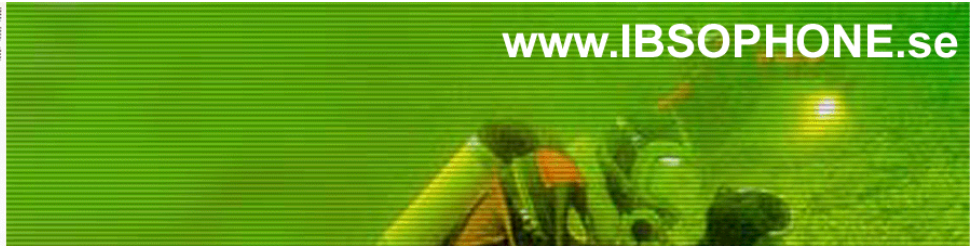




www.IBSOPHONE.se



Ibsophone T1 –Diver telephone.



Manual.

2005-01-01 / CHN.

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PREFACE

The purpose of developing this new product within diving was to meet the growing demand for high quality means of communication between the diver and his attendant. The responsibility for the diver and his very important work under water motivated the use of exquisite, precious components for the telephone presented here.

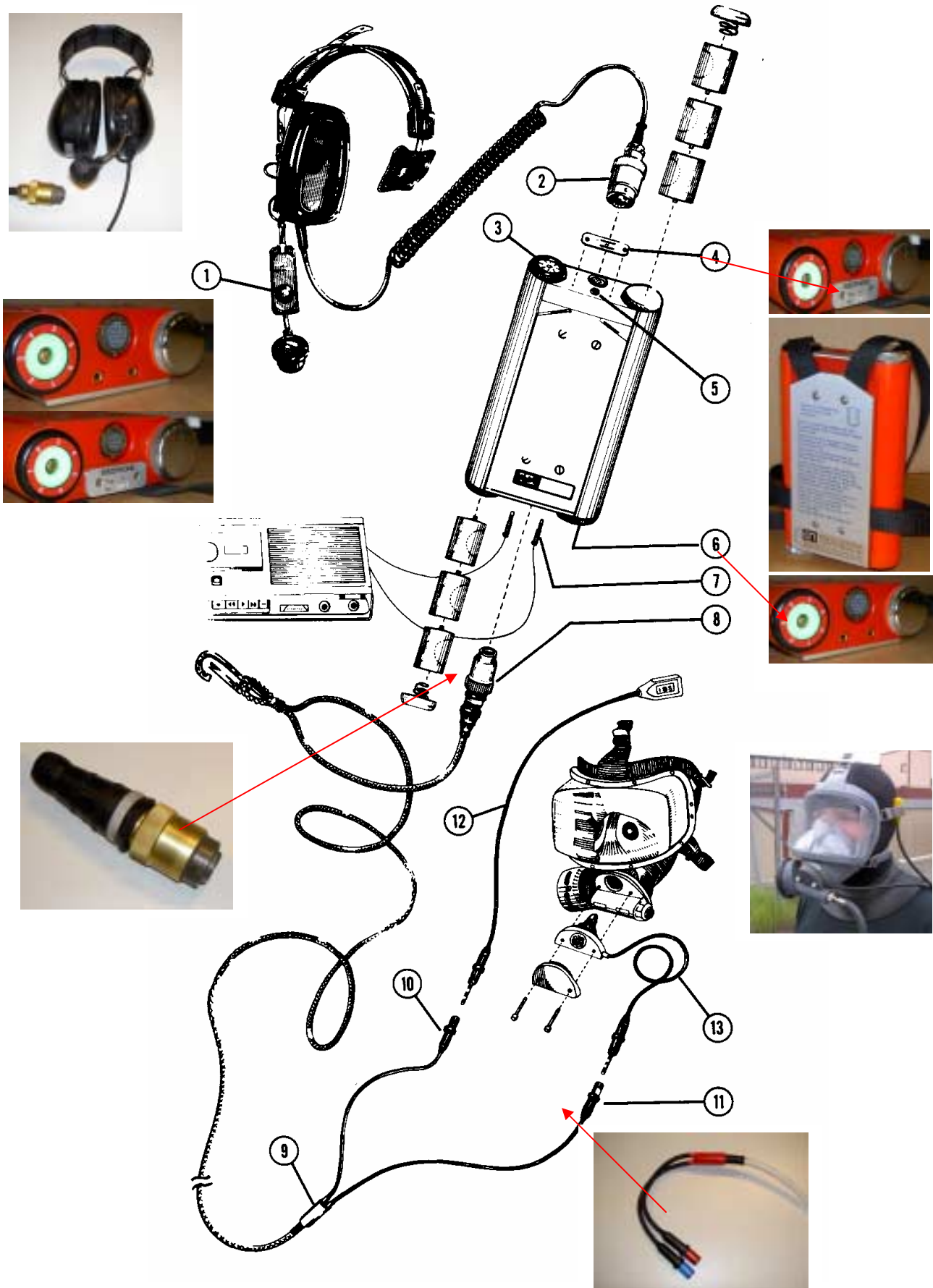
During the design work the telephone was used, in its different development stages, by scuba divers with a mouth piece, as well as with a full face mask. In order to evaluate the audibility of speech, conversations were conserved on tape for comparison with other diving telephones.

