of current absorbent duration based on nitrox injection.

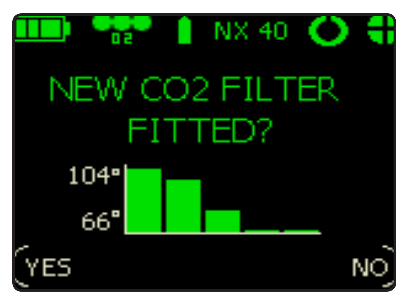


Fig. 3.21

Always remember to reset the absorbent duration when a new scrubber is fitted. You will be prompted to do this during the Pre-dive sequence *(Fig 3.21)*.

! **DANGER: DO NOT reset the absorbent duration unless a new scrubber with fresh absorbent has been fitted.**

Always change the absorbent when the low filter (scrubber) alarm appears, or before if you suspect the absorbent is not operating correctly or close to the end of its life - be conservative - be safe.

! **DANGER: If you do not insert an absorbent scrubber pack, the device greatly restricts breathing on the loop. This is to force you off the breathing loop until the issue is remedied. You must not dive without a CO_2 scrubber pack fitted.**

No matter how many safety monitoring systems are in place, use your own common sense and discipline to ensure you do not push the life support systems beyond their designed limitations. It is your life being supported - respect the equipment and its limitations.

OPTIONAL CARBON DIOXIDE SENSING MODULE

The EXPLORER is designed with an option to fit a CO_2 sensor. The user can elect to buy this initially or upgrade to the sensor later.

Advantages to using a CO_2 sensor include:
1. To ensure active absorbent has been installed.
2. To ensure the absorbent sealing systems are functioning.
3. To warn of reducing absorbent efficiency in order to give the diver time to respond by reducing depth, temperature or work rate to avoid an incident occurring.
4. To warn of rare situations when excessively high CO_2 levels may require immediate bailout to safe open circuit gas.

See the Explorer CO_2 Sensor User Manual (doc. 12-4127 rev. 2 or newer) for further details on safety and use of the Explorer CO_2 sensor.

! **NOTE: With the CO_2 sensor installed the system only requires a 1 minute pre-breathe. Without a CO_2 sensor installed a 5 minute pre-breathe of the absorbent scrubber will be forced.**

! **DANGER: Careful monitoring of scrubber duration is vital regardless of having a CO_2 sensor or not.**

DISPLAY & ALARM SYSTEMS

3.15

HUD, BUD, & COLOR SCREENS

The EXPLORER can be routinely dived by using the HUD (Heads Up Display) as the main underwater human interface. This frees up the diver to concentrate on the dive at hand.

The HUD is mounted in front of the diver's mask on a retaining clip attached to the BOV. It utilizes color LED's and a vibration feature to get your attention when necessary. Additionally, the EXPLORER has a BUD (Buddy Universal Display) on the side of the LSS Module for the Buddy/ Instructor to see your status at a glance. Both the HUD and BUD indicate the same color codes.

If the HUD/BUD system changes from Green for ‘go mode’ to a flashing green/blue then the diver can refer to the main wrist display and investigate the additional information on the STATUS display.

The wrist display utilizes color as an alert for general status changes and couples this alert with unprecedented clarity of information that can be reviewed in further detail.

The HUD, BUD, color screens on the wrist display, and uncluttered screen layouts are key to providing the diver and dive team with essential information in high stress scenarios.

DEFINITIONS

Alarm (state): These are mostly high level alarm conditions. Though they could be lower level alarms or warnings. They could represent a state of the system that is displayed in some way other than via the HUD or STATUS screens.

Alarm Display: The method by which an alarm state is passed to the user. On the LSS module, the HUD, BUD, and tactile alarm are used. On the handset, this is done via the GUI (Graphical User Interface) displays and the STATUS screen, which also has an ACTION Panel reflecting the HUD and a message containing a single user action. Some alarm displays vary depending on other system states, such as other alarms or the dive status (e.g., diving, not diving).

ALARM CODES

With the EXPLORER, a key task has been to process the fault levels and error conditions to indicate the status of the rebreather. Further, the LED states are configured for color blind as well as highly stressed divers. The position of the LED's coupled with the flashing or solid states, provide conditions that cannot be confused with one another. During stressful dive scenarios, the position and status is quickly understood to speed up the desired response/correction by the diver. The status sceens on the wrist display add one more level of security by adding extra information on an alarm states.

! **WARNING: This information is in English, and all users should be adequately trained in interpreting this information appropriately.**

continued

There are 3 main warning levels associated with the HUD, BUD, and on-screen displays.

Alarm Code	Meaning	Correct Action
Solid Green	This code means there are no detected problems.	OK - Procede with dive as planned.
Flashing Green & Blue (HUD/BUD) & Yellow (wrist display)	Warning - It is activated when a manageable error situation is in place.	The correct response will be displayed on the STATUS screen and will often tell the diver to ascend slowly on closed circuit monitoring the wrist display.
Magenta (wrist display only)	Loss of communication between sensors or modules. It is usually associated with DO NOT dive or OC bailout but could just be a warning.	Check the status message on the wrist display an act accordingly.
Flashing Red & Vibrating	It is activated when there is an urgent issue.	- DO NOT start the dive. - If already diving, the diver should switch to the bailout gas and ascend.

! NOTE: Red alarms take priority in the HUD over Green/Blue alarms.

! NOTE: Yellow on the wrist display is equivalent to the alternating blue/green state of the HUD.

! NOTE: The HUD vibration alarm will vibrate every second for 5 seconds, then repeat the 5 second alarm every 30 seconds, or if the source of the alarm changes.

ALARM FLOW DIAGRAMS

The following sections contain flow diagrams to indicate which actions / HUD indication will be used separated into diving and surface cases.

The following flow charts should be used in sequence, where an OK from the red HUD alerts lead to blue/green HUD alerts. Note the following alarm states (used in the diagram):

No Comms — Pressure sensor is not communicating with electronics, ie. lost signal.

Stale — Pressure sensor is not communicating updated data.

Missed Stop — Deco ceiling violated for more than 1min. This alarm state locks out the computer for 24 hours.

Too Shallow — Deco ceiling violated for < 1 min.

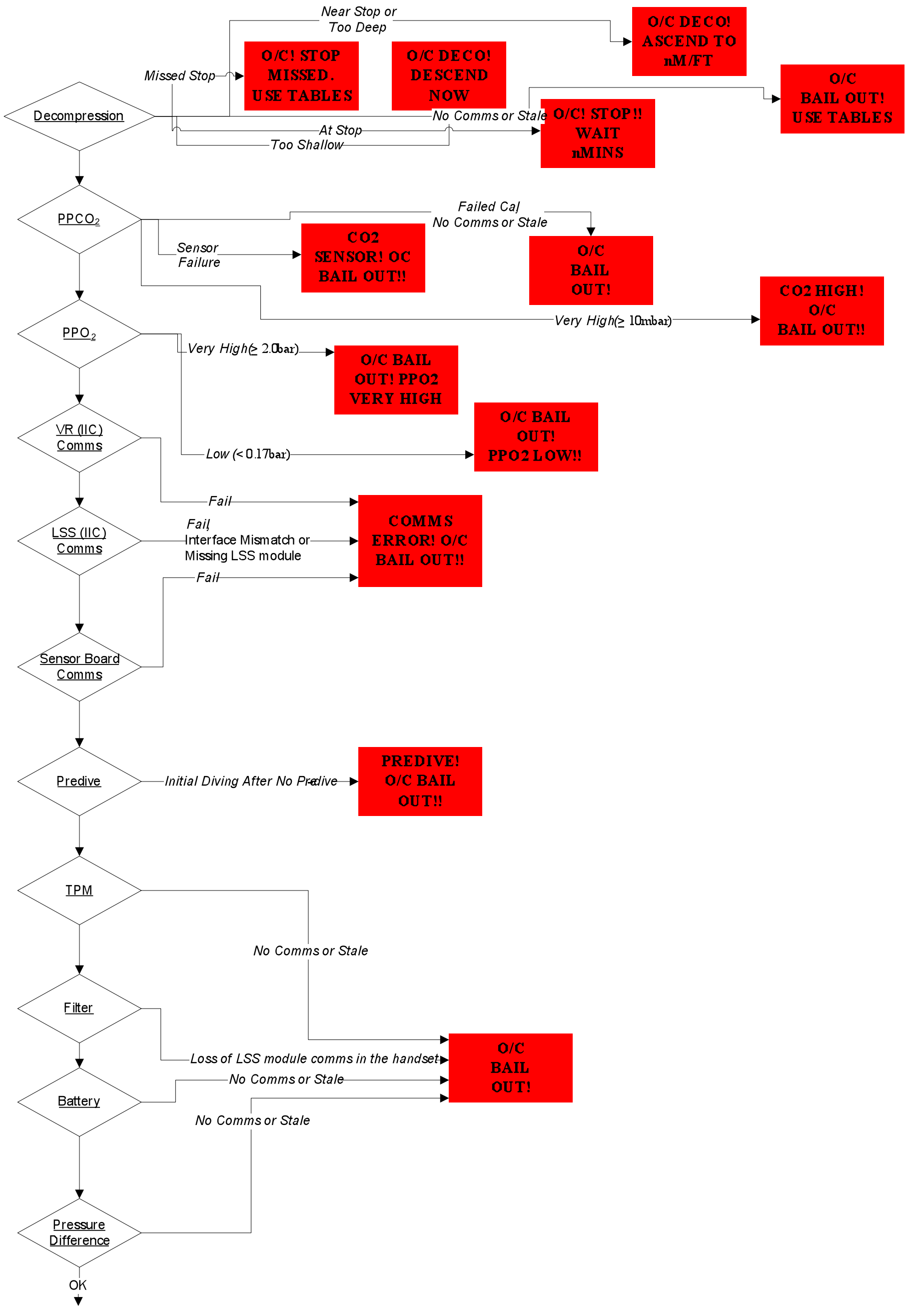
At Stop — Within 0.1 bar (3.3 ft / 1 m) below the next stop.

