

Guidelines for Conducting Dives of Shinkai-6500 in One-Pilot Mode

Operations Department,
Institute for Marine-Earth Exploration
and Engineering (MarE3)

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Operations Department

Guidelines for Conducting Dives of Shinkai-6500 in One-Pilot Mode

In order to establish appropriate standards for ensuring safety of crew during dives of the Shinkai-6500 with one pilot and two observers (hereinafter called one-pilot mode), these guidelines have been formulated in addition to the operation manual stipulated in the operation regulations for research vessels. The purpose of these guidelines is to support the planning by those who wish to conduct the dives in one-pilot mode.

1. Description of the terms

Pilot	Captain of Shinkai-6500 commanding dive operation
Observer	Person other than the Pilot onboard Shinkai-6500
Crew	All persons onboard Shinkai-6500
Chief Scientist	Person onboard R/V Yokosuka, responsible for researchers
Commander	Person in charge of Shinkai-6500 operations at site
Mother ship captain	Person in charge of command of operation of R/V Yokosuka

2. Requirements to be met by pilot and observers

To conduct the Shinkai-6500 dives in one-pilot mode during a survey/research cruise, following requirements must be met by pilot and observer:

(1) Requirements to be met by pilot

- 1) Pilot must have boarding history of Shinkai-6500 and details of the dive operations experienced so far. Based on this information, commander will designate the pilot.

- 2) Pilot must attend the lifesaving course organized by the Fire Department and the Fire Department Disaster Prevention Association in Japan within 3 years prior to the dive date of the survey/research cruise, and obtain a certificate of completion of lifesaving training course "Ordinary Lifesaving Course I" or higher.

(2) Requirements to be met by observer

- 1) One or both observers must have experience of 2 or more dives of Shinkai-6500, and commander has approved their understanding of the dive operation.
- 2) At the stage of making cruise implementation plan, at least 2.5 months before the cruise starts, observers must agree, sign and submit the "Confirmation Letter for Boarding Shinkai-6500" (hereinafter called "Confirmation Letter"; refer Attachment 1) to the Operations Department.
- 3) Observers must attend the lifesaving course organized by the Fire Department and the Fire Department Disaster Prevention Association in Japan, etc., and obtain a certificate of completion of the "Ordinary Lifesaving Course I" or higher, within 3 years before the dive date of the survey/research cruise. If attending a course other than that mentioned above, obtain a certificate of completion after ascertaining that it is equivalent to or higher than the "Ordinary Lifesaving Course I", and organized by a qualified person. In addition, if attending the course abroad, obtain a certificate of completion of the course based on guidelines of the International Consensus (CoSTR) of the International Liaison Committee on Resuscitation (ILCOR¹) or the official standards of relevant country (e.g., AHA-BLS (American Heart Association-Basic Life Support)).

The content of lifesaving courses received in Japan and overseas must include all 3 methods: cardiopulmonary resuscitation for adults, hemostasis, and foreign body removal.

After attending the course, submit a copy of certificate of completion to the Operations Department along with the Confirmation Letter and Boarding Application.

¹ ILCOR (<https://www.ilcor.org/>)

Submission of Confirmation Letter is required in the case of normal dives (2 pilots, 1 observer), too.

3. Emergency related items available in Shinkai-6500

The commander must maintain the following items in the cabin of shinkai-6500:

- (1) Emergency Floatation Manual, in addition to Emergency Response Manual, describing the procedure of resurfacing the Shinkai-6500 by observer, in case pilot is unable to maneuver, and what to do in case of an abnormality such as fire on board Shinkai-6500 (Reference 1)
- (2) First Aid Manual (published by Tokyo Metropolitan Govt.) describing first aid methods for treating an illness/injury (Reference 2)
- (3) Lifesaving Treatment Manual (published by Ministry of Internal Affairs and Communications) describing artificial respiration mask ² and its usage for resuscitation in case of cardiopulmonary arrest (Reference 3)

Each manual must be in both Japanese and English. During the briefing session of Shinkai-6500, the storage location of each manual and related items must be informed to the crew. The observers must be trained to operate relevant equipment of the Shinkai-6500 in case of emergency floatation.

4. Decision on conducting a dive

To conduct a dive in one-pilot mode during a survey/research cruise, following procedure must be followed:

(1) Consultation in advance

At least 2.5 months before the survey/research cruise starts, chief scientist must prepare a plan for dive in the one-pilot mode (Attachment 2), discuss the plan and dive requirements (Attachment 3) with the director of the Operations Department and commander, and obtain their approval (Attachment 4) for implementation of the dive plan.

² Using AED inside Shinkai-6500 was judged to be unsafe for crew and equipment, therefore not installed.

(2) Deliberations by the Risk Assessment Committee of the Operations Department

At the risk assessment meeting of the Operations Department, draft of implementation plan, dive plan, dive requirements, and one-pilot mode operation confirmation form (altogether hereinafter referred as "Implementation Documents") shall be deliberated to identify potential hazards, and to eliminate and/or minimize them.

(3) Deliberations by the Research Safety Committee

Implementation documents deliberated and approved by the Risk Assessment Committee of the Operations Department shall be forwarded to the Research Safety Committee for further deliberations.

(4) Deliberations in Institute for Marine-Earth Exploration and Engineering (MarE3)

Implementation documents deliberated and approved by the Research Safety Committee will be deliberated at the meeting of the Institute for Marine-Earth Exploration and Engineering (MarE3) to decide whether or not the dive be conducted.

5. Changes in dive plan

After the start of the survey/research cruise, if the dive schedule has to be changed due to weather and/or sea conditions or other unavoidable reasons, or changing from the one-pilot mode to normal mode (2 pilots, 1 observer) is required, then commander, chief scientist, and mother ship captain shall discuss the safety issues pertaining to the implementation of the dive, and the commander will make a final decision. The chief scientist will then make changes in the dive confirmation document (Attachment 3) based on the judgment of the commander, and submit it to the director of the Operations Department for approval. As a result of the discussion, if there is a change in the dive plan (e.g., content of work, dive location, observer, etc.), it is necessary to re-perform the deliberations of the Research Safety Committee and MarE3 after chairman of the Research Cruise Review Committee approves the changes.

6. Revision of the guidelines

The Operations Department shall revise these guidelines in consultation with the operations contractor, if the content of these guidelines does not meet actual operation conditions and/or pilot's proficiency in the one-pilot mode dive.

Attachment 1: Confirmation Letter for Boarding Shinkai-6500

Attachment 2: One-Pilot Mode Dive Plan

Attachment 3: One-Pilot Mode Dive Requirements

Attachment 4: Confirmation of One-Pilot Mode Dive Plan

Reference 1: Emergency Floatation Manual

Reference 2: First Aid Manual

Reference 3: Lifesaving Treatment Manual

Confirmation Letter for Boarding Shinkai-6500

When boarding the Shinkai-6500, there are risks as described below. If you mentioned in the "Yokosuka" boarding application form that you planned to board the Shinkai-6500, please make sure to read and sign this document to confirm that you fully understand its contents and purpose.

