



## GUARDIAN DIVE COMPUTER USER'S GUIDE

MARES is proud to introduce its GUARDIAN dive computer, a high-tech instrument based on the most recent scientific research. Designed in close cooperation with hyperbaric medicine experts and manufactured with state-of-the-art technology, GUARDIAN provides divers with the freedom of multi-level diving, coupled with a minimum of risk. MARES thanks you for choosing this sophisticated instrument and recommends that you follow the strictest diving criteria in terms of safety and caution in order to fully enjoy your diving experience.

### Important!

Any critical information or warnings that might affect the performance or result in the injury or death of the technician, regulator owner, or other persons is highlighted with the following symbols:



#### DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



#### WARNING

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



#### CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

MARES reserves the right to modify any products, processes and manufacturing techniques at any time. It is the technicians' responsibility to acquire the latest information and parts from Mares for service and repairs to be performed.



## Rules for Safe Diving

- Plan every dive and dive your plan
- Never exceed the limits of your skill and experience
- Start every dive by reaching your deepest planned depth first
- Check your computer readings often during your dive
- Comply with the ascent rate shown by the computer
- Always stop for at least 3 minutes at a depth of 15 to 20 feet (3 to 5 meters)
- After the safety stop, ascend very slowly to the surface (no faster than 33 feet / 10 meters per minute)
- Avoid yo-yo dives (repeated ascending and descending underwater)
- Avoid strenuous activity during your dive and for half an hour after ascending
- When diving in cold water or with any dive involving strenuous activity, start ascending well before reaching the NO DEC limits. For every dive involving decompression, prolong the decompression stop nearest to the surface by several minutes
- Surface intervals between your dives should never be shorter than 2 hours
- The deepest dive should be the first of the day
- Dive only after the computer has zeroed from any previous day's dive
- When making multiple dives over a number of days, take at least one day of rest with no diving per week. If decompression stops were necessary during the dives, it is recommended to take a day of rest with no diving every three days of diving
- Avoid planned decompression dives and do not dive deeper than 130' (40 meters) unless specifically trained for such technical diving
- Avoid repetitive "square wave profile" dives (dives to a single depth) deeper than 60' (18 meters)
- Always wait as long as possible before flying after diving (at least 12 and preferably 24 hours) in accordance with the Divers' Alert Network's recommendations

## Contents

### **SECTION I**

Rules for Safe Diving	page 22
Warnings and Safety Rules	page 25

### **SECTION II**

Outline of the Instrument	page 26
Technical Specifications	page 27
Functional Characteristics	page 28

### **SECTION III**

Switch-on and Self Check	page 29
Operating Modes	page 30

### **SECTION IV**

Maintenance and Care	page 40
Symbols and Technical Words	page 41

## **Index**

Switch-on	page 29
Lighting	page 29
Automatic Calibration	page 29
Self Check	page 29
Automatic Switch-off	page 29

### **Functions during the dive:**

- Dive mode ( <i>Dive</i> )	page 30
- NO DEC dives	page 30
- DEC dives	page 30
- NO DEC time tables	page 31
- Ascent rate	page 32
- Uncontrolled ascent	page 32
- Decompression stops	page 33
- Safety stop	page 33
- Surfacing	page 34

### **Surface functions:**

- Surface time mode ( <i>Surf time</i> )	page 34
- Calendar clock ( <i>Clock</i> )	page 35
- Dive simulator ( <i>Simul</i> )	page 35
- Dive planning ( <i>Plan</i> )	page 36
- Memory and History ( <i>Log book</i> )	page 36
- Settings ( <i>Setup</i> )	page 38
- Altitude programs	page 38
- Conservative programs	page 38
- Residual nitrogen memory reset	page 38
- Error signaling ( <i>U.B.A.</i> )	page 39

Connection to a PC	page 38
Battery replacement	page 40

## SECTION I

### Warnings and Safety Rules

- For the correct use of any dive computer, the diver must acquire an in-depth knowledge of all its features. Before diving with the GUARDIAN, read this entire instruction manual carefully to learn how it works. If not used correctly, diving with the GUARDIAN or any other diving computer may actually increase your risk of decompression sickness.
- Every dive involves some degree of risk of decompression sickness. Even if used carefully and all safe diving practices are followed, neither the GUARDIAN nor any other diving computer can eliminate the risk of decompression sickness.
- The GUARDIAN should be used by trained and certified divers only.
- Sport dives must be conducted no deeper than 130' (40 m). Diving deeper than 130' (40 m) is considered technical diving and should never be attempted by divers not specifically trained for such diving. Such diving greatly increases the risk of decompression sickness.
- A good diver is a responsible diver. You must strictly comply with all warnings in this manual and with the simple rules listed at the beginning of this guide to avoid increasing your risk of decompression sickness.
- Always dive well within the NO DEC limits of your GUARDIAN dive computer, unless specially trained for such technical diving.
- Do not dive if the <battery> icon indicates that the battery is low: replace the batteries. Do not dive if the instrument warnings are irregular or not clear.
- Do not compress your GUARDIAN in a hyperbaric chamber. The instrument may be damaged seriously if not immersed in water.
- Dive at altitude only after checking that the appropriate altitude program is on.
- Do not fly for 12 to 24 hours following your last dive in accordance with the Divers' Alert Network's recommendations.
- Never use your GUARDIAN for dives with breathing gases other than atmospheric air.