Near Stop — Within 0.3 bar (9.9 ft / 3 m) below the next stop.

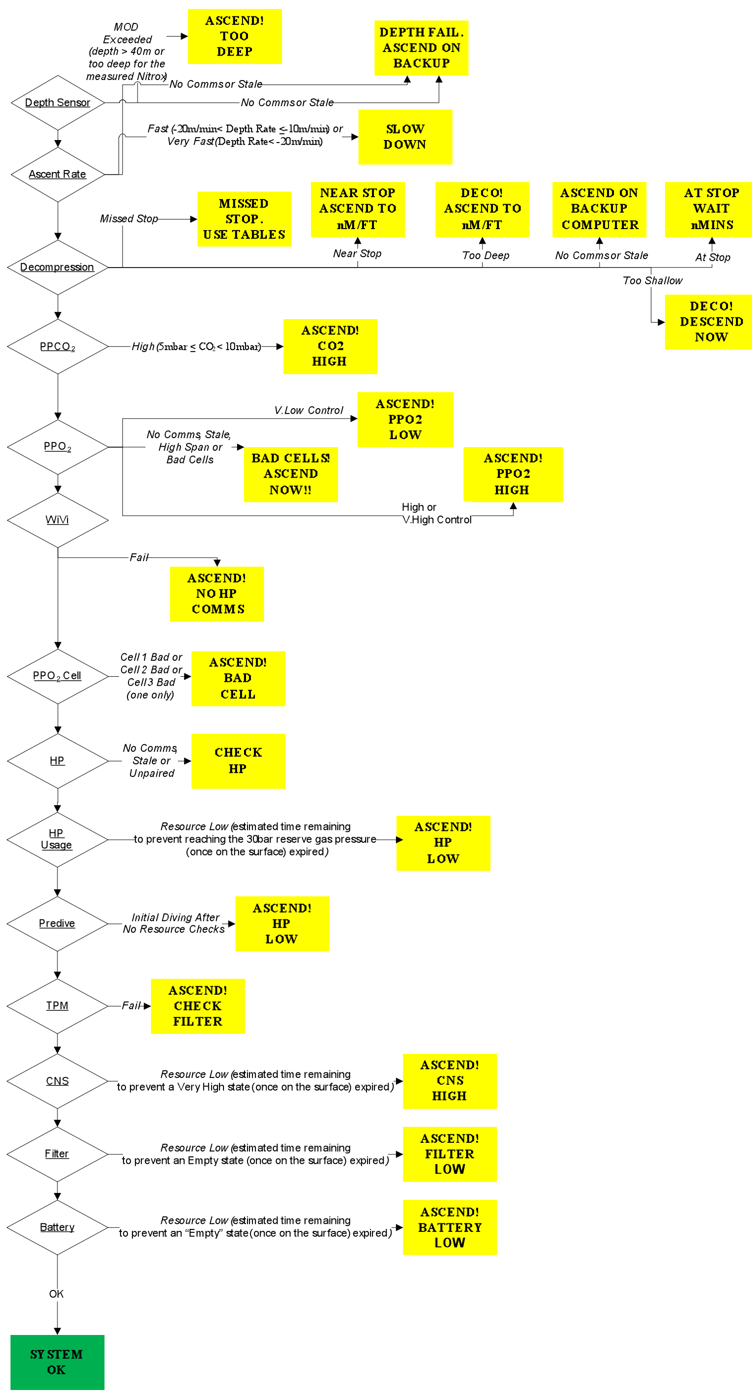
Too Deep — Deeper than 0.3 bar (9.9 ft / 3 m) of the next stop.

IN WATER HUD/BUD ALARMS

Red (OC Bailout) Alarms



Blue/Green Alarms



PO_2 "Bad Cell" States Are As Follows:

- Cell input timed-out
- Cell input stale
- Calibrated sensor input > 3.00 bar
- Calibrated sensor input < 0.15 bar
- Raw sensor input < 7 mV
- Cell input excluded having failed calibration
- Calibrated cell input > 0.2 bar from the other two cells (only a single cell can be in this state)

PO_2 "Ascend" Alarm States Are:

<u>High Span</u>
PO_2 cell span > 0.5 bar (if 2 or 3 cells in state “OK”)

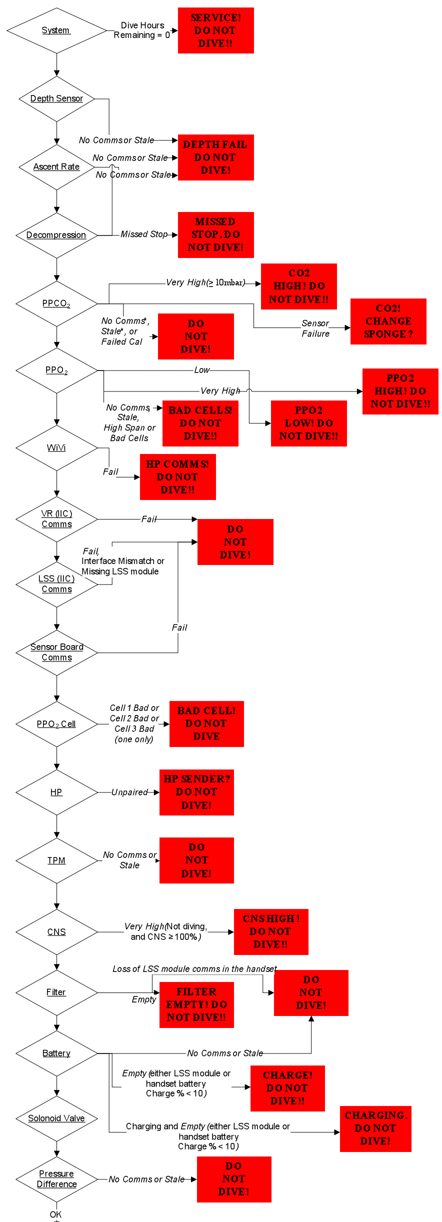
<u>Bad Cells</u>
1 cell in state “OK” or; no cells in state “OK” but with different high/low alarm states or the same alarm states and no O/C bailout case

<u>V. Low Control</u>
If 2 or 3 cells in state “OK”, and PO_2 < -0.20 bar

<u>V. High Control</u>
If 2 or 3 cells in state “OK”, and $PO_2 \geq 0.70$bar where; $PO_2 = PO_2$ – set-point, i.e., the difference between the average PO2 and the setpoint. The average PO_2 is based on the calibrated value from all cells in alarm state “OK”.

SURFACE HUD/BUD ALARMS

Red (Do Not Dive) Alarms



PO_2 "Bad Cell" States:

- Cell input timed-out
- Cell input stale
- Calibrated sensor input > 3.00 bar
- Calibrated sensor input < 0.15 bar
- Raw sensor input < 7 mV
- Cell input excluded having failed calibration
- Calibrated cell input > 0.2 bar from the other two cells (only a single cell can be in this state)

PO_2 "Do Not Dive" alarm states are:

<u>No Comms</u>
All PO_2 cell alarms are “No Comms”

<u>Stale</u>
Any PO_2 cell alarm is “Stale”

<u>High Span</u>
PO_2 cell span > 0.5 bar (if 0*, 2 or 3 cells in state “OK”)

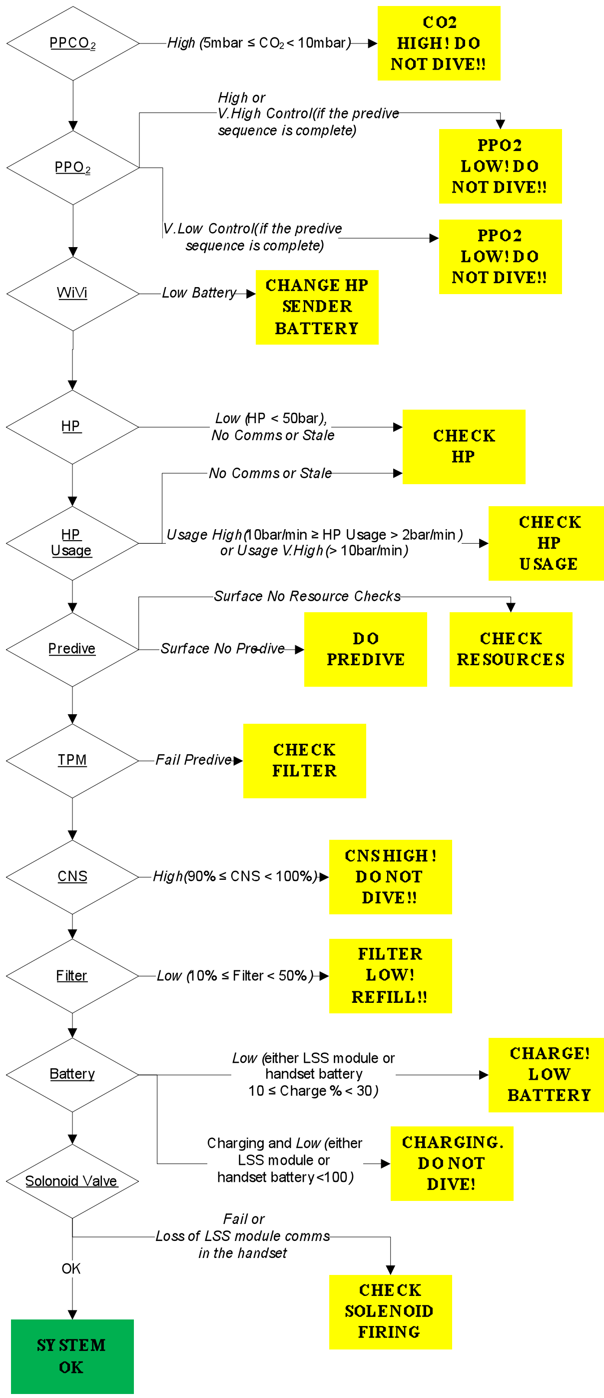
<u>Bad Cells</u>
None or 1 cell in state “OK”