- The Shinkai-6500 is deployed usually for a maximum of 8 hours at a time, however, in the case of bad weather and/or unforeseen events, crew will stay on board Shinkai-6500 for a duration longer than 8 hours.
- The Shinkai-6500 will take at least 3 hours to return from the maximum dive depth of 6500 m to the mother ship Yokosuka, even in the case of an illness and/or injury to the crew during a dive.
- During a dive, if the Shinkai-6500 cannot resurface or gets stuck on the seabed for some reason, the Shinkai-6500 has a life-support system sufficient for 5 days as a countermeasure to such situation.

I pledge to meet the following health requirements for boarding the Shinkai-6500:

- Currently not visiting a hospital
- Currently not having subjective symptoms that require visiting a hospital

I confirm that I fully understand the contents and purpose of this document.

YYYY/MM/DD _____ Signature _____

Complete name:

The personal information received here will be used for making decision on boarding and for smooth operation of cruise. Moreover, the information collected will be handled safely and appropriately in accordance with the Personal Information Protection Management Regulations of the Japan Agency for Marine-Earth, Science and Technology (JAMSTEC).

Cruise ID: YK21-* *
One-Pilot Mode Dive Plan

- Dive area name, dive point (coordinates), dive depth
Ex.: Suruga Bay, 34°12.4'N, 140°24.7'E, 700 m

- Purpose of dive

- Details of work
 - Ex.: Manipulator operation (rock sampling) at 10 points, 1 or 2 samples at each point
 - Ex.: Manipulator operation (mud core sampling) at 3 points along the route
 - Ex.: Planned route length: 2.5 mile, Water depth 4,700 m - 5,000 m

- Observers
 1. Name (affiliation), No. of past dives: 10 (_____ Basin/Fore Arc, etc.)
 2. Name (affiliation), No. of past dives: 0

- Payload
 - Ex.: Sample box, partition board, scoop
 - Ex.: Mud corer x3
 - Ex.: Marker x2
 - _____

- Dive location
 - Ex.: Navigate at 800 m above seafloor
 - _____

Dive area map
showing planned route

Please delete the examples (Ex.) mentioned above,
and this sentence before submitting this document.

One-Pilot Mode Dive Requirements

Name of Observer	Affiliation	No. of Dives in Past	Date of Course Completion* ¹	Health Condition* ²	Dive Plan Number in Cruise YK2*-* *
※※ ※※	JAMSTEC	2	20**/**/**	Good	1 and 3
※※ ※※	JAMSTEC	3			5 and 6
※※ ※※	____Univ.	3			2 and 4
※※ ※※	JAMSTEC	0			1 and 3
※※ ※※	JAMSTEC	0			2 and 4
※※ ※※	JAMSTEC	1			5 and 6
※※ ※※	JAMSTEC	0			5 and 6

※ Person scheduled for a dive may be changed depending upon physical condition and progress of the dive operations.

*1 : Lifesaving course completion date

*2 : Health check based on the Confirmation Letter for Boarding Shinkai-6500

Requirements for observers (refer the Guidelines for Conducting Dives of Shinkai-6500 in One-Pilot Mode)

- 1) One or both observers must have experience of 2 or more dives of Shinkai-6500, and commander has approved their understanding of the dive operation.
- 2) At the stage of making cruise implementation plan, at least 2.5 months before the cruise starts, observers must agree, sign and submit the Confirmation Letter for Boarding Shinkai-6500 to the Operations Department.
- 3) Observers must attend the lifesaving course organized by the Fire Department and the Fire Department Disaster Prevention Association in Japan, etc., and obtain a certificate of completion of the "Ordinary Lifesaving Course I" or higher, within 3 years before the dive date of the survey/research cruise. If attending a course other than that mentioned above, obtain a certificate of completion after ascertaining that it is equivalent to or higher than the "Ordinary Lifesaving Course I", and organized by a qualified person. In addition, if attending the course abroad, obtain a certificate of completion of the course based on guidelines of the International Consensus (CoSTR) of the International Liaison Committee

on Resuscitation (ILCOR¹) or the official standards of relevant country (e.g., AHA-BLS (American Heart Association-Basic Life Support)).

The content of lifesaving courses received in Japan and overseas must include all 3 methods: cardiopulmonary resuscitation for adults, hemostasis, and foreign body removal.

After attending the course, submit a copy of certificate of completion to the Operations Department along with the Confirmation Letter and Boarding Application.

Name of Pilot	No. of Dives in Past	Date of Course Completion ^{*1}	Dive Plan Number in Cruise YK2*-* *
※※ ※※	98	2018/6/5	1, 3, 5
※※ ※※	174	2018/6/5	2, 4, 6
※※ ※※	86	2018/6/5	

* 1: Lifesaving course completion date

¹ ILCOR (<https://www.ilcor.org/>)

20__/__/__

Confirmation of One-Pilot Mode Dive Plan

It is being confirmed herewith that there are no safety issues with implementation of the following dive plans proposed by the chief scientist during the YK21-* * cruise:

Plan 1 : _____ D=5,000 m Implementation approved

Plan 2 : _____ Flat area D=2,050 m Implementation approved
with the following condition:

Work duration between arrival on and departure from seafloor must not exceed 5 hours

Plan 3 : _____ Foothills D=5,100 m Implementation approved

Plan 4 : _____ Flat area D=2,450 m Implementation approved
with the following condition:

Work duration between arrival on and departure from seafloor must not exceed 5 hours

Plan 5 : _____ Foothills D=5,000 m Implementation approved

Plan 6 : _____ Foothills D=5,100 m Implementation approved

Out of 6 dives planned during the cruise, 3 dives (Plans 3, 5, 6) will be conducted in one-pilot mode.

