Warning!

The VR3 is an aid to air and mixed gas open and closed circuit diving. When undertaking any form of diving, divers should always carry backup tables and depth/time instrumentation in case of equipment failure.

Software Upgrades

See the rear of this manual for information on recent software upgrades which may supercede certain sections of this manual

Specifications

Depth limit	150m (calibrated)
Time limit	9999 mins and 59 seconds
Max deco stop	99 levels
Number of gases	10
Battery life	Approx. 100 diving hours Sleep Approx. 1 year
Dive memory	Approx. 22 hours
Record resolution	10 seconds
Logbook dives	100

Pin No.

1. _____

2. _____

3. _____

4. _____

To access all dive features, the PIN number must be entered in the PIN Screen. This also allows programming of security information.

Registration and Warranty Form

Name.....

Address.....

.....

Email.....

Serial Number (on PIN screen) .....

Date Purchased.....

Repeat this three times. Now with the loop full of oxygen equalise the pressure in the loop with the outside pressure. Now calibrate the unit. The calibrate screen also shows a PO_2 bar graph which is available in DIVE and SIM modes.

IMPORTANT. After calibrating set the diluent back to the actual dive gas.

Warranty

This product carries a one year guarantee for bonafide manufacturing faults. This does not cover damage to the case or screen and switches during operation. Faulty units will be repaired or replaced as appropriate.

Maintenance

The VR3 has no parts which require maintenance by the user other than the battery compartment O rings. Do not over-grease these. Replace them if they become damaged or after ten battery changes. Regularly wash the unit in fresh water. If the switches become stiff, flush with fresh water. Keep the battery compartment thread clean.

Service

All digital depth monitoring devices will need a calibration check from time to time. Due to the potential depth of

operation of the *VR3* it is recommended that you return it to the factory for this check every three years (or two hundred hours of diving which ever is the sooner).

User Feedback

As the manufacturers of the *VR3* we welcome any feed back from our customers. Please feel free to Email or fax us with any requests or suggestions. Registered users will be kept informed of upgrades.

Technical Support

For technical support visit our website on www.vr3.co.uk Email is available at: deltapmg@aol.com

Planned Upgrades

If you have any comments on functions you would like to see included on the computer, please do not hesitate to let us know.

Please see our website for new features and options www.vr3.co.uk

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calibration gas. In order to do this correctly the rebreather loop must be totally flooded with oxygen and the counter lung equalised to ambient pressure before calibration takes place. Select the appropriate CAL gas from the diluent select screen, and put in any Altitude/Atmospheric compensation (see section below).

Operation.
While diving, momentarily pushing the right hand button will also show this display. On the dive screen (with XO_2 OFF), the display shows PP followed by the VR3's setpoint. With XO_2 ON the displays shows XP followed by the PO_2 reading from the cell.
If an error occurs with the cable or the PO_2 drops to zero the display will show XP FAIL. With XO_2 set to OFF, if the PO_2 of the diluent at the dive depth exceeds the VR3 setpoint then the diluent PO_2 will be displayed and used in the decompression calculation. With XO_2 set to ON the internal setpoint of the VR3 will toggle on the diluent gas line and below it the external sensor (XP) PO_2 will be displayed. The external sensor PO_2 is used for decompression. If the external sensor PO_2 appears in error simply turn XO_2 OFF to return to using internal setpoint decompression calculations. **To practice using this, enter the SIM mode of the VR3.**

For calibrating at altitude. Because the rebreather works on absolute pressure the calibration gas in the VR3 must be adjusted to allow for altitude pressure.

Example: If you are at an altitude pressure of 850mb. Go to the GAS menu and adjust one of the gases for the following;

$$\text{Actual calibration gas \% X } \frac{\text{Current atmospheric pressure at altitude}}{1000\text{mb}}$$

Therefore if 99% is used for a calibration gas at 850mb altitude;

$$99 \times \frac{850}{1000} = 84\%$$

Therefore instead of setting 99% as the calibration gas, set it to 84% and then do a flush routine as described earlier. This involves evacuate the breathing loop without adding any Air, now flood the unit with oxygen and evacuate again.

For oxygen analysis at altitude, simply set the analyser to 20.8 to 21% in atmospheric air.

Semi-closed Mode
Calibration.
Calibrate as per the analyser instructions.

Operation.
To turn the external cell on simply do a short press of the left hand button in the home or dive screens until the XO_2 icon is displayed. A long push of the left switch accesses that function. Now you can turn the external cell on and off using the + and – keys. To save a setting, do a short push of both buttons.

If you are diving an open circuit VR3 with semi-closed software then with XO_2 set to *off* the unit works as a fixed FO_2 (open circuit decompression based on your gaslist) computer. With XO_2 set to *on* the main screen will display the current mix based on the cell reading and preceded by an X (i.e X Tx 18/40 for an 18/40 trimix) to denote the eXternal reading is being used. The dive screen will display a similar wording. The external FO_2 will now be used in the decompression calculation.

Alarms
An *XFAIL* alarm will appear if the PO_2 sensed by the external cell falls below 0.16 bar. An *XCHECK* alarm will show if the PO_2 of the external call is sensing less that the PO_2 of the diluent selected at the depth. Example. If you have air set as a diluent (or semi-closed gas) and you are at 10 meters and the external cell is reading less that 0.42 PO_2 (air PO_2 at 10m), then the alarm will show. This is useful when a flow orifice has failed in a semi-closed rebreather or PO_2 injection has ceased in a closed circuit unit.

If you are running the VR3 in fully closed mode and the rebreather electronics fails. If you still have the external cell functioning correctly, by putting the VR3 in open circuit mode with the external cell set to *on*, will give you a semi-closed decompression based on the external cell readings.

Closed circuit Mode. Oxygen displays while diving

Calibration.
This function is carried out the same as with the analyser, *with the exception that pure oxygen is often used as the*

ICONS KEY

	DECO STOP		PLUS
	ADJUST		POWER ON
	GAS SELECT		DOWN
	PROFILES		GRAPH
	DIVE NOW		SAVE
	HP CONTENTS		OK
	CLOSED CCT		OPTIONS MENU
	OPEN CCT		BOTH SHORT
	HOME		BOTH LONG
	NEXT		ALTITUDE
	MINUS		BASE ALTITUDE
	STOP		SWITCH GAS
AIR	AIR BREAK	HIGH PO2	ASCEND HIGH PO_2

Introduction

The VR3 is designed as a multi-gas, multi-mode decompression computer. It can be purchased in a variety of configurations - from a simple air and Nitrox unit through to a full, mixed gas open and closed circuit version. The basic options are:

- Open Circuit Air and Nitrox
- Open Circuit Air, Nitrox and Trimix/Heliox
- Closed Circuit Nitrox
- Closed Circuit Nitrox, Trimix/Heliox

The VR3 is designed to integrate with both the Proplanner decompression software and the Prolog dive logging system. It is fully re-programmable should you choose to upgrade between options or if new technology/physiology become available.

