Monitor 2 Plus
Users Manual

CONTENTS

INTRODUCTION

Congratulations on the purchase of your Monitor 2 Plus (M2+) dive computer. Our designers have condensed important dive planning information into a user-friendly dive instrument. By combining graphics with bold alphanumerics, we have created an easy-to-use computer that provides dive data at a glance.

As with all diving equipment, it is important to understand the features and functions of the M2+. Before using the M2+, it is essential to read this manual in its entirety. Contained within this easy to read manual are illustrations to aid you in the complete understanding of the computer.

Section 1 instructs you on diving with the M2+, including pre-dive activation, descriptions of underwater displays, functions after the dive, and diving at altitude. Section 2 shows you how to recall the dive memory. Instructions on planning a future dive are given in Section 3. Care & Maintenance tips are covered in Section 4. Lastly, the reference section contains the technical specifications and a description of the algorithm.

WHAT IS A "DIVE COMPUTER"

DEFINITION OF COMPARTMENTS

A dive computer is an instrument that mathematically simulates the absorption and release of nitrogen by hypothetical tissue types in the human body. These hypothetical tissues are commonly referred to as "compartments." Each compartment absorbs and releases nitrogen at different rates. The M2+ tracks these compartments constantly, providing you with up-to-the-minute decompression information.

MULTI-LEVEL DIVING

If you use, or have used, dive tables you know the total amount of time you can stay under water is based on the maximum depth reached during the dive. Dive tables, such as the U.S. Navy dive tables, assume that you immediately descend to a single depth, stay at that depth for the duration of the dive, then immediately surface from that depth. This type of dive profile is referred to as a rectangular dive profile (figure 1). In reality, however, most recreational divers go to the deepest depth first and make a gradual ascent to the surface. This type of dive profile is referred to as a multilevel dive profile (figure 2).

Multilevel diving is where the M2+ excels. By continuously calculating the nitrogen absorption/release of all the compartments, the computer updates the amount of no-decompression time (NDT) you have left. As you ascend to shallower depths, the computer credits you with more allowable NDT; if you go deeper, it reduces the NDT available.

DIVING RESPONSIBLY

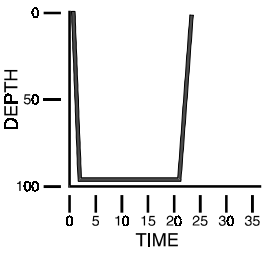


Figure 1
Rectangular Profile

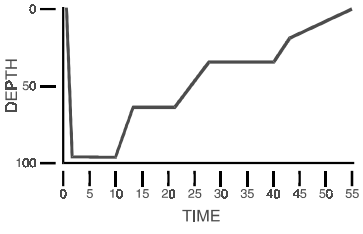


Figure 2
Multi-Level Profile

FEATURES OF THE M2+

THE COMPUTER SCREEN

The M2+ has a large liquid crystal display (LCD) and features large numbers and graphics. The screen is luminous for easy reading during low light dives, including night dives and cave dives.

The illustration on the opposite page calls out each display number or icon and provides a brief description for each one.

THE ELECTRICAL CONTACTS

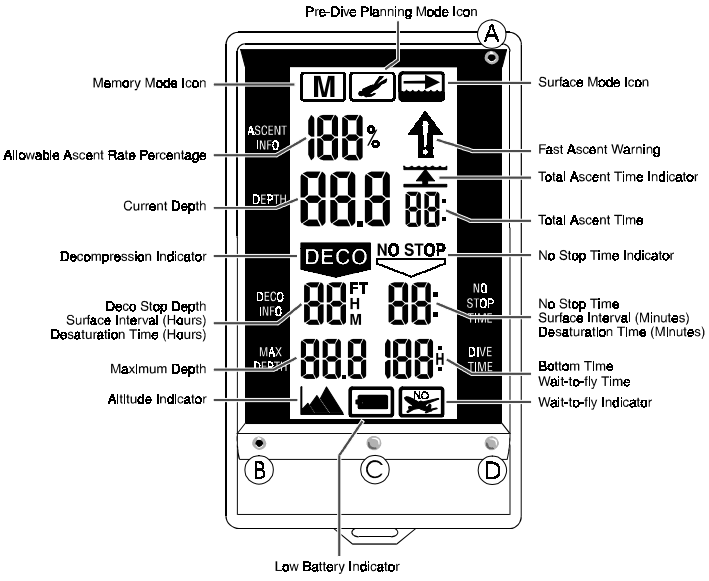
All surface operations and mode changes are made by the use of four electrical contacts placed around the M2+'s screen. These contacts are identified as A, B, C and D (see figure below). As a rule, contact A is always touched in conjunction with one of the other three contacts. After entering different modes, such as Memory Mode or Pre-Dive Planning Mode, contact B always decreases a value, and contact C always increases a value (always in combination with A). To make contact, simply moisten your fingertips and touch the appropriate pair of contacts at the same time. Release the contact as soon as the operation has been activated, usually no more than one second.

AUTOMATIC ACTIVATION

The M2+ automatically activates and starts working as soon as it is submerged in water. This means you can enter the water and start diving without turning on the computer first.

Occasionally, when diving in fresh water, there is not enough electrical conductivty in the water to complete the circuit between contacts. If this is the case, the M2+ will activate using a secondary pressure switch. Therefore, there may be slight delay between entering the water and the computer going into Dive Mode.