Name of director

Name of commander

Director, Operations Department

Shinkai-6500 Commander

(Date of confirmation email from the director)

(Date of confirmation email from the commander)

Table below is an alternative to free text Plan mentioned above:

Plan	Description	Survey area	Water depth (m)	Decision
1			5000	Approved
2		Flat	2050	Approved* ¹
3 [#]		Foothills	5100	Approved
4		Flat	2450	Approved* ²
5 [#]		Foothills	5000	Approved
6 [#]		Foothills	5100	Approved

*¹ Work duration between arrival on and departure from seafloor must not exceed 5 hours

*² Work duration between arrival on and departure from seafloor must not exceed 3 hours

Dive to be conducted in one-pilot mode

SHINKAI6500

Emergency Floatation Manual

(Excerpts)

SHINKAI6500

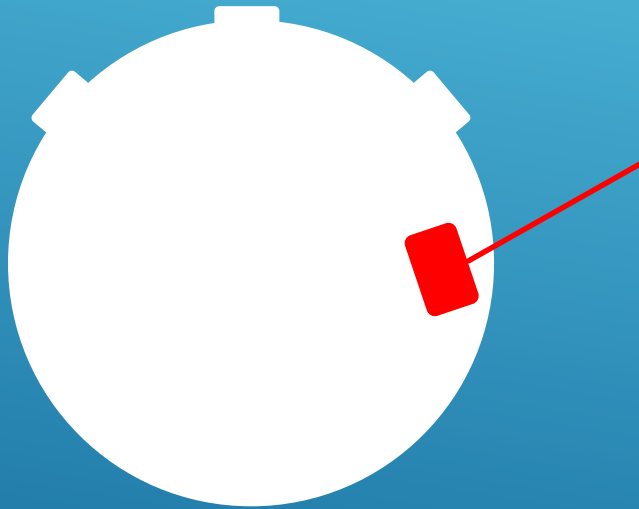
7 items for handling **Emergency**

- ① Underwater telephone (UQC)
- ② Wireless (VHF)
- ③ Ballast release
- ④ Blow valve
- ⑤ Emergency stock
- ⑥ Breathing apparatus
- ⑦ Emergency floatation

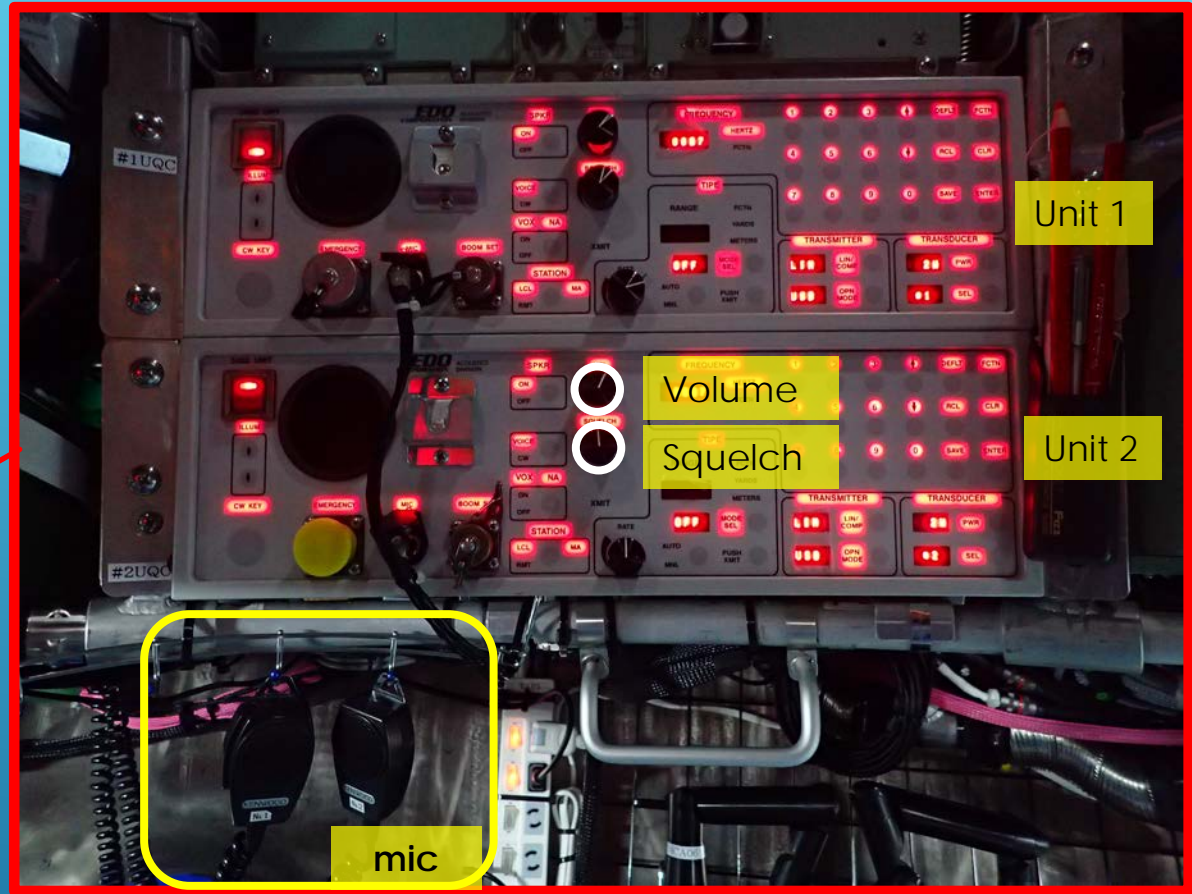
Underwater telephone

(UQC)

Front



Rear



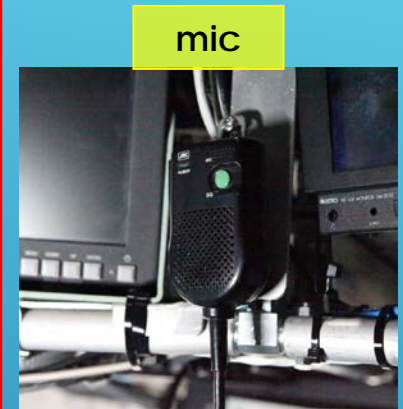
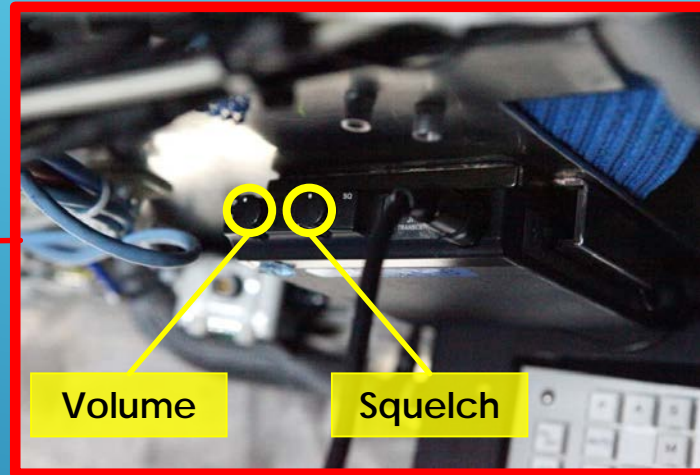
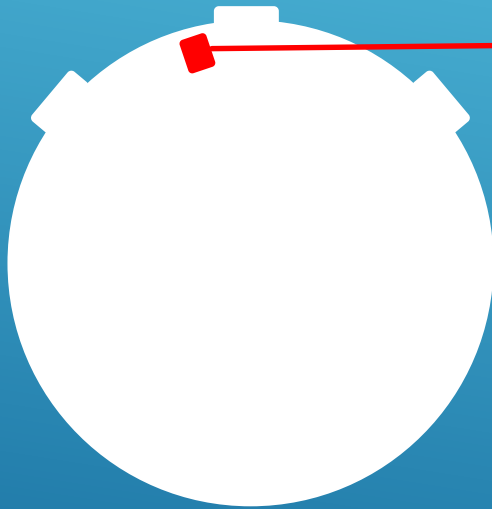
Use either Unit 1 or Unit 2

