Russian scuba divers

1) **AVM-1m apparatus**
2) **AVM5 and AVM7c units**

AVM-1m apparatus Technical

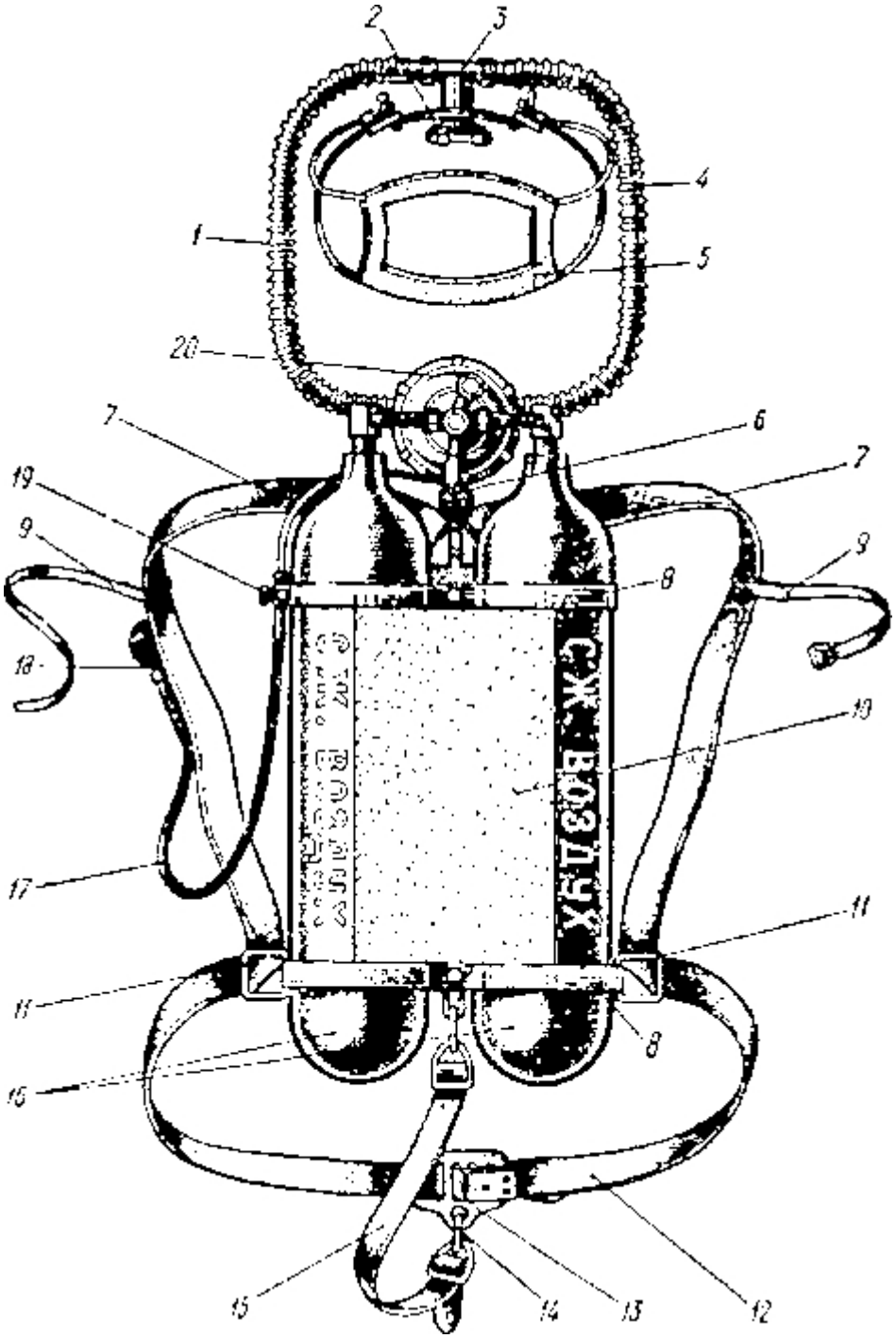
characteristics Working pressure

- 150 ati;
The setting pressure of the reducer is 5-7 ati;
Safety valve operating pressure - 9-11 ati; Air reserve pressure - 30 ati
Capacity of cylinders - 2 7 liters each
Air reserve in cylinders 2 by 7 liters at 150 ati = 2100 liters Weight (cylinders filled with air to working pressure) - 22 kg; Buoyancy in fresh water:
- with empty cylinders - positive - 0.6 kg
- with full cylinders - negative - 2 kg

Description of the apparatus

AVM-1m apparatus consists of the following main parts (Fig.1)

Figure 1



(1), (4) corrugated inhalation and exhalation tubes
(2) mouthpiece
(3) pillbox
(5) headband
(6) air valve
(7) shoulder straps
(8) cylinder clamp
(9) strap for connecting shoulder straps
(10) foam insert
(11) belt buckles
(12) waist belt
(13) belt buckle
(14) brace strap carabiner

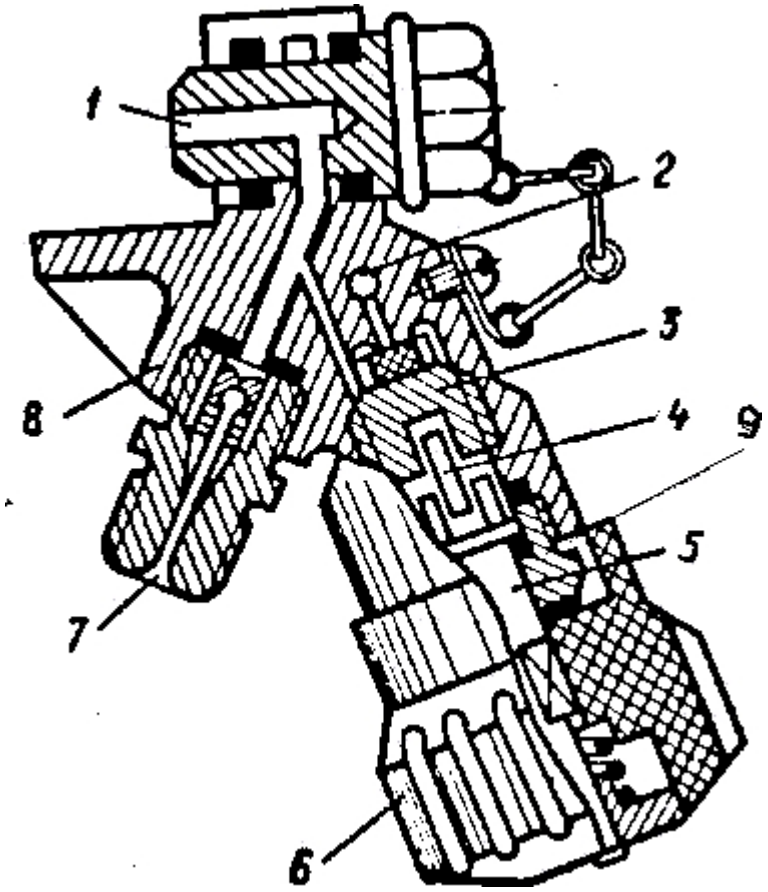
(15) broach belt
(16) cylinders
(17) high-pressure gauge hose
(18) High pressure gauge and minimum pressure gauge
(19) charging connection
(20) reducer and lung machine

The AVM-1m apparatus has two 7-liter cylinders, the cylinders are fastened with clamps, an angle fitting with high-pressure pipes and cap nuts is screwed into the neck of each cylinder on a lead glue. The shutoff valve is installed on the high-pressure pipeline connecting the cylinders of the apparatus and is attached to it with cap nuts. The reducer and lung machine (which are structurally located in one housing) are attached to the shutoff valve on a special platform. A high-pressure hose is connected to the shut-off valve fitting, which goes to the charging fitting and further to the minimum pressure indicator with a manometer. To increase the buoyancy of the apparatus, a foam insert is installed between the cylinders. In later editions there is no foam insert. To put the apparatus on the diver's back, there are straps: shoulder, waist and breast straps.

Cylinders

The apparatus is equipped with cylindrical cylinders with capacity of 7 liters. The cylinders are made of alloy steel and are designed for an operating pressure of 150 kgf/cm2 . Each cylinder is branded with the following information:
trademark of the manufacturer, month
and year of manufacture of the
cylinder,
year of the next hydraulic test (once every 5 years), operating
pressure in ati,
test pressure in ati (1.25 of working pressure), actual
cylinder capacity in liters, nominal cylinder capacity
in liters,
weight of the cylinder without
valve, cylinder number,
the branding of the QC.

