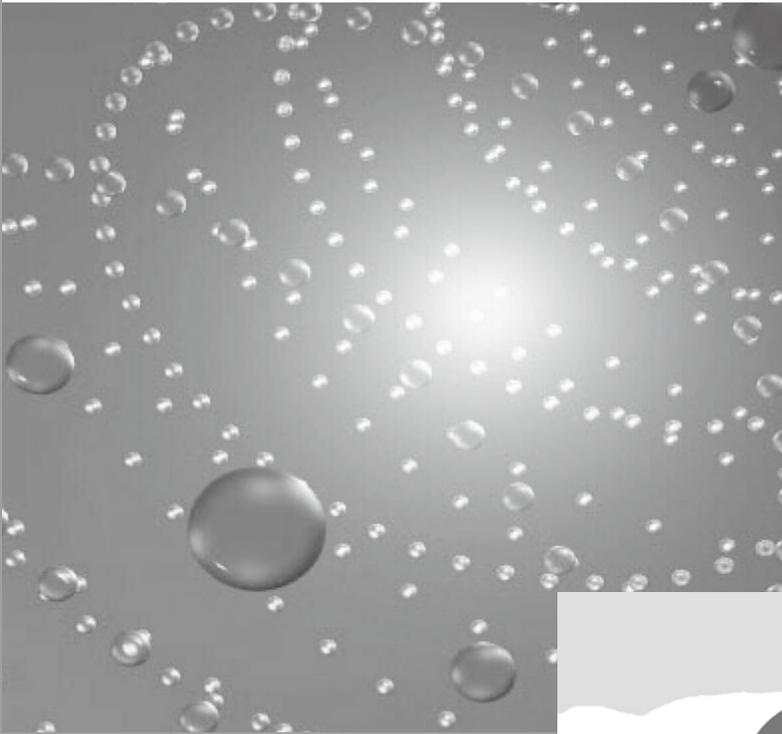


Plan and Rules



●●● Plan and Rules ●●●

When diving, the most important consideration is safety. To safely dive, we must plan the dive in advance, and dive according to the plan. So, which points must we be careful to include in our planning?



Dive Site Selection

When we say suitable dive site, we mean suitable for divers of a certain level, be they beginner or advanced. Further, on dive day, wind direction, ocean current, and such may affect the location to where it cannot be used as a dive site. For this reason, it is always good to plan dives at a minimum of two locations on any given day.

In the case of beginner divers, in consultation with your instructor or guide, it is important to match your skills with those required for the dive when choosing the dive site.

To improve your skills in order to challenge the more difficult dives available is a lot of fun!



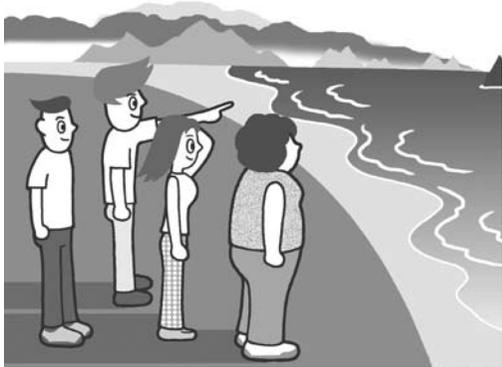
Leader and Members

The dive leader takes into consideration the diving ability of all members of a group when planning a dive and choosing the dive site. When diving among a group of friends, it is important to choose the dive leader by using comprehensive thinking. To help develop your diving leadership skills, it is recommended you dive with both divers and instructors for a broad base of experience.



Buddy System

By buddy system we mean diving in groups of 2 or 3, never alone. Your buddy will carry out (as you should for your buddy) a pre-dive equipment check. Also, as you dive together, you have a companion to assist with safety. If one person is diving alone, such as retrieving dropped equipment, the buddy needs to be equipped and on standby at the water's surface.



Diving alone is prohibited.

Equipment

To prevent forgotten equipment, make a packing list and check it accurately. To prevent a cancelled dive due to malfunctioning equipment or damage, it is important to make maintenance a regular part of your diving.



Let's prevent forgotten items.



Let's keep our equipment in best condition.

Health Maintenance

In order to keep our bodies in their best physical condition, regular exercise like jogging and swimming to maintain strength and cardiovascular health is important. The night before diving, please get adequate sleep and avoid heavy drinking - being hungover does not mix well with diving. When your body is in poor condition, such as having caught a cold, you are not able to dive.