Report status to the commander at every 200 m depth interval

Wireless (VHF)

Fixed type (normal use; output 5 W)

Front



Rear

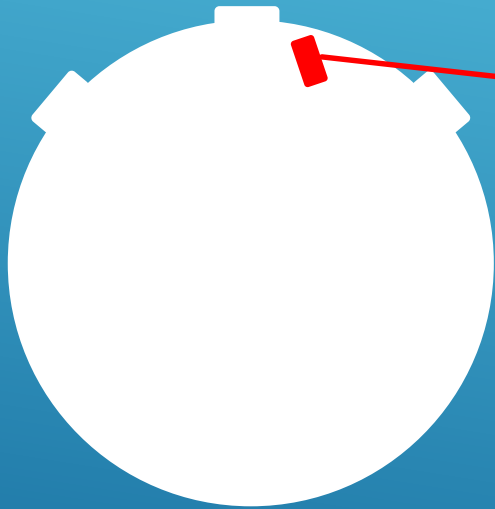
Portable type (to be used if fixed type does not work; output 1 W)

Use wireless only
after resurfacing

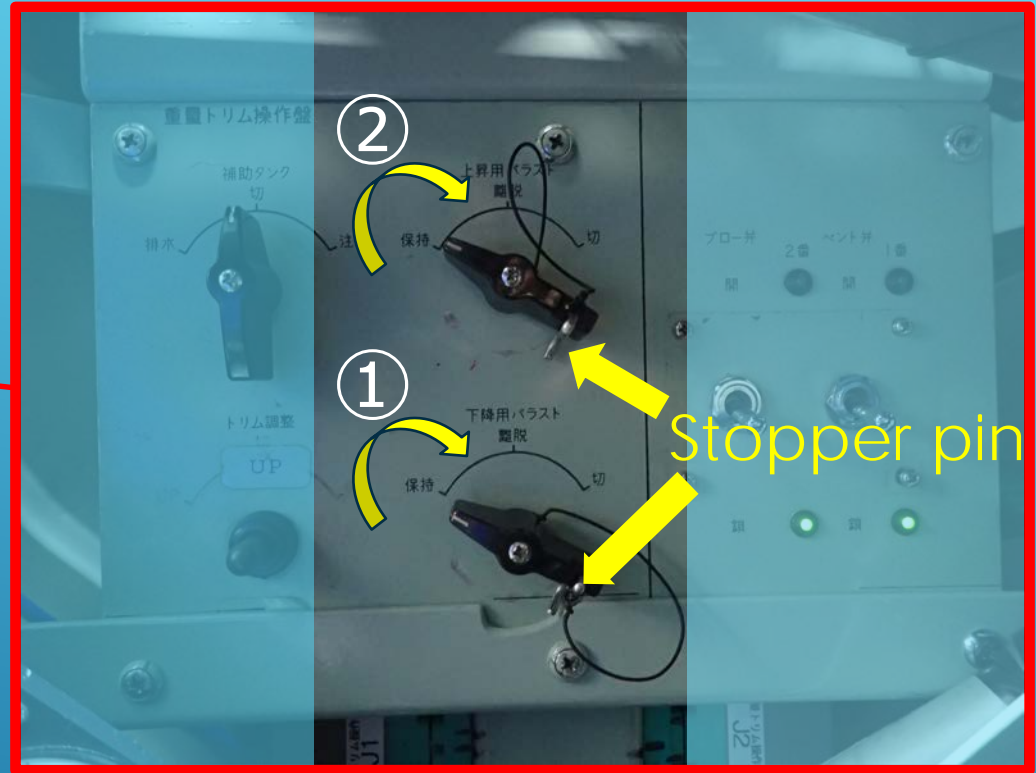


Ballast release

Front



Rear



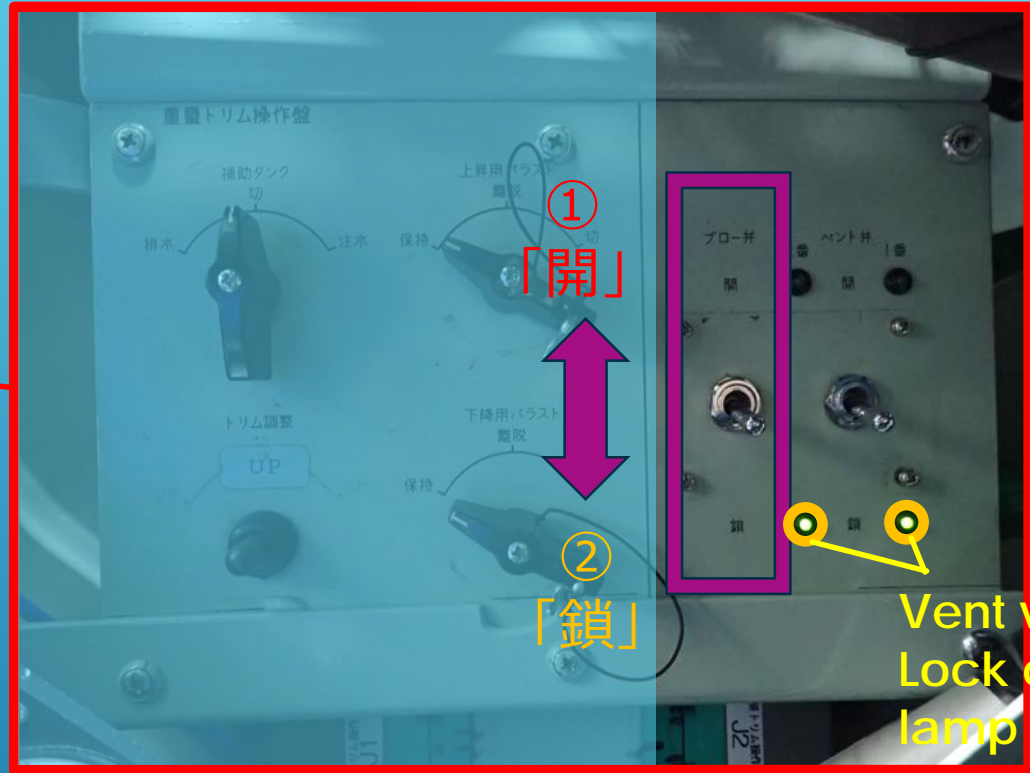
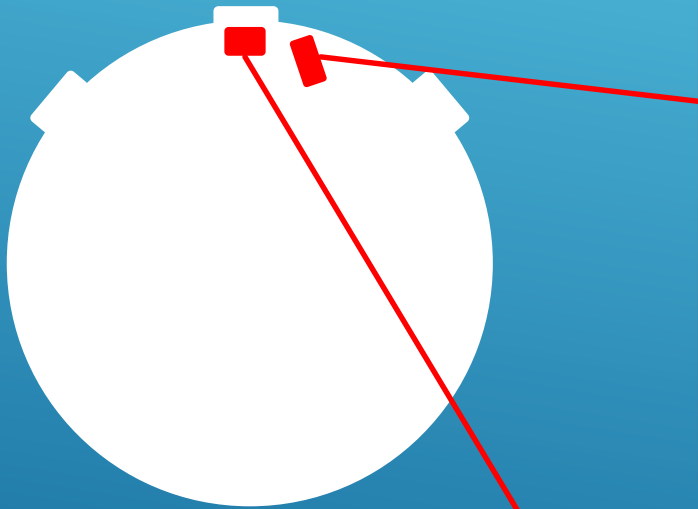
Remove the stopper pin, and turn the switch from safe 「保持」 to release 「離脱」