M2+ DISPLAY AND CONTACT LETTER DESIGNATIONS

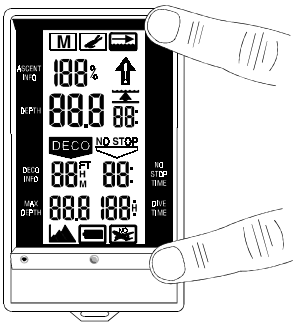


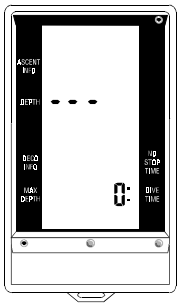
ACTIVATING THE COMPUTER

One of the nice features of the M2+ is that it automatically turns on and starts working when you enter the water. However, its a good idea to manually turn on the computer before a series of dives to make sure it is working properly and to check the battery power. To manually switch on the M2+, touch contacts A and D. Check the display to make sure all the display elements are lit.

The M2+ is now in ***Ready Mode***. The computer switches to Dive Mode after entering the water and submerging below four feet. The depth indication may be delayed for a few seconds.

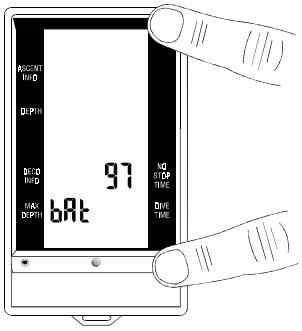
*Note: After three minutes of inactivity, the M2+ screen goes blank. This indicates that the computer is in **Sleep Mode**. To "wake up" the computer, touch contacts A & D.*





CHECKING THE BATTERY POWER

You can manually check the battery power of the M2+. While in Ready Mode or Surface Mode, touch contacts A&D. The word "bat" will be displayed along with the battery power. Battery power is given as a percentage, with 99% being the highest percentage displayed. It is a good idea to check the battery power before you start a series of dives.

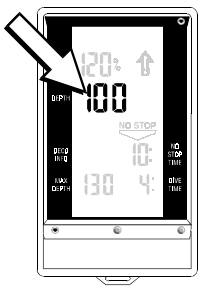


FUNCTIONS DURING THE DIVE

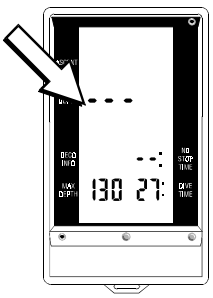
CURRENT DEPTH

Current depth is displayed in one-foot increments down to a maximum of 330 feet. When the depth is two feet or less, the depth display is replaced with three dashes.

Note: Depth measurement is based on freshwater. When diving is salt water, the depth displayed will be slightly greater than the actual depth, depending on the salinity of the water.



Current depth display at 100 feet

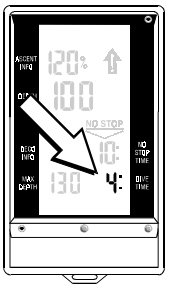


Current depth display at 2 feet or shallower

DIVE TIME

Dive time, which is displayed in minutes, is the amount of time spent below a depth of 4 feet. While the dive time is running, the colon to the right of the number flashes in one-second intervals. Maximum dive time displayed is 199 minutes.

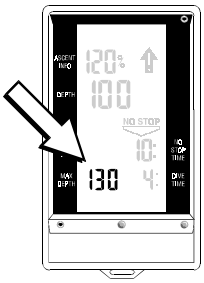
Note: If a dive lasts longer than 199 minutes, dive time will roll over to 0 minutes.



Dive time display

MAXIMUM DEPTH

Maximum depth is the deepest depth reached during the dive. It is only displayed when the actual depth is more than three feet shallower than the maximum depth.

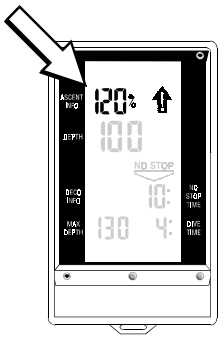


Maximum depth display

ASCENT RATE

The optimal ascent rate varies between 23 and 67 ft/min. depending on the depth. Ascent rate is displayed as a percentage of the allowable ascent rate (rounded to the nearest 10 %). For example, if the allowable ascent rate at the current depth is 67 ft/min, and you ascend at 33 ft/min, the ascent rate will display 50%. If you ascend at 67 ft/min the ascent rate will show 100%.

WARNING: The prescribed ascent rate must be observed at all times! Exceeding the prescribed ascent rate can lead to microbubble formation which can lead to serious injury or death due to decompression sickness.



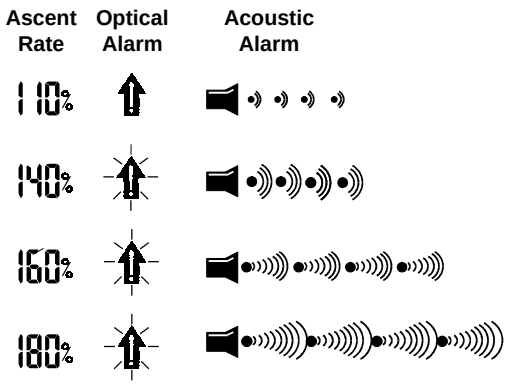
Ascent Rate Display

If the ascent rate is 100% or more, the arrow appears. If the ascent rate exceeds 140%, the arrow starts flashing. Also, an acoustic alarm sounds when ascent rate is 110% or greater. The intensity of the alarm increases as the percentage over the allowable rate increases. Below is a summary of the ascent warnings.

Some Notes on ascent rate:

- *The M2+ may require a decompression stop due to an improper ascent rate, even if you stay within the no-stop limits.*
- *Decompression time necessary for the prevention of microbubbles can increase greatly if the ascent rate is exceeded.*
- *At great depth, ascending too slowly may cause heightened saturation of tissues and increase both decompression time and total ascent time. At shallow depth, a slow ascent may shorten decompression time because the tissues are desaturating during a shallow, slow ascent.*
- *Excessive rates of longer periods are entered in the dive computer's memory*

WARNING: Reduce your ascent speed whenever the above alarms appear. Failure to do so may lead to serious injury or death due to decompression sickness.