Design and operation of the shut-off valve. (Fig.2)
Figure 2



The principle of operation and basic details of all shut-off valves of any apparatus are similar. The difference may be in the constructional design of the body, handwheel, material and dimensions of parts.

The valve consists of body (8), shut-off valve (3), spindle (5), plug (9), nut (4), handwheel (6), the handwheel is held on the spindle by a nut with a spring.

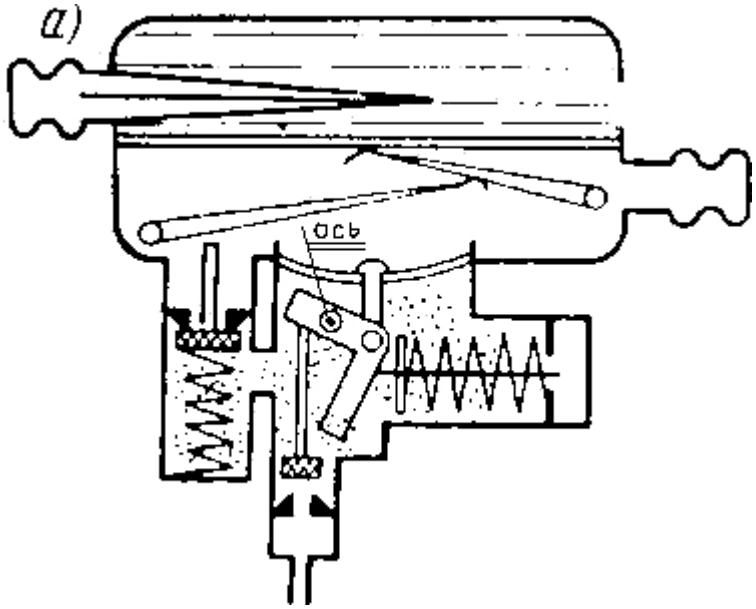
The valve has four connections (1). To the upper one the reducer and the lung machine are attached with a bolt and two second flange gaskets-rings (see figure 2). The lower one is connected to the brass high-pressure tube, which goes to the charging connection and the minimum pressure indicator with manometer. To the right and left connections (not shown in the figure), high-pressure tubes from cylinders are attached with cap nuts.

When turning the handwheel (6) counterclockwise, the rotation is transmitted through the spindle (5) and the dryer (4) to the valve (3). The valve (3) is unscrewed and opens access to air from the cylinders to the reducer with lung dispenser and simultaneously to the charging connection and minimum pressure indicator. When turning the handwheel clockwise, the valve (3) is seated and the air from the cylinders is cut off.

To install the gearbox and lung machine, a platform is provided on the valve body (visible in the figure). There are two holes in the pad, in which threads are cut and adjustment screws are screwed in. The screws adjust the setting of the reducer relative to the pad.

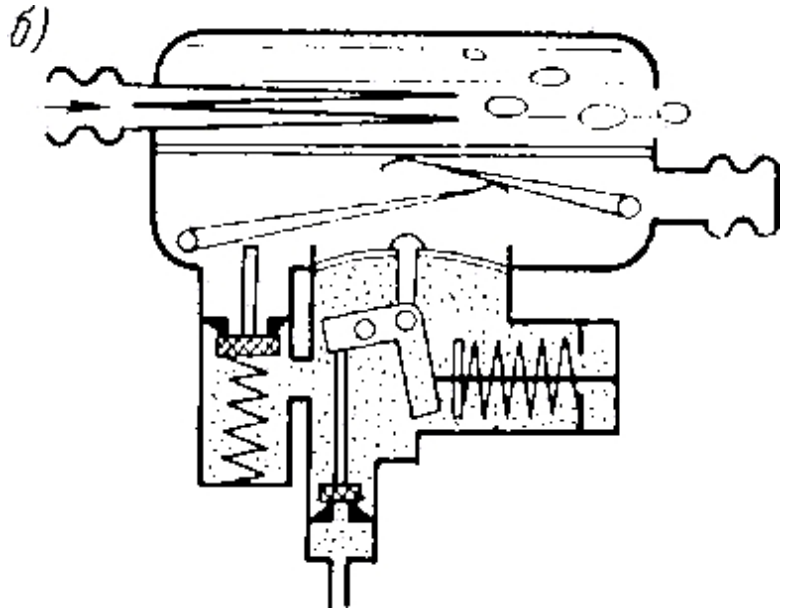
Principle of operation of the pulmonary automatism and reducer (Fig. 4a 4b 4c 4d)

Figure 4a : opened the valve ...



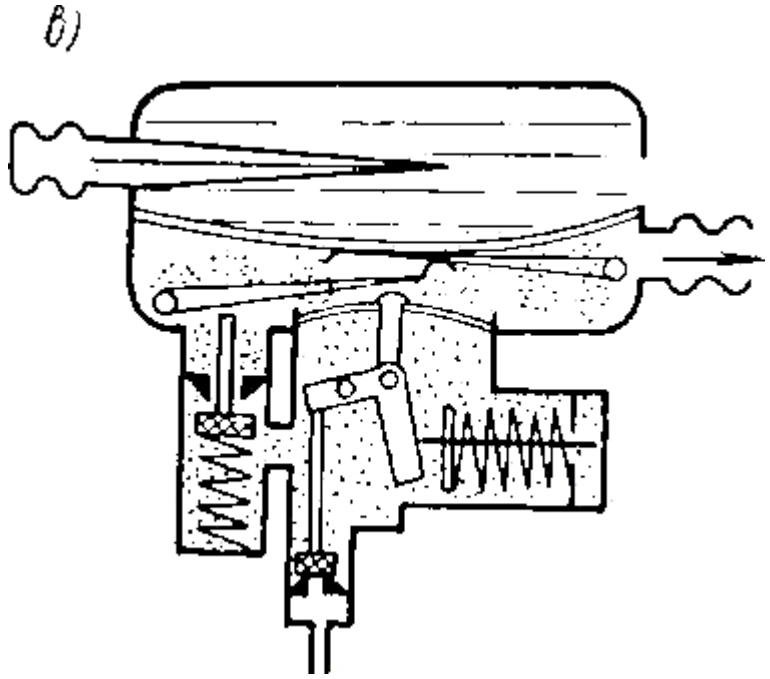
When the shut-off valve is closed, the pusher moves to the left under the action of its spring, presses on the double-arm lever, the lever turns clockwise around its axis (see figure - the axis around which the lever rotates is indicated there), at the same time the reducer valve is in a free state (not pressed against its seat). After opening the shutoff valve (Fig.4-a), air opens the valve and fills the reducer cavity until the reducer diaphragm, bending upward, rotates the double-arm lever around its axis, counterclockwise (Fig.4-b). (((AT: The diaphragm pulls the two-shoulder lever with its stem and thus rotates it around its axis (this is not very obvious from the figure, as you can take the axis of the diaphragm stem mount as the axis of rotation of the lever.... Don't get confused :-)))) The two-arm lever will turn when the pressure in the reducer cavity equals the adjustment pressure of the tappet spring (setting pressure 5-7 ati). The double-arm lever presses and closes the gearbox valve with its upper lever, while the lower lever moves the tappet to the right and compresses the spring. As a result, when the gearbox valve closes, the air in the gearbox cavity is under the set pressure.

Figure 4b : "set" pressure in the reducer cavity (exhalation or no breathing at all).