Turn the Switch ① first, then Switch ②

If the hull is tilted, contact the commander before operating the Switches

Blow valve

Front



Rear



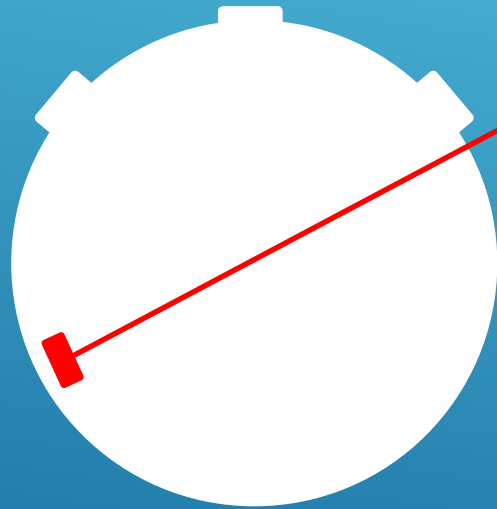
③ Mute

After resurfacing, operate following to secure freeboard:

- ① Push toward 「開」 until alarm goes off
- ② Push toward 「鎖」 after alarm blows
- ③ Mute the alarm

Emergency stock - 1

Front



Rear



Etiquette bags



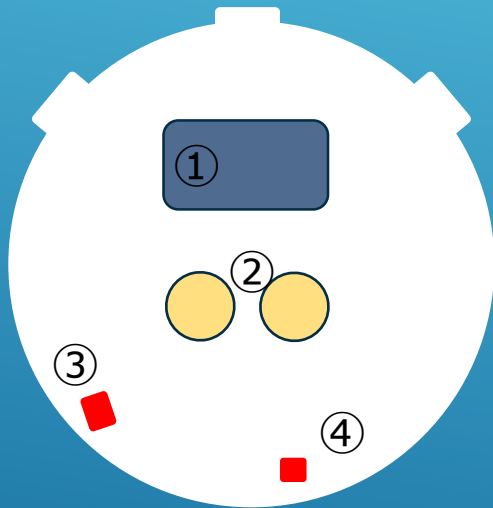
Urination kit



Toilet kit

Emergency stock - 2

Front



Rear

Stored under
floor



Life jackets
(auto inflatable)



Emergency use
Drinking water/food



Medical kit



Fire extinguisher

List of items in medical kit

Front



Rear

Stored under
floor



Disinfectants, bandages, sling

Sterile gauze, cotton wool & swab

Band-Aid

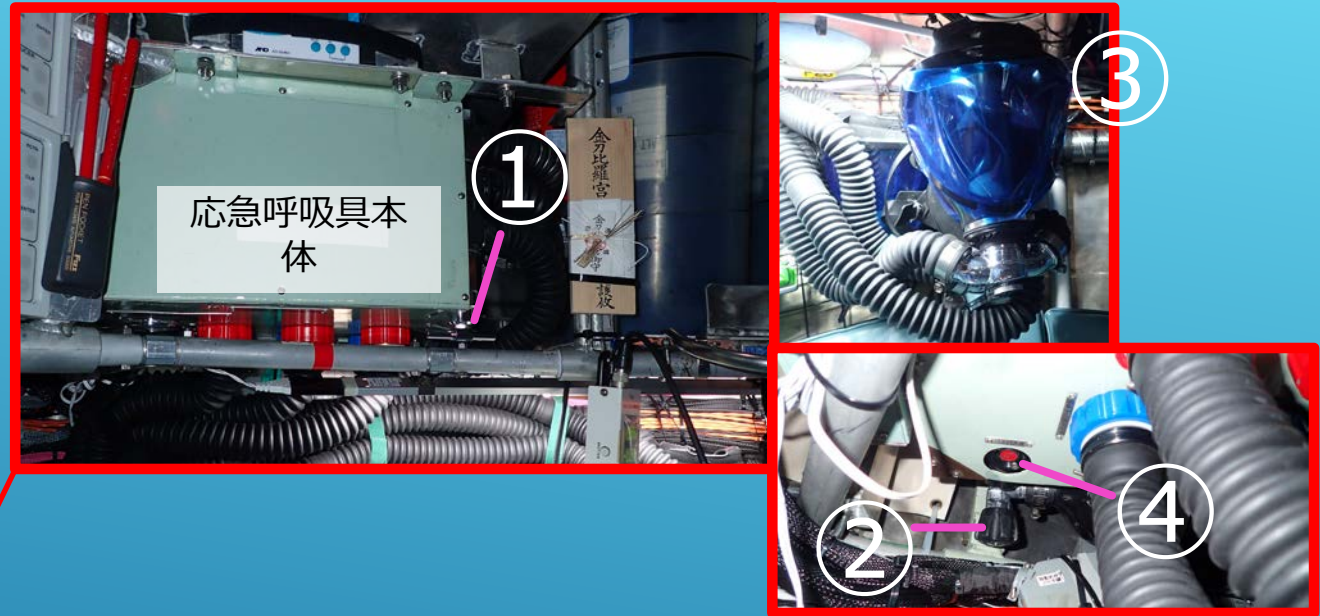
Headache medicine

Gastrointestinal medicine, Seirogan

Eye medicine

Motion sickness medicine

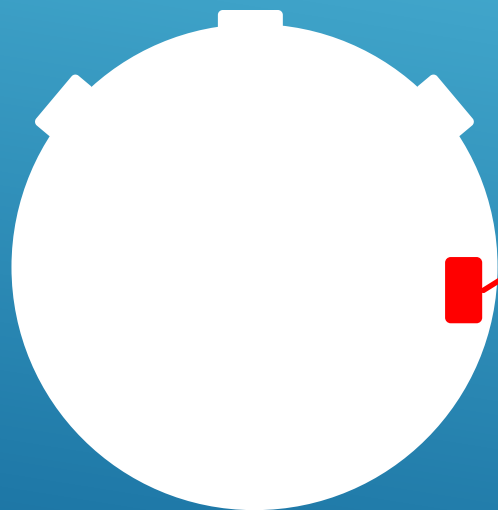
Breathing apparatus



- ① Pull the valve handle (清浄缶開閉弁ハンドル) until it stops
- ② Fully open the check valve (そく止弁)
- ③ Put on the face mask and check airtightness
- ④ Soon after starting to use, press the bypass valve (バイパス弁) for 3 seconds

Emergency floatation

Front



Rear



In order to make the Shinkai-6500 buoyant, operate these switches by following the instructions received via underwater telephone from the commander.



