Dive planning

BSAC
Dive with us

Contents

Dive planning

Module objectives

Having walked through what students can expect to happen on an open-water dive in the last session, this module looks in more detail at the basics of dive planning. It reinforces the need for decompression planning and gives practical advice for planning with tables and dive computers. Gas planning and gas toxicity are also covered.

Achievement targets

At the end of this module, students should:

- **Know how to manage nitrogen absorption and release to minimise the risk of decompression illness (DCI)**
- **Understand the terminology used in the BSAC decompression tables and how to use the tables to plan a single dive**
- **Know how to plan repeat dives with no mandatory decompression stops**
- **Know the monitoring equipment needed to dive a planned dive**
- **Understand the basic functions of dive computers and how they can be used for dive planning and diving**
- **Understand the fundamental differences between dive tables and dive computers and that neither tables nor dive computers are infallible**

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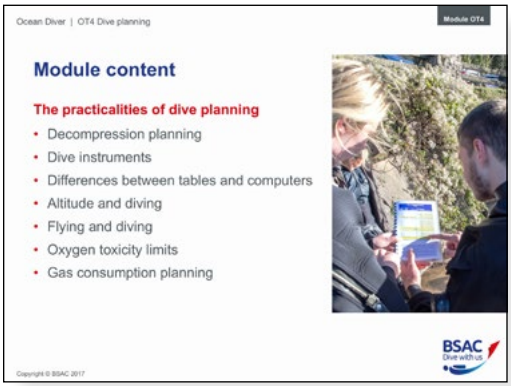
- **Be aware of the effects of altitude on decompression planning**
- **Be aware of the effects of flying on decompression planning**
- **Reinforce their basic understanding of oxygen toxicity**
- **Reinforce the need for gas planning, the use of the rule of thirds to plan gas requirements, and the need to monitor gas on dives**

Additional visual aids needed

BSAC decompression tables, dive computers, a fizzy drink bottle to demonstrate fast release of gas bubbles

Module contents

This module considers the basics of dive planning including decompression avoidance and planning, the use of dive tables and computers, gas planning and gas toxicity.



The practicalities of dive planning

Explain that before going diving it is important that every dive has a plan both for safety and for enjoyment of the dive. The most important considerations in dive planning are the management of nitrogen in the body, ensuring that we take enough gas with us, and that it contains a safe level of oxygen to breathe.

This module covers the following topics:

- **Decompression planning**
  There are two decompression planning tools that we can use to plan dive depth and duration to avoid decompression Illness: decompression tables and dive computers. Both use mathematical models to predict what is happening to nitrogen in the body during a dive. Planning single and repeat dives is a straight forward exercise using either tables or a dive computer.
- **Dive instruments**
  To dive a plan made using tables you need some monitoring equipment. A depth gauge, watch and slate are the minimum needed to carry out the dive plan. Dive computers are in widespread use. They all have similar functions, but students need to consult the instructions for the particular computer in use.
- **Differences between diving on tables and computers**
  Tables and computers are tools for decompression planning, they make different assumptions about the dive profile and give different no-stop times. Neither is infallible.
- **Altitude and diving**
  Students must understand that they need to take altitude into account in their decompression planning.
- **Flying and diving**
  Divers often fly somewhere before or after diving and students need to know how to plan for this.
- **Oxygen toxicity limits**
  Diving with nitrox brings the risk of oxygen toxicity, here we explain the practical steps taken to mitigate the risk.

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- **Gas consumption planning**
  Introducing the rule of thirds enables students to dive the plan safely, ensuring that they have an adequate amount of gas in reserve.

Decompression planning

Module OT2 covered nitrogen absorption, release and the need for management of nitrogen absorption. This module recaps the need for management, and covers the nitrox mixes Ocean Divers can use. It then introduces planning with the BSAC tables and dive computers, comparing and contrasting them.

DCI avoidance

It is important that we do all we can to reduce the risk of decompression illness by managing our diving.

- **Nitrogen management**
  We need to manage the absorption and release of nitrogen to avoid DCI.
- **Plan dive depth and duration**
  We have tools at our disposal to plan our dive depths and duration to avoid DCI.
- **Use dive tables or computer**
  Both these decompression planning tools use mathematical models with inbuilt parameters produced from a great deal of research,

which should neither be ignored nor over-ridden. Although computers are in widespread use, understanding the principles of planning with decompression tables will help with understanding nitrogen absorption and release, and help explain how dive computers work.

Using nitrox

Remind the students that a nitrox mix means that some of the nitrogen in air has been replaced by oxygen.

