Cochran

Undersea Technology

www.DiveCochran.com

Cochran
LIFEGUARD® CPU
With
Display Unit D1

Owner's Manual

English – Imperial
Version: Lifeguard CPU/D1 1.01

1758 Firman Drive
Richardson, Texas 75081, USA
Phone 972-644-6284

For your records, please fill in the following:

Serial Number of the CPU Unit: _____
Serial Number of the Wrist Unit: _____
Your Name: _____
Your Contact: _____
_____
_____
Purchase Date: _____
Purchase Place: _____
Address: _____
_____
_____

LIFEGUARD®

DIVE COMPUTER SYSTEM

SAFETY NOTES & CERTIFICATIONS

Before using this product, the customer shall read and understand all the instructions and warnings. Cochran Undersea Technology does not accept responsibility for damage or injury resulting from failure to follow the instructions provided.

FCC/Industry Canada Two Part Statement:
This device complies with FCC Part 15 and Industry Canada license exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

French Version:
Cet appareil est conforme à FCC Partie15 de Industrie Canada RSS standard exempts de licence (s). Son utilisation est soumise à Les deux conditions suivantes: (1) cet appareil ne peut pas provoquer d 'interférences et (2) cet appareil doit accepter Toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement du dispositif.

Per Industry Canada RSS rules:

English version:
This device complies with Health Canada's Safety Code. The installer of this device should ensure that RF radiation is not emitted in excess of the Health Canada's requirement. Information can be obtained at http://www.hc-sc.gc.ca/ewh-sem/pubs/radiation/radio_guide-lignes_direct-eng.php

French version:
Cet appareil est conforme avec Santé Canada Code de sécurité 6. Le programme d 'installation de cet appareil doit s' assurer que les rayonnements RF n'est pas émis au-delà de l'exigence de Santé Canada. Les informations peuvent être obtenues: http://www.hc-sc.gc.ca/ewhsemt/pubs/radiation/radio_guide-lignes_direct-eng.php

MODIFICATIONS:
Changes or modifications not expressly approved by Cochran Consulting, Inc. could void the user's authority to operate the equipment.

SHIELDED CABLES:
This product is designed to be used only with the Analyst® interface cable to maintain compliance with FCC/Canada Industry Regulations.

CE

NORMES EMC 89/336/EEC
EMC 89/336/EEC STANDARDS
HOMOLOGADA EMC 89/336/EEC
ZERTIFIZIERUNG EMC 89/336/EEC

The CE mark is used to mark conformity with the European Union EMC directive 89/336/EEC. Cochran dive instruments fulfill all the required EU directives.

EN250
EN250 Respiratory equipment – Open Circuit self-contained compressed air diving apparatus – Requirements, testing, marking.
The components/parts used in measuring the cylinder pressure(s), meet the requirements set in this section of the European Standard.

PREN 13319
PREN 13319 "Diving accessories – Depth gauges and combined depth and time measuring devices – Functional and safety requirements test methods" is a European diving depth gauge standard draft. Cochran dive instruments are designed and tested to comply with this standard draft.

WARNINGS:

- COCHRAN strongly supports and agrees with maximum depth limits of 130 feet for recreational SCUBA diving, as established by recognized training and certification agencies, and in no way encourages diving beyond these or any prudent lesser limits as may be necessitated by environmental, diver-specific, or other conditions.
- Read and understand the entire LIFEGUARD® manual and know the principles and practice safe diving before using this device
- The LIFEGUARD® Dive Computer is intended for use by divers who have been adequately and thoroughly trained and certified to engage in diving by a professional, competent, recognized training agency.
- The LIFEGUARD® Dive Computer must not be used by untrained persons who may not have the knowledge of the potential risks/hazards of scuba diving, and diving with enriched oxygen-nitrogen (nitrox) mixtures.
- The diver must obtain scuba certification, and be certified in diving with enriched oxygen-nitrogen (nitrox) mixtures before suing the LIFEGUARD® Dive Computer.
- The diver should never participate in sharing and or swapping of a dive computer.
- The Diver should activate the LIFEGUARD® and preform a PreDive check in order to ensure that all of the Liquid Crystal Display (LCD) segments are displayed, the LIFEGUARD® has sufficient battery power to perform the dive, and that the oxygen setting(s) are correct.
- Do not dive with the LIFEGUARD® with a gas that you have not personally verified its contents and enter the analyzed value into the dive computer. Failure to verify the cylinder contents and properly enter the appropriate gas value(s) into the LIFEGUARD® will result in incorrect dive information.
- When diving with gas mixtures other than Air you are exposed to risks that is different from those associated with standard air diving. While these risks are not obvious, they require proper training to understand and avoid; preventing the possibility of serious injury or death.
- While your LIFEGUARD® will automatically adjust its no decompression algorithm for altitude, you should NOT attempt to dive at altitudes greater than 1,000 feet above sea level without first completing a sanctioned altitude diving course from a recognized training agency for recreational diving. The LIFEGUARD® should not be used for this type of diving by anyone without this important training.
- A mathematical model is used by this Product to calculate physiological effects of SCUBA diving related to the use of compressed air or other breathing mixtures while at depth. Such effects specifically relate to nitrogen absorption into and elimination from body tissues, as well as effects of oxygen used in Enriched Air Nitrox breathing mixtures. However, because of the number of variables and the varying degrees to which they may affect individuals engaged in scuba diving, Cochran does not guarantee that the use of this product will completely eliminate the risk of decompression sickness.
- **Neglecting the above may result in injury or death**.

CAUTIONS:

- Accidental or intentional loss of battery power will cause all previous dive nitrogen loading to be lost. This may affect nitrogen calculations on near-future dives. After a battery change, confirm that the no-decompression time data is reasonable using the per-dive mode. Dive-of day number going to zero immediately after changing batteries is another indication of nitrogen loss.
- If loss of nitrogen loading occurs, Cochran strongly recommends that a period of 24 hours elapse before making any subsequent dives.
- Never test or subject the product to pressurized air!
- Never pressure pot test dive unit in air!
- Never remove the lens from the wrist unit; this will void the limited warranty!
- Never remove the lid from the Computer Processor Unit (CPU) this will void the limited warranty; this will void the limited warranty!
- Only use fresh water to clean the unit! Never use solvents!
- Do not us a screwdriver to remove the battery cap(s)!
- Always keep fresh batteries installed!

- Always use the proper battery
- Failure to respond to the warning symbols or alarms that appear on the display may result in injury or death
- All matters arising, which relate to the safety of this product, should be reported immediately in writing, giving full details, to Customer Support at Cochran Undersea Technology.

Product Introduction: Your LIFEGUARD® Dive Computer from Cochran Undersea Technology is one of the most advanced instruments made for this application. The LIFEGUARD® consists of two component parts, the Computer Processor Unit (CPU) and the Wrist Unit (WU), the CPU contains the High Pressure Transducer(s) Assembly, Depth/Altitude Sensor, and the computer's electronics. The CPU performs the time-depth calculations and is where the detailed dive statistics and profiles are stored. The LIFEGUARD® incorporates more user-programmable functions than any other dive computer made, yet is one of the simplest to use. You may enter personal preferences, dive site, and condition-specific settings. The LIFEGUARD® calculates these factors in the background, displaying to you, the diver, and the critical information you need, in an easy to comprehend display. The LIFEGUARD® computers are one of the first dive computers to implement a Training Mode, which enables the computer to record and store data in shallow water training environments (swimming pools, shallow lakes, etc.). To get the safest and most effective use of this instrument, it is important that the user fully understand the product. Please read and understand this entire manual and know the principles and practice safe diving before using this device. By using the LIFEGUARD®, the diver specifically acknowledges that he has been adequately and thoroughly trained and certified to engage in diving by a professional, competent, recognized training agency.

This Manual is divided into the following Sections:

INSTALLATION: For the LIFEGUARD® Models with high-pressure (HP) sensors, they install into a high-pressure port of your first-stage regulator.

1. Remove the HP plug from your first stage regulator.
2. Lightly lubricate the sensor O-ring only with a lubricant approved for use with Enriched Air Nitrox equipment. DO NOT USE SILICONE GREASE.
3. Screw the sensor lightly into the HP port
4. Using a Scuba Tool, or thin 9/16" open-end wrench, snug the HP sensor connection taking caution to not over tighten.

CAUTION: Tools such as vise-grips or channel lock pliers will damage the sensor.

CAUTION: DO NOT use your hand to tighten the high-pressure connection. This procedure must only be accomplished by using the appropriate tool placed over the metal nut of the high-pressure connection. It must not be over tightened.

CAUTION: DO NOT twist, stress, or otherwise abuse the HP cable.

With the first stage properly attached to a filled SCUBA cylinder, slowly open the cylinder valve. Once the valve has been opened, listen to the HP connection for any escaping gas. If possible, completely immerse the system in water to see if bubbles form around your connection. If any gas leak is seen or heard, immediately turn the gas off by closing the cylinder valve and take the entire regulator system to the place where you purchased your LIFEGUARD®.
Usually, the Lifeguard® CPU clips to a low-pressure hose close to the first-stage. When clipping it onto the low-pressure hose, a rolling motion will provide better results rather than pushing it straight down onto the hose.

A 360 degree HP swivel is available that can make installation simpler in difficult situations. It is particularly useful with the Lifeguard® models L2 and L5 which have two HP sensors.

High Pressure 1st Stage Pivot Swivel
P/N: PS-HP-1

If an additional High Pressure (HP) port is required the optional HP Port Extender creates an extra HP port.

High Pressure Y Adapter
P/N: MB-X2

PO2 SENSORS CONNECTION: LIFEGUARD® CPU models with a PO2 sensor cable (L3, L4 & L5) allows up to three PO2 sensors to be connected. The PO2 cable that is attached to the LIFEGUARD® has a four pin waterproof connector on the end. A mating connector and cable or bulkhead connector can be supplied to attach to a specific Breathing Apparatus. If the Breathing Apparatus already has PO2 sensors, the LIFEGUARD® can be connected to use those sensors, or the LIFEGUARD® can be connected to an independent PO2 sensor.

A "Tee" is available that contains a single PO2 Sensor. The "Tee" can be inserted in the inhalation hose of a rebreather.

The Tank Unit (CPU) clips to a low-pressure hose close to the first-stage, it is recommended that the CPU be located on the divers left side. When clipping the CPU onto the low-pressure hose, a rolling motion will provide better results rather than pushing the CPU straight down onto the hose. The Wrist Unit (WU) may be worn on the wrist or attached to your Buoyancy Control Device with the optional retractor.

TANK UNIT TOUCH CONTACTS: The Contacts are used to let the user command the unit to do a number of functions, communicate with a PC for extracting information or configuring the unit, and determining water conductivity. When Contacts 1 & 2 are shorted, the LIFEGUARD® CPU can detect the difference between wet fingers, metal objects, fresh water, salt water, and a PC interface cable.

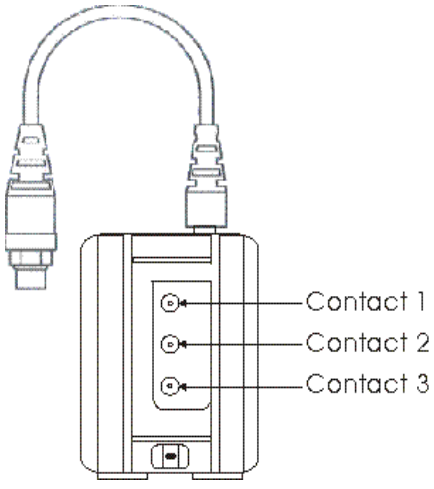


Figure 49
Tank Unit Touch Contacts

TURNING ON THE LIFEGUARD® CPU: The LIFEGUARD® CPU can be awakened either automatically or manually. For those with Cylinder Pressure Transducers, the unit will automatically leave the Asleep Mode and enter the Surface Mode if it senses a Cylinder Pressure of greater than 200 psi. For that Lifeguard® CPU WITHOUT Cylinder Pressure (the L3 model) the unit will automatically enter the Surface Mode if it senses any PO2 Sensor reading greater than 0.30 ATA. For the L6 Lifeguard® this is accomplished by shorting contacts #1 and #2 for one second or more with a metallic object such as coin or knife, all Lifeguard® models may be awakened using this method.

NOTE: When the LIFEGUARD® leaves the Asleep Mode it will issue five one-second beeps as all of its many integrity checks are completed. At any time if the contacts are shorted again, the Lifeguard® will continue to beep as long as the contacts remain shorted, so the user can confirm that the LIFEGUARD® is Awake.

TURNING OFF THE LIFEGUARD® CPU: Returning to the Asleep Mode is automatic. For those models with Cylinder Pressure Transducers, the unit will go asleep when the Cylinder Pressure is less than 200 psi. For the units WITHOUT any Cylinder Pressure (the L3 model) the unit will automatically go Asleep off if it senses all PO2 Sensor readings are less than 0.30 ATA which may require that the rebreather loop be opened to the atmosphere. The R6 will automatically go to sleep 10 minutes after the completion of a dive.

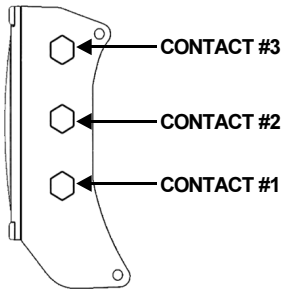
You cannot manually turn the LIFEGUARD® off.

The Lifeguard® will turn off:

1. After 60 minutes if no tank pressure is sensed and no dive is made.

NOTE: The LIFEGUARD® CPU will not enter the sleep mode or turn off as long as cylinder pressure is being applied or the PO2 Sensors are exposed to a PO2 greater than 0.30 ATA.

WRIST UNIT SIDE CONTACTS:



The Contacts are used to let the user command the unit to do a number of functions, or obtain information and/or configuring the unit. When Contacts 1 & 2 are shorted, the LIFEGUARD® WU can detect the difference between wet fingers, metal objects and water.

TURNING ON THE LIFEGUARD® WU: Although the LIFEGUARD® WU automatically turns on when it is submerged in water, it is STRONGLY recommended that wetting two fingers and simultaneously touching Contacts 1 and 2 for two seconds manually power the unit up. This allows the diver to ensure that the unit is operating correctly and has adequate battery capacity prior to entry. The WU will receive information from the CPU from approximately 40 inches; the actual distance will vary depending on the orientation of the WU to the CPU. Once activated and in communications with the CPU, the unit will remain on until the CPU turns off, usually 60 minutes. When the WU is beyond the communication range of the CPU the WU's display will flash. When the WU is back in communication with the CPU the display will cease flashing. Notice that when Contacts 1 & 2 is first bridged, a short beep is issued which indicates that the unit is recognizing the touch. If the WU is activated and not in communications with the CPU, it will turn off after 15 minutes.

The LIFEGUARD® WU will not turn on if the battery voltage is less than 2.5 volts, or a fault is detected during the self-test.

Bridging the wrist units touch contacts one can activate the WU and two with wetted fingers. While the WU will activate upon entering the water it is highly recommended that the WU be turned on manually as part of the diver's pre-dive check.

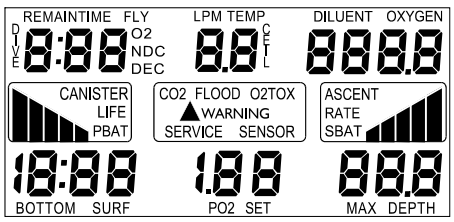


Figure 01 Self Diagnostics Mode

As the LIFEGUARD® WU & CPU first recognize a turn-on command, it begins a "Diagnostic" function where many aspects of the system will be exercised and tested. This procedure takes about five seconds and an audible beep is issued each second as certain tests are successfully completed. During this time, all of the segments in the display are turned on so that the user can confirm their operability. Should a test indicate a malfunction or marginal test, the unit will turn back off again. The user should ensure that all of the display segments are on and operating correctly.

CAUTION: After the WU is activated the "SERVICE" legend will be illuminated, this indicates that the WU's memory is being updated with information from the Tank Unit. It may take several minutes for this process to be completed. A dive should not be started while the "SERVICE" legend is illuminated.

TURNING OFF THE LIFEGUARD®: After the Post Dive Interval following a dive, the LIFEGUARD® CPU will remain on for one hour before automatically entering its "Sleep Mode". During the Sleep Mode, all calculations continue but the display is off. This is a power saving feature of the LIFEGUARD®. The unit will continue calculating Surface Interval, compartment off gassing as required, and any changes in altitude as it affects Nitrogen Loading. The current Surface Interval and PreDive Predictions can be viewed by reactivating the units.

You cannot manually turn the CPU off. The CPU will turn off:

1. After 60 minutes if no tank pressure is sensed and no dive is made.
2. After all 20 half-time compartments are completely off-gassed on repetitive dives.

NOTE: The LIFEGUARD® CPU will not enter the sleep mode or turn off as long as cylinder pressure is being applied to the CPU.

You cannot manually turn the WU off. The WU will turn off:

1. 15 minutes after the CPU turns off and no dive is made.
2. If in a dive and the WU loses communications with the CPU permanently. The WU will turn off 60 minutes after the loss of communications. The touch Contacts are disabled during this time.

MAIN LIFEGUARD® OPERATING MODES:

- Surface Interval (No Nitrogen Residual)
- Surface Interval (With Nitrogen Residual)
- Dive Mode (Normal No Deco)
- Decompression Mode
- Post Dive Interval
- Touch Programming

SURFACE INTERVAL – AIR ONLY/SINGLE GAS NITROX:

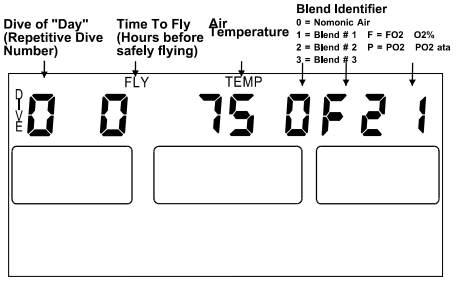


Figure 03 Surface Mode, No Nitrogen, Alternate Screen

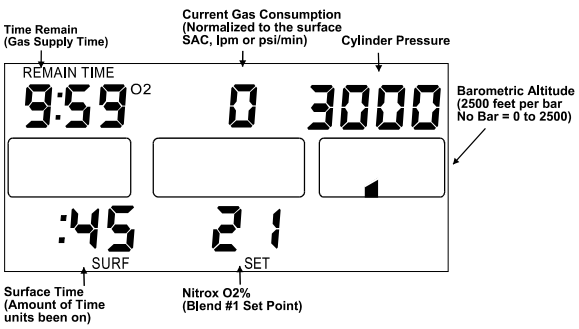


Figure 02a Surface Mode, No Nitrogen, FO2, Primary Screen

After completion of the Self-Diagnostic mode or after the Post Dive Interval following a dive, the LIFEGUARD® enters the Surface Interval. This period has two screens, a Primary and an Alternate. To switch to the Alternate Screen just tap once firmly on the face of the unit. The Primary Screen displays, if applicable; current Surface Time, the previous dive's Maximum Depth, the Current FO2 (normal Blend) oxygen percentage, Cylinder Pressure, Gas Supply Time, Current Gas Consumption, and Altitude. The Alternate Screen displays the previous dive's Bottom Time, Dive of Day number; current Time to Fly, current calculated CNS and OTU value bar graphs. Figure 2 & 2a shows the display with no residual Nitrogen (a clean Dive). Figure 4 & 4a shows the display with residual Nitrogen (a repetitive dive). Figure 3 shows the alternate screen with no residual Nitrogen and Figures 5 & 5a with residual nitrogen.