CardioPulmonary Resuscitation (CPR)

1



① Check the consciousness

Tap on shoulder of victim and ask "Are you OK". Check for replies, limb movements, response to injury/pain, and consciousness.

2



② Report to commander

If there is no response, report to the commander via underwater telephone or radio.

3



③ Check breathing

Watch closely for 10 seconds the chest and abdomen for any sign of movements. If there is no sign, it means no normal breathing, and chest compression (CPR) must be performed.

4



④ Chest compression (CPR)

Place your hands on the center of victim's chest and, compress the chest at least 5 cm. Do it at the tempo of 100 times per minute. When combining the chest compression with artificial respiration, make it a cycle of 30 compressions and 2 respirations.

5



⑤ Give artificial respiration

Position the forehead and chin of the victim in such a way that the airway opens, then place a mouthpiece for artificial respiration (Note 1) in the victim's mouth, pinch the victim's nose with your thumb and index finger, and blow air through mouth-to-mouth contact for about 1 second. Check that victim's chest swells as you blow air.

Note 1: Although the risk of infection is said to be extremely low if a mouthpiece is not used for artificial respiration, it is safer to use it from the viewpoint of infection prevention.

! Hemostasis



Arterial bleeding
Bleeding in spurts



Venous bleeding
Bleeding at steady rate



Capillary bleeding
Bleeding like ooze

Massive bleeding can be life-threatening

Total blood volume of humans is 7-8% of body weight, and the loss of one-third of the blood in the body is life-threatening. Arterial bleeding, such as the spouting of bright red blood, requires immediate treatment. Bleeding from capillaries almost always stops spontaneously.



Hemostasis by direct compression

Wrap gauze or a clean cloth directly on the bleeding area and use bandages or your hand to press strongly. The size of the gauze/cloth should be large enough to cover the entire wound. To avoid infection, use rubber gloves or plastic bag and avoid getting stained with victim's blood.



Hemostasis by indirect compression

If it is difficult to stop bleeding with direct compression, try indirect compression. Press the artery near the heart toward the bone with your thumb to temporarily stop the blood flow. Bleeding from elbow and lower arm can be stopped by strongly pressing with thumb at the central part of upper arm. To stop bleeding from the leg, stretch the bleeding leg and press hard with your fist near the base of the femur.





First aid for fractures and bruises



Fix with a splint

It is prohibited to move an injured patient recklessly. To support a fractured bone of the injured person, prepare a splint and tie it on both sides of the fractured bone with a cloth, so that the bone gets fixed.



Use a sling

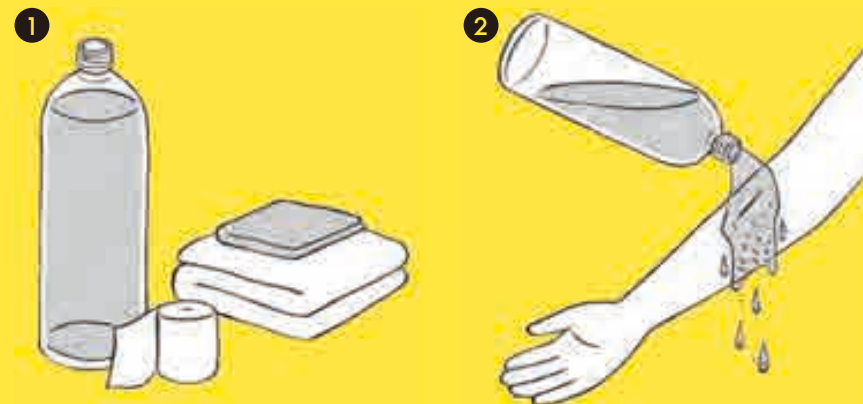
A sling can be used anywhere on the body, and can be prepared with a scarf, furoshiki, or a large handkerchief. Rinse the wound with clean water and apply sterile gauze. Make sure the knot is not directly above the wound.



First aid for cuts

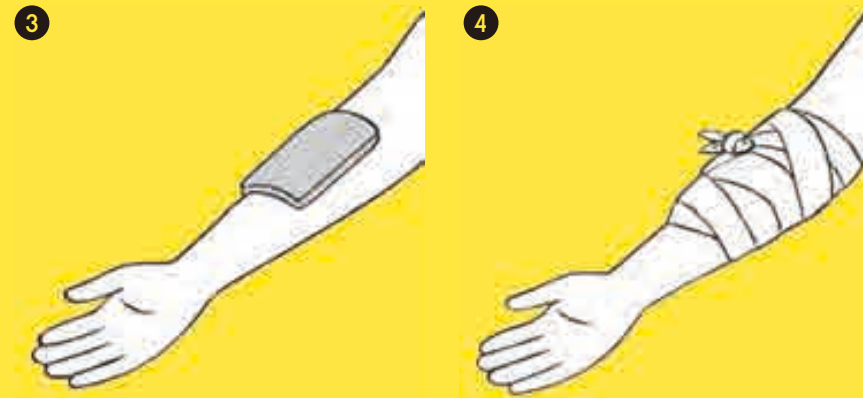


Material : water, cotton, gauze, sterile bandage



Prepare a cloth or bandage large enough to cover the wound.

If the wound is dirty, wash it off with clean water.



If bleeding, apply sterile gauze to protect the wound.

Apply bandage



! First aid for burns



Cool minor burns with water

For burns that cover less than 10% of the body surface area (the area of the victim's palm is 1% of the body surface area), cool with clean water as soon as possible until the pain is gone.

Points to pay attention to

Apply water from a PET bottle, etc. Also, take following precautions when treating the victim:

- Do not remove victim's clothing while cooling the burns
- If burn area is large, be careful not to overcool victim's body
- Be careful not to rupture the blisters
- Do not apply medicines in burn area

! Make the victim relax



Loosen the clothing

Make the victim take a comfortable posture; ask frequently "Does it hurt?", and adjust the posture. Gently loosen clothes and belts while listening to the victim's wishes.



Keep the body temperature

If the victim is feeling chills, has low body temperature, pale face, or is sweating cold, then provide a cover of warm cloth or a blanket to prevent the body temperature from dropping.

! Victim's posture management



Basically lay on back

Basically, laying back on a flat surface is the most stable and relaxing posture.