Power System

The VR3 uses one AA disposable battery.
Note: Use of any other battery will damage the unit and will invalidate the warranty.

Alkaline, Lithium, rechargable or any other type of AA battery can be used between 1.5 and 3.6v.

The battery must be inserted with the + pin entering the unit first. Check the battery spring is in the cap before inserting battery.

The battery life is highly dependent on the operating mode of the active backlight (see page 27). Without lighting, the unit will work continuously for approximately 100 hours diving. If the unit is turned off ('sleep' mode), the battery keeps the internal systems going for 1 year. Every week of "sleep mode" reduces the available dive hours by approximately 2 hours. The battery voltage is displayed on the front screen. Batteries should be changed at approximatly 1.2v. Lithium batteries have a faster discharge curve than standard cells and although will last many hours longer, will discharge quickly.

Calibration

Normally analyser calibration is carried out in air. To do this go into the gas menu and set air as a CAL gas. For analyser mode on open circuit only units. Air is automatically set as the only CAL gas.

From the front screen a momentary push of the right button will cycle to the O_2 option. A long push enters that option. The oxygen percent is shown on screen as a decimal (0.209 = 20.9%). To keep this screen active it is recommended to select DIVENOW (short push both buttons) on the front screen to activate the 5 minute timer. In the O_2 screen you are given the option to exit to the front screen , save the current gas analysis to the gas list (short push both buttons) or calibrate (long push both buttons). Also displayed is a bar graph of PO_2 from 0 to 2 bar.

Now choose CAL (calibrate), push the ✓(right button) to accept and follow the instructions. Flush with the cal gas and press✓. *EQUALISE* simply means ensure the sensor is at ambient pressure, with some cylinder connection kits this may mean stopping the flow of gas. This is the case with the VR3 kit. Flow rates should provide a gentle 'hiss', excessive flow will increase the partial pressure and falsify the reading. To test for flow rate, first calibrate using air from a cylinder and slightly increase the flow until the reading changes, now decrease the flow until it reduces and becomes stable.

That is now the correct flow rate to use in future. Select ✓ once the pressure is equalised.

Finally once you have accepted ✓ the most stable reading (short push both buttons) it will return to the main analyser screen. A further short push of both buttons will save the current analysis and the  icon will appear in the bottom right of the screen. A short push on the right button goes to the gas adjust screen and the gas number will be highlighted. Change the gas number to the position you want your analysed gas to be stored into. Now, with a short push of both buttons➡ , move the cursor until the O_2 icon is highlighted along with the analysed mix. At this time a *TRANSFER* O_2 icon will appear in the bottom right hand corner. A short push of that button will transfer the analysed gas to that position in the gas list. You will now need to turn the gas *ON* to use it.

These conditions include;

1.Temperature
2.Moisture
3.Electrical noise (proximity of power sources and RF interference)
4.Connector corrosion.
5.Flow rate (hence partial pressure)

Therefore, it is not unusual to notice small 'drifts' while calibrating or using the units. While an ideal calibration in air should read between 20.8% and 21% oxygen, it is not unusual to see momentary shifts due to the above.

Many oxygen cells, if unused for a period, appear to benefit from a flow of an oxygen enriched gas prior to calibration and use.

The software option for the VR3 to allow the use of a remote oxygen cell comes in three versions.
a.Surface use only as a standalone oxygen analyser
b.Underwater use as a remote sensor for a semi-closed rebreather
c.Under and above water use as a remote sensor for a fully-closed rebreather and a standalone oxygen analyser

All rebreather versions of the software also allow semi closed rebreather operation.

All versions of this product must have the I/O connector fitted to the VR3. When using the VR3 with the optional analyser mode the Delta P 'cylinder connection kit' and I/O cable must also be purchased. Cylinder connection systems such as the Vandagraph unit are also applicable.

Mechanical Set-up

The standard Teledyne cell recommended for use with the VR3 is the R22 with a 3.5 mini jack connection system. Care must be taken to ensure that the cable end connector is correctly inserted all the way to the cell and does not disconnect during use. Occasionally corrosion may occur on both the cable end and cell connector and it may be necessary to rotate the connector in the cell to clean off any build-up. This can be seen as an incorrect (unstable) reading after calibration or as a moving FO_2 as the connector is rotated

At approximatly 1.2v, the "Battery Low" alarm will show. Battery life is also affected by low temperatures. These figures
are approximately based on an ambient temperature of 20 degrees centigrade.

Units are shipped with batteries installed. It is recommended that batteries are left in at all times.

When changing batteries ensure the VR3 is switched off (blank screen).

When ever possible change batteries before existing ones are flat.

To change battery, turn unit on and then let it turn off automatically before inserting new battery.

When changing batteries, in order not to loose data and to avoid erroneous tissue calculations, new batteries should be inserted **within 3 minutes** if diving is to continue.
(Do not use the unit as an aid for decompression for at least 24 hours if this takes longer and the unit resets, characterised by a loss of your gaslist).
If the batteries are allowed to go flat then **all** stored data will be lost, such as the gas list and logbook.

When changing the batteries if the the VR3 appears to "lock" in a screen, simply leave it for two minutes and it will automatically reset.

If the batteries are completely flat or if changing batteries appears to freeze the screen, put a new battery in and screw in the cap until the screen just flashes. Stop screwing in the cap and allow the unit to turn on and go into the clock screen. After a short time it will turn off (the backup battery is now charged) and you may continue screwing in the cap.

Basic Functions
The VR3 has the following basic functions:

- Time and date
- Light mode (various light functions)
- Programmable safety factor
- Programmable oxygen Air Break alarm
- Metric or US use
- Infra-red PC Link for uploading and downloading of setup and dive data
- On screen logbook of 10 dives
- Time to fly information
- Open and closed circuit modes with the ability to switch between them on certain models
- User programmable gas switches, any mix is adjustable above and below water
- PO_2, decompression violation, air break and ascent rate alarms
- Open circuit bailout option from closed circuit dives
- List of all decompression stops
- Total time to surface display
- CNS and OTU tracking
- Temperature

Decompression Algorithm
The VR3 uses a derivative of the Buhlmann ZHL 16 algorithm. Exactly the same adaptation is used in the Proplanner decompression software.

The new versions of both systems employ some of the latest thinking in practical microbubble avoidance. This may seem to modify the dive profile compared with standard parallel compartment models. The modification takes the form of deepwater microbubble controlling decompression stops. In certain circumstances the VR3 will prompt you to do a short decompression stop, or stops, well below the bulk of the decompression sequence. Along with the other modifications to the remaining profile, this helps to reduce the problems associated with potential microbubble growth.

On reaching the surface, the MISSED STOPS warning will be stored on the logbook and the alarm will display for 24 hours. If you re-enter the water, best-guess decompression will still be shown but again cannot be relied upon.

If you temporarily break a decompression ceiling and get back to the correct depth within 60 seconds the timer will start to count up again. When it reaches 60 the calculations will restart. Depending on the extent of your excursion you should build in extra safety for the remainder of the dive.