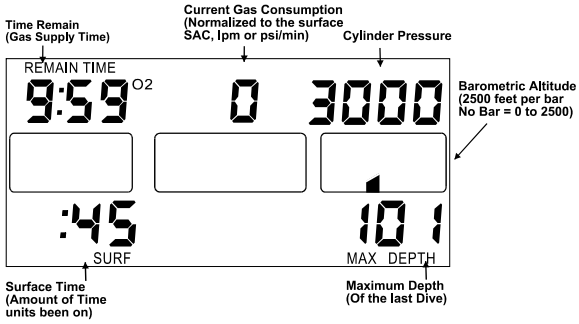


Figure 04 Surface Mode, With NItrogen, Air Only, Primary Screen

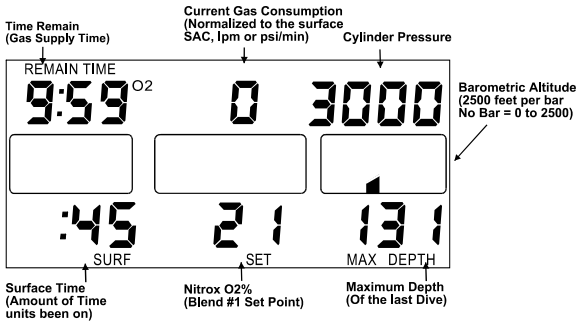


Figure 04a Surface Mode, With NItrogen, FO2, Primary Screen

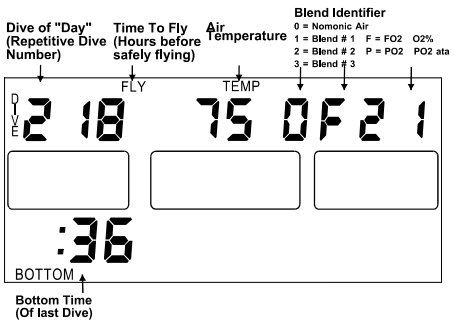


Figure 05 Surface Mode, With NItrogen, Air Only, Alternate Screen

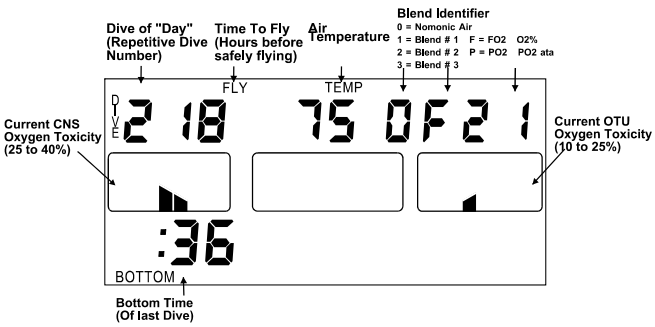


Figure 05a Surface Mode, With NItrogen, FO2/PO2, Alternate Screen

The "Blend Identifier" displays the Oxygen percentage that the computer is using in its no-decompression / decompression calculations. When the unit is on the surface it will display 'OF21' to indicate that the computer is calculating out-gassing using normal (Normonic) air (21%).

"Surface Time" starts at zero after a dive and begins counting minutes. If the computer shuts off and is turned on with Nitrogen residual left, the Surface Time continues to count. If the computer shuts off and is turned on with no Nitrogen residual left, the Surface Time will be zero.

The "Dive of Day" number starts at zero and increments after each dive regardless of the calendar day. When there is no remaining Nitrogen residual, the Dive of Day is set to zero and the computer is referred to as a 'clean' system.

"Time to Fly" is displayed as the number of hours remaining until the nitrogen residual reaches zero plus a twelve-hour safety factor. Flying is not recommended until "Time to Fly" reaches zero.

"Barometric Altitude" is indicated in six ranges via the Ascent Rate Bar Graph as follows (Altitude compensation is seamless up to 15,000 feet above sea level). The six ranges are for display purposes only: The LIFEGUARD® actually senses and computes extremely small altitude changes and hence, is called "Seamless". The term "Barometric Altitude" is used instead of just "Altitude" because the LIFEGUARD® measures Barometric Pressure to determine Altitude. Barometric Altitude can vary from actual Altitude by over +/- 1000 feet! What is important to the body when diving is Barometric Altitude.

0 Bars	sea level to 2,500 feet
1 Bar	2,500 to 5,000 feet
2 Bars	5,000 to 7,500 feet
3 Bars	7,500 to 10,000 feet
4 Bars	10,000 to 12,500 feet
5 Bars	12,500 to 15,000 feet

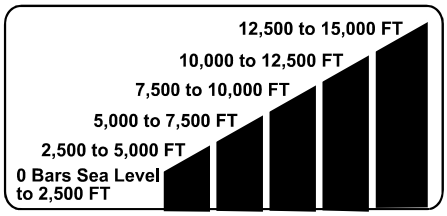


Figure 20 Altitude Bar Graph

The altitudes indicated are for reference only. They do not appear on the WU display.

DIVE MODE – AIR ONLY/SINGLE GAS NITROX:

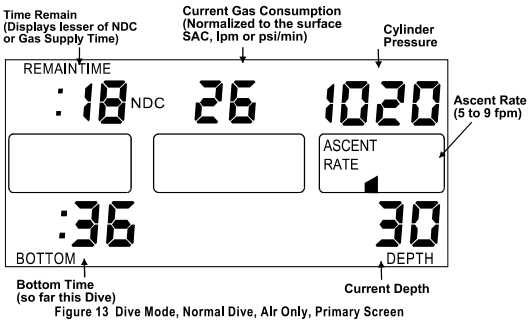


Figure 13 Dive Mode, Normal Dive, Air Only, Primary Screen

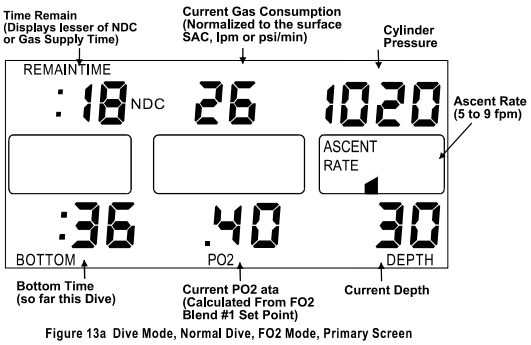


Figure 13a Dive Mode, Normal Dive, FO2 Mode, Primary Screen

Whether in the Surface Mode, PreDive Prediction Mode, or Programming Mode, The LIFEGUARD® will automatically enter the Subsurface Mode when the dive computer senses a depth greater than five feet and exits when the dive computer senses a depth less than five feet.

NOTE: Do not start a dive while the "SERVICE" legend is illuminated.

On the Primary Screen the Surface time will be replaced with the current bottom time, Blend #1 set point is replaced with the calculated PO_2 value. Maximum Depth will be replaced with current Depth, displayed in one-foot increments. Bottom Time will begin once the LIFEGUARD® WU senses that the diver has descended below five feet and continues until the diver has ascended above three feet. The maximum Bottom Time displayed is 9 hours 59 minutes.

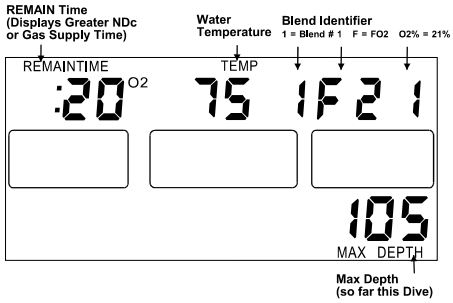


Figure 14 Dive Mode, Normal Dive, Air Only, Alternate Screen

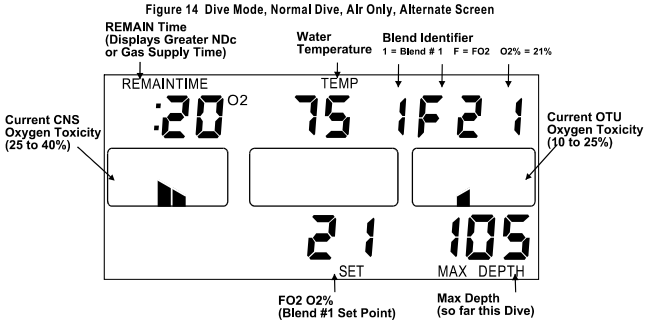


Figure 14a Dive Mode, Normal Dive, FO2 Mode, Alternate Screen

The Alternate Screen will display the current FO_2 value that the unit is using in its NDC calculations, the current CNS and OTU values and the Maximum Depth. (Figure 14 & 14a)

A Depth Alarm, which can be set to warn the diver should a certain depth be exceeded, is set at 130 feet from the factory. The Depth Alarm issues an audible alarm and the "WARNING" legend and Depth Digits will flash on and off for five seconds and be repeated ever two minutes while below the user set depth. The depth alarm is disabled if in the Decompression Mode since flashing depth digits have another meaning in this Mode.

The maximum depth achieved on the current dive is shown as "MAX DEPTH". This is updated once per second.

"REMAIN TIME" (NDC) is the remaining time (in hours and minutes) that the diver can stay at the current depth without requiring decompression. A "Two Minute Warning" will be issued when this time reaches two minutes or less. An audible alarm will be issued and the "WARNING" legend and "REMAIN TIME" digits will flash. By immediately ascending to a shallower depth, the diver may avoid a required decompression stop.

"REMAIN TIME" (O2) is the remaining time (in hours and minutes) that the diver's Gas supply will last until the User Set Reserve is reached (normally 500 psi). A "Warning" will be issued when this time reaches zero. An audible alarm will be issued and the "WARNING" legend and "REMAIN TIME" digits will flash.

Temperature is measured for two purposes. One is to compensate the Depth Transducer for Temperature variations. The other is to compensate the Nitrogen algorithm for changes in Temperature that may affect the body. Both of these purposes require that the Temperature be very slow reacting, just like the Depth Transducer and the body. This slow-reacting Temperature is what is displayed. For Temperature effects on the body, the amount of compensation can be set from NORMAL to REDUCED with the Analyst® PC software Interface, if the diver is using a good dry-suit in cold water. Temperature compensation starts at 75 degrees F and gets progressively more conservative as the temperature decreases. There is no compensation above 75 degrees F.

Bottom Time will begin once the LIFEGUARD® senses that the diver has descended below five feet (see Training Mode) and continues until the diver has ascended above three feet. The maximum Bottom Time displayed is 9 hours 59 minutes.

ASCENT RATE BAR GRAPH:

The Ascent Rate bar graph and alarms are active in both the Dive Mode and Decompression Mode. The five-segment bar graph is used to display the diver's rate of ascent.

Via the Analyst® PC Interface, the Ascent Rate Alarms and Bar Graph can be set to the users preferences.

The first option is a VARIABLE-BY-DEPTH Ascent Rate. When selected on, the Ascent Rate Alarm is determined by depth. As the diver ascends to shallow depths, the Maximum Ascent Rate is lowered. The Maximum Ascent Rates and their associated depth are:

60 feet or deeper	60 feet per minute
60 to 30 feet	feet per minute equal to the depth
Less than 30 feet	30 feet per minute

If VARIABLE-BY-DEPTH is off, the Maximum Ascent Rate Alarm and Bar Graph is specified by the user and can be from 20 to 60 fpm, in one-foot increments.

Another selection is the bar graph itself. The two selections are either FIXED or PROPORTIONAL.

With FIXED, each of the five bars indicates an additional 10 feet per minute of Ascent Rate regardless of the Maximum Ascent Rate selected.

With PROPORTIONAL, each of the five bars indicates 20% (one-fifth) of the selected Maximum Ascent Rate.

For FIXED, the maximum ascent rate is 60 feet per minute. With this setting, the ASCENT RATE legend will illuminate but no bars will be illuminated if a diver is ascending at a rate less than 10 feet per minute.

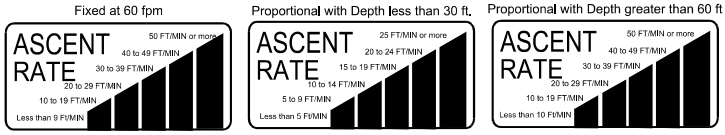


Figure 17 Ascent Rate Bar Graph

If the diver has an Ascent Rate that exceeds the selected maximum, the tallest Ascent Rate Bar Graph will flash, and the audible alarm will sound once per second, and the WARNING legend will illuminate.

The sensitivity or responsiveness of the Ascent Rate may be selected via the Analyst®, eight different levels of sensitivity are available.

NOTE: Customizing the Ascent Rate and Ascent Rate Bar Graph are among many of the additional programmable features available when using the Analyst® PC Interface. Available features are described in the section "USER CONFIGURABLE OPTIONS".

As shipped from the factory, the Ascent Rate is set for VARIABLE-BY-DEPTH AND PROPORTIONAL.

DECOMPRESSION MODE – AIR ONLY/SINGLE GAS NITROX:

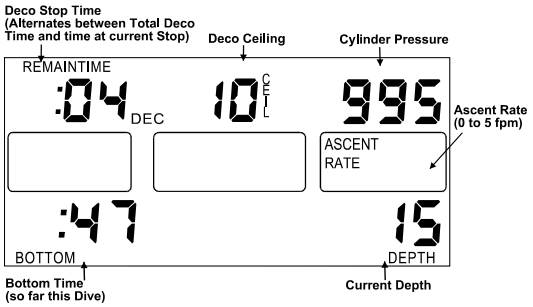


Figure 15 Dive Mode, Deco Dive, Air Only, Primary Screen

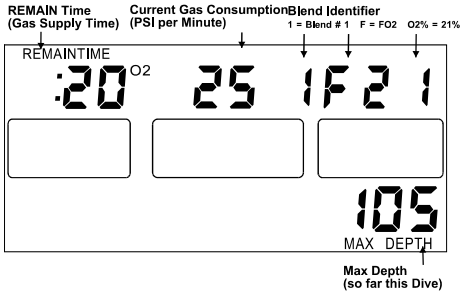


Figure 16 Dive Mode, Deco Dive, Air Only, Alternate Screen

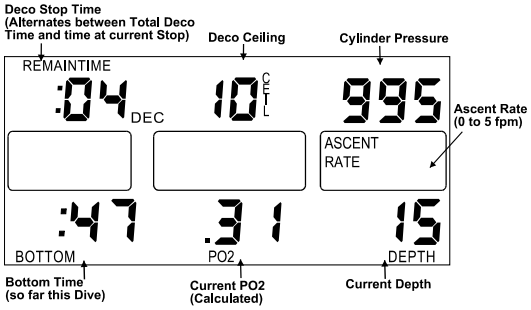


Figure 15a Dive Mode, Deco Dive, FO2 Mode, Primary Screen

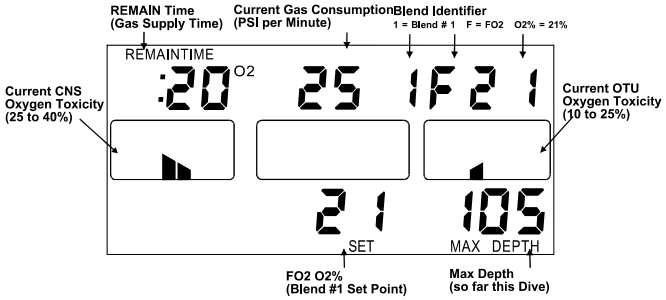


Figure 16a Dive Mode, Deco Dive, FO2 Mode, Alternate Screen

Should a no-decompression limit be overstayed, the LIFEGUARD® will enter the Decompression Mode. In this mode, the Ceiling digits will display the depth at which the diver must stop and not ascend above during final ascent. The “TEMP” legend and two digits will be replaced with the “CEIL” legend and two digits. The Ceiling will start at 10 feet and increase in ten-foot increments as the diver remains at a relatively deep depth. If a Ceiling of greater than 90 feet is calculated the Ceiling display will flash to indicate that the displayed Ceiling is divided by 10, i.e. 10 flashing = 100 feet, 11 flashing = 110 feet, etc.

The Remaining No-decompression Time and “NDC” legend will be replaced with Decompression Time and “DEC” legend (Figure 15). Both STOP time and TOTAL time are displayed in the upper left hand three digits of the screen in hours and minutes. STOP and TOTAL time will alternate at the rate of once every two seconds. In this way, the diver can view the time to spend at a particular STOP depth, and the TOTAL time it will take to complete all STOPS. Clearly, the larger of the two alternating numbers is the Total Decompression Time of all stops, and the smaller of the two numbers is the time required at the current stop. At the ten-foot stop, the TOTAL and STOP times may be the same and therefore appear to not alternate.

When at a specific stop, the required decompression time at that stop is as shown, and will appear to count down as it is recomputed every second, based on the divers exact current depth. The Decompression times (both Stop and Total) are accurate only if the divers’ depth is exactly the same as the required Ceiling. However, it is not necessary to be precisely at that specified Ceiling. Appropriate In-gassing or Out-gassing will be computed regardless of the divers’ current depth.

A small margin shallower than the Ceiling also exists. Should a Ceiling be ‘violated’ (diver is shallower than Ceiling), the “WARNING” legend will illuminate and flash along with the Depth and Ceiling digits. An Audible alarm will sound once every two seconds. This warning will continue until the Depth has been corrected. Out-gassing will continue even though the diver is shallower than the Ceiling. There is no ‘Gauge’ mode or ‘Lockout’ on the LIFEGUARD®.

The Total Decompression time forecast at depth is based on the User Configured ‘Ascent Rate for Deco Prediction value’ the factory setting is 60 fpm. If the diver ascends faster or slower than this value the actual deco forecast times could vary. Regardless of the effects of the ascent rate, the decompression time forecasted at the deepest stop is accurate.

If the diver surfaces before satisfying his decompression obligation, the LIFEGUARD® will continue to give out-gassing credit as if it were in a dive, but at a depth of zero feet and will satisfy the decompression time requirements of the required stops using an FO_2 of 21%. The unit will continue to log data and perform as if actually in a dive. When the decompression obligation is finally satisfied, the ten-minute “PostDive Interval” will begin.

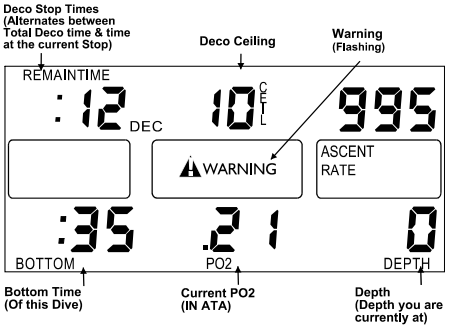


Figure 15c Decompression Mode, At Zero Depth

NOTE: COCHRAN does not intend for this instrument to be used for deliberate Decompression diving.

POST DIVE INTERVAL:
During the first ten minutes (or up to thirty if the unit is in the Training Mode) after a dive, the LIFEGUARD® WU is in the Post Dive Interval. The flashing "SURF" legend and a Surface Time of less than ten minutes indicate this. Should another dive be commenced before the completion of the Post Dive Interval, that dive will be considered an extension of the previous dive. In this case, Bottom Time will NOT include the time spent on the surface in this Post Dive Interval. However, when reviewing the profile with the Analyst®, the time spent on the surface in this period will be shown.

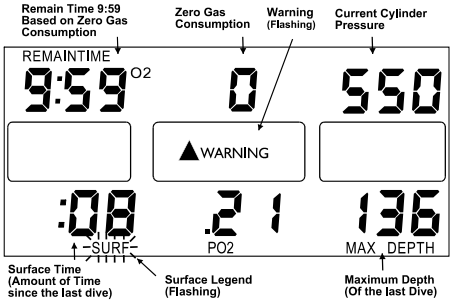


Figure 21 Post Dive Interval (Typical)

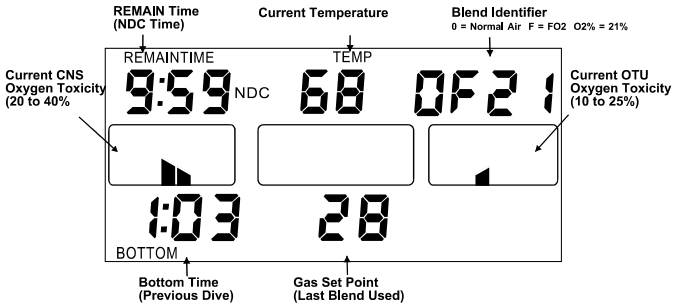


Figure 21a Post Dive Interval, Alternate Screen (Typical)

CONFINED WATER PROTOCOL (Training Mode): The LIFEGUARD® is one of the first dive computers to offer an operating mode designed to record and store data from training dives. That is, dives performed in shallow water environments (swimming pools, shallow lakes, lagoons, etc.) or calm open water environments that have less than 1-foot seas. In the Training Mode, the LIFEGUARD® enters the Dive Mode at a depth of 2 feet instead of 5 feet and will exit the Dive Mode at 1 foot instead of 3 feet. Also the Post Dive Surface Interval may be extended, via the Analyst® from10 minutes up to a maximum of 30 minutes in 1-minute increments after which the dive data is stored in the computer's memory. These changes permit the Instructor to record the complete training session, including in-water surface periods, as a single dive. **The Training Mode can only be enabled/disabled via the Analyst® PC Interface**.