<u>Very High</u>
If 0*, 2 or 3 cells in state “OK” and average $PO_2 \geq 2.0$ bar

<u>Low</u>
If 0*, 2 or 3 cells in state “OK” and average $PO_2 < 0.17$ bar
where; $PO_2 = PO_2$ – setpoint, i.e., the difference between the average PO_2 and the setpoint. The average PO_2 is based on the calibrated value from all cells in alarm state “OK”.

** Zero cells “OK” with the same high/low alarm state, in which case all three are used in the average.*

Blue/Green Alarms



PO_2 Blue/Green 'Do Not Dive' alarm states are:

<u>High</u>
If 2 or 3 cells in state "OK" and average $PO_2 \geq 1.6$ bar

<u>V. High Control</u>
If 2 or 3 cells in state "OK", and provide complete, and $PO_2 \geq 0.70$ bar

<u>V. Low Control</u>
If 2 or 3 cells in state "OK", and predive complete, and $PO_2 < -0.20$ bar where; $PO_2 = PO_2$ – setpoint, i.e., the difference between the average PO_2 and the setpoint. The average PO_2 is based on the calibrated value from all cells in alarm state "OK".

PRIMARY ELECTRONIC BAILOUT SCENARIO CHART*

Failure mode	Loop	HUD status	Solenoid fire	Wrist display	Mandatory Action	Deco will follow
None	Usable loop	Green	Y	System OK	None. Stay on EXPLORER	Onboard, 3 sensor driven PO_2
Bad sensor	Usable loop	Blue/ Green	Y – Fail-safe mode	STATUS screen action panel will show ASCEND NOW.	Stay on EXPLORER and ascend	Air
Bad sensor readings (error greater than 0.5 PO_2).	Usable loop	Blue/ Green	Y – Fail-safe mode	STATUS screen action panel will show ASCEND NOW. PO_2 panel will be in Magenta (No Comms)	Stay on EXPLORER and ascend	Air
PO_2 exceeds safe limits or multiple sensor errors	Usable loop	Red	Y dependant on DCP/PO_2	BAILOUT	Ascend on open circuit	Air
Wireless HP data loss	Usable loop	Blue/ Green	Y	STATUS screen action panel will show ASCEND NOW. HP panel will be in Magenta (No Comms)	Stay on EXPLORER and ascend	Onboard, 3 sensor driven PO_2
High CO_2 (>5 mbar)	Usable loop	Blue/ Green	Y	STATUS screen action panel will show ASCEND NOW.	Stay on EXPLORER and ascend	Onboard, 3 sensor driven PO_2
Very High CO_2 (>10 mbar)	Unusable loop	Red	Y dependant on DCP/PO_2	BAILOUT	Ascend on open circuit	Air

** (see Alarm Tables for lower priority alarms)*

GAS RESERVES

DYNAMIC RESERVE

The EXPLORER monitors the high pressure (HP) contents of the onboard gas supplies.

The EXPLORER includes two warning system for the HP contents.

1. Pressure below reserve level.

2. Rate of use of gas is too high or too low indicating either a leak or that the HP cylinder valve is turned off and gas injection is being unsuccessfully attempted.

The gas supply reserve level is dynamically adjusted based on depth (because ascent times vary with depth) and assumes a stressed breathing rate of 20 l/min on open circuit bailout using the onboard cylinder. If the system sees this reserve limit approaching, it will warn the diver to ascend.

BAILOUT TO OPEN CIRCUIT

Should the operation of the EXPLORER generate an emergency alarm (red HUD LED and vibrating HUD) then the diver must bailout to open circuit on either the in-board supply (above 18 m/60 ft) or the off-board supply (below 18 m/60 ft).

! **NOTE: Decompression calculations for the ascent profile will assume air as a breathing gas to provide additional safety during a bailout ascent.**

MOD (MAXIMUM OPERATING DEPTH)

The EXPLORER will warn on the main display if the maximum operating depth of the unit is exceeded. This MOD is based on three things:

1. A maximum depth of 40 m/130 ft.

2. A maximum depth such that the gas attached to the unit (as measured) cannot result in a PO_2 exceeding 1.6 bar.

3. When a maximum PO_2 of 1.6 bar is reached.

The EXPLORER will not freeze the user out of operation if these depths are exceeded. However, the system and diver are operating beyond the normal recommended conditions and therefore these limits should never be routinely exceeded.

! **WARNING: Exceeding these limits is not condoned by the manufacturer and is not a safe diving practice and must be avoided. If an MOD alarm is seen then you should ascend immediately to a depth where the alarm is not displayed. This depth reduction should be at least 6 m/20 ft but could be more if the MOD has been exceeded by a large amount.**

DIVING AT ALTITUDE

WARNING: Diving at high altitude requires special knowledge of the variations imposed upon divers, their activities, and their equipment by the decrease in atmospheric pressures. Hollis recommends completion of a specialized Altitude training course by a recognized training agency prior to diving in high altitude lakes or rivers.

The Explorer is fitted with a digital depth sensor. For it to accurately gauge altitude and preceding dive depths, the Explorer must be turned on prior to diving. This is the normal process as a predive must be conducted. It becomes especially important if you have transported the Explorer to a change in surface altitude.

LOW PO_2 SAFETY TURN ON & INJECTION

The Explorer has a safety feature that will cause an activation and attempted nitrox injection to raise the PO_2 in the breathing loop if the LSS detects a drop of PO_2 to a level of 0.17 or below. This is an attempt by the system to prevent a hypoxic condition in the breathing loop.

It is important to understand and remember from your training that with an increase in altitude (decrease in ambient pressure) the PO_2 of ambient air will drop. Regardless, of a constant FO_2 of 0.21 the PO_2, what the oxygen sensors measure, may drop to or below 0.17. This would occur above 5,000 ft/1,524 m of altitude.

To avoid accidental activation during transport, either remove the oxygen sensors or add sufficient nitrox to the loop. Upon reaching altitude reinstall the sensors and check the calibration as a part of the normal predive sequence.

For clarity, the Explorer can be oxygen calibrated in air at any altitude. To register the correct dive depths at any altitude the Explorer must be turned on at the intended dive site altitude to establish a correct surface pressure reading.

DECOMPRESSION CONTINGENCY

The EXPLORER is designed for recreational diving without decompression. All dives however require safety decompression stops to be conducted (consult your training agency for information).

If you accidentally stray into decompression the system will generate a green/blue HUD alarm, the decompression stop, and stop time will be displayed on the STATUS screen. This feature is designed for contingency purposes only.

! **DANGER: The EXPLORER is not designed for use with gases other than Nitrox.**

! **WARNING: Decompression diving significantly increases the risk of decompression illness.**

Various alarms will be generated if elements of decompression are violated. Please see the Deco States Table below and the EXPLORER flow charts for further detail.

DECO STATES

State	Reason	HUD Color Code	Status Screen Display
Missed Stop	Missed deco stop	Blue/Green	MISSED STOP! USE TABLES
Too Shallow	Deco Ceiling violated for < 1 min	Blue/Green	DECO! DESCEND NOW
At Stop	Within 1 m/3.3 ft below the next stop	Blue/Green	AT STOP WAIT x MINS
Near Stop	Within 3 m/10 ft of the next stop	Blue/Green	NEAR STOP ASCEND TO x M (FT)
Too Deep	>3 m/10 ft below ceiling	Blue/Green	DECO! ASCEND TO x M (FT)

! **NOTE: When you have decompression stops to complete (or if any alarm is showing) the STATUS display will remain on (and not automatically time out).**

INTERNET REPROGRAMMING

The EXPLORER can be automatically reprogrammed and upgraded with new software downloads from the Internet. The PC Link option enables use of this feature. Contact the manufacturer web site or your dealer for more information.

To check if you're EXPLORER has any available updates and to obtain the reprogramming software, go to http://hollis.com/support.asp.

! **DANGER: After new software is installed you MUST recalibrate the oxygen and CO_2 sensors.**

GETTING READY TO DIVE

GEAR PREP

WEIGHTING

As the counterlungs inflate, the diver may experience movement in the EXPLORER. This is minimized by tightening the harness or adding trim weights to the pocket available on the top of the case. A weight of up to 2-3 kg/4.4-6.6lbs can be used.

If the EXPLORER is allowed to move on the diver's back, a change in breathing resistance may be noted. With the Explorer's back mounted counterlungs it is important that the Explorer is as close to the diver's back as possible.

Your instructor will teach you how to weight yourself correctly.