The person who has to use technical equipment must be able to get information about its way of functioning, as well as its way of operation and handling. Regarding the IBSOPHONE-diving telephone the best way of acquiring most necessary knowledge about the equipment is to study this instruction book. It will then be easier to make proper use of all its special capabilities and to avoid mistakes.



	INDEX	3
A	ILLUSTRATION FOR IBSOPHONE T1	4
B	EXPLANATION FOR ILLUSTRATION	5
1.	SURVEY	6
1.1	General information	6
1.2	Data	7
2.	SHORT DESCRIPTION	8
2.1	Head set	8
2.2	Amplifier unit	8
2.3	Life line	9
2.4	Diver s microphone	9
2.5	Divers earphone	9
3.	USAGE	10
3.1	Current supply	10
3.2	Connecting the divers attendant	10
3.3	Connecting the diver	10
3.4	Volume controls	10
3.5	During the dive	10
3.6	After the dive	11
3.7	Amplifier	11
3.8	Life line	11
3.9	Headset and hone conductor	11
3.10	Microphone in the full face mask	11
4.	VARIATIONS	12
4.1	Diver with a mouth-piece	12
4.2	Cap for the attendant	12
4.3	Outer hood	12
5.	FINDING FAULTS AND PRECAUTIONS	13
6.	EXTRA ACCESSORIES	13

1A. ILLUSTRATION FOR IBSOPHONE T1.



1B. EXPLANATIONS TO THE ILLUSTRATION

HEADSET (Headset)



- 1 Press button (non-locking switch) which must be pressed down when the attendant is speaking to the diver.
- 2 Male connector for connection of the headset to the amplifier unit.

AMPLIFIER UNIT



- 3 Volume control, built in, for finger tip handling and adjustment of the volume tuning of the divers conversation with his attendant.
- 4 Symbol indication plate and manufacturing number.
- 5 Monitoring control, volume control for adjustment of the volume of the attendant's monitoring of his own voice when speaking to the diver.
- 6 Volume control for adjustment of the attendant's conversation with the diver.
- 7 Male connector ("banana plug") for connection of the tape recorder and/ or extra loudspeaker with a separate amplifier and volume control.

LIFE LINE



- 8 Male connector for connection to the amplifier unit.
- 9 Moulded plastic case.
- 10 Female connector, with a blue circle, for connection of the bone conductor as an earphone.
- 11 Female connector, with a red circle, for connection of the microphone of the full face mask or the bone conductor as a microphone, when using the mouth piece.