## SECTION IV

### Maintenance and Care

GUARDIAN is a particularly rugged instrument, designed to withstand the ordinary wear and tear of diving without problem. However, it should be given the usual attention deserved by precision instruments, including avoiding violent shocks, long exposure to sunlight and contact with sharp objects.

For ordinary maintenance, just rinse it with fresh water at the end of every dive. If necessary, wash it with a neutral pH soap. Do not use detergents, alcohol, gasoline or sprayed compounds. The pushbuttons need no special maintenance: do not lubricate them with oils or sprayed compounds. If any malfunction occurs, do not use the instrument for diving and have it checked by an authorized MARES service center.



#### WARNING

**DO NOT use your GUARDIAN if any malfunction occurs. Failure to follow this warning may greatly increase your risk of decompression sickness.**

### Battery Replacement

**Caution!** Do not replace batteries during the first 5 minutes after the dive. If batteries are replaced before that time, the data regarding this last dive will be lost.

**Caution!** Always replace all the batteries whenever battery replacement is indicated. Battery replacement is a very simple operation which does not require the intervention of specialized personnel. Loosen the 4 screws (*Fig. 27*), then remove the watertight cover and replace the batteries.

Be careful to insert them with the correct polarity. The battery compartment is watertight and does not communicate with the core of the instrument. If water leaks inside it, just dry it carefully to get rid of moisture before installing the batteries.

Before closing the battery cover, make sure that the O-ring is in good condition. Check that the O-ring is perfectly clean and grease it slightly with silicone grease. Do not throw the old batteries away at sea!

**WARNING**

This function should only be used by trained and certified technical divers or instructors. The diver who uses the residual nitrogen memory reset function cannot use the instrument for repetitive dives. Do not dive after resetting the Guardian if you have conducted any dives within the previous 24 hours.

Press buttons <+> and <-> simultaneously for at least 3 seconds: "Desat" will be displayed for about 1 second and the memory of any nitrogen remaining from a previous dive will be reset. When resetting the nitrogen memory, the <Setup> mode is exited and the next mode is accessed. You can quit the <Setup> mode and access the next mode by pressing button <MODE>.

**Error signaling (U.B.A.)**

The GUARDIAN's display features a graphic bar (*Fig. 26*) containing 5 asterisks. These correspond to specific diving errors. When the dive is over, the asterisks referring to any errors made are activated. Asterisks A and B refer to two particularly serious errors. The other asterisks refer to diving errors of different degrees, without detailing them. Any error or errors made will be identified in the <log book> or by scrolling the dive profile.

- |   |   |
|---|---|
| A | Decompression stop violated                               |
| B | Uncontrolled ascent                                       |
| C | Repetitive dive less than 2 hours after the previous dive |
| D | DEC dive  |
| E | Depth greater than 130' (40 m)                            |
|   | Repetitive dive deeper than the previous dive             |
|   | Repetitive dive with depth greater than 100' (30 m)       |
|   | Excessive ascent rate                                     |

Excessive ascent rate is signaled when the rate limit set for that depth sector is exceeded by 5% for 21 seconds or for 15 seconds if the diver reaches the surface. The asterisks are displayed until the next dive.

**WARNING**

If asterisk A or B is displayed, immediately contact a doctor specializing in hyperbaric medicine, or the Divers' Alert Network (DAN).

If one or more of the C, D and E asterisks are displayed, carefully monitor your physical condition, and contact a doctor specializing in hyperbaric medicine or the Divers' Alert Network should any signs or symptoms of decompression sickness occur. At the end of a dive conducted by a careful sport diver, no asterisks should be displayed.

## **Remote operation (PC)**

Your GUARDIAN can be connected to PC Windows by means of the serial interface RS 232 C. Press button <MODE> (Fig. 22) from mode <Log book> to access mode <PC>.

**Downloading the stored data:** Data can be downloaded pressing button <+> until <232 on> is displayed. The message <232 on> is displayed by the GUARDIAN to indicate that this function is activated.

The PC interface will allow you to know the type of any errors made during the dive.

Please Note: The function cannot be interrupted until the message <232 on> goes off (after about 5 seconds).

## **Settings (Setup)**

The <Setup> mode allows to operate 5 functions: Clock, Altitude, Temperature unit, Depth unit, Nitrogen memory.

**Activation:** Press button <MODE> from mode <PC> to access <Setup>. The message <Set 1> is displayed.

### **Commands:**

Press button <+> to scroll the functions.

Press button <-> to activate the function to be modified.