! **WARNING: Over-weighting is dangerous. With an empty BCD, no additional bailout cylinder and 50 bar/735 PSI in the main cylinder you should be able to begin slowly to submerge in a controlled fashion by exhaling slightly (too much exhalation and the ADV will add gas upon the next inhalation).**

! **WARNING: It is important to perform weight checks in confined shallow water with at least 50 bar/735 psi bailout gas prior to any open water diving.**

HARNESS/BCD POSITIONING

When adjusting the harness try and imagine that the center of the counter-lungs should be within ± 100 mm/4 inches of the tip of your sternum to give an optimum breathing performance. While the BCD/harness must be comfortable it should not be loose. The harness will sit differently on land compared to when you are in the water.

OCTOPUS, BAILOUT, & CYLINDER CONFIGURATIONS

Exact gas requirements for any type of diving are a matter of personal choice; they are predicted by specific level of EXPLORER certification and training agency.

! **DANGER: It is vital that a breathable open circuit bailout is carried at all times for all depths of the dive, of sufficient volume to allow for a safe ascent to the surface at a stressed breathing rate.**

! DANGER: For deep/long duration dives the onboard gas supply should only be treated as a short-term gas supply, used for a limited period until the off-board bailout gas can be accessed.

! WARNING: In depths shallower than 18 m/60 ft you must be able to provide gas to another diver (buddy). This will require the use of an additional second stage octo attached to your EXPLORER first stage if you are not carrying an external bailout cylinder.

! NOTE: Certain training agencies may required additional gas supplies for diving in 'mixed teams' (open circuit/closed circuit). Please check with your agency for details.

! NOTE: The BOV is connected to the onboard gas supply. Dives shallower than 18 m/60 ft dives can be conducted using only this available gas as a bailout providing that the gas endurance alarms are not exceeded on the unit.

! NOTE: Certain training agencies may required additional gas supplies for diving in 'mixed teams' (open circuit/closed circuit). Please check with your agency for details.

The following is offered as a guide when configuring the EXPLORER for a range of diving conditions. This must be used in conjunction with the recommendations from your Hollis approved training agency.

Depth	Onboard Gas	Off-board Gas
Less than 18m/60ft	5l @ 200 bar/2940 psi (1000 l/40 cuft). Nitrox 32 to 40%	Not required
>19m/63ft to 40m/130ft	5l @ 200 bar/2940 psi (1000 l/40 cuft). Nitrox 32 to 40%	Air or nitrox up to 40% (appropriate mix for depth) of sufficient volume for an ascent from depth with a 150 l/5.3 cuft reserve at the surface after an open circuit ascent.

Bailout gas volumes should be calculated based on the depth of the dive and the ascent gas requirements. Cylinders can be positioned on D-ring attachment points on the harness or optional EXPLORER BCD.

Your Instructor and Training Agency will detail how to calculate for sufficient bailout gas volumes.

COUNTERLUNG VOLUME

The volume of gas in the counterlungs will affect the 'breathing feel' of the unit. Too little gas will make inhaling difficult and too much will make exhaling difficult. All retreathers have optimal positions in the water where they have a better or worse breathing feel due the hydrostatic effects of the counterlung position and the breathable volume within the counterlungs.

It is important to balance the volume in the breathing loop so that excessive inhale or exhale pressure is not experienced.

Under certain situations the EXPLORER will vent during the exhaled breath. This will result in a drop in oxygen levels and more gas addition by the system.

It is possible to balance the loop to an extent by venting a small amount through your nose, particularly on ascents if the need arises.

ADJUSTING THE BREATHING 'FEEL'

The breathing 'feel' of EXPLORER is partially controlled by the LCV. Having removed the case cover this can be seen underneath the Canister. This is an adjustable valve (over a small range). Oriented as shown, moving the valve left *(Fig. 4.1, –)* decreases loop volume (vents more), and moving the valve right *(Fig. 4.1, +)* increases loop volume (vents less).

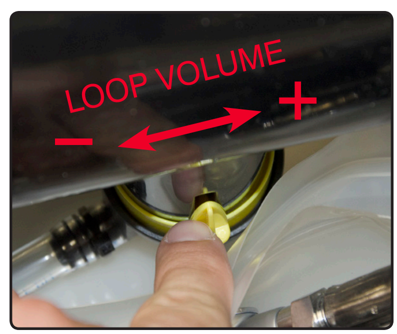


Fig. 4.1

The LCV is a hydrostatically balanced valve, this means that in any swim position it releases gas from counterlungs at approximately the same pressure and rate. In addition it is a water drain device and it is connected to the exhale counterlung via a water drain tube such that as water enters the counterlung (condensed exhaled breath) then it moves through the tube and out of the LCV regularly throughout the dive.

THE AUTOMATIC DILUENT VALVE

The EXPLORER also has an automatic diluent addition valve (ADV), which compensates for loss of gas volume. To activate the ADV either descend or exhale through your nose and breathe in. The ADV is designed to help maintain a breathable lung volume in conjunction with the LCV.

The ADV on the Explorer is a simple tilt lever system that in the relaxed position (no gas applied) will remain open. It seals when gas is applied.

If moisture is present in the system and extreme freezing temperatures are experienced that are able to form ice within the rebreather this valve could freeze in the open position. Freezing of ADV's is a common failure mode in most rebreathers. The EXPLORER design assumes this and provides an additional link to the Pre-dive alarm sequence to warn of such a failure.

If the valve is frozen open then gas will freely flow into the circuit. This will give a 'HIGH HP' usage alarm and the unit will fail its Pre-dive sequence. This is the correct failure mode for this device.

If the system had been pressurized and then it froze and hence the valve failed closed, again pre-dive will fail momentarily until counterlung collapse removes the icing as the lever activates, then pre-dive will pass unless there is a leak due to icing then the pre-dive will again fail (high gas flow alarm).

The Explorer warning system was developed with the recognition that it is common for rebreathers to contain moist gas which can lead to icing in cold environments. The EXPLORER is the first rebreather that fully informs a diver if an ADV failure occurs from and "iced closed" or "iced open" situation.

FILLING THE GAS SUPPLY CYLINDERS

The nitrox cylinder has a maximum fill pressure. This is stamped on the cylinder and must be checked before filling. Refer to regional limitations for maximum fill pressures. Install the nitrox cylinder into the case and tighten the cam band. Now install the regulator DIN connection. Ensure the LP hose is routed through the molded hose retainers in the case back. Otherwise, the LP hose will obstruct closure of the case.

! **DANGER: Although the EXPLORER will analyze its own gas supply it is still important that you always analyze your gas prior to use.**

! **WARNING: If you suspect that the cylinders have become contaminated with salt, water or other contaminants then you must get the cylinder inspected and cleaned as appropriate.**

GAS ENDURANCE

Gas endurance is defined by the Dive Control Parameter (DCP) setting.

For example, a 5 liter cylinder pressurized to 200 bar/2940 psi and assuming a usable gas pressure of the working pressure (minus the regulator interstate pressure of 11 bar/161 psi) this equates to 189 bar/2779 psi available.

Assuming a DCP setting of 50% and a worst case FO_2 of 32%. The EXPLORER gas supply will last a maximum of 189 minutes based on normal swimming work rates.

At extremely high ventilation rates (75 l/min), which is sustainable by a fit Navy diver for only a matter of minutes, the maximum gas endurance could reduce to as low as 57 minutes.

The EXPLORER will continuously update gas minutes remaining throughout the dive for any DCP setting and work rate.

! **DANGER: High pressure gas cylinders (especially nitrox cylinders) must have their cylinder valves opened slowly to avoid risk of injury.**

This duration is also dependent on how much loop venting, mask clearing, BCD/drysuit inflation occurs.

! **NOTE: In Europe, cylinder valves for use with the EXPLORER must be certified in accordance with EN12021.**

CO_2 ABSORBENT SCRUBBER PACK

THE ABSORBENT SCRUBBER PACK

The unit has been tested under CE requirements for CO_2 absorbent scrubber duration. The weight of absorbent in the scrubber pack is approximately 1.5kg/3.3lbs.

! **WARNING: At the time of this writing all figures were tested using the user packed version of the scrubber canister.**

CANISTER DURATION

At 40m/130ft of depth, with Nitrox 32% as a diluent at 4 °C/39 °F water temperature with a CO_2 injection rate of 1.6 l/min and a ventilation (breathing rate) of 40 l/min and a 1.5 kg/3.3 lbs absorbent load of a Hollis Approved absorbent (See PART 8 Section 1), the unit will last 40 minutes at 40 m/130 ft as an extreme test (Ref EN14143: 2003).

This duration changes significantly with higher temperatures and lower work rates

continued

Below is a table of endurance versus depth and changing workloads with temperature.

MINUTES TO 5 MBAR CO_2 REFERENCE

Depth	Total dive time	Ventilation rate	Work rate	Water temp
40 m/130 ft	37 mins	40 l/min	Hard swimming	4° C/39° F
40 m/130 ft	120 minutes +reserve capacity	22.5 l/min	Normal swimming	15° C/59° F
40 m/130 ft	88 mins	40 l/min	Hard swimming	15° C/59° F

! DANGER: Ventilation rates up to 40 l/min are referenced as "Normal swimming" and rates of 40 l/min and above are referenced as 'Hard swimming'. Under strenuous conditions however consumption rates may be significantly higher. Regardless of conditions or readings on the computer, the scrubber should NEVER be used for more than 2 hours.

