AID Nr. 990-1 14 June

POROSITY IN Ti-ALLOY WELDS [Cont'd] S/135/63/000/004/007/012

per 100 mm as the rate increased to 25 m/hr. With increasing specific heat input the amount of porosity increases sharply, especially in welds on pickled sheets. With BT-15 sheets cleaned with a wire brush an increase of heat input from 200 to 300 cal/cm increased porosity from ~ 5 to ~ 25 pores per 100 cm, while with sheets degreased, pickled, and wire brushed the same increase in heat input increased porosity from 30 to well over 80 pores per 100 mm. [DV]

Card 2/2

GORSHKOV, A.I. (Moskva); TRET'YAKOV, F.Ye. (Moskva)

Effect of hydrogen and addition elements on the porosity formation in titanium weldments. Avtom. svar. 16 no.9:36-41 S '63. (MIRA 16:10)

GORSHKOV, A.I.

Use of powdered coal in studying minerals by the method of microdifraction. Zap. Vses.min.ob-va 93 no. 2:195-197 '64. (MIRA 17:6)

Svarochnoye proizvodstvo, no.

TOPIC TAGS: titanium tube, welded titanium tube, titanium alloy tube,

and titanium-alloy tubes

AP4047016

[illegible] per 100 mm of [illegible] results of the tests showed that isolated pores, with diameters not exceeding [illegible] of the [illegible] have no effect on the [illegible] as the number of pores increases, [illegible]

[illegible] mm per 100 mm of weld length. Orig. art. has: 6 figures and 1 table.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: MM, AS

NO REF SOV: 002 OTHER: 000 ATD PRESS: 3133

[illegible] This sentence is not trustworthy. The original reference was [illegible] and no such statement was found. [illegible]

EWP(e)/EWT(m)/EWP(w)/EWA(d)/EWP(v)/T/EWP(t)/EWT(k)/EWP(z)/

Engineer

The causes of the formation of pores in titanium welded joints

EWT(d)/EWT(m)/EWP(w)/EWA(d)/EWP(v)/T/EWP(t)/EWP(b)/EWP(k)/EWP(h)/

Ye.; Viryuknina, G. N.; [illegible]

26

[illegible] of heat treatment on the structure and properties of welded joints [illegible] alloy

[illegible] Metallovedeniye i termicheskaya obrabotka metallov, no. 5, 1965, 59-63

[illegible] titanium alloy, metal mechanical property, electron beam melting, arc welding, heat treatment

ABSTRACT: Four Ti alloys in the form of plates were welded and tested after various heat treatments designed to maximize their strength [illegible] A[illegible] 2.5-3.4% [illegible]

L 57514-65

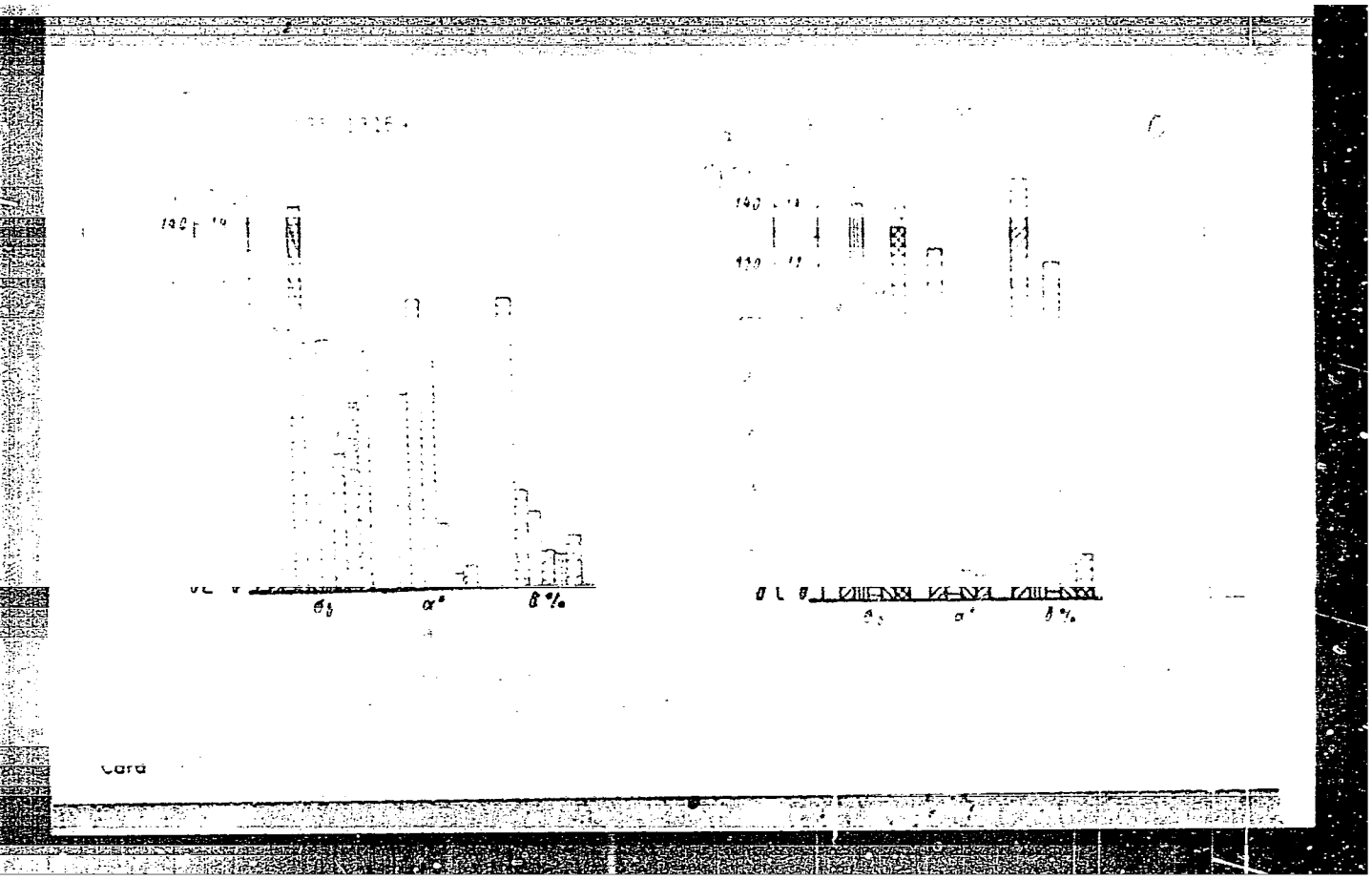
ACCESSION NR: AP5013164

of α-phase precipitation. Dendrites were clearly visible in the welded region, while the heat-affected zone was mostly composed of an equiaxed structure. There were pronounced differences in etch contrast between grains in the heat-affected