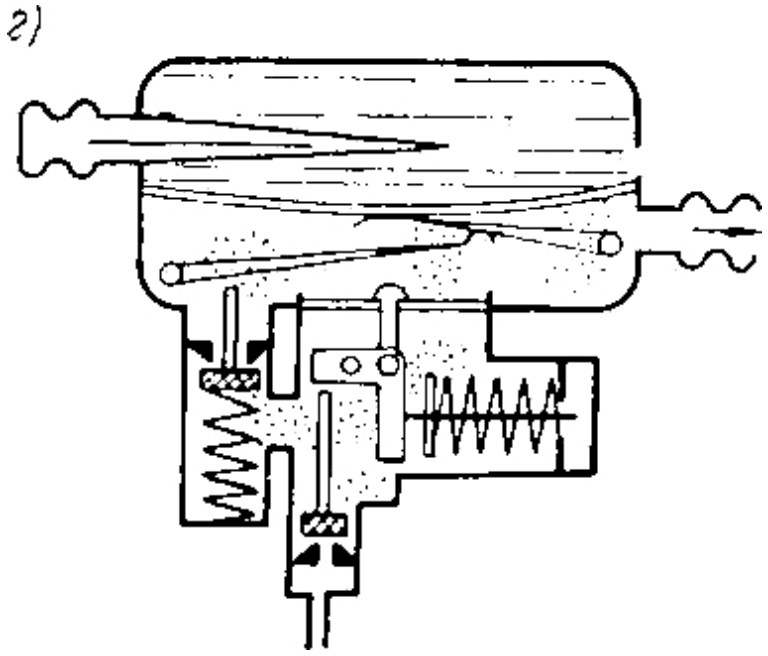
At inhalation (Fig.4-c) in the internal cavity of the lung machine creates a vacuum, the membrane of the machine flexes and presses on the upper lever. The upper lever presses on the lower lever, and the lower lever in its turn presses on the valve stem of the lung dispenser with its adjusting screw. The valve compresses its spring and opens the access of air from the reducer cavity to the lung machine cavity and further to the swimmer.

Figure 4c : Initiation of breath....



At the end of breath (Fig.4-d), the deflection of the membrane of the lung dispenser decreases, the pressure on the levers decreases, and the dispenser valve closes (sits on the seat) under the action of its spring. At the same time, the pressure in the reducer cavity drops, the pusher with the spring comes into operation, the reducer valve opens, and air from the cylinders enters the reducer cavity until the set pressure is reached.

Figure 4g : Continuation (end) of the breath.



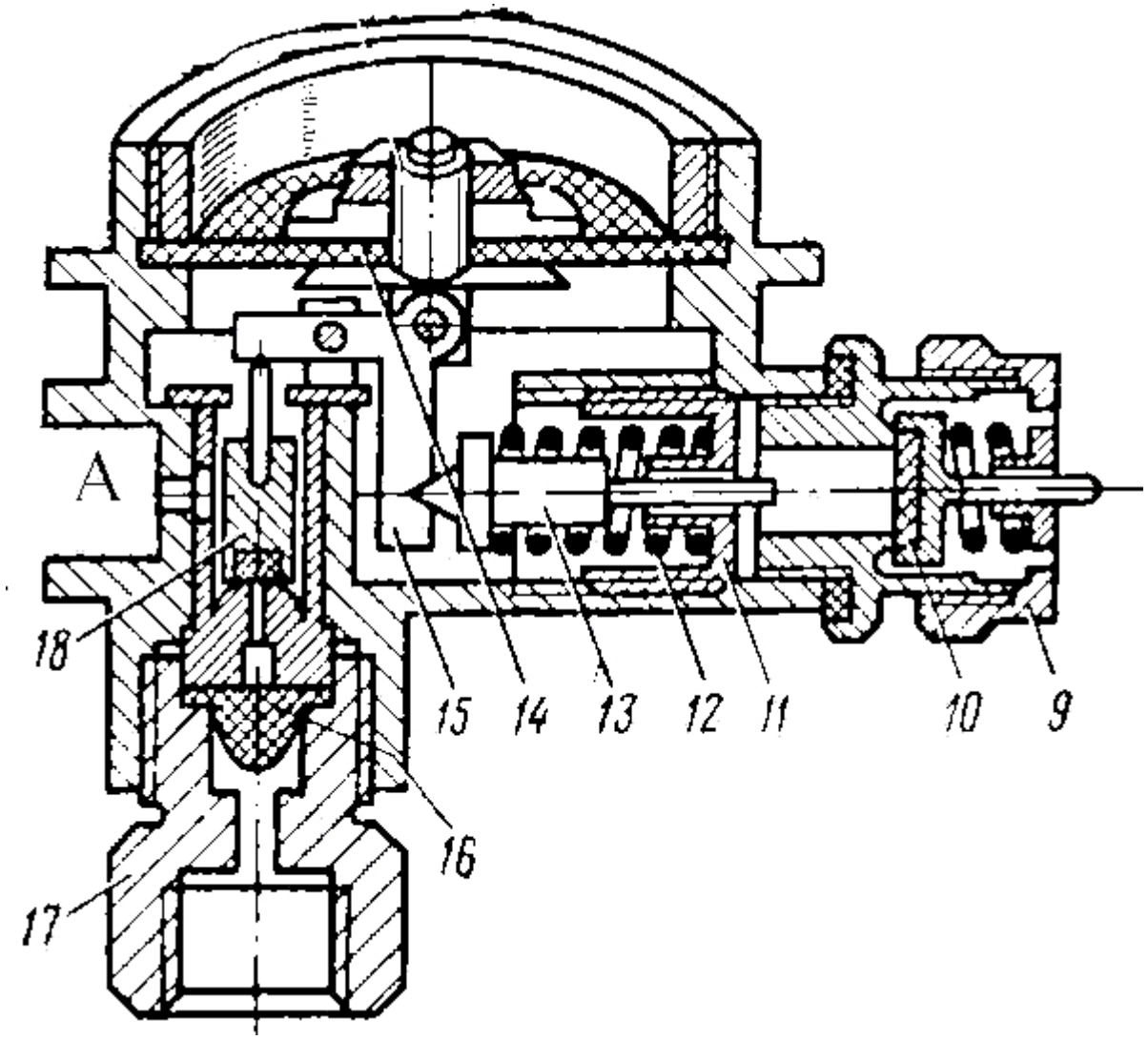
If the reducer malfunctions and the pressure in the reducer rises above the set pressure, the safety relief valve comes into operation. The safety valve spring is compressed, the valve moves away from the seat, and excess air is expelled into the water. Operation of the safety valve serves as a signal of the reducer malfunction, the diver should immediately start ascent to the surface.

In order to take a breath, the diver must create a certain vacuum above the lung machine membrane (approximately 50 mm. of water column). The amount of rarefaction (resistance to breathing) is also influenced by the location of the lung machine. When determining the value of resistance during inhalation, it is necessary to take into account the difference between the pulmonary automat and the center of the diver's lungs. This value will change depending on the diver's position. At vertical position of the diver, when the center of lungs and lung machine are almost at the same level, the resistance arising from the difference of hydrostatic pressures is insignificant. At horizontal position (at swimming), the lung machine is above the lung center, the diver at breath overcomes mechanical resistance of the apparatus and resistance equal to the difference of hydrostatic pressure at the levels of the lung center and location of the breathing machine. When the diver works in the position on the back, inhalation is made with insignificant resistance. And when exhaling the resistance will increase, because the lung machine is located below the center of the lungs. This problem is absent in apparatuses with separated reduction stages (((AT: i.e. modern aqualungs. They have the lung machine attached directly to the mouthpiece and the reducer is on the cylinder))).

Recommendation

Often during operation of AVM-1m due to negligence or inattention, the lung dispenser is deformed and fails. In this case it is necessary to remove the remains of the lung dispenser, see figure 5.