TACLITE™: The LIFEGUARD® wrist unit is equipped with the TACLITE™ tactical low-light fiber-optic backlighted display. The standard TACLITE™ color is night vision safe red, but it is also available in yellow for those individuals who have night vision difficulties with the color red. The TACLITE™ can be activated on demand. To turn the TACLITE™ on, tap the face of the LIFEGUARD® and the TACLITE™ will turn on for

the preprogrammed number of seconds (1 to 98), then turn off. By tapping the face again the TACLITE™ will turn on again. In this fashion the TACLITE™ can be kept on for as long as wanted. If 0 is entered, the TACLITE™ will never turn on. If 99 is entered the TACLITE™ will stay on continuously and only turn off when the LIFEGUARD® does. The number of seconds that the TACLITE™ stays on can be set via the Programming Mode, factory setting is 10 seconds. The TACLITE™ will turn off when the LIFEGUARD® turns off. If the batteries get too low, the TACLITE™ will turn off and cannot be turned back on until fresh batteries are installed.

NOTE: The TACLITE™ will not activate when the WU is in the programming mode or if all three touch contacts are wet and the unit is not in a dive.

TOUCH PROGRAMMING MODE: The CPU Unit and/or Wrist Unit can only be Touch Contact Programmed when the unit(s) are in the Surface Interval and have zero cylinder pressure. Touch Contact Programming allows the user to view or program into the:

CPU Unit:
- Select the PO_2 or FO_2 Operating Mode
- The PreDive Prediction Mode
- Displaying Mode, mode value, CNS, OTU, CPU battery voltage
- A Maximum Depth Alarm
- An Added degree of Conservatism from 0 to 50%
- Setting oxygen percentage of blend 1 in the Constant FO_2 Mode
- Setting the Normal PO_2 set point in the Constant PO_2 Mode
- Setting the Blend #2 FO_2 oxygen percentage
- Setting the Deco Blend FO_2 oxygen percentage
- Setting the Deco PO_2 set point in the Constant PO_2 Mode
- Setting the Deco Bottom Time Benchmark
- Setting the Deco Depth Benchmark

Wrist Unit
- Displaying Mode, mode value, CNS, OTU, WU & CPU battery voltages
- Programming the On Time for the TACLITE™

NOTE: While all LIFEGUARD® configurations share certain programming features others are dependent upon the specific configuration of the unit. Refer to the appropriate manual section for the relevant programming menu items.

TOUCH PROGRAMMING MODE:

NOTE: To enable the Programming Mode, the LIFEGUARD® must be on the Surface, not in the Post Dive Interval and cylinder pressure must be zero.

NOTE: All audible and visual alarms are suspended while the LIFEGUARD® is in the Programming Mode. Upon exiting the Programming Mode all alarms are reactivated.

NOTE: Once a value has been changed and the next menu option selected, the new value is stored.

NOTE: It is strongly recommended that the Programming Mode is activated again and a complete review of what was stored is accomplished.

NOTE: If the LIFEGUARD® is left in the Programming mode for five minutes without the contacts being touched, the unit will automatically exit the Programming Mode and return to the Surface Interval. Once this occurs the LIFEGUARD® will retain the modified programmed settings that have been stored. Options that have not been modified will retain their previous settings.

TOUCH PROGRAMMING MODE - PROCEDURE:

CPU and WU contacts 1, 2, & 3 are for programming sequences. Regardless if programming the LIFEGUARD® Tank Unit or the Wrist Unit the procedure is the same.

To begin the programming sequence:

1. Analyze the gas blend(s) using a calibrated Oxygen Analyzer (for Nitrox enabled units).
2. Turn the Tank Unit and Wrist Unit on.
3. Using a coin or other conductive metal object, briefly bridge Contacts 1 and 2 until a short beep is heard and the Programming Menu is seen on the display. The Programming Menu options depend on whether the unit is activated for Clock, Nitrox, the number of Gas Blends, and if the unit is in the PO2 or FO2 mode. The Menu options are displayed in sequence, incrementing to the next selection each time that Contacts 1 & 2 are bridged with a **coin**. The program option is displayed on the upper row of the display. The current setting for this option is displayed in the lower right of the display.
4. To reprogram the displayed menu values, bridge Contacts 1 & 2 with wetted fingers. This will cause the current setting to flash or in the case of multi-digit numbers, the least significant digit will flash. The clock will toggle between on and off.
5. Using a coin or other conductive metal object, bridge Contacts 2 & 3 to increment the numeric value. A confirmation beep will sound with each increment.
6. Next using wetted finger, bridge Contacts 1 & 2 to select the next digit, once selected the digit will flash to identify that it is being programmed. Bridge Contacts 2 & 3 till the desired value is displayed.
7. Repeat step 5 until all digits have been programmed.
8. To save the changes that have been made bridge Contact 1 & 2 with a coin or other conductive metal object. Once the next programming option is displayed the changes have been saved.

All programming sequences use the same routine of using Contacts 1 and 2 to SELECT the next programming sequence and Contacts 2 and 3 to INCREMENT the specified value.

PROGRAMMING MENU - WRIST UNIT:

The following table lists the various programming choices with their display identification and figure number, it should be noted that the Wrist Units programming choices are always the same regardless of how the LIFEGUARD® is configured.

Identification	Description	Figure	Page
InF	Misc. Information	89	17
TAc dL	TACLITE™ On Time, Allowed value 00 to 99	98	17

TOUCH PROGRAMMING - WU - INFORMATION DISPLAY:

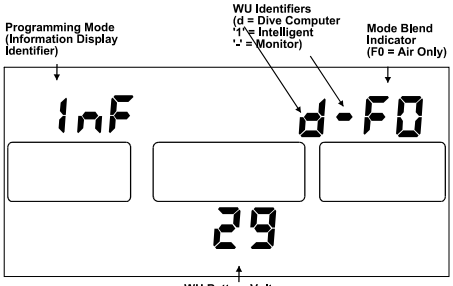


Figure 89a Programming Mode, WU, Air Only Information Display

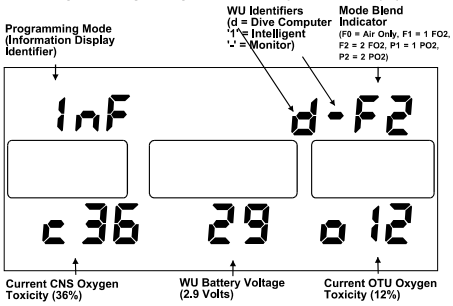


Figure 89b Programming Mode, WU, FO2 or PO2 Information Display

The InFormation display is accessed via the Programming Mode. The information presented will depend on the configuration of the dive computer. The information in the upper right of screen indicates whether unit is in the Constant FO2 or PO2 Mode and the number of gas blends the unit is enabled for. The following table lists the identification and the description.

Identifier	Description
F0	Air only
F1	Single Blend Nitrox, 21 to 50%
F2	Two Blend Nitrox, 21 to 50% and 21 to 99.9%
F3	Three Blend Nitrox, 21 to 50% and two 21 to 99.9%
P1	Single Blend PO2, 0.5 to 1.5 ata
P2	Dual Blend PO2, 0.5 to 1.5 ata and 0.5 to 1.5 ata

The WU Battery voltage is displayed in the lower center of the screen as a two-digit number with a decimal point. If the unit is configured for Constant FO2 (Nitrox) or Constant PO2, the screen will display CNS, OTU and battery voltage. The CNS exposure level is displayed on the lower left as a two-digit number proceeded by a lower case “c”. The OTU value is displayed on the lower right again as a two-digit number but preceded by a lower case “o”. Both the CNS and OTU values are expressed as percentages. Figure 89a displays an Air Only InFormation screen while Figure 89b displays a typical InFormation screen for a unit that is enabled for two nitrox blends.

PROGRAMMING MENU - CPU - AIR ONLY:

The ANALYST® Personal Computer Interface allows the user to enable or disable the second and therefore the third gas mix and enable or disable the constant PO2 functions; the following table lists the various programming choices with their display identification and figure number.

Identification		Description	Figure	Page
PdP		PreDive Prediction	35	17
InF		Misc. Information	36	17
dEP	AL	Depth Alarm, Max value is 420 feet	37	17
Con		Added Conservatism, Max allowed value is 50%	38	17
Ltr		Cylinder Size in liters, Allowed values 00 to 99	39	17

CPU PROGRAMMING MENU - CPU - SINGLE GAS NITROX:

The ANALYST® Personal Computer Interface allows the user to enable or disable the second and therefore the third gas mix and enable or disable the constant PO2 functions; the following table lists the various programming choices with their display identification and figure number.

Identification		Description	Figure	Page
PdP		PreDive Prediction	35	17
InF		Misc. Information	36	17
dEP	AL	Depth Alarm, Max value is 320 feet.	37	17
Con		Added Conservatism, Max allowed value is 50%.	38	17
Ltr		Cylinder Size in liters, Allowed values 00 to 99	39	17
EAn	1	Oxygen percentage of Blend, Allowed values 21.0 to 50.0	40	17

TOUCH PROGRAMMING - CPU - PREDIVE PREDICTION:

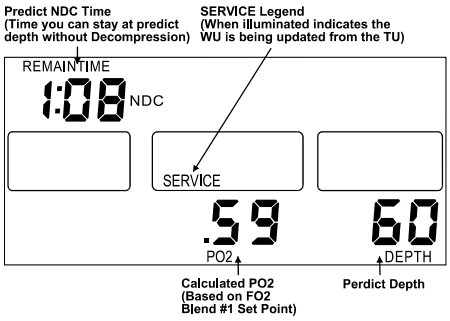


Figure 06 PreDive Prediction, Air or FO2 Mode

PreDive Prediction is accessed via the Touch Contact Programming Menu. This enables the diver to view the PreDive Prediction information at the touch of the Contacts. The PreDive Prediction of the LIFEGUARD® starts at 30 feet and increases in 10 feet increments. PreDive Predictions will terminate when the No-Decompression (NDC) time prediction reaches two minutes or a maximum depth of 320 feet is reached. Additional Conservatism, Residual Nitrogen, blend #1 oxygen percentage and Barometric Altitude can affect PreDive Predictions. During the PreDive Prediction Mode, the unit will compute and display the maximum safe time and the calculated PO_2 value at that depth. Once the maximum PreDive Prediction depth has been reached the unit will return to the Surface Interval.

TOUCH PROGRAMMING - CPU - INFORMATION DISPLAY:

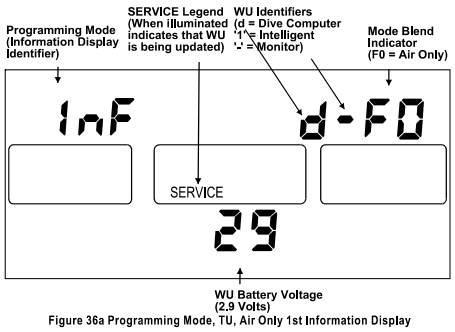


Figure 36a Programming Mode, TU, Air Only 1st Information Display

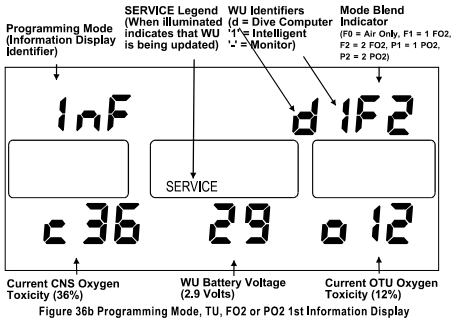


Figure 36b Programming Mode, TU, FO2 or PO2 1st Information Display

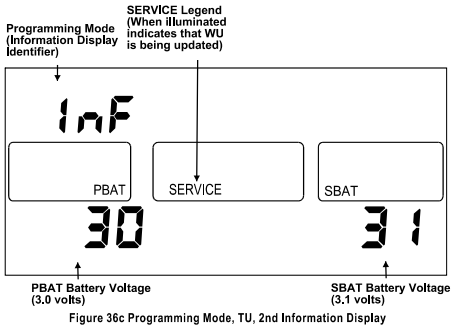


Figure 36c Programming Mode, TU, 2nd Information Display

The InFormation display is accessed via the Programming Mode. The InFormation display contains two screens, to switch between the two screens bridge Contacts 1 & 2 with wetted fingers. The information presented will depend on the configuration of the dive computer. The information in the upper right of first screen indicates whether unit is in the Constant FO2 or PO2 Mode and the number of gas blends the unit is enabled for. The following table lists the identification and the description.

Identifier	Description
F0	Air only
F1	Single Blend Nitrox, 21 to 50%
F2	Two Blend Nitrox, 21 to 50% and 21 to 99.9%
F3	Three Blend Nitrox, 21 to 50% and 21 to 99.9%
P1	Single Blend PO2, 0.5 to 1.5 ata
P2	Dual Blend PO2, 0.5 to 1.5 ata and 0.5 to 1.5 ata

WU Battery voltage is displayed in the lower center of the first screen as a two-digit number with a decimal point. If the unit is configured for Constant FO2 (Nitrox) or Constant PO2, the screen will display the current CNS, OTU and battery voltage. The current CNS exposure level is displayed on the lower left as a two-digit number proceeded by a lower case “c”. The current OTU value is displayed on the lower right again as a two-digit number but preceded by a lower case “o”. Both the CNS and OTU values are expressed as percentages. CPU Battery voltage is displayed on the second screen under the PBAT and SBAT legends. Figure 36a displays an Air Only InFormation screen while Figure 36b displays a typical InFormation screen for a unit that is enabled for two nitrox blends. Figure 36c displays a typical second screen.

TOUCH PROGRAMMING - CPU - DEPTH ALARM: The Depth Alarm allows the diver to select a maximum depth below, which the diver does not wish to descend before an alarm is issued. This depth can be set from 0 to 320 feet in one-foot increments.

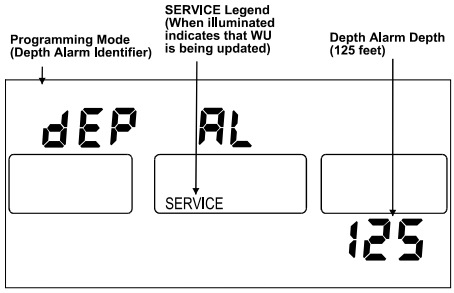


Figure 37a Programming Mode, TU, Setting Depth Alarm

TOUCH PROGRAMMING - CPU - CONSERVATISM: This programming function allows the diver to input an added degree of Conservatism into the LIFEGUARD®'s nitrogen algorithm. Via Touch Programming the Conservatism can be set from 0 to 50%.

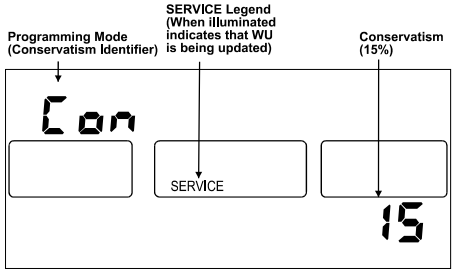


Figure 38a Programming Mode, TU, Setting Conservatism

TOUCH PROGRAMMING - CPU - CYLINDER SIZE: This programming function allows the diver to input the size of the all of the connected cylinders into the Workload portion of the LIFEGUARD®'s nitrogen algorithm. Via Touch Programming the Cylinder Size can be set from 0 to 99.

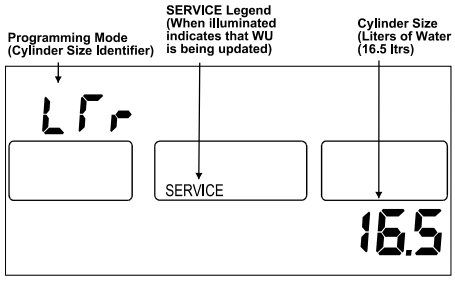


Figure 39a Programming Mode, TU, Setting Cylinder Size

TOUCH PROGRAMMING - CPU - BLEND #1:
The oxygen percentage of Blend #1 can be programmed from 21.0% to 50.0%. Once programmed the oxygen percentage will remain at the value programmed until changed by the user.

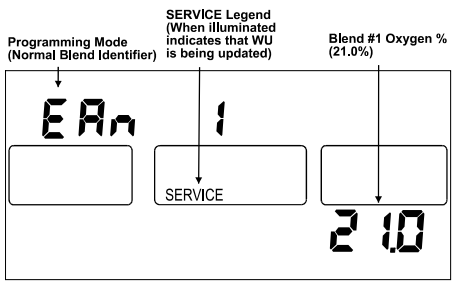


Figure 40a Programming Mode, TU, Setting Normal Blend O2%

WARNING INDICATIONS: Failure to observe audible and/or visual warnings and take corrective action may result in injury or death.

- If the diver is ascending faster than the selected maximum ascent rate, then the top bar of the ascent bar graph will flash and the "WARNING" legend will illuminate. The unique high to low audible sweep alarm will continue to sound once per second until the situation is corrected.
- If the diver descends below the user set Depth Alarm, the Depth digits will flash. A single beep audible alarm will sound once per second for five seconds and will repeat every two minutes. The Depth alarm is not active in the Decompression Mode to avoid confusion with the "Shallower Than Ceiling" alarm.
- If the CPU battery voltage goes below 2.1 volts, the "PBAT" and/or "SBAT" legends will illuminate.
- If the WU battery voltage goes below 2.2 volts, both the "PBAT" and "SBAT" legends will illuminate
- If the cylinder pressure approaches the user set minimum pressure (300 psi to 1500 psi) the "WARNING" legend will illuminate and the Cylinder Pressure digits will flash. A single beep audible alarm will sound once per second for five seconds and will repeat every two minutes.
- If the diver's Gas Consumption Rate is greater or lower than the user set limits the "WARNING" legend will illuminate and flash along with the Gas Consumption Digits. A single beep audible alarm will sound once per second for five seconds and repeat every two minutes until the Gas Consumption Rate is back within the specified range. The Gas Consumption Alarm is only active when the computer is using blend #1, once the switch is made to blend #2 or #3 the alarm is disabled.
- If the diver has less than two minutes of No-Decompression Time (NDC) remaining, the "WARNING" legend will illuminate and flash along with the Remaining NDC time digits. A single beep audible alarm will sound once per second for five seconds and repeat every two minutes.
- If the diver enters the Decompression Mode, a single audible alarm will sound once per second for five seconds.
- During a Decompression Dive, if the Depth is less than the CEILING, the "WARNING" legend will illuminate and flash along with the Depth and Ceiling digits. A unique high to low audible sweep alarm will continue to sound once every two seconds until the situation is corrected.
- During a Decompression Dive, if based on the current Gas Consumption Rate there is less gas in the cylinder than that required to complete five minutes of decompression, the "WARNING" legend will illuminate and flash along with the Cylinder Pressure and DEC REMAIN time digits. A single beep audible alarm will sound once per second for five seconds and repeat every two minutes.
- If the dive computer determines that either the Depth, Temperature or High Pressure sensor is malfunctioning. The "WARNING" legend will illuminate, the computer will also issue a 5-beep two-tone audible alarm once every two minutes to alert the diver to this condition. On the Appropriate Screen the Maximum Depth will be replaced with "S-C" to indicate the high-pressure transducer, "S--" to indicate the low-pressure transducer or "S-t" for the temperature.
- For High PO2, see "**OXYGEN TOXICITY FACTORS**" on page 10.
- For High CNS, see "**OXYGEN TOXICITY FACTORS**" on page 10.
- For High OTU, see "**OXYGEN TOXICITY FACTORS**" on page 10.

SENSOR WARNING: The LIFEGUARD® CPU has the capability of monitoring the integrity of its' sensors both the low-pressure (depth/altitude), the temperature and the high-pressure (cylinder pressure). When the computer detects an error in one of the transducers, the diver is alerted to this condition by the illumination of the "WARNING" an "SENSOR" legends. The computer will also issue a 5-beep two-tone audible alarm once every two minute to alert the diver to this condition. In the case of a sensor failure the Maximum Depth will be replaced with "S--" to indicate the low-pressure transducer or "S-t" for the temperature transducer or "S-C" to indicate the high-pressure transducer. The "WARNING" legend, along with the Temperature digits, or the Depth digits or the Cylinder Pressure digits and the error code will flash once per second. In the highly unlikely situation were two or more sensors are detected as having errors; the display will alternate between the error codes. This warning will be issued whether the computer is in the Surface Interval, Dive Mode, Decompression Mode or Post Dive Interval. The sensor error code will always replace the Max Depth Digits. In the unlikely case that your computer issues one of these warnings the unit should be returned to the factory for evaluation and/or repair.
Figure 28 & 29 show a CPU Sensor Warning, in this case a temperature Sensor, as it would be displayed in the Dive Mode. If the Sensor Warning is for the depth sensor it would display "S--" or if it was for the high-pressure sensor it would display "S-C".

