



ООО Конструкторское бюро морской электроники "Вектор"

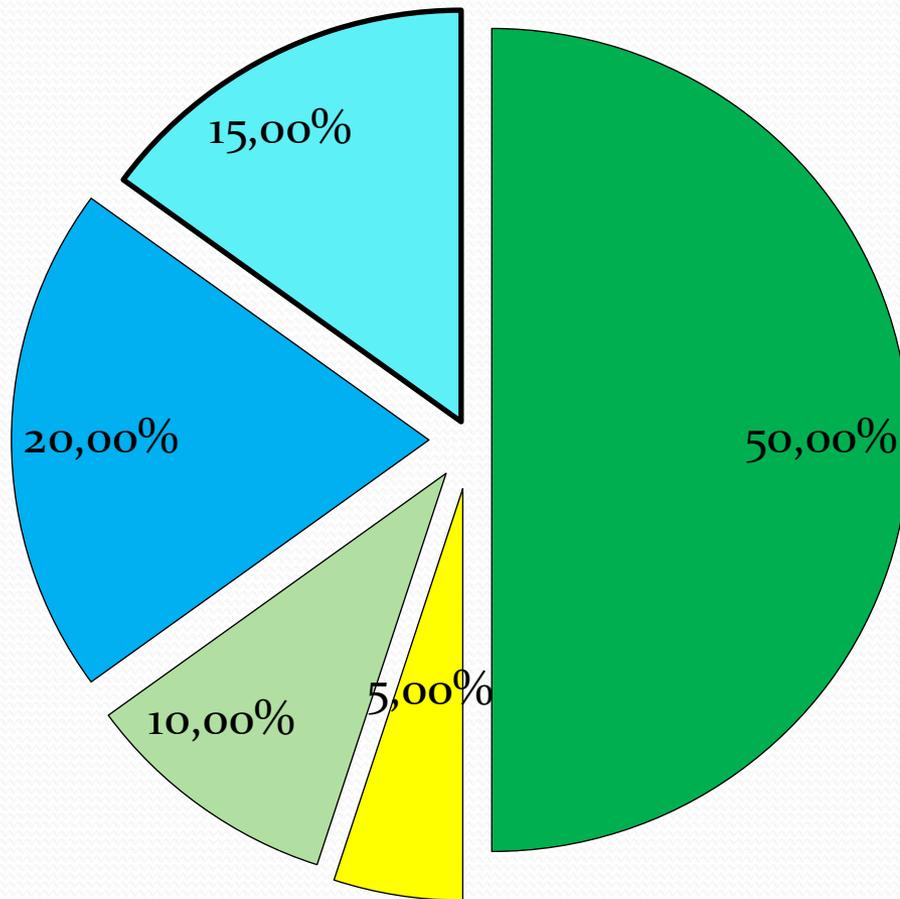
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Low-frequency sonar system to control the behavior of fish

Main tasks solved by GAS



- •Reduction of by-catch of juvenile fish in the selection of commercial fish in pasture aquaculture enterprises;
- •Diversion of fish from water intakes and prevention of its death;
- •The direction of the fish in the fish pass at the hydro bypass;
- •Concentration of fish in the given areas at the organization of recreational fishing;
- •Attraction and return of fish in cages in case of violations of their integrity.

Description of GAS system

Description sistemicas the GAS system is designed to affect fish and other aquatic organisms by emitting acoustic signals with specified characteristics into an aqueous medium;

The GAS system contains an electronic unit and a hydroacoustic low-frequency Converter. The extended system package used for research purposes also contains a hydroacoustic hydrophone;

Power supply of the electronic unit can be performed from the power network with a voltage of 100-240 V at a frequency of 50-60 Hz or from batteries with a voltage of 10-16 V.

The electronic unit contains a signal conditioner, pre-amplifiers, filters, power amplifier, switching elements, power supply;

The final consumer of GAS is transmitted:

Low-frequency hydroacoustic Converter (their number is agreed with the consumer);

Electronic unit;

Connecting cords and cables;

Technical description and operating instructions, form;Hydrophone (with additional equipment);

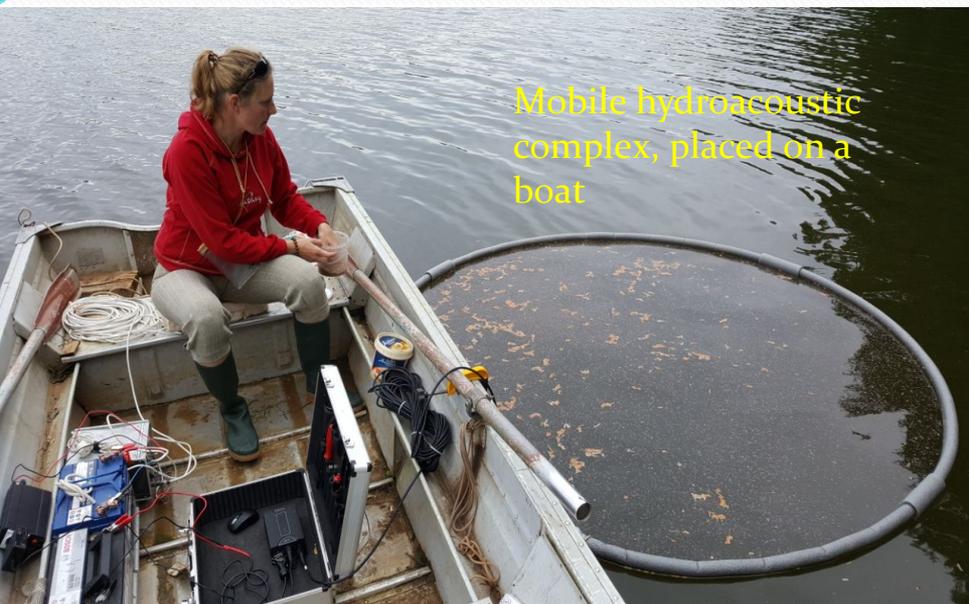
Shipping containers.