FULL FACE MASK



- 12 Bone conductor serving as an earphone, with a fine, encapsulated cord and a male connector for connection to the life lines female connector, marked with a blue circle.
- 13 Microphone, with a firm, encapsulated cord, with a male connector, for connection to the life lines female connector, marked with a red circle.

1. SURVEY

1.1 GENERAL INFORMATION

1.1.1	Manufacturer:	INGENJÖRSFIRMA CURT NYBERG AB	
	Address:	Snickarvägen 13 S-132 38 Saltsjö-Boo Sweden	Kustparken, Mässvägen S-620 35 Fårösund Sweden
	Telephone, sales	+46-8-747 00 05	+46-498-297 700
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	E-mail	info@ibsophone.se	
	Web site	www.ibsophone.se	

1.1.2 PRINCIPLE

The telephone has got amplifiers for two different channels: the divers channel to the attendant and the attendants channel to the diver. The first mentioned channel is normally in function, while the latter one is switched on when the headset button is being pressed. By using two channels with different amplifiers the volume and signal processing is applied to the different conditions prevailing when speaking in a normal atmosphere or under water pressure. The headset is of normal design but specially adapted for its purpose. The amplifier unit has an amplifier with special capacities. The life line is especially manufactured and contains necessary conductors for communication. It has also suitable connectors for plugging into the amplifier and the divers microphone and micro-telephone. The two last mentioned connectors are of special design which makes it possible to disconnect and connect them under water, if desired. The bone conductor can be operated either as a microphone or as an earphone. The sound is transmitted through the bones of the skull, i. e. 'bone conduction'.

1.1.3 SPECIFICATION OF MATERIAL

The diving telephone is delivered in an impregnated and varnished plywood case. The case contains the following equipment:

- 1 of Headset equipped with a press button, a connection cord and a male connector.
- 1 of Amplifier unit.
- 1 of Bone conductor for the diver.
- 1 of Microphone for the diver to be connected to a full face mask.
- 1 of Life line (with conductors).

1.2 DATA
1.2.1 Headset

Microphone, impedance	200 ohm
Headphone, --- “---	16 ohm
Connection cord, spiral cord, 5-conductor	1 metre
Male connector type	MS 3116 E12-1OP

1. 2. 2 Amplifier unit

The connection link between the microphone of the headset to the divers bone conductor

Input voltage for full volume to the diver’s earphone aht.	350mV
Output voltage, sinus 1 kHz	4. 5 volt
Output impedance to the diver	50 ohm

The connection link between the divers microphone and and the earphone of the headset

Input voltage for full volume to the earphone of the headset	20 mv
Output voltage, sinus 1 kHz	2. 5 volt

Joint exit to an extra bud speaker with amplifier and/or tape recorder

Output voltage at max. steering	abt. 1.5 volt
Output impedance	200 ohm

Current supply

During the diver’s speaking	30 mA
During speaking to the diver	40 mA
6 battery cells, each of 1.5 volt=	9 volt

The size of the cells: 25 mm Ø, the length of the cells= 50 mm

Manufacture:

Tudor 1.5S3P or Berek Ull or Malbory Mn 1400 (5Ah)

Amplifiers	length	240 mm
	width	140 mm
	thickness	45 mm
	weight without batteries	2,5 kg

1.2.3 Life line

length	60 m
diameter	10 mm
full weight	4,2 kg
Calculated break load	appr. 2000 daN

The life line can stand a tensile stress of 200 daN in wet condition without change of its electrical properties.

2 SHORT DESCRIPTION

2.1 Headset

The headset consists of an earphone, a microphone, a headband and a switch for shifting the communication direction from the diver to the attendant and vice versa. The microphone and headphone are waterproof, and the switch is hose proof. Tests have proved it to be of advantage for the attendant to have one ear free, enabling him to catch the sounds from the surroundings. Therefore the headset is equipped with only one headphone.