- **Less nitrogen means reduced risk of DCI**
  As DCI risk is related to nitrogen levels in the body, if we breathe less nitrogen on a dive we should reduce our risk of DCI compared with the same dive using air.
- **Ocean Divers may use nitrox mixes up to 36%**
  Remind students that Ocean Divers may use nitrox mixes with a maximum of 36 per cent oxygen. Normally they would use the standard mixes of nitrox 32 and nitrox 36, which have oxygen to nitrogen percentages of 32:68 and 36:64 respectively. (Air is 21:79.)

Dive tables

Dive tables give us information on depth and time limits for planning safe diving.

- **Understanding the principles of BSAC tables will help you understand dive computers**
  By understanding how the BSAC tables work, we can get a better understanding of how dive computers work.

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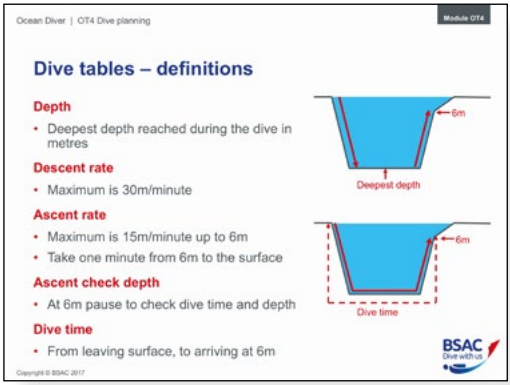
Dive tables – definitions

To plan a dive using the BSAC decompression tables some definitions need to be understood. They are also included at the front of the BSAC table booklets.



Depth

- **Deepest depth reached during the dive in metres**
  Even if the intention is to spend only a small amount of time at the planned deepest depth, for example you may dive down to 18m on a coral wall and then rise slowly up the wall, the dive will be planned on tables based on the maximum depth of 18m. (Measured in metres.)

Descent rate

- **Maximum is 30m/minute**
  Most descents will be slower but this is a maximum figure not to be exceeded to stay within the design parameters of the tables.

Ascent rate

- **Maximum is 15m/minute up to 6m**
  Ascending to six metres, the maximum allowed ascent rate is 15m/minute.
- **Take one minute from 6m to the surface**
  The BSAC tables then require your ascent from six metres to the surface to take a further one minute.

Ascent check depth

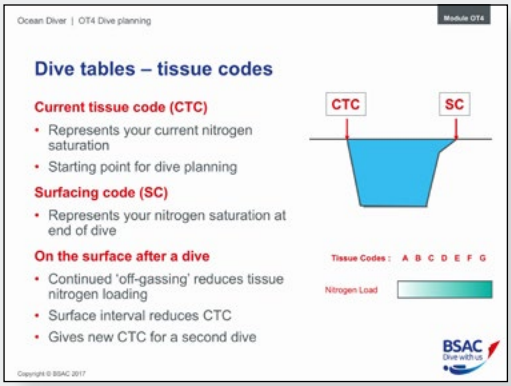
Control of any ascent is very important for the management of nitrogen release. During the last 10m of an ascent to the surface there is the greatest pressure change on your body.

- **At 6m pause to check dive time and depth**
  The ascent check depth at six metres is rather like a traffic light. Divers need to slow their ascent before the check depth to ensure good buoyancy control at six metres. On reaching six metres, you need to stop and check the dive time and depth against the plan. You should be within both limits.

Dive time

- **From leaving surface, to arriving at 6m**
  The very specific definition of dive time used by the BSAC tables is that it is the time from leaving the surface at the start of the dive to arriving back at six metres at the end of the dive.

Dive tables – tissue codes



There are some other definitions we need to understand that relate to the theoretical level of nitrogen saturation in the body, calculated by the maths behind the tables. In the BSAC tables tissue codes are given as A, B, C, D, E, F and G. Tissue code A indicates the normal body tissue state before any diving has been undertaken. Going further down the alphabet indicates increasing nitrogen saturation states caused by going diving. A code of F is the maximum level of nitrogen saturation experienced by Ocean Divers.

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Current tissue code (CTC)

- **Represents your current nitrogen saturation**
  The CTC is the tissue code given to your nitrogen saturation state now.
- **Starting point for dive planning**
  It is most significant and must be known to plan a dive.

Surfacing code (SC)

- **Represents your nitrogen saturation at end of dive**
  The SC indicates the level of nitrogen saturation at the end of the dive. This is dependent on the starting code and the depth and duration of the dive that has taken place.

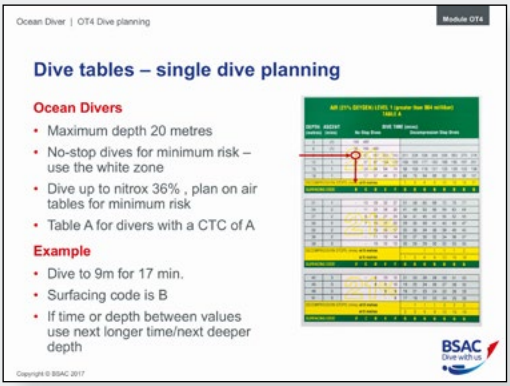
On the surface after a dive

It is important to understand that the tables (or other decompression models/tools) do not get a diver out of the water with the same amount of nitrogen in their body as when they entered the water, the tables aim to get you out at a nitrogen level that avoids DCI and is safe. On the surface, you are in what the tables call the surface interval, which is the time elapsed since the end of the previous dive.