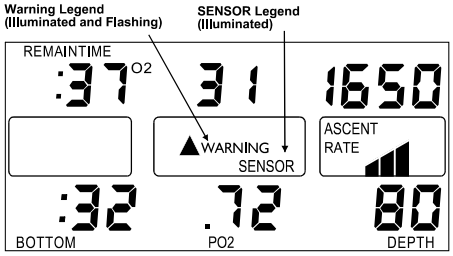


Figure 28 Dive Mode, Sensor Warning, Typical, Primary Screen

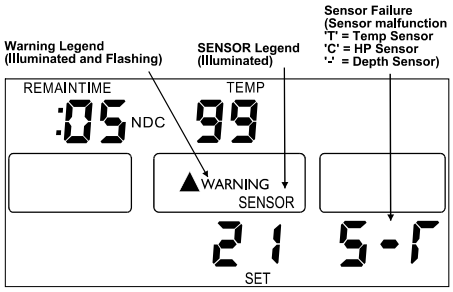


Figure 29 Dive Mode, Sensor Warning, Typical, Alternate Screen

OXYGEN TOXICITY FACTORS: The LIFEGUARD® has the ability to track Oxygen Toxicity levels for the Central Nervous System (CNS) as well as the Mission Oxygen Tolerance Units Dose (OTU). In addition, a maximum Partial Pressure of Oxygen (PO2) warning alarm can also be set. While most other audible alarms of the dive computer consist of five long beeps, the CNS, OTU, and PO_2 have a distinctive audible alarm that consists of short double-beeps that sound once per second for five seconds.
As long as one or more of these three parameters is outside its limits, the "O2TOX" legend will be illuminated and the "WARNING" legend will continue to flash and the audible alarm will be repeated once every two minutes. These three functions are not active if the NITROX capability is disabled via the Analyst® PC Interface.

PARTIAL PRESSURE OF OXYGEN (PO2): High levels of PO_2 can cause severe Oxygen poisoning. Widely different levels of PO2 can affect individual divers. The user via the Analyst® can set the PO_2 alarm to any level between 0.50 ATA and 1.59 ATA. As shipped from the factory, this is set to 1.40 ATA. Should the PO_2 be above the alarm set point, the "WARNING" legend will illuminate and the audible alarm will sound and the displayed PO_2 value will flash.

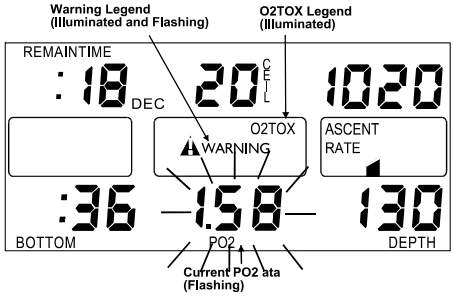


Figure 25 Dive Mode, Deco Dive, FO2 Mode, PO2 Warning, Primary Screen

CENTRAL NERVOUS SYSTEM (CNS) TOXICITY: The user via the Analyst® can set the CNS Toxicity alarm to any level between 40% and 80% of the maximum allowable limit. As shipped from the factory, this is set to 50%. Should the CNS Toxicity reach 50% of the maximum allowable, the "WARNING" legend will illuminate and the audible alarm will sound and on the Alternate Screen the CNS display graph will be flashing along with the "WARNING" legend.

By the accepted definition of CNS toxicity, should a PO_2 value of greater than 1.6 ATA be measured; the CNS Toxicity will be 100%. When the CNS exposure graph is viewed via the Analyst® it will show what the CNS exposure would have been if the diver had not exceeded a PO_2 of 1.60. The ending statistics for the dive will show a 100% CNS exposure. The CNS beginning statistic for the following dive will be based on the recovery time from 100%. The beginning value on the CNS graph and the statistical value will be based on this value. During the Surface Interval, this percentage will decrease as the CNS declines toward zero. Whatever the current CNS Toxicity level, it can also be viewed on the Surface Interval Alternate Screen or on the InFormation screen in the Programming Mode.

OXYGEN TOLERANCE UNITS (OTU): An issue with long term breathing of higher partial pressures of Oxygen above 0.5 ATA is Pulmonary Oxygen Toxicity or sometimes called WHOLE BODY, which must be tracked properly. The LIFEGUARD® tracks OTU based on Dr. Bill Hamilton's 'REPEX' method of oxygen exposure management. The OTU Dose is an exponential function of oxygen partial pressure and time.

The time-dependent limit varies with length of time (days) that the diver continues to dive without full recovery to zero OTU. The Mission OTU Clock tracks the OTU, which is a running clock that tracks long-term Oxygen exposure. This clock may run for several weeks if frequent dives are made using high levels of PO_2. The current Mission Clock, CNS, and OTU can be seen via the Analyst® PC interface or the current CNS and OTU values can be viewed on the Alternate Screen while in the Surface Interval, Dive Mode, Decompression Mode or Post Dive Interval. The current CNS and OTU values can also be viewed via the Touch Contact Programming mode by selecting the InFormation option. The recovery portion of the OTU algorithm is a linear reduction of OTU over time. The Mission OTU clock is reset to 0:00 when the OTU Dose reaches zero.

The user via the Analyst® can set the OTU Toxicity alarm to any level between 40% and 80% of the maximum allowable limit. As shipped from the factory, this is set to 50%. Should the OTU Dose reach 50% of the maximum allowable, the "WARNING" legend will illuminate and the audible alarm will sound and on the Alternate Screen the displayed OTU value graph will be flashing along with the "WARNING" legend.

Symptoms of Pulmonary Oxygen Toxicity include burning in the throat and chest, coughing, and shortness of breath. Discontinue diving and consult a Physician should any of these, or other, symptoms appear.

Figure 25a & 26 show a CNS & OTU exposure over the alarm set point (50%).

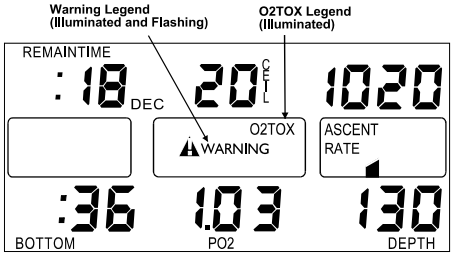


Figure 25a Normal Dive, FO2 Mode, CNS/OTU Warning, Primary Screen

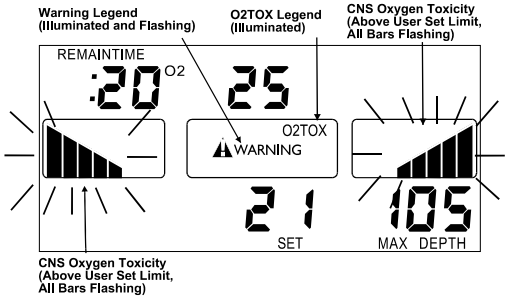


Figure 26 Deco, FO2/PO2 Mode, CNS/OTU Warning,Alternate Screen

CNS BAR GRAPH:

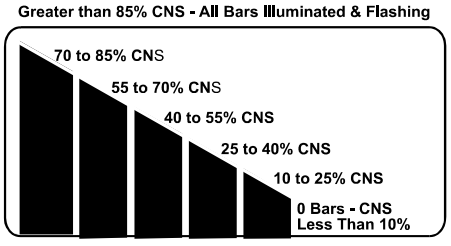


Figure 18 CNS Bar Graph

The percentages indicated are for reference only. They do not appear on the WU display.

OTU BAR GRAPH:

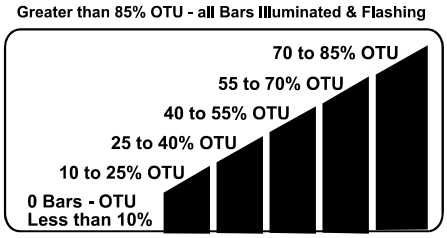


Figure 19 OTU Bar Graph

The percentages indicated are for reference only. They do not appear on the WU display.

LIFEGUARD® - TWO GAS NITROX

OVERVIEW: This configuration of the LIFEGUARD® is capable of being used for two different Nitrox mixtures on the same dive. The first gas or Normal Blend is programmable from 21% to 50% Oxygen in 0.1% increments while Blend #2 can be programmed from 21% to 99.9% Oxygen again in 0.1% increments. Both Blends are set at the factory to 21% Oxygen and use this in its decompression algorithm. PRIOR to diving an Enriched Air Nitrox gas blend, the unit must be programmed accordingly. This can be done via the Touch Contacts or via the Analyst® PC Interface.

GAS BLEND SWITCHING: This configuration of the LIFEGUARD® is capable of FO_2 to FO_2 gas Blend switching. While most other Nitrox dive computers limit the diver to the use of a single gas blend or percentage of oxygen, the LIFEGUARD® allows the diver to use two different gas blends during a dive. These two gas blends are commonly referred to as the Normal or Bottom Gas Blend and the Decompression Gas Blend. Commonly, the Bottom Gas blend is used from initial entry into the water and for most of the time spent during the dive. The Normal Gas Blend is restricted to a maximum of 50% oxygen. The Decompression Gas Blend (Deco Blend) is used only for decompression purposes and can go to 99.9% oxygen content.

Typically, the Deco Blend is in a cylinder that is suspended at some relatively shallow depth beneath the surface.

The automatic gas switching occurs:

1. With the CPU attached to the cylinder containing Blend #1, the CPU continually "senses" a drop in cylinder pressure until the diver is prepared to switch to the cylinder contain Blend #2.
2. Once the diver is breathing from the Blend #2 cylinder, the CPU no longer senses a drop in cylinder pressure from the Blend #1 cylinder and automatically changes its algorithm to the Blend #2 O_2 percentage.
3. If the diver returns to breathe from the Blend#1 cylinder the CPU will automatically switch back to the Blend #1 O_2 percentage.

If Blend switching is NOT desired, it may be disabled via the Analyst®. Setting both Blends to the same percentage of Oxygen is the same as disabling the second Blend.

NOTE: If the diver is using large capacity cylinders and is supplying inflation gas from the Mix1 cylinder for the BC and Dry Suit, and is breathing on Mix 2 or 3. It is possible to cause the dive computer to momentarily perform a mix switch when the BC or Dry Suit is inflated. It is highly recommended that the diver carry a separate gas supply for Dry Suit inflation or have the gas supplied from the second mix cylinder.

SURFACE INTERVAL - TWO GAS NITROX:

The Surface Interval for the Two Gas Nitrox configuration is the same as the Single Gas Nitrox, refer to page 3.

DIVE MODE - TWO GAS NITROX:

The Dive Mode for the Two Gas Nitrox configuration is the same as the Single Gas Nitrox, refer to page 4.

In the Dive Mode the Alternate Screen will display the current oxygen percentage that is being used in the NDC calculations, after a gas switch the unit will display Blend #2 O_2 %.

DECOMPRESSION MODE - TWO GAS NITROX:

The Decompression Mode for the Two Gas Nitrox configuration is the same as the Single Gas Nitrox refer to page 5.

If the diver surfaces before satisfying his decompression obligation, the LIFEGUARD® will continue to give out-gassing credit as if it were in a dive, but at a depth of zero feet. The unit will continue to log data and perform as if actually in a dive. The unit will decompress as if it were actually at the various required decompression stops using an FO_2 of 21%. When the decompression obligation is finally satisfied, the ten-minute "Post Dive Interval" will begin and the dive will terminate in ten minutes.

The Deco Forecast will be based on the Normal Blend, but if a Gas switch does occur the dive computer will update the decompression times to reflect the change in gas.

POST DIVE INTERVAL - TWO GAS NITROX:

The Post Dive Interval is the same as in the Single Gas Nitrox; refer to page 5 for detailed information, except that if the unit has performed a gas switch. While in the Post Dive Interval the Alternate Screen will display the Oxygen percentage of the Deco Gas Blend. If the diver re-enters the Dive mode the unit will perform its' calculations based on the 2nd Gas Blend Oxygen percentage until the diver descends and begins using the Blend #1 gas supply. The unit will then revert to the Normal Gas Blend for the NDC calculations.

PROGRAMMING MODE - TWO GAS NITROX

The programming procedure is the same as Single Gas Nitrox refer to page 7.

PROGRAMMING MENU - TWO GAS NITROX

The ANALYST® Personal Computer Interface allows the user to enable or disable the second and therefore the third gas mix and enable or disable the constant PO2 functions; the following table lists the various programming choices with their display identification and figure number.

Identification		Description	Figure	Page
PdP		PreDive Prediction	35	17
InF		Misc. Information	36	17
dEP	**AL**	Depth Alarm, Max value is 320 feet	37	17
Con		Added Conservatism, Max allowed value is 50%	38	17
Ltr		Cylinder Size in liters, Allowed values 00 to 99	39	17
EAn	**1**	Oxygen percentage of Blend, Allowed value 21.0 to 50.0	40	17
EAn	**2**	Blend #2 Oxygen percentage, Allowed value 21.0 to 99.9	41	18

NOTE: If the LIFEGUARD® is left in the Programming mode for five minutes without the contacts being touched, the unit will automatically exit the Programming Mode and return to the Surface Interval. Once this occurs the LIFEGUARD® will retain the modified programmed settings that have been stored. Options that have not been modified will retain their previous settings.

TOUCH PROGRAMMING - PREDIVE PREDICTION - TWO GAS NITROX: The PreDive Prediction for the Two Gas Nitrox is the same as the Single Gas Nitrox refer to page 8.

TOUCH PROGRAMMING - INFORMATION DISPLAY - TWO GAS NITROX: The InFormation display for the Two Gas Nitrox is the same as the Single Gas Nitrox refer to page 8.

TOUCH PROGRAMMING - DEPTH ALARM - TWO GAS NITROX: The Depth Alarm Programming Procedure is the same as the Single Gas Nitrox refer to page 9.

TOUCH PROGRAMMING - CONSERVATISM - TWO GAS NITROX: The added Conservatism Programming Procedure is the same as the Single Gas Nitrox refer to page 9.

TOUCH PROGRAMMING - CYLINDER SIZE: The Cylinder Size Programming Procedure is the same as the Single Gas Nitrox refer to page 9.

TOUCH PROGRAMMING - BLEND #1 - TWO GAS NITROX: The Blend #1 Programming Procedure is the same as the Single Gas Nitrox, refer to page 9.

TOUCH PROGRAMMING - BLEND #2 - TWO GAS NITROX: The oxygen percentage of Blend #2 can be programmed from 21.0% to 99.9%. Once programmed the oxygen percentage will remain at the value programmed until changed by the user.

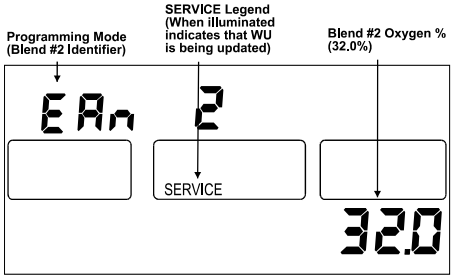


Figure 41a Programming Mode, TU, Setting Blend #2 O2%

WARNING INDICATIONS - TWO GAS NITROX:
Refer to Warning Indications on page 9.

SENSOR WARNING - TWO GAS NITROX:
Refer to Sensor Warning on page 9.

LIFEGUARD® - THREE GAS NITROX

OVERVIEW: This configuration of the LIFEGUARD® is capable of being used for three different Nitrox mixtures on the same dive. The first gas or Normal Blend is programmable from 21% to 50% Oxygen in 0.1% increments while Blend #2 and Blend #3 can be programmed from 21% to 99.9% Oxygen again in 0.1% increments. All three Blends are set at the factory to 21% Oxygen and use this in its decompression algorithm. PRIOR to diving an Enriched Air Nitrox gas blend, the unit must be programmed accordingly. This can be done via the Touch Contacts or via the Analyst® PC Interface.

GAS BLEND SWITCHING: This configuration of the LIFEGUARD® is capable of FO_2 to FO_2 to FO_2 gas Blend switching. While most other Nitrox dive computers limit the diver to the use of a single gas blend or percentage of oxygen, the LIFEGUARD® allows the diver to use three different gas blends during a dive. These two blends are commonly referred to as the Normal or Bottom Gas Blend and the First and Second Decompression Gas Blends. Commonly, the Bottom Gas Blend is used from initial entry into the water and for most of the time spent during the dive. The Normal Gas Blend is restricted to a maximum of 50% oxygen. The First Decompression Gas Blend (Blend #2) is used only for initial decompression purposes and the Second Decompression Gas Blend (Deco Blend) is used for the final decompression obligation. Both Decompression Gas Blends can go to 99.9% oxygen content.

Typically, the Final Deco Blend is in a cylinder that is suspended at some relatively shallow depth beneath the surface.

Since the depth of the Final Deco Blend switch is known ahead of time, and the expected duration of the dive is also known. These two factors can be used to automatically switch the computer to the Deco Blend or back to the Second Blend should the diver descend again. This is accomplished prior to starting a dive by specifying both the Normal Gas Blend Oxygen percentage and the Two Deco Gas Blend Oxygen percentages. The depth of the Deco switch is also specified. Depending on surface swells a few feet may be added to this depth to ensure that when the diver is shallower than the depth the Deco Blend will actually be in use. If the diver subsequently descends below this depth, the #2 Blend is again assumed to be in use. The other important factor that must be specified is the Bottom Time that must elapse before Blend Switching is enabled. The purpose of this factor is to ensure that the switch to the Deco Blend does not occur prematurely should the diver ascend early and not require use of the Deco Blend, the setting of this factor must be carefully considered. The Deco Blend switch is enabled when the diver descends below the switch depth and satisfies the time requirements and then ascends to the programmed switch depth. If the diver does not exceed the programmed switch depth the unit will not switch to the Deco Blend. All of these factors can be set by either the touch contact programming method or via the Analyst® PC interface. If switching to the Deco Blend is NOT desired, it may be disabled via the Analyst®. Setting all three Blends to the same percentage of Oxygen is the same as disabling the Deco Blends.

The automatic gas switching occurs:

1. With the CPU attached to the cylinder containing Blend #1. The CPU continually "senses" a drop in cylinder pressure until the diver is prepared to switch to the cylinder contain Blend #2.
2. Once the diver is breathing from the Blend #2 cylinder, the CPU no longer senses a drop in cylinder pressure from the Blend #1 cylinder and automatically changes its algorithm to the Blend #2 O_2 percentage.
3. For Blend #3, once the diver is breathing from the Blend #2 cylinder and the Time & Depth Benchmarks are satisfied, the unit automatically changes its algorithm to the Blend #3 O_2 percentage.
4. If the diver returns to breathe from the Blend#1 cylinder the CPU will automatically switch back to the Blend #1 O_2 percentage.
5. If the diver descends below the mix switch depth and is not breathing from the Blend #1 cylinder. The unit will switch back to the Blend #2 O_2 percentage.

If Blend switching is NOT desired, it may be disabled via the Analyst®. Setting both Blends to the same percentage of Oxygen is the same as disabling the second Blend.

NOTE: If the diver is using large capacity cylinders and is supplying inflation gas from the Mix1 cylinder for the BC and Dry Suit, and is breathing on Mix 2 or 3. It is possible to cause the dive computer to momentarily perform a mix switch when the BC or Dry Suit is inflated. It is highly recommended that the diver carry a separate gas supply for Dry Suit inflation or have the gas supplied from the second mix cylinder.

SURFACE INTERVAL - THREE GAS NITROX:

The Surface Interval for the Three Gas Nitrox configuration is the same as the Single Gas Nitrox refer to page 3.

DIVE MODE - THREE GAS NITROX:

The Dive Mode for the Three Gas Nitrox configuration is the same as the Single Gas Nitrox refer to page 4.

In the Dive Mode the Alternate Screen will display the current oxygen percentage that the computer is using in the NDC calculations, therefore after a gas switch the unit will display the current Blend oxygen percentage.

