Cochran

UNDERSEA TECHNOLOGY

A Division of Cochran Consulting, Inc.

Diving Into The 21st Century

www.divecohran.com

Cochran
EMC-20H
3FO2/2PO2
With
Helium
Owner's Manual

English - Metric
Ver: EMC-20H-3.00m

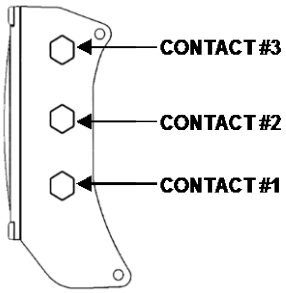
For your records, please fill in the following:

Serial Number: _____
Your Name: _____
Your Contact: _____
_____
_____
Purchase Date: _____
Purchase Place: _____
Address: _____
_____
_____

PRODUCT INTRODUCTION: The EMC-20H is quite simple to use and operate, but underneath that simplicity lies a significant level of sophistication. 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 practices of safe diving before using this device. If you are using the EMC-20H with the Trimix and/or the PO2 functions enabled, the diver specifically acknowledges that he has been adequately and thoroughly trained and certified to engage in Trimix or Constant PO2 diving by a professional, competent, recognized training agency.

This Manual is divided into the following Sections:

SIDE 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 EMC-20H can detect the difference between wet fingers, metal objects, fresh water, salt water, and a PC interface probe.

TURNING ON THE EMC-20H: Although the EMC-20H 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. Once activated, the unit will remain on for 60 minutes. If a dive is not initiated within these 60 minutes, the EMC-20H automatically shuts off. Notice that when Contacts 1 & 2 are first bridged, a short beep is issued which indicates that the unit is recognizing the touch. Every time Contacts 1 & 2 are bridged with wet fingers, the unit will stay on for one full hour.

The EMC-20H will not turn on if the altitude is greater than 4,900 meters or if the battery voltage is less than 2.0 volts, or a fault is detected during the self-test.

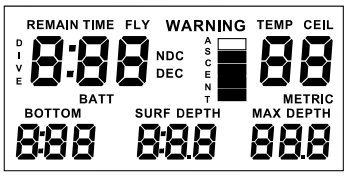


Figure 1
DIAGNOSTIC DISPLAY
(Unit Turning On)
All Segments Illuminated

As the EMC-20H first recognizes a turn-on command, it begins a "Diagnostic" function where many aspects of the system will be exercised and tested. This procedure takes about three 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.

TURNING OFF THE EMC-20H: After the Post Dive Interval following a dive, the EMC-20H 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 EMC-20H. The unit will continue calculating Surface Interval, nitrogen off gassing as required, and any changes in altitude as it affects Inert gas Loading. The current Surface Interval and PreDive Predictions can be viewed by reactivating the unit

MAIN EMC-20H OPERATING MODES:

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

SURFACE INTERVAL:

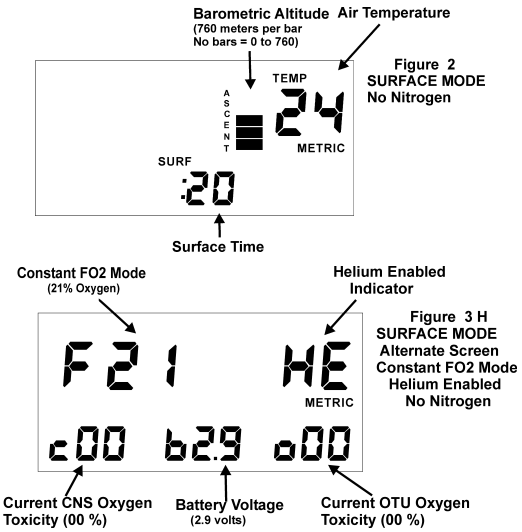


Figure 2
SURFACE MODE
No Nitrogen

Figure 3 H
SURFACE MODE
Alternate Screen
Constant FO2 Mode
Helium Enabled
No Nitrogen

After completion of the Self-Diagnostic mode or after the Post Dive Interval following a dive, the EMC-20H 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 previous dive's Bottom Time, Dive of Day number, current Time to Fly, Altitude and Temperature. The Alternate Screen displays the Current FO2 (default Blend) oxygen percentage, current calculated CNS and OTU values, and current battery voltage. Figure 2 shows the display with no residual Inert gas (a clean Dive). Figure 5 shows the display with residual Inert gas (a repetitive dive). Figure 3 shows the alternate screen without residual Inert gas, figure 6 with.

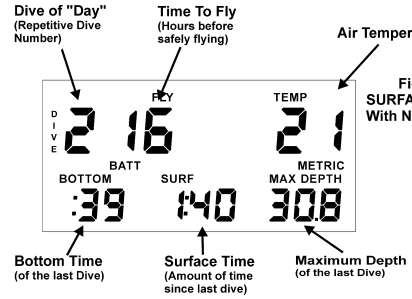


Figure 5
SURFACE MODE
With Nitrogen

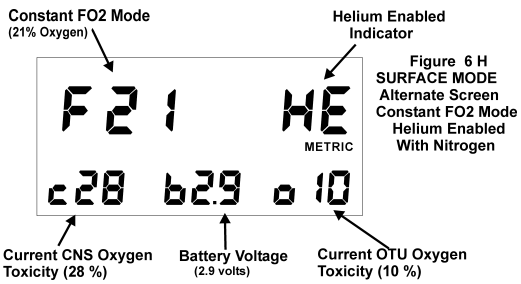


Figure 6 H
SURFACE MODE
Alternate Screen
Constant FO2 Mode
Helium Enabled
With Nitrogen

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

"Dive of Day" number starts at zero and increments after each dive regardless of the calendar day. When there is no remaining Inert gas 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 inert gas 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 4,900 meters above sea level). The six ranges are for display purposes only: The EMC-20H 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 EMC-20H measures Barometric Pressure to determine Altitude. Barometric Altitude can vary from actual Altitude by over +/- 305 meters! What is important to the body when diving is Barometric Altitude

0 Bars	sea level to 760 meters
1 Bar	760 to 1,520 meters
2 Bars	1,520 to 2,280 meters
3 Bars	2,280 to 3,040 meters
4 Bars	3,040 to 3,800 meters
5 Bars	3,800 to 4,900 meters

DIVE MODE:

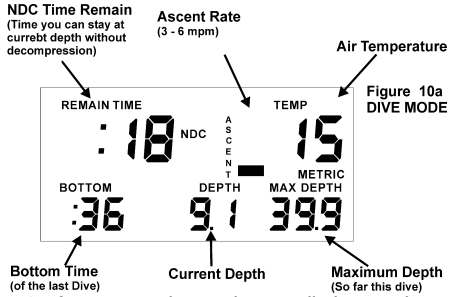


Figure 10a
DIVE MODE

Whether in the Surface Interval, PreDive Prediction Mode, Programming Mode or the Logbook Mode, the EMC-20H will automatically enter the Dive Mode whenever the unit determines that it is in water deeper than 1.5 meters.

On the Primary Screen the Surface time will be replaced with the current calculated PO_2 value. Maximum Depth will be replaced with current Depth, displayed in .1-meter increments. Bottom Time will begin once the EMC-20H senses that the diver has descended below 1.5 meters and continues until the diver has ascended above one meter. The maximum Bottom Time displayed is 9 hours 59 minutes.

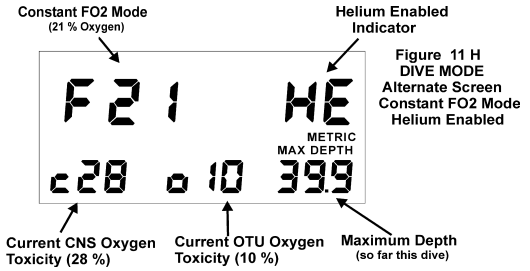


Figure 11 H
DIVE MODE
Alternate Screen
Constant FO2 Mode
Helium Enabled

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 current battery voltage. (Figure 11)

A Depth Alarm, which can be set to warn the diver should a certain depth be exceeded, is set at 40 meters 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. The depth alarm is disabled in the Decompression 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.

Temperature is measured for two purposes. One is to compensate the Depth Transducer for Temperature variations. The other is to compensate the Inert gas 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 (see Analyst® Section), 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 EMC-20H senses that the diver has descended below 1.5 meters (see Training Mode) and continues until the diver has ascended above 1 meter. 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 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:

18 meters or deeper	18 meters per minute
18 to 9 meters	meter per minute equal to depth
Less than 9 meters	9 meters 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 6 to 18 mpm, in one-meter 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 3 meters 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 18 meters per minute. With this setting, no bars will illuminate if a diver is ascending at a rate less than 3 meters per minute.

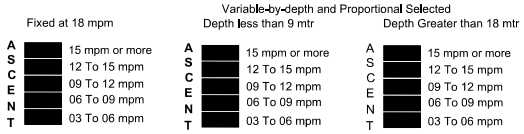


Figure 12a
Ascent Rate Bar Graph

If the diver has an Ascent Rate that exceeds the selected maximum, the entire 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.

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

DECOMPRESSION MODE:

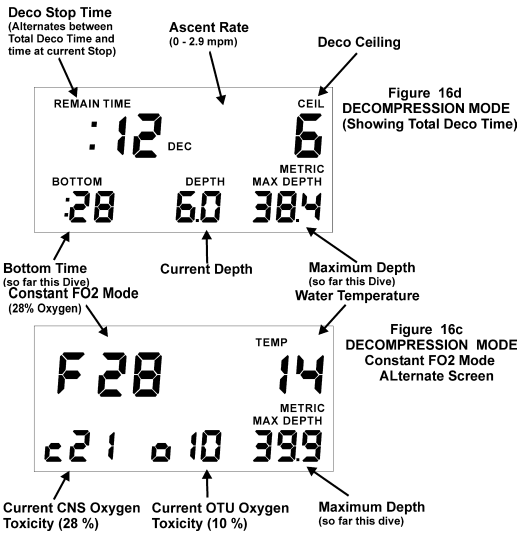


Figure 16d
DECOMPRESSION MODE
(Showing Total Deco Time)

Figure 16c
DECOMPRESSION MODE
Constant FO2 Mode
ALternate Screen

Should a no-decompression limit be overstayed, the EMC-20H 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 3 meters and increase in three-meter increments as the diver remains at a relatively deep depth.

The Remaining No-decompression Time and “NDC” legend will be replaced with Decompression Time and “DEC” legend (Figure 16d). 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 3-meter 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 diver’s 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 diver’s 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 EMC-20H.

If the diver surfaces before satisfying his decompression obligation, the EMC-20H will continue to give out-gassing credit as if it were in a dive, but at a depth of zero meters 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.

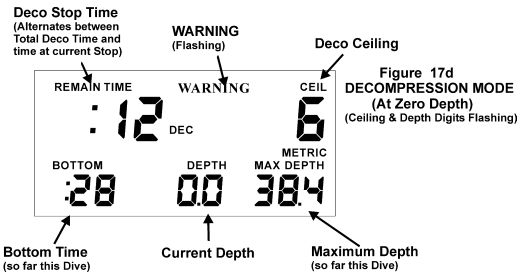


Figure 17d
DECOMPRESSION MODE
(At Zero Depth)
(Ceiling & Depth Digits Flashing)

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 minutes if the unit is in the Training Mode) after a dive, the EMC-20H is in the Post Dive Interval. The flashing "SURF" legend and a Surface Time of less than ten minutes (or up to thirty if the unit is in the Training Mode) 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.