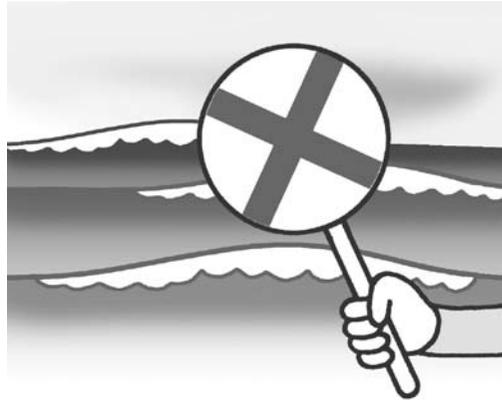
Refresher Course

When you've forgotten your diving skills or knowledge, it is impossible to dive safely and comfortably. If it's been a long time since you last dove, confidence may be a concern, so in-water panic is a possibility. In situations like these, it's always a good idea to do a refresher course before resuming regular diving.



Cancellation and Modification

On dive day, it could be necessary to modify the dive plan because of weather and ocean condition changes. For the consideration of safe diving, cancellation or modification is necessary whenever danger is an issue.



When ocean conditions are poor, cancel the dive.

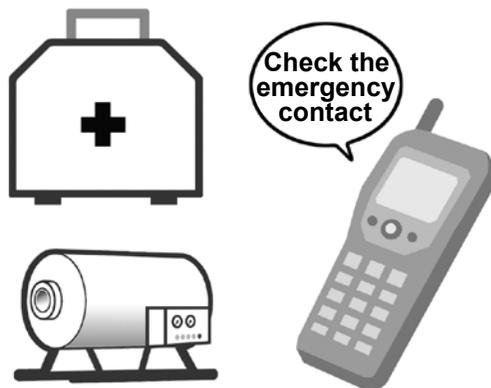
Emergency Plan

To deal with emergencies that can occur during your dive, we plan for them in advance. For example, in the case of a missing diver, after an initial 360 degree search, we generally return to the surface, ensure our buoyancy, and wait for the other group members rather than search around underwater. As well, we prepare emergency contact information and equipment and familiarize ourselves with local emergency services.

We should always have a first aid kit at the ready.



Let's discuss an emergency plan before every dive.



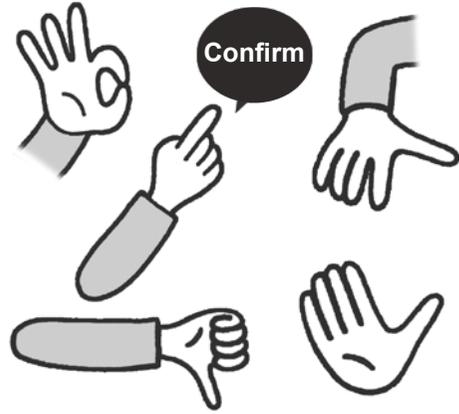
First aid kit and emergency communication methods

Communication

Let's memorize all these key hand signals.

So that your dive buddy can understand you easily, indicate clearly and use big gestures.

Also, make sure to review key hand signals with all members of the group before starting your dive. Remember, it is impossible to use spoken communication underwater, so there is a tradition of using simple gestures to communicate. But for complicated subject matter, underwater notepads or slates are very useful.



Hand signals



OK



OK(from a distant location)



I don't understand



I have a problem

●●● Plan and Rules ●●●



Descend



Ascend



Me



Wait



Out of air

●●●Plan and Rules●●●



Low on air



Give me air
(give me your octopus)



Ear equalization



Calm down



Help

(Tell me)
what's your remaining
air pressure?



My remaining air
pressure is 70 bar.

Air Consumption Ratio

Once you know how much air you breathe in a one-minute period, it is possible to calculate how long a dive you can complete. You can also see on a minute-by-minute basis the strong effects of pressure on the air consumption ratio.

1. Starting pressure – ending pressure
= total air consumption (by pressure)
2. Air consumption pressure x tank volume
= total air consumption (by volume)
3. Total air consumption (by volume) ÷ diving time (by minutes)
= total air consumption (by volume)/minute
4. Total air consumption (by volume)/minute ÷ average depth pressure
= air consumption ratio

Practical Dive Time

Since we are limited to our tank's capacity, our dive time is also limited. It is important to calculate your air consumption ratio, since it varies widely - advanced divers' air consumption ratio is about 20L/minute, while beginners average about 40L/minute. Remember, we leave 50 bar reserve in our tank at exiting for safety. As a rule, you should use the following for calculating your air consumption ratio. We use litre (L) for tank volume; and we use bar to denote pressure.

Practical Dive Time Calculation

Volume capacity of tank used x (starting tank pressure – 50)
÷ 40 ÷ maximum depth

Dive Table

Let's remember "the decompression sickness " that you have learned in a section of the underwater physiology. Nitrogen that is absorbed in the body during diving is released in the case of surfacing.

But, if a large amount of nitrogen is absorbed and then the diver surfaces too quickly, the excess nitrogen forms bubbles in the body.

