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INFORMATION REPORT INFORMATION REPORT

CENTRAL INTELLIGENCE AGENCY

C-O-N-F-I-D-E-N-T-I-A-L
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COUNTRY USSR

REPORT

SUBJECT Brochures of Soviet Inventions Offered Under a License Agreement

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brochures of Soviet equipment

The brochures describe inventions for which the Soviet patent agency Litsentsintorg is offering licenses.

a. Below-Elbow Prosthesis with Bioelectric Control.

b. Semi-Conductor Thermoelectric Cooling Devices.

c. All-Purpose System of Elements for Industrial Pneumoautomatics.

d. Electric Integrator ETNA for Non-Stationary Thermal Conduction Problems.

e. Magnetographic Flaw Detector Type MD-11.

f. Electric Dialing Unit.

g. Supersensitive Highly Stabilized Broad Band Radioreceiving SHF System with a High Degree of Selectivity.

h. Thermoelectrical Refrigerating.

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STATE	DIA	ARMY	NAVY	AIR	NSA	AEC XXX NIC		50X1-HUM

(Note: Field distribution indicated by "#".)

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Vsesojuznoje Objedinenije
"Licensintorg"
Moskva G-200, Smolenskaja 32/34

SUPERSENSITIVE HIGHLY STABILIZED BROAD BAND RADIORECEIVING SHF SYSTEM WITH A HIGH DEGREE OF SELECTIVITY

Vsesojuznoje Objedinenije "Licensintorg" offers a license for a newly developped SHF Radioreceiving System which allows to realize fully all the possibilities and achievements of the modern radiotechnics and physics.

The System allows to eliminate all the shortcomings inherent even in unique receiving systems of the USA and England.

Well-known systems have parameters which do not satisfy the requirements of the I.R.Q.C. for high-grade devices for receiving multichannal television information. Their sensitivity is many times lower than the sensitivity of the new system.

Besides, the dimentions, weight and power consumption are so great that their mass production and wide introduction are practically impossible at present.

The offered system can be fully unified and can operate in the three versions of conditions:

1. Supersensitive Conditions.

In these conditions the System has a highest possible sensitivity in radiotechnics. The sensitivity [illegible] of the [illegible] of the antenna [illegible]

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All the other parameters (passband, selectivity, stability etc.) satisfy the requirements of the I.A.G.C.

The power consumption may achieve some kilowatts. The dimensions of the receiving system proper are about 40 x 40 x 100 cm.

2. Conditions of High Sensibility.

The noise temperature of the system in these conditions measured at the radiator is 10 to 15°K at the high quality of all the other parameters.

The power consumption of such a modification is 2 to 3 kWs. The dimensions of the receiving system proper are the same, the dimensions and weight of auxiliary devices are reduced by about twice.

3. Facilitated Conditions.

In these conditions the noise temperature of the system measured at the radiator is 30 to 50°K at the high quality of the other parameters.

The dimensions and weight of the receiving system and auxiliary devices are reduced by two or three times.

The system together with the power supply can be placed into a usual box of a high quality television receiver.

The receiving device practically does not require any reservation. It can be put into mass production with using standard details, produced by the industries of the USSR, the USA, England, Japan and other countries.

The system is notable for simplicity and solidity of the construction, thus small dimensions and weight.

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of well-known similar systems which have worse
parameters is about one hundred thousand dollars.

The cost of receivers made for the first and
second versions of conditions will be somewhat more than
the cost of a high-quality television set.

The quality of an especial value of the offered
receiving system is the possibility of its adjustment
to the input of any usual commercial television set of
any TV standard if there is need to carry on the
reception in points remote from the relay net of long
distance high fidelity TV transmission, for example
translation of the Olympique games from Tokyo.

The offered receiving system makes it possible
for a communication SHF transmitter to operate to a
single antenna without decreasing the parameters of the
receiving set.

The receiving system has a high stabilized
heterodyne (about 10^{-9}) which can be used as an
exciter of the transmitter.

Specification and Basic Features of Radioreceiving System

1. Frequency band is 300 to 30,000 mc/s, millimeter
band is also possible.
2. Bandwidth of the linear part of the system is 20 to
30 mc/s. It is possible to operate at any bandwidth
in the limits of one octave.
3. Unevenness of the amplitude character in the bandwidth
is less than 0,5 db.
4. Selectivity in respect of jammings at the frequency
of "mirror channel" is more than 40 db. At the first
and second versions of conditions any [illegible] selectivity
can be achieved without [illegible]

6. The active amplifying elements are protected from the action of a strong interference.
6. The system provides for the operation simultaneously or by turns in some bands of centimeter or millimeter waves by means of electrical or mechanical switching.
7. The main units of the system are standardized and have a small quantity of details.
8. The system can be made mobile and provides for the operation at the set vibration and in the different climatic conditions.
9. The dimensions of the system made in miniature are 40 x 40 x 300 mm (without chassis and box). The system can be made of smaller dimensions.
10. The tolerance of the standard elements may be permitted at the range of 20%.
11. The system is particular for the simplicity of tuning and the stability of the set parameters in the course of the operation.
12. The system can operate without a separate antenna irradiator and its canal.

Please send your enquiries to V/O "Licensintorg", Smolenskaja pl. 32/34, Moscow G-200.

Telegraph address: Moscow Licensintorg
Telephone: 44-21-93.

Vsesojuznoje Objedinonije
"Licensintorg"
32/34 Smolenskaja
Moscow G-200

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h. THERMOELECTRICAL REFRIGERATING (Refrigerator "Fountain")

V/O "Licensintorg" offers a license for the semiconductor thermoelectrical refrigerator, named "FOUNTAIN", which intended for preserving small quantities of food products.

For cooling the cabin is employed a semiconductor thermobattery, the hot junction of which is kept cool by water spraying through a fountain. Such an unusual method of removing heat has been followed to produce a highly economic refrigerator, as the temperature of the fountain water is usually 2 - 3°C below the room temperature. This increases the efficiency of the thermobattery to a considerable extent. For example the refrigerators of the same volume which are produced in the USA consume electrical energy two times more than the refrigerator "Fountain".

For producing a miniature thermobattery 30 grams of semiconductor material is consumed which is equivalent to a volume of 4 cc.

Made in a form of a night-table from valuable wood, this refrigerator will decorate any dining-room or drawing-room. The beautiful fountain also moistens and ionises the air in the room.

The second model of this refrigerator is designed for use in the kitchen. The cupboard can be placed on the floor or hang on the wall. The second model is more convenient as it saves working space.

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Technical Figures

1. Useful volume of the refrigerator cabin — 20 litres
2. Temperature in the refrigerator cabin at a temperature of the surrounding air of 20° and normal [illegible] — [illegible] 0°C
3. Weight of the semiconductor material required for the refrigerating thermo-battery — 30 grams
4. Voltage [illegible] — 127 [illegible]
5. The refrigerator has a full-wave rectifier housed in the [illegible]
6. Power consumption [illegible] — 20 [illegible]
7. Power of the [illegible] used for the [illegible]
8. The refrigerator [illegible] to be filled with [illegible] once a week.

Sizes

a) The refrigerator in a wooden frame [illegible] table in addition to the refrigerator cabin.

If the refrigerator is used as a bar, then champagne, [illegible] etc. [illegible] in the refrigerator cabin and [illegible] may be placed on the shelves of this [illegible]

[illegible]

F

most proportio[illegible]

height

width

depth

b) The wall refrigerator in a metallic frame has the following dimensions:

590 mm

[illegible] mm

[illegible] mm

[illegible]

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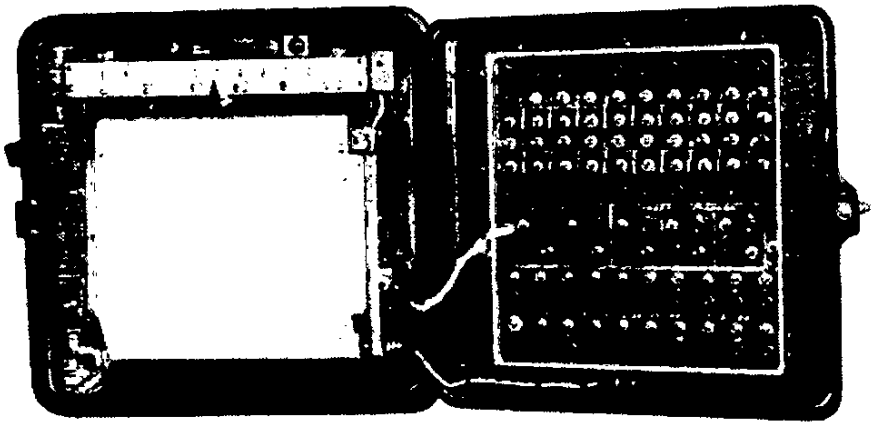

ЭЛЕКТРОИНТЕГРАТОР ЭТНА ДЛЯ РЕШЕНИЯ ЗАДАЧ НЕСТАЦИОНАРНОЙ ТЕПЛОПРОВОДНОСТИ

ETNA

ELECTRIC INTEGRATOR ЭТНА FOR NON-STATIONARY THERMAL CONDUCTION

ЭЛЕКТРОИНТЕГРАТОР ЭТНА ДЛЯ РЕШЕНИЯ ЗАДАЧ НЕСТАЦИОНАРНОЙ ТЕПЛОПРОВОДНОСТИ

Электроинтегратор ЭТНА представляет собой электрическое моделирующее устройство с сеткой из омических сопротивлений, предназначенное для решения дифференциальных уравнений в частных производных нестационарного теплового состояния элементов конструкций.

Результаты решения задач нестационарной теплопроводности автоматически регистрируются с помощью многоточечного самопишущего прибора.

С помощью электроинтегратора можно исследовать нестационарное тепловое состояние элементов конструкции при следующих условиях:

совместный конвективный и лучистый теплообмен;

многослойная стенка плоской, цилиндрической или сферической формы;

наличие внутреннего тепловыделения и фазовых превращений;

наличие изменения теплофизических параметров материала и граничных условий.

Электроинтегратор является универсальным, недорогим малогабаритным прибором настольного типа. Прибор изготавливается из стандартных деталей, на базе серийных многоточечных самописцев.

В отличие от электронных цифровых машин, используемых для решения указанных выше задач, электроинтегратор ЭТНА не требует специального программирования и значительно проще в изготовлении и эксплуатации при точности, удовлетворяющей требованиям инженерной практики.

Измерительная часть регистрирующего прибора электроинтегратора имеет оригинальную конструкцию, что устраняет необходимость применения высокостабильных источников питания измерительной схемы и обеспечивает возможность регистрации относительной величины искомой функции. Регистрирующий прибор также используется для настройки сопротивлений задания (выдачи) граничных условий.

Благодаря регистрации на диаграммной бумаге кривых распределения температуры в зависимости от времени, значительно ускоряется и облегчается процесс решения.

Разработанная техническая документация на прибор позволяет быстро организовать производство электроинтегратора ЭТНА.

Электроинтегратор сможет найти широкое распространение в проектных, исследовательских и учебных учреждениях, в заводских лабораториях при решении тепловых задач, встречающихся во всех областях техники (теплоэнергетика, строительная техника, химическая промышленность, машиностроение и т.д.), а также и для решения ряда других задач из смежных областей (теория диффузии, гидродинамика и др.).

По запросам заказчика В/О "Лицензинторг" может направить высококвалифицированных специалистов для оказания технической помощи при организации производства и для обучения местных специалистов.

Единственным продавцом лицензии на изготовление, использование и продажу электроинтегратора ЭТНА является В/О "Лицензинторг".

Ваши запросы направляйте по адресу:
Москва Г-200, Смоленская пл. 32/34, В/О "Лицензинторг"
Телеграфный адрес: *Москва Лицензинторг*
Телефон: *44-21-88*

ELECTRIC INTEGRATOR ЭТНА FOR NON-STATIONARY THERMAL CONDUCTION PROBLEMS

The electric integrator ЭТНА is an electric simulator with a net of ohmic resistors which is intended for solving partial differential equations describing non-stationary thermal processes in construction elements.

The solutions of non-stationary thermal conduction problems are automatically recorded by an automatic multiple-point recorder.

The electric integrator may be used for investigating non-stationary thermal processes in construction elements under the following conditions:

simultaneous convection and radiant heat exchange;
flat, cylindrical or spherical multi-layer wall;
internal heat irradiation and phase conversions;
variations of thermal physical parameters of the material and of boundary conditions.

The electric integrator is a cheap general-purpose small-size table-mounted instrument. The integrator is assembled from standardized parts and employs commercially-produced multiple-point recorders.

The advantages of the ЭТНА electric integrator over electronic digital computers used for solution of similar problems are that the integrator does not require a special operation programme and is easier to manufacture and in operation while its accuracy meets the standard requirements.

The construction of the measuring system of the integrator recorder is such that it requires no high-stability power supply and permits recording of the relative value of the calculated function. The recorder is also used for setting the boundary conditions of problems.

Charts of temperature-versus-time variations produced by the integrator make for an easier and quicker solution.

Thoroughly detailed technology makes it possible to start the manufacture of the electric integrator ЭТНА within a short period of time.

The integrator can be used in research, development and educational establishments and in factory laboratories for the solution of various thermal problems encountered in heat-power engineering, construction engineering, chemical industry, mechanical engineering, etc. and also for solving a number of other problems in the allied fields (diffusion theory, hydrodynamics, and others).

At the request of the Buyers, V/O "Licensintorg" may provide qualified experts for rendering technical assistance in integrator production and for training local personnel.

V/O "Licensintorg" has the exclusive right to sell licences for the manufacture, use and distribution of the electric integrator ЭТНА.

Please, write to: *V/O "Licensintorg", Moscow G-200, Smolenskaya square, 32/34.*
Cable: *Moscow Licensintorg*
Telephone: *44-21-88*

ELEKTRO-INTEGRATOR ЭТНА ZUM LÖSEN VON AUFGABEN DER INSTATIONÄREN WÄRMELEITFÄHIGKEIT

Der Elektro-Integrator ЭТНА ist eine mit einem Netz aus Ohmschen Widerständen ausgerüstet Modelleinrichtung, die zum Bestimmen der partiellen Ableitungen von Differentialgleichungen des instationären Wärmezustandes von Konstruktionsteilen dient.

Die Ergebnisse beim Lösen von solchen die instationäre Wärmeleitfähigkeit betreffenden Aufgaben, werden automatisch durch einen Vielfach-Selbstschreiber registriert.

Mit Hilfe eines Elektro-Integrators kann der Wärmezustand von Konstruktionsteilen unter folgenden Verhältnissen erforscht werden:

gleichzeitiger Wärmeübergang durch Konvektion und Strahlung;
mehrlagige ebene, zylindrische oder sphärische Wand;
innere Wärmeentwicklung und Phasenänderung;
Änderung der thermodynamischen Werkstoff-Parameter und der Grenzbedingungen.

Der Elektro-Integrator ist ein Universal-Tisch-Kleingerät. Das Gerät wird aus Standardteilen, die auf Basis von reihengefertigten Vielfach-Selbstschreibern hergestellt wurden, zusammengebaut. Der Integrator ist nicht teuer.

Im Gegensatz zu Elektronen-Ziffernrechenmaschinen, die auch zum Lösen obenerwähnter Aufgaben verwendet werden, verlangt der Elektro-Integrator ЭТНА keine besondere Programmierung und ist bedeutend einfacher herzustellen und zu bedienen, obwohl seine Lösungsgenauigkeit vollkommen den von den Ingeneuren in der Praxis gestellten Anforderungen genügt.

Der Meßteil des Elektro-Integrator-Schreibers ist originell gestaltet. Hierdurch werden hochstabile Speisequellen für die Meßschaltung überflüssig und trotzdem können die Bezugswerte der gesuchten Funktion aufgezeichnet werden. Der Schreiber wird auch zum Abstimmen der Sollwert-Widerstände, die die Grenzbedingungen bestimmen benutzt.

Der Prozeß der Aufgabenlösung wird durch das Aufzeichnen auf einem Diagrammstreifen der Temperaturverteilungskurven als Zeitfunktion bedeutend beschleunigt und erleichtert.

o. Integrator ЭТНА ausgearbeiteten technischen Unterlagen kann die Fertigung des Gerätes schnell aufgenommen werden.