Additional information on the methods of use of GASCH is available on the website of KBME "Vector»

Physical and biological basis of the impact of acoustic signals on fish

The fish community develops a reflex connection between feeding and the impact of low-frequency acoustic signals with the specified parameters. After such "training", it is possible to attract fish to the specified areas of the water area with the help of the same emitted acoustic signals.

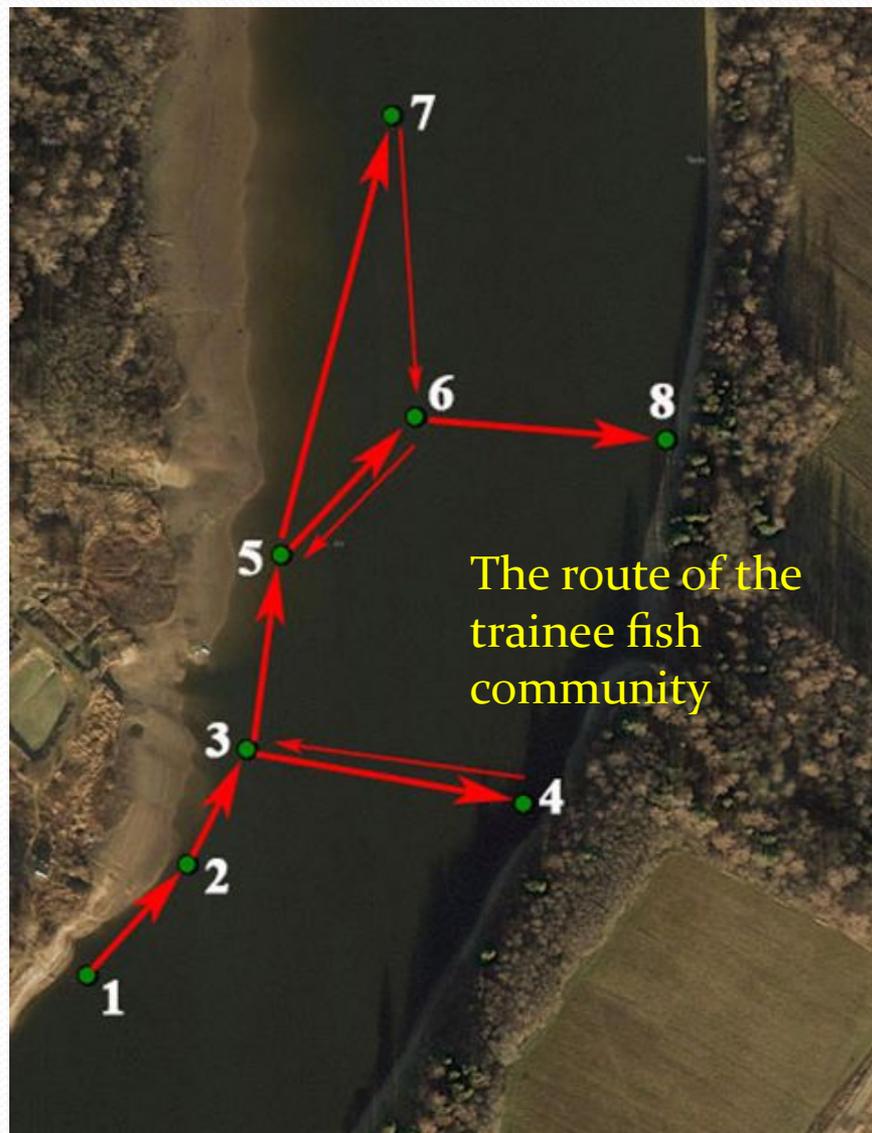
Movement of fish within the water area of the experimental range