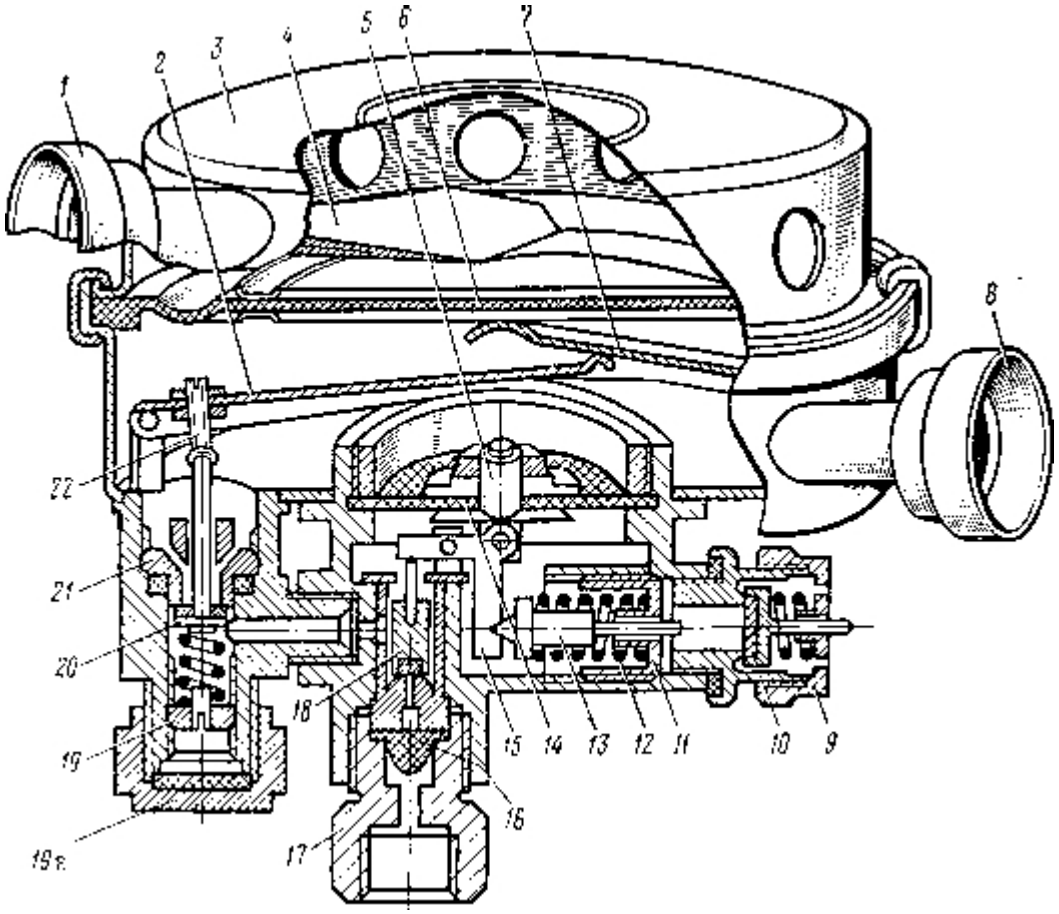
Figure 5



Make an adapter and screw it into the gearbox. The place for the adapter is marked (Fig. 5) with the letter "A". Connect the lung machine from AVM-5 or from Ukraine-2 apparatus to the adapter. The thread in the place of connection to the reducer should have at least 5 full turns. The thread outside is selected depending on the available hose of the lung machine. A tee for the compensator or octopus hose can also be installed between the fabricated fitting and the lung machine hose. This design has been used by the author for several seasons and is still used by many swimmers who are unable to purchase new equipment.

Design of the lung machine and reducer (Fig. 3)

Figure 3



Gearbox Details:
(17) adapter,
(16) strainer,
(18) gearbox valve with PTFE insert,
(15) two-shoulder lever,
(14) reducer diaphragm,
(13) pusher,
(12) pusher spring,
(11) adjusting nut,
(10) safety relief valve,
(9) safety relief valve adjusting nut and spring.

Details of the pulmonary automaton:
(1) connector for connecting the corrugated exhalation hose,
(3) lung machine housing cover,
(4) petal exhalation valve,
(6) Membrane of the pulmonary automatism with a rigid center,
(2) lower pulmonary automatism lever,
(7) the upper lever of the pulmonary automatism,
(8) connector for connecting the corrugated breathing hose,
(5) nut and washer for securing the gearbox diaphragm,
(22) upper arm adjusting screw,
(21) pulmonary automatic valve seat,
(20) pulmonary automatism valve with spring,
(19) adjusting nut.

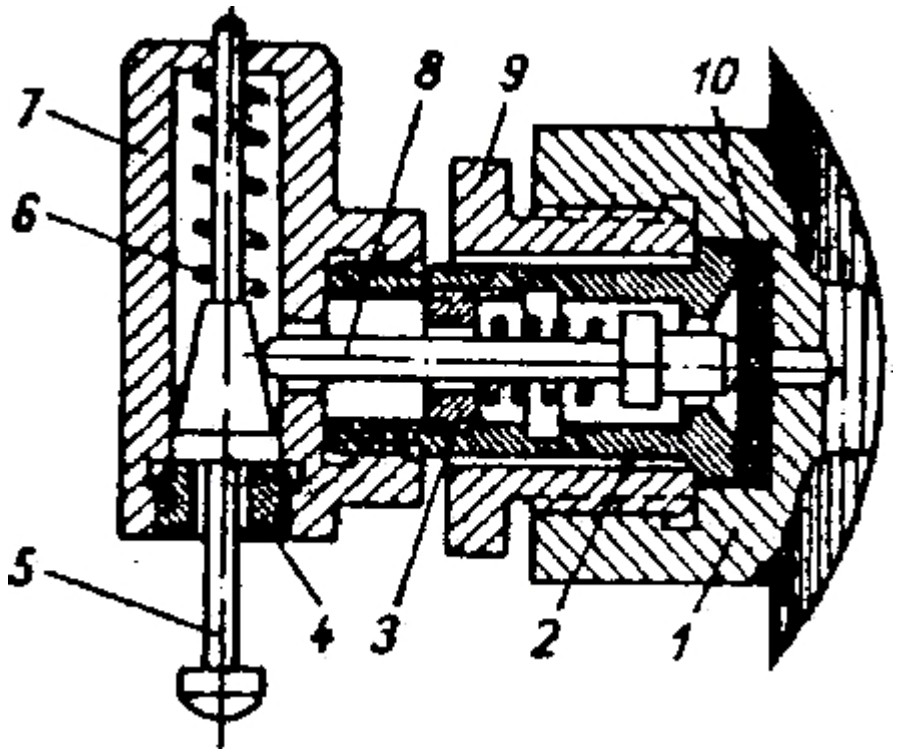
Charging connection

When charging the unit with compressed air, the charging tube from the compressor (filter) is attached to the charging connection. The charging connection is located and fixed on the upper clamp of the left cylinder (see Fig. 1 item 19), the connection is connected with a brass tube to the shut-off valve. A high-pressure hose is connected to the charging fitting from below, which goes to the pressure gauge and the minimum pressure indicator. There is a non-return valve and a strainer in the body of the connection. A plug with a gasket is screwed onto the charging connection from the outside. There are some modifications of the device which do not have a non-return valve in the charging connection. Unfortunately, there is no diagram of the charging connection yet. As soon as it is available, it will be attached to the text.

Minimum pressure indicator with pressure gauge (Fig. 7)

The minimum pressure indicator and the manometer connected to it are used to control the air consumption from the cylinders of the apparatus. In clear water you can use the pressure gauge, in cloudy water or at night - the minimum pressure gauge. (((AT: easy to feel whether its stem has popped out or not))))))

Figure 7



The pointer (pointer body) is attached to the left shoulder strap (Fig.1). A special holder is used to attach the pointer, which allows the diver to rotate the pointer for easy reading. The pointer body has channels going to the pressure gauge and to the pointer diaphragm. The minimum pressure gauge is cocked before the shutoff valve is opened. In order to cock the pointer, it is necessary to press with a finger on the pointer stem head (5) Fig. 7, and hold it, then open the shut-off valve. After opening the valve, the high-pressure air passes through the brass tube to the charging connection, and then through the high-pressure rubber hose to the minimum pressure indicator and to the manometer. Under air pressure, the diaphragm (10) of the indicator flexes and, overcoming the force of the spring, moves the locking rod (8), which goes behind the protrusion of the cocked indicator rod (5). After that, you can stop holding the pointer stem head and the pointer will remain in the cocked position. When the pressure in the cylinders approaches the tank (30 ati), the spring of the locking rod starts to move and the pointer with a small click, under the action of its spring (6) will come out of engagement. The click can be heard in the water. By periodically touching the pointer, you can determine in which position the pointer stem is. And, consequently, to determine when the air reserve will be reached. The pressure should then be monitored by means of a pressure gauge.

AVM-1m apparatus adjustments

- Adjusting the setting pressure of the reducer;
- Adjustment of the safety valve actuation;
- Adjustment of the minimum pressure indicator operation;
- Adjustment of pulmonary automatism levers (inspiratory resistance);
- Adjusting the pulmonary automatic valve/

Adjusting the reducer set pressure

Before adjusting, the setting pressure of the gearbox must be measured. To measure it, you need to:
- install the gearbox on the machine;
- close the shutoff valve;
- instead of the lung machine plug (19a) Fig. 3, install the control manometer;
- open the shutoff valve;
- read the reading on the test gauge.