Der Elektro. Integrator kann weitgehendst in Entwurfbüros, Forschungs. und Lehranstalten sowie in Werklabors beim Lösen von wärmetechnischen Aufgaben auf allen Gebieten der Technik (Wärmeenergetik, Bauwesen, chemische Industrie, Maschinenbau usw.), aber auch beim Lösen einer Reihe anderen Aufgaben aus Grenzgebieten (wie Diffusionstheorie, Hydrodynamik u.a.) eingesetzt werden.

Auf Kundenwunsch kann V/O "Lizenzintorg" hochqualifizierte Fachleute zur technischen Hilfeleistung beim Einrichten der Produktion und zum Anlernen von Fachkräften an Ort und Stelle zur Verfügung stellen.

V/O "Lizenzintorg" ist der einzige Verkäufer von Lizenzen für Fertigung, Nutzung und Verkauf von Elektro. Integratoren ЭТНА.

Bitte senden Sie Ihre Anfragen an folgende Adresse:
Moskau G-200, Smolenskaja Pl., 32/34, V/O "Lizenzintorg"
Drahtanschrift: *Moskau Lizenzintorg*
Fernruf: *44-21-88*

INTEGRATEUR ELECTRIQUE ЭТНА POUR LA SOLUTION DES PROBLEMES DE TRANSMISSION DE LA CHALEUR NON-STATIONNAIRE

L'intégrateur électrique ЭТНА représente un calculateur électrique analogique avec une grille de résistances ohmiques prévu pour la solution des équations différentielles aux dérivées partielles de l'état thermique variable des éléments des constructions.

Les résultats de la solution des problèmes de transmission de la chaleur non-stationnaire sont automatiquement enregistrés aux moyens d'un appareil enregistreur multicourbe.

L'intégrateur électrique permet d'étudier l'état thermique variable des éléments d'une construction dans les conditions suivantes:

échange de chaleur combinée par convection et rayonnement;

paroi hétérogène plane, cylindrique ou sphérique;

présence de dégagement de chaleur interne et de changements de phase;

modification des paramètres thermophysiques des matériaux et des conditions aux limites.

L'intégrateur électrique est un appareil universel de table à encombrement réduit. L'appareil est fabriqué avec des pièces standards, sur la base des appareils enregistreurs multicourbes de série et son prix est modeste.

Contrairement aux calculatrices électroniques digitales utilisées pour la solution des problèmes indiqués plus haut, l'intégrateur électrique ЭТНА n'exige pas l'établissement d'un programme spécial. Il est beaucoup plus simple à fabriquer et en exploitation tout en assurant une précision répondant aux exigences de la pratique technique.

Le dispositif de mesure de l'appareil enregistreur de l'intégrateur électrique possède une construction originale, qui dispense de l'utilisation de source d'alimentation à haute stabilité pour le schéma de mesure et permet d'enregistrer la valeur relative de la fonction recherchée. L'appareil enregistreur est utilisé également pour le réglage des résistances d'assignation des conditions limites.

L'enregistrement des courbes de répartition de la température en fonction du temps sur le papier diagramme accélère et facilite le processus de la solution.

La documentation technique mise au point permet d'organiser rapidement la fabrication de l'intégrateur électrique ЭТНА.

L'intégrateur électrique peut être largement utilisé dans les centres d'études et de recherches, pour l'élaboration des projets, dans les laboratoires d'usine pour la solution des problèmes thermiques, que l'on rencontre dans tous les domaines de la technique (l'énergétique thermique, le bâtiment, l'industrie chimique, la construction mécanique etc.) ainsi que pour la solution de toute une série de problèmes dans les domaines adjacents (théorie de la diffusion, mécanique des fluides etc.).

Sur demande du client V/O «Licenzintorg» peut envoyer des spécialistes qualifiés pour l'aide technique dans l'organisation de la fabrication et pour la préparation du personnel du client.

La licence pour la fabrication, l'utilisation et la vente des intégrateurs électriques ЭТНА est vendue exclusivement par V/O «Licenzintorg».

Prière de diriger vos demandes à l'adresse:
Moscou G-200, Smolenskaïa pl, 32/34 V/O «Licenzintorg»
Adresse télégraphique: *Moscou Licenzintorg*
Téléphone: *44-21-88*

Внешторгиздат. Заказ N 21М38

ELEKTRO-INTEGRATOR ϑTHA ZUM LÖSEN VON AUFGABEN DER INSTATIONÄREN WÄRMELEITFÄHIGKEIT

INTEGRATEUR ELECTRIQUE ϑTHA POUR LA SOLUTION DES PROBLEMES DE TRANSMISSION DE LA CHALEUR NON-STATIONNAIRE

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УСТРОЙСТВО ДЛЯ ПОДАЧИ ЭЛЕКТРИЧЕСКИХ ИМПУЛЬСОВ

ELECTRIC DIALLING UNIT

ELEKTROIMPULSGEBER

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DISPOSITIF D'EMISSION DES IMPULSIONS ELECTRIQUES

УСТРОЙСТВО ДЛЯ ПОДАЧИ ЭЛЕКТРИЧЕСКИХ ИМПУЛЬСОВ

НАЗНАЧЕНИЕ

Устройство для подачи электрических импульсов предназначено преимущественно для использования в качестве телефонного номеронабирателя и обеспечивает подачу электрических импульсов заданной длительности. Общий вид устройства показан на рисунке.

Известные телефонные номеронабиратели сложны по своей конструкции, содержат много деталей, изготовление которых трудоемко и образует большое количество металлических отходов, требует гальванического покрытия, шлифовки, полировки и термообработки.

Предлагаемая конструкция устройства для подачи электрических импульсов отличается простотой, прогрессивной технологией и высокими эксплуатационными показателями.

Устройство может быть изготовлено в двух вариантах, один из которых предназначен для эксплуатации в нормальных климатических условиях при температуре от 0 до +50° С с относительной влажностью воздуха до 90% при температуре +25° С, другой вариант предназначен для жестких климатических условий работы при температуре окружающего воздуха от – 40° до +50° С, относительной влажности воздуха до 98% при температуре +40° С.

ОСНОВНЫЕ ПРЕИМУЩЕСТВА

Применение в максимальной степени деталей из пластмасс позволило сократить количество деталей из цветных металлов на 50%, снизить себестоимость изготовления на 20% при повышении производительности труда.

Исключение ряда деталей и узлов, объединение многих деталей в одну, дало возможность сократить количество деталей на 30%, при этом большинство деталей разработано с учетом применения пластмасс (термопластов).

Вес устройства в два раза меньше существующих конструкций.

Устройство обладает большей надежностью действия, чем существующие номеронабиратели, гарантийный срок службы в 5 раз больше подобных известных конструкций.

Отсутствие червяка и червячной шестерни делает номеронабиратель устойчивым в работе.

Устройство для подачи электрических импульсов, выпущенное в количестве нескольких тысяч штук, безупречно работает в течение нескольких лет.

Новая конструкция номеронабирателя обеспечивает высокую точность подачи электрических импульсов, т.е. надежную работу аппаратуры.

ТЕХНИЧЕСКАЯ ХАРАКТЕРИСТИКА

Импульсное отношение	1,4 до 1,8
Продолжительность обратного хода пальцевого диска, *мм/сек*	860–1060
Продолжительность одного импульса, *м. сек*	90–110
Сопротивление изоляции, *мом*	100
Гарантийный срок службы – число полных заводов диска. (При стендовых испытаниях номеронабиратель выдержал более двух миллионов срабатываний без существенных изменений параметров и нарушения работоспособности)	500000
Вес, *г*	120

По запросам заказчиков В/О "Лицензинторг" может направить высококвалифицированных специалистов для оказания технической помощи в деле организации производства и для обучения местных специалистов. Единственным продавцом лицензии на изготовление и продажу устройства для подачи электрических импульсов является В/О "Лицензинторг".

ELECTRIC DIALLING UNIT

PURPOSE

The electric dialling unit is intended for use as a telephone calling device. The unit generates electric pulses of set duration. The external view of the unit is illustrated in the Figure.

The conventional telephone dialling units have a complex construction, employ many elements which require much labour for their manufacture, produce abundant metal wastes, and involve galvanizing, grinding, polishing and thermal treatment.

The new dialling unit is distinguished for its simple construction, progressive technology and high operation efficiency.

The unit is available in two versions. One version is intended for operation in normal climatic conditions at 0 to +50° C and 90 per cent maximum relative humidity at +25° C. The other version is designed for operation in hard climatic conditions, at -40 to +50° C and 98 per cent maximum relative humidity at +40° C.

BASIC ADVANTAGES

The maximum use of plastic parts allowed to reduce the number of non-ferrous metal parts by 50 per cent, cut down production cost by 20 per cent and appreciably increase labour productivity.

Due to the elimination of many parts and units and to the substitution of a single unit for a number of parts, the number of parts employed for the manufacture of the device was reduced by 30 per cent. The predominant part of the elements are made of plastic (thermoplastic).

The dialling unit is two times lighter than the conventional devices.

The unit is much more reliable in operation than other devices in current use; its guaranteed service life exceeds that of other similar devices 5-fold.

The absence of a worm and a worm gear makes the dialling unit highly stable in operation.

Several thousands of the electric dialling units produced in the USSR have been reliably working during a few-year period.

The new construction of the dialling unit ensures high accuracy of electric pulse generation which increases the reliability of the equipment.

SPECIFICATION

Pulse ratio	1.4–1.8
Time of finger-actuated disc return travel, *mm/sec*	860–1,060
Pulse length, *m, sec*	90–110
Insulation resistance, *Mohms*	100
Guaranteed service life – number of total disc windings (in laboratory tests, the dialling unit withstood over 2 million operations without significant variations of the characteristics or deterioration of serviceability)	500,000
Weight, *g*	120

At the request of the Buyers, V/O "Licensintorg" may provide skilled experts for giving technical assistance and for training local personnel.

V/O "Licensintorg" has the sole right of selling licences for the manufacture and distribution of the electric dialling unit.

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ELEKTROIMPULSGEBER

BESTIMMUNG

Der Elektroimpulsgeber ist hauptsächlich zur Verwendung als Telefonnummerschalter bestimmt und gibt Elektroimpulse mit vorgegebener Impulsbreite. Auf Bild ist die Gesamtansicht des Impulsgebers dargestellt.

Alle bekannten Telefonnummerschalter haben komplizierten Aufbau und bestehen aus vielen Bauteilen, deren Herstellung arbeitsraubend und mit einer Menge von Metallabfällen verbunden ist. Außerdem erfordern diese Bauteile einen galvanisch aufgebrachten Metallüberzug, Schleifung, Polierung und Wärmebehandlung.

Die vorliegende Konstruktion des Impulsgebers ist einfach und zeichnet sich durch eine fortschrittliche Technologie und hohe Betriebseigenschaften aus.

Der Impulsgeber kann in zwei Ausführungen gefertigt werden, von denen eine für den Betrieb unter normalen klimatischen Bedingungen mit Temperatur von 0 bis +50° C und einer relativen Luftfeuchtigkeit bis 90% bei Temperatur +25° C, und die andere für den Betrieb unter schweren klimatischen Bedingungen mit einer Umgebungstemperatur von -40 bis +50° C und relativer Luftfeuchtigkeit bis 98% bei Lufttemperatur +40° C bestimmt ist.

HAUPTSÄCHLICHE VORTEILE

Maximale Anwendung von Kunststoff-Bauteilen ermöglichte die Anzahl der Buntmetall-Bauteile um 50% zu vermindern und hatte eine Herabsetzung der Selbstkosten um 20% bei gesteigerter Arbeitsproduktivität zur Folge.

Das Ausscheiden einer Reihe von Teilen und Baugruppen und Zusammenfügen von vielen Bauteilen in einem Bauteil erlaubte die Gesamtzahl der Teile um 30% herabzusetzen. Dabei wurde bei Ausarbeitung der meisten Bauteile auf Anwendung von Kunststoffen (Thermoplasten) Rücksicht genommen.

Das Impulsgebergewicht ist zweimal kleiner als dieses der gegenwärtigen Bauarten.

Der Impulsgeber verfügt über eine höhere Betriebssicherheit als diese der gegenwärtigen Nummerschalter. Seine garantierte Lebensdauer ist fünfmal größer als bei allen bekannten gleichartigen Bauarten.

Dank dem Auslassen der Schnecke und des Schneckenrades besitzt der Nummerschalter eine hohe Betriebsstabilität.

Einige Tausende hergestellter Impulsgeber arbeiten einwandfrei schon im Laufe einiger Jahre.

Die neue Nummerschalterkonstruktion gewährleistet eine hohe Genauigkeit der Elektroimpulsgebung und folglich eine sichere Arbeit der Apparatur.

TECHNISCHE DATEN

Impulsverhältnis	1,4 bis 1,8
Rückstelldauer der Fingerscheibe, *mm/sec*	860–1060
Impulsdauer, *msec*	90–110
Isolationswiderstand, *MOhm*	100
Garantierte Lebensdauer – Anzahl der vollen Aufzüge der Fingerscheibe. (Bei Standprüfungen hat der Nummerschalter über zwei Millionen Operationen ohne wesentliche Veränderung seiner Kennwerte oder Störung der Arbeitsfähigkeit durchgemacht)	500000
Gewicht, *p*	120

Auf Anfragen der Käufer können vom V/O "Lizenzintorg" hoch qualifizierte Fachleute zwecks technischer Hilfeleistung bei der Produktionsorganisierung und Ausbildung eigener Fachleute gesandt werden. V/O "Lizenzintorg" ist der einzige Verkäufer der Lizenzen für Herstellung und Verkauf der Elektroimpulsgeber.

DISPOSITIF D'EMISSION DES IMPULSIONS ELECTRIQUES

DESTINATION

Le dispositif d'émission des impulsions électriques est surtout destiné à être utilisé comme dispositif d'appel automatique dans la téléphonie et débite des impulsions électriques dont la durée est déterminée. La vue d'ensemble du dispositif est représentée sur la figure.

Les dispositifs d'appel téléphoniques actuellement en service sont d'après leur construction assez compliqués et comportent en outre une multitude de pièces dont l'exécution nécessite beaucoup de travail tout en laissant une grande quantité de chutes de métal et exige également toute une série d'opérations telles que: galvanisation, rectification, polissage et traitement thermique.

La construction du dispositif d'émission des impulsions que nous présentons se distingue par sa simplicité, sa technologie moderne et ses excellents indices de service.

Le dispositif peut être réalisé en deux variantes, l'une de celles-ci prévoit l'exploitation dans des conditions climatiques normales à une température comprise entre 0 et +50° C, avec humidité relative de l'air jusqu'à 90% à une température de +25° C, l'autre variante est conçue pour les conditions climatiques difficiles avec fonctionnement à une température ambiante comprise entre -40 et +50° C et humidité relative de l'air jusqu'à 98% à une température de +40° C.

AVANTAGE ESSENTIELS

L'emploi poussé au maximum de pièces en matière plastique a permis de réduire de 50% le nombre de pièces en métaux non ferreux et d'abaisser le prix de revient de 20% tout en améliorant la productivité du travail.

A la suite de l'élimination de toute une série de pièces et groupes ainsi que grâce à la réunion des pièces en ensembles monoblocs le nombre de celles-ci a été réduit de 30%, il faut en outre noter que la plupart des éléments a été réalisée en tenant compte de l'utilisation des matières plastiques (thermoplastiques).

Ce dispositif est de deux fois plus léger que ceux qui sont en service à l'heure actuelle.

Le dispositif présente par rapport aux dispositifs d'appel connus une sécurité de fonctionnement bien supérieure et son délai de vie est cinq fois plus long que celui des constructions analogues actuellement en service.

L'absence de roue et vis sans fin communique à l'ensemble d'appel automatique une remarquable stabilité de service.

Ce dispositif d'émission des impulsions électriques a été fabriqué en quelques milliers d'exemplaires qui voilà déjà plusieurs années fonctionnent sans aucun défaut.

La nouvelle conception de l'appel automatique assure une remarquable précision de débitage des impulsions électriques, ce qui veut dire que l'appareillage fonctionne dans d'excellentes conditions.