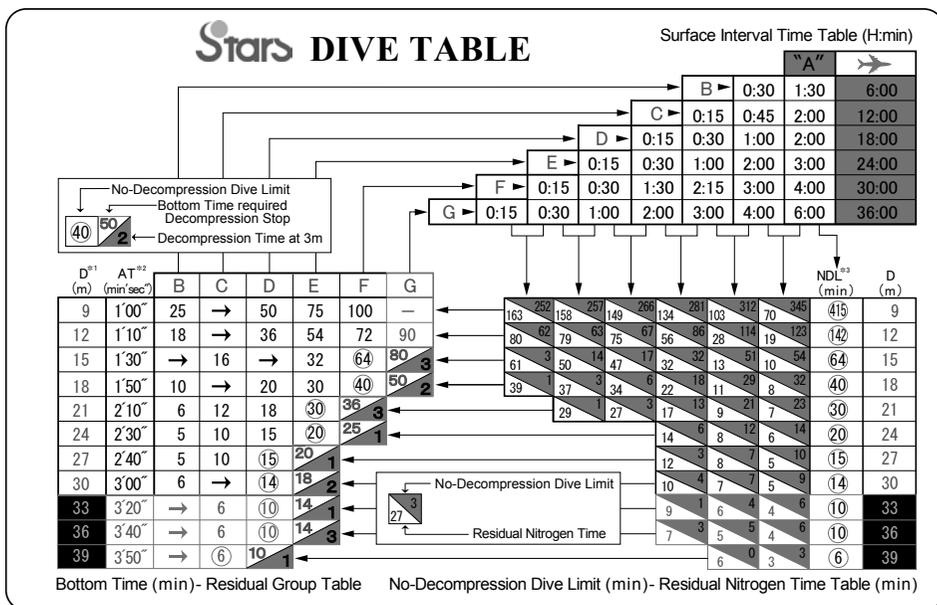
Once these bubbles enter the bloodstream, the disruptions they cause are called decompression sickness (DCS).

A list examining Diving Depth / Bottom Time of a safe range to prevent Decompression Sickness is called Dive Table.

We should not dive with the fear to be Decompression Sickness.

Therefore, we should use a Dive Table to investigate next things and make diving plans.

- No-decompression Dive Limit for the dive.
- Required Surface Interval Time for the next dive.