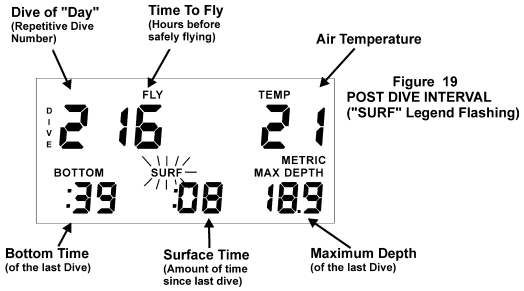


Figure 19
POST DIVE INTERVAL
("SURF" Legend Flashing)

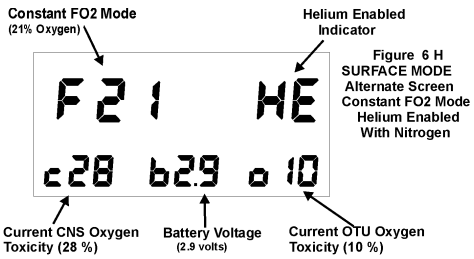


Figure 6 H
SURFACE MODE
Alternate Screen
Constant FO2 Mode
Helium Enabled
With Nitrogen

CONFINED WATER PROTOCOL (Training Mode): The EMC-20H 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 .3-meter seas. In the Training Mode, the EMC-20H enters the Dive Mode at a depth of .6 meters instead of 1.5 meters and will exit the Dive Mode at .3 meters instead of 1 meter. 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 Professional Edition of the Analyst® PC Interface**.

TACLITE™: The EMC-20H 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 vision difficulties with the color red. The TACLITE™ can be activated on demand. To turn the TACLITE™ on, tap the face of the EMC-20H 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 EMC-20H does. The number of seconds that the TACLITE™ stays on can be set via the Programming Mode or via the Analyst® PC Interface, factory setting is 10 seconds. The TACLITE™ will turn off when the EMC-20H turns off. If the batteries get too low, the TACLITE™ will turn off and cannot be turned back on until fresh batteries are installed.

CLOCK MODE: The Clock operating mode of the EMC-20H is NOT enabled when shipped from the factory. It can be enabled via the Analyst® P.C. Interface or at an Authorized Cochran Dealer.

TOUCH PROGRAMMING MODE: Can only be accessed when the unit is in the Surface Interval and allows the user to view or program into the dive computer:

- Setting Clock and Alarm Time
- Select the PO_2 or FO_2 Operating Mode
- The PreDive Prediction Mode
- Displaying Mode, mode value, CNS, OTU & battery voltage
- A Maximum Depth Alarm

- An Added degree of Conservatism from 0 to 50%
- Setting oxygen percentage of the Blend #1 Gas in the Constant FO_2 Mode
- Setting helium percentage of the Blend #1 Gas in the Constant FO_2 Mode
- Setting oxygen percentage of the Blend #2 Gas in the Constant FO_2 Mode
- Setting helium percentage of the Blend #2 Gas in the Constant FO_2 Mode
- Setting oxygen percentage of the Blend #3 Gas in the Constant FO_2 Mode
- Setting helium percentage of the Blend #3 Gas in the Constant FO_2 Mode
- Setting the First PO_2 set point in the Constant PO_2 Mode
- Setting the Blend #1 diluent O_2 oxygen percentage
- Setting the Blend #1 diluent Helium percentage
- Setting the Second PO_2 set point in the Constant PO_2 Mode
- Setting the Blend #2 diluent O_2 oxygen percentage
- Setting the Blend #2 diluent Helium percentage
- Setting the Deco Bottom Time Benchmark
- Setting the Deco Depth Benchmark
- Programming the On Time for the TACLITE™
- Access the Logbook Mode

While all EMC-20H 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 - CLOCK: When the EMC-20H is placed into the Clock mode it will display the time of day in a 24 hour day format. The clock will continue to run when the EMC-20H is in the Dive Computer Mode. The EMC-20H can be placed into the Clock Mode from the Dive Computer Mode when the unit is in the Normal Surface Interval, while the unit is in Clock Mode the Dive Computer will be in the "Sleep" mode.

The Clock Mode can be selected with or without an Alarm. If the Alarm option is selected the unit will display the alarm set time as well as the current time.

When the alarm time is displayed the alarm is activated and at the programmed time the alarm will sound once every 24 hours. When the alarm is activated the unit will issue a medley of all the audible warning tones that the EMC-20H utilizes and the TACLITE™ will flash for one minute, this audible alarm cannot be turned off, it will sound for the full one-minute period.

NOTE: This Time of Day clock is the same clock that is used to time stamp dives. Modifying the Time of Day clock will affect the Local Time as viewed via the Analyst®. The Date portion of the Local Time clock must be changed via the Analyst®.

CLOCK PROGRAMMING PROCEDURE:

Contacts 1, 2, & 3 are for programming sequences.

To begin the programming sequence:
1. Turn the unit on;
2. Using a coin or other conductive metal object, briefly bridge Contacts 1 and 2 until a short beep is heard and the CLoCk Menu is seen on the display.
3. To enter the Clock submenu, bridge Contacts 1 & 2 with wetted fingers. This will cause the unit to display the CLoCk Alarm selection – On or OFF. To Toggle the selection, bridge contacts 1&2 with wetted fingers.
4. Using a coin or other conductive metal object, bridge Contacts 1 & 2 to access the CLoCk Time or Alarm setting screen.
5. Shorting Contacts 1 & 2 with a coin will cause the first digit of the minutes to flash.
6. Shorting Contacts 2 & 3 with a coin will increment the numeric value, continue until the required value is displayed. A confirmation beep will sound with each increment.
7. 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.
8. To select Hours short Contacts 1 & 2 with a coin, increment as in step 6 and 7.
9. Repeat step 5 through 7 until all digits have been programmed.
10. 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.

To exit the Clock Mode Bridge contacts 1 & 2 with wetted fingers and the computer will return to the Dive Computer Mode's Surface Display.

NOTE: Ensure that the EMC-20H is in the Dive Computer Mode before commencing a dive.

Figures 40, 41a, 41b, 42 and 43 show how the Clock display screens appear.

Figure 40
PROGRAMMING MODE
(Clock Menu)

Figure 41a
PROGRAMMING MODE
(Clock Alarm - On/OFF)

Figure 41b
PROGRAMMING MODE
(Clock Alarm - On/OFF)

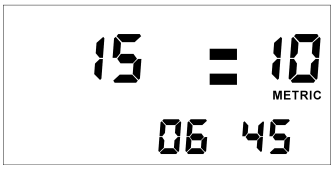


Figure 42
PROGRAMMING MODE
(Clock with Alarm)

TIme 15:10 (3:10 PM)
Alarm 06:45 (6:45 AM)

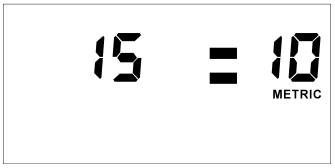


Figure 43
PROGRAMMING MODE
(Clock without Alarm)

TIme 15:10 (3:10 PM)

NOTE: Once the EMC-20H is placed in Clock Mode the unit will remain in that mode until exited by the diver.

TOUCH PROGRAMMING MODE:

NOTE: To enable the Programming Mode, the EMC-20H must be on the Surface and not in the Post Dive Interval.

NOTE: All audible and visual alarms are suspended while the EMC-20H 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 EMC-20H 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 EMC-20H 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:

Contacts 1, 2, & 3 are for programming sequences.

To begin the programming sequence:
1. Analyze the gas blend(s) using a calibrated Oxygen Analyzer.
2. Turn the 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, Trimix, 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 - SINGLE GAS FO2 TRIMIX

The following table lists the various programming choices with their display identification and figure number.

Identification		Description	Figure	Page
CLC		Clock – if enabled	40	4
PdP		PreDive Prediction	22	14
InF		**Misc.** Information	23	14
dEP	**AL**	Depth Alarm, Max value is 125 meters.	25	14
Con		Added Conservatism, Max allowed value is 50%.	26	14
O2	**1**	Oxygen percentage of Blend, Allowed value 5 to 99.9%	27H	14
H2	**1**	Helium Percentage of Blend Allowed value 0 to 95.0%	32H	14
TAc	**dL**	TACLITE™ On Time. Allowed value 00 to 99.	33	15
LOG		Logbook	34a	15

TOUCH PROGRAMMING - PREDIVE PREDICTION:

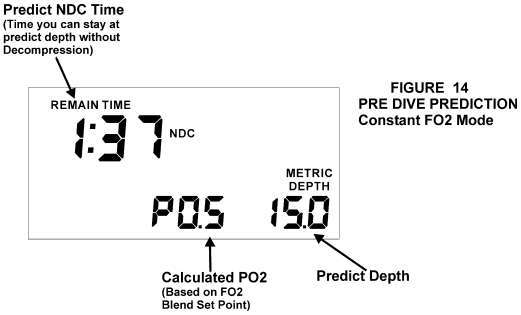


FIGURE 14
PRE DIVE PREDICTION
Constant FO2 Mode

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 EMC-20H's PreDive Prediction starts at 9 meters and increases in 1 meter increments. PreDive Predictions will terminate when the No-Decompression (NDC) time prediction reaches two minutes or a maximum depth of 125 meters is reached. Additional Conservatism, Residual Inert gas, blend #1 oxygen percentage and Barometric Altitude can affect PreDive Predictions. Once the maximum PreDive Prediction depth has been reached the unit will return to the Surface Interval.

Refer to the Analyst® for information about how to modify parameters. During the PreDive Prediction Mode, the unit will compute and display the maximum safe time and the calculated PO_2 value at that depth.

TOUCH PROGRAMMING - INFORMATION DISPLAY:

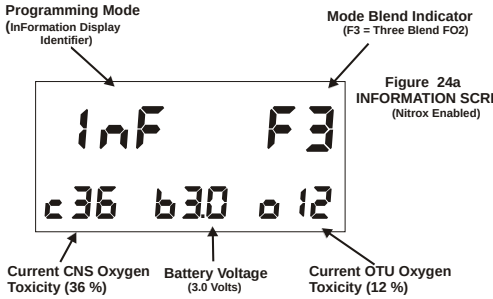


Figure 24a
INFORMATION SCREEN
(Nitrox Enabled)

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
F1	Single Blend FO2 TRIMIX, 5 to 99.9%
F3	Three Blend FO2 TRIMIX, 5 to 99.9% 5 to 99.9% and 5 to 99.9%
P1	Single Blend PO2 TRIMIX, 0.5 to 1.5 ata
P2	Dual Blend PO2 TRIMIX, 0.5 to 1.5 ata and 0.5 to 1.5 ata

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 (Trimix) 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. Figure 24a displays a typical InFormation screen for a unit that is enabled for two Trimix blends. . The alternate screen of the Information display shows the current programmed O2, He & N2 percentages as shown in figure 24aH .

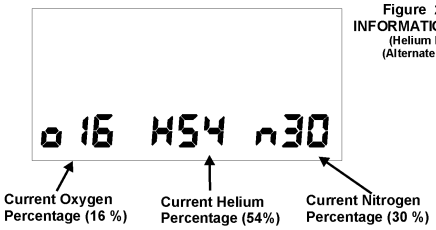


Figure 24aH
INFORMATION SCREEN
(Helium Enabled)
(Alternate Screen)

TOUCH PROGRAMMING - 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 125 meters in one-meter increments.

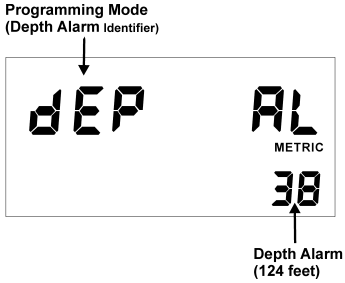


Figure 25a
PROGRAMMING MODE
(Depth Alarm)

TOUCH PROGRAMMING - CONSERVATISM: This programming function allows the diver to input an added degree of Conservatism into the EMC-20H's algorithm. Via Touch Programming the Conservatism can be set from 0 to 50%.

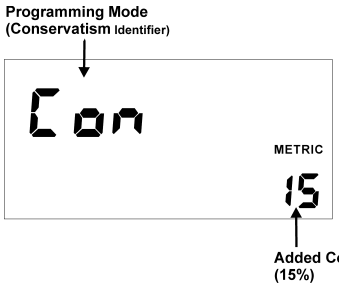


Figure 26a
PROGRAMMING MODE
(Setting Conservatism)

WARNING!

The *EMC-20H* Dive Computer and the Analyst Dive Planning Simulator software perform no checks for the viability of any gas mix. It is the user's sole responsibility to verify the gas mixtures and dives are within acceptable limits considered safe.

TOUCH PROGRAMMING - BLEND #1 OXYGEN %:
The oxygen percentage of Blend #1 can be programmed from 5.0% to 99.9%. Once programmed the oxygen percentage will remain at the value programmed until changed by the user.