Switch
During a dive, you may notice a SWITCH  message and a prompt for a gas other than that which you are breathing.

This is the *VR3* asking whether you wish to switch gases based on the plan you have entered. You may ignore this if you wish and carry on using the same gas. The SWITCH message comes on when the MOD has been reached for that gas, according to the gas list you entered.

PO_2
This alarm occurs when an open circuit gas or Diluent has exceeded 1.6 bar PO_2.

Airbreak
This alarm will display when the user set CNS alarm limit is exceeded (see page 27). This will continue to display periodically once it has been reached.

Ascent Rate
Close to the middle of the screen is a vertical ascent rate bargraph.The bar fills from the bottom. A 50% full bar equals 10m/minute (the recommended rate for all sections of the dive). A full bar equals 20m/minute or greater. The  icon appears at over 10m/min

Addition Rebreather Model Features
Oxygen cell notes
Galvanic oxygen sensors and their connection systems are affected by many environmental conditions and this must be taken into account when using an oxygen analyser or rebreather.

The SIM and DIVEPLAN modes work on current tissue state. If you have just dived this will be reflected in the displayed decompression.

Alarms

The VR3 has several on screen alarms indicated by on-screen messages and the backlight flashing.

Alarm	***Parameter***
XP Fail	PO_2 sensor reading at 0
X Check	Low PO_2 compared to diluent at depth i.e. Air diluent at 10m should read a minimum of 0.42 and no less.
Check FO_2	FO_2, depth and gas type do not match up. For instance if you are at the surface and have air in the counterlung and the FO_2 is less than 21%. This would indicate a possible calibration error.
Down arrow	Violated decompression ceiling
Up arrow	PO_2 greater than 1.6 with no alternative active gas to switch to
Stop	Ascent rate greater than 10m/min
USE Tables	Deco has been violated on current dive, or previous dive within 24 hours
Missed stops	When reaching surface mode after dive, a decompression stop has not been completed
Violated stops	When reaching surface mode after dive, a decompression ceiling has been breached for longer than 1 minute, but all required estimated stops have subsequently been carried out as advised by VR3 in USE Tables mode
Switch Symbol	Switch to other gas in active dive list, based on MODs
Air Break	Repeats every 30 minutes for 5 mins while CNS alarm is above alarm limit

Decompression stop violation

If you ascend past a decompression stop to a level where the tissues may become over-pressurised, then the DESCEND ↓ message appears and a 60 second timer display starts to count down. If the warning is ignored, after 60 seconds a message will appear which says USE TABLES. After this, while the VR3 will continue to display 'best guess' decompression data it cannot be relied upon and you should switch to manual backup tables.

Micro Bubble Stop Rules

On all dives, the VR3 will prompt for deep-water micro bubble controlling stops of 2 minutes in duration.
Deep-water (microbubble) stops are recognised by their duration (normally two minute) and a + next to the time. It is vital that microbubble stops are conducted correctly for a safe decompression.

Should a microbubble stop be missed, a use tables alarm will be visible, then the decompression displayed (Although very close to the required duration) may be in error. If this occurs consult backup tables and add additional safety stops as required. While continued diving is posible on the VR3, the decompression displayed may not exactly that required. "use tables" will show for 24 hours.

Further notes on DCI avoidance

Avoid:
- Smoking
- Post dive exercise
- Caffeine related products
- Drugs and certain decongestants
- Fast ascent rates (greater than 10m/min)
- Yo-Yo dive profiles

Do
- Start hydrating at least 12 hours before diving and immediately after
- Breathe oxygen at the surface for a period after an extended decompression dive
- Rest after a dive
- Be conservative in your dive planning

Getting around

User interaction with the VR3 takes three forms
- Infra-red PC link
- The battery compartment
- The control switches

The Infra Red Link

The VR3's infra-red link is connected via the PC's serial port to the VR3's infra-red adapter (optional). The infra-red link is used to either download dive data (page 23) or upload gas data from Proplanner/Prolog into VR3.

Dives can be planned using Proplanner. The gases used within the dive plan can then be automatically transferred to the VR3. They will appear on the active gas list and be available for the dive.

Prolog PC software is also available so that you may view data filed about previously stored dives. This generates full graphics of any dive and provides a comprehensive dive logging system.

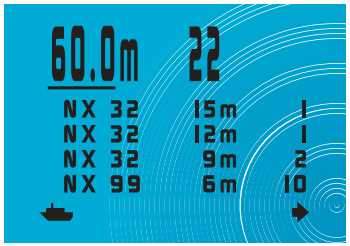
You may also generate sets of gases for uploading into the VR3 by using Prolog.

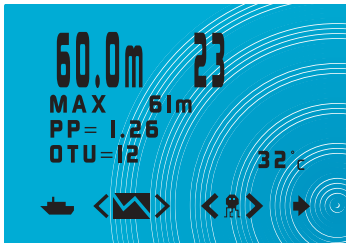
For full instructions on Prolog see the onscreen manual.
It is not necessary to use a PC to programme the VR3.

→ moves to the next page of stops. gives a graph of your current dive profile. goes to the game.

In rebreather mode XON and O_2 features are also available for selecting the external cell and viewing the PO_2. If at any point you change to a different gas, in a few moments the VR3 will modify the decompression list and re-calculate all decompression. The decompression screen stays active for 20 seconds. Every time you push a switch whilst in this screen the 20 second timer starts again and the decompression calculations are temporarily frozen.

Once in the screen, you are able to access several pages of stops by pressing → . The last one displays





maximum depth, current PO_2, current temperature and current OTUs. Current depth and time are also displayed at the top of the screen. A typical decompression screen might look like the one shown above.

CNS
The next line displays the CNS on the left hand side. When the user set 'airbreak' alarm is set (see SETUP), and when this limit is displayed in the CNS% position an 'airbreak' alarm will trigger in the top right of the screen. See Airbreaks on page 43.

TTS
On the same line as CNS is displayed the total time to surface in minutes on the right hand side. This includes ascent time and time at all decompression stops based on your ON gas list. All active (ON) gases will affect this prediction. If you are rebreather diving do not activate your bailout gases (although they may remain on the list, do not turn them on) as they will be used in the prediction. However if you do leave them on but you do not switch to them you will just be held at each stop longer than the prediction.

Gas
The next line displays the currently selected gas. When in closed circuit mode the PO_2 and make up of the Diluent are displayed here.

Message area
Messages appear in the top right of the screen.

Command Area
The bottom line features the command prompts. In SIM mode, a short push of the left-hand switch will increment the depth; a short push of the right hand switch will decrement the depth. With certain models (rebreather) the command prompts will also change during these short pushes. To activate the feature do a long push. To instantly return to 0m and end the simulation, push both buttons together (long push).

During both diving and simulation, a long push of the left hand button will take you into the menus for selecting and adjusting the gas which were described earlier. **Remember that even if the listed gas is not ON, you can enter the ADJUST screen and re-activate it for immediate use.**

The decompression ⤒ function (long push, right switch) allows you to view a list of all the decompression stops required, with the relevant gas switch highlighted, according to the gas plan you entered.