CARACTERISTIQUES TECHNIQUES

Rapport d'impulsion	de 1,4 à 1,8
Durée de retour du cadran d'appel, *mm/s*	860–1060
Durée d'une impulsion, *m s*	90–110
Résistance d'isolement, *Mohms*	100
Durée de la garantie de service en nombre de cycles complets du cadran (pendant les essais au banc le dispositif d'appel a subi plus de 2 millions de manoeuvres sans que les paramètres se modifient d'une façon sensible et sans qu'il apparaisse des défauts de service quelconques)	500000
Poids, *g*	120

Sur demande du client V/O «Licenzintorg» peut fournir des spécialistes qualifiés dans le but d'apporter une assistance technique à l'organisation de la production et à la formation des techniciens sur place.

Le seul fondé de pouvoirs pour la vente des licences de fabrication et de vente de dispositifs d'émission des impulsions électriques est V/O «Licenzintorg».

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Ваши запросы направляйте по адресу:
Москва Г-200, Смоленская пл. 32/34, В/О "Лицензинторг"
Телеграфный адрес: *Москва Лицензинторг*
Телефон: *44-21-88*

Please, write to: *V/O "Licensintorg", Moscow G-200, Smolenskaya square, 32/34.*
Cable: *Moscow Licensintorg*
Telephone: *44-21-88*

Bitte senden Sie ihre Anfragen an folgende Adresse:
Moskau G-200, Smolenskaja Pl. 32/34, V/O "Lizenzintorg"
Drahtanschrift: *Moskau Lizenzintorg*
Fernruf: *44-21-88*

Prière de diriger vos demandes à l'adresse:
Moscou G-200, Smolenskaïa pl, 32/34 V/O «Licenzintorg»
Adresse télégraphique: *Moscou Licenzintorg*
Téléphone: *44-21-88*

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Внешторгиздат. Заказ № 21М17

50X1-HUM

2

MAGNETOGRAPHIC FLAW DETECTOR

50X1-HUM

TYPE МД-11

50X1-HUM

V/O "MASHPRIBORINTORG"
USSR MOSCOW

GENERAL

Advances in the oil and gas industry are inconceivable without the ever growing mileage of pipelines.

In the Soviet Union the length of large-diameter trunk gas pipelines has increased from 2,270 *km* in 1950 to 25,260 *km* in 1962.

For the most part welded joints in long-distance high-pressure gas pipelines, such as those laid from Stavropol to Moscow (1,300 *km*), from Serpukhov to Leningrad (813 *km*) and from Dzharnak to Tashkent (767 *km*), were tested by a magnetographic flow detection method — a very efficient technique. Indeed, this technique has now become predominant on the gigantic Bukhara-Urals gas pipeline 1,020 *mm* in diameter, being over a distance of over 4,500 *km*.

Apart from gas and oil pipelines, magnetographic flaw detection has found a broad field of application in the erection of fuel-fired power stations, refineries, city gas and district-heating schemes, oil storage tanks and other sheet metal weldments.

The magnetographic method is a variety of magnetic flaw detection. This technique differs from the other modifications in that the local flux-leakage fields resulting from hidden defects are recorded on a magnetic tape which is placed on the surface of the welded joint being tested.

The magnetic tape is similar to the one used for sound recording, but has a greater width.

In a test the tape is tightly held against the surface of the weld.

The tape may be either kept in a file, or erased for repeated use.

The magnetographic method is capable of revealing microscopic flaws in welded joints, such as cracks, poor fusion, strings of pores, and slag inclusions.

OPERATING PRINCIPLE

The Magnetographic Flaw Detector Type МД-11 (Fig. 1) has been designed to test welded joints made by the manual submerged-arc process, the semi-automatic and automatic shielded-arc process, and by gas welding.

The instrument is remarkable for its performance: using it, a single operator can test 250 to 300 *m* of welded joints in plate or 60 to 70 joints on pipes 720 to 800 *mm* in diameter.

A mangetographic test consists of two operations:

1. The welded joint to be tested is magnetized to saturation, and a tape is applied to its surface for recording.

2. The tape is played back by means of a cathode-ray tube for observation of the flaws thus recorded.

The first operation is performed by means of either disc magnets or solenoids.

Disk magnets are mainly resorted to when testing welded joints in plate or large-diameter pipes and reservoirs. A disk magnet (Fig. 2) is energized either by a rectifier (under stationary conditions) or by a standard storage battery such as shown in Fig. 3 (under field conditions), fitted with a magnetizing current regulator.

Solenoids have proved convenient in testing circumferential seams on pipes of small and medium diameter. Solenoids are energized by a capacitor through a discharger.

The defects recorded on a tape are played back by a contact method.

The tape records are played back in the magnetographic flaw detector proper.

Until quite recently use was made of pulse-type flaw detectors in which the defects recorded on a tape were shown as spikes of the electron beam on a c.r.t. screen. Their size and shape would give an idea of the nature and size of flaws in welded joints.

The cathode-ray tube employed in the МД-11 produces an image of the welded joint and of the defects detected in it.

The image is an exact replica of the defects both in shape and length. The density of black spots on the image gives a measure of the defect's depth. Should the welded joint have rough defects (such as cracks, poor fusion to over 10 per cent of the work's thickness, strings of pores and deep-seated slag inclusions), a pilot lamp will light up on the panel of the instrument.

In a playback, the tape is threaded into the tape feed mechanism of the instrument so that it is transported past the reproducing heads. At the same time an image of the weld is produced on the screen of the c.r.t.

Records can be played back and, consequently, welds can be examined either continuously or frame by frame. The long-afterglow c.r.t. makes it possible to watch the picture for 15 *sec.*

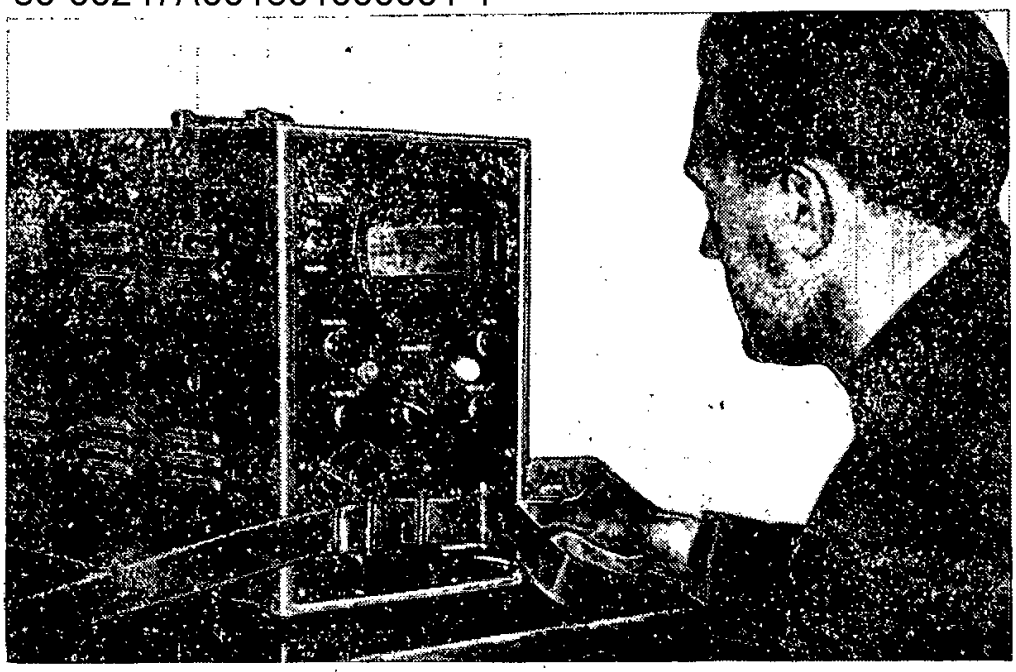

Fig. 1. General View of Magnetographic Flaw Detector Type МД-11 with Type Moving

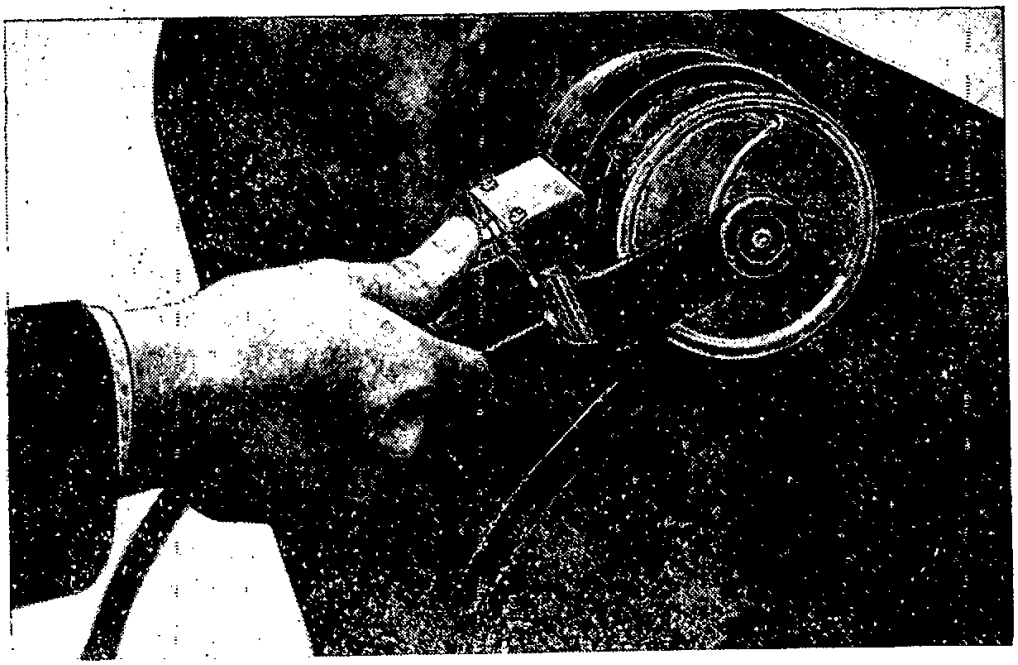

Fig. 2. Disk Magnet Used in Testing Circumferential Seams on Large-Diameter Pipes

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Fig. 3. Storage Battery Complete with a Current Regulator for Use with a Disk Magnet

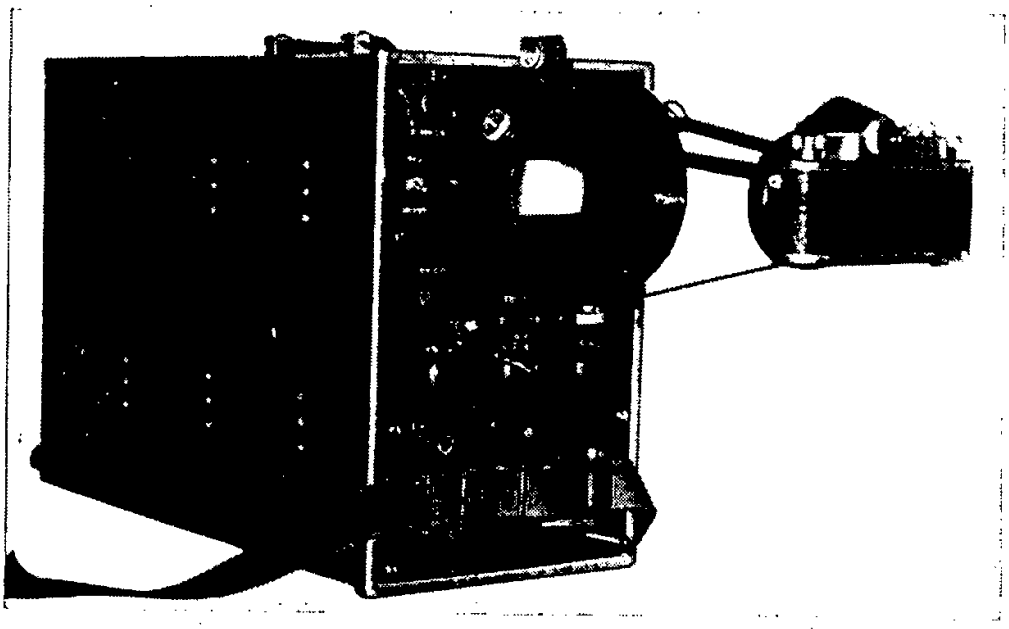

Fig. 4. Magnetographic Flaw Detector Type МД-11 Complete with a Photographic Attachment

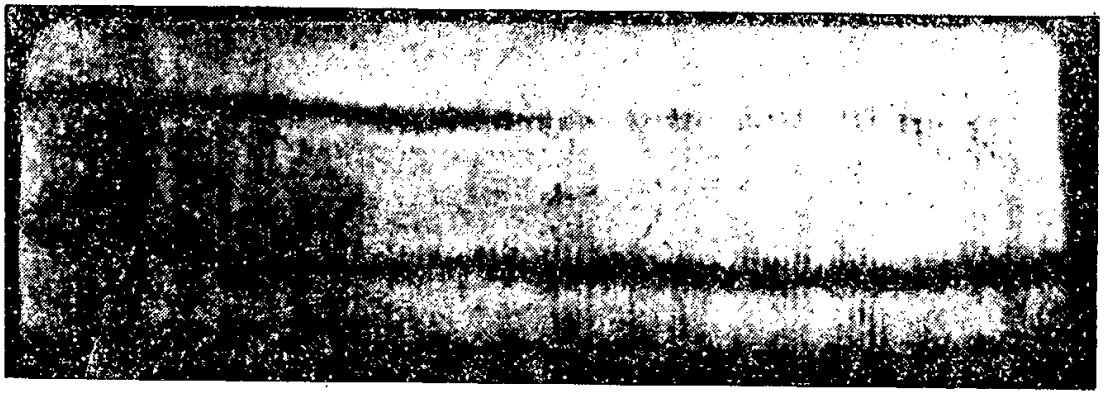

Fig. 5. A Weld Free from Defects (the picture only shows the edges of the weld)