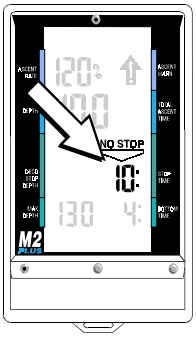


NO-STOP TIME

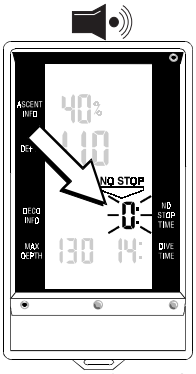
No-Stop Time is the amount of time you can stay at the current depth without making required decompression stops. This number is displayed in minutes, with 99 being the highest number displayed. If 99: is displayed, you have 99 minutes or more of no-stop remaining. No-stop time is easily identified by the no-stop arrow located directly above it.

WARNING: It is unsafe diving practice to "push" the M2+, or any other decompression tool, to its limits. Avoid no-stop times of less than 3 minutes at any given depth.

WARNING: There is an acoustic alarm if no-stop time is less than one minute. In this last minute, the no-stop display shows a flashing 0. In order to prevent a decompression dive, you must ascend immediately.



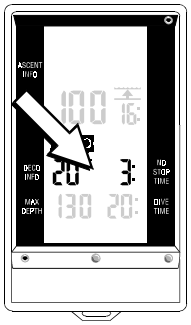
No-Stop Time Display



No-stop time at 0 minutes remaining

DECOMPRESSION STOP INFORMATION

If you exceed the no-stop limits, the Monitor 3 will replace the no-stop time with the deepest (first) decompression stop depth (in feet) along with the amount of decompression time (in minutes) at that depth. When a decompression stop has been completed, the next shallower decompression stop is displayed, along with its required stop time. When all decompression stops are completed, the DECO arrow disappears and the NO STOP arrow reappears.



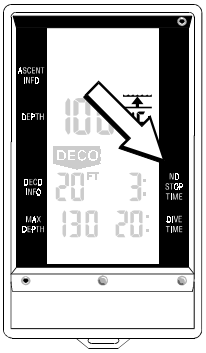
Decompression Stop Information: Diver must make a 20-foot stop for 3 minutes

WARNING: If you ascend shallower than the required decompression stop depth, the DECO arrow will start flashing and an acoustic alarm will sound. Due to the formation of microbubbles, decompression obligation can increase greatly if a decompression stop is ignored. When the surface is reached during the decompression alarm, the DECO arrow continues to flash to point out the risk of a decompression accident. If you do not descend immediately to the required stop depth, the Monitor 3 will enter SOS Mode. Any decompression violation longer

TOTAL ASCENT TIME

Total Ascent Time is the addition of all the decompression stop times plus the amount of time it takes to ascend from the current depth to the first decompression stop.

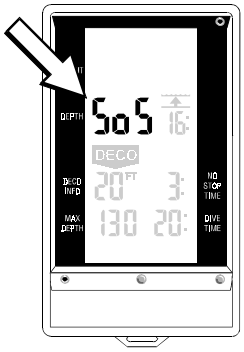
Note: Total ascent time is calculated with an optimal ascent rate of 100% and normal workload. High workloads and different ascent rates may change the total ascent time.



Total Ascent Time Display

SOS MODE

If you ignore your decompression stop and return to the surface (shallower than 4 feet) for more than three minutes, the M2+ switches to ***SOS Mode***. In SOS Mode, the computer displays SOS instead of current depth. While in SOS Mode, the computer cannot be used for 24 hours. SOS Mode can influence the computer's calculations for up to three days after the incident due to the presence of microbubbles.

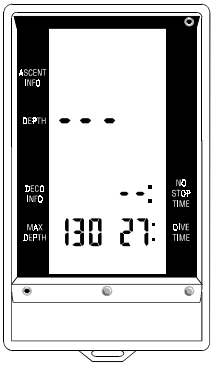


SOS Mode Display

FUNCTIONS AT THE SURFACE

WAIT MODE

After reaching the surface, the M2+ automatically switches into ***Wait Mode*** for five minutes. This is the amount of time necessary to recognize the end of the dive. The five minute delay allows you to come to the surface to orient yourself, then resume the dive. If you stay at the surface longer than 5 minutes, the dive is entered into the logbook and the M2+ switches into surface mode.



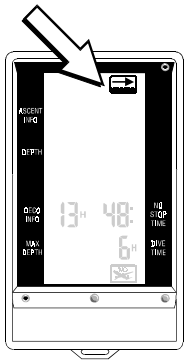
Wait Mode Display

SURFACE MODE

Note: Surface Mode will stay visible for 3 minutes. After that, the screen will go blank to save battery power. To reactivate the Surface Mode display, touch contacts A&D.

SURFACE MODE ICON

Five minutes after surfacing, the M2+ enters Surface Mode. While in Surface Mode, the Surface Mode Icon appears at the top of the display.

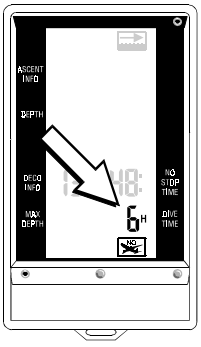


Surface Mode Icon

WAIT-TO-FLY TIME

Wait-to-fly time is the minimum amount of time you should wait before flying in a commercial airliner. Wait-to-fly time is displayed in hours and is denoted by the no-fly icon immediately below it.

WARNING: Flying while the M2+ is still displaying wait-to-fly time may lead to serious injury or death from decompression sickness.



Wait-to-fly time display

Wait-to-fly Recommendations

The Divers Alert Network (DAN) has made the following recommendations regarding wait-to-fly time:

1. A minimum surface interval of 12 hours would be required in order to be reasonably assured a diver will remain symptom free upon ascent to altitude in a commercial jetliner (altitude up to 8000 ft/2400 m).
2. Divers who plan to make daily, multiple dives for several days, or make dives that require decompression stops should take special precautions and wait for an extended surface interval beyond 12 hours before flight.