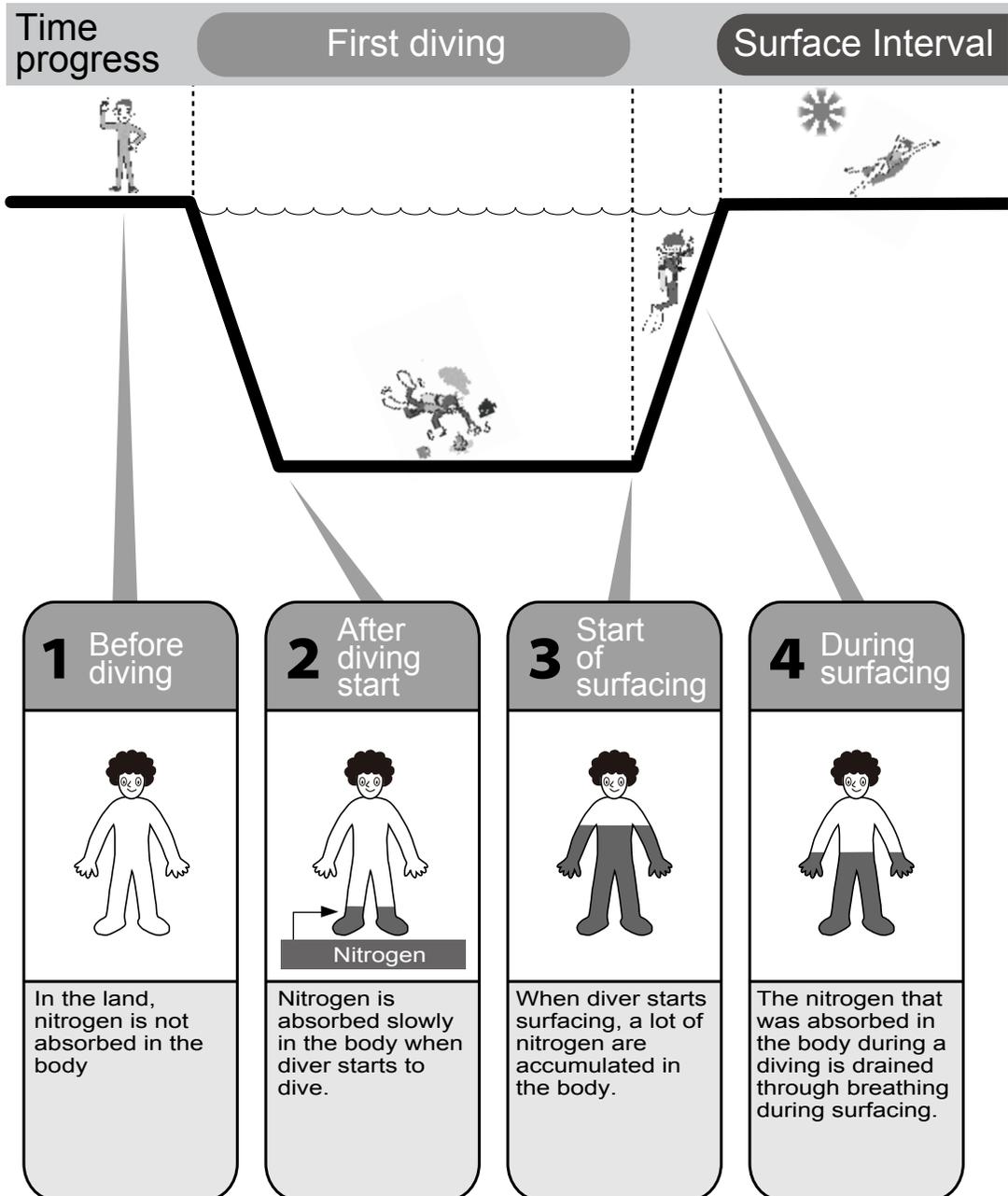
Dive Table

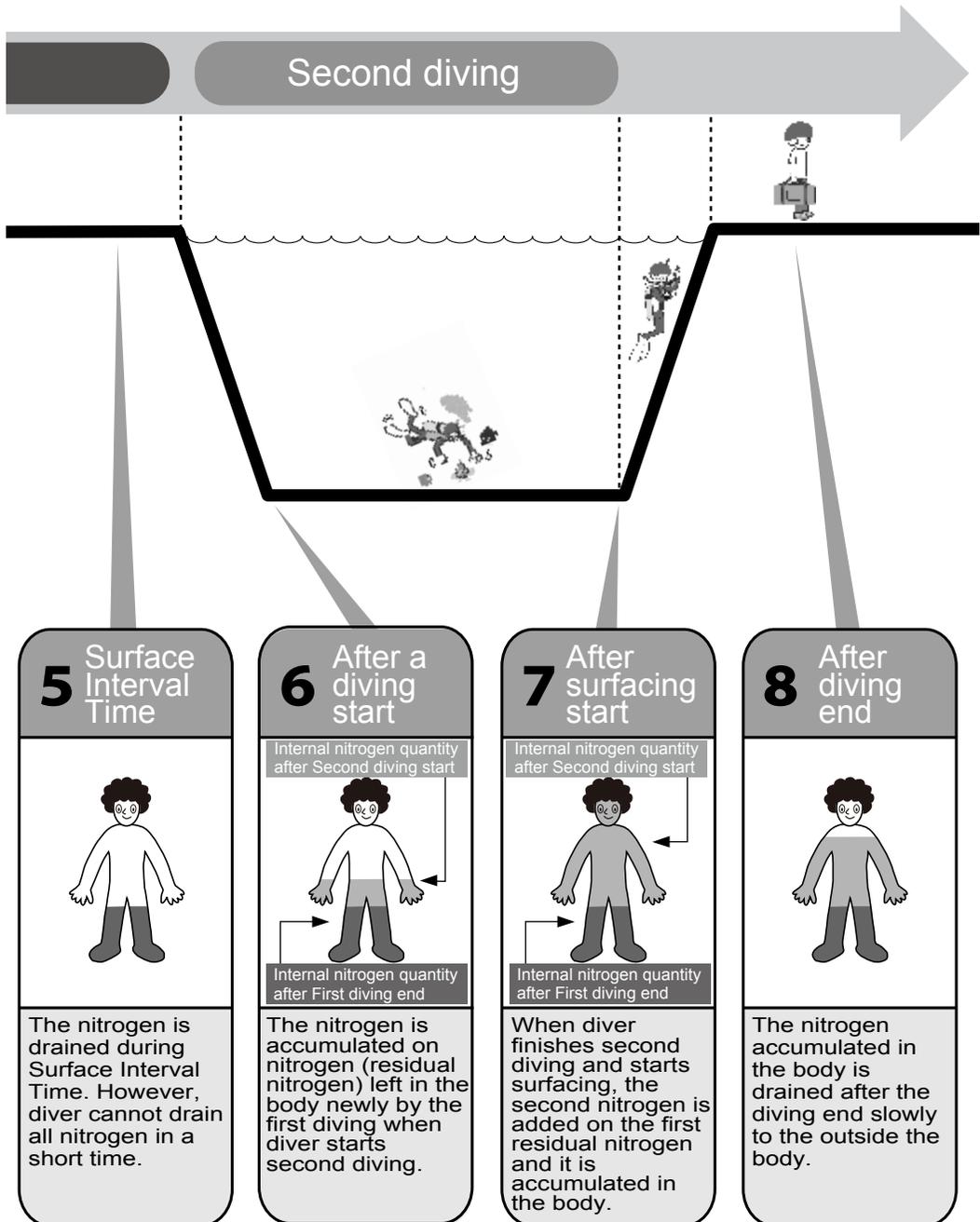
●●● Plan and Rules ●●●

● Change of the internal nitrogen quantity

When a diver breathes underwater, the nitrogen is absorbed slowly in the body. When a diver starts surfacing, the nitrogen absorbed in the body is drained through breathing slowly to the outside of the body.