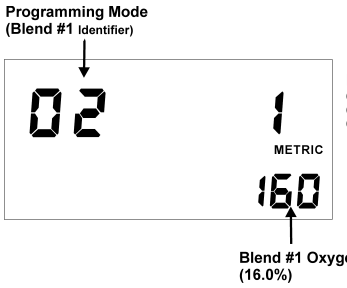


Figure 27aH
PROGRAMMING MODE
(Constant FO2 Mode)
(Helium Enabled)
(Setting Blend 1 Oxygen %)

TOUCH PROGRAMMING - BLEND #1 HELIUM %:
The helium percentage of Blend #1 can be programmed from 0.0% to 95.0%. Once programmed the helium percentage will remain at the value programmed until changed by the user.

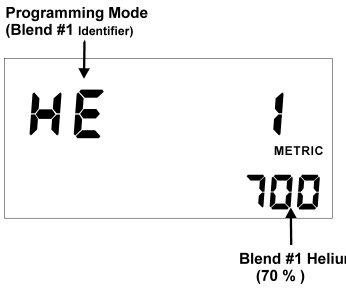


Figure 31aH
PROGRAMMING MODE
(Constant PO2 Mode)
(Helium Enabled)
(Setting Blend #1 Value)

TOUCH PROGRAMMING - TACLITE™: The Taclite™ dwell (on) time can be set so that when the face on the EMC-20H is tapped the Taclite™ will stay on from 1 to 98 seconds. If the dwell time is programmed to '0' the Taclite™ will never come on, if programmed to 99 the Taclite™ will be on whenever the EMC-20H is awake.

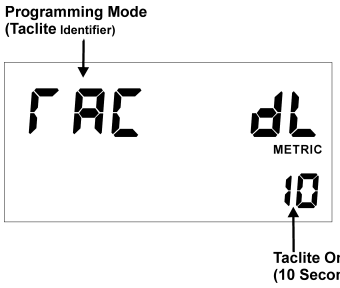


Figure 33a
PROGRAMMING MODE
(Setting TACLITE On Time)

On Time 10 sec

TOUCH PROGRAMMING - LOGBOOK MODE: The Logbook of the EMC-20H has two screens, a Primary Screen and an Alternate Screen. To switch to the Alternate Screen just tap firmly on the face of the unit. The Logbook is accessed via the Touch Contact Programming (see page 5). This enables the diver to view dive statistics; the EMC-20H has the ability to provide diving data for the most recent 1024 dives. The most recent dive will be displayed first. To view the next dive, touch the contacts 1 & 2 with wetted finger after pausing for a few seconds. Do not use a metal object such as a coin or knife-blade once in the Logbook since it will cause the unit to exit the Logbook and return to the Surface Interval.

Information contained in the Logbook will include:

Overall Dive Number	Minimum NDC Time
Fastest Rate of Ascent	Minimum Water Temperature
Bottom Time	Surface Interval Before Dive
Maximum Depth	Ending Battery Voltage
Maximum DEC Time (Deco Dive)	
Maximum Ceiling (Deco Dive)	

It is not necessary to exit the Logbook Mode prior to initiating a dive. Once the diver has descended below 1.5 meters, the EMC-20H will immediately enter the Dive Mode.

NOTE: The overall Dive Number that is displayed on the Logbook Menu screen (Figure 34) permits the diver to identify the total number of dives made with that EMC-20H. If the logbook example shown is the most recent dive made, it can be readily identified that 235 dives have been made with this specific unit.

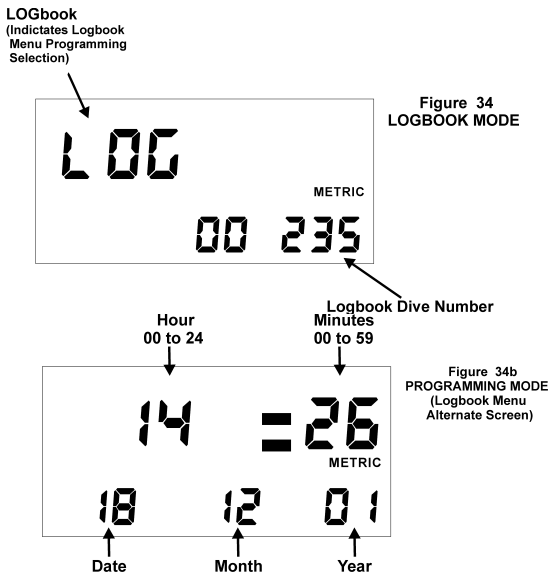


Figure 34
LOGBOOK MODE

Figure 34b
PROGRAMMING MODE
(Logbook Menu
Alternate Screen)

Figures 35 & 37 display the Logbook of a Normal Dive.

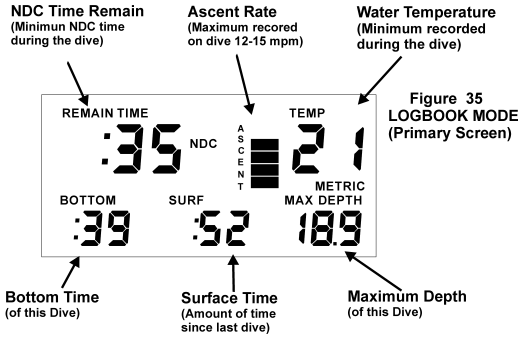


Figure 35
LOGBOOK MODE
(Primary Screen)

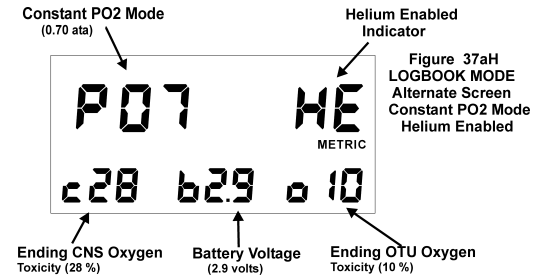


Figure 37aH
LOGBOOK MODE
Alternate Screen
Constant PO2 Mode
Helium Enabled

While Figures 36 & 38 display that of a Deco Dive

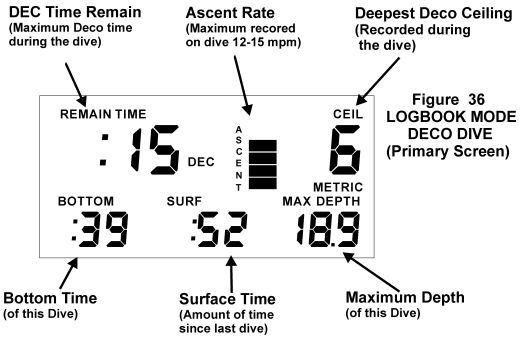


Figure 36
LOGBOOK MODE
DECO DIVE
(Primary Screen)

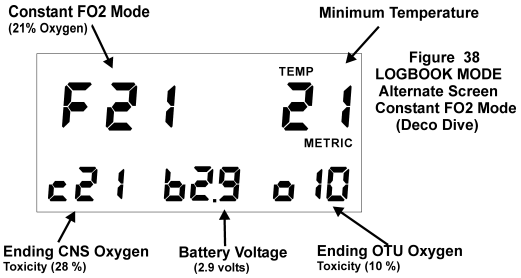


Figure 38
LOGBOOK MODE
Alternate Screen
Constant FO2 Mode
(Deco Dive)

WARNING INDICATIONS: Failure to observe audible and/or visual warnings and take corrective action may result in injury or death. In general, if the WARNING legend is flashing, some other digits should be flashing to indicate the anomaly.

- 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 battery voltage goes below 2.5 volts, the "BATT" legend will illuminate, at 2.2 volts it will flash once per second.
- 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 beep 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.
- If the dive computer determines that either the Depth or Temperature sensor is malfunctioning. The "WARNING" legend will illuminate, the computer will also issue a 5-beep two-tone audible alarm once every two-minute to alert the diver to this condition. On the Appropriate Screen the Maximum Depth will be replaced with "S-d" or "S--" to indicate the low-pressure transducer or "S-t" for the temperature transducer.
- For High PO2, see "**OXYGEN TOXICITY FACTORS**" on page 7.
- For High CNS, see "**OXYGEN TOXICITY FACTORS**" on page 7.
- For High OTU, see "**OXYGEN TOXICITY FACTORS**" on page 7.

If an audible alarm is being issued, the computer will not switch to the Alternate display nor will the TACLITE™ activate.

SENSOR WARNING: The EMC-20H has the capability of monitoring the integrity of its' sensors, both the low-pressure (depth/altitude) and the temperature. When the computer detects an error in one of the transducers, the diver is alerted to this condition by the illumination of the "WARNING" legend, and the computer will also issue a 5-beep two tone audible alarm once every two minute to alert the diver to this condition. The Maximum Depth will be replaced with "S--" to indicate the low-pressure transducer or "S-t" for the temperature transducer (see figure 18a). The "WARNING" legend, along with either the Temperature digits or the Depth digits and the error code will flash once per second. In the highly unlikely situation were both sensors are detected as having errors, the display will alternate between "S--" and "S-t". This warning will be issued whether the computer is in the Surface Interval, Dive Mode, Decompression Mode or Post Dive Interval. 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 18a shows a Sensor Warning, in this case a Temperature Sensor, as it would be displayed in the Dive Mode. If the Sensor Warning were for the depth sensor it would display "S--".

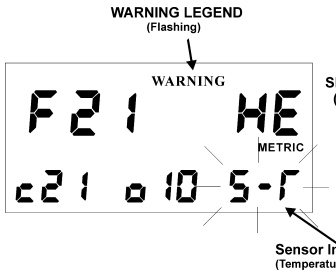


Figure 18aH
SENSOR WARNING
(On Alternate Screen
S-d = Depth Sensor
S-t = Temperature)

OXYGEN TOXICITY FACTORS: The EMC-20H 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 "WARNING" legend on the display will continue to flash and the audible alarm will be repeated once every two minutes.

These three functions are not active if the TRIMIX 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 PO_2 value that is displayed will flash.

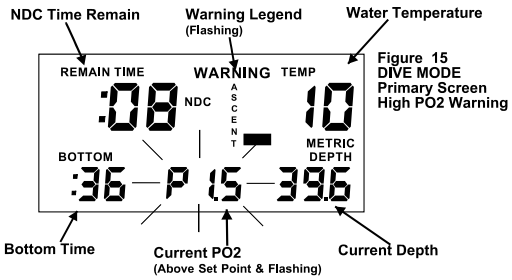


Figure 15
DIVE MODE
Primary Screen
High PO2 Warning

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 displayed CNS percentage 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%. 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 EMC-20H will track the 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 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 39 shows a CNS exposure over the alarm set point (50%), in the situation were both the CNS and the OTU exposure was over their set points both values would flash.

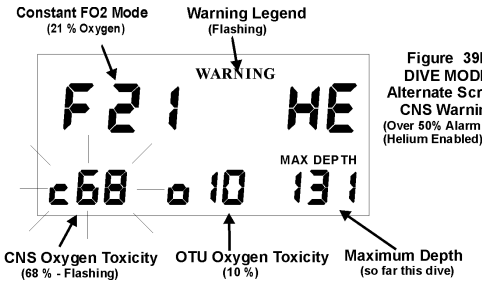


Figure 39H
DIVE MODE
Alternate Screen
CNS Warning
(Over 50% Alarm Point)
(Helium Enabled)

EMC-20H - THREE GAS FO2 TRIMIX:

OVERVIEW: This configuration of the EMC-20H is capable of being used for three different Trimix mixtures on the same dive. The three gases or Blends are programmable from 5% to 99.9% Oxygen in 0.1% increments and from 0% to 95% Helium again in 0.1% increments. Both Blends are set at the factory to 21% Oxygen and 0% Helium and use this in its decompression algorithm. PRIOR to diving a Trimix 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 EMC-20H is capable of FO_2 to FO_2 gas Blend switching. While most other Trimix dive computers limit the diver to the use of a single gas blend or percentage of oxygen, the EMC-20H allows the diver to use three different gas blends during a dive.