Both the Undersea and Hyperbaric Medical Society (UHMS) and DAN agree that:

"There can never be a flying after diving rule that is guaranteed to prevent decompression sickness completely. Rather, there can be a guideline that represents the best estimate for a conservative surface interval for the vast majority of divers. There will always be an occasional diver whose physiological makeup or special diving circumstances will result in the bends."

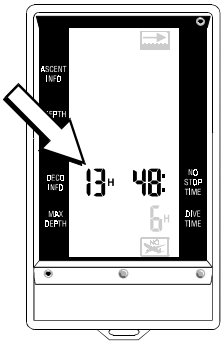
U.S. Divers recommends that you follow either the DAN recommendation, or the wait-to-fly time shown by the M2+, which ever is longer.

DESATURATION TIME

Desaturation time is the amount of time it takes to completely off-gas any residual nitrogen in your system. Desaturation time is displayed in hours and minutes.

SURFACE INTERVAL TIME

Surface interval time is shown immediately after accessing Memory Mode. For more information on accessing Memory Mode, see page xx.

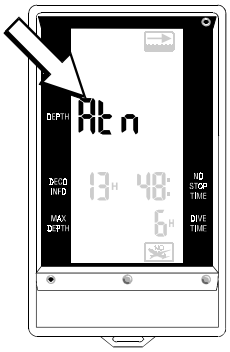


Desaturation time

MICROBUBBLE WARNING

Repetitive diving may cause microbubbles to accumulate in the lungs if the surface interval between dives is not long enough. Ignoring decompression stops or an excessive ascent rate can also lead to bubble formation. In order to reduce the risk of decompression sickness for future repetitive dives, the surface interval should be planned long enough to reduce the risk of decompression sickness. If the M2+ calculates that the formation of microbubbles may occur during the surface interval, it will advise the diver to extend the surface interval. The display "Atn" (= attention) is visible in the depth display area during the surface mode. While "Atn" is displayed, the diver should not undertake another dive.

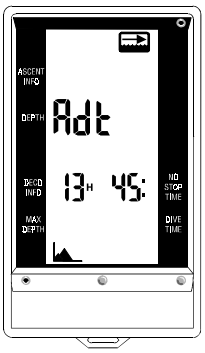
Note: If a dive has to be made while "Atn" is displayed, the amount of "Atn"-time for the following dive can increase considerably. During the dive, no-stop times will be much shorter and decompression times will increase.



Microbubble formation warning Atn = Attention

DIVING AT ALTITUDE

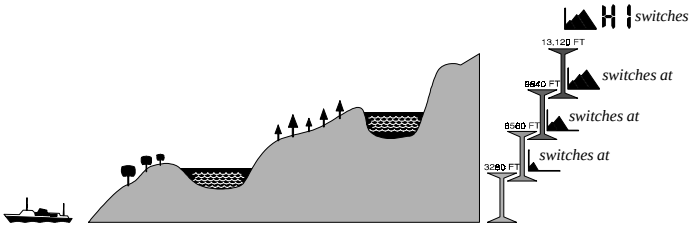
The M2+ measures the atmospheric pressure even while in Sleep Mode. If the computer detects a higher altitude, it automatically switches on and displays the adaptation time. This is the time after which your body is considered desaturated and stable at the given altitude.



Altitude adaptation time display Adt=Adapt

ALTITUDE SECTORS

Atmospheric pressure is influenced by altitude and weather. The M2+ is interested only in the actual atmospheric pressure value for use in decompression calculations. However, it indicates the altitude sector which corresponds most closely with this pressure for normal weather conditions. The altitude sectors and their corresponding altitude is illustrated below.



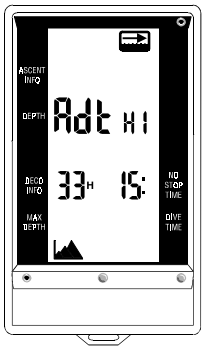
Even the smallest differences in the pressure sensors can cause two computers at the same altitude to display different altitude sectors. (Notice how the altitude sectors overlap in the illustration.) These differences are not meaningful and do not interfere with the operation of the computer. However, if there is an altitude indication while at sea level, or two computers differ by 2 altitude sectors, contact your U.S. Divers dealer for service.

Note: In order to assure optimal decompression even at higher altitudes, the 10-foot decompression stop is divided into a 13-foot stop and 7-foot stop. Therefore, the prescribed decompression stops, in order, are 7 ft, 13 ft, 20 ft, 30 ft ... 80 ft.

EXCEEDING THE ALTITUDE LIMIT

The M2+ operates normally up to an altitude of 13,123 ft. If the altitude limit is exceeded, the M2+ will display "HI" along with all the altitude sectors.

If you make a dive after exceeding the altitude limit the computer will not show any decompression information; it becomes no more than a depth gauge and bottom timer. Also, Pre-Dive Planning Mode cannot be started, since decompression information is not available.



Diving display when altitude limit has been exceeded

SUMMARY OF ATTENTION MESSAGES AND ALARMS

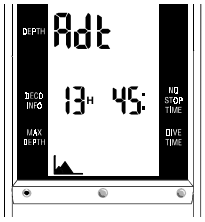
The M2+ draws your attention to certain situations and warns you of unsafe diving practices. Attention messages and alarms are always visual and acoustical while underwater; they are only optical at the surface except for the decompression alarm.