The Battery Compartment
The batteries are standard 1.5 - 3.6v AA style (or similar) which are widely available. The battery compartment is accessed using a coin or a screwdriver. The O rings should be replaced after a maximum of 10 battery changes or if they become damaged or worn. The O ring is an N70, 20 x 2mm standard Nitrile O ring.

The battery must be inserted positive + end first into the computer. Failure to do so will not damage the computer but it will not function until the fault has been corrected. The battery cover should be screwed in until no O ring is visible and the thread bottoms out. Keep the thread clean as this provides the system earth.

The Battery Indicator
A battery indicator is available on the startup screen. The battery should be changed at approximatly 1.2v. This is based on an ambient temperature of 20°C. N.B Lithium batteries although lasting much longer will have a very rapid discharge curve. Dependant on the manufacturer is may be necessicary to change the battery at a higher voltage.

The Control Switches

The VR3 has two slide switches on the front. All functions are accessed via these switches each of which has four modes of operation:

1. A short push and release of one switch - this is used for all non-critical functions.

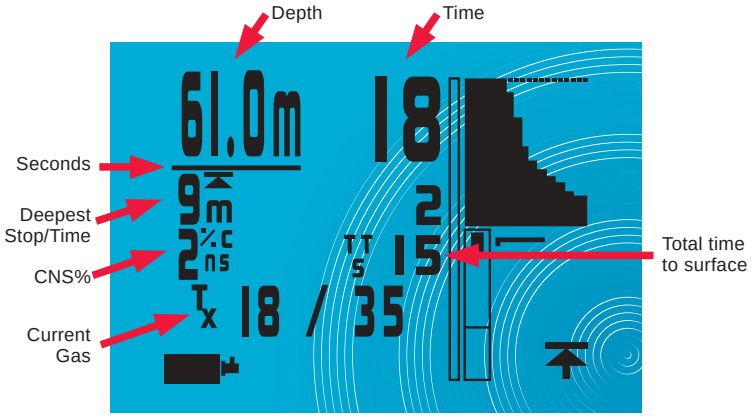
2. A push and hold of one switch. The switch is held until the screen changes. In certain modes such as clock setting, a hold will increment or decrement the number by 10. A short push increments or decrements by 1. In dive mode this provides security against accidental switching to the Gas Change and Decompression screens.
3. Shown as < > with the option between the arrows, a short push of both switches - often used to switch to a new field in order to change it.
4. Shown as **< >** with the option between the arrows,a long push and hold of both switches - often used for critical functions such as switching from open to closed circuit.
5. If no switch is pushed, the VR3 turns off in 30 seconds, or will revert to a previous screen if diving.

To put the VR3 into a 5 minute “on” mode do a long hold of both buttons in the home screen. “Dive Now” will be displayed.

For more details of where these functions are used, please refer to the relevant sections of the manual.

note: If you are unsure of the meaning of the screen icons, the VR3 automatically switches to an icon ID page after 10 seconds of inactivity.

To enter Simulate mode press SIM on the OPTIONS screen. The unit will switch to the DIVE display and a depth of around 10m will be displayed. A short push of the left and right buttons will increment or decrement the depth.



Open Circuit

In closed circuit mode partial pressure of oxygen is displayed on the gas line.

Simulate mode works at ten times real time.

Note: When in closed CCT mode a short push of the left button displays setpoint and a short push of the right button displays a PO_2 bargraph (with XO_2 set to on).With XO_2 set to off, both the diluent and setpoint (PP) will be displayed.

The DIVE screen has the following fields:

Depth

Current depth is displayed . In SIM mode this may vary slightly.

Time

The dive time is displayed in minutes and seconds. (bar graph under the depth shows seconds).

Decompression details

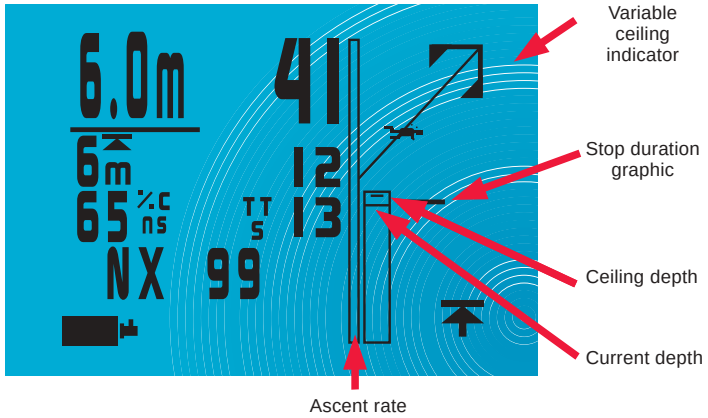
The deepest decompression stop, and time at that stop, are displayed. For a list of all stops, see the decompression section.

Simulate and Dive mode

It is not required to turn the VR3 on to dive, it will automatically turn on at an absolute pressure of approximately 1.3 bar. If you perform a short press of both buttons on the Home screen, the unit will switch to “dive now” mode and the screen will stay on for 5 minutes.

Enter SIM from the ☰ menu. To exit a simulated dive do a long hold of both buttons or ascend to zero depth.

The variable ceiling indicator below disappears during warnings, it is also off until you are within 3m of a ceiling. A tissue graph is normally displayed. A short push of both will change this to a clock and so on.



The variable ceiling indicator shows the proximity of the next deco stop (except Micro Bubble stop). When the diver is a the surface the deco ceiling has been reached. This feature allows you to do a continous decompression rather than a stepped one.

Stop duration - Graphic of approximate number of minutes at each decompression stop.
Ceiling depth - Depth where decompression starts.

Power Up

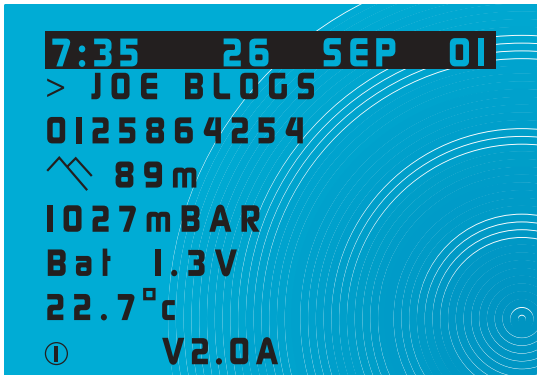
The VR3 is activated by pushing and holding either switch.

You will then be prompted to ⏻ power up(left switch). If the battery has not been replaced the next screen to be displayed will be the Home screen (page 15).

If the batteries have just been changed the time change screen may display.

It is not required to turn the VR3 on to dive, it will automatically turn on at an absolute pressure of approximately 1•3 bar. If you perform a short press of both buttons on the main screen, the unit will switch to “dive now” mode and the screen will stay on for 5 minutes.If you intend to dive shallower than a pressure of 1.3 bar, use the “dive now” feature.