! WARNING: These tests were conducted using Hollis approved absorbent, and durations can only be duplicated using such. DO NOT use any other type of absorbent with the EXPLORER. Safety data on absorbent products can be found at their respective brand websites.

Tests conclude that depth (gas density), temperature, and CO_2 generation all massively affect absorbent duration. The EXPLORER employs a highly efficient axial canister design which not only offers greatly extended durations when compared to other designs employing a similar absorbent load, but it is less affected by the commonly experienced high loss of efficiency associated with increased depth.

HANDLING ABSORBENT

! WARNING: CO_2 absorbent may cause burns to eyes and skin.

First aid treatment is as follows:

• Inhalation. Remove from exposure. Seek medical attention.
• Skin Contact. Drench with clean water and seek medical attention if skin becomes inflamed.
• Eyes. Irrigate thoroughly with clean water. Seek medical attention.
• Ingestion. Wash out mouth thoroughly with clean water. Seek medical attention.

See the brand respective safety data sheets for further safety information.

! WARNING: Always fill scrubber packs in a well-ventilated environment. Avoid contact with eyes and skin.

FILLING STEPS – STANDARD VERSION

! WARNING: Filling a scrubber improperly could lead to a hypercapnia incident.

1. Remove the Scrubber Pack from the Canister. Inspect the quad ring for cleanliness/damage and clean/replace with a small amount of lubricant *(Fig. 4.2)*.
2. Unscrew the yellow top nut and canister lid and inspect the canister and lid mesh for damage.
3. Remove any excess absorbent stains from the canister components with warm, soapy water and then rinse in fresh water. Then allow it to dry.
4. Place the Dust Filter inside at the base of the scrubber canister *(Fig. 4.3)*. It should lay smoothly against the metal screen bottom with the tabs along the radial edge folded upwards. Ensure that the tabs lay smoothly against the inner walls of the scrubber canister.
5. Fill the canister in a well-ventilated environment. Raise the absorbent barrel at least 200mm (8 inches) above the canister to allow dust to blow away as you fill. Fill to the top of the canister, making sure absorbent is at an even depth across the canister.
6. Pack the absorbent by tapping the sides for at least 1 minute.
7. Fill to the top again.
8. Pack the absorbent by tapping the sides for at least 1 minute

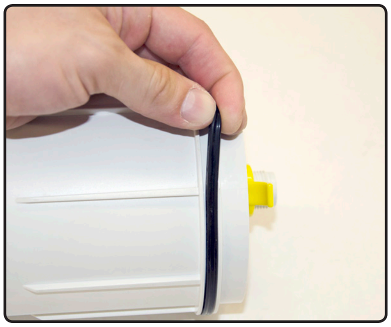


Fig. 4.2

Fig. 4.3

9. Refill with Absorbent to the top. Tap down as required until you can fit the lid. Refit the lid and the spring (under the yellow nut).
10. Screw down the top nut.
11. Wipe any dust from inside the canister.
12. Look into the Canister head and run your finger around the sealing face for the quad-ring removing any debris.
13. Insert the filled Scrubber Pack into the Canister.
14. Refit the Right Hand end cap.
15. Dispose of old absorbent as normal household waste. Do not leave it lying around for animals to ingest.

CO_2 ABSORBENT STORAGE

! DANGER: Once a CO_2 Scrubber has been packed it should remain so. Do not attempt to remove absorbent from a partly used scrubber and dry it, refurbish or re-pack the absorbent in any way.

The scrubber should always be kept sealed until required for use. With scrubber installed and not being used, the EXPLORER should have its breathing loop closed. This is so that external air does not accelerate the degradation of the scrubber. Additionally, the scrubber will continue to degrade and change its characteristics post-dive if it has been activated/used at all.

! WARNING: Once installed, the scrubber should always be changed within 24 hours. Even if it has not been fully used through breathing.

PRE-DIVE SETUP

Having assembled and tested the unit upon receipt, it is still critical that all pre-dive tests are conducted prior to diving.

The EXPLORER is equipped with a set of pre-dive checks that are built into the electronics prompting the diver to test certain aspects of the unit prior to diving. Additionally, there are several manual tasks that should be completed prior to this final system check. These checks automatically start once you turn the unit on. A complete flow chart of all the screen layouts can be found on the enclosed CD and in the rear of this manual.

TURN ON SYSTEMS

The EXPLORER can be fully activated in three separate ways:
1. By button push
2. By breathing (breath detection as a low PO_2 of 0.17 is reached)
3. At depth (>1.15 bar absolute pressure or about 5 ft/1.5 m)

! **DANGER: The batteries must be charged for the automatic systems to work. If the batteries are not charged the unit will not turn on and not support life.**

To turn on EXPLORER simply press both buttons on the handset and hold for 3 seconds. The system will boot up and perform internal checks. This will take about 30 seconds. Then the Hollis splash screen will appear followed by the training acknowledgement screen *(Fig. 4.4)*.

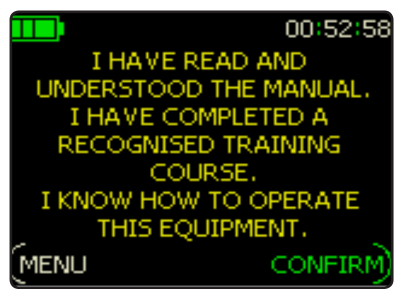


Fig. 4.4

! **DANGER: It important that you have read this manual and are properly trained in order to complete the Pre-dive sequence and dive EXPLORER safely. If you have not undertaken these steps yet, do not proceed any farther.**

By selecting CONFIRM the Pre-dive sequence starts and you will be prompted through the sequence.

PRE-DIVE CHECKS PURPOSE

These tests are designed to:
1. Check that all functions of the EXPLORER have a high likelihood of operating correctly.
2. Detect assembly errors.
3. Detect breathing loop errors.

4. Advise the user of system measurements that are outside correct operating parameters including:

a. High Pressure readings too low
b. High Pressure readings dropping too quickly – possible leaks
c. Battery Levels
d. PO_2 in the breathing loop out of expected range.
e. Calibration of PO_2/CO_2 sensors not performed correctly
f. CO_2 absorbent is not functioning correctly, or sealed correctly.

THE COMPLETE (PASS MODE) PRE-DIVE SEQUENCE

The complete sequence is detailed on the following page. This sequence assumes The unit has been powered on for 30 seconds, all tests pass OK, and no Pre-dive has been conducted within two hours. An APP for any Android device is available at http://hollis.com/support.asp.


00:52:58
I HAVE READ AND UNDERSTOOD THE MANUAL. I HAVE COMPLETED A RECOGNISED TRAINING COURSE. I KNOW HOW TO OPERATE THIS EQUIPMENT.
MENU
CONFIRM
PLEASE WAIT PERFORMING SYSTEM CHECKS
O2
GAS ?
MANUAL CO2 SENSOR OR O2 CELL CALIBRATION?
O2
CO2
NO
CHECK RUBBER MOUTHPIECE AND MUSHROOM VALVES
NOT OK!
OK
CONNECT HOSES, CLOSE HP CYLINDER VALVE AND OPEN MOUTHPIECE
ABORT
CONFIRM
FILL LOOP, THEN EVACUATE LOOP AND CLOSE MOUTHPIECE
ABORT
CONFIRM
PLEASE WAIT 28s
NEGATIVE TESTING LOOP
ABORT
ENSURE MOUTHPIECE CLOSED. OPEN HP CYLINDER VALVE.
ABORT
CONFIRM
PLEASE WAIT 34s
PRESSURISING LOOP
ABORT
NX 36
OPEN MOUTHPIECE
ABORT
CONFIRM
NX 40
EVACUATE LOOP TO TEST ADV
ABORT
OK
NX 40
BLOCK NOSE AND BREATHE ME FOR 49 SECONDS
ABORT
NX 36
BREATHING LOOP CHECKED OK
ABORT
CONFIRM
NX 40
NEW CO2 FILTER FITTED?
104°
66°
YES
NO
NX 36
CHECK BAILOUT AND BCD
OK

At the end of a successful Pre-dive sequence you will see the check resources screen *(Fig. 4.5)*.

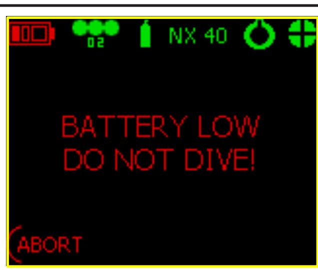
At this point you should cycle through the screens by pressing the left or right button to check that all resources are adequate to complete the dive. After a few seconds the display will time-out to the Dive screen *(Fig. 4.6)*.

Fig. 4.5

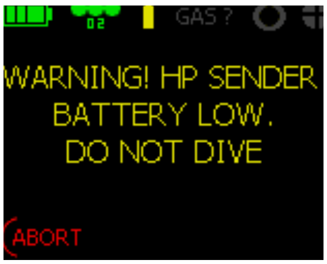
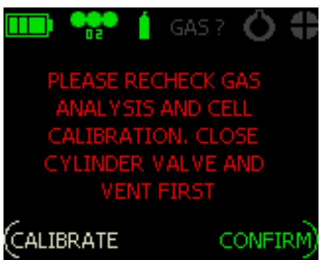
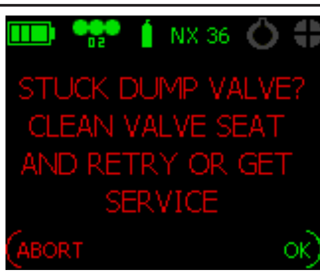
Fig. 4.6

PRE-DIVE PRIMARY ERROR MESSAGES

The following are possible error messages that may occur during the Pre-Dive Sequence and their meanings.