2.2 Amplifier unit

The amplifier unit is mould in plastic, impact resistant, between two PVC plastic tubes. The tubes contain the battery cells. Consequently the amplifier is entirely separated from the batteries. If the batteries should leak, the amplifier would not be damage at any rate (see 3. 7).

All controls and contacts are built in or otherwise protected against damages by careless handling. The unit is pressure-proof and can be submerged.

2.2.1 The unit contains the following equipment:

2. Amplifiers, one for the diver and one for the attendant.
They have a joint tapping to the tape recorder.
2. Terminal contacts. One for the headset and one for the life line.
2. Volume controls. One for the diver and one for the attendant.
2. Sockets for tape recorder and/or additional speaker.
2. Battery accommodations each for 2 x 3 standard battery cells of 1. 5 volt and 25x50 mm.

2.2.2 The amplifiers

are constructed with so called “integrated circuits”. The inlets and outlets are balanced and protected against short-circuit. The reason for the telephone being equipped with two amplifiers is to make the speaking communication independent of the length of the life line as well as of the alterations of its electrical characteristics when diving. Only one amplifier at a time is in function, and the switch-over is made with the push-button control of the headset, giving a communication that is free of disturbance. The current consumption is only appr. 40 mA and consequently, the batteries last very long.

2.2.3 The terminal contacts

are of a very high quality (mil. spec. three point bayonet). They cannot be changed by mistake. The electronic equipment is supplied with current when the contacts of the life line as well as of the headset are connected. The contacts are equipped with extra large “easy—grip handles” enabling easy handling, even when working with thick gloves.

2.2.4 The volume controls

are waterproof built into the amplifier unit and are provided with especially manufactured volume control knobs easily adjustable, even with thick gloves. A safety clutch is protecting the potentiometers against mechanical damages, if the end stops should be overturned.

2.2.5 The tape recorder tapping

has a high level outlet. via. only a terminal amplifications is required from the extra loud-speaker and/or tape recorder. The tapping consists of two female connectors for the usual type of “banana plugs”.

2.2.5 The monitoring control (*only on old models*)

has the following important functions:

It is necessary for the divers attendant to hear his own voice in his earphone (compare with the ordinary telephone), enabling him automatically to keep his voice down on a smooth and comfortable level. The hearing level is adjusted by the manufacturer, and generally it is not necessary to make any individual adjustments. When used indoors or in echoing premises, e. g. in swimming baths it could, however, be necessary to lower the hearing control level. The control is protected against on voluntary reswitching by its place under the symbol indication plate. It is operated by a screwdriver after the plate has been removed.

2.3 Life line

has a length of 60 metres and is equipped with terminal contacts and stram relief clamps at both ends - both for the diver and his attendant. The line is a special product designed by Mr Börje Strömberg together with leading rope manufacturers as the result of a long series of tests. In the life line, the necessary electrical wires are braided with a small lay, making the wires unaffected by tensile stress. Wet lines are very slightly negatively buoyant. The line is made of a rather rigid material which is rough, thus enabling a good hand gripping.

The divers terminal contacts consist of two Electro-Oceanic female connectors which are air-tightly connected with the electrical wires of the life line in one cast house. The life line can stand a tensile stress of 100 kp in wet condition, without its electrical properties being changed. The breaking strength is many times higher.

2.4 Divers microphone

is air-tightly connected to a short wire with an Electro-Oceanic male connector to be placed in INTERSPIRO (AGAs) full face mask, type 331 190 177. It is also possible to place the microphone in other masks. At test with full face masks, however, INTERSPIRO's (AGA) full face mask proved to give the least disturbing sound level from the breathing valve and the air bubbles. The microphone is constructed for a pressure down to 50 metres water depth.

2.5 Divers earphone

so called bone conductor is transmitting the sound via the bones of the skull. The bone conductor is guaranteed to function up to 100 metres depth and has been used to 300 metres depth.

3 USAGE

3.1 Current supply

At both ends of the amplifier there is a screw cover and under each of them there is room for 2 x 3- 1,5 volt battery cells Ø 25 x 50 mm. The battery cells have to be placed according to the symbols.