The lower figure expressed Change of the internal nitrogen quantity in a day.

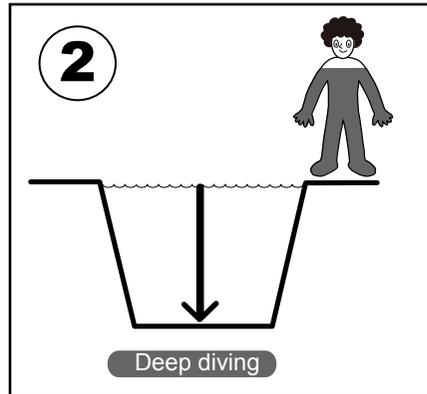
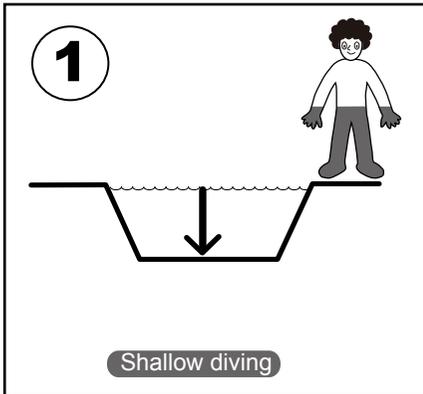




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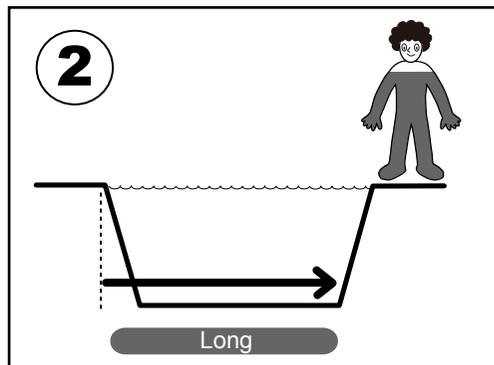
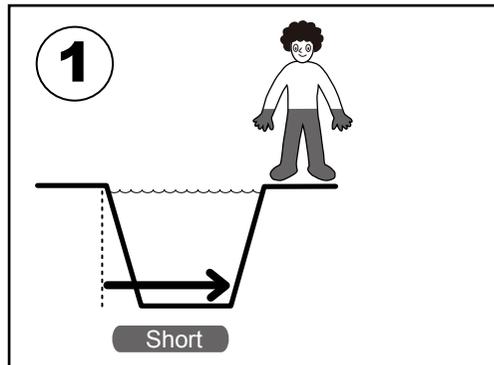
● Relationship between diving depth and accumulation of nitrogen and accumulation of nitrogen

The accumulation of nitrogen after deep diving (1) is more than the one after shallow diving (2).



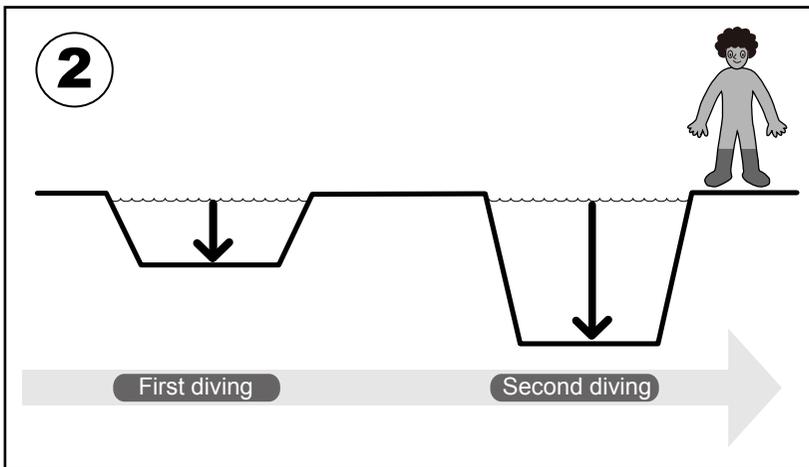
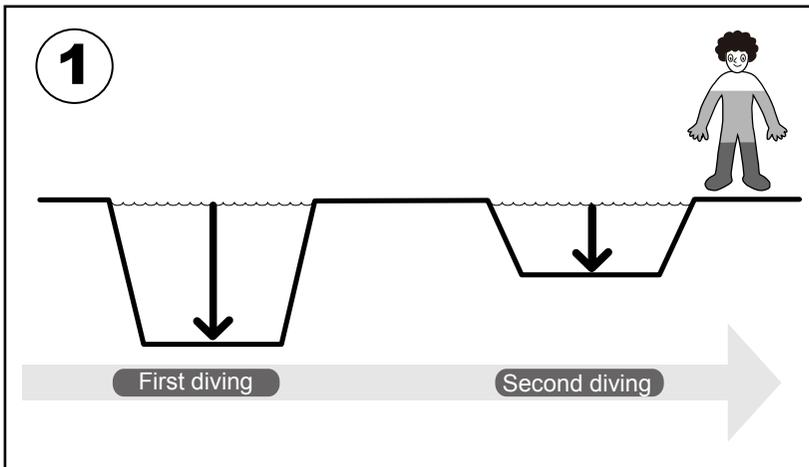
● Relationship between Bottom Time and Accumulation of Nitrogen