[illegible] be due to differences in the am[illegible]

[illegible] welding results in an increase in [illegible]

[illegible] none



GORSHKOV, A.I., inzh.

Argon arc butt welding of nonrotating 1Kh18N9T steel pipe without protective atmospheres at the inner part of the joint. Svar. proizv. no.8:18-20 Ag '65. (MIRA 18:8)

GORSHKOV, A.I.; IGNAT'YEV, V.I.; YASHUKOV, V.P.

Instrument for measuring the vertical component of the electrostatic field. Izv. AN SSSR. Fiz. atm. i okeana 1 no.10:1099-1100 O '65. (MIRA 18:10)

1. Fiziko-tekhnicheskiy institut AN SSSR.

MJW/JD/HM

L 14565-66 EWT(m)/EWA(d)/EWP(v)/T/EWP(t)/EWP(k)/EWP(z)/EWP(b)

ACC NR: AP6003284 SOURCE CODE: UR/0135/66/000/001/0

43

B

AUTHOR: Gorshkov, A. I. (Candidate of technical sciences); Tret'yakov, F. Ye. (Candidate of technical sciences)

ORG: none

TITLE: Short-arc welding of VT6S titanium alloy

SOURCE: Svarochnoye proizvodstvo, no. 1, 1966, 24-26

TOPIC TAGS: welding, arc welding, short arc welding, titanium, titanium alloy, alloy welding, TIG welding / VT6S titanium

ABSTRACT: Short-arc TIG welding of VT6S titanium alloy has been studied. It was found that by gradual lowering of the tungsten electrode end below the part level (Fig. 1), titanium-alloy parts up to

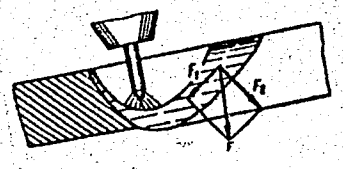


Fig. 1. Layout of short-arc TIG welding

UDC: 621.791.856.3:669.295.5

2

L 14

ACC N

Card 1/2

L 1852-66 EWT(m)/EWA(d)/EWP(v)/T/EWP(t)/EWP(k)/EWP(z)/EWP(b)/EWA(c) HJW/JD/
HM/HW

ACCESSION NR: AP5020159 UR/0135/65/000/008/0018/0020
621.791.856:3:621.9-462:669.15-194

AUTHOR: Gorshkov, A. I. (Engineer) 44,55

TITLE: Argon shielded arc welding of 1Kh18N9T steel tubes in fixed position without backing 44,55

SOURCE: Svarochnoye proizvodstvo, no. 8, 1965, 18-20

TOPIC TAGS: arc welding, stainless steel, stainless steel tube, stainless steel welding, tube welding

ABSTRACT: An attempt has been made to join small-diameter tubes of 1Kh18N9T steel by argon shielded arc welding without backing. It was found that under strictly maintained conditions, sound joints with uniform penetration can be produced. It was determined experimentally that the highest quality joints were obtained at a groove angle of 90° and a root face of 1.5 mm for tubes 20 mm in diameter with a 3 mm wall thickness, and at a root face of 2.5 mm for tubes 34, 46, 58, and 76 mm in diameter with a 5 mm wall thickness. To ensure uniform penetration on the root side of the weld, the arc current and travel rate must be closely controlled: reduced or increased depending on the weld position. For example, for a tube 20 mm in diameter the welding of the root pass begins with a current of 100 amp and ends

Card 1/2

L 1852-66

ACCESSION NR: AP5020159

0

with 70 amp. In the second pass the welding speed changes from 9 m/hr in the beginning to 12 m/hr at the end. The joints are welded in two passes, the first without and the second with filler wire. Orig. art. has: 6 figures and 1 table. [AZ]

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: MM, IE

NO REF SOV: 000 OTHER: 000 ATD PRESS: 4087

Card 2/2

L 13606-66 EWT(m)/EWP(t)/EWP(z)/EWP(b)/EWA(h) IJP(c) JD/HW

ACC NR: AP6002903 SOURCE CODE: UR/0286/65/000/024/0071/0072

INVENTOR: Semenova, N. V.; Pankratova, L. S.; Agaronik, V. Ya.; Platova, S. N.; Gorshkov, A. I.

ORG: none

TITLE: Nickel-base alloy. Class 40, No. 177073. [announced by the Central Scientific Research Institute of Ferrous Metallurgy im. I. P. Bardina (Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii)]

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 24, 1965, 71-72

TOPIC TAGS: alloy, nickel base alloy, molybdenum containing alloy, chromium containing alloy, aluminum containing alloy, copper containing alloy

ABSTRACT: This Author Certificate introduces a Ni-base alloy containing 20—28% Mo. In order to improve the physical and mechanical properties, 1—10% Cr, 0.5—5% Al, and 0.5—2% Cu are added. [WW]

SUB CODE: 11/ SUBM DATE: 26May64/ ATD PRESS: 4187

Card 1/1 UDC: 669.245.018.5

L 32031-66 EWT(m)/EWP(v)/T/EWP(t)/ETI/EWP(k) IJP(c) JD/WW/HM/JG

ACC NR: AP6019426 (N) SOURCE CODE: UR/0135/66/000/006/0007/0010

AUTHOR: Frolov, V. V. (Doctor of technical sciences); Gorshkov, A. I. (Candidate of technical sciences)