3.2 Connecting the divers attendant

The amplifier should be bung around the neck and be carried at the side. The waist belt is fastened by a quick-clip, as shown on the cover. The headset is placed on the head and its male connector (2) connected to the amplifier. The spiral cord can be pulled behind the back. Dressed like this the attendant is able to move freely and to assist the diver without being hindered by cords etc.

At this stage it is a good rule for the divers attendant to connect the life line to the amplifier and to the divers microphone and bone conductor enabling him to control the functioning of the communication. One might have forgotten the batteries! When the two male connectors (2) and (8) are connected, the telephone is in function. Reversely it is disconnected by pulling out one of the male connectors.

3.3 Connecting the diver

The life line is in the usual way connected round the waist by a square knot and a bowline, boot please make sure that the loose end is long enough from the moulded plastic case (9) to be put over the shoulder. When the diver is fully dressed with the full face mask, the attendant places the bone conductor (12) under his hood (or under the outer hood) behind his left ear. Moisten the male connectors and connect the microphone (13) to the red female connector (11) and the bone conductor (12) to the blue female connector (10). The life line with its connectors must be put under the strap of the breathing apparatus on the shoulder. The diver must be able to move freely, and the ropes are not allowed to become outstanding loops.

3.4 Volume controls

The volume control (3) intended for speaking to the attendant is placed close to the headsets connection to the amplifier, and the volume control for speaking to the diver (6) is close to the connection of the life line. The knobs are green and handled by the finger-tips. When the diver is out of the water, the volume control must be tuned in such a way that the attendant can hear the diver faintly. When the attendant wants to talk to the diver, he must first press the small bottom (1) on the headset microphone arm. By repeated questions using the volume control (6) the attendant is able to tune in a suitable sound level when speaking to the diver. The attendant must be able to hear his own voice in his own earphone, but it might happen that the attendant is disturbed by his own voice: then he has got a too high monitoring (see 2.2.6).

Now it is possible to “launch” the diver. The acoustic coupling between the bone conductor and the diver can be altered in the water. Therefore it is necessary to make a repeated tuning of the controls with the diver is one or two metres under the water surface.

3.5 During the dive

Be prepared that the frequency of the divers voice will become higher when he comes down to greater depths. This is not due to the telephone, but to characteristics of the air at higher pressure.

If the divers hood is filled by air, the bone conductor could change its position, resulting in the diver hearing the attendant rather faintly. In such a case, the diver can adjust the position and empty his hood from air. A connector that is pulled out can be connected again under water.

3.6 After the dive

When the diver has come up, the bone conductor (12) must be taken care of immediately (it is a sensitive and expensive device). The attendant must first separate the connectors of the microphone and the bone conductor by pulling them out. He must remove the bone conductor carefully from the hood and has to stow it away first of all.

The bone conductor is pressure and water resistant, but it is not knock

The attendant is now able to increase his flexibility by loosening the life line from the amplifier. At the same time the current is cut off which is economic for the batteries.

3.7 Amplifier

Diver' telephones belong to the kind of equipment that could stay unused for longer periods of time. Practically all manufactures of battery cells start leaking sooner or later. It is true the space for the battery cells is separate from the electronics, bet anyhow, no corrosive substance should be allowed to back out since it is difficult to get rid of them and they can make the metal parts corrode. It is much easier to remove the batteries after each dive.

The female connectors of the lifeline and the male connector of the headset should be cleaned from time to time and also sprayed with CRS or another good contact ou.

WARNING: Never use any silicone oil or silicone grease for electrical

3.8 Life line

The life line must not be squeezed, for instance in a door, as it contains electric cables. Sailors know it as a rule that cordage must be coiled down in a clock-wise direction, whereas braided cordage has to be coiled down in turns. Another way is to coil it down in s. c. "1' rench fakes" and a third way to wind up the line on a drum. All the three methods result in a smooth line when it is running out. The method of winding up on a drum, however, has the disa4vantage that the inner end cannot be connected to the amplifier unit when the line is going out.