DECOMPRESSION MODE - THREE GAS NITROX:

The Decompression Mode for the Three Gas Nitrox configuration is the same as the Two Gas Nitrox refer to page 11.

If the Deco Forecast with Deco Blend has been 'enabled' via the Analyst® P.C. Interface, the Total Deco Time will be calculated using the Deco Blend to calculate nitrogen out-gassing for the deco stops shallower than the blend switch depth. If this option is not enabled, the Forecast will be based on the Normal Blend, but if a Gas switch does occur the dive computer will update the decompression times to reflect the change in gas.

Several seemingly ambiguous situations may occur with the Deco Forecast 'enabled', they are:

- Satisfying Deco Stops during ascent.
- The Deco Gas Switch may occur early or late.
- Forecast Deco Stop time & depths may switch up/down/up/down as the diver ascends due to the in-gassing and out-gassing of the different 'controlling' tissue group.

NOTE: This function should NOT be 'Enabled' if the Diver is not performing a Gas switch.

POST DIVE INTERVAL - THREE GAS NITROX:

The Post Dive Interval is the same as in the Single Gas Nitrox; refer to page 13 for detailed information, except that if the unit has performed a gas switch. While in the Post Dive Interval the Alternate Screen will display the Oxygen percentage of the Deco Gas Blend. If the diver re-enters the Dive mode the unit will perform its' calculations based on the 3rd Gas Blend Oxygen percentage until the diver descends and begins using the Blend #1 gas supply. The unit will then revert to the Normal Gas Blend for the NDC calculations.

PROGRAMMING MODE - THREE GAS NITROX

The programming procedure is the same as Single Gas Nitrox, refer to page 8.

PROGRAMMING MENU - THREE GAS NITROX

The ANALYST® Personal Computer Interface allows the user to enable or disable the second and therefore the third gas mix and enable or disable the constant PO2 functions; the following table lists the various programming choices with their display identification and figure number.

Identification		Description	Figure	Page
PdP		PreDive Prediction	35	17
InF		Misc. Information	36	17
dEP	**AL**	Depth Alarm, Max value is 320 feet	37	17
Con		Added Conservatism,		

		Max allowed value is 50%	38	17
Ltr		Cylinder Size in liters, Allowed values 00 to 99	39	17
EAn	**1**	Oxygen percentage of Blend, Allowed values 21.0 to 50.0	40	17
EAn	**2**	Deco Oxygen percentage, Allowed values 21.0 to 99.9	41	18
EAn	**3**	Deco Oxygen percentage, Allowed values 21.0 to 99.9	42	18
dEC	**b**	Bottom Time Benchmark for Deco FO2 switching, Allowed values 10 to 999 minutes	43	18
dEC	**d**	Depth Benchmark for Deco FO2 switching, Max value is 99 feet	44	18

NOTE: If the LIFEGUARD® is left in the Programming mode for five minutes without the contacts being touched, the unit will automatically exit the Programming Mode and return to the Surface Interval. Once this occurs the LIFEGUARD® will retain the modified programmed settings that have been stored. Options that have not been modified will retain their previous settings.

TOUCH PROGRAMMING - PREDIVE PREDICTION - THREE GAS NITROX: The PreDive Prediction for the Three Gas Nitrox is the same as the Single Gas Nitrox, refer to page 8.

TOUCH PROGRAMMING - INFORMATION DISPLAY - THREE GAS NITROX: The InFormation display for the Three Gas Nitrox is the same as the Single Gas Nitrox, refer to page 8.

TOUCH PROGRAMMING - DEPTH ALARM - THREE GAS NITROX: The Depth Alarm Programming Procedure is the same as the Single Gas Nitrox, refer to page 9.

TOUCH PROGRAMMING - CONSERVATISM - THREE GAS NITROX: The added Conservatism Programming Procedure is the same as the Single Gas Nitrox, refer to page 9.

TOUCH PROGRAMMING - CYLINDER SIZE: The Cylinder Size Programming Procedure is the same as the Single Gas Nitrox, refer to page 9.

TOUCH PROGRAMMING - BLEND #1 - THREE GAS NITROX: The Blend #1 Programming Procedure is the same as the Single Gas Nitrox, refer to page 9.

TOUCH PROGRAMMING - BLEND #2 - THREE GAS NITROX: The Blend #2 Programming Procedure is the same as the Single Gas Nitrox, refer to page 9.

TOUCH PROGRAMMING - BLEND #3 - THREE GAS NITROX: The oxygen percentage of Blend #3 can be programmed from 21.0% to 99.9%. Once programmed the oxygen percentage will remain at the value programmed until changed by the user.

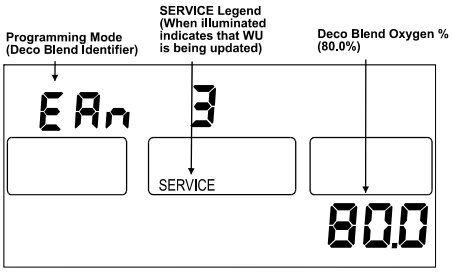


Figure 42a Programming Mode, TU, Setting Deco Blend O2%

TOUCH PROGRAMMING - BLEND #3 - TIME BENCHMARK - THREE GAS NITROX: The Blend #3 (Deco) Time Benchmark can be programmed from 10 to 999 minutes. Once programmed the setting will remain at the value programmed until changed by the user.

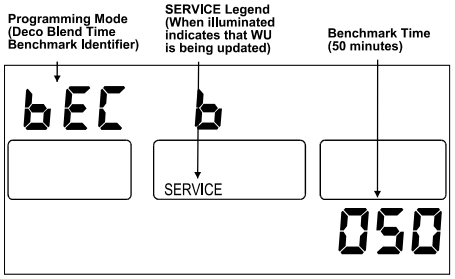


Figure 43a Programming Mode, TU, Setting Deco Time Benchmark

TOUCH PROGRAMMING - BLEND #3 - DEPTH BENCHMARK - THREE GAS NITROX: The Blend #3 (Deco) Depth Benchmark can be programmed from 10 to 999 minutes. Once programmed the setting will remain at the value programmed until changed by the user.

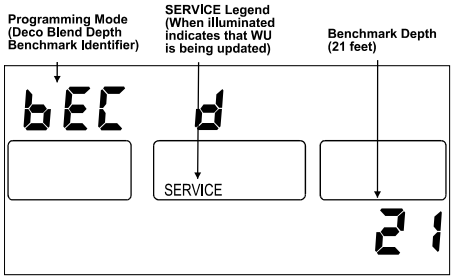


Figure 44a Programming Mode, TU, Setting Deco Depth Benchmark

WARNING INDICATIONS - THREE GAS NITROX:
Refer to Warning Indications on page 9.

SENSOR WARNING - THREE GAS NITROX:
Refer to Sensor Warning on page 9.

CONSTANT PO2 OPERATING MODE

CONSTANT PO_2 & FO_2 MODES: Almost all other dive computers only compute using air or enriched air (Nitrox), which is referred to as "Constant FO_2" and is commonly found in open-circuit systems and in semi-closed circuit rebreathers. The LIFEGUARD® has this capability, but also computes using a "Constant PO_2" as commonly found in closed-circuit rebreathers. The user can select which of these two modes or combination of these two modes is desired by using the Analyst® PC Interface.

If the user selects CONSTANT PO_2 mode, the Partial Pressure of Oxygen (PO_2) can be selected between 0.5 and 1.5 ata.

Regardless if the LIFEGUARD® is in CONSTANT PO_2 mode or the CONSTANT FO_2 mode when the unit is on the Surface after a dive, nitrogen out-gassing is based on Air (21% Oxygen).

LIFEGUARD® - SINGLE GAS PO2

SURFACE INTERVAL - SINGLE GAS PO2: The Surface Interval is the same as in the Single Gas Nitrox configuration; refer to page 4 for a detailed discussion. The exception is that the Alternate Screen displays the Current PO_2 set point value, current calculated CNS and OTU values. Figure 02b shows the display with no residual Nitrogen (a clean Dive).

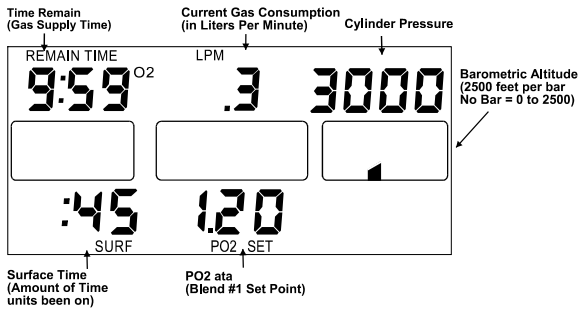


Figure 02b Surface Mode, No NItrogen, PO2, Primary Screen

Figure 04b shows the display with residual Nitrogen (a repetitive dive), figure 05a shows the alternate screen with residual nitrogen.

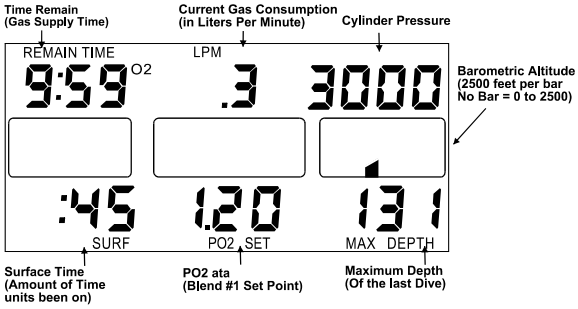


Figure 04b Surface Mode, With NItrogen, PO2, Primary Screen

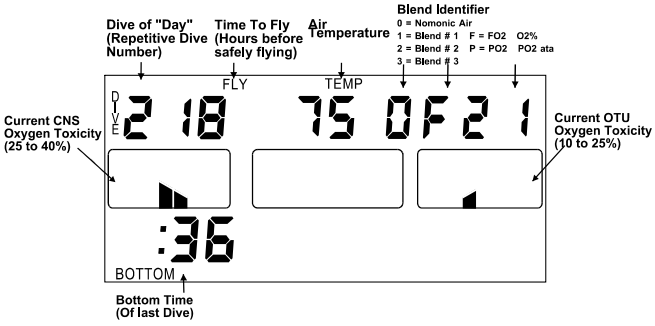


Figure 05a Surface Mode, With NItrogen, FO2/PO2, Alternate Screen

DIVE MODE - SINGLE GAS PO2: The Dive Mode for the PO_2 configuration is the same as the Single Gas Nitrox. The Primary Display Screen will display the current Calculated FO2 of the Breathing Gas, in the lower center of the display, based on the Depth and PO_2 Setting. (Figure 13b)

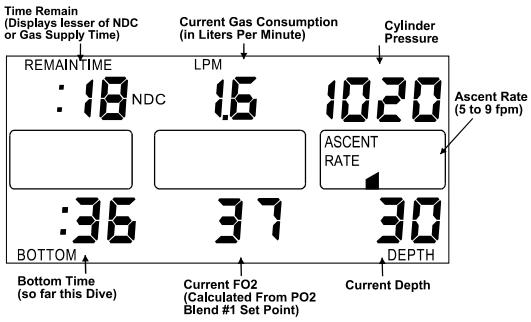


Figure 13b Dive Mode, Normal Dive, PO2 Mode, Primary Screen

The Alternate Screen in the PO_2 Mode will display the current PO_2 set point that the unit is using in its NDC calculations, the current CNS and OTU values and the Maximum Depth reached so far on this dive. (Fig. 14b)

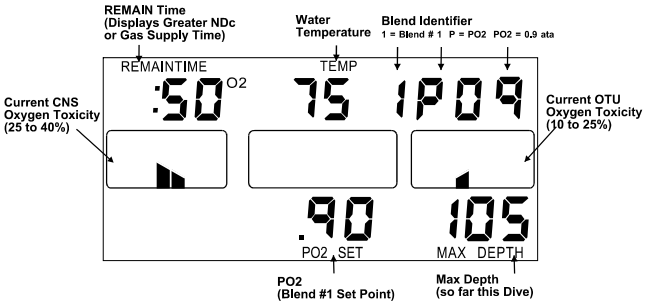


Figure 14b Dive Mode, Normal Dive, PO2 Mode, Alternate Screen

DECOMPRESSION MODE - SINGLE GAS PO2: The Decompression Mode for the PO_2 Mode configuration is the same as the Single Gas Nitrox, refer to page 4.

Figures 15b & 16b shows the LIFEGUARD® WU in the PO_2 mode at the Decompression Stop.

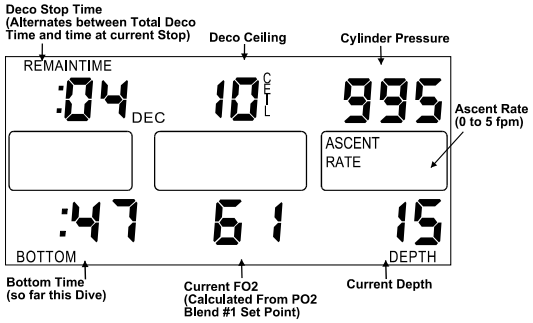


Figure 15b Dive Mode, Deco Dive, PO2 Mode, Primary Screen

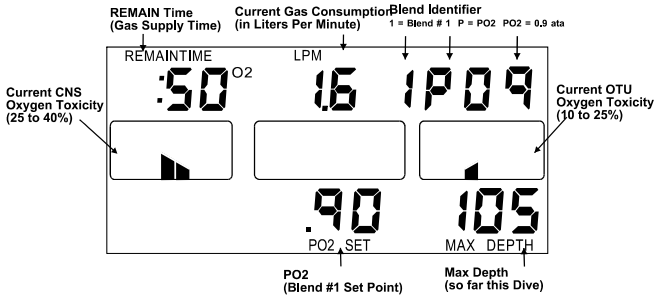


Figure 16b Dive Mode, Deco Dive, PO2 Mode, Alternate Screen

If the diver surfaces before satisfying his decompression obligation, the LIFEGUARD® will continue to give out-gassing credit as if it was in a dive, but at a depth of zero feet. The unit will continue to log data and perform as if actually in a dive. When the decompression obligation is finally satisfied, the ten-minute “Post Dive Interval” will begin and the dive will terminate in ten minutes.

Figure 15c shows the primary display at a depth of Zero feet.

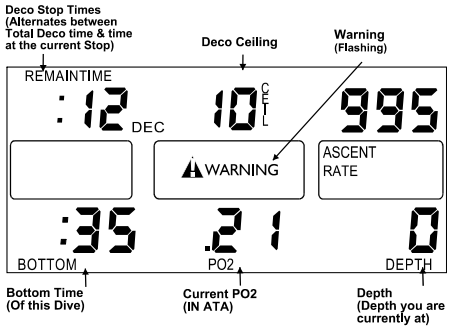


Figure 15c Decompression Mode, At Zero Depth

It should be noted that in the Constant PO_2 mode the shallower the decompression stop the shorter the stop decompression time. This is a result of higher FO2s in the breathing gas as the depth decreases.

POST DIVE INTERVAL MODE - SINGLE GAS PO2: The Post Dive Interval is the same as in the Single Gas Nitrox; refer to page 6 for detailed information.

TOUCH PROGRAMMING - SINGLE GAS PO2

The programming procedure is the same as Single Gas Nitrox refer to page 8, except that there is an additional programming choice that selects the FO_2 or PO_2 mode. The first table shows the programming sequence with PO_2 selected as the operating mode and the second table shows the menu as it appears with FO_2 selected.

TOUCH PROGRAMMING MENU - FO2/PO2 - PO2 SELECTED

The ANALYST® Personal Computer Interface allows the user to enable or disable the second and therefore the third gas mix and enable or disable the constant PO2 functions; the following table lists the various programming choices with their display identification and figure number. The Programming sequence and choices are determined by the selection of PO_2 or FO_2 Mode. This table assumes programming choice #1 is PO_2.

Identification		Description	Figure	Page
PO2 / FO2		Toggles between PO2 Mode and FO2 Mode	34	17
PdP		PreDive Prediction	35	17
InF		Misc. Information	36	17
dEP	AL	Depth Alarm, Max value is 320 feet	37	17
Con		Added Conservatism, Max allowed value is 50%	38	17
Ltr		Cylinder Size in liters, Allowed values 00 to 99	39	17
PO2	1	PO2 value Allowed values 0.5 to 1.50	45	18

TOUCH PROGRAMMING MENU - FO2/PO2 MODE - FO2 SELECTED

The ANALYST® Personal Computer Interface allows the user to enable or disable the second and therefore the third gas mix and enable or disable the constant PO2 functions; the following table lists the various programming choices with their display identification and figure number. The Programming sequence and choices are determined by the selection of PO_2 or FO_2 Mode. This table assumes programming choice #1 is FO_2.

Identification		Description	Figure	Page
PO2 / FO2		Toggles between PO2 Mode and FO2 Mode	33	17
PdP		PreDive Prediction	35	17
InF		Misc. Information	36	17
dEP	AL	Depth Alarm, Max allowed value is 320 feet	37	17
Con		Added Conservatism, Max allowed value is 50%	38	17
Ltr		Cylinder Size in liters, Allowed values 00 to 99	39	17
EAn	1	Oxygen percentage of Blend, Allowed values 21.0 to 50.0	40	17

NOTE: If the LIFEGUARD® is left in the Programming mode for five minutes without the contacts being touched, the unit will automatically exit the Programming Mode and return to the Surface Interval. Once this occurs the LIFEGUARD® will retain the modified programmed settings that have been stored. Options that have not been modified will retain their previous settings.

TOUCH PROGRAMMING – PO2/FO2 - ONE GAS PO2: The selection of PO2 or FO2 determines the operating mode of the computer. The selection will toggle between PO2 and FO2. Figure 86 shows the Programming displays with FO2 selected and figure 87 with PO2.

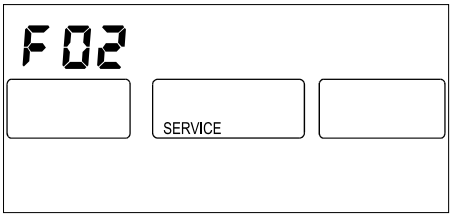


Figure 33 Programming Mode, TU, FO2/PO2, Showing FO2

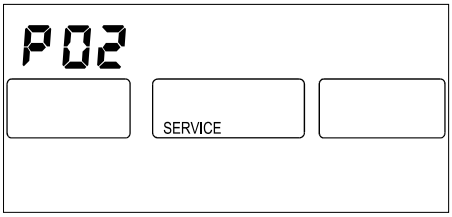


Figure 34 Programming Mode, TU, FO2/PO2, Showing PO2

TOUCH PROGRAMMING - PREDIVE PREDICTION - SINGLE GAS PO2: PreDive Prediction is accessed through the Touch Contact Programming Menu (See Programming, page 8). This enables the diver to view the PreDive Prediction information at the touch of the Contacts. The LIFEGUARD® PreDive Prediction starts at 30 feet and increases in 10 feet increments. PreDive Predictions will terminate when the No-Decompression (NDC) time prediction reaches two minutes or a maximum depth of 320 feet is reached. During PreDive Prediction the current PO2 setting that the unit is programmed for is used to compute the NDC time remaining and will be displayed in the lower center of the display. Additional Conservatism, Residual Nitrogen and apparent Altitude can also affect PreDive Predictions.

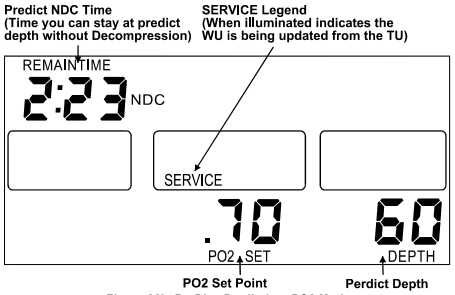


Figure 06b PreDive Prediction, PO2 Mode

TOUCH PROGRAMMING - INFORMATION DISPLAY - SINGLE GAS PO2: The InFormation display for the Single Gas PO2 is the same as the Single Gas Nitrox, refer to page 8.

TOUCH PROGRAMMING - DEPTH ALARM - SINGLE GAS PO2: The Depth Alarm Programming Procedure is the same as the Single Gas Nitrox, refer to page 9.

TOUCH PROGRAMMING - CONSERVATISM - SINGLE GAS PO2: The added Conservatism Programming Procedure is the same as the Single Gas Nitrox, refer to page 9.