From within the "clock" function, press button <MODE> to store the value displayed and to go to the next parameter or the next function.

### *Function setup procedure:*

<Set 1> - **Clock setup** - When activated, the minute digits will blink (Fig. 23). The displayed figure can be modified using <+> or <->. Keep the buttons pressed for rapid scrolling of the digits. Press <MODE> to go to the other data: hour, day, month, and year.

<Set 2> - **Altitude setup:** The "Altitude" program is displayed upon activation: P0 (from sea level to 2300 ft or 700 m) - P1 (2300 ft to 3900 ft or 700 to 1500 m) - P2 (4900 ft to 7800 ft or 1500 to 2400 m) and P3 (more than 7800 ft or 2400 m) (Fig. 24). Press key <-> to access the altitude value following the current value. The icon of a mountain is displayed for P1, two mountains for P2 and three mountains for P3.

**Conservative program setup** - If programs P1 - P2 and P3 are used at sea level, dives will be based on parameters with an increasing conservative degree. These restrictive parameters are highly recommended for cold water, deep or repetitive dives over several days.

<Set 3> - **Temperature unit setup** - Upon activation, the currently used temperature unit ( $^{\circ}\text{C}$  or  $^{\circ}\text{F}$ ) will blink (Fig. 25). Press button <-> to switch to the other unit.

<Set 4> - **Depth unit setup** - Upon activation, the currently used depth unit (m or ft.) will blink. Press <-> to switch to the other unit.

<Set 5> - **Residual nitrogen memory reset**

- total number of dive hours
- maximum absolute depth reached
- minimum temperature recorded during a dive.

## Working memory

The <Log book> function allows you to display the data regarding the last 30 dives conducted: dive n. 1 will be the most recent dive, whereas dive n. 30 will be the remotest dive. The latter is canceled automatically to make room for the data of a new dive. For the last 10 dives, the single profile points of each of them can be displayed. The maximum is 600 points in total.

### *Data retrieval procedure:*

When <log book> is activated, press button <+> to display the page regarding dive n. 1.

Press button <+> again to scroll the various pages until the desired page is obtained.

The following information is thus displayed (Fig. 19):

<h><min>	Indication of the time when the dive has started
<depth>	Indication of the year of the dive
<max depth>	Indication of the month of the dive
<dive time>	Indication of the day of the dive
<dive n.>	Indication of the progressive dive number

When the desired dive is obtained, press button <-> to display the data summarizing that dive (Fig. 20):

<max depth>	Maximum depth reached
<dive time>	Dive length
<U.B.A.>	Signaling of any errors made during the dive
<%>	Maximum ascent rate reached, in percentage
<down arrow>	Decompression stop violated
<no dec>	NO DEC dive
<deco>	Dive with decompression stops

Press button <-> to display the profiles of the 10 most recent dives. Press button <-> to scroll individual profile points. At the end of the profile of the selected dive, press <-> again to go to the next dive. Press <+> from anywhere on the profile to go to the next dive. For each profile point, the display (Fig. 21) will show the following recorded data:

<depth>	Depth of the profile point
<dive time>	Time elapsed from the beginning of the dive
<%>	Percentage of ascent rate (if the profile point corresponds to a time during ascent)
<down arrow>	Decompression stop violated

To quit the <log book> mode, press button <MODE> at any time.

- (33 ft./min.); press <+> and <-> simultaneously to ascend at 18 m/min. (60 ft./min.).
- **Surface Time:** When the simulated dive is over, the computer goes automatically to "surface" mode. To simulate the surface time before conducting another dive, just wait for the desired time considering a 12:1 ratio. Therefore, wait for 5 minutes to simulate a surface time of one hour.
  - **Repeated Dive:** Press <-> after the established surface time to simulate a repeated dive. Press the same key again to start the new descent.
  - **Exit from Simul mode:** You can exit the <simul> mode at any time by pressing <mode>.

Please note: If the simulation is interrupted and no buttons are pressed for 30 minutes, the GUARDIAN switches off and simulation data are lost.

### Dive planning (Plan)

Press button <MODE> from the <Simul> mode to access the <Plan> mode (Fig. 17). The computer will scroll the depths and the NO DEC times, considering any remaining tissue saturation due to a previous dive. The GUARDIAN provides a *scrolling* function with consecutive commands, so that the diver can stay on the selected depth/time value as long as he or she wishes. With the <Plan> mode, the diver can plan a NO DEC dive to a maximum depth of 160 feet (48 meters), while setting the expected surface interval. It is thus possible to scroll the planned dive in advance.

#### Dive planning procedure:

**Activation:** Press button <+> repeatedly to scroll the current NO DEC limits.

**Surface time:** Press button <-> to plan the surface interval. Every time the button <+> is pressed, the current surface interval is increased by 10 minutes. Press <-> again to confirm the datum. The hours and minutes set as explained above are displayed beside "max depth" and "dive time" respectively.