ORG: none

TITLE: Effect of hydrogen on the formation of porosity during argon-shielded arc welding of titanium

SOURCE: Svarochnoye proizvodstvo, no. 6, 1966, 7-10

TOPIC TAGS: titanium alloy, titanium alloy welding, argon shielded welding, alloy weld, weld porosity, hydrogen porosity, arc welding/VT1-2 alloy, VT14 alloy, VT15 alloy

ABSTRACT: The relationship between porosity formation and hydrogen diffusion in titanium alloy welds has been investigated. VT1-2, VT14, and VT15 alloy sheets 2.5, 3.0, and 1.2 mm thick were welded under the following respective conditions: current 165, 250 and 110 a, arc voltage 10, 11 and 8 v, and welding speed 0.4, 0.4 and 0.7 cm/sec. The experiments showed that the maximum desorption of hydrogen occurred in the front part of the melting pool. Desorption of hydrogen prevailed upon diffusion at all concentrations of hydrogen in titanium. Diffusion of hydrogen depends on the heat input: an increase of heat input from 300 to 900 kg·cal/cm increased the volume of diffused hydrogen from $2.1 \cdot 10^{-4}$ to $16 \cdot 10^{-4}$ cm^3 and the weld porosity about 8 times.

Card 1/2 UDC: 621.791.753.93.019:669.295.5

ACC NR: AP6019426

Time that the metal remains in the liquid state greatly affects the amounts of diffused and desorpted hydrogen and the porosity in the weld; all three decrease if metal remains for a prolonged period of time in the liquid state, i.e., with increasing heat input. There is, however, a critical value of heat input. An increase of heat input to the values below the critical increases the amount of porosity. Only after the critical value has been exceeded does the amount of porosity drop with a further increase of heat input. Orig. art. has: 8 figures and 4 tables. [AZ]

SUB CODE: 11, 13/ SUBM DATE: none/ ORIG REF: 009/ ATD PRESS: 5019

Card 2/2

L 09983-67 EWT(m)/EWP(w)/EWP(v)/EWP(t)/ETI/EWP(k) IJP(c) JD/HW/JH

ACC NR: AP6035503 SOURCE CODE: UR/0135/66/000/011/0023/0025

37
35

AUTHOR: Gorshkov, A. I. (Candidate of technical sciences)

ORG: none

TITLE: Electron-beam welding of VT15 titanium alloy

SOURCE: Svarochnoye proizvodstvo, no. 11, 1966, 23-25

TOPIC TAGS: welding, titanium alloy, titanium alloy welding, electron beam welding, weld property, heat treated weld property/VT15 titanium alloy

ABSTRACT: Properties of electron-beam welds in VT15 titanium alloy sheets 3—6 mm thick were investigated and the effect of heat treatment conditions was analyzed. Weld properties were found to vary widely, depending on gas and impurity content and the thickness of the sheet. Properties of welds in as-welded condition (tensile strength 93.8—99.0 kg/mm^2, bend angle 65—75°, for 3-mm sheets) were close to those of fully annealed base metal (tensile strength 99.1 kg/mm^2, bend angle 126°). The subsequent heat treatment (annealing at 800C for 10—20 min and water quenching) followed by aging (15 hr at 500C and 15 min at 560C) raised the weld tensile strength to 126— 155 kg/mm^2, but reduced the bend angle to 4—14°. Welds aged at 450—500C for 16—20 hr have maximum strength, but their ductility drops to a minimum. A satisfactory combination of strength and ductility is obtained by shortening the aging time to 6—10 hr. The low ductility of base metal and welds is

Card 1/2 UDC: 621.791.72:669.295

L 09983-67

ACC NR: AP6035503

caused by high oxygen, hydrogen, and nitrogen content which increases β-phase brittleness. It is recommended that the oxygen content in base metal be reduced to 0.08% and the hydrogen content to 0.005—0.008%. Orig. art. has: 5 figures and 3 tables.

SUB CODE: 13, 11/ SUBM DATE: none ORIG REF: 005/ OTH REF: 002/
ATD PRESS: 5105

Card 2/2 egk

S/865/62/002/000/020/042
D405/D301

AUTHORS: Yuganov, Ye.M., Kas'yan, I.I., Cherepakhin, M.A. and Gorshkov, A.I.

TITLE: On some responses of human subjects to sub-gravity conditions

SOURCE: Problemy kosmicheskoy biologii. v. 2. Ed. by N. Sisakyan and V. Yazdovskiy. Moscow, Izd-vo AN SSSR, 1962, 206-214

TEXT: This article was presented at the 10th European Congress on Aviation and Space Medicine, Paris, 26-30 September, 1961. The authors investigated the nature of sensory response and the degree of change of some motion indicators of human subjects under sub-gravity conditions. The experiments were conducted during parabolic flight with weightlessness periods of up to 35-45 sec. An analysis of the experimental material showed that all the subjects can be divided, from the point of view of their sensory response, into 3 groups: a) those subjects whose general state did not deter-

Card 1/3

iorate or who even experienced a feeling of relief or comfort; b) those who were disoriented and could no longer properly respond to environment; however, after 12-15 trials of weightlessness they became fully adapted to it; c) those who temporarily lost their working capacity; in these cases 20-30 periods of weightlessness were necessary for their adaptation. It is noted that this is but a general scheme, applicable to short periods of weightlessness only. In the experiments, the muscular force of the hand was measured and the possibility of making and sustaining a prolonged effort was analyzed. In 266 measurements on 26 subjects it was found that the muscular force of the hand decreased (in 82% of the cases) from 45-65 kg to 4-22 kg. A special dynamograph with visual control was used in the experiments. It was found that in the first seconds of weightlessness the muscular force underwent fluctuations ranging from 0 to 400 gm. It can be assumed that in operating the control levers, designed for a force of up to 400 gm, the accuracy of the muscular effort during the transient periods can vary considerably; this can prove a major factor in equipment control on board space ships. Conclusions: From the point of view of sensory response,

On some responses ... S/865/62/002/000/020/042
D405/D301

all human subjects can be divided into 3 groups. At the initial stage of weightlessness, various changes in motor-force indicators are observed. Weightlessness is accompanied by regular changes in the bioelectric activity of the neck muscles that manifests itself by a marked drop in biopotential amplitude (from 40 to 25 microvolt). Parabolic flights on aircraft can be used not only for weightlessness experiments, but also for space flight crew selection and training. The majority of selected subjects do not experience sensory ill-effects under weightlessness conditions. There are 4 figures.