On the power up screen below date and time, are two lines available for personal information programming (page 25).
Also shown is atmospheric pressure, temperature and battery voltage. A short push of the right switch toggles between a clock and tissue loading display.



It is now necessary to follow the pin number instruction on page 25 to activate your purchased level.

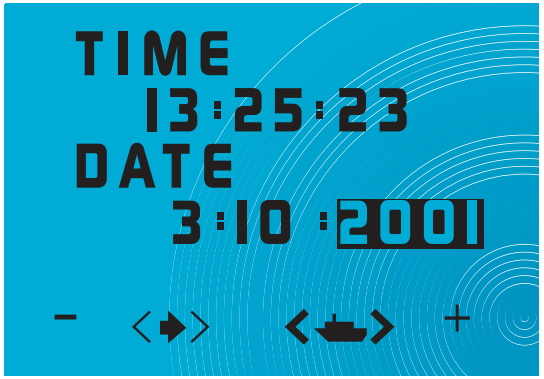
Time Change Mode

This is automatically displayed if the battery has been removed and the internal power backup has discharged (approximately 5-10 minutes).

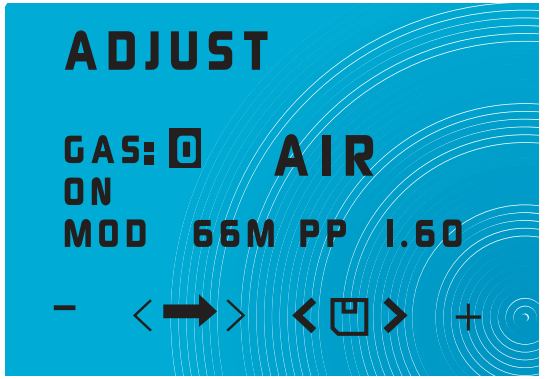
If a battery has not been changed, then the time change screen is accessible from the Options Menu ☰ under the SETUP sub menu. The VR3 is not a precision chronograph, but it does meet the European PREN standard for digital dive timing devices. You may need to adjust it occasionally in order to display the correct time.

Changing the time will **not** affect desaturation calculations.

The highlighted numbers are those which will change when a key is pressed. + and - will increment or decrement the number (short push). A push and hold of + will increment the highlighted number by 10. Holding - will decrement the number by 10. Pushing both buttons together (short push), →, will move the highlight to the next field to change; it can then be changed in the same manner. Pushing and holding both buttons <💾> will exit the screen and SAVE the changes. After a SAVE, the unit will then turn off.



Pressing ADJUST <🔧> takes you to the gas adjusting screen similar to that used in Open Circuit mode. The Diluent content is then adjusted in the same way, the PO_2 again being a reflection of the MOD (not the Rebreather Setpoint). If the external cell option is fitted, <CAL> sets the current gas as a Cal gas.
When the analyser version is purchased, air is assumed to be the CAL gas.

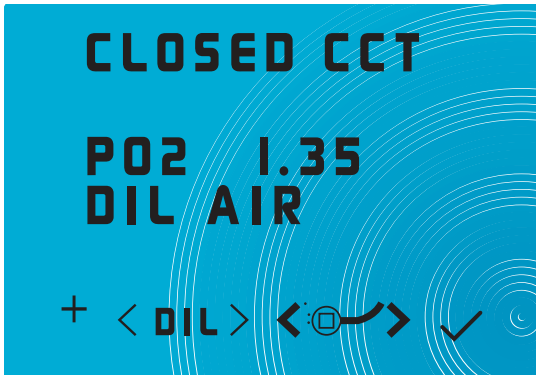


Pressing SAVE <💾> will take you back to the previous screen. Pressing again will take you back to the PO_2 change screen. A final press of will take you back to the Home or DIVE screen (if you are diving). Whichever Diluent you have modified and selected will be displayed at the PO_2 setpoint you have selected.

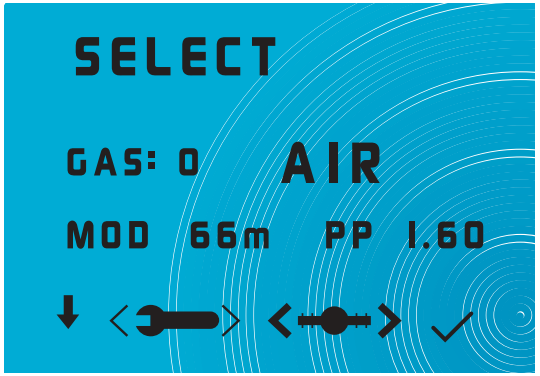
Note: During diving, the current depth is displayed at the top of gas select screens.

Changing Diluents

Having selected Closed Circuit mode the following screen will be displayed.



Press <DIL> to get to the gas change screens. This is similar to the gas select screen for Open Circuit. By pressing ↓ you can scroll through the range of programmed Diluents in the next screen until the one required is found. Pressing ✓ returns you to this screen for changing PO_2.



Home screen ( )

After a power up the unit will default to the Home screen. This shows date, time, current gas and has a command section at the bottom.

Repeated long holds of both buttons flips the screen through 360 degrees.

The GAS menu ▬▮ - (long hold) - may be accessed from this screen; this enables changing and setting of the required gases. It is also possible to access an options menu ☰ - (long hold) - in order to configure various features.

The DIVE option (short push, both switches) puts the unit into a five minute timer mode to allow you to start the dive. A repeat push at anytime resets the timer. It is not necessary to active dive mode unless you plan to dive less than 1.3m absolute of water pressure (3m at sea level).

When in any screen, if no switches are pressed, the VR3 will turn off after 30 seconds.

Note: In most cases the bottom line in the Command section requires a short push of either the left or right switch to change between functions.

Once a function is shown a long push will activate it.

EXAMPLE
If the rebreather link is installed and you are in CC mode, then a short push on ▬▮ changes to XO_2. A long push in either ▬▮ or XO_2 will move to that function. A short push when ☰ is displayed moves to 0_2. A long push on ☰ or 0_2 will move to that function.

You simply select Closed Circuit mode  on the VR3 and program Trimix 18/35, Nitrox 36 and oxygen as the three Diluents (nitrox and oxygen are to be the open circuit bailout gases). In this setup the Nitrox 36 and oxygen should remain OFF unless you switch to open circut. If you leave them ON then they will be used in the decompression prediction although if you do leave them ON accidentally the decompression you actually do will only be based on the gas you currently have switched to. In other words the prediction will be wrong but the actual decompression will be correct.

In the event of an Open Circuit bailout, all three gases are now available as Open Circuit gases but must be turned ON to obtain an accurate prediction. Setting the MODs correctly will automatically trigger a prompt for the correct gas switches.

Changing PO_2

By pressing **+**, the PO_2 will increment in steps of 0.1 bar. Once you have the desired PO_2, press OK. The unit will go back to the Home screen (or DIVE screen if you are diving). The PO_2 and the Diluent make- up will be displayed.