Since the depth of the second & third Blend switches are 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 Second Blend or back to the First Blend should the diver descend again. This is accomplished prior to starting a dive by specifying Gas Blend #1 Oxygen and Helium percentages, Gas Blend #2 Oxygen and Helium percentages and Gas Blend #3 Oxygen and Helium percentages. The depths of the Gas switches are 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 desired Gas Blend will actually be in use. If the diver subsequently descends below this depth, and is using Gas #3, Gas #2 is again assumed to be in use and if the diver descends below the Gas #2 switch depth Gas #1 is 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 Second Blend does not occur prematurely should the diver ascend early and not require use of the Second or Third Blends, the setting of this factor must be carefully considered. The 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 Second Blend. All of these factors can be set by either the touch contact programming or via the Analyst® PC interface. If switching to the Second or Third Blend is NOT desired, it may be disabled via the Analyst®. Setting all Blends to the same percentage of Oxygen is the same as disabling Blend switching. Via the Analyst® the second gas can be selected as the first gas, this allows the diver to start the dive on an Oxygen rich mixture and at the programmed switch depth switch to an Oxygen lean mixture and upon ascent switch back to the Second Gas and then to the Third. It this option is enabled the Switch Depth Time (dEC b) must be set to zero.

NOTE: It is recommended that the gas blend switch depth be set between ceiling depths, i.e. at 7 meters not at 6, at 4 meters not 3, etc.

SURFACE INTERVAL - THREE GAS FO2 TRIMIX:

The Surface Interval for the Two Gas Trimix configuration is the same as the Single Gas Trimix please refer to page 1.

DIVE MODE - THREEGAS FO2 TRIMIX:

The Dive Mode for the Two Gas Trimix configuration is the same as the Single Gas Trimix please refer to page 2.

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 Deco Gas Blend oxygen percentage.

DECOMPRESSION MODE - THREEGAS FO2 TRIMIX:

The Decompression Mode for the Two Gas Trimix configuration is the same as the Single Gas Trimix please refer to page 3.

If the diver surfaces before satisfying his decompression obligation, the EMC-20H will continue to give out-gassing credit as if it were in a dive, but at a depth of zero meters. The unit will continue to log data and perform as if actually in a dive. The unit will actually 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 Default Blend, but if a Gas switch does occur the dive computer will update the decompression times to reflect the change in breathing 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 FO2 TRIMIX:

The Post Dive Interval is the same as in the Single Gas Trimix, refer to page 3 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 Default Gas Blend for the NDC calculations.

PROGRAMMING MODE - THREE GAS FO2 TRIMIX:

The programming procedure is the same as Single Gas Trimix refer to page 5.

PROGRAMMING MENU - THREE GAS FO2 TRIMIX:

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 for three gas using Trimix with their display identification and figure number.

Identification		Description	Figure	Page
CLC		Clock - if enabled	40	4
PdP		PreDive Prediction	22	14
InF		**Misc.** Information	23	14
dEP	**AL**	Depth Alarm, Max value 125 meter	25	14
Con		Added Conservatism, Max		

		allowed value is 50%.	26	14
O2	**1**	Oxygen percentage of Blend, Allowed value 5 to 99.9%	27	14
H2	**1**	Helium Percentage of Blend Allowed value 0 to 95.0%	31H	14
O2	**2**	Deco Oxygen percentage, Allowed value 5 to 99.9%	28	14
HE	**2**	Helium Percentage of Blend #2 Allowed value 0 to 95.0%	32H	15
dEC	**b**	Bottom Time Benchmark for Blend #2 gas switching, Allowed value 0 to 999 minutes.	29	15
dEC	**d**	Depth Benchmark for Blend #2 gas switching, Max value is 120 meter	30	15
O2	**3**	Oxygen percentage for Blend #3, Allowed value 5 to 99.9%	281aH	15
HE	**3**	Helium Percentage of Blend #3 Allowed value 0 to 95.0%	321aH	15
dEC	**d3**	Depth Benchmark for Blend #3 switching, Max value is 120 meter	301	15
TAc	**dL**	TACLITE™ On Time Allowed value 00 to 99.	33	16
LOG		Logbook	34a	16

NOTE: If the EMC-20H 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 EMC-20H will retain the modified programmed settings that have been stored. Options that have not been modified will retain their previous settings.

TOUCH PROGRAMMING - CLOCK - THREE GAS FO2 TRIMIX: The Clock Programming Procedure for the Two Gas Trimix is the same as for the Single Gas Trimix please refer to page 4.

TOUCH PROGRAMMING - PREDIVE PREDICTION - THREE GAS FO2 TRIMIX: The PreDive Prediction for the Two Gas Trimix is the same as for the Single Gas Trimix please refer to page 5.

TOUCH PROGRAMMING - INFORMATION DISPLAY - THREE GAS FO2 TRIMIX: The InFormation display for the Two Gas Trimix is the same as for the Single Gas Trimix please refer to page 5.

TOUCH PROGRAMMING - DEPTH ALARM - THREE GAS FO2 TRIMIX: The Depth Alarm Programming Procedure is the same is the same as for the Single Gas Trimix please refer to page 5.

TOUCH PROGRAMMING - CONSERVATISM - THREE GAS FO2 TRIMIX:: The added Conservatism Programming Procedure is the same is the same as for the Single Gas Trimix please refer to page 5.

WARNING

The *EMC-20H* Dive Computer and the Analyst Dive Planning Simulator software perform no checks for the viability of any gas mix. It is the user's sole responsibility to verify the gas mixtures and dives are within acceptable limits considered safe.

TOUCH PROGRAMMING - BLEND #1 O_2 % - THREE GAS FO2 TRIMIX: The Blend #1 Programming Procedure is the same as for the Single Gas Trimix please refer to page 6.

TOUCH PROGRAMMING - BLEND #1 He % - THREE GAS FO2 TRIMIX: The helium percentage of Blend #2 Programming Procedure is the same as for the Single Gas Trimix please refer to page 6.

TOUCH PROGRAMMING - BLEND #2 O_2 % - THREE GAS FO2 TRIMIX: The oxygen percentage of Blend #2 can be programmed from 5.0% to 99.9%. Once programmed the oxygen percentage will remain at the value programmed until changed by the user.

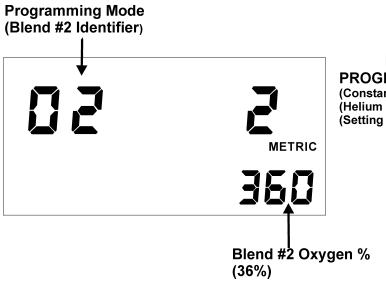


Figure 28aH
PROGRAMMING MODE
(Constant FO2 Mode)
(Helium Enabled)
(Setting Deco Blend Oxygen %)

TOUCH PROGRAMMING - BLEND #2 He % - THREE GAS FO2 TRIMIX: The helium percentage of Blend #2 can be programmed from 0.0% to 92.0%. Once programmed the helium percentage will remain at the value programmed until changed by the user.

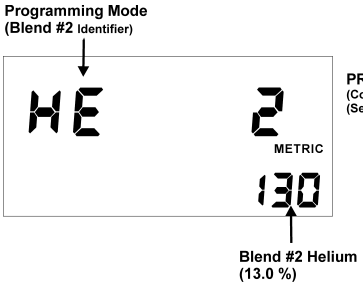


Figure 32aH
PROGRAMMING MODE
(Constant PO2 Mode)
(Setting Deco PO2 Value)

TOUCH PROGRAMMING - BLEND #2 - TIME BENCHMARK - THREE GAS FO2 TRIMIX: The Blend #2 (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.

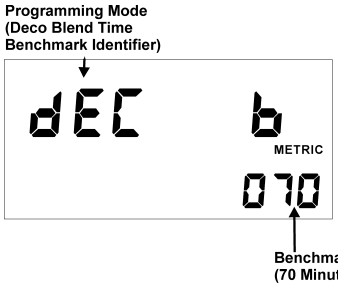


Figure 29a
PROGRAMMING MODE
(Constant FO2 Mode)
(Setting Deco Blend -
Time Benchmark)

TOUCH PROGRAMMING - BLEND #2 - DEPTH BENCHMARK - THREE GAS FO2 TRIMIX: The Blend #2 (Deco) Depth Benchmark can be programmed from 0 to 99 meters. Once programmed the depth setting will remain at the value programmed until changed by the user.

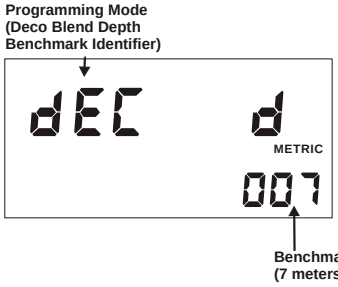


Figure 30a
PROGRAMMING MODE
(Constant FO2 Mode)
(Setting Deco Blend -
Depth Benchmark)

Depth 7 mtr

TOUCH PROGRAMMING - BLEND #3 O_2 % - THREE GAS FO2 TRIMIX: The oxygen percentage of Blend #3 can be programmed from 5.0% to 99.9%. Once programmed the oxygen percentage will remain at the value programmed until changed by the user.

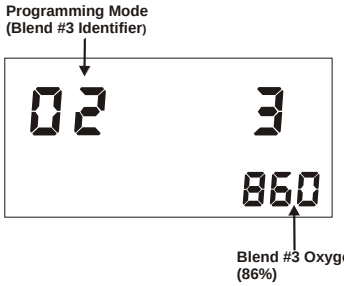


Figure 281aH
PROGRAMMING MODE
(Constant FO2 Mode)
(Helium Enabled)
(Setting Blend #3 Oxygen %)

TOUCH PROGRAMMING - BLEND #3 He % - THREE GAS FO2 TRIMIX: The helium percentage of Blend #3 can be programmed from 0.0% to 92.0%. Once programmed the helium percentage will remain at the value programmed until changed by the user.

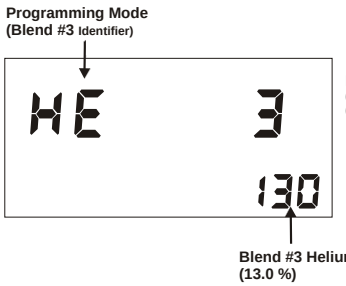


Figure 321aH
PROGRAMMING MODE
(Constant PO2 Mode)
(Setting Blend#3 Helium)

TOUCH PROGRAMMING - BLEND #2 - DEPTH BENCHMARK - THREE GAS FO2 TRIMIX: The Blend #2 (Deco) Depth Benchmark can be programmed from 0 to 99 feet. Once programmed the depth setting will remain at the value programmed until changed by the user.

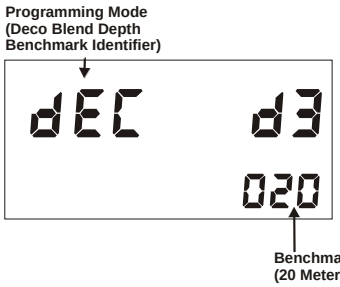


Figure 301
PROGRAMMING MODE
(Constant FO2 Mode)
(Setting Blend #3 -
Depth Benchmark)

Depth 20 meters

TOUCH PROGRAMMING – TACLITE™ - TWO GAS FO2 TRIMIX: The Taclite™ Programming Procedure is the same is the same as for the Single Gas Trimix please refer to page 6.

TOUCH PROGRAMMING - LOGBOOK MODE - TWO GAS FO2 TRIMIX: The Logbook Mode is the same as in the Single Gas Trimix refer to page 6 for detailed information.

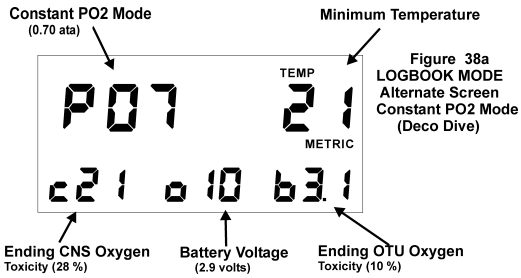


Figure 38a
LOGBOOK MODE
Alternate Screen
Constant PO2 Mode
(Deco Dive)

WARNING INDICATIONS - TWO GAS FO2 TRIMIX:
Refer to Warning Indications on page 7.