Card 3/3

ACCESSION NR: AP4037623 S/0216/64/000/003/0369/0375

AUTHOR: Yuganov, Ye. M.; Sidel'nikov, I. A.; Gorshkov, A. I.; Kas'yan, I. I.

TITLE: Sensitivity of the vestibular analyzer and sensory reactions of man during short-term weightlessness

SOURCE: AN SSSR. Izv. Seriya biologicheskaya, no. 3, 1964, 369-375,

TOPIC TAGS: weightlessness, vestibular analyzer, parabolic flight, rotation, Coriolis acceleration, postrotational stability, nystagmus

ABSTRACT: Research on weightlessness has established that all persons may be classified into three groups on the basis of vestibular-sensory reactions. Group I consists of persons who can stand weightlessness without deterioration of general well-being or loss of work capacity. Group II consists of persons who suffer from illusory sensations concerning the orientation of their bodies in space. Group III consists of persons in whom adverse reactions appear rapidly and lead to the onset of motion sickness (nausea, vomiting, etc.), and

Card 1/3

ACCESSION NR: AP4037623

ACCESSION NR: AP4037623

Group II persons manifest spatial illusions, an increased sensitivity of the vestibular analyzer to adequate stimuli, and a fairly pronounced inhibitory effect on the vestibular analyzer by other analyzer systems. Persons from Group III are characterized by high sensitivity of the vestibular apparatus to adequate stimulation and a weak inhibitory effect of other afferent systems on the vestibular apparatus. Orig. art. has: 1 table.

ASSOCIATION: none

SUBMITTED: 16May63 DATE ACQ: 05Jun64 ENCL: 00

SUB CODE: PH, LS NO REF SOV: 004 OTHER: 003

Card 3/3

ACCESSION NR: AT4037686 S/2865/64/003/000/0167/0175

AUTHOR: Yuganov, Ye. M.; Gorshkov, A. I.

TITLE: Excitability of the vestibular apparatus in man during brief exposures to weightlessness

SOURCE: AN SSSR. Otdeleniye biologicheskikh nauk. Problemy* kosmicheskoy biologii, v. 3, 1964, 167-175

TOPIC TAGS: weightlessness, parabolic flight, Coriolis acceleration, manned space flight, vestibular apparatus, otolith

ABSTRACT: Volunteers were exposed to brief (20-30 sec) periods of weightlessness during parabolic flight in aircraft. In addition, the subjects were exposed to Coriolis accelerations while flying along parabolic trajectories or during ground tests. During brief periods of weightlessness the subjects' vestibular lability to angular accelerations, Coriolis accelerations, and galvanic current was lower than in controls. Weightlessness did not inhibit the otolithic function, although otolithic impulses were powerful inhibitors of the normal function of semicircular canals.

Card 1/2

VOLYNKIN, Yu.M.; ARUTYUNOV, G.A.; ANTIPOV, V.V.; ALTUKHOV, G.V.; BAYEVSKIY, R.M.; BELAY, V.Ye.; BUYANOV, P.V.; BRYANOV, I.I.; VASIL'YEV, P.V.; VOLOVICH, V.G.; GAGARIN, Yu.A.; GENIN, A.M.; GORBOV, F.D.; GORSHKOV, A.I.; GUROVSKIY, N.N.; YESHANOV, N.Kh.; YEGOROV, A.D.; KARPOV, Ye.A.; KOVALEV, V.V.; KOLOSOV. T.A.; KORESHKOV, A.A.; KAS'YAN, I.I.; KOTOVSKAYA, A.R.; KALIBERDIN, G.V.; KOPANEV, V.I.; KUZ'MINOV, A.P.; KAKURIN, L.I ; KUDROVA, R.V.; LEBEDEV, V.I.; LEBEDEV, A.A.; LOBZIN, P.P.; MAKSIMOV, D.G.; MYASNIKOV, V.I.; MALYSHKIN, Ye.G.; NEUMYVAKIN, I.P.; ONISHCHENKO, V.F.; POPOV, I.G.; PORUCHIKOV, Ye.P.; SIL'VESTROV, M.M.; SERYAPIN, A.D.; SAKSONOV, P.P.; TERENT'YEV, V.G.; USHAKOV, A.S.; UDALOV, Yu.F.; FOMIN, V.S.; FOMIN, A.G.; KHLEBNIKOV, G.F.; YUGANOV, Ye.M.; YAZDOVSKIY, V.I.; KRICHAGIN, V.I.; AKULINICHEV, I.T.; SAVINICH, F.K.; SIMPURA, S.F.; VOSKRESENSKIY, O.G.; GAZENKO, O.G., SISAKYAN, N.M., akademik, red.

[Second group space flight and some results of the Soviet astronauts' flights on "Vostok" ships; scientific results of medical and biological research conducted during the second group space flight] Vtoroi gruppovoi kosmicheskii polet i nekotorye itogi poletov sovetskikh kosmonavtov na korabliakh "Vostok"; nauchnye rezul'taty medikobiologicheskikh issledovanii, provedennykh vo vremia vtorogo gruppovogo kosmicheskogo poleta. Moskva, Nauka, 1965. 277 p. (MIRA 18:6)

YUGANOV, Ye.M.; GORSHKOV, A.I.; KAS'YAN, I.I.; BRYANOV, I.I.; KOLOSOV, I.A.; KOPANEV, V.I.; LEBEDEV, V.I.; POPOV, N.I.; SOLODOVNIK, F.A.