ATTENTION MESSAGES

Attention messages are given by symbols, letters, or flashing figures. In addition, two short beeps can be heard, in intervals of 4 seconds, in two different frequencies. Attention messages appear in the following situations:

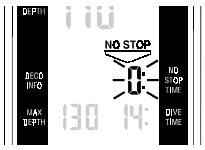
Altitude dive

During a change to a higher altitude, the M2+ displays an altitude sector icon and the corresponding adaptation time.



End of no-stop time

To avoid making a decompression dive, a "0" flashes during the last minute of no-stop time to alert you to ascend to a shallower depth. Also, two beeps are sounded.



Microbubble warning (Atn)

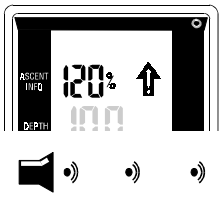
This message is displayed when the M2+ calculates that there is an excess of microbubbles in your body tissues. Do not dive while this message is displayed. If you dive while the message is displayed, no-stop times will be reduced and decompression times will be longer.

ALARMS

Alarms are communicated to you by symbols, letters, or flashing icons. In addition, an acoustic warning sounds during the duration of the alarm. An alarm occurs in the following situations.

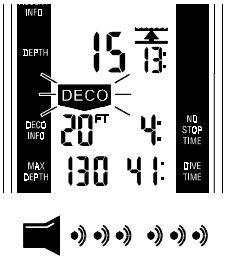
Fast ascent

Reduce your ascent rate



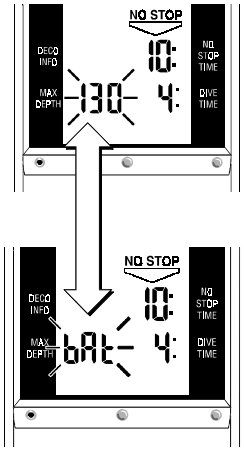
Missed decompression stop

Descend to the prescribed decompression stop at once.



Low computer battery

While diving, "bAt' alternates with the maximum depth display. During Surface Mode or Ready Mode, "bAt" flashes in the maximum depth position. This indicates battery charge is nearing 0%.



MEMORY MODE

OVERVIEW

The Monitor 2+ is able to display the details of the last 19 dives. Any dive that lasts two minutes or longer is entered into memory. After the memory is filled with all 19 dives, the oldest dive is deleted for each new dive entered. All the dive information stays in memory until the battery is removed.

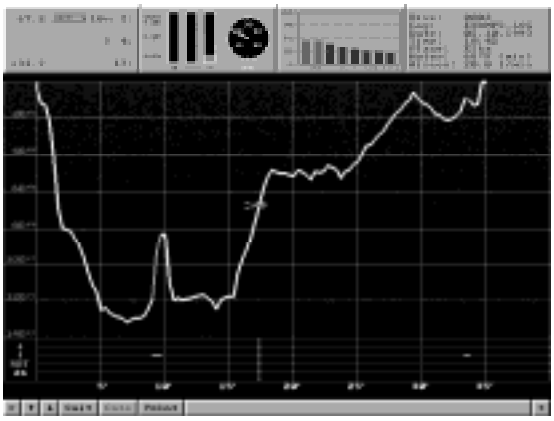
The illustration on the opposite page shows all the information that is logged for each dive.

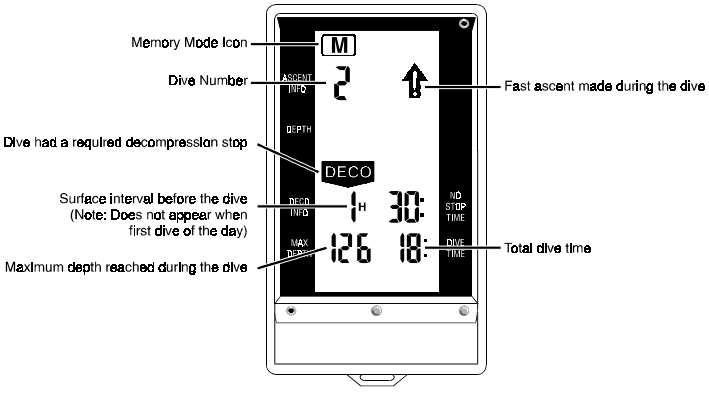
DOWNLOADING THE MEMORY TO A PC

With the use of a separate interface kit, the Monitor 2+ has the ability to download the details of the last 37 dives to an IBM compatible computer. In addition, detailed information on the last 200 minutes of diving, sampled every 20 seconds, allows the software to plot a graph depicting your actual dive profile and display the computer information anywhere along the profile.

The interface kit and software available from your Authorized U.S. Divers dealer.

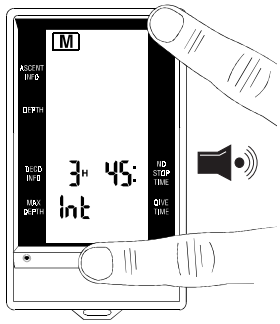
Note: The procedures for downloading data to a personal computer are described in the manual that comes with the interface kit.





ACTIVATING MEMORY MODE

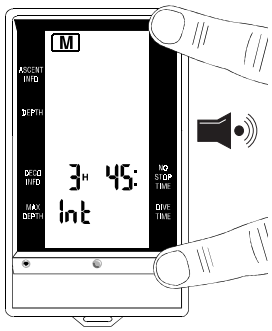
From *Ready Mode* or *Surface Mode*, touch contacts A & C. The computer will emit one beep and the Memory Mode icon will appear at the top of the screen. If activating from Surface Mode, the current surface interval also appears.



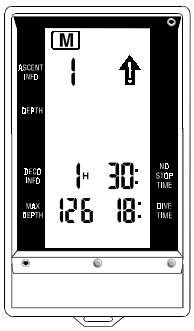
Activating Memory Mode from Surface Mode

Touch Contacts A & D to confirm the selection. After a few moments, the information for the most recent logged dive appears.