The accumulation of nitrogen after the long Bottom Time (2) is more than the one after the short Bottom Time (1).



● **The relationship between the diving depth and the accumulation of nitrogen**

The quantity of nitrogen that diver has (1) in the first diving depth is deeper than the second diving depth is more than the one that diver has (2) in the first diving is shallow and the second diving depth is deep.



Plan your diving schedule that is Second diving depth is shallower than First diving depth!

●●● Plan and Rules ●●●

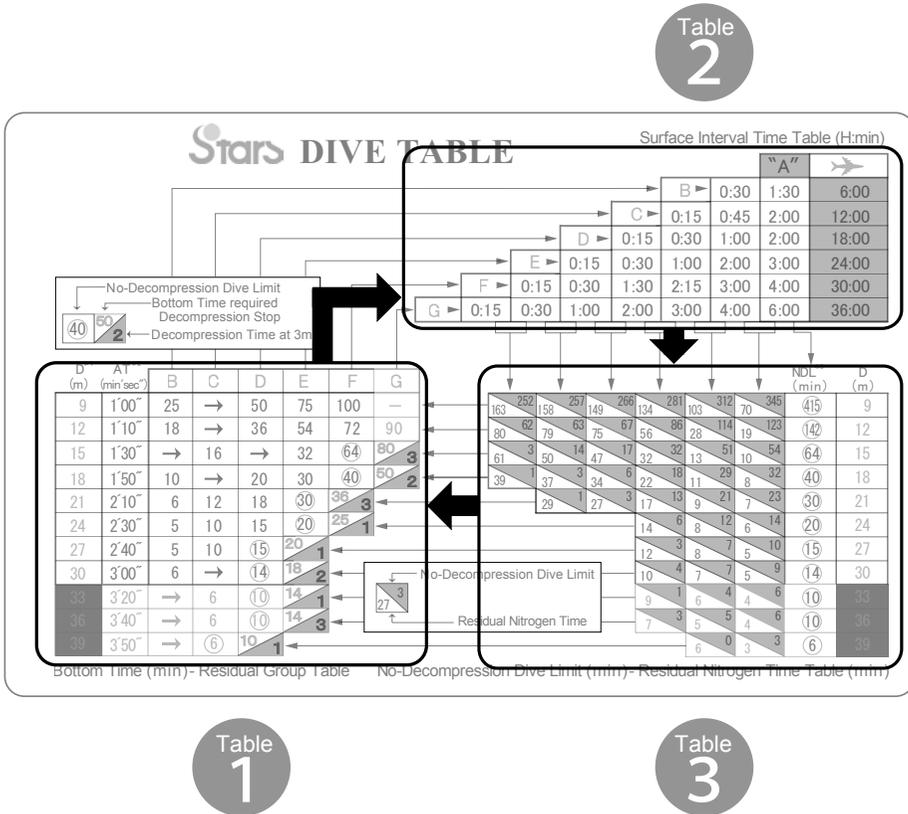
● Constitution of the Dive Table

Dive Table consists of three lists.

[Table 1] Bottom Time – Residual Group Table

[Table 2] Surface Interval Time Table

[Table 3] A No-decompression Dive Limit - Residual Nitrogen Time Table



■ [Table 1] The usage of Bottom Time – Residual Group Table

[Table 1] In Bottom Time – Residual Group Table, you can examine three information mainly.

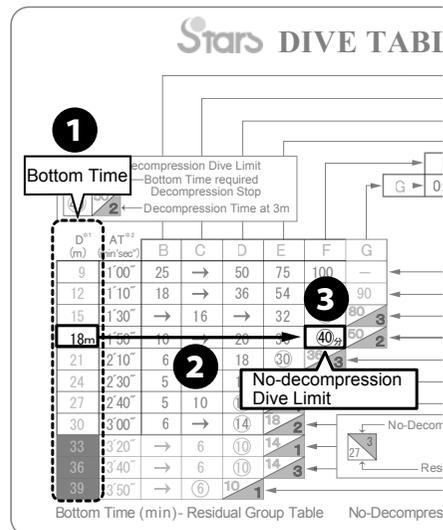
1. How long are you able to dive for your planning depth?
2. How much is the quantity of nitrogen in body at the time of first diving end?
3. How long is Surfacing Time from each depth for safety?