Vestibular reactions of astronauts during the "Voskhod" spaceship flight. Izv. AN SSSR. Ser. biol. no.6:877-883 N-D '65. (MIRA 18:11)

L 40926-66 EWT(1)/FCC GW

ACC NR: AP6006134 SOURCE CODE: UR/0362/65/001/010/1099/1100

AUTHOR: Gorshkov, A. I.; Ignat'yev, V. I.; Yashukov, V. P.

ORG: Physico-technical Institute, Academy of Sciences SSSR (Akademiya nauk SSSR, Fiziko-tekhnicheskiy institut)

TITLE: Instrument for measuring the vertical component of an electrostatic field

SOURCE: AN SSSR. Izvestiya. Fizika atmosfery okeana, v. 1, no. 10, 1965, 1099-1100

TOPIC TAGS: electrostatic field, atmospheric physics, electric measuring instrument

ABSTRACT: The authors describe an electrostatic fluxmeter for measuring the electrostatic field in the atmosphere, which consists of an external sensor and cathode followers, a radio unit, a recorder, and plate and filament rectifiers. The measuring and shielding four-section plates are chrome plated and polished. The reference voltage for the synchronous detector is produced by an auxiliary electrostatic generator. The shielding plates of both generators are rotated at 3000 rpm. The radio unit consists of a three-state amplifier of the main signal, a reference voltage amplifier, and a synchronous detector. The instrument measures the field within 210 V/m over the entire scale at a minimal amplification factor and 57 V/m at a maximal amplification factor. The accuracy of the measurements is ± 1 V/m. The inertia of the flux-

Card 1/2 UDC: 551.508.94

L 40926-66

ACC NR: AP6006134

meter permits recording, practically without distortion, the magnitude and front of variations of the electrostatic field with a duration of 1 sec and amplitude of 10 V/m. The electrostatic fluxmeter was used for prolonged measurements of the field under good weather conditions in 1963—1964. Orig. art. has: 3 figures.

SUB CODE: 08,14/ SUBM DATE: 08Feb65/ ORIG REF: 004/ OTH REF: 001

Card 2/2 MLP

L 40930-66 EWT(1)/FCC GW

ACC NR: AP6011375 SOURCE CODE: UR/0362/66/002/003/0316/0319

AUTHOR: Gorshkov, A. I.; Ignat'yev, V. I.; Lavrent'yev, G. Ya.; Stefanovskiy, A.M.; Yashukov, V. P.

55

B

ORG: none

TITLE: Effect of meteor streams on the electrical field of the atmosphere

SOURCE: AN SSSR. Izvestiya. Fizika atmosfery i okeana, v. 2, no. 3, 1966, 316-319

TOPIC TAGS: meteor, atmospheric electricity, electric field

ABSTRACT: Data on measurements of the electrical field of the atmosphere enabled the authors to study the effect of meteor streams on this field. The results of measurements of nine geophysical stations were used. The data on the electrical field of the atmosphere were analyzed by calculating the mean diurnal and mean monthly values of the field from the data of each geophysical station. These values were averaged for the three years of observations (1957—1959). Then the variations of the field, i.e., the differences between the mean diurnal and mean monthly values, were calculated. The calculated values and the change in the number of meteors for all three streams (Perseid, Geminid, and Quadrantid) were compared. The comparison readily showed that the Perseid meteors did not affect the electrical field of the atmosphere. An

Card 1/2 UDC: 551.594

L 10930-66

ACC NR: AP6011375

increase of the field during the passage of meteors was noted only for the more powerful streams, such as Geminid and Quadrantid. However, the dispersion of the data did not permit considering this conclusion sufficiently reliable. Therefore the correlation method of analyzing the experimental data was used to elicit the assumed relation between the changes of the electrical field and the number of meteors. The confidence interval was also calculated for each stream. The correlation coefficient-stream intensity curve, for which the 10-min value of the number of meteors was taken, showed that for the most powerful streams the correlation coefficients had essentially positive value. Thus, statistical analysis of the results of the measurements showed with sufficient reliability that powerful meteor streams affect the electrical field of the atmosphere at the level of the earth. A detailed study of the relationship between these two phenomena and an explanation of the mechanism of this relation is needed for the final solution of this problem. Orig. art. has: 1 table and 3 figures.

SUB CODE: 03,04/ SUBM DATE: 02Jul65/ ORIG REF: 006/ OTH REF: 000

Card 2/2

GONCHAROV, V.P.; GORSHKOV, A.K.; BABAYAN, A.I.

Hydraulic fracturing in gas wells. Gaz. delo no.5:10-12 '65. (MIRA 18:6)

1. Nizhnevolzhskiy nauchno-issledovatel'skiy institut geologii i geofiziki.

GORSHKOV A. M.

USYUKOV, Ivan Petrovich, prof., kand.tekhn.nauk; AVER'YANOV, Ivan Grigor'yevich; GOROKHOV, Vladimir Semenovich; GORSHKOV, Anatoliy Maksimovich; ZAKHAROV, Aleksandr Vasil'yevich; YELUKHIN, Nikolay Kasparovich; MALKOV, M.P., prof., doktor tekhn.nauk, retsenzent; IONOV, P.M., inzh., red.; BOL'SHAKOV, B.N., red.; KASPEROVICH, N.S., red.; TIKHANOV, A.Ya., tekhn.red.

[Machinery and apparatus for units separating air by the method of deep refrigeration; atlas of designs] Mashiny i apparaty ustanovok razdeleniia vozdukha metodom glubokogo okhlazhdeniia; atlas konstruktsii. Pod red. I.P.Usiukina. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroit.lit-ry, 1959. 189 p. (MIRA 13:3)

(Gases--Separation)

(Refrigeration and refrigerating machinery)

GORSHKOV, A.M.

YEPIFANOVA, V.I., kandidat tekhnicheskikh nauk; GORSHKOV, A.M., dotsent.

The KTK-12,5 oxygen turbocompressor. Kislorod 10 no.2:10-15 '57.
(Oxygen--Industrial applications) (Compressors) (MLRA 10:9)

YEPIFANOVA, V. I., kand. tekhn. nauk; GORSHKOV, A. M., inzh.