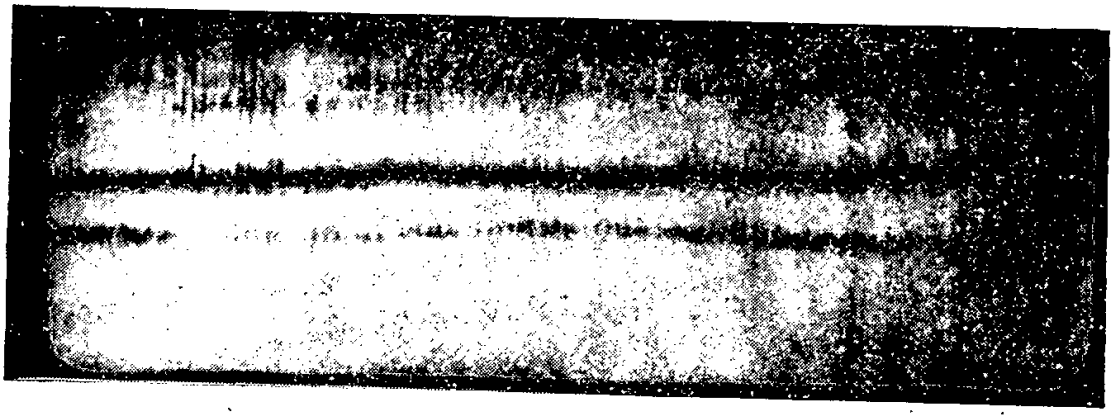

Fig. 6. Poor Fusion

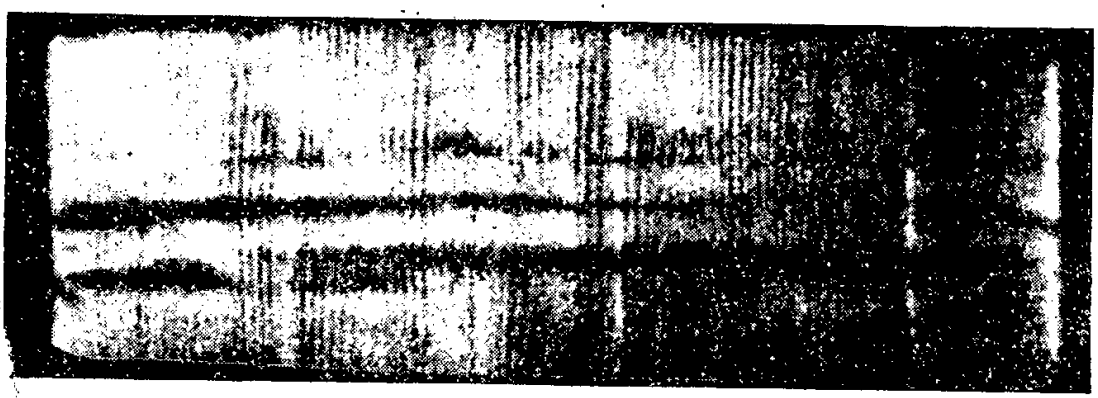

Fig. 7. Longitudinal Crack

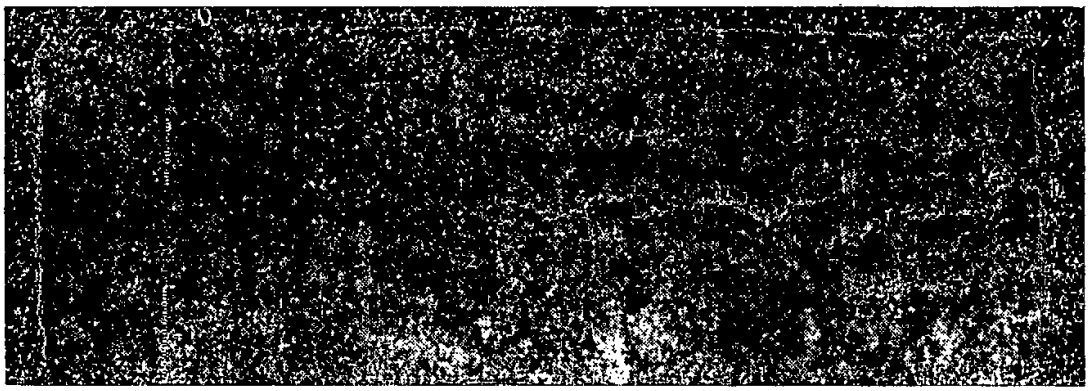

Fig. 8. String of Slag Inclusions

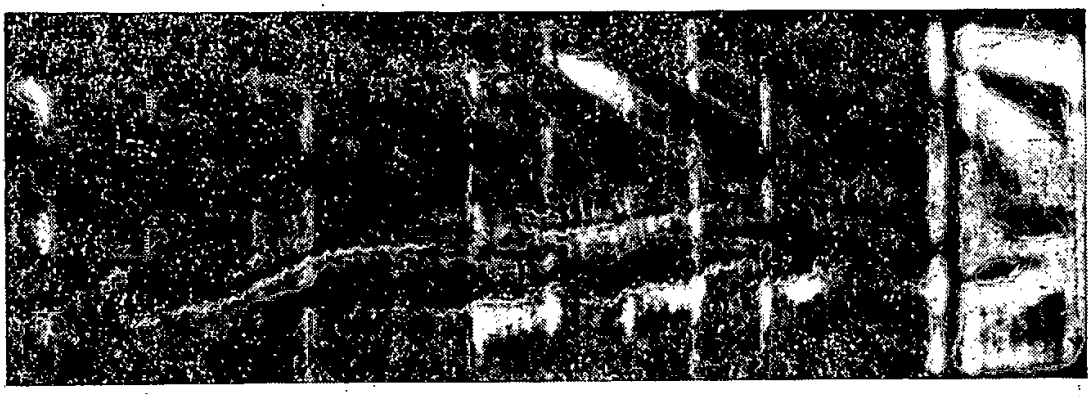

Fig. 9. A Weld with Rough Surface and Hidden Flaws

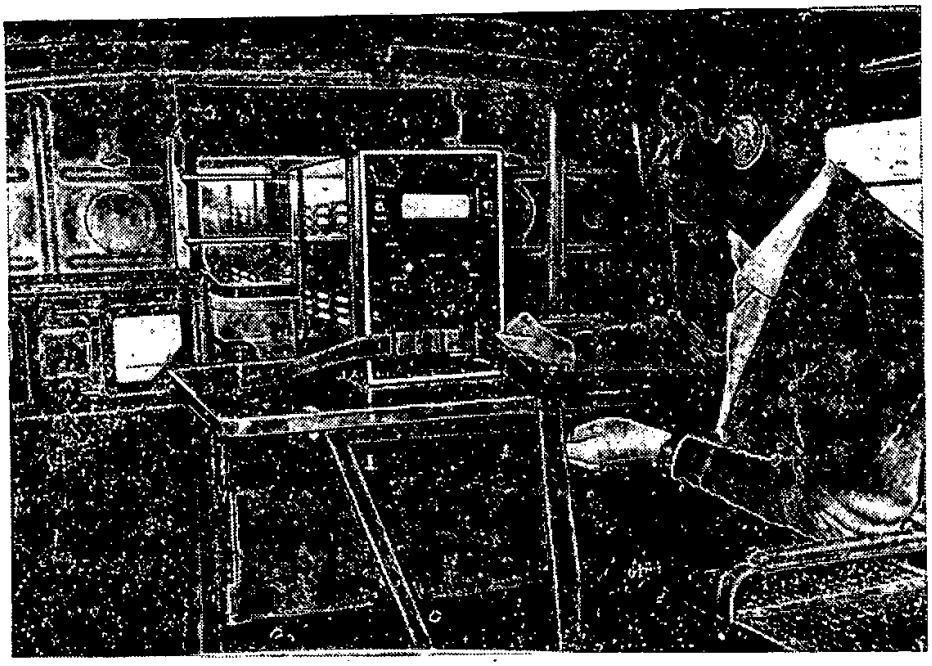

Fig. 10. Inside View of a Mobile Laboratory

When necessary, the operator can conveniently take a photograph of the selected frames, for which purpose the flaw detector may be furnished complete with a photographic attachment (Fig. 4). Examples of oscillograms obtained with the Type МД-11 are shown in Figs. 5—9.

Under field conditions the Type МД-11 may be set up in a mobile laboratory built into a vehicle. The laboratory (Fig. 10) has all that is necessary to power the flaw detector and the magnetizing devices with both D.C. and A.C., and the requisite auxiliary equipment.

In a mobile laboratory the flaw detector is mounted on a specially designed spring suspension.

The mobile laboratory adds to the comfort of the operator and speeds up magnetographic inspection about two-fold.

Here are **the high lights** of the Magnetographic Flaw Detector МД-11:

1. Apart from locating hidden flaws, the detector indentifies them and determines their shape and size.
2. Handling capacity is 8 to 10 times that of X-ray inspection.
3. The cost is one-seventh to one-eighth of X-ray inspection.
4. The detector fully guarantees exposure of the most dangerous flaws in welded joints, such as cracks and deep-seated poor fusion.
5. The method is inherently safe, as it involves no harmful radiations inavoidable in X-ray and gamma-ray inspection.

The experience acquired to-date has proved the reliability of both the Type МД-11 and the method itself.

SPECIFICATIONS

Range of weld thickness, mm	1—12*
Linear speed of playback, m/sec	5,000
Length of weld observable on c.r.t. screen, mm	110
Recording time per frame, sec	2
Supply voltage, V	115; 127; 220
Permissible variations in supply voltage, per cent	from +5 to —10
Mains frequency, c/s	50
Mains consumption, VA	150
Continuous operation, hrs	8
Overall dimensions, mm	233×400×565
Weight, kg	25

* With suitable magnetizing facilities the weld thickness may be as great as 16 mm.

STANDARD EQUIPMENT

The standard equipment includes:

The Magnetographic Flaw Detector Type МД-11 proper, complete with mains cord, erasing choke, drawtube, and voltage stabilizer.

The Photographic Attachment (on special order).

The Magnetizing Facility (either a disk magnet or a solenoid).

A Storage Battery complete with a current regulator in the case of a disk magnet or a discharger in the case of a solinoid (for use under field conditions).

Note. On request the instrument may be furnished complete with both types of magnetizing facilities.

Set of spare parts.

Discription and Instruction for Operation.

The drawings and specifications of the instrument make it possible to organize the manufacture of Type МД-11 flaw detectors within a reasonable period of time.

On request V/O "Mashpriborintorg" can send experts to render technical assistance in organizing the manufacure of Type МД-11 flaw detectors and in training local personnel.

V/O "Mashpriborintorg" is the sole seller of licences on the manufacture, use and sales of Type МД-11 Magnetographic Flaw Detectors.

Send all inquiries to:

V/O "Mashpriborintorg"

32/34, Smolenskaya Pl., Moscow, Г-200, USSR

Cables: MASHPRIBORINTORG MOSCOW

Telephone: 44-27-75

Telex: 188

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Vneshtorgizdat. Order No. 25704/2063.

Resp.: Tokmakova L. N., Valkova V. V., Kravchenko I. G., Volkova E. D.

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50X1-HUM

ALL-PURPOSE SYSTEM OF ELEMENTS FOR INDUSTRIAL PNEUMOAUTOMATICS (УСЭППА)

C O N F I D E N T I A L
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V/O "MASHPRIBORINTORG"

ALL-PURPOSE SYSTEM OF ELEMENTS FOR INDUSTRIAL PNEUMOAUTOMATICS (УСЭППА)

All-purpose system of elements for industrial pneumoautomatics opens great possibilities in designing various automatic control devices and systems. It allows to increase considerably the scope of automation in

Oil-Refining
Chemical
Iron-and-steel
Woodworking
Food
and Many Other Branches of Industry

Applying little variety of unified elements of the УСЭППА, the systems may be designed which carry out the following functions:

automatic control according to usual laws;
complex control with application of special laws;
bunch parameter control;
automatic optimization;
program-control;
discontinuous control;
multiposition control;
automatic control of cyclic processes, and others.

The УСЭППА may be used in the automatic machine tool process control and automatic production line control.

Existing pneumoautomatic modular systems have block (instrument) sets ensuring the creation of various automatic control circuits. Making of the circuits solving more complicated automation problems by means of modular systems is rather difficult and requires in any particular case the development of new designs. Unlike the modular systems, while using the УСЭППА each new instrument and new circuit is assembled of the all-purpose elements, therefore making of any new device and automation circuits with the help of the УСЭППА excludes the necessity of the development of the new designs.

The УСЭППА is a new system which consists of the self-contained unified devices — pneumatic elements, each of them carries out the simpliest operations. The principle employed in the system allows to assemble various instruments and circuits from the unified elements of the automatic control including the blocks of the existing modular systems.

The system elements are selected so as to provide for the following operations:

Carry out linear computing operations with accuracy sufficient for control.

Simulate the linear and non-linear dynamic systems.

Perform the algebraic and temporary logical functions.

Design systems of discontinuous control.

Perform multipositional control.

Some basic components included into the pneumoautomatic all-purpose industrial system of elements are shown in Figs. 1—8.

The instruments employing the УСЭППА are fed with compressed air at a pressure of up to 1.4 atm. gauge. In case of necessity, however, the range of working pressure may be changed (for instance, 0.1 ÷ 1.0 atm. gauge).

All-purpose system of elements for industrial pneumoautomatics ensures:

1. Carring out of any linear computing operations: summation, differentiation, integration and others with the accuracy necessary for making of various controllers.
2. Analog to digital conversion and vice versa.
3. Performance of the elementary logical functions, for example, "NOT", "AND", "OR" and others.
4. Designing of pneumatic single-cycle and multi-cycle relay circuits.
5. Designing of discontinuous automatic control systems.
6. Designing of various temporary command devices.

The УСЭППА is the first fully pneumatic system in the world, which similar to the electric and electronic devices ensures the design of various relay circuits. It makes possible the design of completely pneumatic digital control computers.

To illustrate these possibilities, was built completely pneumatic digital computer called "pneumatic player", which played with a live partner the game "Morra". This computer was demonstrated at the Soviet Exhibition in London (1961).

The pneumatic elements of the system are of small dimensions. The largest pneumatic element has the following dimensions: 40×40×75 mm, the smallest — 30×30×15 mm.

Such result has not yet been achieved anywhere in the world.