Mobile hydroacoustic complex, placed on a boat



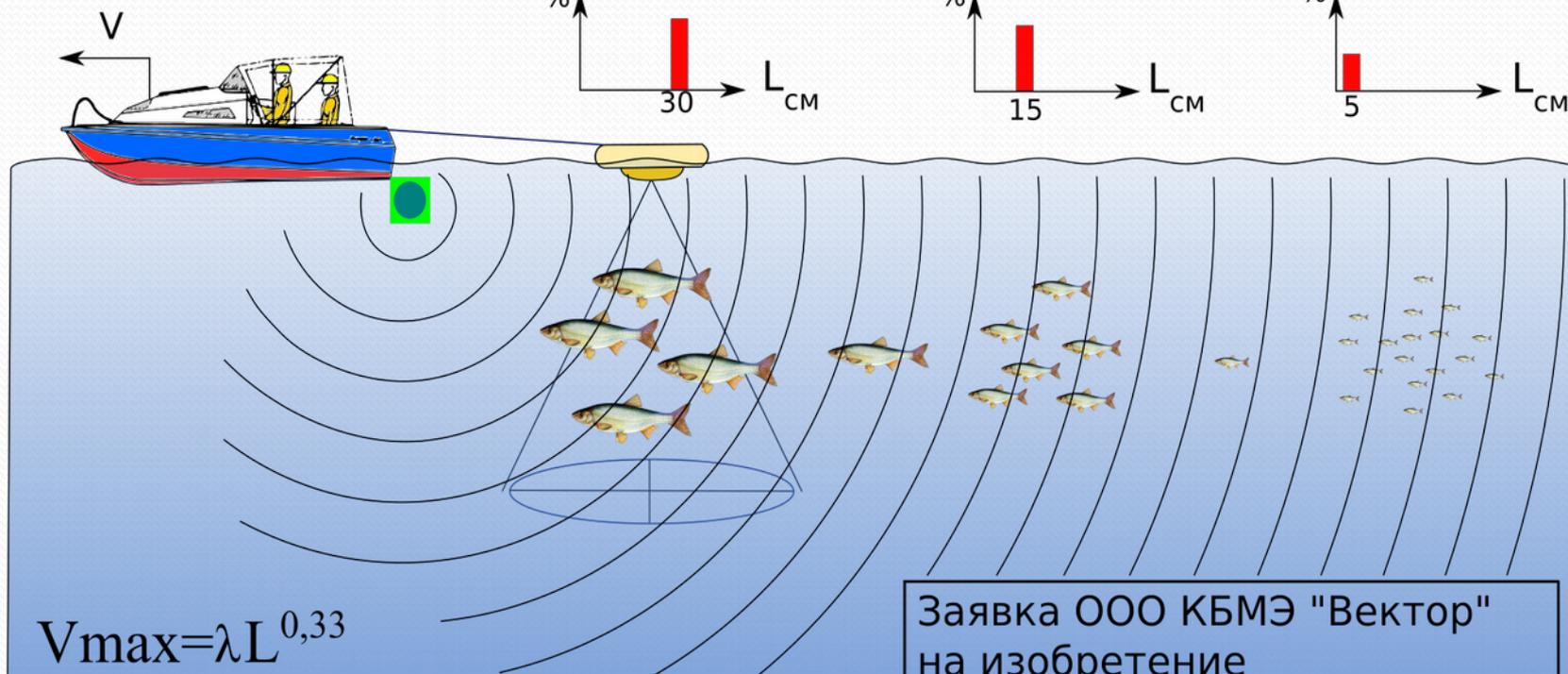
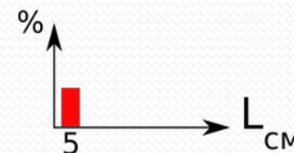
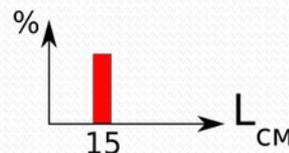
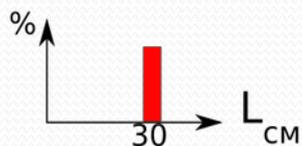
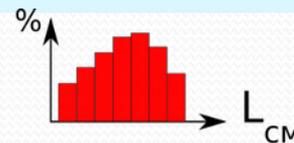
A flock of trained fish inside the feed area