When delivered the life line is coiled in terns.

After each dive the life line contains a lot of water. Therefore it must be dried in the air.

3.9 Headset and bone conductor

The headset must not be stepped on, and the bone conductor is not knock proof. Consequently both units must be kept in its case. The bone conductor needs to be kept in foam-plastic. When handling the bone conductor you need to hold it at the yellow part = the sensitive one.

3.10 Microphone in the full face mask

Normally no special treatment is necessary for the this unit. However, when transferring it from one mask to another the following procedure has to take place: First the two small M3 insex-screws must be loosened, and the microphone must be taken out in the same careful way.

4 VARIATIONS

4.1 Diver with mouth piece

The microphone (13) is replaced by a bone conductor (12). Thus the diver has two bone conductors: one connected as a microphone and the other connected as an earphone. The bone conductor connected to the red female connector of the life line is functioning as a microphone and should be placed behind left ear. The other bone conductor connected as an earphone has to be placed behind right ear. The reason for this being that the out breathing air from most mouth-pieces flows out to the right side of the divers head. There will be a “jingling” sound in the attendants ear, if the microphone is placed in the bubble current.

With a mouth-piece between his teeth the diver is not able to produce any true speaking. The attendant can distinguish some common word. However, the diver can hear what the attendant says. The communication is most successfully proceeding, if the attendant asks so called leading questions, to which the diver could reply by a short “yes” or a long “NOOO”. One gets accustomed to this special way of communication very soon and the diver very soon learns to “speak” into the mouth—piece in this way.

4.2 Cap for attendant

The easiest way is to put a woollen cap over the headset. It is also excellent to have the set over the woollen cap, even if it is pulled over the ears. The volume controls have to be adjusted accordingly

4.3 Outer hood

is recommended for divers using the Unisuit or a similar suit and could of course be placed over the straps of the mask, naturally after first having been pulled over the neck before the mask is put on. It is recommended to punctuate this hood at the back of the head, thus avoiding the out breathing air to stay in the hood.

5 FINDING FAULTS AND PRECAUTIONS

- 5.1 The hearing is bad with a bad quality in both directions:
Please control that all the battery cells are turned into the right direction. If one or several battery cells are turned in the wrong direction, the telephone cannot function satisfactorily.
- 5.2 The diver can only hear the attendant faintly or not at all - the attendant, how ever, can hear the diver: It is time to replace the batteries, as there is a larger power consumption when speaking to the diver than when speaking from the diver (see 1. 2. 2).
- 5.3 The divers attendant mostly hears a “jingling’ sound and it is difficult for him to hear anything from the diver: The diver also has difficulties to hear the attendant: The microphone (13) and the earphone (12) are connected to the wrong female connectors. Connect the microphone and the ear-phone to the right female connector (see 3.3).
- 5.4 The diver mostly hears wind noise, when the attendant speaks to him:
That is in fact due to the wind. The monitoring (see 2.2.6) is adjusted too low. The monitoring gives not only a balanced voice to the attendant, but the wind noise in the microphone also disturbs the attendant. This means, that the attendant more or less willingly turn aside from the wind at the right adjustment of the monitoring, when speaking to the diver to avoiding the wind noise.
- 5.5 Serious faults such as e. g. a cut-off life line or destroyed parts:
Get in touch with the manufacturer or the supplier. Damaged parts can be replaced by new ones or exchanged for second-hand ones by short loans during the time of repair.

6 EXTRA ACCESSORIES

6. 1 Bone conductor, like item (12) to be used by a diver using the mouth-piece (see 4. 1).
6. 2 Extra loud-speaker, 4 watt, with built-in power amplifier and current supply.
6. 3 Tape-recorder. A tape-recorder can be used as an extra loud-speaker.