If you exit the PO_2 screen and then re enter it and select another PO_2 and then exit the screen again, the next time you enter the screen a long push on + will toggle between the two setpoints.

Note: The PO_2 selected is the assumed PO_2 that the Rebreather will maintain (its Setpoint) during the dive. This is obviously variable depending on both the rate of ascent and descent and the characteristics of the unit and its operator. You are strongly advised to be conservative with your PO_2 selection.

Note: If you see a PO_2 displayed higher than the setpoint, this is because you are using a diluent which has a PO_2 greater than the setpoint at that dive depth.

Changing to Open Circuit

A long push of both buttons will re-select Open Circuit mode .As before, you will then be able to select the gas you want to breathe in Open Circuit.

During a dive, you are able to switch in and out of Closed/Open Circuit as required in the event of a bailout being required.

Note: When planning Open Circuit bailouts, while setting the gases up in Closed Circuit mode, it is important that the Diluent make-ups are also breathable in Open Circuit at the relevant depths.

Example

A Trimix rebreather dive is planned with 18/35 as the Diluent. The dive will use Closed Circuit Trimix throughout and then switch to Open Circuit surface-supplied oxygen at the 6m stop. The bailout is planned as carrying an Open Circuit 18/35 cylinder and an Open Circuit Nitrox 36 to give a similar, safe decompression profile if an Open Circuit bailout is required.

The Menus

As mentioned previously, all menus are accessed via the Home screen. Let's look at the Options menus first.

The Options Menus ( )

A long push from Home screen of the right hand switch, when is displayed, accesses the first of these menus. (short push) moves the cursor on to the next option selects the relevant option.
A short push of both goes back to the home screen.
A long push of moves up the menu.

Gaslist

This option displays all ON gases and their maximum operating depths (MODs). It acts as a quick guide as to how the computer is currently set up.

(short push both) goes to profile mode. See page 22.

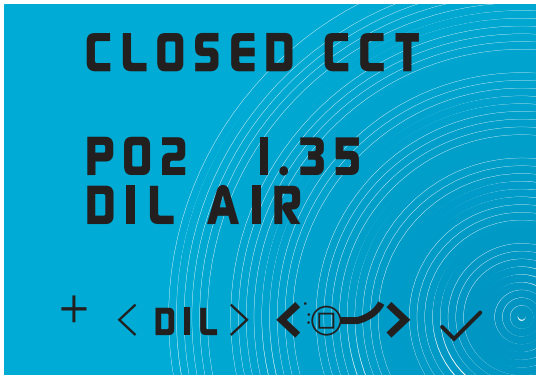
displays the next page of gases.
returns you to the main menu.

Selecting Closed Circuit Operation

In the GAS SELECT screen you have a Closed Circuit option. Press and hold both switches. This allows the diver to select a closed circuit decompression algorithm.

Entering this mode opens a new gas adjusting screen. In the new screen the mix content is displayed as a selection of Diluents and gives you the option to change PO_2s.

Once Closed Circuit is selected, the setpoint for the current PO_2 will be displayed on the dive screen.



The options within this menu are:

Note: The MOD setting is important as this is where the VR3 will prompt you to switch to that gas. If you do not select the MOD correctly you can still switch, but the system will not prompt until the MOD has been reached. Exceeding the MOD will trigger a PO_2 alarm. Incorrectly setting the MOD, or leaving gases ON which will not be used, will mean that the optimum decompression profile will not be calculated and displayed. What you actually do during the ascent, and what switches you make will still be calculated but the on-screen prediction may not be the most efficient profile.

If at any point during the dive you modify a gas content on the ON list, the decompression profile prediction will alter to take this into account.

Setting all MODs to 1.6 will give the best profile prediction.

Once you are happy with the setup for this gas, press → again until the gas number is highlighted then move to the next gas and change it. The gas you have just left will automatically be saved. If you are only changing one gas then pressing ← 💾 → (both switches, long push) will save the change and take you back to the previous one where the gas you have just changed will be displayed. You will have the option to select that gas as the gas to breathe now. If you do not wish to set this gas press ↓ until the gas you require is shown. Pressing ✓ will make that gas the one which you are currently breathing.

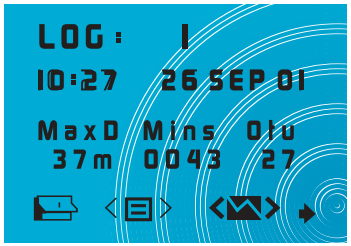
Note: Even if you select a Trimix, the VR3 assumes you will only ever breathe air at the surface. It will only start calculating for the Trimix when you descend.

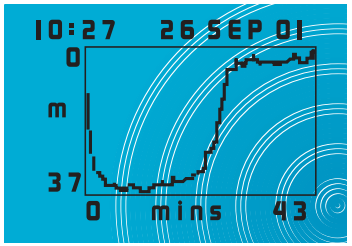
Log

The logbook screen shows one dive at a time. By pressing → (short push, right switch) the next dive in the sequence will be displayed. A long push jumps 10. If no more dives have been logged, none are shown.

The logbook stores 100 on-screen dives and 100 in calendar mode. If the PC link is purchased, dives can be downloaded to a PC and can be displayed in much more detail. The VR3 can store 22 hours of diving, stored at 10-second intervals. When the memory in the VR3 is full, it simply overwrites and starts again. If long, detailed dives are logged, they should be downloaded as soon as possible to avoid losing them.

From the log screen, pressing ← 📈 → will access the graph screen. A short push of the right button goes to the next graph and the left hand button exits.

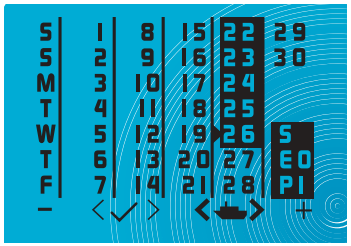




As well as storing depth and time information, OTU's (oxygen tolerance units) which track pulmonary oxygen toxicity are calculated. The maximum dose in 24 hours should not exceed 300 units.

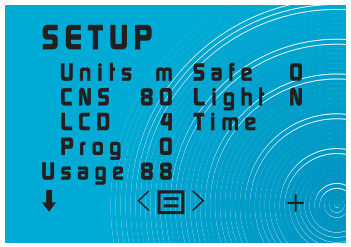
Calendar

From the logbook, press to enter calendar mode +/- moves back and forward one day. A long push moves 1 month. Days with dives are highlighted, pressing ✓goes to the activity screen. goes back to the logbook moves to the next activity. + puts the activity in the calendar. To set an alarm for that day press ,then set the time. When the alarm time/date is reached, the unit will automatically turn on.



Setup

Selecting SETUP will access another range of sub-menus, which allow the diver to configure the unit. Options under SETUP will be discussed separately (page 26).



USAGE is an indication of total unit 'ON' hours

Activating a gas

When the ON/OFF area is highlighted, by using the +/- keys you can make a gas ON for the dive.