TOUCH PROGRAMMING - CYLINDER SIZE: The Cylinder Size Programming Procedure is the same as the Single Gas Nitrox, refer to page 9.

TOUCH PROGRAMMING - BLEND #1 - SINGLE GAS PO2: The Blend #1 Programming Procedure is the same as for the Single Gas Nitrox except the diver is programming a constant PO2 value between 0.5 and 1.5 ata, refer to page 9.

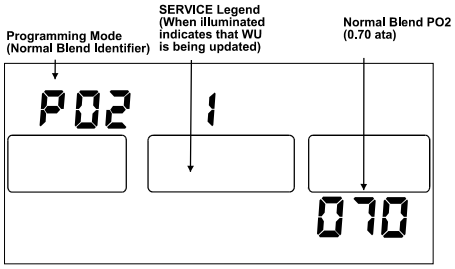


Figure 45a Programming Mode, TU, Setting Normal Blend PO2

WARNING INDICATIONS - SINGLE GAS PO2: Refer to Warning Indications on page 9.

SENSOR WARNING - SINGLE GAS PO2: Refer to Sensor Warning on page 9.

LIFEGUARD® - TWO GAS PO2

CONSTANT PO_2 & FO_2 MODES: Almost all other dive computers only compute using air or enriched air (Nitrox), which is referred to as "Constant FO_2" and is commonly found in open-circuit systems and in semi-closed circuit rebreathers. The LIFEGUARD® has this capability, but also computes using a "Constant PO_2" as commonly found in closed-circuit rebreathers. The user can select which of these two modes, or combination of these two modes is desired by using the Analyst® PC Interface.

If the user selects CONSTANT FO_2 mode, the Oxygen content of the Nitrox blends can be selected from 21.0 to 50.0 percent on the normal blend and 21.0 to 99.9 percent on the Deco.

If the user selects CONSTANT PO_2 mode, the Partial Pressure of Oxygen (PO_2) for both the Normal and Deco blends can be selected between 0.5 and 1.5 ata.

Via the Analyst® PC Interface, the user can specify when, or if the unit should change from CONSTANT PO_2 mode to CONSTANT FO_2 mode at or near the surface.

BLEND SWITCHING: Depending on the configuration of the LIFEGUARD® 'BLEND' refers to Constant FO_2 Nitrox gas blends or Constant PO_2 gas blends. The LIFEGUARD® is capable of FO_2 to FO_2, PO_2 to FO_2, or PO_2 to PO_2 Blend switching.

For a detailed description of blend switching refer to page 11.

SURFACE INTERVAL - TWO GAS PO2: The Surface Interval for the Two Gas PO2 configuration is the same as the Single Gas Nitrox, refer to page 5.

DIVE MODE - TWO GAS PO2: The Dive Mode for the Two Gas PO2 configuration is the same as the Single Gas Nitrox, refer to page 4.

DECOMPRESSION MODE - TWO GAS PO2: The Decompression Mode for the Two Gas PO2 configuration is the same as the Two Gas Nitrox, refer to page 5.

If the diver surfaces before satisfying the decompression obligation, the LIFEGUARD® will continue to give out-gassing credit as if it were in a dive, but at a depth of zero feet. The unit will continue to log data and perform as if actually in a dive. The unit will decompress as if it were actually at the various required decompression stops using an FO_2 of 21%. When the decompression obligation is finally satisfied, the ten-minute "Post Dive Interval" will begin and the dive will terminate in ten minutes.

If the Deco Forecast with Deco Blend has been 'enabled' via the Analyst® P.C. Interface, the Total Deco Time will be calculated using the Deco Blend to calculate nitrogen out-gassing for the deco stops shallower than the blend switch depth. If this option is not enabled the Forecast will be based on the Normal Blend, but if a Gas switch does occur the dive computer will update the decompression times to reflect the change in breathing gas.
It should be noted that in the Constant PO_2 mode the shallower the decompression stop the shorter the stop decompression time. This is a result of higher FO2s in the breathing gas as the depth decreases.

If the Deco Forecast with Deco Blend has been 'enabled' via the Analyst® P.C. Interface, the Total Deco Time will be calculated using the Deco Blend to calculate nitrogen out-gassing for the deco stops shallower than the blend switch depth. If not 'enabled' the Deco Forecast will be based on the Normal Gas Blend.

NOTE: This function should not be 'Enabled' if the Diver is not performing a Gas switch.

POST DIVE INTERVAL MODE - TWO GAS PO2: The Post Dive Interval is the same as in the Air only Mode; refer to page 5 for detailed information, except that if the unit has performed a gas switch. While in the Post Dive Interval the Alternate Screen will display the Oxygen percentage of the Deco Gas Blend and if the diver re-enters the Dive mode the unit will perform its' calculations based on the Deco Gas Blend Oxygen percentage until the diver descends below the Gas switch Depth. Below this depth the unit will revert to the Normal Gas Blend for the NDC calculations.

TOUCH PROGRAMMING - THREE GAS FO2/TWO GAS PO2

The programming procedure is the same as for the Single Gas Nitrox refer to page 5. The table below shows the programming sequence with FO_2 selected as the operating mode, on page 17 the table shows the programming menu as it appears with PO_2 selected.

TOUCH PROGRAMMING MENU - THREE GAS FO2/2-PO2 - FO2 TO FO2 TO FO2 GAS SWITCH

The ANALYST® Personal Computer Interface allows the user to enable or disable the second and therefore the third gas mix and enable or disable the constant PO2 functions; the following table lists the various programming choices with their display identification and figure number. The Programming sequence and choices are determined by the selection of PO_2 or FO_2 Mode. This table assumes programming choice #1 is FO_2 with an FO_2 to FO_2 gas blend switch.

Identification		Description	Figure	Page
PO2 / FO2		Toggles between PO2 Mode and FO2 Mode	33	17
PdP		PreDive Prediction	35	17
InF		Misc. Information	36	17
dEP	**AL**	Depth Alarm, Max value is 320 feet	37	17
Con		Added Conservatism, Max value is 50%	38	17
Ltr		Cylinder Size in liters, Allowed values 00 to 99	39	17
EAn	**1**	Oxygen percentage of Blend, Allowed values 21.0 to 50.0	40	17
EAn	**2**	Blend #2 Oxygen percentage, Allowed values 21.0 to 99.9	41	18
EAn	**3**	Deco Oxygen percentage, Allowed values 21.0 to 99.9	42	18
dEC	**b**	Bottom Time Benchmark for Deco switching, Allowed values 10 to 999 minutes	43	18
dEC	**d**	Depth Benchmark for Deco switching, Max allowed value is 99 feet	44	18

TOUCH PROGRAMMING MENU - TWO GAS FO2/PO2 - PO2 TO FO2 GAS SWITCH

The ANALYST® Personal Computer Interface allows the user to enable or disable the second and therefore the third gas mix and enable or disable the constant PO2 functions; the following table lists the various programming choices with their display identification and figure number. The Programming sequence and choices are determined by the selection of PO_2 or FO_2 Mode. This table assumes programming choice #1 is PO_2 with a PO_2 to FO_2 gas blend switch.

Identification		Description	Figure	Page
PO2 / FO2		Toggles between PO2 Mode and FO2 Mode	34	17
PdP		PreDive Prediction	35	17
InF		Misc. Information	36	17
dEP	**AL**	Depth Alarm, Max value is 320 feet	37	17
Con		Added Conservatism, Max value is 50%	38	17
Ltr		Cylinder Size in liters, Allowed values 00 to 99	39	17
PO2	**1**	PO2 value Allowed values 0.5 to 1.50	45	18
EAn	**2**	Deco FO2 Oxygen percentage, Allowed value 21.0 to 99.9	41	18
dEC	**b**	Bottom Time Benchmark for Deco switching Allowed Values 10 to 999 minutes	43	18
dEC	**d**	Depth Benchmark for Deco switching Max value is 99 feet	44	18

TOUCH PROGRAMMING MENU - TWO GAS PO2 - PO2 to PO2 GAS SWITCH

The ANALYST® Personal Computer Interface allows the user to enable or disable the second and therefore the third gas mix and enable or disable the constant PO2 functions; the following table lists the various programming choices with their display identification and figure number. The Programming sequence and choices are determined by the selection of PO_2 or FO_2 Mode. This table assumes programming choice #1 is PO_2 with a PO_2 to PO_2 gas switch.

Identification		Description	Figure	Page
PO2 / FO2		Toggles between PO2 Mode and FO2 Mode	34	17
PdP		PreDive Prediction	35	17
InF		Misc. Information	36	17
dEP	**AL**	Depth Alarm, Max value is 320 feet	37	17
Con		Added Conservatism, Max allowed value is 50%	38	17
Ltr		Cylinder Size in liters, Allowed values 00 to 99	39	17
PO2	**1**	PO2 value Allowed values 0.5 to 1.50	45	18
PO2	**2**	Deco PO2 value Allowed values 0.5 to 1.50	46	18
dEC	**b**	Bottom Time Benchmark for Deco switching Allowed values 10 to 999 minutes	43	18
dEC	**d**	Depth Benchmark for Deco switching Max allowed value is 99 feet	44	18

TOUCH PROGRAMMING - PREDIVE PREDICTION - TWO GAS PO2: The PreDive Prediction for the Two Gas PO2 is the same as the Single Gas Nitrox, refer to page 7.

TOUCH PROGRAMMING - INFORMATION DISPLAY - TWO GAS PO2: The InFormation display for the Two Gas Nitrox is the same as for the Single Gas Nitrox, refer to page 7.

TOUCH PROGRAMMING - DEPTH ALARM - TWO GAS PO2: The Depth Alarm Programming Procedure is the same as the Single Gas Nitrox, refer to page 9.

TOUCH PROGRAMMING - CONSERVATISM - TWO GAS PO2: The added Conservatism Programming Procedure is the same as the Single Gas Nitrox, refer to page 9.

TOUCH PROGRAMMING - CYLINDER SIZE: The Cylinder Size Programming Procedure is the same as the Single Gas Nitrox, refer to page 9.

TOUCH PROGRAMMING - BLEND #1 - TWO GAS PO2: The Blend #1 Programming Procedure is the same as the Single Gas PO2, refer to page 9.

TOUCH PROGRAMMING - BLEND #2 - TWO GAS PO2: The Blend #2 Programming Procedure is the same as for the Two Gas Nitrox except the PO_2 value can be programmed from 0.50 to 1.50 ata. Once programmed the oxygen percentage will remain at the value programmed until changed by the user.

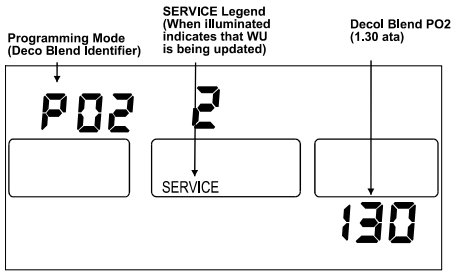


Figure 46a Programming Mode, TU, Setting Deco Blend PO2

TOUCH PROGRAMMING - BLEND #2 - TIME BENCHMARK: The programming procedure for the Blend #3 Time Benchmark is the same as the Two Gas Nitrox, refer to page 13.

TOUCH PROGRAMMING - BLEND #2 – DEPTH BENCHMARK: The programming procedure for the Blend #3 Depth Benchmark is the same as Two Gas Nitrox, refer to page 13.

WARNING INDICATIONS - TWO GAS PO2: Refer to Warning Indications on page 9.

SENSOR WARNING - TWO GAS PO2: Refer to Sensor Warning on page 9.

TOUCH CONTACT PROGRAMMING SCREENS: The following are all of the screens that the LIFEGUARD® WU is capable of presenting in the Touch Programming Mode. Refer to the particular configuration for appropriate screens.

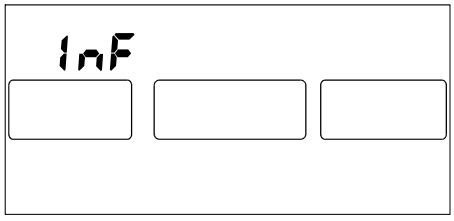


Figure 89 Programming Mode, WU, Information Display Menu

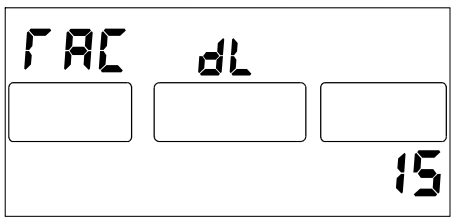


Figure 98 Programming Mode, WU, TACLITE On Time Menu

TOUCH CONTACT PROGRAMMING SCREENS: The following are all of the screens that the LIFEGUARD® CPU is capable of presenting in the Touch Programming Mode. Refer to the particular configuration for appropriate screens.

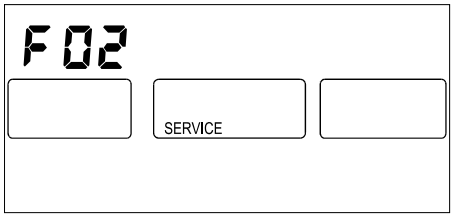


Figure 33 Programming Mode, TU, FO2/PO2, Showing FO2

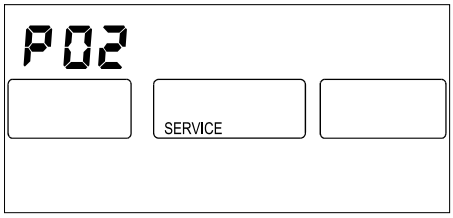


Figure 34 Programming Mode, TU, FO2/PO2, Showing PO2

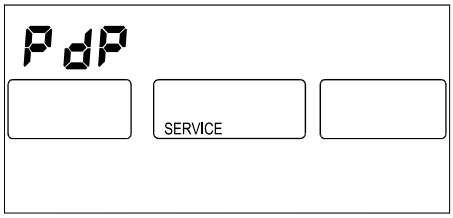


Figure 35 Programming Mode, TU, PreDIve Prediction Menu

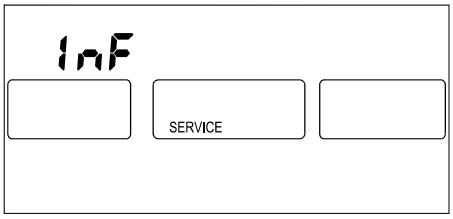


Figure 36 Programming Mode, TU, Information Display Menu

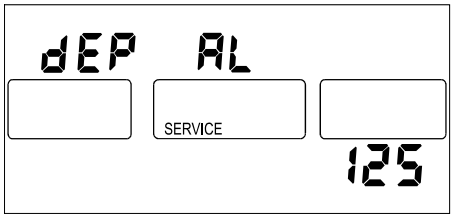


Figure 37 Programming Mode, TU, Depth Alarm Menu

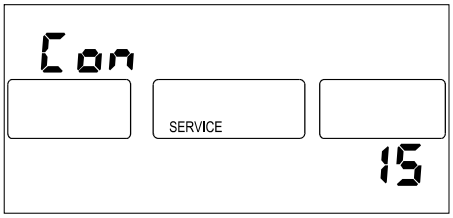


Figure 38 Programming Mode, TU, Conservatism Menu

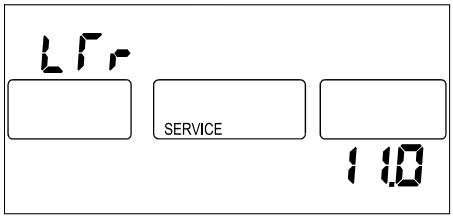


Figure 39 Programming Mode, TU, Cylinder Size Menu

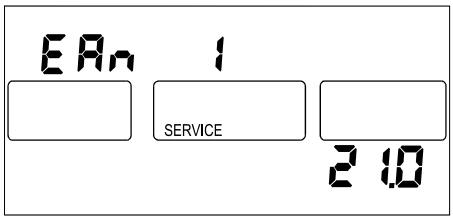


Figure 40 Programming Mode, TU, Normal Blend O2% Menu

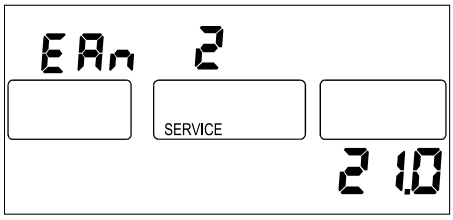


Figure 41 Programming Mode, TU, Blend #2 O2% Menu

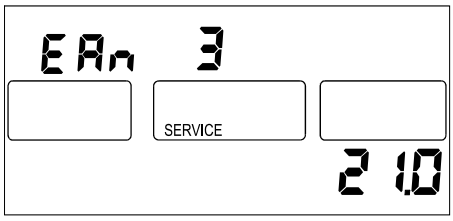


Figure 42 Programming Mode, TU, Deco Blend O2% Menu

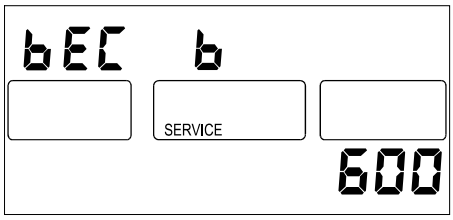


Figure 43 Programming Mode, TU, Deco Time Benchmark Menu

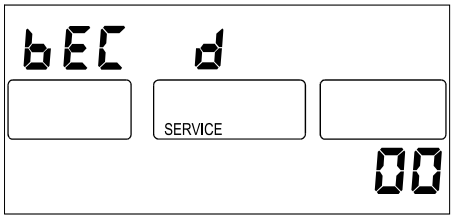


Figure 44 Programming Mode, TU, Deco Depth Benchmark Menu

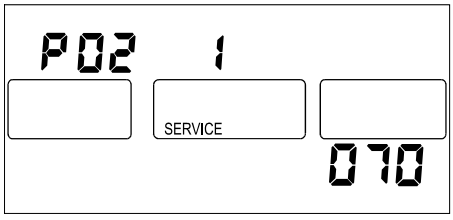


Figure 45 Programming Mode, TU, Normal Blend PO2 Menu

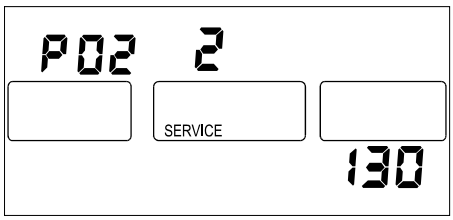


Figure 46 Programming Mode, TU, Deco Blend PO2 Menu

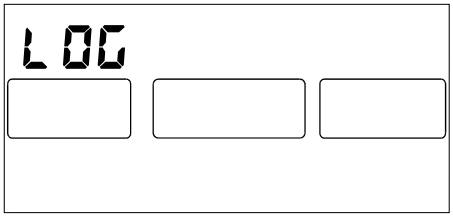


Figure 99 Programming Mode, Logbook Menu

DATA STORAGE TYPES & CAPACITY: The LIFEGUARD® has the following internal distinct data storage activities that can be recalled, viewed, and stored with the Analyst® PC computer interface:

- **Current Variable Information:** Local Time, CNS toxicity, OTU dose, OTU Mission Clock, Barometric Altitude, PBAT Battery voltage, SBAT Battery voltage, Time to Fly remaining, Current Unit Temperature, 16 tissues loading.
- **Current Configuration Data:** As can be seen in USER CONFIGURABLE ITEMS, below.
- **Historical Totals Summaries:** Dive Time, Number of Dives, Number of Marginal Dives, Number of Violated Dives, Number of Warnings, Decompression Dives, and Decompression Time, Maximum Depth and Ceiling, Maximum Depth and Ceiling Dive Number.
- **Each Dive Beginning Statistics:** Nitrogen loading, Local Time Clock, Dive of Day, Dive Number, Surface Time, CNS Toxicity, OTU Dose, OTU Mission Clock, Barometric Altitude, Time to Fly, PBAT Battery voltage, SBAT Battery voltage, Surface Gas Consumption, Cylinder Pressure, Cylinder Size. Capacity is the most recent 512 dives (dependent upon memory configuration).
- **Each Dive Ending Statistics:** Nitrogen loading, Bottom Time, Max Depth, Average Depth, Min Remaining NDC Time, Time Remaining Min NDC occurred, Max Deco Time, Max Deco Ceiling, Max Deco Bottom Time, Missed Ceiling, Missed Deco Time, CNS Toxicity, OTU Dose, OTU Mission Clock, Max Ascent Rate, Max A/R Depth, Blend #3 Switch Depth, Blend #3 Switch Time, Min Temperature, Average Temperature, Max Temperature, Min PBAT Battery Voltage, Min SBAT Battery Voltage, Time to Fly, number of Warnings, Max PO_2, Min PO_2, Average PO_2, Dive PO_2 Set Point, High PO_2 Alarm, Cylinder Pressure, Min Remaining Gas Time, Min Gas Consumption, Time Min Gas Consumption occurred, Max Gas Consumption, Surface Gas Consumption. Capacity is the most recent 512 dives (dependent upon memory configuration).
- **Each Dive Configuration Data:** Full and complete configuration of the system, including Blend #1 Oxygen %, Blend #2 Oxygen %, Blend #3 Oxygen %, Deco Blend Activate Time, Deco Blend Activate Depth, User Conservatism. Capacity is the most recent 512 dives (dependent upon memory configuration).
- **Profile Graphical Information:** Depth Graph, Ascent Rate Graph, Temperature Graph, PO_2 Graph, O_2 % Graph, CNS Graph, OTU Graph, Cylinder Pressure Graph, and Gas Consumption Graph. Capacity is 1100 hours at one second sampling (dependent upon memory configuration).
- **Inter-Dive Events:** Number of Initializations, Unit Activation, Altitude Changes of 500 Feet, Low Batteries, Sensor Malfunction, Analyst® Interface with Dive Computer.