SENSOR WARNING - TWO GAS FO2 TRIMIX:
Refer to Sensor Warning on page 7.
CONSTANT PO2 OPERATING MODE

CONSTANT PO_2 & FO_2 MODES: Almost all other dive computers only compute using air or enriched air (Trimix), which is referred to as "Constant FO_2" and is commonly found in open-circuit systems and in semi-closed circuit rebreathers. The EMC-20H 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 EMC-20H is in CONSTANT PO_2 mode or the CONSTANT FO_2 mode when the unit is on the Surface after a dive, inert gas out-gassing is based on Air (21% Oxygen).

EMC-20H - SINGLE GAS PO2 TRIMIX

SURFACE INTERVAL - SINGLE GAS PO2 TRIMIX: The Surface Interval is the same as in the Single Gas Trimix configuration; refer to page 1 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, and current battery voltage. Figure 2 shows the display with no residual Inert gas (a clean Dive). Figure 4 shows the alternate screen without residual Inert gas.

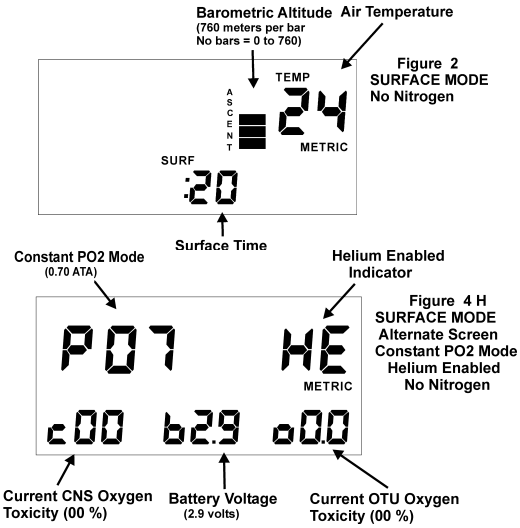


Figure 2
SURFACE MODE
No Nitrogen

Figure 4 H
SURFACE MODE
Alternate Screen
Constant PO2 Mode
Helium Enabled
No Nitrogen

Figure 5 shows the display with residual Inert gas (a repetitive dive), figure 7 shows the alternate screen with residual inert gas .

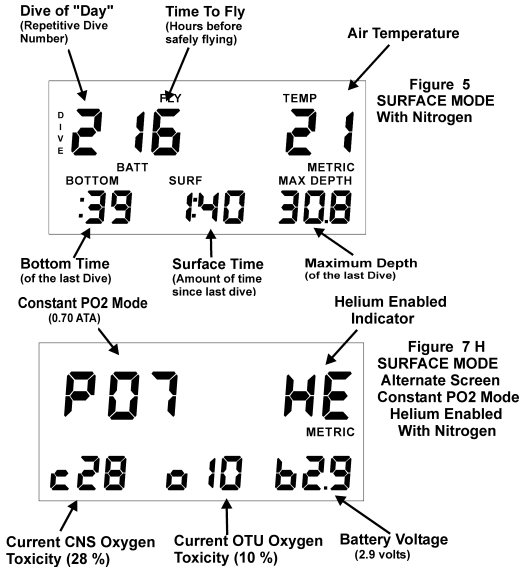


Figure 5
SURFACE MODE
With Nitrogen

Figure 7 H
SURFACE MODE
Alternate Screen
Constant PO2 Mode
Helium Enabled
With Nitrogen

DIVE MODE - SINGLE GAS PO2 TRIMIX: The Dive Mode for the PO_2 configuration is the same as the Single Gas Trimix. 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.

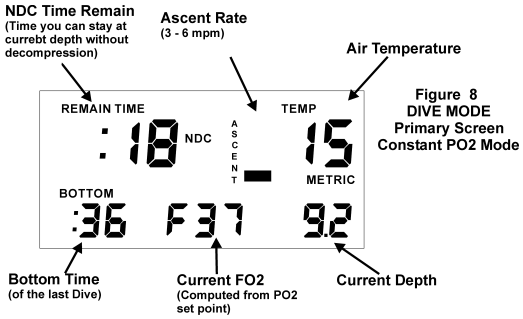


Figure 8
DIVE MODE
Primary Screen
Constant PO2 Mode

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.

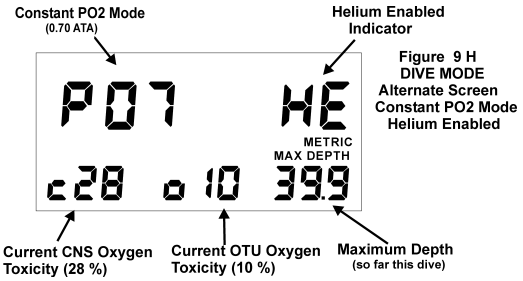


Figure 9 H
DIVE MODE
Alternate Screen
Constant PO2 Mode
Helium Enabled

DECOMPRESSION MODE - SINGLE GAS PO2 TRIMIX: The Decompression Mode for the PO_2 Mode configuration is the same as the Single Gas Trimix please refer to page 3.

Figures 16 & 16b shows the EMC-20H in the PO_2 mode at the Decompression Stop.

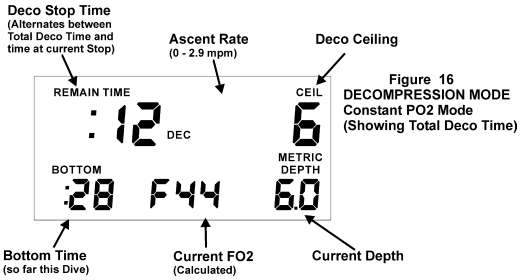


Figure 16
DECOMPRESSION MODE
Constant PO2 Mode
(Showing Total Deco Time)

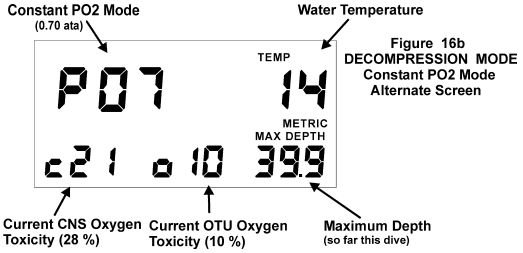


Figure 16b
DECOMPRESSION MODE
Constant PO2 Mode
Alternate Screen

If the diver surfaces before satisfying his decompression obligation, the EMC-20H will continue to give out-gassing credit as if it was in a dive, but at a depth of zero meters. 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 17 shows the primary display at a depth of Zero meters.

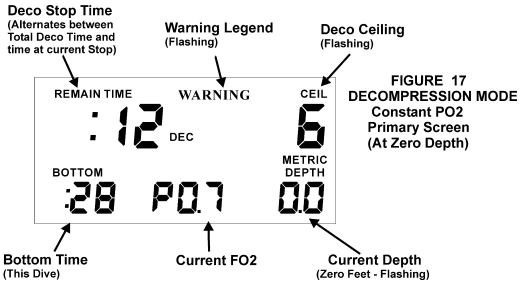


FIGURE 17
DECOMPRESSION MODE
Constant PO2
Primary Screen
(At Zero Depth)

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 TRIMIX: The Post Dive Interval is the same as in the Single Gas Trimix refer to page 3 for detailed information.

TOUCH PROGRAMMING - SINGLE GAS PO2 TRIMIX:

The programming procedure is the same as Single Gas Trimix refer to page 5, 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 constant PO2 function; 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
CLC		Clock – if enabled	40	4
PO2 / FO2		Toggles between PO2 Mode and FO2 Mode.	21	14
PdP		PreDive Prediction	22	14
InF		**Misc.** Information	23	14
dEP	**AL**	Depth Alarm, Max value is 125 meters.	25	14
Con		Added Conservatism, Max allowed value is 50%.	26	14
PO2	**1**	PO2 value. Allowed value 0.5 to 1.50.	31	14
O2	**1**	Oxygen percentage of Blend, Allowed value 5 to 50%	27	14
H2	**1**	Helium Percentage of Blend Allowed value 0 to 95.0%	31H	14
TAc	**dL**	TACLITE™ On Time. Allowed value 00 to 99.	33	15
LOG		Logbook	34a	15

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; the following table lists the various programming choices for a single gas FO2 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
CLC		Clock – if enabled	40	4
PO2 / FO2		Toggles between PO2 Mode and FO2 Mode.	20	14
PdP		PreDive Prediction	22	14
InF		**Misc.** Information	23	14
dEP	**AL**	Depth Alarm, Max allowed value is 125 meters.	25	14
Con		Added Conservatism, Max allowed value is 50%.	26	14
O2	**1**	Oxygen percentage of Blend, Allowed value 5 to 99.9	27	14
H2	**1**	Helium Percentage of Blend Allowed value 0 to 95.0%	31H	14
TAc	**dL**	TACLITE™ On Time Allowed value 00 to 99.	33	15
LOG		Logbook	34a	15

NOTE: If the EMC-20H 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 EMC-20H will retain the modified programmed settings that have been stored. Options that have not been modified will retain their previous settings.

TOUCH PROGRAMMING - CLOCK - ONE GAS PO2 TRIMIX: The Clock Programming Procedure for the Single Gas PO2 is the same as for the Single Gas Trimix please refer to page 4.

TOUCH PROGRAMMING – PO2/FO2 - ONE GAS PO2 TRIMIX: The selection of PO2 or FO2 determines the operating mode of the computer. The selection will toggle between PO2 and FO2. Figure 20 shows the Programming display with FO2 selected and figure 21 with PO2.

Figure 20
PROGRAMMING MODE
(FO2/PO2 - Showing FO2)

Figure 21
PROGRAMMING MODE
(FO2/PO2 - Showing PO2)

TOUCH PROGRAMMING - PREDIVE PREDICTION - SINGLE GAS PO2 TRIMIX: PreDive Prediction is accessed through the Touch Contact Programming Menu (See Programming, page 5). This enables the diver to view the PreDive Prediction information at the touch of the Contacts. The EMC-20H PreDive Prediction starts at 9 meters and increases in 1-meter increments. PreDive Predictions will terminate when the No-Decompression (NDC) time prediction reaches two minutes or a maximum depth of 125 meters 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 Inert gas and apparent Altitude can also affect PreDive Predictions.

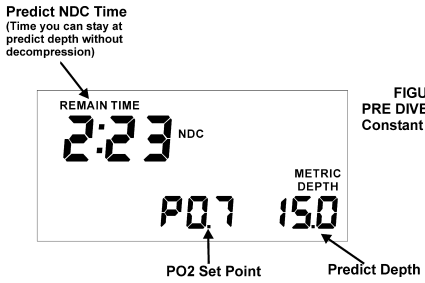


FIGURE 13
PRE DIVE PREDICTION
Constant PO2 Mode

WARNING!

The *EMC-20H* Dive Computer and the Analyst Dive Planning Simulator software perform no checks for the viability of any gas mix. It is the user's sole responsibility to verify the gas mixtures and dives are within acceptable limits considered safe.

TOUCH PROGRAMMING - INFORMATION DISPLAY - SINGLE GAS PO2 TRIMIX: The InFormation display for the Single Gas PO2 is the same as for the Single Gas Trimix please refer to page 5.

TOUCH PROGRAMMING - DEPTH ALARM - SINGLE GAS PO2 TRIMIX: The Depth Alarm Programming Procedure is the same is the same as for the Single Gas Trimix please refer to page 5.

TOUCH PROGRAMMING - CONSERVATISM - SINGLE GAS PO2 TRIMIX: The added Conservatism Programming Procedure is the same is the same as for the Single Gas Trimix please refer to page 5.

TOUCH PROGRAMMING - BLEND #1 - SINGLE GAS PO2 TRIMIX: The Blend #1 Programming Procedure is the same as for the Single Gas Trimix except the diver is programming a constant PO2 value between 0.5 and 1.5 ata, please refer to page 6.

Figure 31
PROGRAMMING MODE
(Constant PO2 Mode)
(Setting PO2 Value)

Set Point PO2 070 ata

TOUCH PROGRAMMING - BLEND #1 OXYGEN %: The oxygen percentage of Blend #1 can be programmed from 5.0% to 50.0%. Once programmed the oxygen percentage will remain at the value programmed until changed by the user.