Vomiting or injury on back

Lay on stomach and turn victim's face sideways. Be careful not to clog victim's throat in case of vomiting.



Head injury and/or difficulty in breathing

Lay on back and raise upper body slightly with a cushion.



Abdominal pain or injury

Raise the victim's upper body with a cushion, etc., and put another cushion under the knees, too.

Chest pain or breathing trouble

Seat with legs stretched out, put a cushion on the legs to support the chest, and relax upper body.



Breathing but unconscious

To secure the airway, lay victim on side and bend the knee of the upper leg by 90 degrees.



Heat stroke / anemia / hemorrhagic shock

Lay on back, place a cushion under the legs to keep them 15 - 30 cm higher than upper body.



! Regulate body temperature

Body temperature can be regulated by adjusting the temperature behind the neck, under the armpits, and over the coccyx (tailbone). Use these areas for relief measures against chills or heat stroke.

Behind the neck

Simply wrap a muffler etc. around the back of the neck, as it improves blood circulation and thus maintains the body temperature. This area is also effective for cooling when body temperature is high.

Under the armpits

Since there are large arteries in this area, warming or cooling here will have an effect on the entire body.

Over the coccyx

Body temperature can be easily regulated by warming / cooling the area around the coccyx (tailbone).



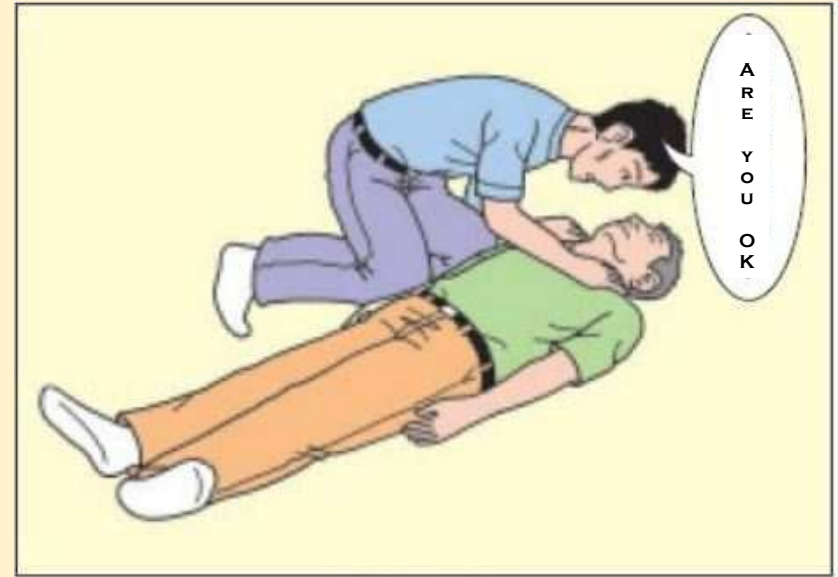
Life Saving Procedure & CPR

1. Check the response of victim

While yelling "Are you okay" or "Hello" in the victim's ear, tap shoulder to see if there is any reaction.

★ If victim does not respond to the call by opening eyes or a purposeful gesture, it should be judged as "no response".

★ If victim responds (is conscious), listen to the victim and provide necessary first aid.



Check the response

2. Inform the commander (use underwater telephone/wireless)

Check the situation and report to the commander.

Life Saving Procedure & CPR

3. Secure the airway (head tilt - chin lift maneuver)

Straighten the victim's throat to make it easier for air to pass through the lungs (securing the airway).

★ Place your one hand on the victim's forehead and tips of index and middle fingers of your other hand under the victim's chin (the hard part with bone), and pull the mandible up. This lifts the victim's tongue and improves the airway.



Head tilt - chin lift maneuver

Life Saving Procedure & CPR

4. Check respiration

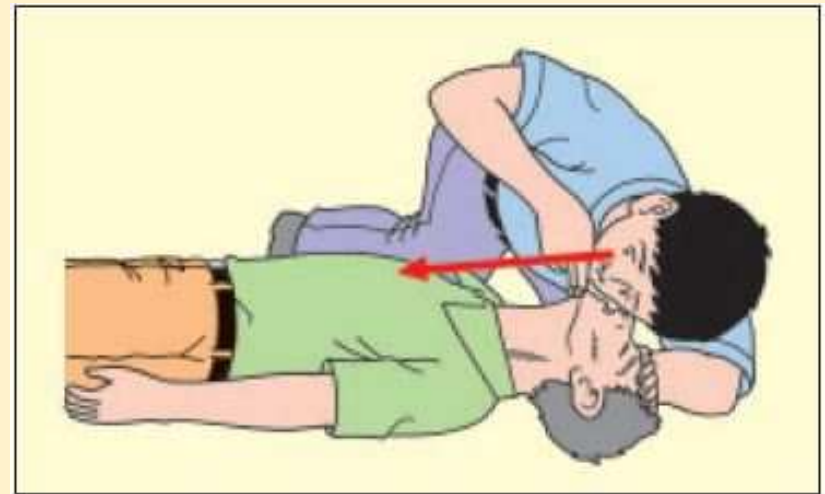
Check if the victim is breathing properly (normal breathing).

- With the airway secured, bring your cheek closer to the victim's mouth and nose while facing the victim's chest.
- For 10 seconds, check if you: 1. see any rise and fall of the chest/abdomen, 2. hear the sound of breath, and 3. feel the breath on your cheek.

➔ In any of the following cases, breathing is not normal:

- ★ No movement of chest or abdomen; no breathing sound; no exhaled breath
- ★ Even after watching for 10 seconds, not sure about victim's respiration
- ★ Intermittent breathing, convulsive gasps

➔ Immediately after a cardiac arrest, intermittent breathing may be experienced. This is called “agonal breathing or gasping”, and is not a normal breathing.



Confirm by looking, listening & feeling

Life Saving Procedure & CPR

5. Artificial respiration (mouth-to-mouth)

If the victim is not breathing normally, perform mouth-to-mouth artificial respiration.

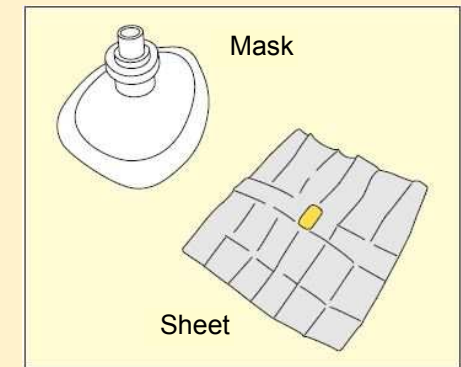
★ In the first attempt, if the victim's chest does not rise as you blow the air, try to readjust the victim's airway, and blow the air again. Even if the chest does not rise in the second attempt, immediately proceed to chest compressions.

★ Use infection prevention tools (sheet or mask with one-way valve for artificial respiration).

★ If the victim is bleeding or is hesitant about mouth-to-mouth respiration due to lack of infection prevention tool, skip the artificial respiration and immediately proceed to chest compressions.