**Depth:** To set the desired depth ("depth"), press button <+> again: every time this button is pressed, depth increases by 10 feet (3 meters).

**Bottom time:** For any depth value set, the maximum "no dec" time allowed for ascending without decompression stops is displayed.

### Memory (Log Book)

Press button <MODE> from mode <Plan> to access mode <Log book>. Data are stored in the <Log book> only for the dives during which the computer is taken to a depth > 5 ft (1.5 m) for > 1 min.

### History (Fig. 18)

When the <Log book> is activated, the message "HS" is displayed to indicate that the history memory is accessed. The display shows the data stored in its history memory:

- total number of dives

**WARNING**

**ALWAYS** wait at least 12 hours, and preferably 24 hours, to fly after diving regardless of what your GUARDIAN reads in accordance with the Divers' Alert Network's recommendations on flying after diving.

### Calendar clock (*Clock*)

Press button <MODE> from <dive> or <surf time> to access the <Clock> mode.

The following information is displayed (Fig. 15):

<depth>	Indication of the year (last two digits)
<h><min>	Indication of hours and minutes
<max depth>	Indication of the month (number of the month)
<dive time>	Indication of the day (from 01 to 31)
<temp>	Indication of air temperature

### Dive simulator (*Simul*)

The GUARDIAN's simulator (Fig. 16) allows you to check the profile of any future NO DEC, DEC or repetitive dives. In its preventive calculations, it takes into account the residual saturation level after the previous dive and the actual surface time expected. The display anticipates all the data that will be shown during the planned dive, including any decompression stops and alarms for "uncontrolled ascent" or "stop violation".

The simulator can be used for dives to a depth of 500 feet (150 meters).

The simulation time factor ratio is 5:1. This means that 1 second of simulation corresponds to 5 actual seconds; 12 seconds correspond to 1 minute of dive. The surface interval is calculated based on a 12:1 ratio. For instance, when simulating a dive conducted 3 hours (180 minutes) after the previous dive, it is necessary to wait for 15 minutes (180:12=15) before setting the data concerning the dive to be checked.

**Backlighting:** Backlighting can be activated when the unit is in <Simul> mode. To do so, after activating the <simul> mode, press button <+> before starting the simulated dive. To switch the backlighting off, press button <+> again.

*Simulation procedure:* Press <MODE> from mode <Clock> to activate mode <Simul>.

- **Descent.** Press <-> to reach the desired depth; keep it pressed to descend at a rate of 12 m/min (39 ft./min.); press it at short intervals to descend foot by foot until the desired depth is reached.
- **Bottom Time:** It is set keeping the 5:1 ratio into account. Therefore to stay at a given depth for a given time, simulate 1/5 of the actual time. For instance, 20 min. of actual permanence at a given depth will require 4 min. for simulation purposes.
- **Ascent:** Two ascent rates can be adopted: press <+> to ascend at 10 m/min

If the diver goes out of the depth range mentioned above, the no decompression time is displayed again, whereas the "safety stop" count is interrupted. When the diver returns into the "safety stop" range, the safety stop count is resumed from the point where it was interrupted. If the diver redescends to a depth greater than 33 ft. (10 m), the "safety stop" does not consider the stop made previously and starts counting from 3 minutes.

## Surfacing

When depth is shallower than 4 feet (1 m) the dive time is interrupted. If the diver does not descend below 5 feet (1.5 m) within 10 minutes, the dive is considered to be terminated and its data can be read in the <log book>. Conversely, if the diver goes back beyond that depth, the "dive time" count is resumed and the calculation regarding the dive continues. Do not replace the batteries during these 10 minutes.

### WARNING

**ALWAYS** allow for at least a two hour surface interval between dives regardless of what your GUARDIAN reads to decrease your risk of decompression sickness.

## SURFACE FUNCTIONS

### Surface (*Surf time*)

When the dive is over and diver gets out of the water (hence with dry contacts), the computer switches from <Dive> to <Off> and the following is displayed:

- airplane icon until the no fly time goes to zero
- "desat time" and icon until the desaturation time goes to zero
- graphic U.B.A. bar with the indication of any errors made.

If the button <mode> is pressed, the computer goes to the <dive>, then to the <Surf time> mode. The latter remains on until the "no fly" message is displayed. When in <Surf time>, the computer will display the following (Fig. 14):

- |            |   |
|------------|---|
| <h><min>   | Surface interval in hours and minutes   |
| <temp>     | Air temperature (in C or °F)  |
| <U.B.A.>   | Indication of any errors made during the dive on the graphic bar.<br>The bar can display 5 errors: the two top asterisks are used for serious errors. The two bottom asterisks are used for minor errors. Errors are displayed until the next dive. |
| <airplane> | The "airplane" icon is displayed until the no fly time has elapsed.   |
| <desat>    | Push the <+> button to replace the information regarding surface time with the indication of the remaining desaturation time ("desat").   |
| <no fly>   | Push the <+> button again to indicate the no fly time. Push the <+> button again for the display to resume its original status and to display the surface time.   |