- **Continued ‘off-gassing’ reduces tissue nitrogen loading**
  Further off-gassing of nitrogen occurs on the surface after diving.
- **Surface interval reduces CTC**
  As time passes on the surface your tissue code will change from your SC, gradually moving back down the alphabet. We can say that the surface interval reduces the CTC.
- **Gives new CTC for a second dive**
  This improvement as time passes giving a new CTC starting point for a subsequent dive.

Dive tables – single dive planning

Ocean Divers are trained to carry out no-stop diving to a maximum depth of 20m using air or nitrox mixes of up to 36 per cent. These dives must be planned using either BSAC 88 or BSAC Nitrox (21%) decompression tables.



Ocean Divers

- **Maximum depth 20 metres**
  The Ocean Diver qualification allows diving to a maximum depth of 20m so it is this upper section of the BSAC tables that are to be used.
- **No-stop dives for minimum risk – use the white zone**
  Ocean Divers carry out no-stop diving to introduce them to diving with minimum risk, enabling them to be really comfortable with their buoyancy control on ascent before undertaking more adventurous diving training. This further reduces the area of the tables to be used down to the white zone.
- **Dive up to nitrox 36%, plan on air tables for minimum risk**
  Ocean Divers can use mixes up to 36 per cent nitrox but all their dives are planned on an air (21 per cent) table for minimum risk, as the amount of nitrogen in the breathing gas is much less than the table calculations assume.

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- **Table A for divers with a CTC of A**
  There are separate tables for each tissue code. Table A is used for divers with a CTC of A. This would usually be the case if no dive has taken place in the last 16 hours.

  Here the instructor, using the VAs, can step the students through planning a dive using table A.

  The instructor will need to ensure that students understand the principles of using the tables to plan one dive. Additional examples may be needed to confirm that the students understands.

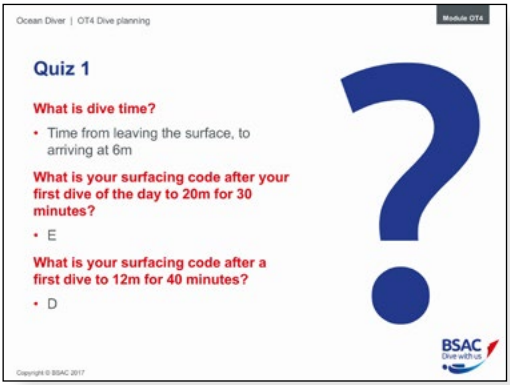
Example:

- **Dive to 9m for 17 min**
- **Surfacing code is B**
- **If time or depth between values use next longer time next deeper depth**

Quiz 1

What is dive time?

- **Time from leaving the surface, to arriving at 6m**



What is your surfacing code after your first dive of the day to 20m for 30 minutes?

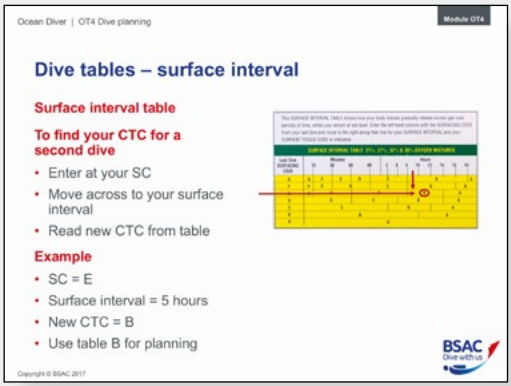
- **E**

What is your surfacing code after a first dive to 12m for 40 minutes?

- **D**

Dive tables – surface interval

Going diving does not have to be limited to only doing one dive a day. Further dives can be planned using the tables.



Surface interval table

The surface interval table allows you to see how your CTC improves back up towards an A as time passes on the surface between dives.

To find your CTC for a second dive

- **Enter at your SC**
  In the left-hand column find the surfacing code following your latest dive.
- **Move across to your surface interval**
  Look at the timescale along the top of the table. Move to the value that corresponds to the surface interval that you will have had, that is the time from surfacing to the time planned for starting the next dive.
- **Read new CTC from table**
  Read the new, improved CTC from the table; this is the code (and therefore the page in the tables) to be used for planning your next dive.