Note: If you are only checking surface time, you can immediately return to Surface or Ready Mode by touching contacts A & B instead of touching A & D.



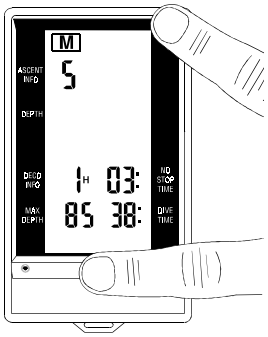
Confirm the selection by touching contacts A & D



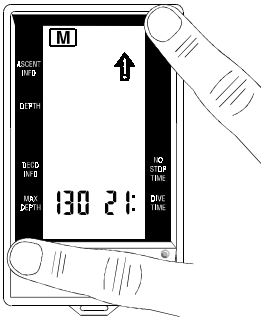
Typical Memory Mode display

SCROLLING THROUGH LOGGED DIVES

To scroll back through the last 19 dives in memory (towards the oldest dive), touch contacts A & C. To scroll forward through the memory (towards the most recent dive), touch contacts A & B.



Scroll back through memory by touching contacs A & C



Scroll forward through memory by touching contacts A & B

EXITING MEMORY MODE

To exit Memory Mode, touch contacts A&D. If there is no activity for three minutes while in Memory Mode, the computer will automatically switch back to Surface or Ready Mode.

PRE-DIVE PLAN MODE

OVERVIEW

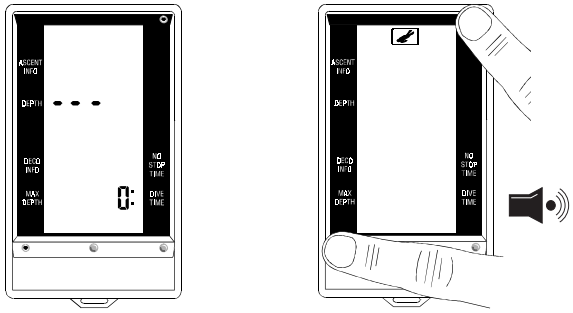
The Monitor 2+ has a built-in dive planner that allows you to plan both no-stop dives and decompression dives. The planner takes into account the temperature of the most recent dive and altitude.

WARNING: Planned decompression dives violate the responsible diving practice standards of every major diving organization. Recreational or sport scuba divers should not attempt decompression dives. Only professional divers with extensive experience, training, and the appropriate equipment for decompression diving (including the presence of an on-board recompression chamber) should attempt to plan a decompression dive. Those who attempt decompression dives must be willing to accept an increased risk of decompression sickness.

You can access the Pre-Dive Plan Mode form either *Ready Mode* or *Surface Mode*. When you access the planner from Surface Mode, you have the option of adding surface-interval time to plan for a dive at some point later in the day.

ACTIVATION FROM READY-MODE

STEP 1 From *Ready Mode*, touch contacts A & B. The computer will emit one beep and the Dive Plan Icon will appear at the top of the screen.

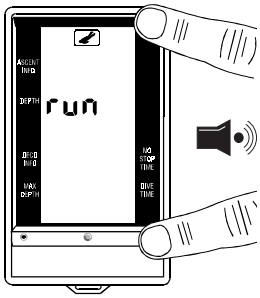


Ready Mode

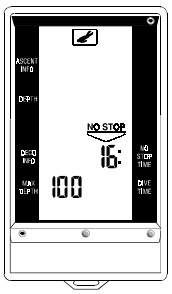
NOTE: Always moisten your fingertips before touching the contacts. Otherwise, you cannot get a good electrical connection. Contacts only need to be touched momentarily unless noted otherwise.

STEP 2 Touch contacts A & D to confirm the selection. The word RUN will flash for about five seconds and then start scrolling through the available time-depth combinations.

The Monitor scrolls from 50 to 200 feet in 10-foot increments.



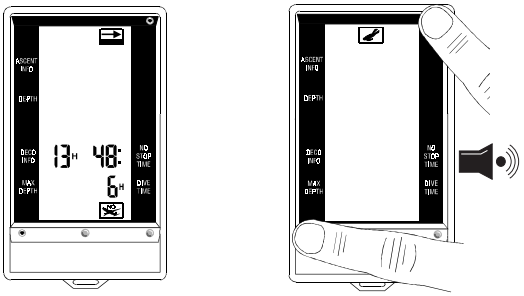
STEP 3 For each depth the computer gives the maximum allowable no-stop time at that depth.



Note: If you want to stay longer than the no-stop time limit, proceed to "Planning a Decompression Dive" on page 36.

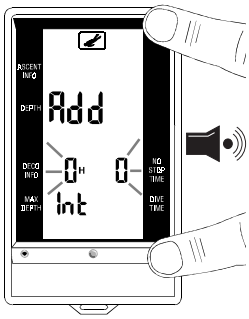
ACTIVATION FROM SURFACE MODE

STEP 1 From *Surface Mode*, touch contacts A & B. The computer will emit one beep and the Dive Plan Icon will appear at the top of the screen.

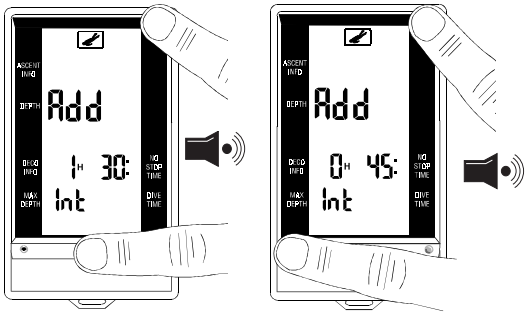


Surface Mode

STEP 2 Touch contacts A & D to confirm the selection. The words "Add" and "Int" appear along with a flashing surface interval time.