Experience in designing high-speed oxygen turbocompressors. Trudy VNIIKIMASH no.3:3-10 '60. (MIRA 13:9)
(Turbomachines) (Compressors) (Oxygen)

GORSHKOV, A.M., inzh.; GRUSHEVSKIY, V.M., inzh.

KTK-7 oxygen turbocompressor. Trudy VNIIKIMASH no.4:43-64 '61. (MIRA 15:1)

(Oxygen)
(Compressors)

GORSHKOV, A.M., inzh. [deceased]

Turbine TSK-100-61 air compressor. Trudy VNIIKIMASH no.5: 20-35 '62. (MIRA 18:3)

BELOV, N.V., akademik, red.; GORSHKOV, A.M., nauchnyy red.; TYUTYUNIK, M.S., red.izd-va; SHEVCHENKO, T.N., tekhn. red.

[Checking, controlling, and improving techniques in the production of building materials]Kontrol', regulirovanie i sovershenstvovanie tekhnologii v proizvodstve stroitel'nykh materialov. Pod red. N.V.Belova. Moskva, Gosstroiizdat, 1962. 158 p. (MIRA 16:3)

1. Akademiya nauk SSSR. Komitet molodykh spetsialistov na obshchestvennykh nachalakh.
(Building materials industry)

NIKITENKO, I.T., nauchnyy sotrudnik; SHIDLOVSKIY, Yu.M. [Shydlovs'kyi, IU.M.], nauchnyy sotrudnik; GORSHKOV, A.P. [Horshkov, A.P.], nauchnyy sotrudnik; KAPLIN, I.M., nauchnyy sotrudnik

Continuous harvesting of grain. Mekh. sil'. hosp. 12 no. 6:5-8 Je '61. (MIRA 14:5)

1. Ukrainskiy nauchno-issledovatel'skiy institut mekhanizatsii i elektrifikatsii sel'skogo khozyaystva.
(Grain—Harvesting)

NIKITENKO, I.T., kand.sel'skokhozyaystvennykh nauk; SHIDLOVSKIY, Yu.M., inzh.; KAPLIN, I.N., inzh.; GORSHKOV, A.P., inzh.

Continuous-flow harvesting of grain by combines with straw chopping. Mekh. i elek. sots. sel'skoz. 20 no.3:6-9 '62. (MIRA 15:7)

1. Ukrainskiy nauchno-issledovatel'skiy institut mekhanizatsii i elektrifikatsii sel'skogo khozyaystva.
(Grain--Harvesting) (Harvesting machinery)

GORSHKOV, A.P.

Status of the eruptive fracture of the Koryakskiy Volvano on April 7, 1962. Biul. vulk. sta. no.36:37-38 '64.
(MIRA 17:9)

Name: GORSHKOV, A.Г.

Author of book, "Radio Amateur Handbook." This book was based on questions sent by amateurs to the radio consultation bureau. The questions and answers are arranged according to subject matter such as: receivers, tubes, loud speakers, sound recording equipment, power supply, etc. In addition, schematic circuit arrangements of factory type receivers with data is included.

REF: Radio Front #15-16, p.96, 1938

GORSHKOV, A. PA 78T18

USSR/Electricity Feb 1948
Inductance - Measuring
Coils, Inductance

"Easy Method for Calculating the Inductances of Coils," A. Gorshkov, 1½ pp

"Radio" No 2

Describes simple method to make subject calculations.

ID 78T18

GORSHKOV, A. P.

Kak ustanovit' radiopriemnik. [How to set up a radio receiver]. Moskva, Gos. izd-vo lit-ry po voprosam sviazi i radio, 1950. 45 p. (V pomosnch' radioslushateliu).
DLC: Slavic unclass.

SO: Soviet Transportation and Communications, A Bibliography, Library of Congress, Reference Department, Washington, 1952 Unclassified.

TROITSKIY, Leonid Vasil'yevich; GORSHKOV, A.P., redaktor; FRIDKIN, A.M., tekhnicheskiy redaktor

[Collection of answers to questions asked by radio amatuers] Sbornik otvetov na voprosy radioliubitelei. Moskva, Gos. energeticheskoe izd-vo, 1955. 111 p. (Massovaia radiobiblioteka no.214) [Microfilm] (Radio--Amateurs' manuals)

(MLRA 8:3)

GORSHKOV, A.

AUTHOR: Gorshkov, A. 107-57-6-57/57

TITLE: A Universal Stroboscopic Disk (Universal'nyy stroboskopicheskiy disk)

PERIODICAL: Radio, 1957, Nr 6, inner page of the back cover (USSR)

ABSTRACT: A stroboscopic disk is offered for checking the speed of 33 1/3 and 78 rpm phonograph records. The number of notches and the dimensions of the disk are so proportioned that, illuminated by a neon lamp, the disk seems motionless when its actual speed is equal to the standard speed. One figure which can be clipped and used as a stroboscopic disk.

AVAILABLE: Library of Congress

Card 1/1

6(4)

PHASE I BOOK EXPLOITATION SOV/2863

Gorshkov, Aleksandr Pavlovich

Kak ustanovit' radiopriyemnik (How to Install Radio Receivers) 3d ed., rev. Moscow, Svyaz'izdat, 1958. 85 p. 195,000 copies printed.

Ed.: V. I. Bashchuk; Tech. Ed.: K. G. Markoch.

PURPOSE: This booklet is intended for the general reader.

COVERAGE: The author briefly discusses the operation of radio receivers and describes methods of switching, tuning and maintaining home radio equipment. A brief discussion of battery-operated receivers as well as phonograp is also presented. No personalities are mentioned. There are no references.

TABLE OF CONTENTS:

How to Install Radio (Cont.)

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AVER'YANOV, V.; GORSHKOV, A.P.; DZHERBASHYAN, R.A.; FARBEROV, A.; SHTEYNBERG, G.S.

Crater of the Klyuchevskaya Sopka in September 1962. Biul. vulk. sta. no.37:33 '64. (MIRA 18:3)

GORSHKOV, A.P.