The VR3 is able to advise you of the total decompression profile, as well as which gas you should be breathing at what depth. This is based on the plan entered in this screen and is defined by the MOD setting of the ON gases. The VR3 will only prompt for the gases you TURN ON during this planning phase. **To avoid confusion during diving, only turn ON the gases you actually want to use.**

Note: If you TURN OFF a gas and then find you need it during the dive, you will be able to open this screen when underwater and TURN ON (or modify) the gas. **When closed circuit diving do not turn on your open circuit bailout gases as this will give a false decompression look ahead. Only turn them on as you need them.**

To do this, simply go to the GAS [redacted]en (where only your ON gases will be shown), select and change the gas number until the inhibited gas you want to change is displayed. It can now either be switched ON or adjusted using the fields on this screen.

Changing a mix content

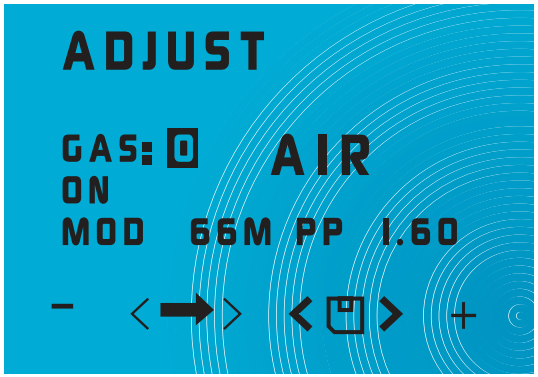
Keep pressing (short push, both switches) to move the highlight and stop at the oxygen content of the gas. Now use +/- to change the mix (you may use a long push to increment/decrement by 10). Once set, move onto the helium content (using) and do the same. If you do not need to set helium, leave it at zero. Pushing again will move the highlight to the MOD. This should normally be set at a maximum calculated PO_2 of 1.6 bar for decompression gases. The PO_2 will change as the MOD is altered.

(NX 36). A Trimix is displayed as TR then the oxygen followed by the helium content (TR18/35). The MOD is adjustable. This will recalculate and change the PO_2 accordingly. As altitude changes the PO_2 will vary for the MOD (Dalton's law).

Let's look at each field in turn.

Gas number

Ten gases are available. Once the field is highlighted, the **+** key changes the gas number. Change the gas number until the one you want to use, or modify, is displayed.



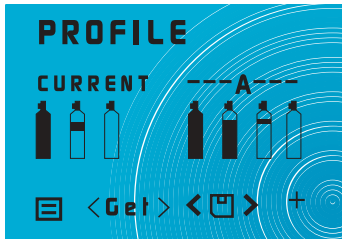
Stops

Under this item, you have the option of selecting the shallowest decompression stop displayed. Being a dive computer, you always have the option of stopping deeper than at the stop displayed, but the stop duration would have to be lengthened to compensate.

'Stop depth selection' simply selects the shallowest stop for which decompression will be displayed. It is recommended that either the 6m or 4.5m options are used. 4.5m is preferred, when using high oxygen mixtures, as the PO_2 will be relatively low during the final phases of the decompression and changes in pressure caused by venturing too close to the surface will be kept to a minimum.

Flytime

Having selected Flytime from the ☰ menu, the screen below (left) will be displayed. It shows when you may fly in a pressurised aircraft and when your tissues will be totally desaturated after a dive.



Profile

Go into the gas menu (above right) and set up your first set of gases. Now exit back to the main screen.
Go to the menu option and select PROFILE and use the + button to pick a profile memory into which you want it saved (A,B or C) and press SAVE. Now that gas list is saved into the profile you selected.Now go back and set up another gas list. Now go back to PROFILE and select another profile A,B or C (not one you used before). Press SAVE. Repeat the process for the last set of gases. To restore any of the saved profiles, go to the PROFILE menu and use + to get the profile you want (A,B.C) and GET the profile.

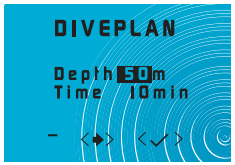
Simulate

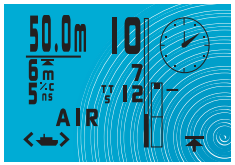
See section on diving for detailed operation.

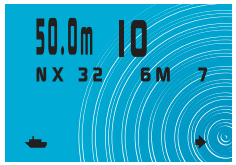
Diveplan

Having set your gases, entering Diveplan allows you to enter depth and time and calculate a set of backup tables. Selecting ⤒ will display a dive screen. ✓ will show page after page of decompression stops as in normal Dive mode.

Note: It may take a few seconds for TTS to update and show accurate decompression.

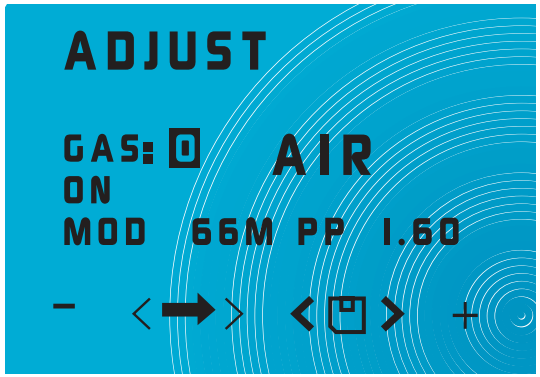






Adjusting a gas

If you are not happy with the gas displayed and wish to change any of its paramaters, or program a new one, press ⟨🔧⟩ (both buttons, short push). This displays the Adjust screen.



Several options are now available. By pressing ➡ (both buttons, short push) a new field will be highlighted. The fields available for change are:

- The gas number
- The on (active) or off (inactive) status.
- The mix. Each component (oxygen and helium) of the mix is adjustable. Air is displayed as AIR; a Nitrox is displayed as NX followed by the oxygen fraction

***Gas 0 cannot be changed.**

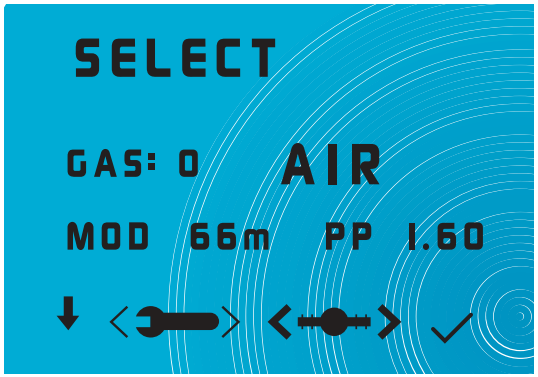
Gas Selection

From the Home screen, there is an option to select GAS.

At the surface, a long push (left switch) will open the GAS menus. When diving, this same option is also available and is protected by a long push of the same switch.

Pressing ↓ displays the next gas in the ON list. Up to 10 gases are available for selection. Simply keep pressing ↓ until the gas you wish to breathe is displayed. Once you are confident that the correct gas is indicated, press ✓. The chosen gas will now be displayed in the centre of the Home screen (or of the DIVE screen if you are diving).