Adjust if necessary (set pressure of the reducer is 5-7 ati):
- unscrew the safety valve body;
- using a special wrench or screwdriver, unscrew or screw the adjusting nut (11) Fig.3, the adjusting nut compresses or unclamps the tappet spring (12), if it compresses - the setting pressure increases, if it unclamps - decreases;
- replace the safety relief valve;
- measure the set pressure;
- if the resulting value differs from the required value, proceed with the adjustment again;

Adjustment of the safety relief valve actuation

In the operating instructions of the AVM-1m apparatus when adjusting the safety valve it is required to use the repair and control unit (RKU-2). The safety valve is unscrewed from the reducer, screwed to the connection of RKU-2, and then the adjustment is made (by adjusting nut (9) Fig. 3, the degree of compression of the valve spring is changed). In practice, in field conditions, not always the RKU is available.

In the absence of an ESC, I recommend adjusting as follows:
- install the test pressure gauge as in the setting pressure adjustment;
- remove lung machine cover (3) fig.3
- pull out the pulmonary automatism diaphragm (6);
- fold back the levers (2) and (7);
- open the shutoff valve;
- Press the nut (5) with a screwdriver handle or wrench, when the safety valve starts to operate, read the reading on the control manometer;
- if the reading differs from the required reading (9-11 ati), proceed to adjustment (compress or unclamp the valve spring);
- after adjustment, reassemble the gearbox and lung machine.

In the absence of a test pressure gauge and if the set pressure of the gearbox is correctly adjusted, the adjustment can be carried out as follows:
- open the shutoff valve;
- slowly turn counterclockwise the adjusting nut (9) Fig.3;
- when the safety relief valve starts to operate, record this moment;
- 1/2 turn clockwise
- tighten the lock nut.

Adjusting the position of the pulmonary automatism levers (inspiratory resistance)

The distance between the upper lever (7) of Fig. 3 and the diaphragm (6), determines the amount of resistance during inhalation.
- remove lung machine cover (3) Fig. 3;

- pull out the pulmonary automatism diaphragm (6);
- instead of the diaphragm, put a ruler on the body, the distance between the ruler and the upper lever should be about 3 mm;
- turn the lower lever adjustment screw (22) to achieve the desired position of the levers and diaphragm;
- to assemble a lung machine.

Adjusting the pulmonary automatic valve (air flow rate)

Lung machine valve (20) Fig.3 on the surface should provide air flow rate of 30 liters per minute.

Adjustment is made on the RKU-2, using a rheometer-manometer. In

practice, it can be done as follows:
- unscrew pulmonary automatism plug (19a) Fig.3;
- fully unscrew the adjusting screw (19);
- slowly screw in the screw (19) to set the moment when the lung dispenser valve spring starts to compress;
- make three complete turns with the screw (19);
- screw on the plug (19a).

Adjustment of the minimum pressure indicator actuation

The stem of the minimum pressure indicator must operate at a residual cylinder pressure of 30 ati. Before adjustment,

the pointer actuation should be measured:
- to cock the pointer;
- open the shut-off valve (during this check the cylinder must be charged with at least 50 ati);
- make sure the pointer is cocked;
- close the shutoff valve;
- breathe in slowly while monitoring the pressure gauge on the pointer;
- at 30 ati, the pointer should go off.

If the pointer does not operate at 30 ati, proceed with adjustment:
- to depressurize;
- unscrew indicator housing (1) Fig. 7;
- compress or unclamp the rod spring (8) by adjusting nut (3) Fig.7;
- to assemble the index;
- measure/

Recommendations

For operation of AVM-1m apparatus cylinders with imported regulators it is necessary to make an adapter. The drawing of the adapter is shown in Figure 6.

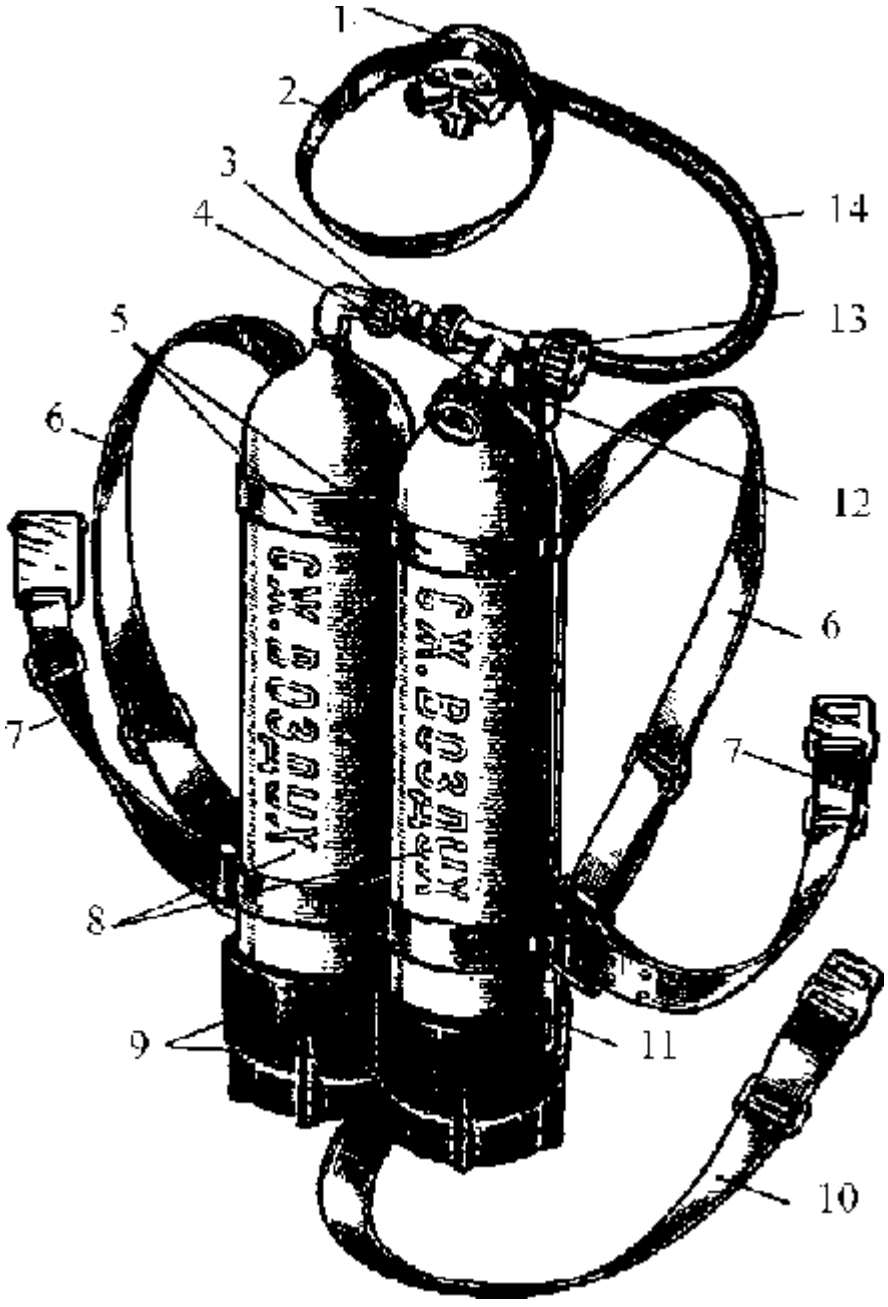
Literature:
1. V.G. Fadeev, A.A. Pechatin, V.D. Surovkin "Man under Water", DOSAAF Publishing House, Moscow, 1960.
2. I.V. Merinov "Light Climbing", Moscow "Transport" 1977.
3. I.V. Merinov, V.V. Smolin, "Diver's Handbook. Questions and Answers", Leningrad "Sudostroenie" 1990.

Aqualungs AVM-7s, AVM-5 and their modifications

About 15 years ago an autonomous breathing apparatus AVM-7s appeared in free sale. The apparatus and its modifications were and still are manufactured in Orekhovo-Zuyevo, Moscow region, at the Respirator plant. The device is simple in design and reliable in operation. Suggested description

In addition, it is possible to avoid accidents caused by malfunctioning equipment, as well as tips on maintenance and operational checks of the equipment.