Message	Meaning
	batteries at 10% - 30% power Pre-dive and dive not permitted until charged.
	batteries at less than 10% power Pre-dive and dive not permitted until charged.
	CO_2 sensor is unable to calibrate and must be replaced or removed (the 5 minute pre-breathe system will be activated).
	O_2 sensor(s) unable to calibrate and must be replaced and/or their connectors cleaned.

Message	Meaning
	O_2 sensor(s) unable to calibrate or failed LSS/Sensor Module. Recharge unit and try again. Return to dealer if problem persists.
	Negative test failed. Ensure Cylinder is attached. Ensure Mouthpiece is fully in OC mode. Fill loop until vent valves exhausts then attempt negative test again.
	Low HP gas in dive cylinder.
	If HP reduces by >50bar/735 psi or does not reduce by at least 5bar/73.5 psi. Make sure cylinder valve is fully open. Check cylinder size is correct in DEFAULT GAS Menu. Do not use unlisted cylinders. Submerge unit and look for LP/HP leaks, BC inflator failures etc.

Message	Meaning
	Wireless HP sender battery is low.
	Analyzed gas is not what is expected by the DEFAULT GAS setting. Analyze gas and check setting.
	The LCV and OPV are not venting at the correct pressure. Flush valves with fresh water and repeat test. If the problem persists return the unit to your dealer.
	You have stopped breathing while conducting a pre-breathe sequence. Repeat the test. If the error persists return the unit to your dealer.
	If the Predive sequence is completed, the STATUS window is active, and you see the above alarm, then HP usage is greater than 1bar/min – 14.7 psi/min. This could indicate a leak in the HP or LP circuit (internal pipework), BC or BOV. Submerge to locate the leak.

EMERGENCY START-UP SYSTEM (ESS)

Should you have no option other than to enter the water immediately, EXPLORER will activate the display and show all pertinent alarms in the STATUS screen. It is vital that you correct anything in error immediately before continuing to dive.

If you enter the water without completing the relevant Pre-dive checks and ESS mode is activated, you will be given an O/C bailout alarm (red HUD) warning you to return to the surface immediately to complete the Pre-dive checks. After 1 minute underwater (if nothing else is alarming) the bailout alarm will stop.

! DANGER: The ESS should never be used as a routine diving start-up system. A full Pre-dive check MUST always be conducted to ensure safe operation. The ESS is designed ONLY as a safe guard. If you have not completed pre-dive checks, abort the dive and perform a proper pre-dive on the surface.

TURNING OFF

The EXPLORER cannot inadvertently turn off while submerged. Although while at the surface, if no button pushes are detected within 15 minutes it will automatically turn off to save power *(Fig. 4.7)*.

To manually turn off EXPLORER then select the Menu option and do a long press of the left button - OFF *(Fig. 4.8)*.

LESS THAN 2 HOUR PRE-DIVE SEQUENCE

If you have completed a sucessful Pre-dive Sequence within the last 2 hours, then upon reactivating the unit (assuming there is nothing wrong with the system) it will display the Hollis splash screen followed by two screens *(Fig. 4.9, 4.10).* It will then allow you to choose DIVE or PREDIVE (repeat the Pre-dive Sequence from the beginning).

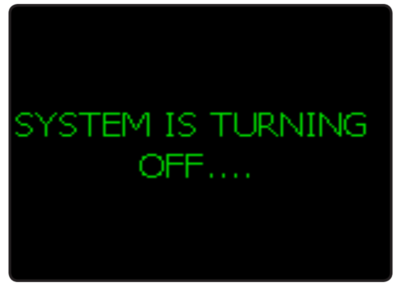


Fig. 4.7

Fig. 4.8

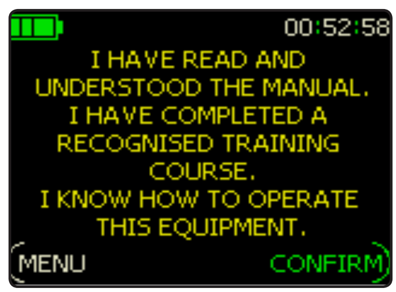


Fig. 4.9

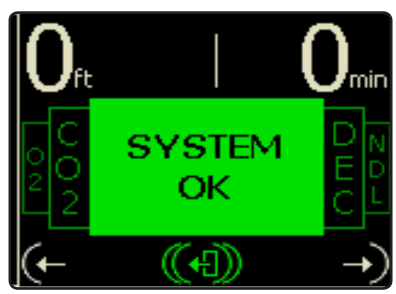


Fig. 4.10

POST DIVE
DAILY MAINTENANCE

POST DIVE

During a diving sequence, it is important that a small amount of daily maintenance is undertaken. These fall into 5 categories:

1. Care of oxygen and CO_2 sensors
2. Loop cleaning
3. Recharging
4. Cylinder filling
5. Absorbent changing
6. BCD

CARE OF OXYGEN AND CO_2 SENSORS

The Sensor Module (SM) is easily removed from the unit by removing the Life Support System Module (LSS) and pulling the SM out. The SM carries the three oxygen sensors and the CO_2 sensor.

Post dive the CO_2 filter (yellow cap) sponge should be replaced as detailed.

At the end of a days' diving the complete SM should be removed (and the LSS cap refitted) and kept in a dry (low humidity) and ambient temperature environment. The CO_2 filter cap should be removed for the non-diving period.

SANITIZING

After a dive the Explorer breathing loop needs to be sanitized. The recommended sanitizer for the Explorer is Steramine™. This sanitizer is available through your Hollis dealer.

Please see www.Steramine.com for Safety and Handling Instructions.

Basic sanitizing can be conducted by making up a solution in the correct quantities and soaking or wiping the part with the solution.

! **WARNING: The use of any other sanitizing agent may damage the component parts of the rebreather, in particular the mushroom valves.**

Items to be sanitized are:

- The BOV and hoses
- The counterlungs
- The canister tube and all its internal components

WARNING: You MUST make sure you read the Material Safety Data information before using.

The hoses should be removed and Steramine™ solution should be flushed through the complete assembly and allowed to drain out. To remove excess solution, push the hose corrugations together (like using a concertina) to squeeze the water out.

RECHARGING

Please see "Batteries" PART 2 Section 1.

ABSORBENT DISPOSAL

Absorbent must be changed in accordance with the PART 4 Section 2 of this manual.

BCD

Drain any water from the BCD. Re-inflate, operate dump valves, and the inflator to confirm everything is OK.

MANDATORY DIVING SKILLS
EXPLORER BASICS

The primary diving skills required to use the EXPLORER will be covered in your chosen agency's training program and will not be reviewed here. However, there are certain unit-specific skills, which must be covered during your training course. These are detailed below.

LEAK TESTING

See PART 4 Section 1.

CALIBRATION

See PART 3 Section 12.

HARNESS ADJUSTMENT

See the Hollis Buoyancy Guide (doc. 12-4012).

BUOYANCY CONTROL AND TRIM

Initially, in shallow confined water you will be required to maintain a hovering simulated decompression stop. You will then practice short ascents/ descents initially ascents will be made from progressively deeper depths and will involve the use of a surface marker buoy.

OPEN CIRCUIT BAILOUT

On every dive you will practice switching to the BOV and/or bailout stage bottle. On some dives you may be required to conduct additional bailouts possibly back to the surface as defined by your instructor.

OPEN PREPARING THE UNIT FOR DIVING AND MAINTENANCE/ CLEANING

You will be shown how to assemble the unit and complete the pre-dive check sequence. In addition you will be shown how to care for your unit post-dive.

REMOVING WATER FROM THE LOOP

Condensate will naturally collect in the exhale hose on the diver’s right. This will be accompanied by a ‘gurgling’ noise.

Water is allowed to then move into the top of the exhale counterlung. This is acceptable for the following reasons:

1. Water entering the counterlung is forced out again by through LCV system.
2. A small amount of water will not affect the CO_2 absorbent performance.

To move water out of the loop via the LCV system: Close the mouthpiece*. Then put the breathing hoses above your head and shake the hose, squeezing the exhale hose like an accordion will move water down the hose quickly.

Now return to the loop and keep breathing normally. If water continues to enter the loop, abort the dive and solve the issue out of the water. You may then submerge the unit in a tub of water, with the unit pressurized and the loop closed, to locate the leak. A common leak point might be a BOV that is not fully open or closed or a rubber mouthpiece on the BOV.

BAILOUT AND ASCENTS

Open circuit bailouts become necessary if a loop is unbreathable (high CO_2 or low/high PO_2) or flooded. In the unbreathable scenario the loop will need to vent during the ascent. This is done automatically by the OPV and the LCV combined.

! **WARNING: Ascents must be practiced on the training course while on open circuit and with a loop full of gas. Venting will occur naturally if the diver is weighted correctly.**

! **WARNING: A flooded loop will result in 5 kg/42 Newtons (11 lbs) of buoyancy loss. If a diver is over-weighted, they may not be able to overcome this negative buoyancy in an emergency. Proper weighting is important.**

IN-WATER SKILLS

In-water skills are a vital element of dive training. It is important, especially when teaching complex skills or equipment, that training is progressive. Non-progressive training only serves to scare and confuse students and at best reduce the learning experience to a series of 'hoops' that should be jumped through. This is not the goal at all; the desire to learn should

** Follow all local standards and training agency guidelines regarding available breathing sources while executing this skill.*

be nurtured by making the experience as informative, fun, and as exciting as possible. Only then will the subject matter and key survival skills be remembered.