The route of the trainee fish community

Selective selection of commercial fish for pasture aquaculture

Исходное распределение рыб по размеру -



$$V_{\max} = \lambda L^{0,33}$$

где λ - зависит от вида рыбы

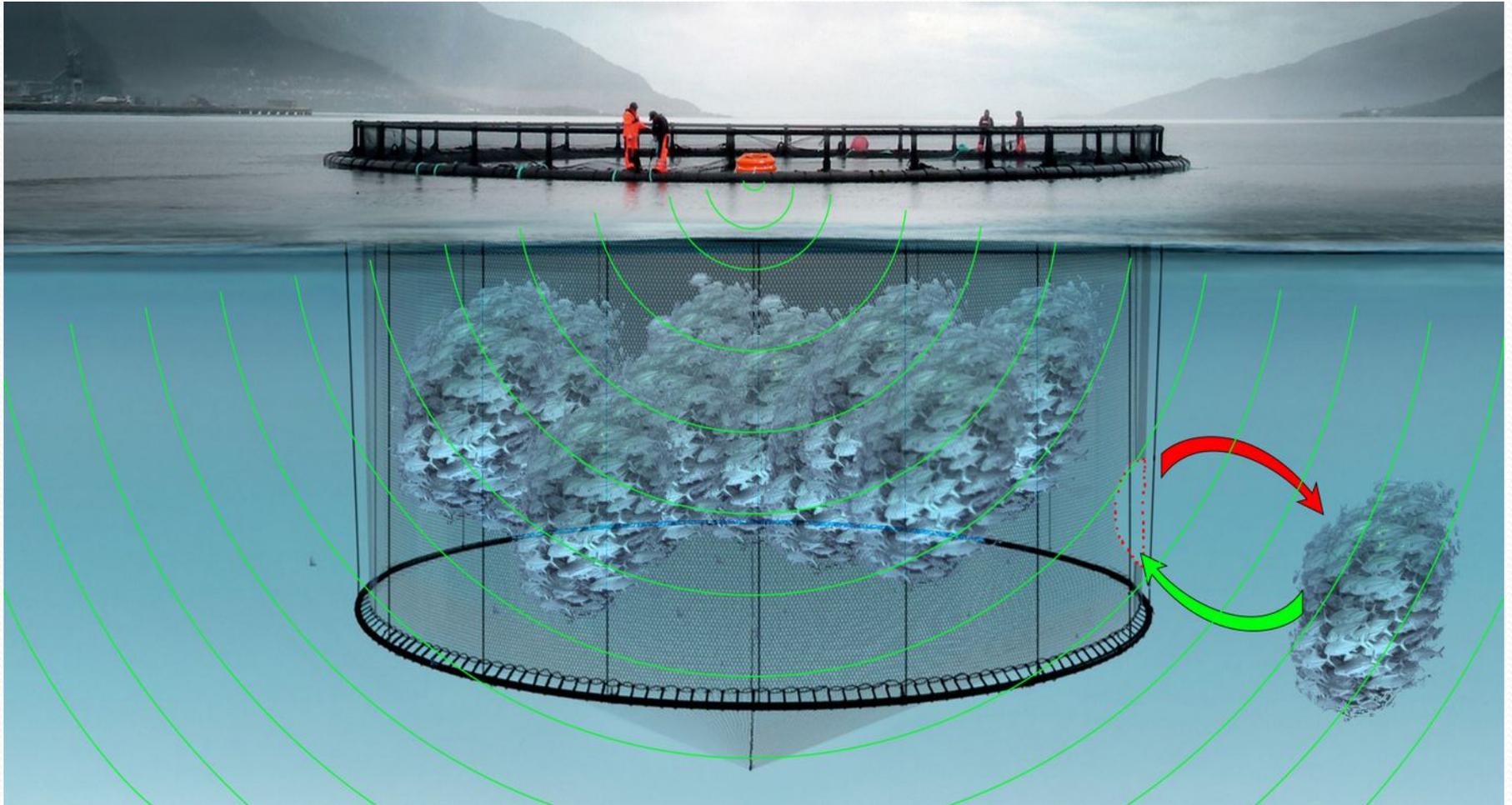
L - длина рыбы

Заявка ООО КБМЭ "Вектор"
на изобретение
"Способ селективного отбора
товарной рыбы"
№2017139063/13(068093)

Method of selective selection of commercial fish

Perform selective selection of trained fish with pre-established reflex dependencies between feeding processes and acoustic signals. The initial composition of the fish is characterized by a histogram showing its relative number for each size intervals. When such fish is caught, even taking into account the selectivity of the fishing gear (nets) used, there will be a significant by-catch of small fish, as well as injury to the snatched fish from the nets. To reduce the by-catch of young fish, the dependence of the maximum speed of the fish on its length is used. Before fishing include acoustic transducer that emits acoustic signals to attract fish. The acoustic transducer installed on the boat is moved in space at such a speed V that the fish fry gradually lagged behind the boat. Control of the size of the fish following the boat is determined by the hydroacoustic equipment installed also on the boat. After obtaining the necessary size of the fish, perform its fishing.

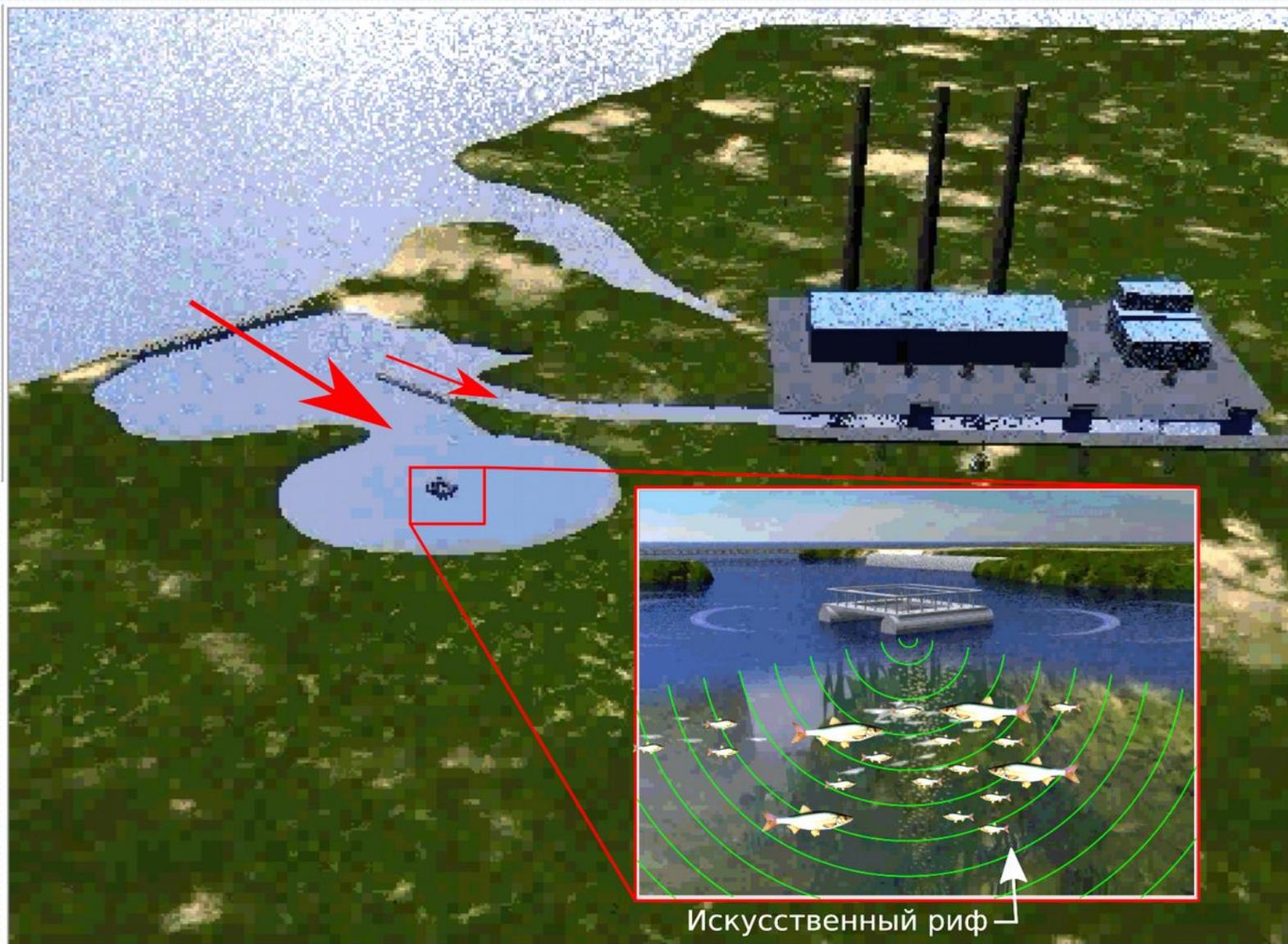
Return of fish to the tank in violation of its integrity