Appearance of the apparatus.
The appearance of the device is shown in Fig.1
1. Lung machine (2nd stage regulator)
2. Headband
3. Adapter
4. Main air supply valve
5. Clamps
6. Shoulder straps
7. Belt straps
8. Cylinders
9. Shoes
10. Brass belt
11. Remote activation of reserve air supply
12. Gearbox (1st stage regulator)
13. Backup air supply valve
14. Lung machine hose Figure 1

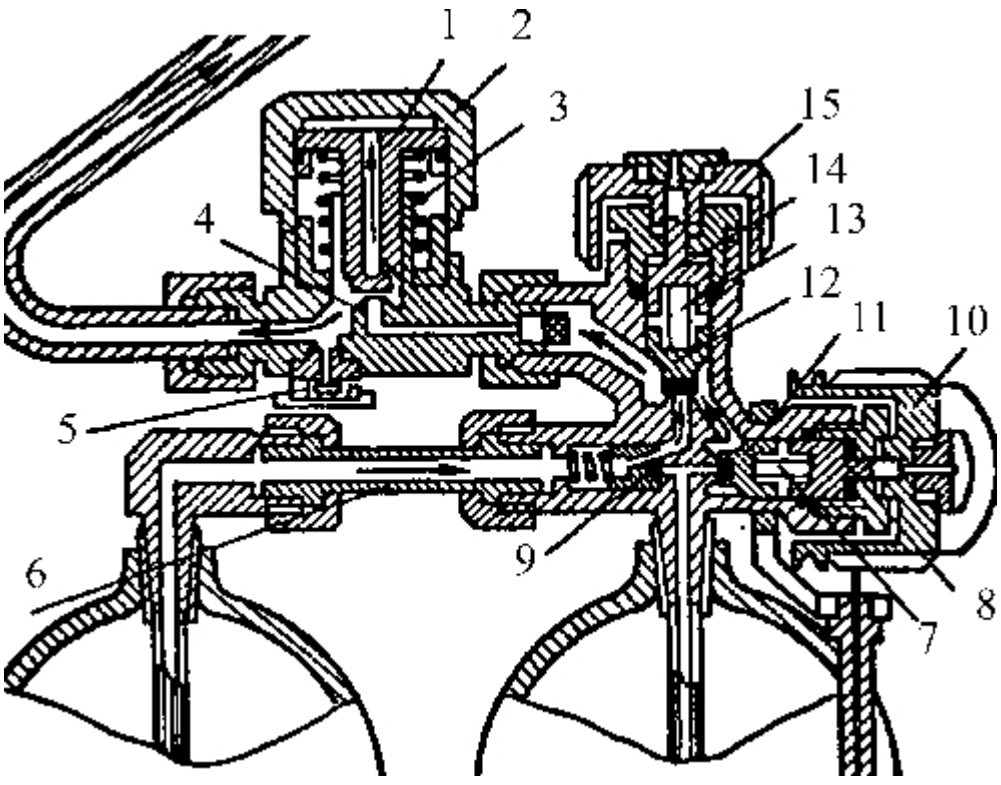


The apparatus consists of the following main units: lung machine (1) Fig.1, reducer (12), cylinder with angle (on Fig.1 it is on the left), cylinder with valve (on Fig.1 it is on the right), rubber shoes (9) are put on the cylinders from below, suspension system (6), (7) and (10), two clamps (5), hose of the lung machine. The cylinders are connected with each other by an adapter (3), the tightness of the connection is achieved by means of rubber sealing rings. A reducer (12) is attached to the cylinder valve outlet fitting, connected by a hose (14) to the lung machine (1). Tightness of the cylinder-reducer-hose-automatic unit connection is achieved by means of rubber sealing rings of different diameter. The cylinders are connected by two clamps (5) with bolts. Between the cylinders there are two dryers, designed to provide a certain gap between the cylinders. On the right and left sides of the lower clamps there are buckles for fastening waist and shoulder straps. Shoulder straps are fastened to the upper clamp's buckle. The brace belt is attached to the lower clamp. To the side posts of the upper and lower clamps, the remote reserve control (11) is attached.

Technical characteristics of AVM-7s apparatus
Working pressure in cylinders 200 ati (modifications with RPAB = 150 ati are available). Set pressure of the reducer is 8 - 10 ati.
Relief valve actuation pressure 10 - 12 ati Relief valve actuation pressure 40 - 60 ati
Capacity of the apparatus cylinders is 7 liters (each).
The weight of the apparatus is about 20 kg (the weight depends on the supplied cylinders).

Schematic diagram of the apparatus
The schematic of the apparatus is
shown in Fig.2 In the schematic:
1; 2; 3; 4 - gearbox parts
5 - safety valve of the reducer
6 - connection of right and left cylinders (adapter) 7; 8; 10;
11 - parts of reserve air supply valve
9 - by-pass valve
12; 13; 14; 15 - parts of the main air supply valve

Figure 2



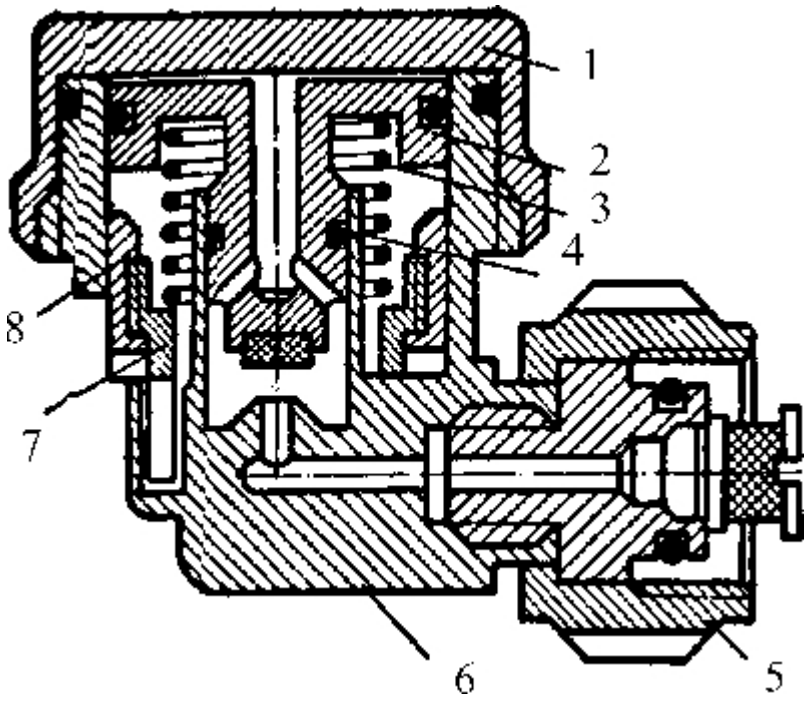
The main air supply valve (15) is open, the reserve air supply valve (10) is closed, the apparatus is charged to operating pressure. When the valve (12) of the valve (15) is open, the air from the left cylinder bypassing the bypass valve (9) goes to the reducer and then to the lung machine for inhalation to the swimmer. For some time the swimmer breathes air from the left cylinder (cylinder with a corner). When the pressure in the left cylinder will be at 40
- 60 ati (relief valve adjustment pressure) is less than in the right cylinder, the relief valve (9) is activated. The valve opens under the influence of the air pressure from the right cylinder and the air from the two cylinders simultaneously flows into the reducer. Due to the operation of the bypass valve, a pressure difference of 40-60 ati will be maintained in the cylinders. The pressure in the right cylinder (cylinder with valves) will be lower than in the left one. When the unit is operating, the pressure difference in the cylinders will be maintained (due to the operation of the relief valve) at all times. When the pressure in the left cylinder will be close to 0, the relief valve under the action of its spring will begin to gradually close. The swimmer will feel resistance with each breath, increasing with each subsequent breath. Until the air in the left cylinder is completely exhausted, you can take 5 - 10 full breaths, then the air in the left cylinder will run out. Having felt the first signs of resistance on the breath it is necessary to pull the lever of remote reserve activation with the right hand (Fig.7). This will open the reserve air supply valve and air from the right cylinder (in which the pressure is 40 - 60 ati), through the channels bypassing the bypass valve, will simultaneously flow into the left cylinder and will go into the reducer and inhale the swimmer. The characteristic sign of successful opening of the reserve air supply valve is the noise of air flowing from cylinder to cylinder, and the cessation of resistance during inhalation. When the pressure in the right and left cylinders is equalized, the noise stops. The pressure in the cylinders at this time (if the relief valve is adjusted to 40 ati) will be 20 ati in each cylinder, or (if the relief valve is adjusted to 60 ati) will be 30 ati in each cylinder. The swimmer's breath air will now be supplied simultaneously from two cylinders. The swimmer then uses this reserve air supply to begin surfacing.