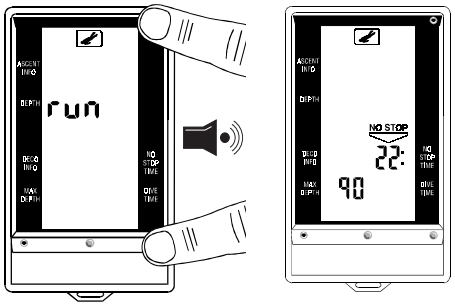
STEP 3 If you do not want to add any additional surface time, go to step 4. If you do want to add surface time, touch contacts A & C. If you add too much surface time and want to decrease it, touch contacts A & B.



Increase Time ***Decrease Time***

Note: Surface interval time increases in 15 minute increments for the first 6 hours, 30 minute increments from 6 to 12 hours, and 1-hour increments after that.

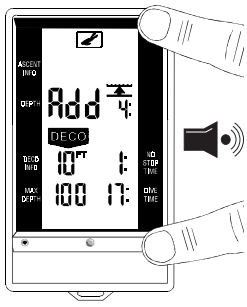
STEP 4 After adding the desired amount of surface interval time, touch contacts A & D. The word "run" flashes for a few moments, then the Monitor starts scrolling from 50 to 200 feet in 10-foot increments. For each depth the computer gives the maximum allowable no-stop time at that depth.



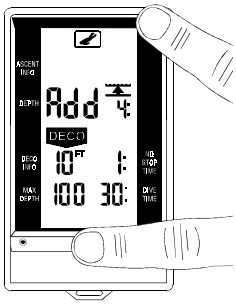
PLANNING A DECOMPRESSION DIVE

Before planning a decompression dive, reread the import warning at the beginning of this section.

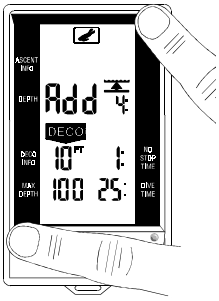
STEP 1 When the Monitor 2+ scrolls to the desired depth, touch contacts A & D. The word "Add" appears in the depth zone, the flashing dive time is now one minute more than the allowable no-stop time, and all decompression information is displayed, including stop depth, stop time, and total ascent time.



STEP 2 Increase the dive time by touching contacts A & C. If you increase the dive time too much and want to reduce it, touch contacts A & B.



Increase Time



Decrease Time

STEP 3 When you reach the desired dive time, release the contacts. After a few moments, the Monitor 2+ will display the new decompression information, including the first decompression stop, time at the first stop, and total ascent time. You can then, as shown in step 2, increase and decrease the dive time as you wish.

To return to the pre-dive scrolling, touch contacts A & D. If you want to

Note: If there is no activity during the Pre-Dive Planning Mode for three minutes, the M2+ automatically returns to Surface Mode or Ready Mode.

STEP 4 To return to Surface Mode or Ready Mode, touch contacts A & D until you hear two beeps.

WARNING: If two or more divers using computers are planning a dive, planning for all divers must be based on the dive computer showing the shortest no-stop times. Failure to do this may lead to serious injury or death from

CARE AND MAINTENANCE

OVERVIEW

The M2+ is a robust instrument designed to withstand the rigors of SCUBA diving. However, you still need to protect it from shock, extreme heat, chemical attack, and tampering.

Even though the M2+'s material is tough and durable, it is susceptible to chemical attack and scratches. Chemical attack can be in the form of spray propellants, gasoline fumes in your garage or boat, and alcohol. U.S. Divers cannot replace scratched gauge faces. However, small scratches naturally disappear underwater.

CAUTION: Never use aerosol sprays, including silicone sprays, on or near the M2+. The propellants may chemically attack the plastic, causing the plastic case to crack.

CARE BEFORE THE DIVE

The M2+'s plastic housing is made of a shock resistant resin. This housing protects the M2+ from the normal bumps that occur when diving. However, the computer cannot withstand the impact of heavy objects, such as weight belts or SCUBA cylinders. Impact from heavy objects is the most common cause of computer damage. When you set up your dive gear on a boat or the beach, keep the M2+ protected until you are ready to dive. Never leave the computer exposed where someone could accidentally step on it, or drop something on it.

CARE DURING THE DIVE

The most common damage inflicted on a computer while underwater is scratches to the computer face. Scratches occur when a dangling computer console gets dragged over coral or rocks. Most buoyancy compensators have gauge hose retainers that keep the computer close to your body for easy access and reduce the possibility of scratching the computer face.

CAUTION: Scratches to the computer body or gauge face are not covered by the Two-Year Limited Warranty

CARE AFTER THE DIVE

CAUTION: If the M2+ is not attached to a first-stage regulator while soaking (explained below), make sure that water is not allowed to enter the high pressure hose. Water entering the submersible pressure gauge (SPG) via the high pressure hose may cause damage to the internal components.

After each day of diving, soak the M2+ in a warm, fresh water bath to dissolve salt crystals. To dissolve heavy salt buildup, use a slightly acidic vinegar/water bath. After removing the computer from the bath, rinse thoroughly with fresh water. Towel dry the computer before final storage. Place the M2+ in a cool, dry and protective case to transport.

If the M2+ is in a console, it should be rinsed at the same time the regulator is rinsed. Connect the first-stage to a charged SCUBA cylinder. Turn on the cylinder valve and submerge the whole regulator/tank system in a bath of water. By applying pressure to the regulator, you absolutely prevent any water from entering the regulator, including the high pressure hose.

ANNUAL DEALER INSPECTIONS & FACTORY SERVICE

The M2+ should be inspected annually by an Authorized U.S. Divers Dealer. The dealer will perform a depth accuracy test, function check, and routine inspection for damage or wear. To keep the two-year limited warranty in effect, this annual inspection must be done one year from the purchase date, plus or minus 30 days. U.S. Divers recommends that you continue to have yearly inspections to ensure the M2+ is working properly, even after the warranty period expires. An annual inspection record is provided in the rear of this manual, which should be signed by the technician after each inspection. The cost of this service is not covered under the two-year limited warranty. Also, be sure to record any factory services that are performed.