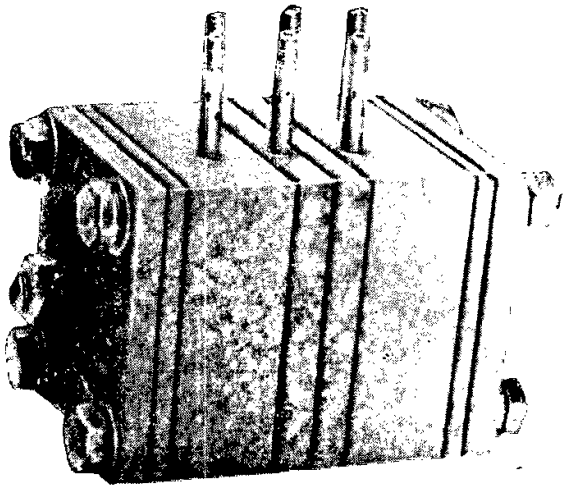

Fig. 1. Comparison Element

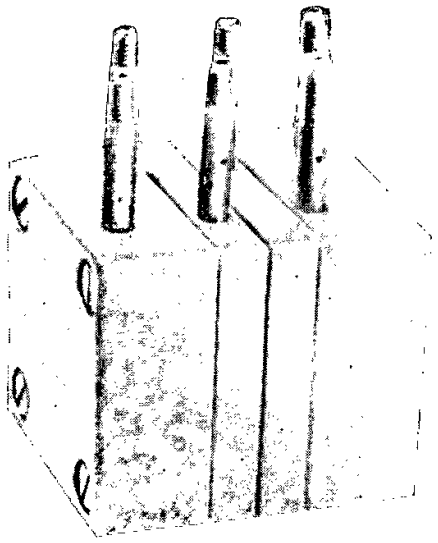

Fig. 2. Pneumatic Relay

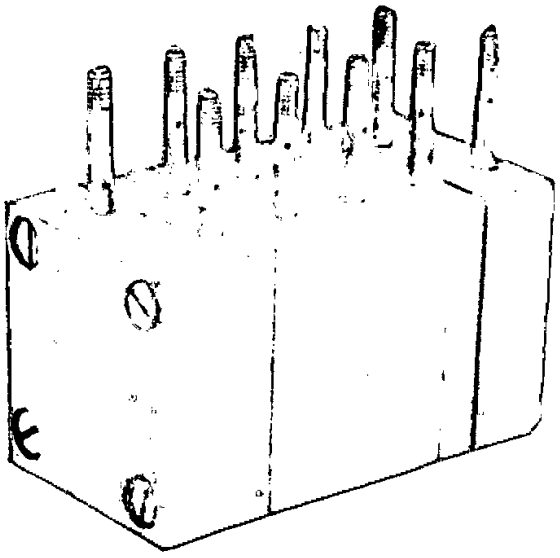

Fig. 3. Digital Storage Cell

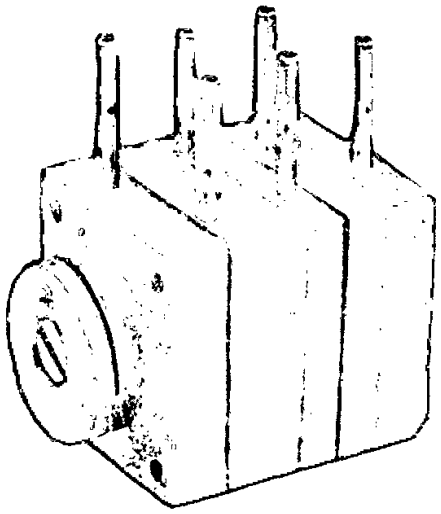

Fig. 4. Continuous Storage Cell

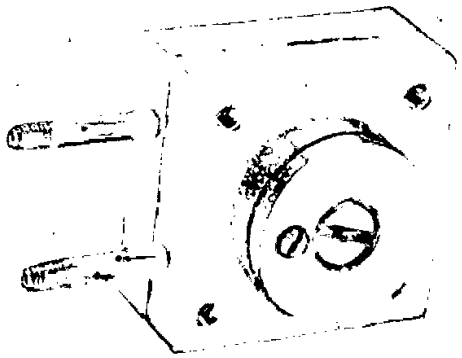

Fig. 5. Continuous Pneumatic Follower

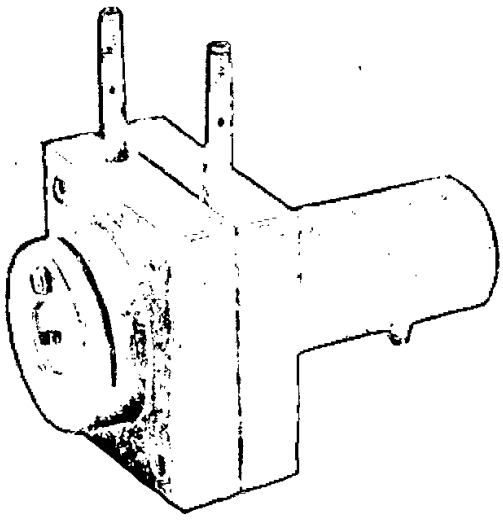

Fig. 6. Modification of Continuous Pneumatic Follower

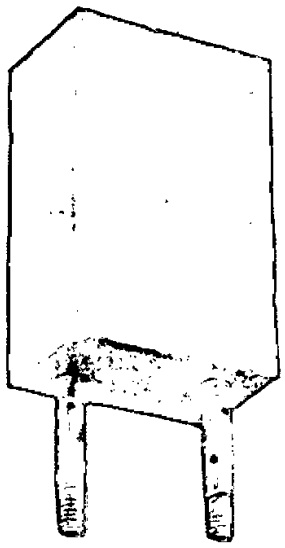

Fig. 7. Uncontrolled Pneumatic Resistance

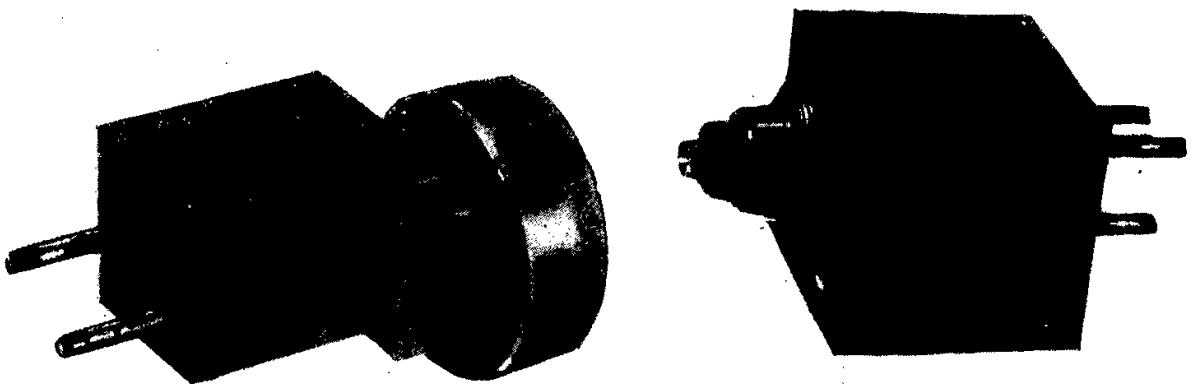

Fig. 8. Modification of Controlled Pneumatic Resistances

All the pneumatic elements are very simple in making and have tuning and adjustment knobs. The pneumatic elements are highly unified in dimensions, configuration, separate units and have a standard socket to be connected to the circuit, similar to radio valves and some other electronic components.

The instruments using pneumatic elements are mounted on the unified panels where there are standard cells to connect the pneumatic elements.

The mounting of communications in the unified panels may be carried out by using printed circuit method similar to that of the electronic circuits. The great advantage of the system is the possibility to check the operation of any part of the circuit without switching off the operating instrument from the whole device, i. e. the pneumatic circuit can be easily checked by "ringing out" method similarly to the electric one.

In case of necessity it is possible quickly to replace the defective element (but not the whole instrument) without the switching off the whole system.

The small dimensions of the elements and the possibility to carry out rapid mounting allow to make multielement instruments with complex circuits. In addition, the produced instruments are compact and have small dimensions. The automatic optimizer making use of the modular system blocks and the same optimizer assembled of the elements of the УСЭППА are compared in Figs. 10 and 11. The dimensions of the first optimizer are 550×750 mm, of the second — 200×370 mm; the weight of the latter, however, is 8 times less than that of the first one.

The application of the all-purpose system of elements for industrial pneumoautomatics favours the development of automation in all the industry branches.

The prominent Soviet scientists — specialists in automation took part in the development of this original system. In case of necessity technical papers of the УСЭППА may be delivered. We are ready at

the request of the Customer to send our highly qualified Soviet specialists to give technical assistance in organizing the production and training of local specialists.

The only Seller of the licence for manufacturing of the pneumatic elements and the application of the pneumoautomatic all-purpose industrial system is V/O "Mashpriborintorg".

Please, forward your requests to:

Moscow, Г-200, Smolenskaja 32/34
V/O "Mashpriborintorg"
Cable address: Mashpriborintorg, Moscow
Telex 184.

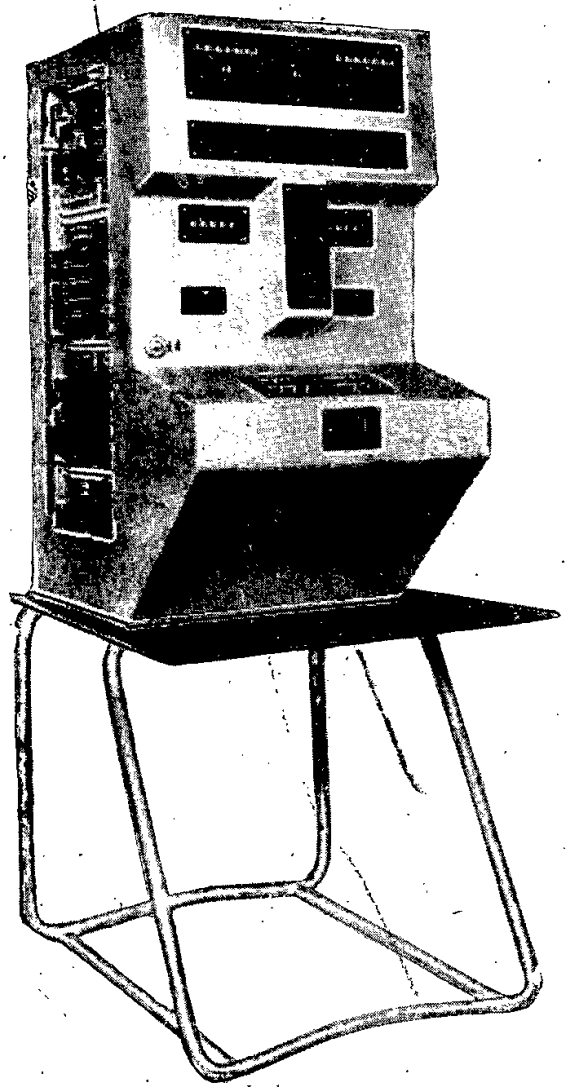

Fig. 9. Pneumatic Digital Computer -- "Pneumatic Player"

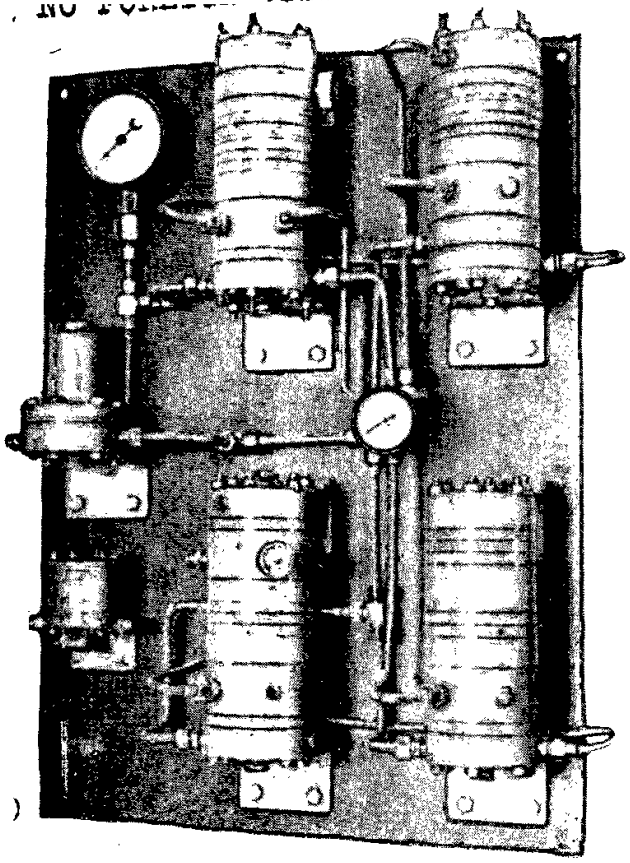

Fig. 10. Automatic Optimizer Using Modular System Blocks

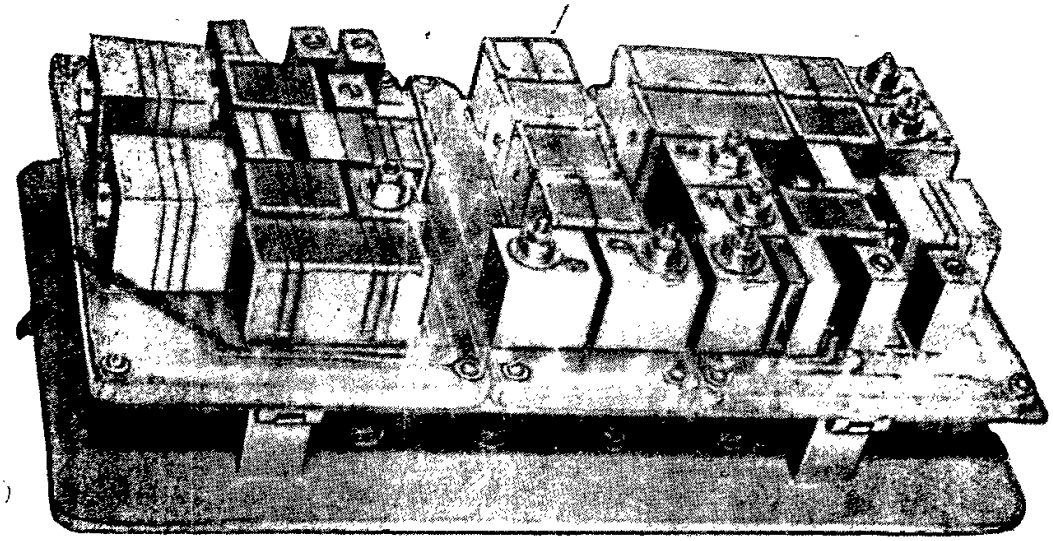

Fig. 11. Automatic Optimizer Using УСЭППА Elements

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SEMI-CONDUCTOR THERMOELECTRIC COOLING DEVICES

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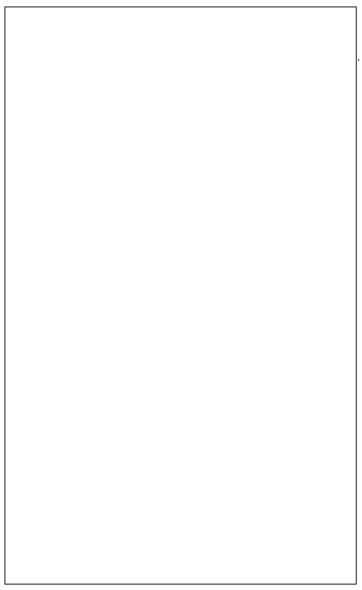

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V/O "MASHPRIBORINTORG"
Moscow
USSR

SEMI-CONDUCTOR THERMOELECTRIC COOLING DEVICES

Scientists all over the world work at the problem of thermoelectric cooling. The thermocooling effect, discovered by the French physicist Peltier in 1834, was deeply and thoroughly investigated by academician Ioffe, a prominent Soviet scientist, and scientists of his school.

The principle of thermocooling can be widely applied in the following fields:

ELECTRONICS

Cooling of power transistors
Cooling of micromodules in electronic devices
Spot cooling of electric components
Stabilization of cristal temperature

MEDICINE

Microtome specimen freezer
Microscope object stages
Cooled container for cultures, sperm, plasma etc.

CHEMISTRY

Evaporation equipment
Distillation apparatus
Continuous process equipment

INSTRUMENTATION

Laboratory microcoolers
High-vacuum traps for vapour-oil diffusion pumps
Thermoelectric hygrometers

The function of these and similar devices is based on direct conversion of electricity into heat energy by means of thermoelements.

The principle of work of a thermoelement is based on the effect caused by two connected to each other passing current conductors of various metals which are heated on one end and cooled on the other.

This effect is known for a long time, but due to the wide

methods it has not received as yet extensive practical use.

The interest in thermoelectric cooling is continuously increasing with the improvement of its efficiency. A marked growth of such interest is manifested nowadays when it became possible to receive, with an insignificant admixture, bismuth, selenium, tellurium, germanium, silicon, antimony, tin, indium, zink and gallium which can be used either as positive or negative semi-conductors. This achievement of science and technique created the possibility to work out and to practically apply thermocooling devices.

Soviet scientists and engineers worked out a perfect technology of production of thermoelements which serves as a basis of all thermoelectric devices.

Practically unlimited operation time, small dimensions, absence of moving parts, absolute reliability are the distinguishing features of devices invented by the Soviet scientists.

For mass production our experts worked out detail technology for the following devices.

MICROSCOPE OBJECT STAGE WITH THERMOELECTRIC HEATING AND COOLING

The temperature of an object under consideration can be adjusted from – 25° to +60° C.

Microscopic examination in biology, botany and crystallography often requires an alteration of temperature in the study of a process or the behaviour of an object.

The available devices can, as a rule, afford above room temperature. It is practically impossible to carry out investigations at sub-room temperature due to the application of complicated apparatus for this purpose, though it is precisely this temperature range which is most attractive to research in certain cases.

Thermoelectric effect in semi-conductor materials made it possible to find an effective solution to this problem. It is known that the effect of cooling or heating in a thermoelectric couple, which consists of semi-conductor materials, is stipulated by the direction of the feeding current. During one polarity of current the couple operates under conditions of cooling, while during alternating polarity the couple operates under conditions of heating.

Various types of microscope stages are manufactured (see Fig. 1). It is a self-contained device which can be mounted on any conventional microscope without any changes in the latter's design.

The microscope object stage with thermoelectric heating and cooling makes it possible to gradually alter the temperature of the object under examination in the range from – 7° up to +60° C.

Fig. 1 a presents a microscope object stage on five sector

plates of which four thermocouples are assembled forming a closed quadrangle. There is a through hole in the quadrangle for examination of the object fitted on the stage in the passing light.

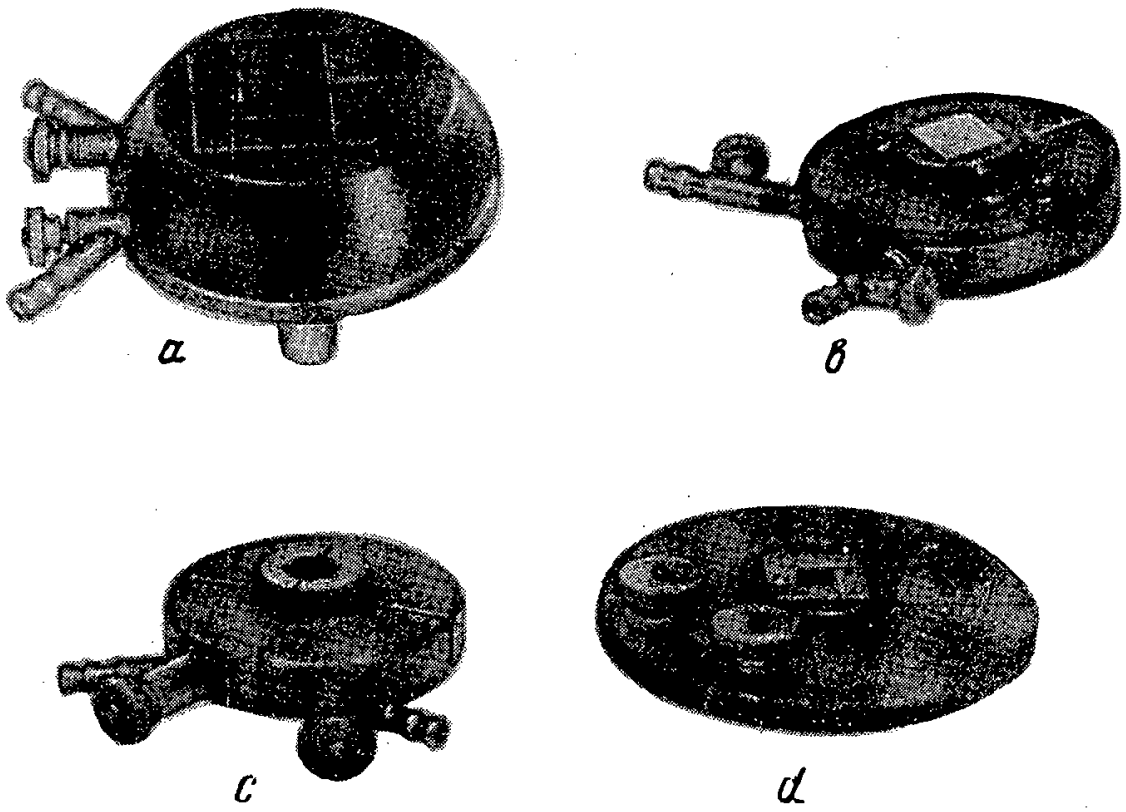

Fig. 1. Microscope Object Stages with Thermoelectric Heating and Cooling

If the object stage operates under conditions of cooling, the lower sectors are "hot" radiational plates which run off heat from the thermoelectric couples. Object and cover glass is put on the top commutation plates which lie on the same surface. Between this glass is put the examined object. Cooling is transmitted from the upper "cold" commutation basis of thermoelements through the glass. All the parts of the object stage are bound by epoxy-resin to give the stage the necessary mechanical stability.