Crater of Klyuchevskaya Sopka in August 1963. Biul. vulk. sta. no.37:34 '64. (MIRA 18:3)

GORSHKOV, A.P.

SHLEPOV, S.G., inzhener, redaktor; GORSHKOV, A.P., redaktor; PERSON, M.N., tekhnicheskiy redaktor

[Planner's manual for structural designs] Spravochnik proektirovshchika organizatsii stroitel'stva. Moskva, Gos.izd-vo lit-ry po stroitel'stvu i arkhitekture. Vol.2. [Electric supply, air compressors, fuel supply, water supply] Elektrosnabzhenie, snabzhenie szhatym vozdukhom, teplosnabzhenie, vodosnabzhenie stroitel'stva. Izd.2-oe. 1952. 93 p. [Microfilm] (MLRA 9:1)

1. Vsesoyuznaya kontora tipovogo proyektirovaniya i tekhnicheskikh issledovaniy.

(Building)

TEMKIN, L.Ye., inzhener, redaktor; GORSHKOV, A.P., redaktor; SMOL'YAKOVA, M.V., tekhnicheskiy redaktor.

[Unheated roofs made of asbestos-cement corrugated sheets of reinforced design VU for industrial buildings. Standard drawings. TCh-8-52/MSPTI] Neuteplennye pokrytiia iz asbestotsementnykh volnistykh listov usilennogo profilia VU dlia promyshlennykh zdanii. Tipovye chertezhi. TCh-8-52/MSPTI. Moskva, Gos. izd-vo lit-ry po stroit. i arkhitekture. 1953. 22 p.

(MLRA 7:9)

1. Russia (1923- U.S.S.R.) Ministerstvo stroitel'stva. Tekhnicheskoe upravleniye.
(Asbestos cement) (Roofs)

ZHUKOV, Konstantin Vasil'yevich, kandidat arkhitektury; GORSHKOV, A.P., redaktor izdatel'stva; GUSEVA, S.S., tekhnicheskiy redaktor

[Complete window blocks; new elements of precast reinforced concrete] Kombinirovannye okonnye bloki; novye detali sbornogo zhelezobetona. Moskva, Gos. izd-vo lit-ry po stroit. i arkhitekture, 1956. 20 p. (Windows)

(MLRA 10:1)

GORSHKOV A.P.

VOROB'YEV, Vasiliy Aleksandrovich, professor, doktor tekhnicheskikh nauk; KOLOKOL'NIKOV, V.S., dotsent, kandidat tekhnicheskikh nauk; IVANOV, O.M., kandidat tekhnicheskikh nauk, retsenzent; SHCHEPETOV, A.M., kandidat tekhnicheskikh nauk, nauchnyy redaktor; GORSHKOV, A.P., redaktor izdatel'stva; TOKER, A.M., tekhnicheskiy redaktor

[Building materials and elements] Stroitel'nye materialy i detali. Moskva, Gos. izd-vo lit-ry po stroit. i arkhitekture, 1956. 284 p. (Building materials) (MLRA 10:3)

KOS'KOV, B.I., inzhener; PAVLOV, K.P., inzhener; SHEIN, D.S., kandidat tekhnicheskikh nauk, nauchnyy redaktor; GORSHKOV, A.P., redaktor izdatel'stva; PERSON, M.N., tekhnicheskiy redaktor

[Manual for the realization of plans and building of towns and settlements] Rukovodstvo po perenosu proektov planirovki i zastroiki gorodov i poselkov v naturu. Moskva, Gos. izd-vo lit-ry po stroit. i arkhitekture, 1956. 318 p. (MLRA 9:7)
(City planning) (Surveying) (Building)

GORSHKOV, A.P.

BARANNIKOV, M.G.; GVOZDEV, A.A.; GUSHCHIN, V.M.; DAVYDOV, S.S.; DUDOROV, N.P.; KOLENKOV, V.A.; LOVEYKO, I.I.; SVETLICHNYY, V.I.; SKROMTAYEV, B.G.; KUCHERENKO, V.A., redaktor; BARSKOV, I.M., redaktor; RUBANENKO, B.P., redaktor; GORSHKOV, A.P., redaktor izdatel'stva; STRELETSKIY, I.A., tekhnicheskiy redaktor

[Construction practices abroad; in countries of Western Europe. Based on material gathered by a delegation of Soviet building specialists] Opyt stroitel'stva za rubezhom; v stranakh Zapadnoi Evropy. Po materialam otchetov delegatsii sovetskikh spetsialistov-stroitelei. Moskva, Gos. Iz-vo lit-ry po stroit. i arkhitekture, 1956. 365 p. (Europe, Western--Building) (MIRA 10:1)

GORSHKOV, A.P.

VLASOV, I.I., inzhener; GORSHKOV, A.P., inzhener.

Altering the configuration of the receiver grate of one-rotor hammer crushing mills. Tsement 22 no.6:22-23 N-D '56. (MLRA 10:2)

1. Pikalevskiy tsementnyy zavod.
(Pikalevo--Cement industries) (Crushing machinery)

OVSYANKIN, V.I., otvetstvennyy red.; KUBANENKO, B.R., otvetstvennyy red.; BARANOV, N.G., otvetstvennyy red.; ZHDANOV, P.P., nauchnyy red.; KONSTANTINOV, V.N., nauchnyy red.; GORSHKOV, A.P., red.; PECHKOVSKAYA, T.V., tekhn. red.

[Housing construction; new technical features recommedned for introduction and testing] Zhilishchnoe stroitel'stvo; novye tekhnicheskie resheniia, rekomenduemye k vnedreniiu i eksperimental'noi proverke. Moskva, Gos. izd-vo lit-ry po stroit., arkhit. i stroit. materialam. Vol.1. 1958. 227 p. (MIRA 11:8)

1. Russia (1923- U.S.S.R.) Gosudarstvennyy komitet po delam stroitel'stva.

(Apartment houses)

BUMAZHNYY, L.O., red.; GALKIN, Ya.G., red.; KISELEVICH, L.N., red.; KUZNETSOV, A.I., red.; RUBANENKO, B.R., red.; GORSHKOV, A.P., red.; TEMKINA, Ye.L., tekhn.red.