"uncontrolled ascent" and displays the appropriate asterisk if the diver ascends from 70' to 23' (-21 m to -7 m) (two thirds of the depth) at a rate greater than 48'/min. (14.5 m/min.) (versus 40'/min. or 12 m/min. as required) up to 33' (-10 m), and greater than 40'/min. or 12 m/min. (versus 33'/min. or 10 m/min. as required) up to 23' (-7 m). Please note: if the rapid ascent takes place only between 26' (-8 m) and the surface, this is not considered an "uncontrolled ascent", although it is highly recommended that your ascent be very slow for these last 26 feet (8 meters). If the ascent rate decreases and the audible alarm goes out, the U.B.A. system will not consider your ascent as an "uncontrolled ascent".

### Decompression stops (Fig. 10)

When conducting a DEC dive (either inadvertently, if a sport diver, or purposefully if a trained and certified technical diver), the computer indicates the precise decompression ceilings and the need for correcting the depth of the stop. The following icons are displayed between the depth and the stop duration values:

- Two lighted triangles = decompression depth is correct (Fig. 10)
- An upward triangle = ceiling not reached: ascend! (Fig. 11)
- A downward triangle = ceiling exceeded: descend! (Fig. 12)

If the ceiling is exceeded (insufficient depth), a continuous audible alarm remains on until the diver descends to the minimum *ceiling* and the icon is blinking. If the stop depth is exceeded by more than three feet (1 m) for over three minutes, the GUARDIAN goes to <stop violation>. After surfacing and getting out of the water (hence with dry contacts), the computer displays the following (Fig. 13):

- blinking airplane icon;
- desat time;
- U.B.A. (with the first asterisk on to indicate <stop violation>).

When in <dive> mode, the <stop> message is displayed and the computer will only run the depth gauge and clock functions for 24 hours. The <stop> message remains also in the <plan> mode, though this function is not enabled.



#### WARNING

Failure to carefully follow the GUARDIAN's instructions for decompression stops and/or ascent rates will greatly increase your risk of decompression sickness.

### Safety Stop

If a NO DEC dive is conducted below 33 ft. (10 m), the "safety stop" function is activated automatically and the GUARDIAN recommends to have a 3 minutes' safety stop at a depth between 16 and 10 ft. (-5 and -3.5 m). When the diver reaches the ceiling of 16 ft. (-4 m) during his/her ascent, the message "St 3 min" is displayed (Fig. 13/a) and the message "no dec" goes off.



## WARNING

**ALWAYS** make a “safety” stop for 3 to 5 minutes at 15-20' (5-7 m) after every dive regardless of what your GUARDIAN reads to further reduce your risk of decompression sickness.

### Ascent rate (Fig. 6)

The GUARDIAN provides for different ascent rates depending on depth:

60'/min. - 18 m/min from the bottom to -20 m (65 ft.)

40'/min. - 12 m/min. -20 m to -10 m (65 to 33 ft.)

33'/min. - 10 m/min. -10 m (33 ft.) to the surface

During the ascent, the display shows 4 percentage (%) rate values (60, 90, 100, 120) and the message <slow>. Each value indicates the current rate compared to the expected ascent rate. For instance, if at a depth of 9 m (30 ft.) the diver ascends at 6 m/min. (20 ft./min.), the first value is displayed to indicate that the current rate is equal to 60% of the maximum allowed ascent rate (Fig. 7). If the latter is exceeded by more than 20%, the values up to “120” are displayed as well as the message <slow>, and the audible alarm is triggered (Fig. 8).



## WARNING

**NEVER** exceed the GUARDIAN’s ascent rate indicator, as such an ascent will increase your risk of DCS.

If the audible alarm remains on beyond a given limit, the GUARDIAN records an “uncontrolled ascent” error. After surfacing and getting out of the water (hence with dry contacts), the computer displays the following: (Fig. 9):

- blinking airplane icon;
- desat time;
- U.B.A. (with the second asterisk on, indicating an “uncontrolled ascent”).

When in <dive> mode, the <stop> message is displayed and the computer will only run the depth gauge and clock functions for 24 hours.

The <stop> message remains also in the <plan> mode, though this function is not enabled.



## WARNING

**ALWAYS** start each dive by descending to the deepest planned depth of your dive first, and then gradually ascending during the course of your dive. Diving in this manner will reduce your risk of decompression sickness.

**Uncontrolled ascent** - An “uncontrolled ascent” is any ascent conducted at a rate which exceeds by 20% the maximum ascent rate set for that depth and continued at least for 2/3 of the depth at which the audible alarm is triggered. For instance, the computer records an

an audible alarm (5 beeps) is triggered and the message <deco> is displayed. Instead of the remaining time, the display now shows the depth ("m" or "ft.") and the time of the first decompression stop in minutes ("min"), as well as the total time expected for ascending ("asc time"), this being displayed instead of temperature (Fig. 5). These values will either increase or decrease based on how the dive is further conducted.