● You are able to examine the No-decompression Dive Limit

You are able to examine the time that you are able to stay at your planning depth.

🗨️ How long is your No-decompression Dive Limit in case of your planning depth is 18m?

- (1) You look for 18m from diving depth (D).
- (2) You trace 18m aside and look for a circled number.
- (3) In case of your planning depth is 18m, your No-decompression Dive Limit is 40 minutes.





- When there is not the same number about Diving Depth and Bottom Time, you should use the next big number for safety.
- The diving at the maximum depth that is shallower than 9m should be considered as the diving at the 9m deep.

[The Dive Table term]

■ **Diving depth**
The maximum depth for one diving

■ **Bottom Time**
The time between the start of descent and the start of surfacing
(The time for Safety Stop and Decompression Stop is not involved)

■ **No-decompression Dive Limit**
The maximum Bottom Time for that you need not decompression stops.

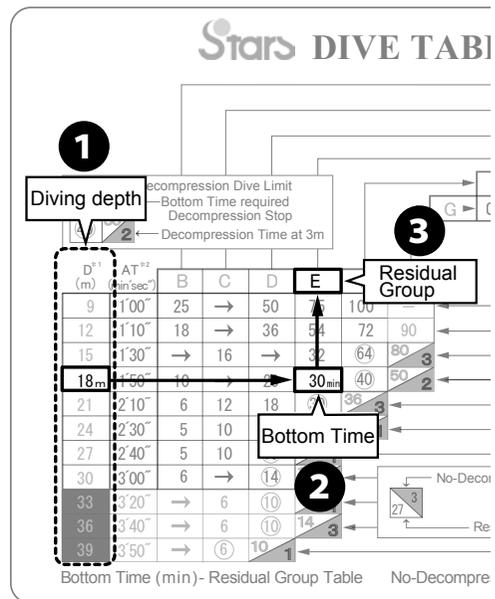
●●● Plan and Rules ●●●

● How to examine Residual Group at the end of First diving?

At the end of the first diving, you should examine Residual Group to know the quantity of internal nitrogen.

Q. Which is the Residual Group in case of the Bottom Time is 30 minutes at 18m?

- (1) You trace depth (D) 18m aside.
- (2) You look for Bottom Time 30 minutes. And then, you trace it in above.
- (3) The Residual Group is E.



When you stayed 30 minutes at 18m, the quantity of internal nitrogen is E level.

(As the alphabet nears G, the quantity of internal nitrogen increases.)

[The Dive Table term]

■ Residual Group

The level of the residual nitrogen is showed in the alphabet. As it goes to G nearly from A, the quantity of residual nitrogen becomes high-level.

■ Residual Group Table

You are able to know the level (the alphabet) of residual nitrogen after one diving end.

● How to examine the Surfacing Time?

You are able to examine Surfacing Time for arriving at the surface safely while draining the nitrogen that is collected in the body during a diving.

Q How long is the Surfacing Time from 18m deep?

- (1) You look for diving depth (D) 18m.
- (2) The row of the right neighbor (AT) becomes the Surfacing Time.

The Surfacing Time from 18m deep is 1 minute 50 seconds.

Stars DIVE TABLE

D (m)	AT ⁰² (min:sec)	B	C	D	E	F	G
9	1'00"	25	→	50	75	100	—
12	1'10"	18	→	36	54	72	90
15	1'30"	16	→	32	48	64	80
18	1'50"	14	→	28	42	56	70
21	2'10"	12	→	24	36	48	60
24	2'30"	10	→	20	30	40	50
27	2'40"	8	→	16	24	32	40
30	3'00"	6	→	12	18	24	30
33	3'20"	6	→	10	14	18	22
36	3'40"	6	→	8	10	14	18
39	3'50"	6	→	6	8	10	12

Bottom Time (min) - Residual Group Table No-Decompress



- The surfacing speed is equal to or less than 10m a minute for all kinds of diving. For this aim, you should not overtake smallest bubbles in bubble that you exhaust.
- The Surfacing Time is not included in Bottom Time.



■ [Table 2] How to use Surface Interval Time Table.

● Nitrogen Disappearance Time "A"

This is the period at surface between dives. The nitrogen that is collected in the body at the first diving is drained through breathing during surface slowly into the outside of the body.

[Table 2] "A" of the surface of Surface Interval Time Table is Nitrogen Disappearance Time.