As in all training, while certain skills must be mastered first before the student can progress safely to the next level, there are always issues that affect the training sequence. These can include:

1. Environment
2. Support logistics
3. The students ability to learn

Your instructor will sequence skills according to standards of the agency you will be certified through. Though all agencies will complete the same list found in the "In-Water Skills Chart" section of this chapter, additional skills may vary by agency.

DIVING SAFETY GUIDELINES

The instructor should confirm all valves are open before making dives.

All divers must enter the water with enough gas in their BC to allow the diver to safely float on the surface.

The Pre-Dive sequence must not be done sitting on the edge of a boat or pontoon. It **MUST** be done, when prompted, with the nose blocked, seated in a safe location*, and in a way they can easily read their displays.

Divers should carry a minimum 3 liter of bailout gas for dives deeper than 18 m/60 ft.

Safety decompression stops should be conducted on all dives.

** Safe location: where a student is unlikely to injure themselves or drown if they lose consciousness.*

IN-WATER SKILLS CHART

Skill Number	Skill	Learning Requirement	Purpose	Details
1	Pre-dive checks	Accurately complete all checks without bypassing any items.	To confirm the EXPLORER has been prepared correctly, the function of the absorbent, and the monitoring system function.	Follow on screen sequence using the wrist display.
2	Calibration of Explorer	Complete calibration of O_2 & CO_2 sensors.	To confirm calibration of all sensors on primary electronics with air CAL sequence.	Explain sensor calibration rules in manual, importance of sensor position, date stamp, logging system, O_2 sensor voting logic system, and CO_2 scrubber replacement.
3	In-water leak, buoyancy, and trim checks	Diver checks themselves and buddy for leaks. Diver maintains buoyancy and trim checks.	To ensure no LP, HP, or breathing loop leaks are present that either were missed by Pre-dive checks or occurred after checks. Make buoyancy and trim adjustments.	Check LP, HP, and breathing loop fittings/hoses while submerged, between the surface and 6 m/ 20 ft. Look for incorrectly configured or stowed equipment. Ensure proper weighting (should be neutral with full counterlungs. Emphasis should be placed on good trim.

Skill Number	Skill	Learning Requirement	Purpose	Details
4	Carry and use of additional bailout gas	Carry external bailout gas cylinder on dives deeper than 18 m/60 ft. Practice use of the BOV and external bailout. Perform static and dynamic open circuit bailout drill. Include at least 2 OC ascents from bottom the bottom to approximately 6 m/20 ft	To verify bailout systems function. To ensure the diver is correctly weighted to maintain depth control under all urgent/emergency conditions. To reinforce how to deal with a hypercapnia situation and reinforce involved muscle memory.	The unit should be weighted to offset the buoyant volume of the EXPLORER. Additional weight is needed to compensate for their exposure suits and additional bailout cylinder. Switch to off-board open circuit via the BOV. Ascend slowly. The biggest buoyancy change is in the last 10 m/33 ft, and ideally the student should remain horizontal within this depth range. Weighting should be such that automatic venting should control the ascent. (This skill should be conducted twice, 1st along a contoured bottom or shot line; the 2nd time with an SMB.)

Skill Number	Skill	Learning Requirement	Purpose	Details
5	Dive Control Parameter Adjustment	Use the Manual and Auto DCP settings on the primary controller.	To fully understand the function, adjustment of the DCP, and how different settings effect no-stop times and endurance.	Using the wrist display, adjust the DCP with both the manual and automatic settings.
6	Remove and replace unit on surface	User demonstrates comfort removing and replacing equipment.	To ensure a diver is comfortable in the equipment, can remove it in an emergency, and improve abillity to dive equipment from a small vessel.	This skill is to be completed at the surface, with weights removed, and BCD inflated.
7	Electronics operation	User demonstrates competency and understanding of the use of the electronics.	To ensure the diver understands all functions with a focus on the STATUS system.	On the surface and in the water the diver should be able to demonstrate navigation through all the STATUS screens, describe (onsurface) each screen's meaning, and comfortably interpret all displayed information.
8	SMB deployment	User demonstrates deployment of an SMB followed by a safe ascent, stopping at 6 m/ 20 ft, while using the EXPLORER.	To ensure the diver can maintain buoyancy and monitor displays, while tasked with SMB deployment.	This skill teaches students the relationship between PO_2 changes due to ascent and buoyancy changes.

6.2

Skill Number	Skill	Learning Requirement	Purpose	Details
9	Remove water from the breathing loop with the LCV	User demonstrates how to clear water from the breathing loop.	To learn how to remove water from the breathing loop due to condensation, improper mouthpiece handling; etc.	Towards the end of a dive, move to an upright position, switch to open circuit, and shake loop above head to drain any water from BOV and hose*. Then return to breathing loop. Continue breathing, as normal, and the LCV system will vent water from the loop. If on an ascent, simply continue ascending until the counter lung over pressurizes. Water will drain through the LCV.
10	HUD/BUD use + STATUS monitoring	Understand Handset/computer operation, STATUS monitoring, Menu System, & HUD/BUD	To understand the STATUS display and the HUD light and vibration motor alarms. To understand the set-up menus of the EXPLORER	Using the Simulator APP and during dives, review the STATUS information. Using the Simulator APP and the display, understand the surface menu's
11	Gas share with a buddy	User demonstrates gas sharing with a buddy	To practice deploying and receiving a second stage bailout	Stay on the EXPLORER. Allow a Buddy to use the Buddy regulator. Initially conduct in a horizontal swim then during an ascent to 6m/20ft.

** Follow all local standards and training agency guidelines regarding available breathing sources while executing this skill.*

EXPLORER SKILLS - COMPLETED

DRY SKILLS

1. Management of O-rings	Student ______	Instructor ______
2. Assemble the unit	Student ______	Instructor ______
3. Proper dive planning	Student ______	Instructor ______
4. Post dive care	Student ______	Instructor ______
5. Complete Explorer Exam (with a minimum score of 80%, missed questions reviewed with instructor)	Student ______	Instructor ______

IN-WATER SKILLS

1. Pre-dive checks	Student ______	Instructor ______
2. Callibration of EXPLORER	Student ______	Instructor ______
3. In-water leak, buoyancy, and trim checks	Student ______	Instructor ______
4. Carry and use of additional bailout gas	Student ______	Instructor ______
5. Dive Control Parameter Adjustment	Student ______	Instructor ______
6. Remove and replace unit on surface	Student ______	Instructor ______
7. Electronics operation	Student ______	Instructor ______
8. SMB deployment	Student ______	Instructor ______
9. Remove water from the breathing loop with the LCV	Student ______	Instructor ______
10. HUD use/STATUS monitoring	Student ______	Instructor ______
11. Gas share with a buddy	Student ______	Instructor ______
12. Equalizing ears	Student ______	Instructor ______
13. Mask clearing skills	Student ______	Instructor ______
14. Drysuit use (where applicable)	Student ______	Instructor ______
15. Reducing compliant lung volume	Student ______	Instructor ______
16. Follow dive plan, not exceeding depth or dive time	Student ______	Instructor ______
17. Maintain depth while making safety stop	Student ______	Instructor ______
18. Omitted decompression procedures	Student ______	Instructor ______

LONG TERM MAINTENANCE & SERVICE
OXYGEN SENSORS

APPROVED OXYGEN SENSORS

The EXPLORER is only approved to use Hollis EXPLORER Oxygen Sensors. Hollis EXPLORER Oxygen Sensors have temperature ranges as detailed below.

Operating temperature range: 0 – 40 °C
Storage temperature: -20 to +50 °C
Recommended storage temperature: +5 to +15 °C

OXYGEN SENSOR CARE

! **WARNING: In the event of a faulty sensor, all three sensors should be replaced together as it cannot be guaranteed that the scenario that made the first sensor fail has not affected all the sensors.**

! **WARNING: Number each individual sensor before removal so they can be replaced in the same position.**

Basic care includes:
- **NEVER** store sensors in any gas other than air.
- **NEVER** subject sensors to high temperatures i.e. (Car trunks).
- **NEVER** freeze sensors (left in cars overnight).
- **NEVER** subject sensors to physical shocks.
- **NEVER** subject sensors to vacuum.
- **NEVER** submerge sensors in liquids.
- **Never** attempt to open a sensor housing.
- Sensors deteriorate very slowly and near the end of their useful life may show a reading drift soon after calibration.
- Always change all 3 sensors together and after a maximum of 12 months from first usage or the "Do Not Use After" date printed on the sensor, whichever comes first.
- Water and corrosion on the sensor jack plug may give false Oxygen readings. Seawater may dry leaving a deposit on the jack connectors and the sensor membrane. If you suspect corrosion, remove the sensor from the sensor module and clean the jack plug with a cloth and DeoxIT® GN5 contact cleaner.

• Check the sensor membrane. A certain amount of moisture will always appear on and around the sensors. If you suspect excessive water has made contact with the sensor faces. Remove excess water carefully with a paper tissue and leave to dry in a warm area. If the jack socket on the sensor is wet, the sensor may be damaged, as the electronics inside the sensor will also be wet.

! **WARNING: Flooded sensors must be replaced.**

Your instructor will educate you on what you the end user can service yourself. For all other service needs your Hollis Explorer Technician has been trained in the proper skills to service your your Hollis equipment.

Always follow the Maintenance Schedule at the end of this chapter to keep your EXPLORER in peak condition. The EXPLORER also keeps a log of usage hours, and it will display a service reminder when it is close to the service interval *(Fig. 7.1)*.