There is no high-pressure manometer in the design of AVM-7s type apparatuses, by which pressure (air reserve) in cylinders can be controlled during diving.
RECOMMENDATION
1. When using the apparatus, be sure to take a dive computer or watch underwater. Knowing at what depth you are swimming and the time, you can always determine approximately when to open the reserve.
2. Never use unfamiliar (foreign) apparatus without first ensuring that the back-up air supply system is working properly.
3. Make periodic adjustments and reserve checks in the presence of a competent technician.
4. Make an adapter and use an imported regulator with a pressure gauge in a set with AVM cylinders.

Operating diagram of the gearbox

The diagram of the gearbox is shown in Figure 4 , and Figure 5
1. Gearbox cover
2. piston
3. Gearbox spring
4. O-ring
5. union nut
6. Gearbox housing
7. Adjustment nut
8. bushing
9. 10. 11. 12 Parts of the safety relief valve

Figure 4

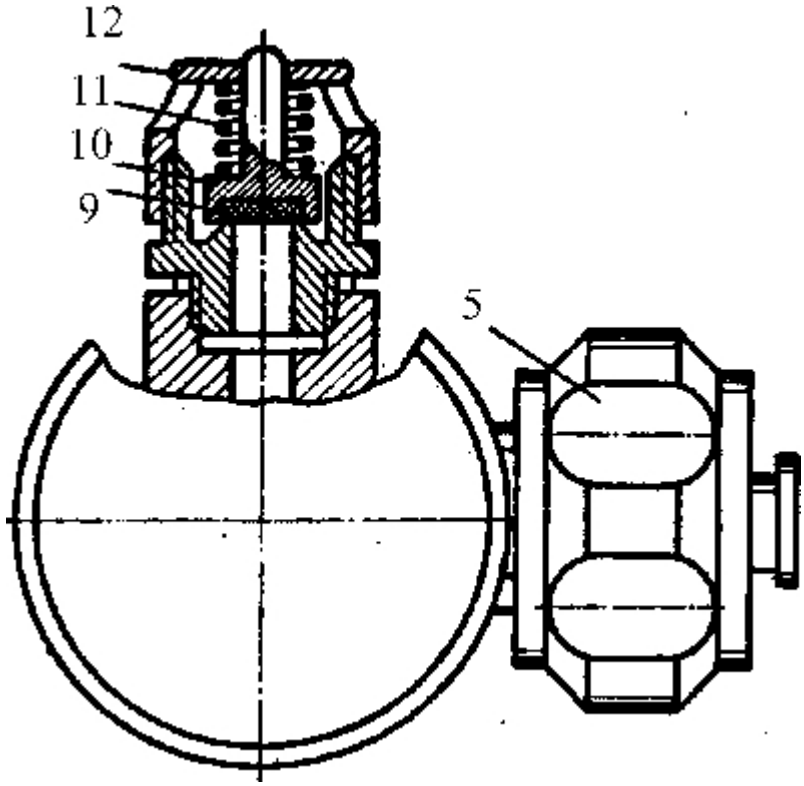


When the main air supply valve is closed, the reducer piston (2) is in the upper position under the action of the spring (3). At the same time, the reducer valve is in the open position. When the main air supply valve is open, air passes through the filter and enters the reducer cavity and the lung machine hose, at the same time air enters the suprapiston space through the channel in the piston body. When the pressure in the piston space is equal to the spring adjustment pressure (reducer setting pressure), the piston will start to move downwards, the spring will be compressed. A secondary plastic valve is pressed into the bottom of the piston. As the piston moves down, the valve seats. This stops the air flowing into the gearbox cavity. When the swimmer takes a breath, the pressure in the reducer cavity and piston space decreases and the piston moves up again under the action of the spring and the valve opens.

There are holes in the gearbox housing. The holes are designed in such a way that the gearbox spring is in the water. Therefore, not only the spring but also the water presses on the piston from below. The water pressure changes with depth. At a depth of 10 meters. The column of water creates a pressure of 1 ati, 20 m - 2 ati, etc. Thus, at any depth of immersion the pressure in the reducer cavity is 8-10 ati higher than the ambient pressure (water).

If for any reason (malfunction, etc.) the pressure in the reducer cavity rises, the safety valve is activated (adjustment pressure 10-12 ati). The safety valve actuation is a signal of the reducer malfunction, it is necessary to start the ascent to the surface immediately.

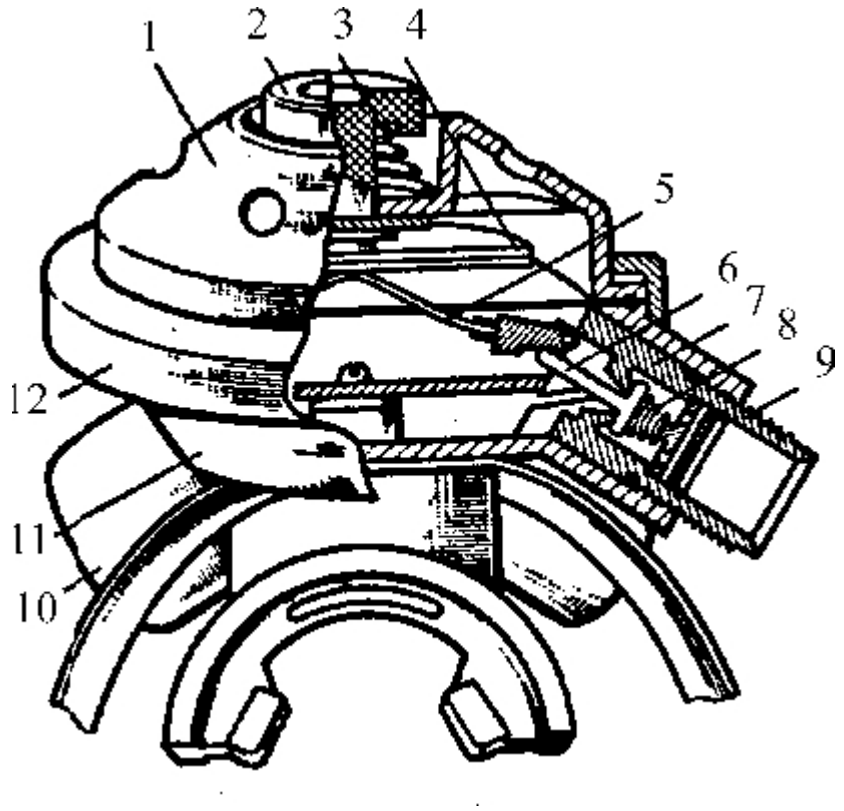
Figure 5



Scheme of operation of the lung machine

A schematic of the pulmonary automaton is shown in Figure 6.
1. Lung machine cover with holes
2. Forced air button
3. Spring of the forced air button
4. Lung machine membrane
5. Lever
6. Automatic valve
7. Valve seat
8. valve spring
9. Strainer
10. Exhalation valve
11. Lung machine housing
12. Cover mounting clamp