INTER-DIVE EVENTS: The LIFEGUARD® stores important information between dives, even when the unit is not turned on. The information is stored as acquired and is called an “Inter-Dive Event”. These events can be viewed via the Professional Version of the Analyst® P.C. Interface version 5.00 or higher.
Some Inter-Dive events are:

- Initialization of the unit.
- The unit is turned on
- Low batteries
- Altitude Changes of over 500 feet
- Sensor Malfunction
- Analyst® P.C. Communication

GAS CONSUMPTION: Gas Consumption (GC) is a measure of your breathing efficiency. The more you dive, the more efficient your breathing becomes. With your dive computer, you will be able to monitor

and log your progress. The number displayed is the amount of gas you breathe per minute in psi normalized to the surface (one atmosphere). This data is sometimes referred to as Surface Gas Consumption (SGC). Gas Consumption is displayed in psi per minute when the computer is configured for imperial calculations and in liters per minute (lpm) when in metric or PO_2 operating mode. Via the optional Analyst® Personal Computer Interface, you can also select Gas Consumption to display in either psi per minute or liters per minute when in Imperial or BAR per minute or liters per minute when in Metric. If "liters per minute" is selected when in the FO_2 mode, the high and low alarm point values should be changed to reflect the lpm gas flow values.

In the FO_2 mode depth is eliminated as a variable. You will easily be able to compare your breathing rate from depth to depth and dive to dive. As you know, the amount of actual gas you breathe per minute varies proportionate with depth even if your gas consumption rate remains unchanged. By normalizing your gas consumption rate to the surface, an immediate comparison of the rates can be made. For example, let's say that you made two dives, the first to 99 feet and the second to 66 feet. Let's also assume that your gas consumption rate was the same on both dives; and using the previous example, lets say your GC displayed 23, indicating your breathing rate as 23 psi per minute normalized to the surface. If depth entered the equation, your 99-foot dive would display a SGC of 92 (23 x 4ATM's = 92) while the dive to 66 feet would display a SGC of 69 (23 x 3ATM's = 69). With your dive computer, you can immediately see that your rate remained unchanged from the first to second dive. If the actual psi per minute breathed at depth were displayed, you would have seen two very different numbers, 92 and 69, and you would then have to calculate further to achieve a comparison.

Since GC is computed by monitoring the drop in tank pressure, a larger volume tank will show a more efficient GC while the GC of a smaller tank will be less efficient. For normal, casual sport SCUBA diving on a 10-liter (80 cubic foot tank), a GC of between 18 and 35 is considered normal. If you are diving with a cylinder configuration were the connected cylinders have a volume greater than 25 liters, it is recommended that the Breathing Parameter Units be set to "lpm" (liters per minute)."

In the PO_2 mode, regardless if in the Imperial or Metric Mode, the computer displays the volume of gas per minute that you are consuming in liters per minute (lpm). Gas Consumption in lpm is not normalized to the surface.

The following table shows the units of measure, display indication, and the range for the units of measure for gas consumption in Imperial and Metric in FO2 and PO2 modes.

	FO2 MODE				PO2 MODE	
	Imperial		Metric		Imperial	Metric
Units	psi/min	lpm	bar/min	lpm	lpm	lpm
Indicator	none	LPM	none	LPM	LPM	LPM
Range	0 – 99	0 - 99	0 – 9.9	0 – 99	0 - 9.9	0 - 9.9

In the FO_2 mode Gas Consumption is computed and updated only after 1 minutes of dive time. After cylinder pressure is applied the LIFEGUARD® will display "-.-" for the SGC value, if the system is not being breathed on after one-minute the value will show"0". Once the diver has been breathing for an additional one minute the SGC value will start to display the divers SGC value.

In the PO_2 mode Gas Consumption is computed and updated after cylinder pressure is applied, the LIFEGUARD® will display "-.-" for the GC value, after one-minute the display will show the current GC (O_2 flow rate) value in lpm.

NOTE: Rebreather divers should ensure that the flow rate is stabilized before beginning a dive.

USER CONFIGURABLE ITEMS: The number of and which of the configurable options are viewed is determined by the configuration of your LIFEGUARD®.

Caution: Items that can be changed via Touch Contact Programming may be different from their factory settings.

By using the optional Analyst® Personal Computer Interface, the user has the ability to change the following items:

Dive Time/Date Stamp: This is the internal clock setting that is used by the system to time-stamp each individual dive as it occurs. Due to changes in battery voltage and temperature, the internal Time-of-day clock may slowly drift from the ideal. It is recommended that this clock be periodically set to your local time via the Analyst®.

Metric or Imperial: The diver may select whether the data is computed and displayed in Metric or Imperial units. The LIFEGUARD® may be ordered either way as shipped from the factory.

Cylinder Pressure Metric Measurement Units: If the computer is set to display in the metric mode, either BAR or kg/cm^2 may be selected to determine the units in which pressure is displayed. The LIFEGUARD® may be ordered either way as shipped from the factory.

Selectable Ascent Rate Bar Graph (Fixed or Proportional): This option determines whether the Ascent Rate bar graph indicates the speed of ascent or the percentage of the selected maximum ascent rate. The LIFEGUARD® is shipped from the factory as PROPORTIONAL.

Selectable Type of Ascent Rate Alarm (On or Off): This option gives the diver the ability to utilize a fixed ascent rate warning or a warning based on depth. Should the diver prefer the fixed ascent rate warning, the diver can select the maximum ascent rate limit can be selected in one-foot increments from 20 to 60 feet per minute (See next topic). As shipped from the factory, this is set to FIXED. If the VARIABLE rate is selected then the warning will illuminate based on the following table:

DEPTH	AVERAGE ASCENT RATE
60 feet and deeper	60 feet per minute
59 to 30 feet	same as depth
Shallower than 30 feet	30 feet per minute

Selectable Fixed Ascent Rate Alarm Limit: If Variable-By-Depth Ascent Rate alarm was set to OFF from the above topic, the user may enter the desired Ascent Rate for the alarm to sound.

Ascent Rate for Deco Predictions (20 to 60): This option allows the diver to select the ascent rate to be used in the forecasting of the displayed Total Decompression time. The LIFEGUARD® is shipped from the factory with this option set to 60.

Ascent Rate Responsiveness (0 to 7): This option determines the responsiveness or sensitivity of the Ascent Rate Bar Graph. Zero is highly responsive and seven is very slow. This feature is set to three as shipped from the factory.

Remaining Time Responsiveness (0 to 7): This option determines the responsiveness or sensitivity of the Remaining Time that is displayed. Zero is highly responsive and seven is very slow. This feature is set to three as shipped from the factory.

Gas Consumption Responsiveness (0 to 7): This option determines the responsiveness or sensitivity of the Gas Consumption information that is displayed. Zero is highly responsive and seven is very slow. This feature is set to three as shipped from the factory.

Max Depth Alarm (0 to 320): This option allows the diver to select a maximum depth below which, the diver does not wish to descend before an alarm is sounded. This function is disabled when in the Decompression Mode. The option may also be set via the Touch Contact Programming Method. From the factory, the Depth Alarm is set for 130 feet.

Select Decompression Time Display (Total, Stop, Both): There are three options for the manner in which the decompression time is displayed.

If you select TOTAL, the decompression time displayed will indicate the total time you will spend in decompression, including ascent to the surface. Watch the Ceiling depth change in order to identify when to ascend to the next stop depth.

If you select STOP, the decompression time displayed will indicate the time you must remain at the current Ceiling. When this time is 0:00, the Ceiling depth will decrease and the new stop time will be displayed.

If you select BOTH, the TOTAL time and STOP time will alternate at the rate of once every 2 seconds. From the factory, the unit is set to BOTH.

Repetitive Dive Dependent Nitrogen (Off or On): This option allows the dive computer to consider recent dive history's effects on the nitrogen loading, particularly if the diver engages in inverted profile diving. If "On" the recent dive history is used to compensate the nitrogen loading for the current dive. The LIFEGUARD® is shipped from the factory with this feature set to 'Off'.

Temperature Dependent NDC Computations (Normal or Reduced): This feature compensates the decompression algorithm proportional to the ambient water temperature. See User & Environmental Adaptation, Water Temperature on page 25 for a detailed description of this function. The LIFEGUARD® is shipped from the factory with this feature set to NORMAL.

Select Altitude <2000 feet as One Zone (Off or On): This option provides 'actual' altitude for any given day at any diving location as explained in the previous section ALTITUDE ACCLIMATIZATION. With changes in barometric pressure due to temperature and weather systems, it is possible, even expected, to have a different apparent altitude at the same dive site from day to day.

While the seamless means of monitoring provides the most accurate decompression schedule, all altitudes less than 2,000 feet above sea level can be treated in the algorithm as sea level if so selected.

With this option OFF, the unit is calculating altitude in a seamless fashion. With this option ON altitudes less than 2,000 feet above sea level will be treated as sea level. Regardless of the selection, altitudes greater than 2,000 feet above sea level will be treated in a seamless manner. From the factory, this is set to sense seamless altitude from sea level to 15,000 feet above sea level.

Select Audible Beeper Alarm (On or Off): This allows the user to enable or disable the Audible Alarms and beeper. As shipped from the factory, this is set to 'On'.

Select Ceiling Display Divided by 10 (On or Off): This option allows the diver to select when in the Decompression Mode the Ceilings are displayed as 1 = 10, 2 = 20, 3 = 30 etc. (On) or as 10, 20, 30 etc (Off). From the factory this option is set to 'Off'.

Select Nitrox Computations (Enabled or Disabled): This option enables and disables NITROX computations. If this option is disabled, mixtures other than 21.0% oxygen will be disallowed. Furthermore, if this option is selected as OFF, the LIFEGUARD® WU will not compute CNS Toxicity, OTU Dose, or maximum PO2 alarm. The factory setting for this option is 'On'. **This option is only available with the Professional Edition of the Analyst®.** As shipped from the factory, this set to 'Enabled'.

Select Constant Mode Computations (FO_2 or PO_2): This allows the user to select between the Constant PO_2 and Constant FO_2 modes. This option may also be set via the Touch Contact Programming method. As shipped from the factory, this is set to 'Constant FO_2'.

Blend #1 Cylinder Size: This is the TOTAL water volume in liters of all the connected diving cylinders that are attached to the CPU. If you were diving with twin ten-liter tanks, you would enter 20.0 for this option. If you select zero the dive computer will default to 11.0 liters. This option is set at 10.9 from the factory. To calculate an approximate water volume of a cylinder; divide Cylinder size in Cu. Ft by the working pressure and multiply by 411.

Cylinder Pressure Alarm Set Point: This option allows you to set the minimum cylinder pressure reserve that will cause the Low Cylinder Pressure Alarm to sound. The pressure range is from 300 psi to 1500 psi in one-psi increments. The factory setting for this option is 500 psi.

Cylinder Pressure Reserve Set Point: This option allows you to set the minimum cylinder pressure reserve that will be used to calculate Remaining gas time. When this value is reached the Remaining gas time will display 0:00. The range is from 300 psi to 1500 psi in one-psi increments. The factory setting for this option is 500 psi.

Select NITROX Blend #2 Switching: This option enables your unit to switch to Blend #2. This option is enabled from the factory.

Select NITROX Deco Blend Switching: This option enables your unit to switch to Blend #3. This option is enabled from the factory.

Select Blend Switching back to Blend #1: This option allows the algorithm to switch back to Blend #1 should you begin to breathe off your bottom mix during ascent. You may choose to disable this option if you will be using your bottom blend cylinder for filling lift bags at the end of the dive. This option is enabled from the factory.

Enter Normal Blend Oxygen % in NITROX mixture: This option allows you to enter the analyzed oxygen percentage for blend #1 in 0.1 % increments. Range is 21.0% to 50.0% factory setting is 21%.

Enter Blend #2 Oxygen % in NITROX mixture: This option allows you to enter the analyzed oxygen percentage for blend #2 in 0.1 % increments. Range is 21.0% to 99.9% factory setting is 21%.

Enter Deco Blend Oxygen % in NITROX mixture: This option allows you to enter the analyzed oxygen percentage for blend #3 in 0.1 % increments. Range is 21.0% to 99.9% factory setting is 21%.

Enter Deco Blend Bottom Time activation minutes: You will enter the bottom time benchmark for switching to Blend #3.

Enter Deco Blend Depth activation feet: You will enter the depth benchmark that you must ascend above for switching to Blend #3.

Enter Normal Dive PO_2 for Constant PO_2 Computations (.50 to 1.50): This allows the user to experiment with different PO_2s. This option may also be set via the Touch Contact Programming method. As shipped from the factory, this is set to 0.7.

Enter Deco PO_2 for Constant PO_2 Computations (.50 to 1.50): This allows the user to experiment with different PO_2s. This option may also be set via the Touch Contact Programming method. As shipped from the factory, this is set to 0.7.

Gas Consumption Alarm Lower Limit: The computer is shipped with this limit set to zero. You will need to reset a low limit below, which the alarm will sound.

NOTE: There are separate low limit values for the FO2 mode and PO2 mode.

Gas Consumption Alarm High Limit: The computer is shipped with this limit set to 99. You will have to reset a high limit above, which the alarm will sound.

NOTE: There are separate high limit values for the FO2 mode and PO2 mode**.**

Select Breathing Parameter Units (psi/min or lpm): This option allows you to select whether the Gas Consumption value displayed is shown in psi/min or liters per minute (lpm)

Select Automatic PO2/FO2 Switching (Enabled or Disabled): This option enables the unit to switch from the Normal Dive PO2 mode to the Deco Blend FO2 mode. As shipped from the factory, this is set to 'Disabled'.

Select Touch Contact Programming of PO2/FO2 Switch (Enabled or Disabled): This option allows the diver to switch from the PO2 mode to the FO2 mode and vise versa via the Touch Contacts. As shipped from the factory, this is set to 'Disabled'.

Enter Maximum PO_2 Alarm Value (0.5 to 1.6): This option allows you to set a desired maximum PO_2 value that if exceeded will cause an alarm that will sound once per minute. The WARNING legend and the PO_2 digits will flash and the O2TOX Legends will illuminate. As shipped from the factory this feature is set to 1.4 ATA.

Selectable NDC Conservatism (0% to 50%): This feature will allow the diver to input an added degree of conservatism to the decompression algorithm from 0 to 50 percent in one-percent increments. This may be desirable if the diver is dehydrated, tired, or has some other factor that warrants added conservatism. This option may also be set via the Programming Mode. Conservatism is set to zero as shipped from the factory.

Enable Mix Switching In Deco Forecast (Enabled or Disabled): This option enables the units to forecast decompression times utilizing the programmed deco gas for stops that are shallower than the switch depth. As shipped from the factory this option is enabled.

High CNS Alarm Point (40% to 80%): This option allows the diver to select a maximum CNS (Central Nervous System) exposure at which an alarm is sounded. Values from 40% to 80% are allowed. This is set to 50% at the factory before shipping.

High OTU Alarm Point (40% to 80%): This option allows the diver to select a maximum OTU (Oxygen Tolerance Units) exposure at which an alarm is sounded. Values from 40% to 80% are allowed. This is set to 50% at the factory before shipping.

Confined Water Protocol (Training Mode) - (Enabled or Disabled): This option enables the Training Mode for the LIFEGUARD®. In this mode the LIFEGUARD® will enter the Dive Mode at 2 feet instead of 5 feet and exit the Dive Mode at 1 foot instead of 3 feet. The Training Mode also permits the selection of an increased Post Dive Interval period from 10 to 30 minutes in one-minute increments. These changes permit the Instructor to record a complete training session, including in-water surface periods, as a single dive. As shipped from the factory, this is set to 'Disabled'. **This option is available with the Professional Edition of the Analyst®.**

Training Mode Post Dive Interval Period (10 to 30): If the Training Mode is enabled this allows the user to select the duration of the Post Dive Interval period from a minimum of 10 minutes to a maximum of 30 minutes in one-minute increments. As shipped from the factory, this is set to 10. **This option is available with the Professional Edition of the Analyst®.**

Restore Original Configuration Settings: This allows the diver to restore the original factory default settings with a single command.

CPU SPECIFICATIONS2:

Algorithm:	Lifeguard® EMC-20
Computation Period	Once every second
CPU Activation	Manual, Water and High Pressure
WU Activation	Manual and Water
Depth Range*	420 feet, 1-foot increments
Depth Accuracy	+/- 1% of full scale (+/- 3.3 feet)
Cylinder Pressure Range	0 - 5119 psi, 1 psi increments
Cylinder Pressure Accuracy	+/- 1% of full scale (+/- 51 psi)
Maximum Altitude	16,000 feet
Altitude Accuracy	+/- 1000 feet
Temperature Range	0 to 99 degrees F, 1 degree increments
Temperature Accuracy	+/- 2% of full scale after the unit has stabilize from a change in temperature
Surface Time	0 to 19:59 hrs/mins, 1 minute increments
Bottom Time	0 to 19:59 hrs/mins, 1 minute increments
Time To Fly	0 to 36 hours, 1 hour increment
No-Deco Time	0 to 9:59 hrs/mins, 1 minute increments
Decompression Time	0 to 9:59 hrs/mins, 1 minute increments
Decompression Ceiling	0 to 420 feet, 10-foot increments
Dive Profile Storage	up to 1100 dive hours at one second sampling (depending upon configuration)
Profile Sampling	1 second increments
Transmit Carrier	126 kHz
Transmit Signal Strength	81.8 dBµV/m at 3m

* While the Lifeguard® is capable of depths greater than 420 feet it is only rated to 420 feet.

D1 WRIST UNIT SPECIFICATIONS:

WU Activation	Manual and Water
Depth Display	0 to 327 feet, 1-foot increments
Cylinder Pressure Display	0 - 5119 psi, 1 psi increments
Temperature Display	0 to 99 degrees F, 1 degree increments
Surface Time Display	0 to 19:59 hrs/mins, 1 minute increments
Bottom Time Display	0 to 19:59 hrs/mins, 1 minute increments
Time To Fly Display	0 to 36 hours, 1 hour increment
No-Deco Time Display	0 to 9:59 hrs/mins, 1 minute increments
Decompression Time Display	0 to 9:59 hrs/mins, 1 minute increments
Decompression Ceiling Display	0 to 420 feet, 10-foot increments

Power

	CPU UNIT	WRIST UNIT
Battery size	2 CR12600SE	1 CR12600SE
Battery type	Lithium	Lithium
Typical battery Life	1000 dive hours*	1000 dive hours,* depending on TACLITE™ use

* With fresh new batteries

NOTE: Specifications are an additional +/- one least significant display digit due to rounding. Specifications are subject to change without notice.

CARE AND MAINTENANCE:

The Tank Unit and Wrist Unit contain NO user serviceable components. DO not remove the lid from the Tank Unit or the Lens from the Wrist Unit, doing so WILL VOID the Limited Warranty.