Confirm the rise in chest



Infection prevention tools



Using infection prevention sheet



Using infection prevention mask

Life Saving Procedure & CPR

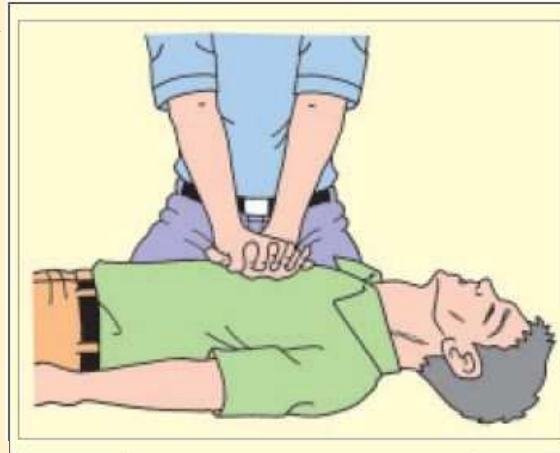
6. Chest compression (heart massage)

Immediately after artificial respiration or if you decided to skip it, start chest compressions to keep blood circulating throughout victim's body.

★ Use your both hands to press at the center of victim's chest "strongly, quickly, and constantly".

★ Place the base of your palm in the middle of victim's chest (middle point on the line connecting the nipples).

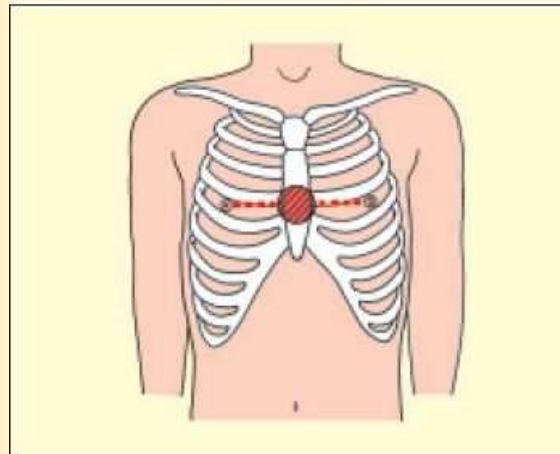
★ Put your another palm over the previous one (if you put the fingers of both hands together, the compression will be more effective).



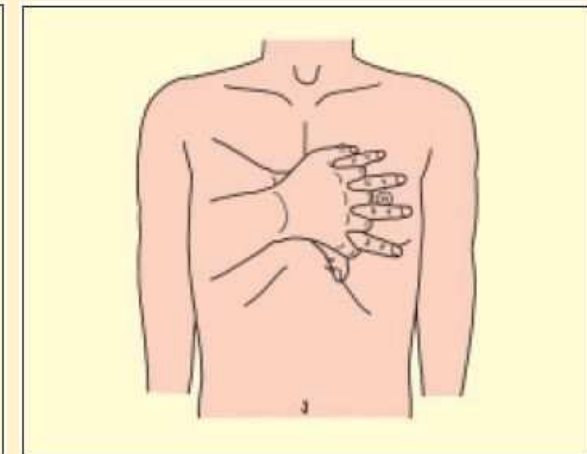
Chest compression
(heart massage)



Chest compression
posture



Chest compression
point



Using both hands for
compression

Life Saving Procedure & CPR

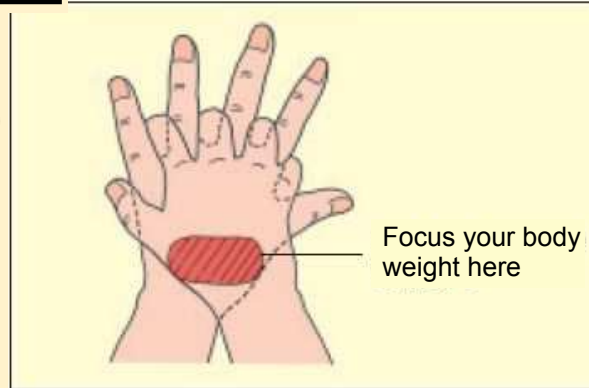
6. Chest compression (heart massage)

Immediately after artificial respiration or if you decided to skip it, start chest compressions to keep blood circulating throughout victim's body.

★ Straighten your elbows to put your weight on the base of your hands, and press the victim's chest about 4 - 5 cm.

★ Press and relieve continuously, 30 times in a row at a fast tempo of 100 times per minute.

★ In between 2 successive compressions, let the victim's chest return to normal position.



Way to overlap both hands



Press vertically



Do not press diagonally



Do not bend elbows

Life Saving Procedure & CPR

7. Implementation of CPR

(continuous cycle of chest compression and artificial respiration)

- Perform chest compressions 30 times in a row, followed by artificial respirations 2 times.
- Continue this combination of chest compressions and artificial respirations (30 : 2 cycle).

★ Performing CPR is a tiring process, so take turns every 2 minutes (5 cycles) and continue the CPR.

★ Report the status to the commander, check about medical advice received via wireless onboard "Yokosuka", and confirm the continuation of CPR as appropriate.



Chest compression and artificial respiration postures

Life Saving Procedure & CPR

7. Implementation of CPR

(continuous cycle of chest compression and artificial respiration)

☆ Chest compression 30 times

- Press at the center of the chest
- Strongly (chest sinks by 4 to 5 cm)
- Fast (@100 times per minute)
- Continuously (30 times in a row)
- Relax the chest between 2 compressions (do not remove your hands from chest)

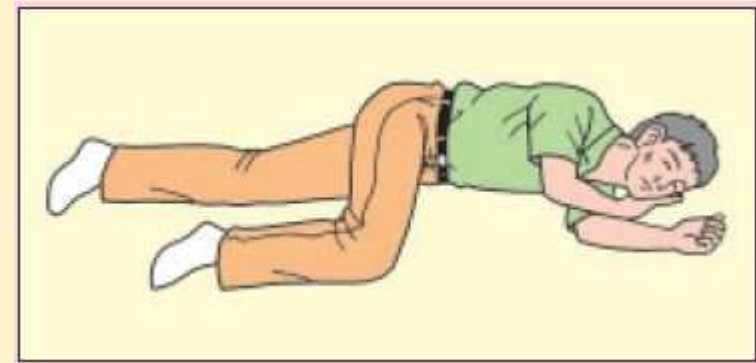
☆ Artificial respiration 2 times (may be skipped)

- Pinch victim's nose
- Check that victim's chest rises
- Once for about 1 second
- Try twice in a row

● No response but breathing normally → Recovery posture

★ If there is no response, but breathing is normal, then lay the victim in recovery posture and make sure that the airway is open.

★ Move lower chin forward and place the victim's face on the back of palm. Bend the upper knee about 90 degrees to prevent the victim from rolling back.



Recovery posture