Switching on feeding current to the object stage is accomplished through two terminals which are connected with two bottom commutation plates. Its power consumption from a direct current source is 2 *W* under 14 *A* current.

Overall dimensions of the object stage: height – 10 *mm*; diameter – 70 *mm*.

Weight is 165 *gr*

In certain cases it is necessary to carry out microscopic investigation under deeper cooling of the objects under observation

The microscope object stage guaranteeing a drop in temperature down to –25° C of the object fitted on it requires water cooling of hot junctions ot the thermoelements.

The channels in which cooling water passes are made in hot commutation plates serving as a basis of the object stage.

Fig. 1 "c" presents a microscope object stage on three plates of which two thermoelements are assembled. Their cooling solders are connected with two semicircular commutation plates forming with their end planes a through hole for light that passes from the microscope condenser.

The object glass with the object under observation is arranged on the upper commutation plates.

Switching on feeding current to the object stage is accomplished through terminals which have connecting pipes for water supply.

SPECIFICATIONS

Water consumption, *l* per *hr*	10
Power consumption, *W*	about 3.5
Dimensions of the object stage, *mm*:	
diameter	50
height	15
Weight, *gr*	130

Types of microscope object stages are given in Fig. 1 "a" and "b".

The service life of such devices is practically unlimited.

Control of the heating or cooling rate of the object fitted on thermoelectric object stages is accomplished by altering the quantity of feeding current. Temperature measurements are carried out by a special thermocouple.

Alteration of the object stage operating regime from cooling to heating is accomplished by switching the current polarity.

LABORATORY THERMOELECTRIC MICROCOOLER

It is often "a must" in research work to examine a specimen or any phenomenon in a wide range of temperature, particularly on subzero levels.

Fixed compressor-type cooling plants are ineffective for this purpose because of a number of their disadvantages. The application of various coolants can also not serve the purpose since this does not insure a gradual change of temperature.

The laboratory thermoelectric microcooler is a self-contained device providing for a gradual alteration of temperature within a range of +50° down to –25° C. The size of the device provides a possibility to examine various objects of laboratory investigation.

The main part of microcoolers is a semi-conductor thermoelect-

ric battery, which consists of an assembly of positive and negative semi-conductors connected to each other in series. When current flows through the battery one of its sides cools down while the other gets hot. The battery is positioned on the wall of the internal cylinder.

The microcooler is designed to stabilize temperature when used together with a thermocontroller.

By putting a temperature transmitter in the working volume it is possible to maintain temperature with an accuracy of ±0.5° C.

The service life of a microcooler is practically unlimited.

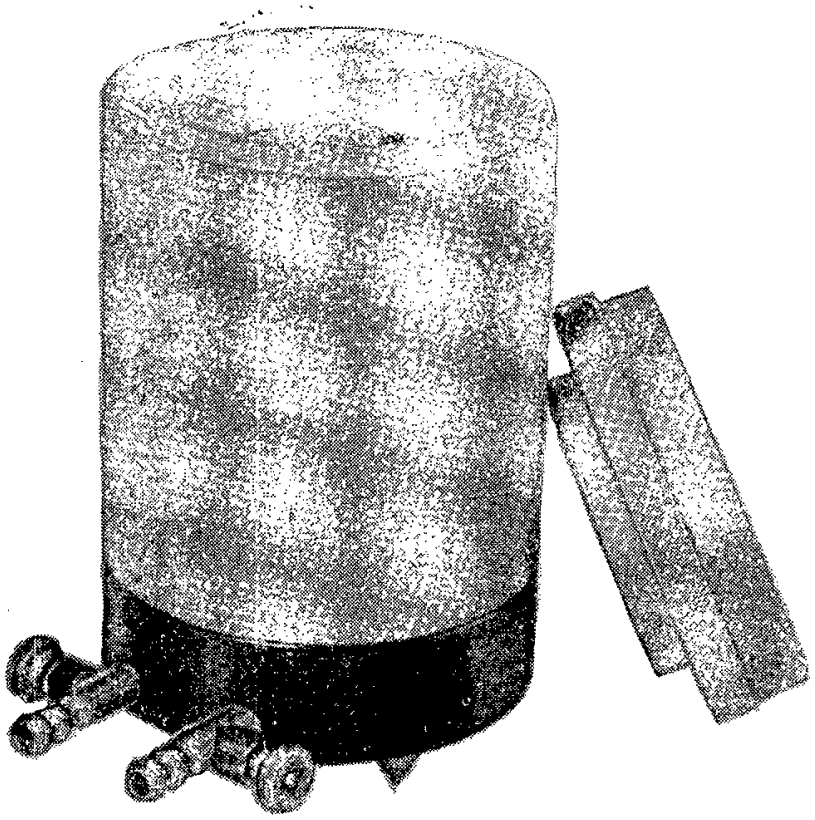

Fig. 2. Laboratory Thermoelectric Microcooler

SPECIFICATIONS

Internal chamber capacity, cm^3	75
Power consumption, W	25
Overall dimensions, *mm:*	
diameter	80
height	130
Weight, *gr*	550

HIGH-VACUUM TRAP WITH THERMOELECTRIC COOLING FOR DIFFUSION VAPOUR-OIL PUMPS

Practical operation of high-vacuum suction systems has proved that the main factor ensuring a maximum drop in pressure of the pumped out volume is vapour tension of the used working fluid in the pump. The best quality of oil in modern oil vapour pumps makes it possible to receive a maximum vacuum of $(2 \div 5) \times 10^{-6}$ *mm* Hg.

A further drop in pressure is possible under additional condensation of oil steam by means of a cooling trap situated between the pump and the pumped out volume.

Using traps which are cooled by means of flowing water makes it possible to lower the limiting vacuum up to $1 \times 10^{-6} \div 8 \times 10^{-7}$ *mm* Hg.

If it is necessary to receive a still lower vacuum the traps are usually cooled with liquid nitrogen.

However, using liquid nitrogen for cooling is accompanied by the following inconveniences: relative scarcity of liquid nitrogen, the large quantity being consumed, explosive danger when used in glass vacuum systems (during use of the so-called "liquid air"), difficulties in using traps cooled with liquid nitrogen in automatic pumping out arrangements and in others.

The development of theory and practice of thermoelectric cooling made it possible to design a high-vacuum trap for oil-vapour pumps in which the effect of thermoelectric cooling is used.

The thermoelectric cooling trap can be fitted on any commercial-type diffusion pump.

The main constructive element of the trap is a thermoelectric semi-conductor battery which creates a negative temperature on the surfaces of condensation.

The configuration of condensed surfaces is such that the oil-vapour molecule must undergo repeated reflection before getting into the pumped volume which practically results in "freezing out" any vapours left over. Various types of traps improve vacuum by 6 – 7 times.

As an example we shall cite the Main Specifications for the trap of a pump with a capacity of 500 litres per second:

Surface condensation temperature, I stage, °C	**20**
Surface condensation temperature, II stage, °C	**50**
Resistance to suction speed, %	**35**
Power consumption, *W*	**90**
Overall dimensions, *mm*:	
height	**132**
diameter	**240**
Weight, *kg*	**11.2**

Service life is practically unlimited.

GENERAL SPECIFICATION OF THERMOELEMENTS

1) Coefficient of thermoelement "goodness" is $Z = \frac{}{K}$ $Z = 2,4 \times 10^{-3} \times K^{-1}$ is a coefficient of positive branch $Z = 2,2 \times 10^{-3} \times K^{-1}$ is a coefficient of negative branch .

2) is a coefficient of thermoelectromotive force = 200 mu v x C^{-1} is a coefficient of positive & negative branches is = 400 mu v x C^{-1}.

3) K - is a coefficient of heat conductivity $K = 3,4 \times 10^{-3} \frac{c}{gr.cm}$

4) t = temperature difference between hot & cold solders in vacuum is 65 - 68°C.
Th = 27°C is temperature of hot solder
Tc = -41°C is temperature of cold solder

5) t is 56 - 58°C in the air
th = 27°C is temperature of hot solder
Tc = 31°C is temperature of cold solder

6) Coefficient of electrodonductivity is = 1000 - 1100 om^{-1} cm^{-1}.

7) Efficiency of thermocooling instruments can be various depending on outside factors. In particular "Eff" of microcooler is 30 - 50°/o according to "Th", parasitic heatflow, gradiences of supply current and voltage.

8) Configuration and dimensions of thermoelements in accordance with various technology can be received vyrous.

For example:

There are 10 thermoelements in microcooler of 8 x 8 x 4 mm dimensions.

There are 8 thermoelements in microscope object stage of 5 x 5 x 5 mm.

There are 20 thermoelements in vacuum trap of 12 x 10 x 8 mm.

9) For supplying semiconductor-thermocoolers it takes current of 10 - 30 A and voltage of 0,5 - 2 v depending on concrete types of instruments.

10) At the present time the technology of manufacturing thermoelements on the base of monocrystalline semiconductor material is used.

Forming monocrystals is rather protracted expensive and complex process which demands using well clean companents. In spite of the above-said large quantities of defect are received during the production of thermoelements.

The technology in accordance with the licence of V/O "Mashpriborintorg" is based on the manufacturing pressed thermoelements with using technical clean companents such as tellurium, bismuth, antimony, selenium, Such technology is based on using materials with polycrystalline apparatus and does not demand special equipment for forming monocrystals.

The cost of manufacturing polycrystalline semiconductor material is rather low.

The elaborating technology secures 100°/o going out thermoelements, i.e. without defects.

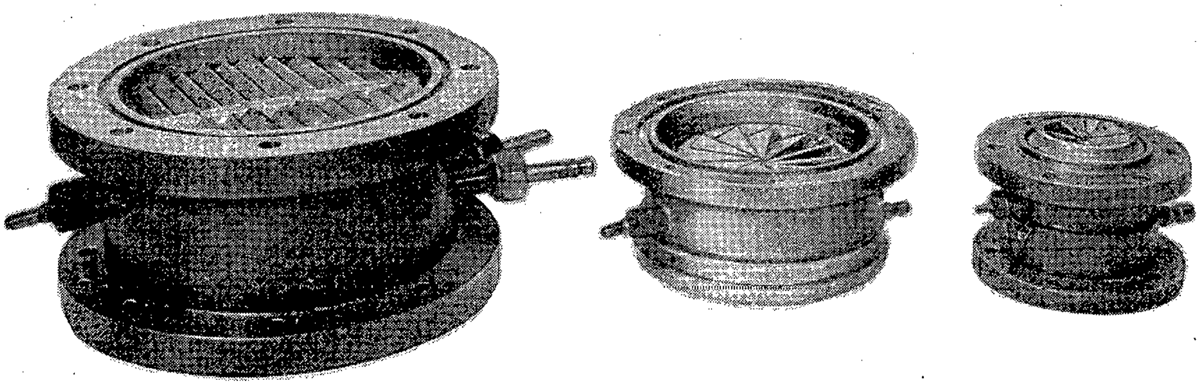

Fig. 3. Traps with Thermoelectric Cooling

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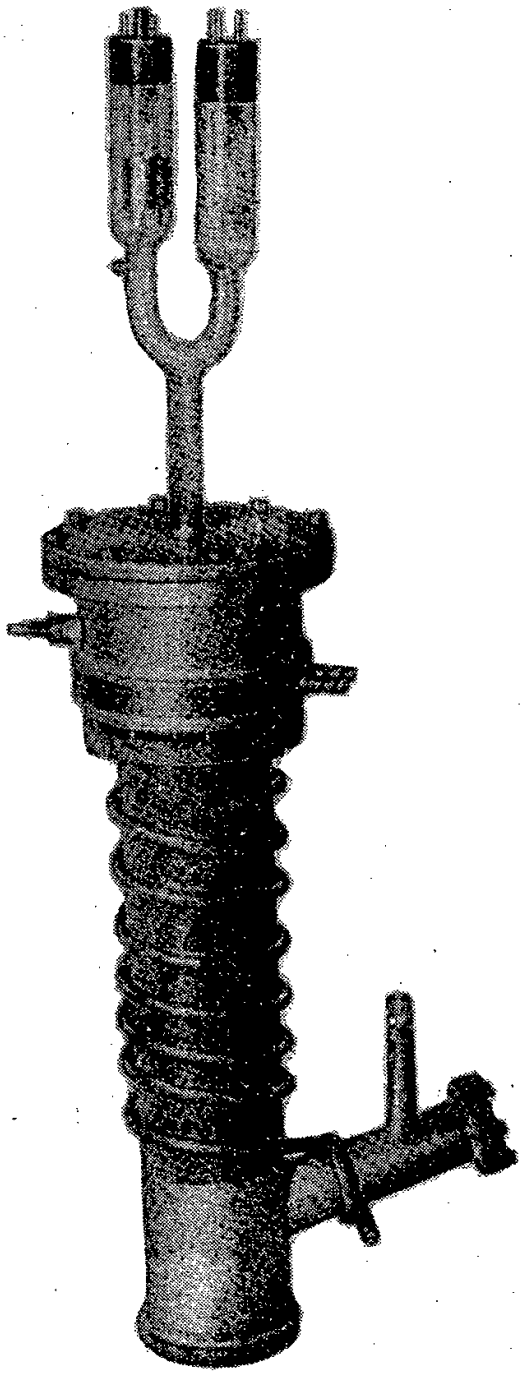

Fig. 4. Diffusion Pump with High-Vacuum Trap

The organization of production of such devices does not require the use of complex and expensive equipment. The necessary quantity of technical documentation on the thermocooling devices and detail instructions for their manufacture can be rendered on satisfactory terms to the Buyer.

By agreement with the Buyer, if so required, highly-trained Soviet experts will be assigned to render technical assistance and to train local personnel.

V/O "Mashpriborintorg" is the sole Seller of licences for the manufacture of thermoelectric semi-conductor devices.

Please, send your enquiries to V/O "MASHPRIBORINTORG", MOSCOW, G–200
Cable address: MASHPRIBORINTORG, MOSCOW
Telex: 184

Vneshtorgizdat, Order No. 25391
Resp.: Krajushkin V.I., Ivanova V.V.,
Tregubenko A.M.

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ПРОТЕЗ ПРЕДПЛЕЧЬЯ С БИОЭЛЕКТРИЧЕСКИМ УПРАВЛЕНИЕМ

Q. BELOW-ELBOW PROSTHESIS WITH BIOELECTRIC CONTROL

OBERARMPROTHESE MIT BIOELEKTRISCHER STEUERUNG

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PROTHESE DE L'AVANT-BRAS A COMMANDE BIOELECTRIQUE

ПРОТЕЗ ПРЕДПЛЕЧЬЯ С БИОЭЛЕКТРИЧЕСКИМ УПРАВЛЕНИЕМ

В Советском Союзе разработана оригинальная конструкция протеза предплечья с биоэлектрическим управлением, представляющая собою принципиально новый вид протеза, в котором активные движения пальцев кисти (активный схват и активное раскрытие пальцев) осуществляются при помощи биоэлектрических токов, возникающих в мышцах культи предплечья при их сокращении инвалидом.