RINSING AND CLEANING: Your dive computer is designed to require minimum care and maintenance. Both the CPU and WU are molded from fiberglass-reinforced resins that are extremely resistant to salt, chlorine, and exposure to ultraviolet light. However, both the CPU and WU contain sophisticated electronic components, and therefore, require reasonable care and treatment.

- Avoid sharp impacts to the CPU and WU.
- Do not expose units to extreme heat or cold.
- Replace batteries when they become discharged, or once a year, whichever should occur first.
- Rinse both units with fresh water and allow them to air-dry after each use. Take special care when rinsing the opening on the CPU that is between the battery caps. DO NOT attempt to clean this area with a pointed object or with blasts of compressed air. Doing so will cause severe damage to your CPU, rendering it inoperable and voiding the Warranty

You can extend the service life of your dive computer by simply rinsing it with fresh water. When using a garden hose to rinse your unit, keep the water pressure very low. No chemicals of any type should be used on your dive computer. The WU's rubber strap may be conditioned with silicone spray especially developed for use with SCUBA equipment. You will find this type of silicone spray at your local dive shop. Care should also be taken to prevent your WU's lens from becoming scratched or damaged. Minor scratches will become invisible underwater. However severe gouges or cracks in the lens would require that it be replaced.

HIGH-PRESSURE TRANSDUCER CARE: When installing your high-pressure transducer(s) use a scuba tool or a thin open-ended wrench on the transducer's hex nut to tighten **DO NOT use tools such as vise-grips or channel lock pliers. These tools can damage the transducer and such damage is not covered by the limited warranty**. When the CPU is not attached to your regulator, replace the dust cap on the high-pressure transducer to prevent contaminants from entering the opening. **NEVER** insert any object into the high-pressure transducer opening. **SEVERE DAMAGE** may result.

BATTERY TYPE AND REPLACEMENT: Your dive computer operates on two different sizes of user-replaceable batteries. The CPU will operate on either two 3V Lithium Battery (CR12600SE or CR2NP) this is the recommended battery or four 1.5V N-Cell size Alkaline battery(s) if a 3V Lithium battery is not available. While the WU will operate on either one 3V Lithium Battery (CR12600SE or CR2NP) this is the recommended battery or two 1.5V N-Cell size Alkaline battery(s) if a 3V Lithium battery is not available. The CPU may be powered by any of the following types of batteries, Alkaline (rechargeable), Lithium and Nickel Cadmium. Cochran recommends the use of ENERGIZER® brand batteries. Use of old, off-brand, incorrect and/or visibly corroded batteries will also affect performance, damage the units, and void the warranty. Always replace all CPU batteries at the same time, **do not mix new and used batteries.**

There are factors, which can significantly vary battery-operating life. These include:

- Original quality of battery as manufactured
- Age of battery prior to installation
- Length of time the batteries have been installed
- Frequency and cumulative number of WARNINGS issued by the computer
- Temperature of the battery in operation

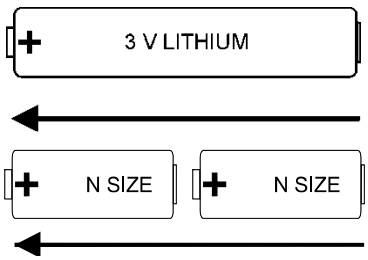
Fresh batteries installed in the CPU or WU will read about 3 volts as viewed of the InFormation screen, accessed by Touch Contact Programming. When the CPU reaches 2.1 volts the low battery alarm will cause the PBAT and/or SBAT legends to illuminate. At 1.6 volts, your CPU will not turn on. Since the WU is equipped with the TACLITE™ backlighted display, battery life in the WU will be affected depending upon the number of times you activate the TACLITE™.

To replace the CPU batteries:

a) Double check the orientation of batteries with the picture on the bottom of the battery tubes. When installing new batteries, ensure that the positive "+" end of the battery is inserted into the battery compartment first.
b) Using the supplied battery replacement tool, remove one battery cap; replace the batteries, re-install the battery cap carefully making sure not to cross-thread the battery cap
c) Remove the other battery cap; replace batteries, re-install the battery cap carefully making sure not to cross-thread the battery cap

To replace the WU batteries:

a) Double check the orientation of batteries with the picture at the bottom on the back of the WU case
b) Using the supplied battery replacement tool, remove the battery cap; replace the batteries, re-install the battery cap carefully making sure not to cross-thread the battery cap
c) When installing new batteries, ensure that the positive "+" end of the battery is inserted into the battery compartment first.



Plus end goes in First

CAUTION!!! ***Putting the battery(s) in backwards may cause permanent damage to the unit and will VOID the Warranty.***

BATTERY CARE: Two separate, sealed CPU battery compartments isolate the batteries from the Primary computer. Gases given off by the chemical reaction that produces electricity within batteries react with the metal contacts of the batteries, causing corrosion. Over time, this coating accumulates and lowers the amount of power the battery can deliver. Even though batteries that have been in the dive computer for a period of time may indicate ample voltage, the corrosion interferes with delivery of power from the battery to the dive computer. Preventive maintenance in the form of the periodic burnishing of the battery's contacts and applying a thin film of silicone grease to the battery terminals will greatly minimize this corrosion.

NOTE: It is always advisable to replace older or questionable CPU batteries with new, fresh batteries before a long series of dives, especially if your dive computer has been inactive for an extended time.

NOTE: Remember, your CPU cannot be manually turned off; and since the CPU computes all of the diving data, if the WU turns off it will not affect your decompression information. Residual nitrogen elimination, as well as time To Fly can be viewed by turning the WU back on.

CAUTION!!! DO NOT ALLOW THE LIFEGUARD® TO HAVE LOW OR NO BATTERIES FOR ANY EXTENDED PERIOD OF TIME! ACCIDENTIAL OR INTENTIONAL LOSS OF BATTERY POWER WILL CAUSE ALL PREVIOUS DIVE NITROGEN LOADING TO BE LOST. THIS MAY AFFECT NITROGEN CALCULATIONS ON NEAR-FUTURE DIVES. AFTER A BATTERY CHANGE, CONFIRM THAT NO-DECOMPRESSION TIME DATA IS REASONABLE DURING PRE-DIVE PREDICTION MODE. DIVE-OF-DAY NUMBER GOING TO ZERO IMMEDIATELY AFTER CHANGING BATTERIES IS ANOTHER INDICATION OF A LOSS OF NITROGEN LOADING. IF LOSS OF NITROGEN LOADING OCCURS, COCHRAN STRONGLY RECOMMENDS THAT A PERIOD OF 24 HOURS ELASPES BEFORE MAKING ANY SUBSEQUENT DIVES.

PRODUCT ASSISTANCE, REPAIR & MAINTENANCE: If you suspect that your LIFEGUARD® is not operating correctly, please contact our Customer Support Department in the USA for assistance at 972.644.6284 or FAX details to 972.644.6286 or E-mail details to service@divecochran.com. Most problems can be resolved without returning the unit. The unit may also be returned to the place of purchase and request the dealer to contact us. If this is not possible or is inconvenient due to a change in location, contact us for the name of the nearest Team Cochran Authorized Dealer.

Analyst® Personal Computer Interface: The Analyst® Personal Computer Interface is a complete hardware/software system that down loads data from the LIFEGUARD® dive computer to a Personal Computer with a Windows ® operating system. The Analyst® Personal Computer Interface allows the diver to retrieve dive data, customize the dive computer and to also enter and store additional information for each dive in a logbook database. Visit Your Team Cochran Dealer for a demonstration.

LIMITED WARRANTY: To the original purchaser ("OWNER") only, Cochran Consulting, Inc. ("COCHRAN") represents this Product to be free of defects in materials and workmanship under normal recreational SCUBA use for 24 months from the original date of shipment from COCHRAN. Units that are used for Rental, Commercial, or Military purposes are warrantied to be free of defects in materials and workmanship for 12 months from the original date of shipment from COCHRAN. For purposes of establishing warranty eligibility, this date of shipment may be noted on the original Product box, or can be determined by contacting COCHRAN.

Any defective Product, unless cause is specifically excluded in the "Warranty Conditions and Limitations" section below, will at the sole discretion of COCHRAN, be repaired or replaced with a new or refurbished unit of comparable or better function and/or condition. COCHRAN is not responsible for any incidental or secondary damages as a result of Product malfunction.

WARRANTY CONDITIONS and LIMITATIONS: Product must have been obtained from a COCHRAN Authorized Dealer or directly from COCHRAN. Contact COCHRAN for verification of dealer status. This Limited Warranty is not transferable. The product must be registered with COCHRAN within 15 days of purchase in order to validate Limited Warranty. The product can be registered via the COCHRAN website (www.DiveCochran.com/ProductRegistration).

Failure to provide proper care for this Product will render this Limited Warranty null and void. Damages or malfunction resulting from accidental or deliberate abuse, tampering, battery leakage, exceeding maximum intended operating depth or other parameters, extreme heat or cold, exposure to harmful chemicals such as hydrocarbons, or other conditions which COCHRAN may deem to be outside the intended scope of this Limited Warranty are not covered.

This Limited Warranty does NOT cover plastics, O-rings, batteries, battery life, and flooded battery compartments.

This Limited Warranty will be rendered null and void if an attempt is made to establish communications with the computer with any hardware and/or software other than the COCHRAN approved Analyst® Interface.

The OWNER is responsible for shipping this Product to COCHRAN for service, and paying all associated costs, including shipping, insurance, and import duties. OWNER may take Product to an Authorized Dealer to arrange service under terms of this Limited Warranty. COCHRAN will return Product to US OWNER or US Dealer via a method and carrier of its choosing. Costs for requested expedited return shipping will be the responsibility of OWNER. Product returned for service under terms of this Limited Warranty must be accompanied by a photocopy of the original sales receipt in order for warranty repair or replacement to be performed if the Warranty Registration is not on file.

STATEMENT OF LIMITED LIABILITY: A mathematical model is used by this Product to calculate physiological effects of SCUBA diving related to the use of compressed air or other breathing mixtures while at depth. Such effects specifically relate to nitrogen absorption into and elimination from body tissues, as well as effects of oxygen used in Enriched Air Nitrox breathing mixtures.

However, because of the number of variables and the varying degrees to which they may affect individuals engaged in SCUBA diving, COCHRAN DOES NOT GUARANTEE THAT USE OF THIS PRODUCT WILL PREVENT DECOMPRESSION SICKNESS OR ANY OTHER CONDITION OR INJURY INCURRED WHILE USING THIS PRODUCT.

These influencing variables may include, but are not limited to, dehydration, obesity, age, old injuries, or other physical conditions on the part of the diver, or environmental extremes of heat or cold, or poor training, or diving practices, any of which may promote the onset of decompression sickness or other harmful effects.
This Product is sold and intended to be used only as a guide, providing the TRAINED and CERTIFIED diver the information needed to make his own intelligent diving decisions. It is expressly understood that by buying and/or using this Product the Diver assumes ALL RISK as to its operability, reliability, quality, performance, accuracy, and suitability for his diving style. Furthermore, Diver recognizes that this Product is an electronic instrument being used in a hostile environment and is subject to failure, which may manifest itself in a number of ways. COCHRAN and its distributors and retailers will not be held liable for any personal injuries or other damages resulting from its use, even if COCHRAN has been advised of such occurrences or damages.

This product must be handled with care and properly maintained to assure the optimum performance. Users must possess the proper training for SCUBA diving activities and should be fully educated in the operation of this product. Users are encouraged to possess and utilize a redundant (backup) computer for their dive planning and execution. Divers are always encouraged to dive with a buddy at all times.

COCHRAN strongly supports and agrees with maximum depth limits of 130 feet for recreational SCUBA diving, as established by recognized training and certification agencies, and in no way encourages diving beyond these or any prudent lesser limits as may be necessitated by environmental, diver-specific, or other conditions.

THE WARRANTY AND REMEDIES SET FORTH ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHERS, WHETHER ORAL OR WRITTEN, EXPRESSED OR IMPLIED. COCHRAN UNDERSEA TECHNOLOGY SPECIFICALLY DISCLAIMS ANY AND ALL IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

No Cochran Undersea Technology dealer, agent, or employee is authorized to make any modification, extension, or addition to this warranty.

USER & ENVIRONMENTAL ADAPTATION: The LIFEGUARD® is one of the new breed of Dive Computers that adapts its algorithm to the users diving environment and style as originally pioneered by COCHRAN. All of COCHRAN's newer dive computers incorporate this capability. The factors used for this 'Adaptation' in the LIFEGUARD® are:

Water Temperature	Salt/Fresh Water Compensation
Microbubble	Altitude Acclimatization
User Conservatism	Previous Dive Profile
Workload	

However, the LIFEGUARD® allows the diver, via the optional Analyst® P.C. Interface, to disable the Temperature compensation should the diver deem a particular diving situation would so warrant. Calculation of Central Nervous System Oxygen Toxicity (CNS), Mission Oxygen Tolerance Units (OTUs), and the Partial Pressure of Oxygen (PO_2) is yet another added feature of this algorithm. You will find that this unit is extremely user friendly and can be customized to your individual diving conditions and practices. Factors that influence the decompression algorithm of your LIFEGUARD® are detailed below.

WATER TEMPERATURE: Diving in cold water can lower a diver's core and skin temperature, affecting the gas exchange rate of the body's tissues. The LIFEGUARD® features two modes of Temperature compensation, Reduced or Normal, in the Normal Mode the LIFEGUARD® progressively makes its' nitrogen algorithms more conservative as the water temperature declines below 75 degrees F. Above this water temperature, there is a minimal amount of temperature compensation. In the Reduced Mode, the algorithms are made more conservative by a fixed amount regardless of water temperature. If the diver is wearing an insulated dry suit and is relatively warm even in cold water, this temperature compensation factor may be set to the Reduced Mode at the divers discretion using the Analyst® PC software.

MICROBUBBLE: There are several theories regarding the method by which a nitrogen bubble forms from a microbubble. Currently, the predominant theory states that more rapid ascents accelerate bubble formation. The LIFEGUARD® accounts for this by progressively increasing its compensation as the diver's ascent rate exceeds 30 feet-per minute (fpm).

USER CONSERVATISM: Current dive computers cannot tell if the diver is dehydrated, tired, smokes, overweight, or has some other physical issue that may require additional conservatism in the nitrogen algorithm. The LIFEGUARD® allows the diver to input an added degree of conservatism to the nitrogen algorithm from 0 to 50 percent in one-percent increments. Touch Contact programming is featured.

PREVIOUS DIVE PROFILES: Under some circumstances, recent dive activity can have an effect on nitrogen loading, particularly if the diver engages in inverted profile diving. This occurs when a deep dive is followed by an even deeper dive. This recent dive history is used to compensate the nitrogen loading for the current dive.

SEA WATER/FRESH WATER RECOGNITION (High/Low Conductivity): There is approximately three-percent difference in depth readings taken in fresh water versus seawater. Some dive computers are calibrated in feet of fresh water and some are calibrated in feet of salt water. Diving in a medium different from what the dive computer is calibrated will cause apparent depth errors. Only COCHRAN dive computers, including the LIFEGUARD®, actually determine the type of diving medium and compensate the depth reading accordingly. This is accomplished by measuring the conductivity of the water during a dive. Caution must be taken in interpreting this reading since some apparent fresh water is actually high in minerals or contaminants and is correctly compensated as salt water (High Conductivity). This commonly occurs in some caves, springs and lakes.

ALTITUDE ACCLIMATIZATION: Driving or flying to a dive site significantly higher in altitude requires special modifications to the sea level algorithm. The LIFEGUARD® regularly samples the ambient barometric pressure to determine these changes in altitude. Accordingly, the decompression algorithm is changed to reflect these barometric pressure changes. Note: temperature and weather systems also affect barometric pressure and hence, apparent altitude. Using the 'Time To Fly' digits, the number of hours required to adapt to the new altitude is immediately known to the diver. If a significant altitude change occurs, a minimum of one hour should pass before diving to allow the unit to adapt to this new altitude. Rapid changes in altitude should be avoided. The dive computer may interpret a rapid change from a high altitude to a lower altitude as a dive. Should this occur, removing the batteries for ten minutes would reset the computer, however, all tissue nitrogen loading will also be lost.

Should it be desired to initiate a dive PRIOR to completing the adaptation time, the LIFEGUARD® will treat this dive as a repetitive dive in its algorithm, taking into account the residual nitrogen present due to travel to altitude. There are two methods of compensating for altitude. Via the Analyst® P.C. Interface, ZONE or SEAMLESS compensation for altitude may be selected.

In **ZONE,** all altitudes less than 2,000 feet above sea level use the sea-level algorithm. At altitudes greater than this, altitude compensation is seamless; literally, every small fraction of gained altitude is considered in adjusting the algorithm. ZONE will reduce the occurrences of obtaining slightly different altitude readings and corresponding no-decompression (NDC) limits when diving within a given area. ZONE reduces the accuracy of altitude compensation for the first 2,000 feet above sea level, treating altitudes below 2,000 feet *as* sea level. The advantage in ZONE is that changes in apparent altitude (due to temperature or weather changes at sea level) will not affect NDC computations.

In **SEAMLESS**, the algorithm is adjusted for extremely small changes in altitude. A difference in altitude may be seen from day-to-day at a given dive site due to temperature or weather systems and their effect on barometric pressures. SEAMLESS will provide the most accurate altitude compensation algorithm, but normal variations in atmospheric barometric pressure may affect the no-decompression time which is more predominantly seen in the PreDive Prediction forecast.

WARNING: While your LIFEGUARD®, will automatically adjust its no-decompression algorithm for altitude, you should NOT attempt to dive at altitudes greater than 1,000 feet above sea level without first completing a sanctioned altitude diving course from a recognized training agency for recreational diving. A LIFEGUARD®**,** should not be used by anyone without this important training.

WORKLOAD COMPENSATION: When a diver's work rate or exertion level increases, he consumes more breathing gas (air) and his Breathing Mix Gas Consumption (GC)/Surface Air Consumption (SAC) increases. The diver exchanges and retains higher levels of nitrogen in his tissues at a high work rate as compared to a low work rate. As work rate increases, the LIFEGUARD® compensates by progressively increasing the conservatism of its nitrogen algorithms. The Workload Compensation starts when the diver's GC exceeds 35 psi per minute and reaches maximum compensation at 98 psi per minute. For accurate Workload Compensation the cylinder size, in liters, must be set correctly. This can be done by the Programming Mode or with the Analyst® Personal Computer Interface.

METRIC/IMPERIAL MODES: Most dive computers always compute in either Metric or Imperial units and merely convert the display to the other units. The LIFEGUARD® actually computes and displays in the selected units giving maximum accuracy and user familiarity. If the computer is computing and displaying in Metric, the "METRIC" legend will be illuminated when the computer is on. Metric/Imperial selection is made using the Analyst® software. Changing Modes does not affect any profiles or data stored in the computer.

LOW BATTERY INDICATIONS: Fresh should read about 3.2 volts on the InFormation Screen. When the CPU battery voltage drops to 2.1 volts, WU 2.2, the 'PBAT' and/or 'SBAT' legends will be illuminated. It is recommended to change the batteries at this point, but several dives might still remain possible. Once the 'PBAT' & 'SBAT' legends illuminate it is recommended that the diver monitor the battery voltage as displayed on the InFormation screen. Once the CPU battery voltage declines below 1.6 volts, WU 2.0, it can not be activated until fresh batteries are installed. While there should be sufficient battery power to normally complete a dive, it is not recommended to begin a new dive until fresh ENERGIZER® brand alkaline batteries are installed. After the computer automatically turns itself off (enters Sleep Mode) 70 minutes after a dive, it cannot be turned back on if the CPU battery voltage is less than 1.6 volts, WU 2.0. Fresh batteries must be installed. See the "BATTERY CHANGES" section of this manual for detailed information on how to change batteries.

CAUTION!!! COMPLETE LOSS OF BATTERY POWER MAY CAUSE ALL PREVIOUS DIVE NITROGEN LOADING TO BE LOST. THIS WILL AFFECT NITROGEN CALCULATIONS ON NEAR-FUTURE DIVES. AFTER A BATTERY CHANGE, CONFIRM THAT NO-DECOMPRESSION TIME DATA IS REASONABLE IN THE PRE-DIVE PREDICTION MODE. DIVE-OF-DAY NUMBER GOING TO ZERO IMMEDIATELY AFTER CHANGING BATTERIES IS ANOTHER INDICATION OF A LOSS OF NITROGEN LOADING.

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