Figure 6

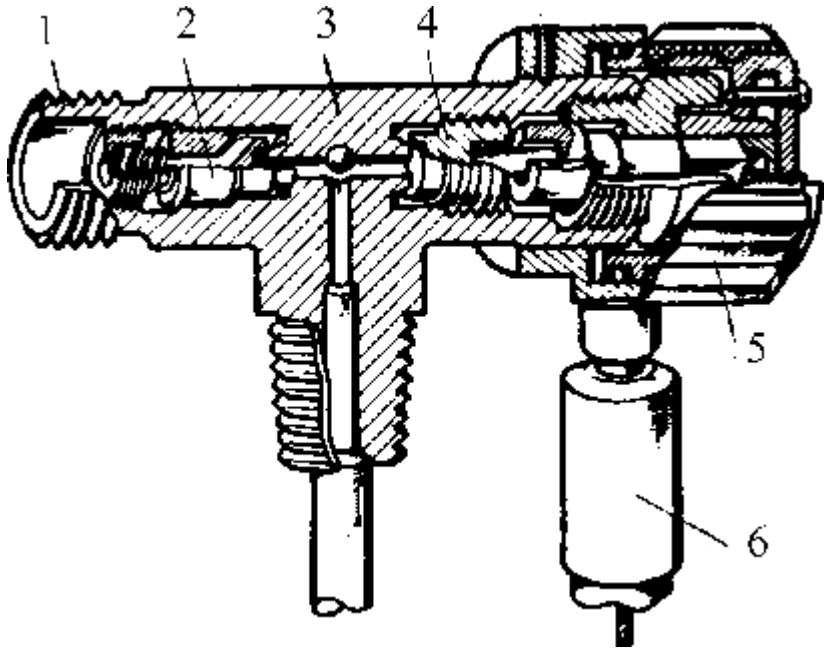


When a diver takes a breath, a vacuum is created in the lung dispenser cavity. At that, the diaphragm (4) moves downward and presses on the lever (5) with its rigid center, the lever, moving around its axis, presses on the dispenser valve, it tilts, moves away from the seat (7) and opens access to the air flow from the hose and reducer cavity to the lung dispenser cavity and to the diver for inhalation through the mouthpiece. When the diver exhales, the diaphragm (4) moves upwards, stops pressing on the lever (5), the valve (6) under the action of its spring sits on the seat, the air access from the hose to the lung machine cavity stops. The diver continues to exhale, pressure is created in the lung machine cavity and the exhaled air is removed through the open (under pressure) exhalation valves into the environment. From the outside, through holes in the cover (1), the diaphragm (4) is pressurized by water. Consequently, at the moment of inhalation, air is supplied to the diver under ambient pressure.

Valve

The main and reserve air supply valves are designed in one housing (3) Fig.8. The valve body is screwed into the cylinder.
The design of both valves is similar and the parts are interchangeable. Only the position and design of the handwheels are different.
When the handwheel of the valve (15) fig. 2 is rotated, the rotation through the spindle (14) fig. 2 and the dryer (13) fig. 2, is transmitted to the valve (12) fig. 2, which moves off or sits on its seat.

Figure 8



Scuba Operational Test

When operating any scuba diver, a working check should be made before each descent. It does not take much time or effort to perform a working check. A properly performed operational check of your equipment will save you a lot of trouble.

1. Check the pressure in the cylinders.

To do this, attach a high-pressure control gauge instead of the reducer. Close the valve on the pressure gauge. Open the main and reserve air supply valves. Read the readings on the manometer. Then close the valves, open the valve on the high pressure gauge (bleed the air from the gauge) and remove the gauge.

2. External Examination.

A) Check the set and correct assembly of the aqualung (attachment of the reducer, lung machine, clamps, straps, etc.), you can take the aqualung by the straps and shake it easily.

B) Adjust the straps

3. Tightness check A) Dry.

With the valves closed, try to inhale from the lung machine. At the same time check the tightness of the diaphragm, exhalation valves, connections. Everything is in good working order if the breath can not be taken.

B) Wet.

Open all valves. Place the lung machine under the tank and lower the tank into the water. If there are air bubbles from under the connections, the aqualung is defective.

4. Check the operation of the bypass valve (reserve). Open the main air supply valve, using the forced air supply button of the lung machine, bleed some air (about 20-30 seconds). Then open the reserve air supply valve. At the same time you should hear a characteristic noise of air flowing from cylinder to cylinder. This test does not determine the amount of bypass valve operation. Having carried out all actions, you are convinced that you have a serviceable relief valve in your scuba tank and, as a consequence, there is a reserve.

AVM-7c scuba diver adjustments

1. Adjusting the setting pressure of the gearbox
2. Adjusting the actuation of the gearbox safety relief valve
3. Adjusting the lung machine
4. Adjusting the operation of the bypass valve (reserve)

Adjusting the setting pressure of the reducer (8-10 ati)
1. Measure the setting pressure. Disconnect
the lung machine.
Connect a test pressure gauge (0-16 ati) to the hose. Close the tap on
the test pressure gauge.
Open the main air supply valve. Measure the pressure
(8-10 ati).
Close the main air supply valve.
Open the valve on the test pressure gauge (bleed air)
2. Adjustment.
Unscrew gearbox cover (1) Fig. 4
Pull out the piston (2) Fig.4 . To do this, screw a puller (or select a screw) into the threaded hole in the upper part of the piston and pull the puller. Then the piston can be easily pulled out. It is not recommended to use a screwdriver and try to hook the piston by the edge.
To increase the setting pressure, compress the reducer spring (3) Fig.4 To decrease it, loosen
the spring.
Two types of gearboxes were produced.
In the first case, to adjust the setting pressure, special adjusting washers must be placed under the spring (3) or removed.
In the second case it is necessary to move the adjusting nut (7) over the thread of the bushing (8) Fig.4.
In both variants the meaning of all actions is to compress or decompress spring (3).
The reducer is then reassembled and the set pressure is measured again.

Adjustment and metering manipulations are performed until the set pressure value is equal to 8-10 ati.

Adjustment of safety valve actuation (10-12 ati)

All AVM aqualung instruction manuals recommend that the safety valve operation be adjusted at the repair and control unit (RCU).
The safety valve is screwed onto a special connection on the control valve. The valve is pressurized and the valve is adjusted to the required pressure by compressing the spring (11) Fig. 5.

In practice, the adjustment is carried out in a slightly different way.
1. Adjust the gearbox to the set pressure
2. Unscrew the lock nut on the safety relief valve
3. Slowly turn the valve body (12) Fig. 5 counterclockwise to the position where the valve starts to actuate.
4. Screw the valve body (12) half a turn clockwise, the valve will stop bleeding air.
5. Tighten the lock nut.

In this way, we adjust the valve to an opening pressure that is slightly higher than the set pressure (0.5-2 ati)

Adjusting the lung machine

It is written in the instruction manual of the scuba diver that the pulmonary automatism is not adjustable. In practice, you can adjust the ease of breathing (resistance on inhalation) by bending the lever (5) Fig.6. When bending the lever, the distance between the diaphragm (4) and the lever (5) Fig. 6 changes, the greater the distance, the greater the resistance to breathing. It should be noted that if the lung dispenser is adjusted correctly, then when placing it in water, the air will come out arbitrarily with the mouthpiece upwards. If the lung machine is turned with the mouthpiece down (as shown in Fig. 6), the air will stop coming out.

Adjusting the operation of the bypass valve (reserve)
1. Measuring the relief valve adjustment pressure.
When measuring this value, the unit must be charged to a pressure of at least 80 ati.

Unscrew the reducer and the lung machine.
With the backup air supply valve closed, open the main air supply valve. Bleed the air.
When the air stops coming out, screw a high-pressure control gauge (0-250 ati) to the connection (instead of the reducer).
Close the tap on the pressure gauge.
The pressure gauge should show 0 ati.
Next, open the backup air supply valve and wait until the pressure in the cylinders is equalized (the characteristic noise of air flowing will be heard).
The pressure indicated by the pressure gauge is the pressure of the air reserve. Multiply this value by 2 to obtain the relief valve actuation pressure.
The air reserve pressure should be within 20-30 ati, respectively the relief valve actuation pressure should be within 40-60 ati.
2. Adjustment
If the measurement results show the need for adjustment. Bleed any remaining air from the cylinders.
Loosen clamps (5) Fig. 1
Loosen the union nuts of the adapter (3) Fig.1 (you can use a gas wrench). Pull cylinders apart and remove adapter (3)
At the point where the adapter (3) is attached to the cylinder with valves, the bypass valve adjusting nut will be accessible.
Change the setting by compressing or unclamping the spring of the by-pass valve using the adjusting nut. If it is necessary to increase the adjustment pressure, compress the spring (turn the nut clockwise), if it is necessary to decrease it, compress the spring.
3. Assemble the tank.
4. Charge to 80 ati.
5. Take a measurement.
6. Repeat the adjustment if necessary.

O-rings and lubrication of the unit

To ensure tightness of connections, the unit uses rubber sealing rings of various diameters. To prevent "drying out", the rings should be lubricated. Technical petroleum jelly (CYATIM 221) or its substitutes are used for lubrication. The lubricated ring should be placed in the grease, kept for some time (5-10 min.), then cleaned from excess grease and put in place. In addition, the machine is lubricated rubbing parts of the gearbox (piston). Apply grease and then remove excess grease.

Frequency of apparatus inspections.

Operational check - before each descent Small check (check all adjustments, lubrication of sealing rings) - before the start of the season Full check (small check + complete disassembly and assembly) - upon receipt from the warehouse, in case of doubt in serviceability, after long storage.