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Example

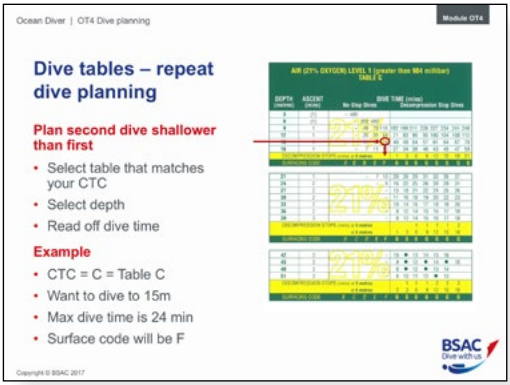
Divers surface with an SC of E and want to dive again in five hours. What will their CTC be for planning the next dive?

- **SC = E**
  Enter the table in the left-hand column by finding the row for SC = E.
- **Surface interval = 5 hours**
  As the surface interval from surfacing to the planned start time of the next dive is five hours move along the row to the five-hour point indicated along the top of the table and read down.
- **New CTC = B**
  The table indicates that the new CTC is B and so table B should be used for planning the next dive.

Dive tables – repeat dive planning

Plan second dive shallower than first

Planning a second dive to be shallower than the first will allow a longer dive time for the second dive. It is considered good diving practice to do this.



- **Select table that matches your CTC**
  Choose the appropriate table for your current tissue code.

- **Select depth**
  Look down the left hand side of the table and select your desired maximum depth. Remember that Ocean Divers are limited to a maximum of 20m, and that your second dive should be shallower than the first.
- **Read off dive time**
  Move across the table to right-hand side of the white area to read off the maximum dive time allowed for an Ocean Diver. And the scroll down to obtain the surfacing code for the dive.
  Note: Ocean Divers should take extreme care not to go into the green zone, as such dives will require mandatory decompression stops.

Example

After a surface interval, divers calculate that they have a CTC of C.

- **CTC = C = Table C**
- **Want to dive to 15m**
- **Max dive time is 24 min**
- **Surface code will be F**

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Dive instruments

To dive a plan made using tables you need

- **Depth gauge**
  A depth gauge is required to monitor depth against the plan and to ensure that you do not exceed the planned maximum depth.
- **Watch**
  A dive watch is required to monitor time against the plan and to ensure that you do not exceed the planned time.
- **Dive slate**
  A reminder of the planned maximum depth and time can be recorded on a dive slate and taken on the dive. The slate will also allow deeper/longer plans to be recorded in case either limit is inadvertently exceeded.
- **Gas analyser (nitrox mixes)**
  It is important to know exactly what gas you will be breathing. An oxygen analyser should be available to confirm the nitrox content of the breathing gas in the cylinder to be used on the dive.

Plan the dive and dive the plan

Having spent time planning a safe dive, using the tables to minimise risks, it is important to stick to the plan. It can be very tempting to be drawn deeper by something interesting or be distracted and stay longer. It is vital to pay close attention to ensure that this doesn't happen.

Dive computers

Wrist-mounted dive computers run theoretical mathematical models of the on and off-gassing of body tissues to calculate decompression requirements. There are many makes and models of dive computers available, ranging from small units no bigger than diving watches to units with much bigger screens. Some can be mounted in a console along with other dive instruments such as pressure gauge and diving compass.

Computer functions

- **Calculate nitrogen loading**
  On a dive, dive computers continuously measure depth and dive time using a pressure sensor and timer (equivalent to the depth gauge and watch used when diving using tables) and they calculate the nitrogen loading of the diver in real time.
- **Provide planning information (depth and time)**
  After a dive, computers will give planning information for future dives and some will run a simulation of a planned dive.
- **Allow personal risk settings**
  Computers often have the ability to add extra conservatism to the mathematical models by way of personal risk settings. It is important to carefully read the computer's instruction manual and understand when these should be used and what effect they will have.

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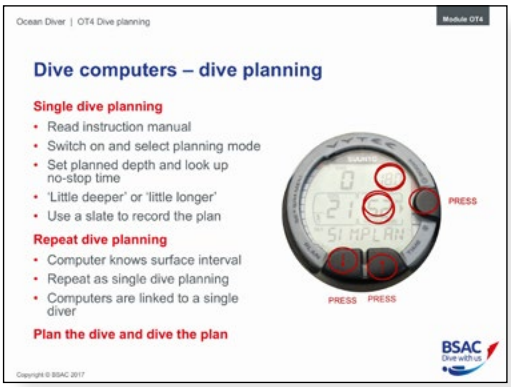
- **Record depth, time and temperature**
  Computers will continuously record and display depth, time and usually temperature.
- **Give audible and screen warnings**
  Computers will also deliver warnings, both visual and audible, when set limits (depth, dive time, remaining no-stop time, ascent rate) are either approaching or violated. The limits can often be set by the user.
- **Log previous dives**
  Computers have a logbook function that can be interrogated after diving to see depths and times of previous dives. Some will display a graph or replay depth against time of previous dives. Nearly all can be connected to a personal computer to download dive log data.