Way to return fish to cages

In fish, located in the cages, pre-set reflex dependence between feeding and its impact on the acoustic signals. In case of unauthorized exit of fish from the cages, for example, when breaking their net web, include an acoustic transducer that emits acoustic signals that attract fish into the cages.

Diversion of fish from water intakes and prevention of its death



Diversion of fish from water intakes and prevention of its death

In fish, located in the area of water intake, pre-set reflex dependence between feeding and its impact on the acoustic signals. The acoustic radiator is located in the pool, which takes the fish away from the water intake. Coming back attracts fish for an untrained community fish. To maintain reflexes in force periodically conduct sessions feeding fish located in the pool, while the impact on her acoustic signals.

Use of Gas in recreational fishing

On the sites of recreational fishing, 5-10 sessions of feeding fish are carried out with simultaneous impact of a low-frequency acoustic signal on it. This allows the fish community to get a reflex connection between these processes, which is used in the future to attract fish to the given areas of the water area. To increase the bite, fish are attracted to the fishing zone by turning on the acoustic transducer located in it. If necessary, the opposite – divert fish Converter features out-of-zone fisheries.

Patents obtained by KBME "Vector»

1. Patent No. 100924-priority from 04 October 2010 "Acoustic system effects on aquatic organisms»
2. Patent No. 104020 with priority dated 24 December 2010 " Adaptive acoustic system for exposure to hydrobionts»
3. Patent № 129266 with priority of January 09, 2013 " Mobile acoustic monitoring system of fish ponds»
4. Patent № 168944 with priority of November 10, 2016 " Hydroacoustic low-frequency Converter»
5. Filed application No. 2017139063/13 from 09.11.2017 on "Method of selective breeding of commodity fish»

РОССИЙСКАЯ ФЕДЕРАЦИЯ



ПАТЕНТ

НА ПОЛЕЗНУЮ МОДЕЛЬ

№ 100924

**АКУСТИЧЕСКАЯ СИСТЕМА ДЛЯ ВОЗДЕЙСТВИЯ НА
ГИДРОБИОНТОВ**

Патентообладатель(ли): *Общество с ограниченной
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электротехника "Вектор" (ООО КБМЭ "Вектор") (RU)*

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Николаевич (RU)*

Заявка № 2010140547

Приоритет полезной модели 04 октября 2010 г.

Зарегистрировано в Государственном реестре полезных
моделей Российской Федерации 10 января 2011 г.

Срок действия патента истекает 04 октября 2020 г.



*Руководитель Федеральной службы по интеллектуальной
собственности, патентам и товарным знакам*

Б.П. Симонов

The patent proposes an acoustic system for the impact on hydrobionts low-frequency acoustic signal, which is formed from two or more high-frequency interacting acoustic signals. The low frequency signal can be moved in space, sounding local areas of the water environment.

РОССИЙСКАЯ ФЕДЕРАЦИЯ



ПАТЕНТ

НА ПОЛЕЗНУЮ МОДЕЛЬ

№ 104020

**АДАПТИВНАЯ АКУСТИЧЕСКАЯ СИСТЕМА ДЛЯ
ВОЗДЕЙСТВИЯ НА ГИДРОБИОНТОВ**

Патентообладатель(ли): *Общество с ограниченной
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электроники "Вектор" (ООО КБМЭ "Вектор") (RU)*

Автор(ы): *Долгов Александр Николаевич (RU), Максимов
Виталий Николаевич (RU)*

Заявка № 2010153401

Приоритет полезной модели 24 декабря 2010 г.

Зарегистрировано в Государственном реестре полезных
моделей Российской Федерации 10 мая 2011 г.

Срок действия патента истекает 24 декабря 2020 г.