### WARNING

**NEVER** dive deeper than 130' (40 m) or do planned decompression dives with the GUARDIAN unless you are a trained and certified technical diver (IANTD, TDI, ANDI, PSA, etc.) well versed in the skills and risks of deep air diving and have been certified at least to the level of Deep Air diving for depths beyond 130' (40 m). Even with such certification and experience, the risks of DCS are far greater for such technical dives regardless of the table or computer used, and you must be aware of and willing to accept those risks before attempting such a dive.

**TABLE OF NO DECOMPRESSION TIMES  
OF THE 4 GUARDIAN PROGRAMS**

<i>Depth</i>	<i>P0 curve</i>	<i>P1 curve</i>	<i>P2 curve</i>	<i>P3 curve</i>
40' - 12 m	99	87	71	60
50' - 15 m	68	56	46	38
60' - 18 m	48	37	31	26
70' - 21 m	34	28	23	19
80' - 24 m	26	21	17	14
90' - 27 m	20	16	13	11
98' - 30 m	16	13	11	9
108' - 33 m	13	11	8	7
118' - 36 m	11	9	7	5
128' - 39 m	9	7	5	4
138' - 42 m	8	6	4	3
148' - 45 m	6	4	3	2
157' - 48 m	5	3	2	1



### WARNING

**NEVER** use your GUARDIAN or any other dive computer to make repetitive "square wave profile" dives (dives to the same or nearly the same depth) over 60' (18 m) as such an unsafe diving practice will greatly increase your risk of DCS, regardless of what your GUARDIAN reads.



### WARNING

**NEVER** use your GUARDIAN for "yo-yo" dives (repeated ascending and descending underwater) as this will greatly increase your risk of DCS regardless of what your GUARDIAN reads.

## OPERATING MODES

**Selecting the operating modes** - The three pushbuttons <MODE>, <+> and <-> are used to select one of the 8 operating modes of the GUARDIAN or to access the functions included in each mode. From mode <Off>, the following modes can be accessed sequentially: *Dive* (Diving) - *Surf time* (Surface) - *Clock* (Calendar clock) - *Simul* (Dive simulator) - *Plan* (Dive planning) - *Log book* (Memory) - *PC* (PC interface) and *Set* (Settings).

## FUNCTIONS DURING THE DIVE

### Dive (Dive)

The *Dive* mode is selected by pressing the <MODE> button once or by wetting the external contacts. If the computer, with dry contacts, is not taken to an actual depth of 4 feet (1.5 meters) minimum within 3 minutes, the unit goes to <Off>.

After going beyond a depth of 4 feet (1.5 meters), the dive time chronometer starts counting. The display will show the following data (*Fig. 4*):

<depth>	Value of actual depth (in "m" or "ft.")
<temp>	Value of water temperature (in °C or °F)
<max. depth>	Value of the maximum depth reached (in "m" or "ft.")
<dive time>	Time elapsed from the beginning of the dive, in minutes
<no dec>	Remaining no decompression time, or, in the case of DEC dives:
<deco>	Time and depth of the first decompression stop
<asc time>	Total ascent time (displayed instead of temperature)

### NO DEC dive (*Fig. 4*)

Besides current depth, maximum depth, dive time and temperature, the computer also shows <no dec> and the remaining NO DEC time at the current depth. When the remaining NO DEC time decreases to zero, an audible signal is triggered (3 beeps).

#### WARNING

ALWAYS ascend several minutes prior to going into DEC mode, and give yourself even more time if diving in cold water, doing repetitive dives over 60' (18 m), or on any dive involving greater than normal exertion. Failure to do so will increase your risk of decompression sickness.

#### WARNING

ALWAYS start each dive by descending to the deepest planned depth of your dive first, and then gradually ascending during the course of your dive. Failure to do so will increase your risk of decompression sickness.

### DEC dives (*fig.5*)

If the diver does not ascend to a shallower depth when the NO DEC time has elapsed,

## SECTION III

### SWITCH-ON AND SELF CHECK (*Self Check*)

**Switch-on** (Fig. 2) - Switch-on is automatic when the unit is in the water (wet contacts) and the instrument can start the dive immediately without waiting for it to "read" the surface parameters. As a matter of fact, if it is not pre-activated manually, it will keep into account the data stored from the previous reading (Autozero) and will go automatically to *Dive* mode. On the surface, when the contacts are dry, GUARDIAN is switched on by pressing the <mode> button and selecting the Dive mode. When activated with dry contacts, all the data shown on the display go on for 2 seconds. The computer then carries out a self check and goes to Dive mode.

**Lighting** - When the self check begins, backlighting goes on for 2 seconds. During the dive, press the <MODE> button to light the display temporarily. Lighting will go off automatically after 10 seconds. Press button <+> first, then button <->, or viceversa, for continuous backlighting. Repeat the same operations to switch it off. When in <Simul> mode, backlighting can be switched on or off by pressing the <+> button before starting the simulated dive.