Dive computers – dive planning

Reinforce that it is important that dives are still planned even when you are diving using a dive computer.



Single dive planning

- **Read instruction manual**
  It is very important that the user manual is read and understood before you dive with a new/different computer. This is to ensure that you know how it works.

- **Switch on and select planning mode**
  The dive computer should be switched on and the planning mode should be selected.
- **Set planned depth and look up no-stop time**
  Either the planned depth should be entered and the maximum no-stop time viewed, or the planning mode should be watched as it scrolls through depths and maximum no-stop times.
- **'Little deeper' or 'little longer'**
  As well as the planned depth/no-stop time, a plan which is a 'little deeper' and a 'little longer' should be noted.
- **Use a slate to record the plan**
  All of these dive depths and times should be recorded clearly on a slate, which is then taken on the dive in case the computer should fail.

Repeat dive planning

As the computer knows the residual nitrogen loading from previous dives, repeat dive planning follows a similar process to that used for the first dive.

- **Computer knows surface interval**
  As we know, off gassing takes place during a surface interval and the longer the surface interval the closer the body gets to its 'normal' state. The dive computer continues to work during the surface interval applying this surface time to its mathematical models.
- **Repeat as single dive planning**
  Planning for a repeat dive follows exactly the same process as planning for a single dive (as described earlier). Remember that planning a second dive to be shallower than the first will allow a longer dive time for the second dive and is considered good practice.

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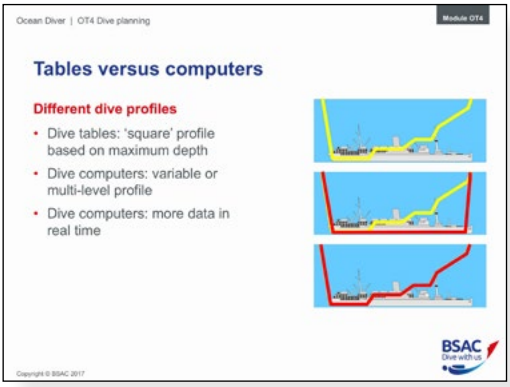
- **Computers are linked to a single diver**
  They should not be shared during a series of dives.

Plan the dive and dive the plan

Whether using tables or computers the dive must be pre-planned and depth and time must be adhered to.

Tables versus computers

For Ocean Diver students' early diving, the main difference between planning with tables or dive computers will be the different no-stop times given. The differences arise from the different dive profiles that tables and computers use for the same dive.



Different dive profiles

A dive profile is a simple tracking line of depth against time and is used as a simple way for divers to record dives in their logbooks.

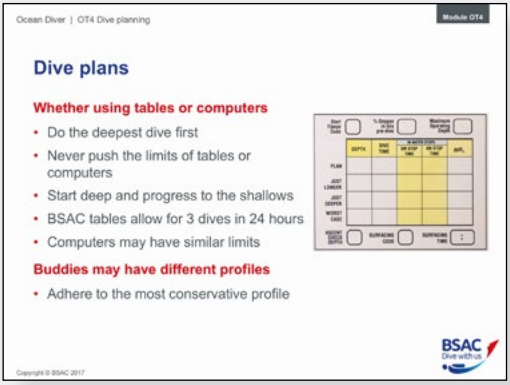
For example, on this wreck dive, the stern of a wreck has been chosen as the deepest part of the dive, the divers will then move up the wreck to shallower depths before the final ascent.

- **Dive tables: 'square' profile based on maximum depth**
  Dive table calculations assume that the diver remains at the maximum depth throughout the dive. There is no allowance for ascending to shallower levels and reducing nitrogen levels. All timings are based on what is called a square profile.

- **Dive computers: variable or multi-level profile**
  Dive computers continuously update their calculations based on the actual depth of the diver and the time spent at all levels throughout the dive.
  This means that a computer uses a variable or multi-level depth profile.
- **Dive computers: more data in real time**
  Computers continuously track the depth of the diver throughout the dive as well as the time spent at all levels throughout the dive. Computers continuously update the theoretical nitrogen absorption in each of the body tissue compartments for the actual dive undertaken. With the continuously updated information the computer-generated no-stop time will differ from the square table profile. It will be more generous than the dive table square profile if time is spent shallower than the maximum depth reached.

Dive plans

Whether using tables or computers, a dive must be preplanned and depth and time must be adhered to.



Whether using tables or computers

There are a few simple general planning rules that should be adhered to when planning dives using tables or computers.