If you ever doubt the accuracy of the M2+'s depth readings, DO NOT dive with it until you have it inspected by an Aqua Lung dealer. Some dive stores who provide this service do not have test gauges on their pressure chambers as accurate as the depth sensor on the M2+. Therefore, if you request a depth check, verify that the test chamber gauge accuracy is better than ±2 feet.

If the facility does not have the special tools to follow these service procedures, have the dealer return the M2+ directly to Aqua Lung.

HOW TO OBTAIN SERVICE

Factory service for the M2+ was discontinued in 1997. If a battery change is needed, please contact one of the following Aqua Lung dealers:

1. Sea Sports, Houston, TX
   281-894-4488
   e-mail: ssscuba@flash.net

2. Underseas Scuba Center, Villa Park, IL (Chicago area)
   630-833-8383
   e-mail: bruce@underseas.com

OPERATING TEMPERATURE

The M2+ operates normally between 12ºF to 122ºF (-10ºC to 50ºC). You may notice the liquid crystal display (LCD) becoming sluggish at extremely low temperatures. This is normal and will not affect the computer's accuracy.

It is possible to damage the electronics if left exposed to direct sunlight or in a hot, confined space (like a car trunk). After the dive, cover the computer and keep it out of the sun. If inadvertently left in direct view of the sun, the LCD may become totally black. If this occurs, immediately immerse the M2+ in cool water. The display should recover its normal appearance after a few minutes. Damage from extreme heat or cold is not covered under the two-year limited warranty.

REPLACING THE BATTERY

The M2+'s battery is not user-replaceable. It must be returned to the dealer or factory for replacement. If you notice any low battery warnings, have the battery changed as soon as possible. Refer to the previous section "How to Obtain Service" for information on returning the M2+ to U.S. Divers Co.

TECHNICAL SPECIFICATIONS

OPERATIONAL PERFORMANCE

Depth Range:	0-330 feet
Time Measurement:	0-199 min.; Quartz timing
Temperature Range:	14ºF to 122ºF (-10ºC to 50ºC)
Display:	High contrast, custom liquid crystal with back luminescence
HP Hose Connection:	7/16" UNF regulator HP port
Dive Log Mode	Stores last 37 dives in memory After 37 dives, adds latest dive to memory, deletes oldest dive (37 most recent dives are retained in memory)
Altitude Range:	0-13,200 feet above sea level; Full computer functions up to 13,200 ft.
Battery:	LR07 long life lithium battery (factory replaceable only)
Module Weight	150 g (5.29 oz)
Module Dimensions	3.875" tall x 2.28" wide x .9" deep

NO-DECOMPRESSION MODEL

- ZH-L8 ADT
- 8 tissue compartments, 5 to 640 minutes
- Decompression stop depths at 10 to 80 feet in 10-foot increments

ZH-L8 ADT CALCULATION MODEL

The M2+ uses a new calculation model known as the ZH-L8 ADT. This model uses eight compartments or "tissue" groups with half-times ranging from 5 to 640 minutes. This calculation model is based on the most current research conducted by the late Dr. A.A. Buhlmann. Most computer decompression models only take into account time and depth; the M2+ model also factors in other physiological factors, including temperature and ascent rate.

TEMPERATURE

Blood perfusion to the body's organs is not constant. Skin and muscle tissues are especially subject to changes in blood perfusion, depending on temperature. Changes in blood perfusion to these organs change their nitrogen saturation tolerance. The ZH-L8 ADT model takes these effects into account and thus the "skin" and "muscle" compartments in the M2+ have variable half-time periods and saturation tolerances.

Decompression information is calculated according to the diver's individual decrease in skin temperature. The decrease in skin temperature is based upon the water temperature and the dive time. By considering these changes in saturation, the time that must be spent at the surface prior to flying can be considerably lengthened, depending on the depth, time, and temperature of a dive.

ASCENT RATE AND MICROBUBBLE FORMATION

The ZH-L8 ADT model considers nitrogen in both its dissolved and gaseous phase (microbubbles). Formation of microbubbles is considered to be a strong indicator of a high risk of decompression sickness. The model calculates the formation of microbubbles depending on various assumed influences in arterial and venous blood. During normal, slow ascents, microbubbles form mainly in venous blood. During fast ascents, microbubbles may also form in arterial blood and the body's tissues. If a particular dive profile results in the formation of microbubbles, decreased bottom time and/or increased decompression times, and increased wait-to-fly times, will be indicated.

Microbubbles can form if the diver makes a fast ascent, ignores decompression stops, or makes repeated ascents during a dive (yo-yo diving). These microbubbles can form in arterial blood and body tissues. If these microbubbles partially impair circulation, the rate of gas diffusion and saturation tolerance of surrounding tissues are changed. If required, both decompression time and remaining bottom time will be adjusted in such a way that already existing microbubbles will stop growing. Increased decompression time will also assist those local areas of impaired circulation to desaturate with less risk of decompression sickness.

The calculation of microbubbles results in altered ascent instructions. If microbubbles are assumed to be present based on the data used by the M2+, the ascent rate is reduced to 23 feet/minute. This will help prevent the formation of microbubbles in the arterial circulation and minimizes formation of microbubbles in the venous circulation after the dive.

SUMMARY

With its new decompression model, the M2+ is a versatile tool which can increase your diving comfort and safety. As with any diving tool, however, ultimate responsibility for diving safety remains with the individual diver. The same responsible diving practices taught by all diving certifications are still absolutely necessary in order to safely dive with the M2+.