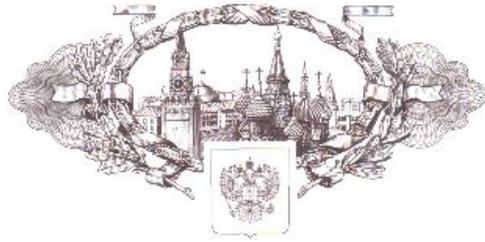
*Руководитель Федеральной службы по интеллектуальной
собственности, патентам и товарным знакам*



Б.Н. Симонов

An acoustic system is proposed for the influence of low-frequency acoustic signal on hydrobionts, which can be moved in the aqueous medium. The signal parameters are automatically adjusted depending on the type of hydrobionts and the desired effects.

РОССИЙСКАЯ ФЕДЕРАЦИЯ



ПАТЕНТ

НА ПОЛЕЗНУЮ МОДЕЛЬ

№ 129266

**МОБИЛЬНАЯ СИСТЕМА АКУСТИЧЕСКОГО
МОНИТОРИНГА РЫБОРАЗВОДНЫХ ВОДОЕМОВ**

Патентообладатель(и): *Общество с ограниченной
ответственностью "Конструкторское бюро морской
электроники "Вектор" (ООО КБМЭ "Вектор") (RU)*

Автор(ы): *Долгов Александр Николаевич (RU), Максимов
Виталий Николаевич (RU)*

Заявка № 2013100905

Приоритет полезной модели 09 января 2013 г.

Зарегистрировано в Государственном реестре полезных
моделей Российской Федерации 20 июня 2013 г.

Срок действия патента истекает 09 января 2023 г.

*Руководитель Федеральной службы
по интеллектуальной собственности*

Б.П. Симонов



A mobile system with various hydroacoustic systems as well as sensors recording the parameters of the water environment is proposed. The system moves on the surface of the reservoir and the results of research on the radio channel are transmitted to the operator, which records the results, as well as controls the mobile system. The design of the system is chosen such that it can be easily moved from one reservoir to another.

РОССИЙСКАЯ ФЕДЕРАЦИЯ



ПАТЕНТ

НА ПОЛЕЗНУЮ МОДЕЛЬ

№ 168944

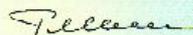
**ГИДРОАКУСТИЧЕСКИЙ ПИЗКОЧАСТОТНЫЙ
ПРЕОБРАЗОВАТЕЛЬ**

Патентообладатель: *ООО Конструкторское бюро морской
электроники "Вектор" (RU)*

Авторы: *Долгов Александр Николаевич (RU), Максимов
Виталий Николаевич (RU), Воловова Лариса Андреевна (RU),
Гончаров Сергей Михайлович (RU)*

Заявка № 2016144250
Приоритет полезной модели 10 ноября 2016 г.
Дата государственной регистрации в
Государственном реестре полезных
моделей Российской Федерации 28 февраля 2017 г.
Срок действия исключительного права
на полезную модель истекает 10 ноября 2026 г.