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- **Do the deepest dive first**
  In a series of dives, doing the deepest dive first will maximise the no-stop time underwater.
- **Never push the limits of tables or computers**
  Individual susceptibility to DCI can vary due to age, fitness levels, and other factors. So it is sensible to leave some margin and not assume that it is always safe to dive to the limits of the theoretical models.
- **Start deep and progress to the shallows**
  It is generally a good plan to reach the maximum depth planned for the dive early on and spend the dive gradually progressing shallower. This approach helps to minimise the body's nitrogen loading.
- **BSAC tables allow for 3 dives in 24 hours**
  Do not dive more than three times in 24 hours when using the BSAC tables.
- **Computers may have a similar limit**
  Read the instructions for a dive computer as it may have a similar restriction.

Buddies may have different profiles

Where there is a mix of table and computer use in a buddy pair, the maximum dive times allowed and recommended ascent rates will differ. This can also happen with different brands of computer, or if one of the buddies has carried out another dive earlier in the day.

- **Adhere to the most conservative profile**
  In these scenarios the shortest dive time and the slowest ascent rate offered by the tables or computer should be followed as the most conservative.

Limitations of tables and computers

Tables and computers

Both tables and dive computers use calculations based on theoretical tissue models to generate safe dive times. They cannot accurately reflect the real tissues of the diver using them.

- **Minimise risk of DCI but not infallible**
  The models developed for both tables and computers minimise the risks of DCI but are not infallible due to the theoretical nature of the modelling.

DCI risk factors

DCI can happen even when diving within the tables or computer parameters as other factors can affect a diver's predisposition to DCI.

- **Cold**
  Avoid getting cold as this may cause the diver to be outside the parameters set for the tissue models.
- **Alcohol/drugs**
  Do not dive under the influence of alcohol or drugs or with a hangover. The effects of alcohol, for example, interfere with clear thinking so more mistakes may be made. Alcohol also dehydrates the body.
- **Poor buoyancy control**
  Poor buoyancy control may prevent you from descending or

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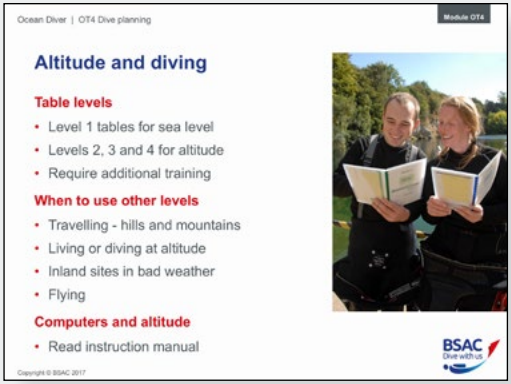
ascending at the appropriate rates to stay within parameters. It may also prevent you from stopping at an ascent check depth to confirm a suitable dive time limit has been met against the plan.

- **'Saw-tooth' profiles**
  Avoid saw-tooth profiles – with ups and downs of more than six metres during a dive – as these may compromise the mathematical calculations of both tables and computers.

Individual susceptibility

- **Fitness**
  Personal fitness for diving is always a good thing.
- **Exertion**
  Avoid excessive exercise before, during and after diving as it can increase the risk of DCI.
- **Pre-dispositions**
  Individuals may have medical pre-dispositions increasing their risk of DCI. These factors would normally be detected as part of the diving-related medical screening processes and diving medical practitioners may advise individuals to dive with more conservative use of tables/computers. Many computers allow divers to add extra conservativeness to their model.

Altitude and diving



Another important concept to explain to students is the existence of the levels (one, two, three and four) in the BSAC tables. They reflect different atmospheric pressure ranges, shown in millibars, getting progressively lower in levels two, three and four. On and off-gassing is affected by a reduction in atmospheric pressure and the different table levels take account of this.

Table levels

Each level table has an atmospheric pressure range that applies to it.

- **Level 1 tables for sea level diving**
  Level one tables are suitable for use at sea level where the atmospheric pressure is greater than 984 millibar. This range is marked on table header.
- **Levels 2, 3 and 4 for altitude**
  There are table sets for each of the levels that represent a higher altitude and lower atmospheric pressure range. The tables also come with a transfer table should a diver need to move between levels.
- **Require additional training**
  Training on how to use these tables can be obtained through a separate module where required.

When to use other levels

The altitude levels and transfer tables will need to be taken into account when:

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- **Travelling - hills and mountains**
  Travelling to and from dive sites over high hills or mountains will result in a change in altitude.
- **Living or diving at altitude**
- **Inland sites and bad weather**
  Diving sites at sea level when a low-pressure weather system is present. This might mean planning dives on level two tables.
- **Flying**
  In pressurised aircraft the ambient pressure is reduced compared with atmospheric pressure at sea level. Standard commercial aircraft cabins during flight would be at a pressure equivalent to level four.
  Note: When branches/centres need to use the altitude and transfer tables for their normal diving activities then the altitude table module should be taught.

Computers and altitude

- **Read instruction manual**
  To understand how a particular dive computer should be used if you are diving at altitude, students need to consult the instruction manual.