Fig. 7.1

! **NOTE: The maximum usage hours between service is 200 hours. When less than 25 of the 200 allowed hours are remaining, the service reminder will start to display *(Fig. 7.1)*. If the service reminder is ignored, the Explorer operation will lock out after 200 hours.**

MAINTENANCE SCHEDULE

KEY:
E = before every dive — A = annually
C = at canister change — 30 = 30 hours

Item	User (U) or Dealer (D)	Inspect/Clean	Replace/ Service	Notes
Mushroom valves	U	E	annually or sooner if damaged	
Quad seal	U	C	annually or sooner if damaged	
CO_2 sensor silica beads	U	E (inspect)	4-6 hours / or sooner if the beads have turned emerald green	
Hose end O-rings	U	E	annually or sooner if damaged	
BOV barrel O-rings only (not 2nd stage regulator)	U	If pre-dive failed (leaks)	annually or sooner if damaged	
BOV 2nd stage regulator	D	Wash at end of dive day.	annually or sooner if needed	Flush with fresh water and sanitize as required.
End cap O-rings	U	C	annually sooner if damaged	
ADV diaphragm	D	A	annually or sooner if damaged	
Oxygen/CO_2 sensor connections	D	30	Clean at annual service sooner if needed	Inspect for damage. Clean with contact cleaner (Deoxit Gold GN5)
Oxygen sensors	U	30	Whichever comes first, 12 months or the DO NO USE AFTER DATE	Inspect for damage.
Counterlungs and LCV port O-rings	U	Before every day of diving.	replace annually, sooner if damaged	
LCV port mushroom valve	D	Before every day of diving.	Have serviced by dealer annually, sooner if damaged	

Item	User (U) or Dealer (D)	Inspect/Clean	Replace/ Service	Notes
LCV assembly	D	Wash at end of dive day.	annual or sooner if damaged	Fresh water flush after dive trip.
OPV	D	Wash at end of dive day.	annual or sooner if damaged	Flush with fresh water. Have serviced if not holding a negative.
Regulator first stage	D	Wash at end of dive day.	annual or sooner if needed	Flush with fresh water.

APPROVED PRODUCTS AND GLOSSARY
APPROVED PRODUCTS

CO_2 SCRUBBER MATERIAL

Intersorb 812 (8-12 mesh) or Sofnolime (8-12 mesh)

OXYGEN SENSORS

Hollis EXPLORER Sensors

CLEANING PRODUCTS

Steramine 1-G Tablet
White Vinegar
Crystal Simple Green® or Dawn (or similar mild) dish detergent

MAINTENANCE PRODUCTS

Dow Corning® 7 Silicone (non-O_2 clean parts only)
CRISTO-LUBE® MCG 111
Tribolube 71®
DeoxIT® Gold GN5 Electrical Contact Cleaner

Other products not listed may be appropriate for use with the Explorer. If there is a particular product which you wish to use, please call the factory to make sure the product does not contain chemical components which may be harmful to components within the rebreather or the diver.

! **CAUTIONS: Consult manufacturer Material Safety Data Sheets for further safety recommendations for these materials.**

Never use the following products or families of products on ANY part or surface of the Explorer rebreather:

- Products which contain alcohol, high concentrations of chlorine, ammonia, gasoline, Benzene or any petrochemical-based solvent (Basically, any product with the suffix "ene" in it.)

- Polishes, wax, automotive cleaning products.

- Glues, binding agents, plastic fillers other than those listed in the "maintenance and troubleshooting" or "approved products" sections of the manual.

! **DANGER: Never attempt to clean your rebreather, or any part of your rebreather in a dishwasher or any other type of machine that employs high pressure jets of cold, warm or scalding hot water.**

GLOSSARY

Absorbent: chemical media used to remove CO_2 from exhaled gas.

Absorbent Scrubber Pack: Mechanical assembly where the CO_2 absorbent is housed.

ADV (Automatic Diluent* Valve): a mechanical valve that automatically adds fresh gas to the counterlungs in response to increased ambient pressure from depth or decreased volume.

Bailout: a redundant gas supply system.

Balance Tube: The tube between the exhale counterlung and the LCV. This tube removes water from the counterlung and controls (breathing) loop pressure with the LCV.

BUD (Buddy Universal Display): Universal display on the side of the LSS module, codes identical to HUD.

BCD (Buoyancy Control Device): the harness/buoyancy compensator assembly.

BOV (Bail Out Valve): a valve that allows for the switching from closed circuit mode and open circuit mode (via a built in second stage regulator) breathing.

Breakthrough: The moment when absorbent scrubber fails, no longer removing CO_2 at an adequate rate.

Breathing Hose: The large hoses that connect the Canister assembly to the BOV.

Breathing Loop: the portion of a rebreather through which breathing gas circulates.

Canister: Mechanical assembly where the Absorbent Scrubber Pack is housed.

Caustic Cocktail: very alkaline liquid (water mixed with CO_2 absorbent material).

CC: closed circuit mode

CO_2: carbon dioxide

Dive Control Parameter (DCP): The control to define how high the oxygen level is set for the dive profile.

eSCR (electronic Semi-Closed Rebreather): a semi-closed rebreather that utilizes electronics for setpoint maintenance.

Exhale Counterlung: The counterlung positioned behind the diver's right shoulder.

FO_2: fraction of oxygen

Graphical User Interface (GUI): The display system for communicating information to the diver.

Heads Up Display (HUD): The LED display positioned in front of the mask.

HP: high pressure

Inhale counterlung: The counterlung positioned behind the diver's left shoulder.

IP: intermediate pressure

**(The use of the word diluent is a misnomer carried over from a component used in closed circuit rebreather diving that operates in a similar fashion. In the Explorer the ADV does not dilute the gas but instead enriches with nitrox gas.)*

LCV Port: the port on the exhale counterlung that houses the exhale counterlung mushroom valve. This port links to the LCV via a balance tube.

Life Support System (LSS) Module: the diver's left hand electro/mechanical assembly.

Loop Control Valve (LCV): the valve in the canister that controls the amount of exhaust gas exiting the rebreather and controls the breathing loop pressure.

LP: low pressure

Maximum operating depth (MOD): the maximum depth a given gas can be used safely.

Mushroom valve: a flexible one-way flapper valve that permits the gas to flow in a circular path through a rebreather.

Negative Pressure Check: a test placing the Breathing Loop under a vacuum condition to check for leaks.

O_2: oxygen

OC: open circuit

Optocon: The wireless transmission system used in Explorer to send data between the LSS and Sensor Module.

Oxygen Sensor: galvanic oxygen sensors

OPV (Over-Pressure Valve): a mechanical valve that vents gas to prevent breathing loop-component rupture.

PCO_2: Partial pressure of carbon dioxide

PO_2 (PPO_2): partial pressure of oxygen

Positive Pressure Check: a test that looks for leaks in the Breathing Loop when pressurized.

QD: quick disconnect

Quad Ring: a specially designed sealing ring that creates a positive seal on the CO_2 canister.

Sensor Module: Electro/mechanical assembly where the oxygen sensors, CO_2 sensor and Thermal Profile Monitor are housed.

Setpoint: The PO_2 setting used to determine when a solenoid valve injects gas into the breathing loop.

TPM (Thermal Profile Monitor): The device that monitors the thermal front of the reaction zone inside the absorbent scrubber.

The Right Hand End Cap: End cap that when removed gives access to the CO_2 Scrubber Pack.

WOB (Work Of Breathing): The effort required to complete an inspiration/expiration breathing cycle.

OUR HISTORY //

Bob Hollis had his first rebreather experiences in the mid 60's. He used Draeger units to allow him to get close to Sea Otters and other marine life in Monterey Bay. In 1970, Hollis made some of the first dives on the Electrolung rebreather using Heliox down to 300 feet in Honduras and Bonaire, filming shipwrecks and deep reefs. In 1990, Bob & Oceanic developed the "Phibian" rebreather, which at the time was the only commercially available unit.

In 2000, Hollis' parent company American Underwater Products under two separate contracts with the United States Naval Surface Warfare Command, developed and delivered a unit called the "ATUBA" (Advanced Tactical Underwater Breathing Apparatus). That led to the development and success of the Prism 2 eCCR technical rebreather. All of that experience has been leveraged to bring you something new the Hollis Explorer eSCR, the world's first electronically controlled semi-closed rebreather for recreational divers.

HOLLIS REBREATHER DEALER SUPPORT COMMITMENT //

As a consumer, you will receive a greater level of support from a Hollis Rebreather Dealer. Not because a non-Rebreather dealer doesn't care about support. Instead, the Hollis Rebreather Dealer has a greater level of commitment to the complete product line. A Hollis Rebreather Dealer has perfected their diving skills and is at their peak of instruction. They will provide access to rebreather training, service, consumables, upgrades and travel. The view from a Hollis rebreather into the underwater realm is like a view from no other place on earth. Hollis Gear promises to deliver an experience like no other.

AMERICAN UNDERWATER PRODUCTS ENVIRONMENTAL QUALITY POLICY //

American Underwater Products is committed to the preservation of our oceans and supports outreach and awareness programs that develop an understanding of the oceans' importance to life on earth, the fragility of marine ecosystems, the damage done by pollution, and the threat of overfishing. We produce innovative products of the highest quality, manufactured in an environmentally sustainable manner that meets or exceeds our customer's expectations and regulatory requirements

HOLLIS®

NO LIMIT