В существующих обычных протезах для выполнения каких-либо движений используется мускульная сила ампутированного, причем для выполнения самого простого движения требуется затрата очень больших усилий, управление осуществляется значительно удаленными от предплечья частями тела с помощью специальных тяг.

В протезе с биоэлектрическим управлением в качестве источников энергии используются внешние источники, инвалиду не приходится затрачивать больших усилий при выполнении каких-либо движений.

Протез предплечья с биоэлектрическим управлением обеспечивает инвалиду лучшие функциональные возможности по сравнению со всеми другими существующими конструкциями протезов предплечья.

Управление движением пальцев искусственной кисти осуществляется с помощью самой культи без каких-либо других компенсаторных движений.

Протез позволяет инвалиду производить сгибание и разгибание пальцев кисти при любом положении протезированной конечности. Таких возможностей не представляет ни один протез другой конструкции, так как в других конструкциях движение пальцев кисти зависит от положения протезированной конечности и надплечий.

Движение пальцев кисти может дозироваться инвалидом. Зная исходное положение пальцев кисти протеза, протезированные могут произвольно осуществлять различную степень сгибания и разгибания пальцев кисти.

Протез легко управляем, так как захват предметов обеспечивается сокращением мышц-сгибателей, а разгибание пальцев кисти – сокращением мышц-разгибателей. Для управления движением пальцев кисти требуется очень небольшое напряжение мышц (величина биосигнала порядка 20–40 *мкв*).

Практически работа с биоэлектрическим протезом не утомляет инвалида. Плечевой пояс больного при пользовании протезом с биоэлектрическим управлением освобождается от каких-либо приспособлений, которые в обычных протезах необходимы для передачи силы на протез с частей тела, расположенных проксимальнее культи предплечья.

Протез прост в освоении. Для обучения инвалидов пользованию протезом и отработки движений требуется сравнительно небольшая (несколько сеансов по 20–30 *мин*) тренировка в раздельной работе мышц-антагонистов.

Указанные выше особенности протеза предплечья с биоэлектрическим управлением позволяют инвалидам, протезированным этим протезом, сравнительно быстро осваивать и выполнять большое число различных бытовых и трудовых действий, большинство из которых невозможно выполнить при пользовании протезами предплечья других конструкций. Так, например, инвалиды, получившие протезы с биоэлектрическим управлением, после некоторой тренировки могут:

удерживать протезом паяльник, отвертку, керн, работать пинцетом:

брать и удерживать искусственной кистью яйцо, не раздавливая скорлупу;

удерживать часы, заводя их здоровой рукой;

доставать из кармана папиросы и спички, зажигать их, закуривать;

стричь ногти на пальцах здоровой руки с помощью пружинной машинки для ногтей;

стянуть рукав пальто, надеть кашне;

удерживать расческу, причесываться;

чистить одежду и обувь шеткой и ряд других действий.

Гильза предплечья, изготовленная по гипсовому слепку из слоистого пластика, предназначена для размещения в ней культи предплечья. С гильзой предплечья шарнирно связана гильза плеча, выполненная из кожи в виде манжеты с застежкой.

Гильза служит для закрепления протеза на верхней конечности инвалида. Вместо гильзы плеча можно применить для этой цели крепление в виде уздечки.

Дистальный отдел гильзы предплечья с помощью специального металлического кольца соединяется с кистью. Это соединение позволяет осуществлять пассивную ротацию предплечья. В кисти размещен привод, состоящий из микроэлектродвигателя и редуктора. Подвижный первый палец и подвижный блок четырех пальцев кисти связаны с редуктором посредством рычагов.

На кисть надевается эластичная косметическая оболочка.

Токосъемное устройство служит для снятия биоэлектрических сигналов с мышц культи предплечья.

Биоэлектрический сигнал усиливается в усилительном блоке, который представляет собою двухканальный усилитель (канал сгибания и канал разгибания). Усиленный сигнал включает аккумуля-

торную батарею на электродвигатель, который приводит в движение кисть протеза.

Аккумуляторная батарея состоит из малогабаритных аккумуляторов, которые в процессе эксплуатации нуждаются в периодической зарядке (в среднем 1 раз в два–три дня). Для этого в комплекте протеза имеется зарядное устройство, работающее от сети переменного тока напряжением 127 или 220 *в*.

Соединение всех элементов электрической схемы протеза производится с помощью экранированных гибких проводов и специальных миниатюрных разъемов.

Усилительный блок и аккумуляторная батарея могут размещаться в одежде инвалида в зависимости от того, как ему удобнее: в карманах брюк или пиджака, на поясе. Обычно усилитель размещают в специальном карманчике с внутренней стороны брюк, а аккумуляторную батарею – в кармане брюк или пиджака.

ОСНОВНЫЕ ДАННЫЕ

Усилие захвата, *кг*	1,3 – 1,5
Максимальное усилие захвата после подачи нескольких дополнительных импульсов, *кг*	2
Вес, *г*:	
протеза	800
усилителя	120
аккумуляторной батареи	320
Габаритные размеры, *мм*:	
усилителя	82 × 46 × 21
аккумуляторной батареи	100 × 63 × 37

Разработанная техническая документация позволяет быстро организовать крупносерийное производство.

Единственным продавцом лицензии на производство протеза с биоэлектрическим управлением является В/О "Лицензинторг"

Рис. 1. Fig. 1 Bild 1 Fig. 1

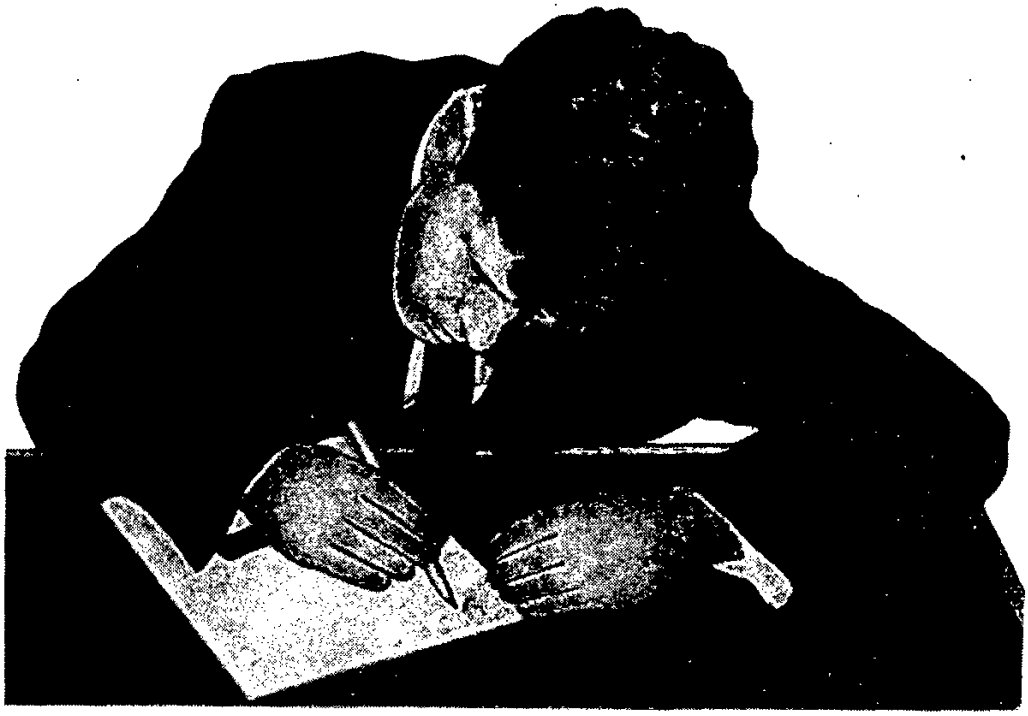

Рис. 2 Fig. 2 Bild 2 Fig. 2

Рис. 3 Fig. 3 Bild 3. Fig. 3

Рис. 4 Fig. 4 Bild 4 Fig. 4

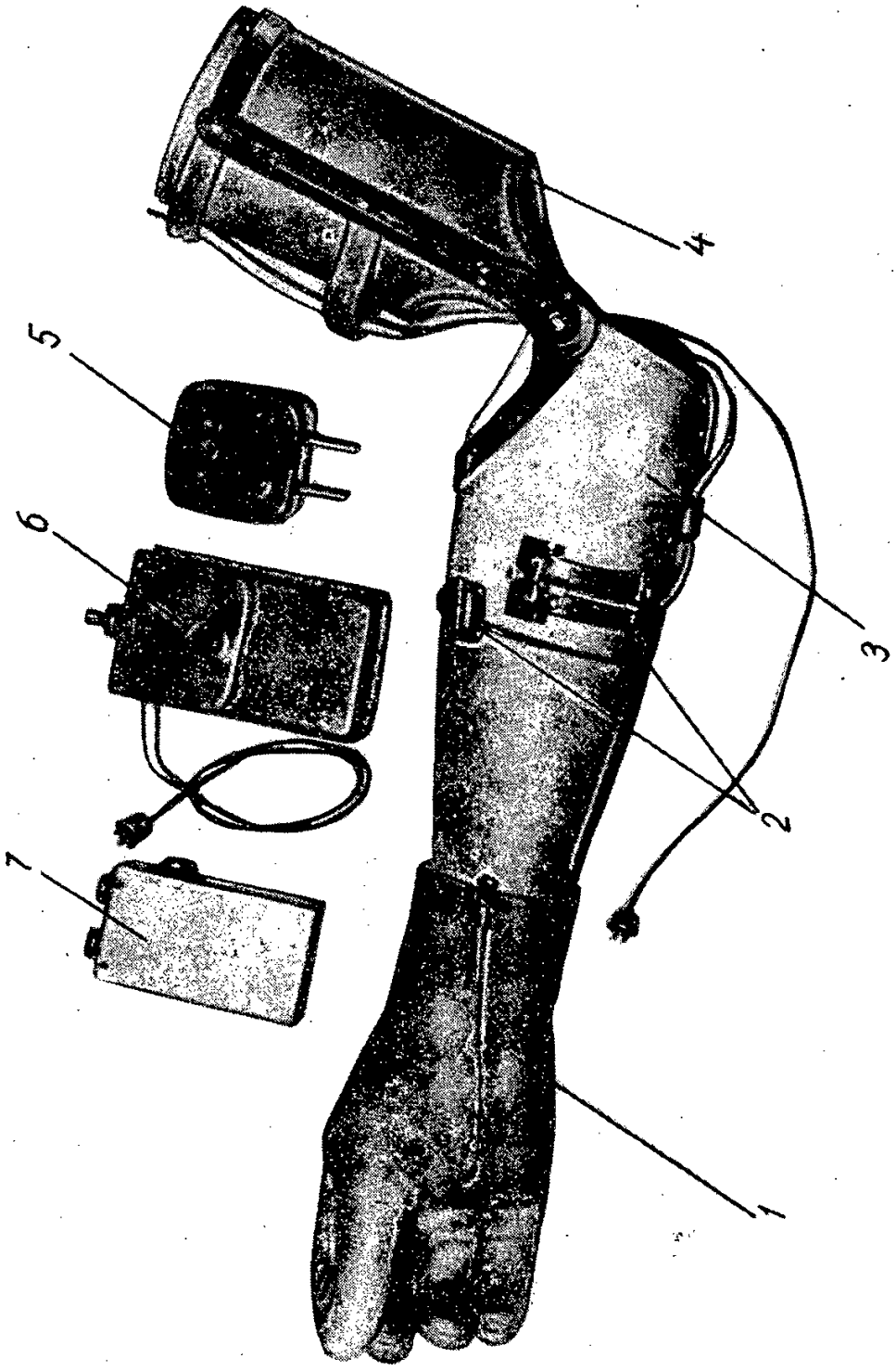

Рис. 5. Протез предплечья с биоэлектрическим управлением:
1 – кисть с электромеханическим приводом; *2* – токосъемное устройство; *3* – гильза предплечья; *4* – гильза плеча; *5* – зарядное устройство; *6* – аккумуляторная батарея; *7* – усилительный блок

Fig. 5. *Below-Elbow Prosthesis with Bioelectric Control:*
1 – forearm with a bioelectric drive; 2 – power take-off device; 3 – forearm socket; 4 – shoulder socket; 5 – charging device; 6 – storage battery; 7 – amplifier

Bild 5. *Oberarmprothese mit bioelektrischer Steuerung:*
1 – Hand mit elektromechanischem Antrieb; 2 – Stromabnehmer; 3 – Oberarmhülse; 4 – Achselhülse; 5 – Ladeeinrichtung; 6 – Akkumulatorenbatterie; 7 – Verstärkerblock

Fig. 5. *Prothèse de l'avant-bras à commande bioélectrique:*
1 – poignet à dispositif de commande électromécanique; 2 – dispositif de prise de courant; 3 – colonne de l'avant-bras; 4 – colonne du bras; 5 – chargeur des accumulateurs; 6 – batterie d'accumulateurs; 7 – bloc amplificateur

BELOW-ELBOW PROSTHESIS WITH BIOELECTRIC CONTROL

A below-elbow prosthesis of original design, with bioelectric control, has been developed in the USSR. This prosthesis incorporates a new principle: active movements of the fingers, both grasping and opening, are performed by means of the bioelectric currents originating in the muscles of the forearm stump when contracted by the amputee.

In existing conventional prostheses the amputee's muscular strength is used for performing movements; great effort is necessary for the simplest movement, and control is effected by parts of the body at some distance from the forearm, acting through special links.

In the prosthesis with bioelectric control external power sources are used, and the amputee does not have to exert great effort in performing movements.

The below-elbow prosthesis with bioelectric control ensures the amputee a better functional ability than prostheses of any other design now in use.

Movement of the fingers of the artificial hand is controlled by means of the stump itself without any other compensatory movements.

With this prosthesis the fingers can be flexed and extended whatever the position of the affected extremity. This is impossible with prostheses of any other design, since in their case the movement of the fingers depends on the position of the affected extremity and the shoulder.

With the new prosthesis the wearer can regulate the movement of the fingers. Seeing the initial position of the fingers, he can flex or extend them to a greater or less degree as he likes.

The prosthesis is easily managed, since objects are grasped by contraction of the flexor muscles and the fingers are extended by contraction of the extensor muscles. This requires only slight muscular tension – a biosignal of the order of 20 – 40 μV.

The amputee will find that work with this prosthesis is practically untiring; his shoulder girdle is freed from all contrivances necessary in conventional designs for the transmission of effort to the prosthesis from parts of the body situated proximally to the stump.

It is easy to learn how to use the prosthesis with bioelectric control. Teaching the amputee how to operate the prosthesis and practice

for the refinement of movements require only short training in the separate work of the antagonist muscles – several 20-30 minute periods are sufficient.

These features of the prosthesis with bioelectric control make it possible for the amputee to quickly master a large number of operations encountered with in every-day life and in his work, most of which cannot be performed when using below-elbow prostheses of other designs. For example, after a little training the amputee wearing a prosthesis with bioelectric control can do the following:

hold a soldering iron, screwdriver or centre punch with the prosthesis, or work with forceps;

pick up and hold an egg without crushing the shell;
hold a watch while winding it with the sound hand;
take cigarettes and matches out of his pocket and light up;
trim the fingernails on the sound hand with spring clippers;
take off his greatcoat or put on his muffler;
hold a comb and dress his hair;
brush his clothes and boots, and perform a great number of other actions.

The forearm socket is made from laminated plastic to a plaster cast of the stump. The socket is hinged to the upper-arm corset, which is laced.

The corset is for suspending the prosthesis from the upper extremity. Instead of a corset, a harness arrangement may be used for this purpose.

The socket is connected distally to the hand by means of a metal ring. This joint makes possible passive rotation of the forearm. A drive is mounted inside the hand, consisting of a micro-motor and reducing gear. The active thumb and active fingers, which are fixed in a single block, are linked to the reducing gear by means of levers.

The hand is provided with an elastic, cosmetic covering.

A current pick-up transmits bioelectric signals from the stump muscles.

Bioelectric signals are amplified by the amplifying unit, consisting of a two-channel amplifier (flexing channel and extending channel). The amplified signal connects the motor to the storage battery, thus actuating the artificial hand.