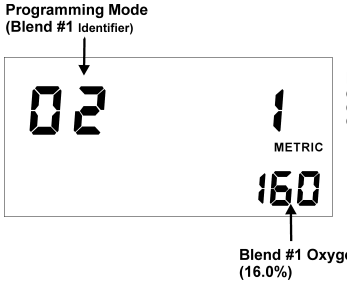


Figure 27aH
PROGRAMMING MODE
(Constant FO2 Mode)
(Helium Enabled)
(Setting Blend 1 Oxygen %)

TOUCH PROGRAMMING - BLEND #1 HELIUM %: The helium percentage of Blend #1 can be programmed from 0.0% to 95.0%. Once programmed the helium percentage will remain at the value programmed until changed by the user.

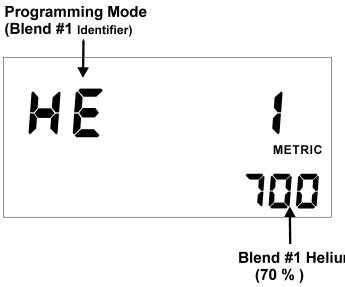


Figure 31aH
PROGRAMMING MODE
(Constant PO2 Mode)
(Helium Enabled)
(Setting Blend #1 Value)

TOUCH PROGRAMMING – TACLITE™ - SINGLE GAS PO2 TRIMIX: The Taclite™ Programming Procedure is the same is the same as for the Single Gas Trimix please refer to page 6.

TOUCH PROGRAMMING - LOGBOOK - SINGLE GAS PO2 TRIMIX: The Logbook Mode is the same as in the Air Only Mode, but contains additional information on the Alternate Screen (Non Deco dive Figure 37a, Deco Dive Figure 38a), refer to page 19 for detailed information.

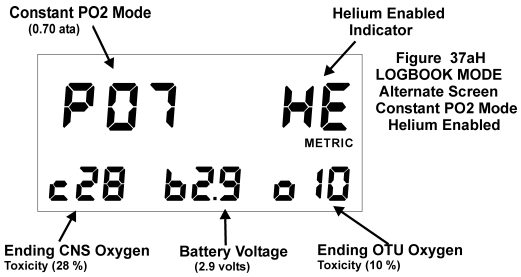


Figure 37aH
LOGBOOK MODE
Alternate Screen
Constant PO2 Mode
Helium Enabled

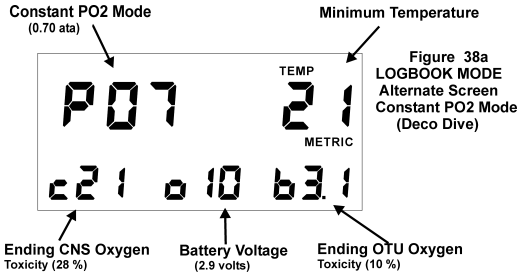


Figure 38a
LOGBOOK MODE
Alternate Screen
Constant PO2 Mode
(Deco Dive)

WARNING INDICATIONS - SINGLE GAS PO2: Refer to Warning Indications on page 7.
SENSOR WARNING - SINGLE GAS PO2: Refer to Sensor Warning on page 7.

EMC-20H - TWO GAS FO2 / PO2 TRIMIX:

CONSTANT PO_2 TRIMIX & FO_2 TRIMIX MODES: Almost all other dive computers only compute using air or enriched air (Trimix), which is referred to as "Constant FO_2" and is commonly found in open-circuit systems and in semi-closed circuit rebreathers. The EMC-20H 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 Trimix blends can be selected from 5.0 to 99.9 percent on the default blend and 5.0 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 Default 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 EMC-20H 'BLEND' refers to Constant FO_2 Trimix gas blends or Constant PO_2 gas blends. The EMC-20H is capable of FO_2 to FO_2, FO_2 to PO_2, or PO_2 to PO_2 Blend switching.

For a detailed description of blend switching refer to page 8.

SURFACE INTERVAL - TWO GAS PO2 TRIMIX: The Surface Interval for the Two Gas PO2 configuration is the same as the Single Gas Trimix, please refer to page 1.

DIVE MODE - TWO GAS PO2 TRIMIX: The Dive Mode for the Two Gas PO2 configuration is the same as the Single Gas Trimix, please refer to page 2.

DECOMPRESSION MODE - TWO GAS PO2 TRIMIX: The Decompression Mode for the Two Gas PO2 configuration is the same as the Two Gas Trimix, please refer to page 3.

If the diver surfaces before satisfying the decompression obligation, the EMC-20H will continue to give out-gassing credit as if it were in a dive, but at a depth of zero meters. 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.

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 - TWO GAS PO2 TRIMIX: The Post Dive Interval is the same as in the Air only Mode, refer to page 3 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 Default Gas Blend for the NDC calculations.

TOUCH PROGRAMMING - TWO GAS PO2/ THREE GAS TRIMIX WITH PO2 to FO2 BLEND SWITCHING ENABLED

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

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

The ANALYST® Personal Computer Interface allows the user to enable or disable the PO2 to FO2 Switching; 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
CLC		Clock – if enabled	40	4
PO2 / FO2		Toggles between PO2 Mode and FO2 Mode.	20	14
PdP		PreDive Prediction	22	14
InF		**Misc.** Information	23	14
dEP	**AL**	Depth Alarm, Max value is 125 meters..	25	14
Con		Added Conservatism. Max value is 50%.	26	14
PO2	**1**	PO2 value. Allowed value 0.5 to 1.50	31	14
O2	**1**	Oxygen percentage of Blend, Allowed value 5 to 50%	27	14
HE	**1**	Helium Percentage of Blend #1 Allowed value 0 to 95.0%	31H	15
O2	**2**	Oxygen percentage of Blend #2, Allowed value 5 to 99.9%	28	14
HE	**2**	Helium Percentage of Blend #2 Allowed value 0 to 95.0%	32H	15
dEC	**b**	Bottom Time Benchmark for Blend #2 gas switching, Allowed value 0 to 999 minutes**.**	29	15
dEC	**d**	Depth Benchmark for Blend #2 gas switching, Max value is 120 meter	30	15
O2	**3**	Oxygen percentage for Blend #3, Allowed value 5 to 99.9%	28	14
HE	**3**	Helium Percentage of Blend #3 Allowed value 0 to 95.0%	32H	15
dEC	**d3**	Depth Benchmark for Blend #3 switching, Max value is 120 meter	30	15
TAc	**dL**	TACLITE™ On Time. Allowed value 00 to 99.	33	16
LOG		Logbook	34a	16

TOUCH PROGRAMMING MENU - TWO GAS PO2/ THREE GAS TRIMIX - PO2 to PO2 GAS SWITCH

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
CLC		Clock – if enabled	40	4
PO2 / FO2		Toggles between PO2 Mode and FO2 Mode.	20	14
PdP		PreDive Prediction	22	14
InF		**Misc.** Information	23	14
dEP	**AL**	Depth Alarm, Max value is 125 meters.	25	14
Con		Added Conservatism. Max value is 50%.	26	14
PO2	**1**	PO2 value. Allowed value 0.5 to 1.50.	31	14
O2	**1**	Oxygen percentage of Blend, Allowed value 5 to 50%	27	14
H2	**1**	Helium Percentage of Blend Allowed value 0 to 95.0%	31H	15
PO2	**2**	Deco PO2 value. Allowed value 0.5 to 1.50.	32	15
O2	**2**	Deco FO2 Oxygen percentage, Allowed value 5 to 50%	28	14
H2	**2**	Helium Percentage of Blend Allowed value 0 to 95.0%	32H	16
dEC	**b**	Bottom Time Benchmark for Deco FO2 switching. Allowed value 10 to 999 minutes**.**	29	15
dEC	**d**	Depth Benchmark for Deco FO2 switching, Max value is 120 meter	30	15
TAc	**dL**	TACLITE™ On Time. Allowed value 00 to 99.	33	16
LOG		Logbook	34a	16

TOUCH PROGRAMMING - CLOCK - TWO GAS PO2 TRIMIX: The Clock Programming Procedure for the Two Gas PO2 is the same as for the Single Gas Trimix please refer to page 4.

TOUCH PROGRAMMING - PREDIVE PREDICTION - TWO GAS PO2 TRIMIX: The PreDive Prediction for the Two Gas PO2 is the same as for the Single Gas Trimix please refer to page 5.

TOUCH PROGRAMMING - INFORMATION DISPLAY - TWO GAS PO2 TRIMIX: The InFormation display for the Two Gas Trimix is the same as for the Single Gas Trimix please refer to page 5.

TOUCH PROGRAMMING - DEPTH ALARM - TWO GAS PO2 TRIMIX: The Depth Alarm Programming Procedure is the same as for the Single Gas Trimix please refer to page 5.

TOUCH PROGRAMMING - CONSERVATISM - TWO GAS PO2 TRIMIX: The added Conservatism Programming Procedure is the same as for the Single Gas Trimix please refer to page 5.

WARNING!

The *EMC-20H* Dive Computer and the Analyst Dive Planning Simulator software perform no checks for the viability of any gas mix. It is the user's sole responsibility to verify the gas mixtures and dives are within acceptable limits considered safe.

TOUCH PROGRAMMING - BLEND #1 - TWO GAS PO2 TRIMIX: The Blend #1 Programming Procedure is the same as for the Single Gas PO2, please refer to page 11.

TOUCH PROGRAMMING - BLEND #2 - TWO GAS PO2 TRIMIX: The Blend #2 Programming Procedure is the same as for the Two Gas Trimix, 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.

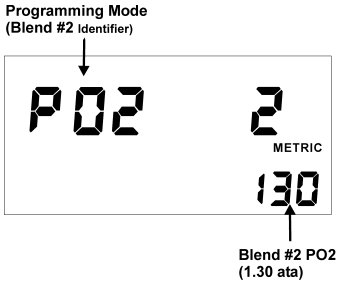


Figure 32a
PROGRAMMING MODE
(Constant PO2 Mode)
(Setting Deco PO2 Value)

Set Point PO2 1.30 ata

TOUCH PROGRAMMING - BLEND #2 O_2 % - TWO GAS PO2 TRIMIX: The oxygen percentage of Blend #2 can be programmed from 5.0% to 50%. Once programmed the oxygen percentage will remain at the value programmed until changed by the user.

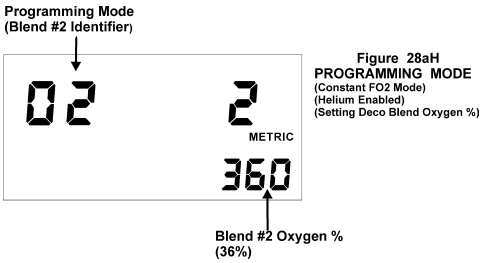


Figure 28aH
PROGRAMMING MODE
(Constant FO2 Mode)
(Helium Enabled)
(Setting Deco Blend Oxygen %)

TOUCH PROGRAMMING - BLEND #2 He % - TWO GAS PO2 TRIMIX: The helium percentage of Blend #2 can be programmed from 0.0% to 50%. Once programmed the helium percentage will remain at the value programmed until changed by the user.

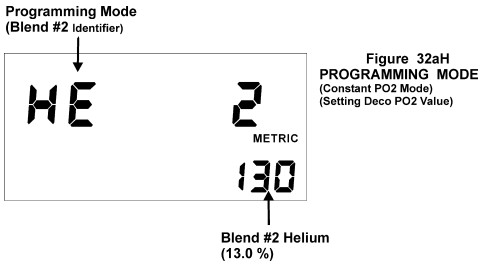


Figure 32aH
PROGRAMMING MODE
(Constant PO2 Mode)
(Setting Deco PO2 Value)

TOUCH PROGRAMMING - BLEND #2 - TIME BENCHMARK: The programming procedure for the Blend #2 Time Benchmark is the same as for Two Gas Trimix, refer to page 90.

TOUCH PROGRAMMING - BLEND #2 – DEPTH BENCHMARK: The programming procedure for the Blend #2 Depth Benchmark is the same as for Two Gas Trimix refer to page 9.

TOUCH PROGRAMMING – TACLITE™ - TWO GAS PO2 TRIMIX: The Taclite™ Programming Procedure is the same is the same as for the Single Gas Trimix please refer to page 6.

TOUCH PROGRAMMING - LOGBOOK - TWO GAS PO2 TRIMIX: The Logbook Mode is the same as in the Single Mix Trimix refer to page 6 for detailed information.