Руководитель Федеральной службы
по интеллектуальной собственности

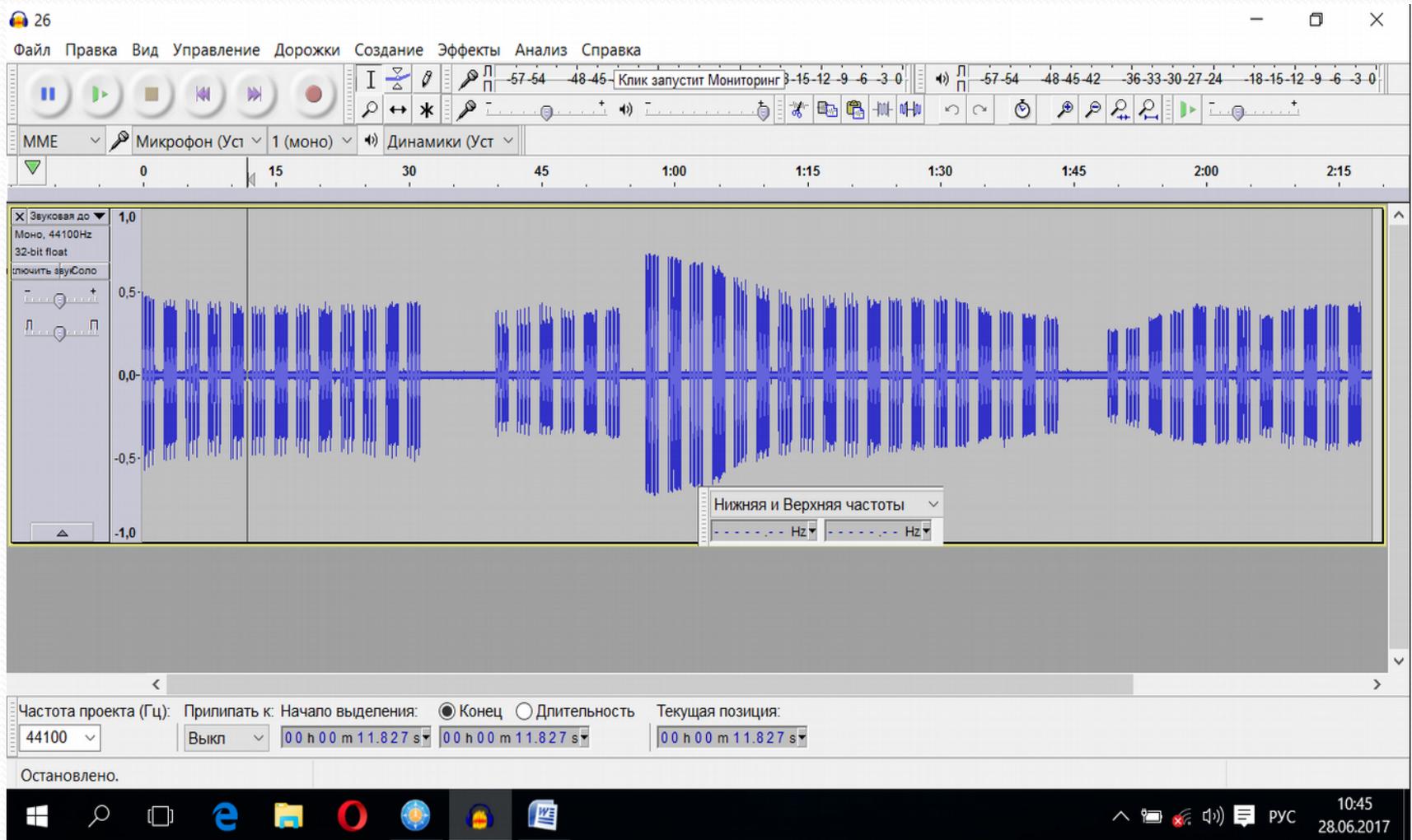
 Г.И. Налимов



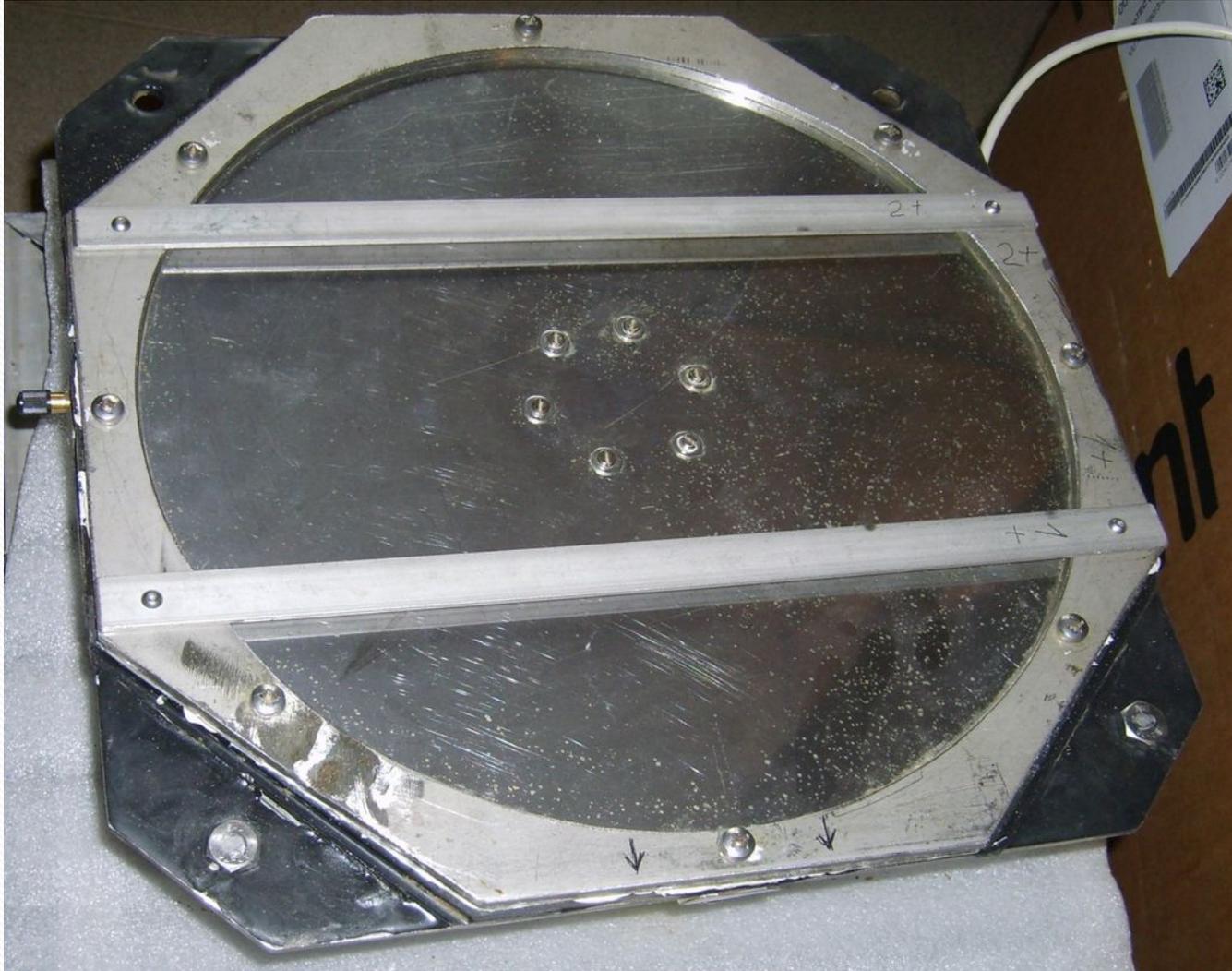
A low-frequency acoustic radiator with a hydrostatic pressure compensator is proposed, which allows it to operate at different depths without deterioration of the emitted acoustic signal. The Converter is designed to affect fish and other aquatic organisms.