**Automatic calibration (Autozero)** - When it is off, your GUARDIAN checks the external parameters and carries out an automatic calibration every two minutes to compensate for any atmospheric pressure and temperature changes. During the dive, the effects due to water temperature and salinity changes (fresh water/sea water) are compensated automatically.

#### **Self check** (Fig. 3)

If batteries are getting low, an audible alarm is triggered and two visual signals may be displayed:

- if the <battery> icon goes on, it is still possible to conduct two or three dives, provided that <backlighting> is off;
- if the <battery> icon goes on and <LO> is displayed, batteries must be replaced before the dive.

**Automatic switch-off** - In any operating modes, the instrument and the display go <Off> if no buttons are pushed for three minutes, except in the following cases:

- In <Simul> mode, switch-off takes place after 30 minutes.
- In <Dive> mode, the instrument remains on for 10 minutes after the dive while waiting for a new dive (if any).
- When the tissue desaturation time and/or the no-fly time are greater than zero on the surface and contacts are dry, the computer goes to <Off>, but the following information is still displayed:
  - desaturation time and <desat> message
  - blinking airplane icon
  - signaling of errors (if any) on the U.B.A. graphic bar.

## Functional Characteristics

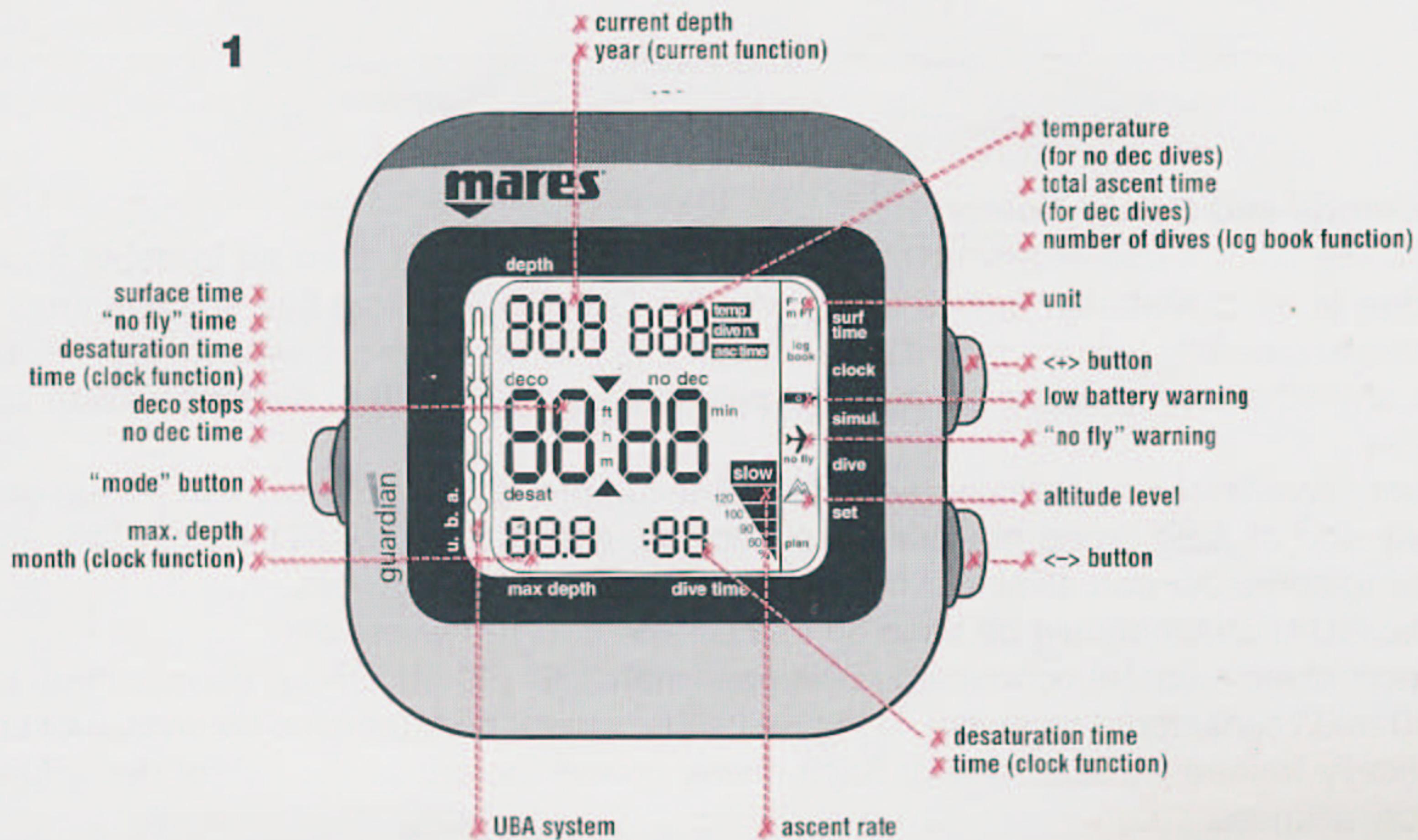
- Functions controlled by three pushbuttons
- Visual and audible alarms: NO DEC limits, excessive ascent rate, decompression stop violated, low batteries
- Calendar clock (dive chronometer from 0 to 99 minutes)
- Display lighting: automatic or manual switch-off
- Switch-on during the dive: automatic, with automatic measurement of the actual depth
- Switch-off on the surface: automatic after 10 minutes
- Self check
- Dive planning
- Dive simulator
- Ascent rate: 10 to 18 m/min.
- Data storage: log book of the last 30 dives (date and time, dive time, maximum depth, minimum water temperature)
- Dive profile memory: 10 dives (10 dive hours max.), with 600 profile points, each indicating the maximum depth reached, any ascent violations and any decompression stop violations
- History: total number of dives, total dive hours, maximum depth reached, minimum temperature recorded
- Battery replacement memory: storage of all memories, except the nitrogen memory
- Errors made: automatic signaling on the U.B.A. (Underwater Behavior Analysis) bar on the display; in "Surf Time" mode, the display remains on until the next dive
- Zeroing: residual saturation memory can be reset
- Interface with PC/Windows: a dedicated software allows you to print the log book.