WARNING INDICATIONS - TWO GAS PO2 TRIMIX:

Refer to Warning Indications on page 7.

SENSOR WARNING - TWO GAS PO2 TRIMIX: Refer to Sensor Warning on page 7.

TOUCH CONTACT PROGRAMMING SCREENS: The following are all of the screens that the EMC-20H is capable of presenting in the Touch Programming Mode. Refer to the particular configuration for appropriate screens.

Figure 20
PROGRAMMING MODE
(FO2/PO2 - Showing FO2)

Figure 21
PROGRAMMING MODE
(FO2/PO2 - Showing PO2)

Figure 22
PROGRAMMING MODE
(PreDive PREDICTION MENU)

Figure 23
PROGRAMMING MODE
(Information Display Menu)

Figure 25 m
PROGRAMMING MODE
(Setting Depth Alarm)

Depth Alarm 38 meters

Figure 26
PROGRAMMING MODE
(Setting Conservatism)

Conservatism 15 %

Figure 27H
PROGRAMMING MODE
(Constant FO2 Mode)
(Helium Enabled)
(Setting Blend 1 Oxygen %)

Oxygen Percentage 16 %

Figure 28H
PROGRAMMING MODE
(Constant FO2 Mode)
(Helium Enabled)
(Setting Deco Blend Oxygen %)

Oxygen Percentage 36 %

Figure 281aH
PROGRAMMING MODE
(Constant FO2 Mode)
(Helium Enabled)
(Setting Blend #3 Oxygen %)

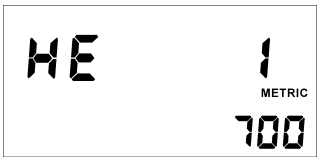


Figure 31H
PROGRAMMING MODE
(Constant PO2 Mode)
(Helium Enabled)
(Setting Blend #1 Value)

Set Value 70%

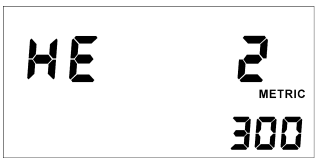


Figure 32H
PROGRAMMING MODE
(Constant PO2 Mode)
(Helium Enabled)
(Setting Deco Value)

Set Value 30 %

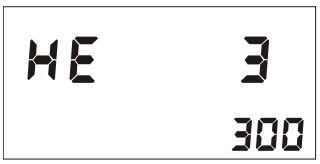


Figure 321H
PROGRAMMING MODE
(Constant PO2 Mode)
(Helium Enabled)
(Setting Blend #3 Value)

Set Value 30 %

Figure 29
PROGRAMMING MODE
(Constant FO2 Mode)
(Setting Deco Blend - Time Benchmark)

Bottom Time 70 min.

Figure 30
PROGRAMMING MODE
(Constant FO2 Mode)
(Setting Deco Blend - Depth Benchmark)

Depth 7 mtr

Figure 301
PROGRAMMING MODE
(Constant FO2 Mode)
(Setting Blend #3 - Depth Benchmark)

Depth 20 meters

Figure 31
PROGRAMMING MODE
(Constant PO2 Mode)
(Setting PO2 Value)

Set Point PO2 070 ata

Figure 32
PROGRAMMING MODE
(Constant PO2 Mode)
(Setting Deco PO2 Value)

Set Point PO2 1.30 ata

Figure 33
PROGRAMMING MODE
(Setting TACLITE On Time)

On Time 10 sec

Figure 34a
PROGRAMMING MODE
(Logbook MENU)

DATA STORAGE TYPES & CAPACITY: The EMC-20H 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, Altitude, Battery voltage, Current unit Temperature, 20 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, Decompression Time, Maximum Depth and Ceiling, Maximum Depth and Ceiling Dive Number.
- **Each Dive Beginning Statistics:** 20 tissues loading, Local Time Clock, Dive of Day, Dive Number, Surface Time, CNS Toxicity, OTU Dose, OTU Mission Clock, Altitude, Time to Fly, Battery Voltage. Capacity is up to the most recent 1024 dives.
- **Each Dive Ending Statistics:** 20 tissues loading, Bottom Time, Max Depth, Average Depth, Min NDC Time, Max Deco Time, Max Deco Ceiling, Missed Ceiling, Missed Deco Time, CNS Toxicity, OTU Dose, Max PO2, Max Ascent Rate, Max A/R Time, Max A/R Depth, Blend #2 Switch Depth, Blend #2 Switch Time, Min Temperature, Average Temperature, Maximum Temperature, Min Battery Voltage, Time to Fly, number of Warnings. Capacity is the most recent 1024 dives.
- **Each Dive Configuration Data:** Full and complete configuration of the system, including Blend #1 Oxygen %, Blend #2 Oxygen %, Blend #2 Activate Time, Blend #2 Activate Depth, User Conservatism. Capacity is the most recent 1024 dives.
- **Profile Graphical Information:** Depth Graph, Ascent Rate Graph, Temperature Graph, PO_2 Graph, O_2 % Graph, CNS Graph, and OTU Graph. Capacity is 1500 hours at one second sampling (dependent upon memory configuration).
- **Inter-Dive Events:** Number of Initializations, Unit Activation, Altitude Changes of 300 Meters, Temperature Changes of 6 degrees C, Low Batteries, Sensor Malfunction, Analyst® interface with Dive Computer.

INTER-DIVE EVENTS: The EMC-20H 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 Analyst® P.C. Interface version 4.00 or higher. Some Inter-Dive events are:

- Initialization of the unit.
- The unit is turned on
- Low batteries
- Altitude Changes of over 300 meters
- Temperature Changes of 6 degrees C
- Sensor Malfunction
- Analyst® P.C. Communication

USER CONFIGURABLE ITEMS: The number of and which of the configurable options are viewed is determined by the configuration of your EMC-20H.

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 EMC-20H 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 EMC-20H is shipped from the factory as 'Proportional' (percentage).

Selectable Variable-By-Depth 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 of from 6 to 18 meters per minute (See next topic). As shipped from the factory, this is set to ON. If the VARIABLE rate is selected then the warning will illuminate based on the following table:

DEPTH	AVERAGE ASCENT RATE
18 meters and deeper	18 meters per minute
18 to 9 meters	same as depth
Shallower than 9 meters	9 meters 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 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 determines the responsiveness of the Remaining Time 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: This option allows the diver to select a maximum depth below, which the diver does not wish to exceed before an alarm is sounded. This function is disabled when in the Decompression Mode. This option may also be set via the Touch Contact Programming. As shipped from the factory, the Depth Alarm is set for 40 meters.

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.

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 (Off or On): This option allows the dive computer to consider recent dive history's effects on the inert gas loading, particularly if the diver engages in inverted profile diving. If "On" the recent dive history is used to compensate the inert gas loading for the current dive. The EMC-20H 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 19 for a detailed description of this function. The EMC-20H is shipped from the factory with this feature set to 'Normal'.

Select Altitude <610 meters as One Zone (Off or On): This option provides "actual" altitude for any given day at any diving location as explained in the "ALTITUDE ACCLIMATIZATION" on page 19. 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 610 meters 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 610 meters above sea level will be treated as sea level. Regardless of the selection, altitudes greater than 610 meters above sea level will be treated in a seamless manner. From the factory, this is set to 'Off', seamless altitude from sea level to 4,900 meters.

Select Alternate Screen Viewing Time (3 to 10): This option allows the diver to set the amount of time that the Alternate Screen will be viewed once it has been accessed. From the factory this is set to 4.

Select Display Backlight On Time (0 to 99): This option allows the user to set the amount of time, in seconds, that the TACLITE™ stays on once activated. If this option is set to "0" the TACLITE™ will never activate, if set to "99" the TACLITE™ will stay on all the time and only turn off when the EMC-20H does. From the factory this is set to 10. This option may also be set via the Touch Contact Programming method.

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 Disabled, the EMC-20H will not compute CNS Toxicity, OTU Dose, or maximum PO2 alarm. The factory setting for this option is 'Enabled'.

Select Helium Computations (Enabled or Disabled): This option enables and disables Helium computations. If this option is disabled, mixtures less than 21.0% oxygen will be disallowed. The factory setting for this option is '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'.

Enter Blend #1 Oxygen % in Mixture (5.0 to 99.9): For Constant FO_2 mode, this option allows the user to enter the desired Oxygen percentage for the FO_2 Blend #1 in 0.1% increments. Values from 5.0% to 99.9% may be entered. This option may also be set via the Touch Contact Programming method. As shipped from the factory, this is set to 21.0%.

Enter Blend #2 Oxygen % in Mixture (5.0 to 99.9): For Constant FO_2 mode, this option allows the user to enter the desired Oxygen percentage for the FO_2 Blend #2 in 0.1% increments. For Constant PO_2 mode, this option specifies the FO_2 blend percentage if and when the unit switches to FO_2 computations. Values from 5.0% to 99.9% may be entered. This option may also be set via the Touch Contact Programming method. As shipped from the factory, this is set to 21.0%.

Enter Blend #3 Oxygen % in Mixture (5.0 to 99.9): For Constant FO_2 mode, this option allows the user to enter the desired Oxygen percentage for the FO_2 Blend #3 in 0.1% increments. Values from 5.0% to 99.9% may be entered. This option may also be set via the Touch Contact Programming method. As shipped from the factory, this is set to 21.0%.

Enter Blend #1 Helium % in Mixture (0.0 to 95.0): For Constant FO_2 mode, this option allows the user to enter the desired Helium percentage for the Trimix FO_2 Blend in 0.1% increments. Values from 0.0% to 95.0% may be entered. This option may also be set via the Touch Contact Programming method. As shipped from the factory, this is set to 0.0%.

Enter Blend #2 Helium % in Mixture (0.0 to 95.0): This option allows the user to enter the desired Helium percentage for the FO_2 Trimix Gas #2 or Diluent Gas in 0.1% increments. For Constant PO_2 mode, this option specifies the FO_2 Trimix blend percentage if and when the unit switches to FO_2 computations. Values from 0.0% to 95.0% may be entered. This option may also be set via the Touch Contact Programming method. As shipped from the factory, this is set to 0.0%.

Enter Blend #3 Helium % in Mixture (0.0 to 95.0): This option allows the user to enter the desired Helium percentage for the FO_2 Trimix Gas #3 in 0.1% increments. Values from 0.0% to 95.0% may be entered. This option may also be set via the Touch Contact Programming method. As shipped from the factory, this is set to 0.0%.

Enter Blend #2 Bottom Time Activation Minutes: Here, you will enter the bottom time benchmark for switching to the Deco Blend. The Field Programming Mode previously described may also modify this setting. As shipped from the factory, this is set to 600. This option may also be set via the Touch Contact Programming method.

Enter Blend #2 Ascent Depth Activation: Here, you will enter the depth benchmark, which you will need to be above for switching to Blend #2. The Field Programming Mode previously described may also modify this setting. As shipped from the factory, this is set to 3 meters. This option may also be set via the Touch Contact Programming method.

Enter Blend #3 Ascent Depth Activation: Here, you will enter the depth benchmark, which you will need to be above for switching to Blend.#3 The Field Programming Mode previously described may also modify this setting. As shipped from the factory, this is set to 0 meters. This option may also be set via the Touch Contact Programming method.

Enter Set Point for PO_2 #1 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 Set Point for PO_2 #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.

Select Blend #2 Switching (Enabled or Disabled): This option enables the unit to switch to the Deco blend. If it is disabled the EMC-20H will not switch to the Decompression gas blend. As shipped from the factory, this set to 'Enabled'.

Select Blend #3 Switching (Enabled or Disabled): This option enables the unit to switch to blend #3. If it is disabled the EMC-20H will not switch to the third gas blend. As shipped from the factory, this set to 'Enabled'.

Select Blend #2 as First Gas (Enabled or Disabled): This option enables the unit to start the dive using gas #2 and then switch to gas #1 at the depth benchmark depth on decent and back to Gas #2 upon ascent. Deco Blend Benchmark Time is set to "0". As shipped from the factory, this is set to 'Disabled'.

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'.

High PO2 Alarm Point (0.50 to 1.59): This option allows the diver to select a maximum PO2 (Partial Pressure of Oxygen) at which an alarm is sounded. Values from 0.50 to 1.59 are allowed. This is set to a PO2 of 1.40 at the factory before shipping.