Flying and diving

Divers often fly to different dive destinations around the world. Flying affects dive planning, because you experience different

ambient pressures during the flight. So, when planning a trip itinerary you will need to time the fights and the beginning and end of the diving to avoid any potential problems.

Flying before diving

- **Tissues off-gas**
  All passengers' tissues off-gas while flying and, depending on the length of the flight, can take some time to return to their normal nitrogen levels on landing.
  Diving after flying may seem a good idea as the nitrogen loading may be reduced but flying has other effects on the body.
- **Stresses of flying**
  Most people will suffer from stress of some kind during air travel, such as disorientation, tiredness, nervousness, irritability and dehydration. This can increase the risk of DCI so divers should not dive until they feel physically and mentally rested following a long flight.
- **Recover before diving - 10 hours' minimum**
  A good interval should be allowed to elapse between flying and diving. Unless a surface interval of 10 hours has elapsed between a short flight of less than 90 minutes in a pressurised aircraft and diving, you will need to use table B.

Flying after diving

- **Increased level of off-gassing – DCI**
  Tissues continue to off-gas after a dive; tables or computers generally work to get a diver safely out of the water as fast as possible, with the majority of nitrogen desaturation back to normal levels taking place on the surface after a dive. Even in a pressurised aircraft, the reduced ambient pressure will cause any existing bubbles in the diver's body to expand or new bubbles to form. This greatly increases the risk of DCI.

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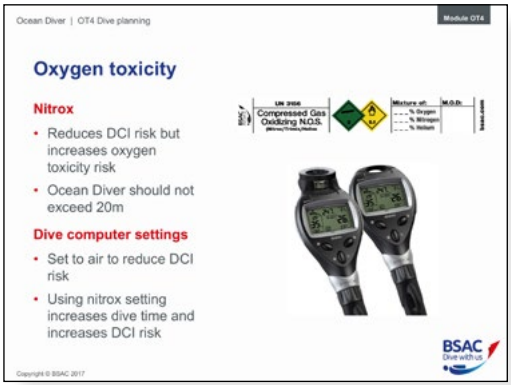
- **Stresses of flying**
  Again, the stresses of air travel can have an effect on the body.
- **Ensure long surface interval between last dive and flying**
  A good surface interval must elapse before flying. It is recommended that divers do not fly within 24 hours of their last dive.
- **Tables require CTC of A or B**
  If using the BSAC tables for planning, then your CTC needs to have returned to at least a B before flying in a pressurised aircraft and A for an unpressurised (small) aircraft.
- **Computers – follow instructions**
  If using a dive computer for planning, then it is important to understand the no-fly warnings on the particular type being used. The instruction manual will explain the flying restrictions associated with the decompression model used.

Oxygen toxicity



Oxygen can be toxic when breathed at high partial pressures. Oxygen toxicity determines the maximum operating depth (MOD) for a particular nitrox mix, but staying within that MOD does not guarantee freedom from oxygen toxicity. The length of time that oxygen is breathed at high partial pressures is also a major consideration. (Oxygen toxicity was introduced in OT2).

Nitrox

- **Reduces DCI risk but increases oxygen toxicity risk**
  Nitrox mixes, because they generally contain a higher percentage of oxygen, contain a correspondingly lower percentage of nitrogen. This helps to reduce nitrogen absorption but increases the risk of oxygen toxicity.
- **Ocean Diver should not exceed 20m**
  Ocean Divers are limited to a maximum depth of 20m, which must not be exceeded. This minimises the risk of oxygen toxicity when using the nitrox mixes containing up to 36 per cent oxygen.

Dive computer settings

Nitrox dive computers can be set with the mix of gas being used.

- **Set to air to reduced DCI risk**
  By leaving a nitrox computer set to air (21 per cent) and diving using a nitrox mix, the computer will always think more nitrogen has been absorbed and therefore this reduces the risk of DCI.
- **Using nitrox setting increases dive time and increases DCI risk**
  By setting the dive computer to the nitrox mix being breathed the computer model will allow an increased dive time when compared with the air setting, but there will no longer be a safety margin reducing the risk of DCI.

Go back

Gas consumption planning

Gas planning

- **Ensure sufficient gas for the dive**
  You must ensure that you have enough breathing gas for the planned dive.
- **Ensure good reserve**
  Not only should there be sufficient gas to complete the dive but you should plan for an adequate reserve of gas in the cylinder at the surface, in case of an emergency.

Rule of thirds

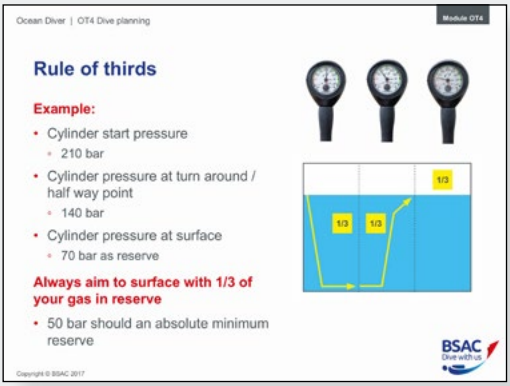
There is a simple rule that can be used for planning and monitoring the use of the breathing gas on a dive, the rule of thirds.