Only turn ON the gases you intend to breathe on the dive. In closed circuit mode, only turn on the gases to be used in closed circuit. Bailout gases should be in the list but turned OFF until needed.



Proplanner and Prolog

Both the Proplanner decompression software and Prolog logbook software are available for the unit as an option. When you upgrade the VR3, you will receive an update of Proplanner appropriate to your new qualification level.

PC Link (DOS version)

PC Link need only be selected when using the Prolog PC interface. Having installed the Proplanner software,simply start the program by clicking on the file PLAN.BAT. Then select the COM port for the interface.

To download a dive, select option 1 (DOWNLOAD) and enter the dive you wish to download (dive numbers are allocated on VR3's logbook screen). You will then be asked to put the VR3 onto PC LINK. Do this and line it up with the IR port on your computer. Prolog will then prompt you to continue.

If using an extension cable for the serial IR link. Make sure it has no crossovers.

The VR3's IR port beams out of the top of the display near the words VR3.

This should line up with your computer's IR port. If no link is established the screen will time out after 20 seconds. Press → to start download The PC link screen will go blank during a download. Press any button to exit.
Do not change the 〈FULL〉 feature (FULL should equal 0), this is for extended memory options.

Some laptops have inbuilt IR ports. these may emit information which conflicts with the VR3 protocol. To be sure you should use a serial IR port.

Windows Prolog

A windows version of Prolog is available as an option with the unit. Simply insert the CD and follow the instructions. On screen help will guide you through the functions. Access PC link on the VR3 in the same way.

Gas Programming

Proplanner not only allows you to plan backup decompression tables, but will allow you to take the gases you have planned to use and upload them to the VR3.

You will find the Gas Table function under O for OPTOMISE in Proplanner. This should contain a list of your favorite gases. It is important that you set the MOD of each gas correctly as, when they are uploaded to the VR3, they will become the depths which trigger the gas switch alarm.

This feature is also available in the Windows Prolog.

Note: You do not need to use the PC software to set gases. It can all be done under the gas menus on the VR3.

Language

Several languages are available, not all may be available at the time this manual was printed. Please contact the website for regular updates.

Altitude

1009 mBar = Current pressure

1027 mBar = Reference pressure (user selectable)

-85m = Altitude compared to 1000mb

-155m = Altitude compared to reference pressure

Press < = > to set reference pressure to current pressure. ➔ moves to history graph of pressure/Altitude Vs time. ☰ exits.

Altitude information is displayed on the startup screen as a feet or metres above or below "standard" atmospheric pressure of 1000 millibars. Hence if the pressure reading is 1012mb then the depth will be a minus (below sea level) pressure.

On the Altitude screen there are four readings. The top left is current altitude based on 1000 millibar as a reference. Bottom left is current millibar pressure. If you do a short press of both buttons then the bottom right displays the 'saved' current atmospheric pressure. The top right also records the current atmospheric pressure and logs it as zero metres/feet. Now if you climb or descend in altitude you can see the height change reference to the zero you have set. This function is useful for calibrating rebreathers and deciding what backup tables to use at altitude.

CNS

This option allows the user to set the alarm limit after which the VR3 will display an Air Break warning. The warning will appear in the Message area (top right) of the dive screen and will show for five minutes in every 25 after the alarm limit has been met.

The CNS limit follows the theoretical oxygen clock and is based on a derivative of the NOAA oxygen limits. Once built up, CNS toxicity levels will only reduce once the PO_2 has fallen below 0.5 bar. At the surface, when breathing air, a 90 minute oxygen half time will be assumed - in other words, in 90 minutes the CNS load will halve. By pressing SEL the CNS alarm % will increment.

During the “Air Break” the diver should switch to a low PO_2 content gas at that depth (preferably air or Trimix on Trimix dives).

Whichever gas is selected on the VR3, will be the gas which the decompression algorithm will follow. A small extension may therefore be made to the stop time.

Light Mode

Light levels are selectable from Y, N and D.
To save battery power when in use the VR3 has an auto light save mode.
Y (Yes) similar to D mode but activated at the surface also.
N (No) will turn it off.
When in D (Dive) mode the light will not turn on until a switch has been depressed, it will then stay on for approximately 10 seconds. As access to the light is via a short push, no on screen data will change nor will any menus be selected.

LCD

This is the screen contrast control. A second screen is accessed to adjust contrast.

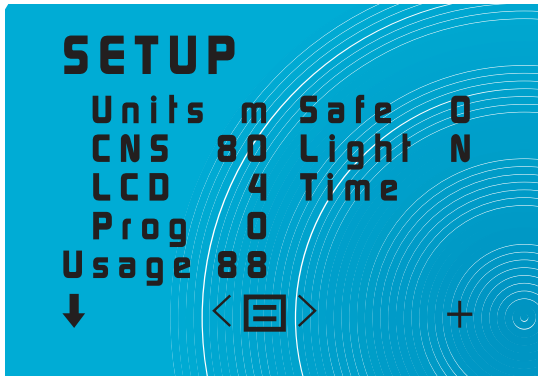
TIME - Sets system clock.

PROG - Do not enter this feature unless programming via the website. If you access this accidentally, enter NO. IF THE UNIT FREEZES SIMPLY REMOVE THE BATTERY FOR TEN MINUTES TO RESET THE UNIT.

USAGE - Is an indication of total dive hours.

SETUP Functions

The sub menus under SETUP are broken down as follows:



Pressing ↓ moves the cursor. Pressing **+** increments the number or changes the value. For example, when UNITS is selected, the field will change from M (metres) to FT (feet). By selecting TIME, the time change display is shown as described on page 14. Selecting <⊟> takes you back to the OPTIONS menu.

Safety

Pressing + when the cursor is next to SAFETY will increment the safety factor by 10%, up to a maximum of 50%.

Altering anything in this screen will not affect your decompression obligation or diving at altitude.

Games

Games can be displayed on land and are also available from 10 meters and shallower underwater (assuming no warnings are displayed). To access games underwater push ↑ then → to the last decompression screen. Press <🤿> to access the game.

Octopus game

Change the angle and velocity (short push between functions) to hit the black octopus. Hit rates and levels are scored

Other games will be pressed on the website.

Pin Number

Each VR3 comes with a unique serial number. You will also find a unique Pin on the inside rear cover of this manual, relevent to your current purchase level.

1. To upgrade to a new level, contact your dealer or the factory with the serial number, who will then give you a new Pin. Enter this and the new level will be activated. You can also use the Pin to change your security information. Each time the pin is entered the cursor jumps to the top line to allow you to change your security information. A long hold of either button will move the highlighted by 8. Each number is hexadecimal (base 15) 0_9 and A-F.
2. You can also log onto the website and with the optional programming cradle obtain downloads (new games, software upgrades etc). Support for this feature is available mid 2003.

All units are shipped as open circuit Nitrox, to activate your purchased level, enter the pin in the rear of this manual. The pin screen is in the options menu.