Nitrogen Disappearance Time is the time that is not enough time for us to drain nitrogen from our body completely.

But, nitrogen is drained from our body to the level that does not influence the next diving.

Therefore, you are able to use [Table 1] Bottom Time – Residual Group Table for next diving in the same way as the first diving if Surface Interval Time exceed Nitrogen Disappearance Time of "A".

Conversely, if Surface Interval Time does not exceed Nitrogen Disappearance Time of "A", the next diving is called repetitive diving.

For repetitive diving, pay attention to residual.

Surface Interval Time Table (H:min)

		Nitrogen Disappearance Time "A"					
		0:30	1:30	2:00	2:45	3:00	4:00
	D ▶	0:15	0:30	1:00	2:00	3:00	4:00
	E ▶	0:15	0:30	1:00	2:00	3:00	4:00
	F ▶	0:15	0:30	1:30	2:15	3:00	4:00
	G ▶	0:15	0:30	1:00	2:00	3:00	4:00

Diagram description: The table shows a grid of surface interval times. A dashed box labeled "A" highlights the top row of the grid, which corresponds to the 'Nitrogen Disappearance Time' column. Arrows point from the labels D, E, F, and G to their respective rows in the grid.

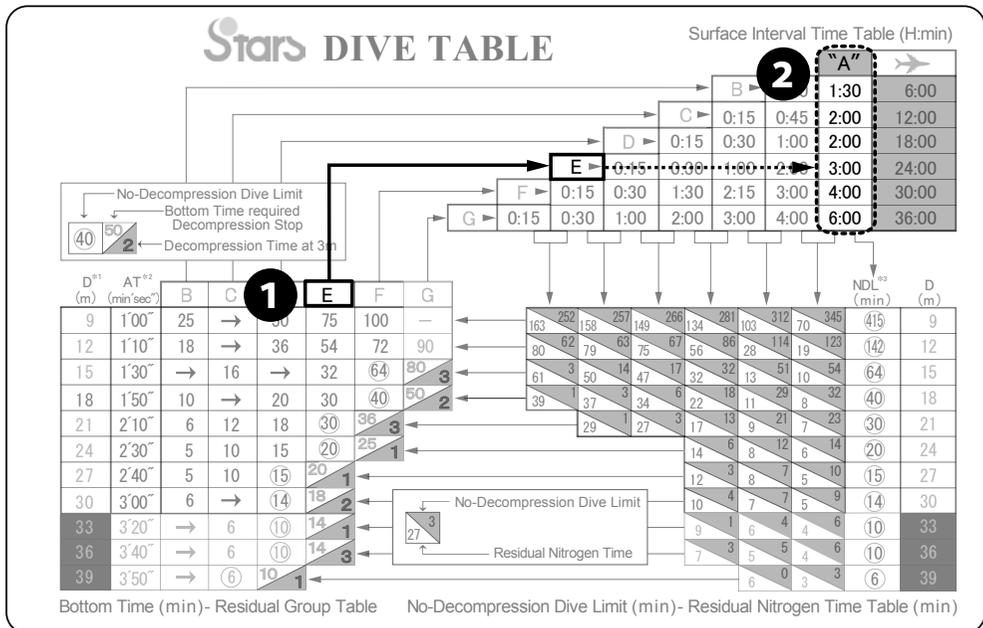
Q Which is the Nitrogen Disappearance Time for Residual Group E diver at the time of the first diving end?

(1) The Residual Group at the time of the first diving end was E.

You should trace the line and look at [Table 2] Surface Interval Time Table.

(2) You just advance aside and look at the row of "A".

Nitrogen Disappearance Time is three hours.



[The Dive Table term]

■ Surface Interval Time

This is the period spent at surface between dives.

■ Surface Interval Time Table

When time passes, the residual nitrogen level lowers. You should know a new nitrogen level for the next diving by this Table.

■ Repetitive diving

This is a dive completed within Nitrogen Disappearance Time.

●●● Plan and Rules ●●●

● How to examine required Surface Interval Time

For repetitive diving, you should know how long Surface Interval Time is necessary.

Q A diver of Residual Group E at the time of the first diving end plans the second diving of 35 minutes at 15 m in a coral reef.
How long Surface Interval Time is necessary at least?

- (1) You should look for Residual Group E at the time of the first diving end in [Table 2] Surface Interval Time Table.
- (2) You should look for 15m for the next diving in the depth (D) of [Table 3] No-decompression Dive Limit - Residual Nitrogen Time Table. You just trace aside from 15m and look for No-decompression Dive Limit that is 35 minutes or over 35 minutes and closer to 35 minutes.
- (3) The contact of the point traced No-decompression Dive Limit 51 minutes in above (1) and the point traced Residual Group E aside (2) is between 1:00 and 2:00.

If you have 1 hour Surface Interval Time at least, you can dive for 35 minutes at 15m for the second diving.