detailed information regarding the dives, as well as their total number, the total number of dive hours, the maximum depth reached and the minimum temperature recorded. PC interfacing allows you to print the personal log book and the entire profile of the dives performed. The GUARDIAN's display is equipped with an additional replaceable shield protecting it from shocks and scratches.

### Technical Specifications

- Algorithm type: modified Haldane
- Number of sample tissues (compartments): 9, with half-saturation times ranging from 2.5 to 480 minutes
- Maximum operating depth: 500 feet (150 meters)
- Maximum decompression stop: 90 feet (24 meters)
- Altitude operation: 4 levels (0-700 m/ 700-1500 m/ 1500-2400 m/ more than 2400 m)
- Automatic fresh water/sea water calibration
- Operating temperature: -10 to +50°C (14 to 122°F)
- Shelf temperature: -20 to +70°C (-3°F to 160°F)
- Air-water thermometer
- Powered by 3 AAA alkaline 1.5 V batteries
- Interface with PC/Windows: serial with RS 232 C adapter
- Unit: m/feet - °C/°F
- Battery life: approximately 100 hours of diving, with backlighting used twice per dive on average; approximately 25 hours of diving with backlighting always on (data referring to fully operational batteries)
- Size: 80 x 87 x 47 mm
- Weight: 260 g
- Protection degree: IP 68 (CEI 529)

1



## SECTION II Outline of the Instrument

GUARDIAN is a dive computer developed and designed for divers by expert divers; it is a perfect buddy, able to give precise information at any time. Its powerful microprocessor processes all information regarding the dive, while integrating it with surface parameters and keeping into account the residual tissue (compartments) saturation level until theoretical desaturation is established. The display shows the information required both for "NO DEC" (no decompression) and "DEC" (decompression) dives; at the same time, any ascent or decompression errors are signaled and recorded. GUARDIAN allows you to plan your dives precisely. In the <Plan> mode, the current NO DEC limits or the limits following the expected surface interval are displayed, while the <Simulator> allows you to analyze any set profile. The program can be modified if more restrictive parameters are to be applied or in the case of altitude dives, but it cannot be used for nitrox or any other breathing gas other than atmospheric air.



### WARNING

**DO NOT use the GUARDIAN for dives involving breathing mixtures other than pure atmospheric air.**

The computer is fully operational to a depth of 330 feet (150 meters); it is equipped with calendar clock functions and its display is of the backlit type. The memory stores the

## Symbols and Technical Words

$^{\circ}C$	centigrade or Celsius degrees
$^{\circ}F$	Fahrenheit degrees ( $100^{\circ}C = 212^{\circ}F$ )
%	ascent rate percentage
min	minutes
sec	seconds
h	hour
m	meter
ft.	feet (1 foot = 30.48 cm)
LO	low (referring to the residual battery charge)
PC	Personal Computer
asc time	total ascent time
U.B.A.	underwater behavior analysis
ceiling	ceiling (minimum depth not to be exceeded during decompression)
dec	decompression
deco	decompression
desat	desaturation
log book	dive book
max depth	maximum depth reached
mode	operating mode
no dec	no decompression
scrolling	displaying the NO DEC limits
set - set up	to set, calibrate
simul	simulator
slow	slow down
surf	surface
surf time	surface time
temp	temperature
yo-yo	dive profile with considerable depth differences



### WARNING

DO NOT attempt to use the GUARDIAN unless you are a certified diver and have read and understood the instruction manual. Proper use of the GUARDIAN will reduce your risk of decompression sickness, but no computer or table can eliminate that risk.