The storage battery consists of small-size cells which must be periodically recharged when in use – usually every two or three days. For this purpose the prosthesis is supplied with a charging device which operates from 127 or 220 *V* A.C. mains.

All parts of the electrical system are connected with flexible screened wires and special miniature plugs.

The amplifying unit and the storage battery can be carried in the amputee's clothes, wherever he finds it most convenient: in the pockets of trousers or jacket, or on the belt. The amplifier is usually placed in a special pocket inside the trousers, and the storage battery in trousers or jacket pocket.

SPECIFICATIONS

Grasping force, *kg*	1.3 – 1.5
Maximum grasping force after transmission of several additional impulses, *kg*	2
Weight, *g*:	
prosthesis	800
amplifier	120
storage battery	320
Overall dimensions, *mm*:	
amplifier	82×46×21
storage battery	100×63×37

Detailed drawings and specifications make it possible to quickly organize large-scale serial production.

Licences for the manufacture of the prosthesis with bioelectric control are to be obtained through V/O "Licensintorg" only.

OBERARMPROTHESE MIT BIOELEKTRISCHER STEUERUNG

In der Sowjetunion wurde eine originelle Oberarmprothese mit bioelektrischer Steuerung entwickelt. Es handelt sich um eine prinzipiell neue Prothesenkonstruktion, bei der ihren Zweck erfüllende Fingerbewegungen (Ergreifen und Loslassen von Gegenständen mit den Fingern) mit Hilfe von bioelektrischen Strömen erfolgen. Letztere entstehen in den Muskeln des Oberarmstumpfes des Invaliden, wenn er sie spannt.

Die üblichen Prothesen benutzen beim Ausführen beliebiger Bewegungen die Muskelkraft des Amputierten. In diesem Falle ist selbst bei den allereinfachsten Bewegungen ein großer Kraftaufwand erforderlich. Die Bewegungen werden durch Körperteile, die recht weit vom Oberarm entfernt sind, mit Hilfe einer Zugvorrichtung gesteuert.

Bei der Prothese mit bioelektrischer Steuerung wird die nötige Energiemenge von Fremdquellen geliefert. Der Invalid braucht bei beliebigen Bewegungen keine großen Anstrengungen zu machen.

Die Prothese mit bioelektrischer Steuerung stellt dem Invaliden bessere funktionelle Möglichkeiten zur Verfügung, als alle anderen bestehenden Oberarmprothesen-Bauarten.

Die Fingerbewegungen an der künstlichen Hand werden durch den Armstumpf ohne irgendwelche kompensierenden Bewegungen gesteuert.

Die Prothese ermöglicht dem Invaliden, die Finger in einer beliebigen Lage des prothesierten Armstumpfes zu biegen und wieder auszustrecken. Solche Möglichkeiten gibt keine einzige andere Prothesenkonstruktion, da bei ihnen die Fingerbewegungen von der Lage des prothesierten Armstumpfes und der Achsel abhängen.

Der Invalid selbst kann bestimmen, in welchem Maße er Finger bewegen will. Da er die Ausgangsstellung der Prothesenfinger kennt, kann er nach Belieben mehr oder weniger die Finger biegen oder wieder ausstrecken.

Die Prothese kann leicht gesteuert werden, da zum Fassen von Gegenständen nur die Beugemuskeln und beim Geraderichten der Finger die Streckmuskeln gespannt werden müssen. Eine ganz geringe Muskelkraft (ein Biosignal von ungefähr 20 . . . 40 μV) genügt zum Steuern der Fingerbewegungen.

Der Einsatz von bioelektrischen Prothesen hat bewiesen, daß sie den Invaliden nicht ermüden.

An der Achsel des Kranken werden bei Benutzung einer Prothese mit bioelektrischer Steuerung keinerlei Vorrichtungen befestigt, wie sie bei den üblichen Prothesen unerläßlich sind, um der Prothese Kräfte von (in Bezug auf den Oberarm) rumpfwärts gelegenen Körperteilen zu übermitteln.

Die praktische Verwendung der Prothese kann leicht erlernt werden. Eine verhältnismäßig geringe Übungszeit (einige 20—30 min lange Sitzungen), in denen die Muskeln antagonistisch (unabhängig voneinander) bewegt werden, genügt, um die Invaliden mit dem Gebrauch der Prothese bekannt zu machen und sie die nötigen Bewegungen zu lehren.

Obenerwähnte Besonderheiten der Oberarmprothese mit bioelektrischer Steuerung ermöglichen den mit diesen Prothesen ausgerüsteten Invaliden verhältnismäßig schnell eine Vielzahl unterschiedlicher, im Leben und bei der Arbeit erforderlicher Handgriffe zu erlernen und auszuführen. Die größte Menge dieser Handgriffe ist nicht möglich bei Verwendung von Prothesen anderer Bauart. So können zum Beispiel Invaliden, die Prothesen mit bioelektrischer Steuerung besitzen, schon nach einer kurzen Übungsfrist:

mit der Prothese Lötlampe, Schraubenzieher oder Körner halten und mit einer Pinzette arbeiten;

ein Ei in ihre künstliche Hand nehmen und es festhalten, ohne dabei die Eischale zu zerdrücken;

eine Uhr halten und sie mit der gesunden Hand aufziehen;

Zigaretten und Streichhölzer aus der Tasche nehmen, ein Streichholz anzünden und sich eine Zigarette anstecken;

die Fingernägel an der gesunden Hand mit Hilfe eines Feder-Nagelschneiders schneiden;

den Mantelärmel herabziehen oder einen Schal um den Hals legen;

einen Kamm halten und sich kämmen;

Schuhe und Kleider mit einer Bürste reinigen sowie eine Reihe anderer Handgriffe ausführen.

Die Schichtplast-Oberarmhülse wurde anhand eines Gipsabgusses gefertigt und dient zur Aufnahme des Oberarmstumpfes. Mit dieser Hülse ist die Achselhülse, die aus einer Ledermanschette mit Verschluß besteht, gelenkig verbunden.

Mit Hilfe der Achselhülse wird die Prothese am Oberarmstumpf des Invaliden befestigt. An ihrer Stelle kann auch eine zaumartige Befestigung verwendet werden.

Der distale Teil der Oberarmhülse ist durch einen speziellen Metallring mit der Hand verbunden. Diese Verbindung läßt passive Oberarmbewegungen zu. In der Hand ist ein Antrieb eingebaut, der aus Kleinstelektromotor mit Untersetzungsgetriebe besteht. Der bewegliche Daumen und der aus vier Fingern bestehende bewegliche Block sind mit dem Untersetzungsgetriebe durch ein Gestänge verbunden.

Die Hand besitzt einen elastischen hygienischen Überzug.

Ein Stromabnehmer nimmt die bioelektrischen Signale, die von den Oberarmstumpfmuskeln ausgehen, auf.

Das bioelektrische Signal wird im Verstärkerblock verstärkt. Letzterer besteht aus einem Zweikanalverstärker (ein Beuge-und ein Streckkanal). Das verstärkte Signal schaltet die Akkumulatorenbatterie an den Elektromotor, wonach der Motor die Prothesenhand bewegt.

Die Akkumulatorenbatterie besteht aus Kleinakkumulatoren, die während der Nutzung periodisch (etwa einmal in zwei-drei Tagen) geladen werden müssen.

Zu diesem Zweck enthält der Prothesensatz eine Ladeeinrichtung, die an ein Wechselstromnetz mit 127 oder 220 *V* Spannung angeschlossen werden kann.

Alle Bauelemente der elektrischen Prothesenschaltung sind durch abgeschirmte biegsame Leiter und spezielle lösbare Miniaturverbindungen miteinander verbunden.

Verstärkerblock und Akkumulatorenbatterie können in der Kleidung des Invaliden untergebracht werden, wo dies ihm am bequemsten erscheint, z.B. in den Hosen- oder Jackentaschen oder am Gürtel. Meistens wird der Verstärker in einer Sondertasche auf der Hoseninnenseite und die Akkumulatorenbatterie in einer Hosen- oder Jackentasche getragen.

HAUPTDATEN

Faßkraft, *kp*	1,3 – 1,5
Maximale Faßkraft nach dem Senden von mehreren Zusatzímpulsen, *kp*	2
Masse, *g*:	
Prothese	800
Verstärker	120
Akkumulatorenbatterie	320
Außenmaße, *mm*:	
Verstärker	82×46×21
Akkumulatorenbatterie	100×63×37

Die erarbeiteten technischen Unterlagen ermöglichen es, schnell eine Großserienfertigung aufzunehmen.

V/O "Lizenzintorg" ist der einzige Verkäufer von Lizenzen für die Fertigung von Prothesen mit bioelektrischer Steuerung.

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PROTHESE DE L'AVANT-BRAS A COMMANDE BIOELECTRIQUE

Une prothèse de l'avant-bras à commande bioélectrique de construction parfaitement originale, a été mise au point en Union Soviétique; c'est une prothèse basée sur un principe entièrement nouveau, dans laquelle les mouvements actifs des doigts (préhension active, et ouverture active des doigts) sont effectués à l'aide des courants bioélectriques, engendrés dans les muscles du moignon de l'avant-bras au moment de leur contraction par l'invalide.

Dans les prothèses existantes de construction courante pour exécuter des mouvements quelconques on met en oeuvre la force musculaire de l'amputé, l'exécution du mouvement le plus simple nécessitant des efforts très grands tandis que la commande est faite par des parties du corps humain sensiblement éloignées de l'avant-bras, à l'aide de tringles spéciales.

Dans la prothèse à commande bioélectrique on emploie comme sources d'énergie des souces extérieures et l'invalide n'a pas à déployer d'efforts importants pour exécuter des mouvements quelconques.

La prothèse de l'avant-bras à commande bioélectrique procure aux invalides des possibilités fonctionnelles meilleures que toutes les autres variantes existantes des prothèses de l'avant-bras.

Les mouvements des doigts du poignet artificiel sont commandés à partir du moignon lui-même sans nécessiter aucuns autres mouvements compensatoires.

Cette prothèse permet à l'invalide d'effectuer la flexion et l'extension des doigts en n'importe quelle position du moignon. Ces possibilités n'existent pas dans aucune autre prothèse, puisque dans d'autres exécutions les mouvements des doigts dépendent de la position du membre portant la prothèse et des épaulières.

Les mouvements des doigts peuvent être exactement dosés par le sujet. Connaissant la position initiale des doigts du poignet artificiel, les invalides peuvent réaliser à volonté un taux différent de flexion et d'extension des doigts.

La prothèse est facile à commander, car la préhension des objets est effectuée par la contraction des muscles fléchisseurs et le redressement des doigts par la contraction des muscles extenseurs. Pour commander les mouvements des doigts on doit faire des efforts musculaires insignifiant (la valeur du biosignal étant de l'ordre de 20 à 40 μV).

Pratiquement le travail avec la prothèse bioélectrique ne fatigue pas l'invalide.

L'épaulière du sujet est libérée d'accessoires quelconques lorsqu'on utilise une prothèse à commande bioélectrique; peu contre dans les prothèses ordinaires ces accessoires sont nécessaires pour transmettre à la prothèse les efforts à partir des membres du corps disposés à proximité du moignon du bras.

La prothèse est très facile à assimiler. Pour enseigner aux invalides l'utilisation de cette prothèse et pour assimiler les mouvements à exécuter, il suffit d'un d'entraînement court comprenant plusieurs séances de 20 à 30 *mn* de fonctionnement séparé des muscules antagonistes.

Les particularités mentionnées de la prothèse de l'avant bras à commande bioélectrique permettent aux amputés portant cette prothèse d'assimiler rapidement et d'exécuter un grand nombre de mouvements nécessaires dans la vie courante, comme dans leur activité professionnelle. La majorité de ces mouvements est impossible avec des prothèses de l'avant bras d'autres conceptions. Par exemple, les invalides possédant des prothèses à commande bioélectrique peuvent, après un certain entraînement effectuer les opérations suivantes:

tenir avec la prothèse un fer à souder, un tournevis, un pointeau et travailler avec des pinces;

prendre et maintenir un oeuf avec la main artificielle sans écraser sa coquille;

tenir une montre qu'ils remontent avec leur main saine;

sortir les cigarettes et les allumenttes de leurs poches, allumer la cigarette et fumer;

couper les ongles des doigts de la main saine à l'aide d'une pince à ressort prévue à cet effet;

dégager son bras de la manche d'un pardessus, mettre un cachenez;

tenir un peigne et se coiffer;

nettoyer les vêtements et les souliers à l'aide d'une brosse ainsi qu'un certain nombre d'autres opérations encore.

La colonne prothétique de l'avant-bras, exécutée en matière plastique stratifiée à partir d'un moulage en plâtre, est destinée à loger le moignon de l'avant-bras. La colonne du bras, articulée avec celle de l'avant-bras, est exécutée sous forme d'un brassard en cuir avec boucle de fermeture.

Cette colonne sert à la fixation de la prothèse au membre supérieur de l'invalide. On peut utiliser à la place de la colonne du bras une fixation en forme de harnais.

La partie distale de la colonne de l'avant-bras est raccordée à l'aide d'une bague métallique au poignet artificiel. Ce mode de raccordement permet la rotation passive de l'avant-bras. Le poignet porte le dispositif de commande comprenant un micromoteur électrique et un réducteur. Le pouce mobile ainsi que le bloc des quatre autres doigts sont accouplés au réducteur par l'intermédiaire de leviers.

La main est revêtue d'une gaîne cosmétique souple.

Un dispositif de prise de courant sert à prélever les signaux bioélectriques des muscles du moignon de l'avant-bras.

Le signal bioélectrique est amplifié dans le bloc amplificateur, constitué par un amplificateur à deux voies (la voie de flexion et la voie d'extension). Le signal amplifié branche la batterie d'accumulateurs au moteur commandant. Les mouvements du poignet prothétique.

La batterie d'accumulateurs comporte des accumulateurs de faible encombrement, nécessitant une recharge périodique en cours d'exploitation (une fois tous les deux à trois jours en moyenne).

Pour permettre cette recharge, la prothèse est livrée avec un chargeur, alimenté par un secteur à courant alternatif 127 ou 220 *V*.

Tous les éléments du circuit électrique de la prothèse sont raccordés par des fils souples blindés et des connecteurs spéciaux miniatures.

Le bloc d'emplificateur et la batterie d'accumulateurs peuvent être placés dans les vêtements de l'invalide de la manière la plus commode pour ce dernier, comme par exemple, dans les poches du pantalon ou de veston, sur la ceinture. Habituellement l'amplificateur est porté dans une poche spéciale executée du côté intérieur du pantalon et la batterie d'accumulateurs est placée dans une des poches du pantalon ou du veston.

CARACTERISTIQUES PRINCIPALES

Effort de préhension, *kg*	1,3–1,5
Effort maximum de préhension après envoi de plusieurs impulsions complémentaires, *kg*	2
Poids, *g*:	
de la prothèse	800
de l'amplificateur	120
de la batterie d'accumulateurs	320
Encombrement, *mm*:	
de l'amplificateur	82×46×21
de la batterie d'accumulateurs	100×63×37

Une documentation technique détaillée permet d'organiser rapidement la fabrication en grande série de cette prothèse.

Le seul organisme habilité pour la vente de la licence de fabrication de la prothèse à commande bioélectrique est V/O «Licenzintorg».

 IGN DISSEM

Ваши запросы напаравляйте по адресу:
Москва Г-200, Смоленская пл. 32/34 В/О "Лицензинторг"
Телеграфный адрес: *Москва Лицензинторг*
Телефон: *44-21-88*

Please, write to: *V/O "Licensintorg", Moscow G-200, Smolenskaya square, 32/34.*
Cable: *Moscow Licensintorg*
Telephone: *44-21-88*

C O N F I D E N T I A L
NO FOREIGN DISSEM

Bitte senden Sie ihre Anfragen an folgende Adresse:
Moskau G-200, Smolenskaja Pl. 32/34 V/O "Lizenzintorg"
Drahtanschrift: *Moskau Lizenzintorg*
Fernruf: *44-21-88*

Prière de diriger vos demandes à l'adresse:
Moscou, G-200, Smolenskaïa pl, 32/34, V/O «Licenzintorg»
Adresse télégraphique: *Moscou Licenzintorg*
Téléphone: *44-21-88*

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