- **Use one-third out**
  One-third of your breathing gas supply is used for the descent and either the first half of the dive time or to determine your turn-around point.
- **Use one-third return**
  The next third of your breathing gas supply is used for the second half of the dive, or the return leg, including the ascent.
- **Keep one-third in reserve**
  Following this rule, you should arrive on the surface with one-third of your breathing gas remaining. This has been kept as a sufficiently large emergency reserve in case of an incident happening towards the end of your dive.

Rule of thirds

Example

Using the rule of thirds is straightforward.



- **Cylinder start pressure**
  Take a cylinder filled to 210 bar (the size of the cylinder is not relevant), divide 210 bar by three to find what one-third is = 70 bar.
- **Cylinder pressure at turnaround/half way point**
  210 bar – 70 bar = 140 bar, reaching this will determine the turnaround or halfway point of the dive.
- **Cylinder pressure at surface**
  140 bar -70 bar = 70 bar reserve, which you will need to have on surfacing. So you will need to begin surfacing with slightly more gas than this.

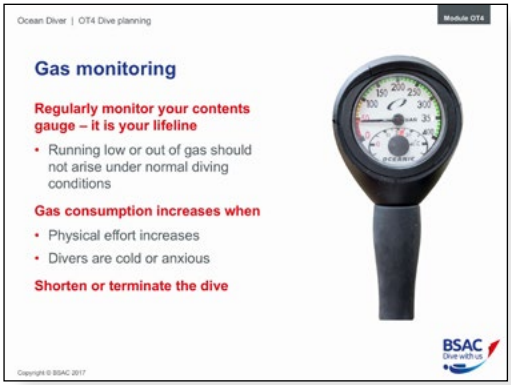
Always aim to surface with one-third of your gas in reserve

- **50 bar should be an absolute minimum reserve**
  Using the rule of thirds, the instructor can give other examples to students.

Go back

Gas monitoring

Gas should be monitored during a dive to ensure that you are within your gas plan and can continue to follow the dive plan.



Regularly monitor your contents gauge – it is your lifeline

- **Running low or out of gas should not arise under normal diving conditions**
  With regular monitoring a diver should not run low or out of gas.

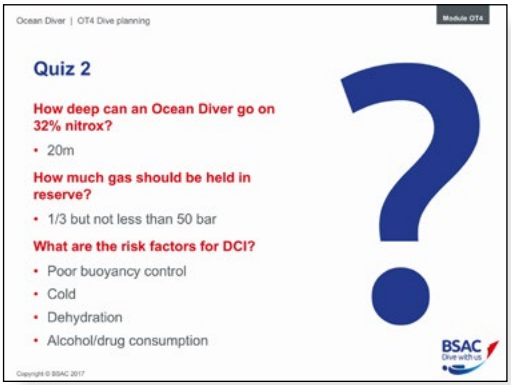
Gas consumption increases when

- **Physical effort increases**
- **Divers are cold or anxious**

Shorten or terminate the dive

The dive should be shortened or ended early if gas consumption is higher than planned.

Quiz 2



How deep can an Ocean Diver go on 32% nitrox?

- **20m**

How much gas should be

held in reserve?

- 1/3 but not less than 50 bar

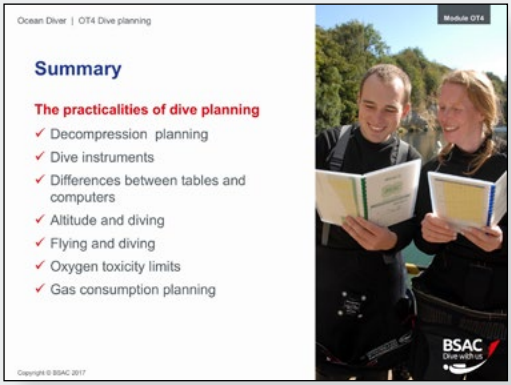
What are the risk factors for DCI?

- Poor buoyancy control
- Cold
- Alcohol/drug consumption
- Saw-tooth dive profile

Summary

The practicalities of dive planning

- Decompression planning
- Dive instruments
- Differences between tables and computers
- Altitude and diving
- Flying and diving
- Oxygen toxicity limits
- Gas consumption planning



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Document change record

Date published	Document Version Number	Pages(s) effected	Discription of changes	Author
21/8/2017	v5.0			
15/12/2022	v5.1	All	Convert to phone friendly format	Adrian Collier
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