Selectable NDC Conservatism (0% to 50%): This feature allows 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 Touch Contact Programming. Conservatism is set to '0%' as shipped from the factory.

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 EMC-20H. In this mode the EMC-20H will enter the Dive Mode at .6 meters instead of 1.5 meters and exit the Dive Mode at .3 meters instead of 1 meter. 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 can only be 'Enabled' via 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 can only be set via the Professional Edition of the Analyst®.**

Select Clock Functions (ON or OFF): This option allows the diver to enable or disable the time of day Clock. If set to ON the clock time can be set via Touch Contact Programming method. As shipped from the factory, this is set to OFF.

Enter Clock Time: This allows the diver to set the clock's time to that of the P.C. time.

Select Alarm Clock Audible Alarm (ON or OFF): This option allows the diver to enable or disable the time of day Clock's Alarm feature. If set to ON the Alarm Clock time can be set via Touch Contact Programming. As shipped from the factory, this is set to OFF.

Enter Alarm Clock Hour (0 to 23): This allows the diver to program the time of day Alarm Clock's hour setting. The Alarm Clock's time utilizes a 24 hour format, i.e. 0 = 12:00 am, 20 = 8:00 pm, etc. This is also settable via Touch Contact Programming.

Enter Alarm Clock Minute (0 to 60): This allows the diver to program the time of day Alarm Clock's minute setting. This is also settable via Touch Contact Programming.

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

SPECIFICATIONS:

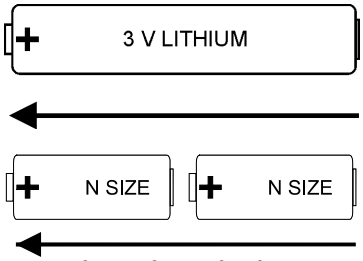
Algorithm	EMC-20H
Computation Period	Once every second
Activation	Manual and Water
Maximum Depth	130 meter, .1-meter increments
Depth Accuracy	+/- 1% of full scale (+/- 1.1 meter)
Maximum Altitude	4,900 meters, seamless
Altitude Accuracy	+/- 305 meters
Temperature Display	0 to 37 degrees C, 1 degree increments
Temperature Accuracy	+/- 2% of full scale after the unit has stabilized from a change in temperature)
Surface Time	0 to 9:59 hrs/mins, 1-minute increments
Bottom Time	0 to 9:59 hrs/mins, 1-minute increments
Time To Fly	0 to 48 hours, 1 hour increments
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 125 meters, 3-meter increments
Dive Summary Storage	up to 1024 Dives
Dive Profile Storage	up to 1450 Dive hours at one second sampling depending on configuration
Profile Sampling	1 second increments
Typical Battery Life*	Over 500 dive hours under normal diving conditions or one years (whichever is first), TACLITE off. Over 40 hours, TACLITE on continuously.
Typical Battery Life**	Over 1000 dive hours under normal diving conditions or two years (whichever is first), TACLITE off. Over 75 hours, TACLITE on continuously

* With fresh new ENERGIZER® brand alkaline batteries
** With fresh new Lithium battery

Note: Specifications are additionally +/- one least significant digit due to rounding. Specifications are subject to change without notice.

CLEANING THE EMC-20H: Clean the unit only with fresh water after each use and towel dry the unit; never use air pressure to dry the unit. This could damage the unit and will void the warranty. Do not use chemicals to clean the case or lens as this may damage the unit, or permanently fog the lens.

CHANGING BATTERY: The EMC-20H 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 batteries should be changed when the 'BATT' legend is seen or battery voltage reaches 2.5 volts as can be seen on the Information Display. The unit will operate until the battery voltage drops below 2.0 volts. Only use fresh batteries for maximum battery life. At this time, *Eveready Energizer* Alkaline is recommended for the N-Cells. Care should be taken not to activate the TACLITE™ during battery replacement. Be sure to confirm that the batteries are REALLY new and have not been sitting on a shelf losing life. Cold temperatures tend to shorten apparent battery life. Change batteries every two years regardless of battery condition.



Plus end goes in First.

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

When installing new batteries, ensure that the positive "**+**" end of the battery is inserted into the battery compartment first. Inspect the battery cap O-rings for nicks and scratches. If either O-ring is damaged carefully remove both O-rings and replace with new silicone O-rings. Lightly lubricate each end of the batteries with silicone grease or petroleum jelly to help minimize corrosion and therefore extend battery life.

When reinstalling the battery cap, lightly lubricate the O-rings and slowly twist the cap into place using a coin (US Quarter supplied). Press the coin into the battery cap slot firmly to prevent slipping and damaging the slot. Ensure there is no dirt or debris on the O-rings or the mating surface and that the O-rings are properly installed.

As the battery cap is screwed in, carefully observe that the double O-rings install correctly.

It is best to have the new batteries ready to install since the EMC-20H was designed to allow for battery changes without resetting. This period of time is typically 30 seconds, but varies with temperature and the voltage of the batteries being replaced. It can be significantly less if batteries are not replaced promptly when the 'BATT' legend first comes on. Again care should be taken not to activate the TACLITE™ during battery replacement, if the TACLITE™ is activated it will significantly reduce the time that the EMC-20H allows for battery changes.

If the batteries are allowed to discharge too low, or if removed for too long, the EMC-20H may enter a state where it will not turn on even with new batteries. If this occurs, remove the batteries and allow the unit to set for 30 minutes and then install fresh batteries. This procedure could affect the internal Time of Day Clock's settings and these settings should be verified via the Analyst® P.C. Interface.

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.

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

ASSISTANCE, REPAIR & MAINTENANCE: The Cochran EMC-20H does not require an Annual Maintenance, but if you suspect that your EMC-20H 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.

- **NEVER TEST OR SUBJECT THE PRODUCT TO PRESSURIZED AIR! (Voids Warranty)**
- **NEVER REMOVE THE LENS FROM THE UNIT! (Voids Warranty)**
- **ONLY USE FRESH WATER TO CLEAN UNIT! NEVER USE SOLVENTS!**
- **DO NOT USE A SCREWDRIVER TO REMOVE BATTERY CAP! (Voids Warranty)**
- **ALWAYS KEEP FRESH ENERGIZER® BRAND BATTERIES INSTALLED!**
- **LUBRICATE BATTERY ENDS WITH THIN FILM OF SILICONE GREASE!**

ANALYST® Personal Computer Interface

The ANALYST® Personal Computer Interface is a complete hardware/software system that uploads data from the Cochran EMC-20H to an Personal Computer with a Windows® operating system. The ANALYST® Personal Computer Interface allows the diver to retrieve dive data, customize the dive computer and also to enter and store information for each dive in a logbook database.

FCC LABEL

This device has been tested and Verified to comply with Part 15, Class B, of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

INTERFERENCE STATEMENT

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device. If not installed and used in accordance with the instructions, it may cause interference to radio communications. The limits are designed to provide reasonable protection against such interference in a residential situation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna of the affected radio or television.
- Increase the separation between the equipment and the affected receiver.
- Connect equipment and the affected receiver to power outlets on separate circuits.
- Consult the dealer or an experienced radio/TV technician for help.

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® USB interface module and cable to maintain compliance with FCC Regulations.

PATENT INFORMATION

Protected under one or more Foreign or US patents.

5,899,204 5,794,616
5,617,848 5,570,688

Other patents may be pending.

All specifications are subject to change without notice. Analyst® is a registered trademark of Cochran Consulting, Inc. Energizer is a registered trademark of the Eveready Battery Co., St. Louis MO.

CE

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.

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.

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 (http://www.divecochran.com/productregistration/productregistration.aspx).

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 use of compressed air or other breathing mixtures while at depth. Such effects specifically relate to inert gas absorption into and elimination from body tissues, as well as effects of oxygen used in Enriched Air Trimix 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 safe 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.

These products 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 40 meters 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 EMC-20H 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 that are used for this "Adaptation" in the EMC-20H are:

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

WATER TEMPERATURE: Diving in cold water can lead to a lower diver core and skin temperature which can affect the gas exchange rate of the body's tissues. The EMC-20H features two modes of Temperature Compensation, Normal or Reduced. The EMC-20H progressively makes its algorithms more conservative as the water temperature declines below 75 degrees F. Above this water temperature, there is no temperature compensation. In the Reduced Mode, the algorithms are made more conservative by approximately one-half the amount of the Normal Mode. 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 Reduced Mode at the divers discretion using the Analyst® PC software.

MICROBUBBLE: There are several theories regarding the exact method by which a inert gas bubble forms from a microbubble which was formed from micronuclei. Currently the predominant theory states that more rapid ascents accelerate bubble formation. The EMC-20H comprehends and adjusts for this phenomenon.

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 algorithm. The EMC-20H allows the diver to input an added degree of conservatism to the algorithm from 0 to 50 percent in one-percent increments. This can be done via the Touch Contact Programming Mode or with the Analyst® Personal Computer Interface.

PREVIOUS DIVE PROFILES: Under some circumstances, recent dive activity can have an effect on inert gas 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 inert gas loading for the current dive. This can be enabled or disabled with the Analyst® Personal Computer Interface.

SALT/FRESH WATER COMPENSATION (High/Low Water Conductivity): There is approximately a three percent difference in depth readings taken in salt water versus fresh water. Some dive computers are calibrated in feet of fresh water and some are calibrated in feet of seawater. Diving in a medium different from what the dive computer is calibrated for will cause apparent depth errors. Only COCHRAN dive computers, including the EMC-20H, 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 EMC-20H regularly samples the ambient barometric pressure to determine these changes in altitude whether the unit is On or Off. Accordingly, the decompression algorithm is changed to reflect these barometric pressure changes. Note that 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 higher altitude to a lower altitude as a dive. Should this occur, removing the batteries for ten minutes will reset the computer, however, all tissue inert gas loading will also be lost.

Should it be desired to initiate a dive PRIOR to completing the adaptation time, the EMC-20H will treat this dive as a repetitive dive in its algorithm, taking into account the "residual" inert gas present due to travel to altitude. There are two methods of compensating for altitude. Via the Analyst® PC Interface, ZONE or SEAMLESS altitude compensation may be selected.

In **ZONE** all altitudes less than 610 meters 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. However, ZONE reduces the accuracy of the altitude compensation for the first 610 meters above sea level, since all altitudes below 610 meters are treated 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 the NDC computations.

In **SEAMLESS**, the algorithm is adjusted for extremely small changes in altitude. However, 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 Pre-dive Prediction forecast.

CAUTION: The EMC-20H will not perform Altitude Acclimatization if the touch contacts are shorted or bridged. Rinse the unit with clean fresh water and dry it with a towel after each dive. Transporting and storing the unit in its case will help prevent the possibility of the contacts being shorted or bridged.

WARNING: While the EMC-20H will automatically adjust its no decompression algorithm for altitude, you should NOT attempt to dive at altitudes greater than 305 meters above sea level without first completing a sanctioned altitude diving course from a recognized training agency for recreational diving. The EMC-20H should not be used for this type of diving by anyone without this important training.

METRIC/IMPERIAL MODES: If the computer is 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 batteries should read about 3.2 volts on the Information Screen. When the battery voltage drops to 2.5 volts, the "BATT" legend will be illuminated. It is recommended to change the batteries at this point, but several dives might still remain possible. When the battery voltage decays to 2.2 volts, the "BATT" legend will begin to flash on and off. Once the "BATT" legend begins to flash the TACLITE™ is deactivated, to conserve the remaining battery power even though the unit may be on a dive, and 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 batteries are installed. After the computer automatically turns itself off 70 minutes after a dive, it cannot be turned back on if the battery voltage is less than 2.0 volts. 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 INERT GAS LOADING TO BE LOST. THIS WILL AFFECT INERT GAS 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 INERT GAS LOADING.

TABLE OF CONTENTS

FIGURES INDEX

Cochran
UNDERSEA TECHNOLOGY
A Division of Cochran Consulting, Inc.

Diving Into The 21st Century

Cochran
EMC-20H
With
HELIUM
Owner's Manual

English - Metric
Ver: EMC-20H-2.50m

1758 Firman Drive
Richardson, Texas 75081, USA
Phone 972-644-6284
Fax 972-644-6286
www.divecochran.com