Experimental test

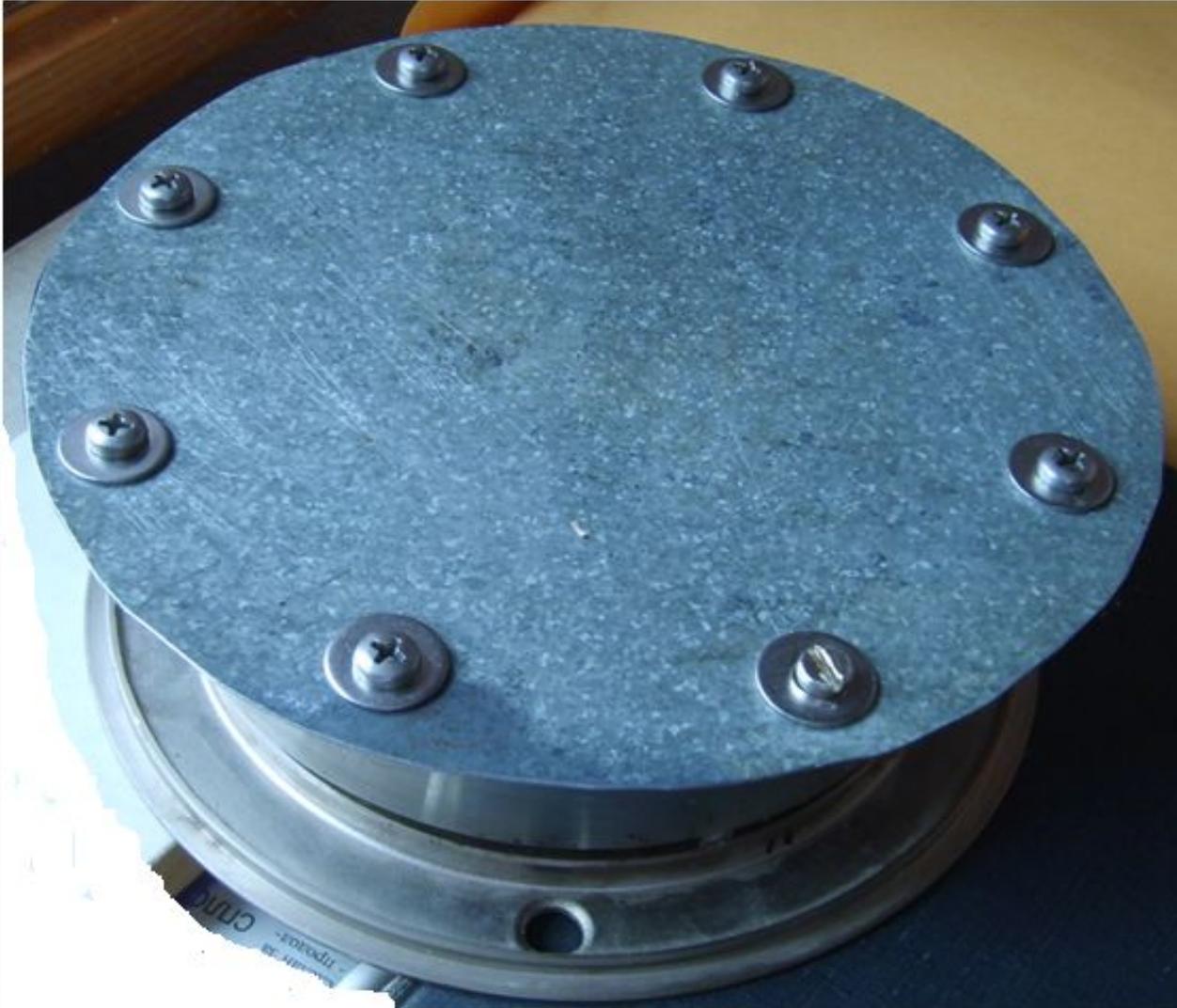
- Records of signals of influence



The layout of the electrodynamic transducer with a compensation of the hydrostatic pressure.



The layout of the electromagnetic transducer



Electronic unit for excitation of two hydroacoustic transducers



Example of testing the version of the GAS on lake «Glubokoe» in the Moscow region



Summary

1. The staff of VNIRO confirmed the acquisition from the fish reflex connections between the processes of feeding and the impact on the low-frequency acoustic signals. They show that the community of such "trained" fish can be controlled by the impact on them of acoustic signals.
2. As a result of the work in this direction, carried out jointly by VNIRO, in KBME "Vector" several variants of equipment used for acoustic effects on fish were developed. The development is made at the level of inventions.
3. The models of the developed devices were tested, which showed the possibility of their use at different stages of fish growing in aquaculture enterprises. At the same time, they received feed savings, an increase in the percentage of catch of commercial fish of a given size with its grazing, and other positive effects.
4. The proposed equipment can be used by designers of aquaculture systems in the creation of highly automated Aqua farms.
5. It is necessary to carry out the ROC for the production of a set of technical documentation for the developed equipment with the letter O₁ for its subsequent serial production. During the execution of the ROC must also VNIRO and other interested institutions of the Russian Federal fisheries Agency and Russian Academy of Sciences to work out the technology of using instruments for a variety of applications for subsequent release of methodical recommendations to consumers.

Thank you for listening!