[Proceedings of the section on housing, cultural facilities, amenities, and the planning and building of towns] Sektsiia zhilishchnogo i kul'turno-bytovogo stroitel'stva, planirovki i zastroiki gorodov. Moskva, Gos. izd-vo lit-ry po stroit., arkhit. i stroit. materialam, 1958. 463 p. (MIRA 12:1)

1. Vsesoyuznoye soveshchaniye po stroitel'stvu. Moscow, 1958.
2. Chlen prezidiuma Akademii stroitel'stva i arkhitektury SSSR (for Rubanenko).

(Construction industry) (City planning)

MAKLAKOVA, Tat'yana Georgiyevna; SERGEYEV, D.D., nauchnyy red.; KALISH, V.G., nauchnyy red.; GORSHKOV, A.P., red.; SMOL'YAKOVA, M.V., tekhn.red.

[Panel housing construction; structural and architectural solutions] Panel'noe domostroenie; razvitie konstruktivnykh i arkhitekturno-planirovochnykh reshenii. Moskva, Gos.izd-vo lit-ry po stroit., arkhit. i stroit.materialam, 1959. 190 p. (MIRA 13:6)

(Concrete slabs) (Apartment houses)

F

L

2893. RATIONAL FUEL CONSUMPTION BY SOVIET POWER STATIONS.
Gorshkov, A. S. (Za Ekonomiyu Topliva (Fuel Econ.), Nov. 1947, (11), 10-14). Review of the rationalization of fuel consumption between 1913 and 1945.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R000516320005-9"

GORSHKOV, A. S. PA 35/49T42

USSR/Engineering Sep 48
Fuel Consumption
Power Plants - Performance

"An Experiment in Establishing Progressive Norms for Fuel Consumption in Power Engineering," A. S. Gorshkov, Cand Tech Sci, 5 pp

"Za Ekonomiyu Topliva" No 9

Gives examples in applying subject norms. "Progressive" means setting the norm, not at the average of the industry, but at the mark attained by the leading enterprises in the industry.

[redacted] 35/49T42

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

5A

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4

1541. A method of calculating the efficiency of power systems including thermal stations. GURSHKOV, A. S. *Elektr. St.*, 19, 37-41 (*June*, 1948) *In Russian.*—A criticism of the article by Butakov [Abstr. 1540 (1949)]. The criticism is mainly levelled at the impossibility of disregarding physical facts such as the intrinsic differences between various forms of energy for the sake of mathematical expediency. Butakov's calculation is mathematically correct but, as proved by Gurshkov, physically meaningless. Gurshkov's method is not of the apparent elegance of Butakov's, nor does it supply the answer in one compact expression, but it follows accepted and tried principles.

B. F. K.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

GORSHKOV, A. S.

"Technical and Economic Indexes of Steam-Electric Power Stations," (Tekhniko-ekonomicheskiye pokazateli teplovykh elektricheskikh stantsiy), Gosenergoizdat, 1949, 288 pp.

GORSHKOV, A. S., Engr., Min, Power Plants, -c1947-48-.

"Review of V. V. Bolotov's "Theoretical Basis for Selecting an Economical System for Complex Electrification.'"

Iz. Ak. Nauk SSSR, Otdel. Tekh. Nauk, No 6, 1949.

Usrekhi Tepolfikatsii V SSSR. (Thermofication Progress in the USSR)
... Moskva (Izd-Vo "Pravda") 1950.

18 P. Illus.

At head of title: Vsesoyuznoye Obshchesiyo po rasprostraneniyu Politicheskikh I nauchnykh Znamiy.

Lecture deals with the significance of Soviet National economy's thermofication, Its present development in various cities and prospects in the future.

MAGYAR ENERGIA'AZDASAG
POWER ECONOMY IN HUNGARY
VOL LV 1951
No. 1, Jan.

A. S. Gershkov:
Study on the tests made for establishing progressive standards for fuel consumption in power economy. (From the Russian) 19 - 25

METALLURGICAL LITERATURE CLASSIFICATION

Director, Dzerzhinskiy Thermotechnical Institute

"Introduce New Mobile Grain Drier," Pravda 1951

Current Digest of the Soviet Press, Vol. III, No. 26, 1951, page 28. (In [redacted] Library)

GORSHKOV, A.

Fuel

Improving fuel utilization in the national economy of the U.S.S.R. Za ekon. mat. No. 1, 1952.

Monthly List of Russian Accessions, Library of Congress, December 1952. Unclassified.

GORSHKOV, A.S. and YERMAKOV, D.A.

"Thirteenth Anniversary of the Scientific and Practical Activity of the Kashira Electric Power Station in Collaboration with the All-Union Thermo-Technical Institute," Izv. VTI. 21, No.6, 1952

USSR/Electricity - Power Engineering Dec 50
Heat-and-Power Stations

"Progress of the Soviet Heat and Power Station Program," A. S. Gorshkov, Cand Tech Sci

"Nauka i Zhizn'" No 12, pp 25-29

In 1948, the output of heat from centralized heat-and-power stations increased by 2,500 billion calories and this increase continued in 1949 and 1950. Moscow is the leading city with regard to use of heat-and-power stations, followed by Kemerovo, Kazan'. Leningrad, Chelyabinsk. Novosibirsk,

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Saratov, Krasnoyarsk, Minks, Rostov-on-Don, Khar'kov, and Kiev. The heat-and-power stations save millions of tons of fuel yearly.

222T21

GORSHKOV, A. S.

Fuel Abstracts, Vol. 14. No. 4, Oct 1953

Subject : USSR/Engineering AID P - 2039

Card 1/2 Pub. 110-a - 12/14

Author : Gorshkov, A. S., Kand. of Tech. Sci.

Title : Problem of Mastering of superhigh and supercritical pressure in Soviet power engineering (Discussion)

Periodical : Teploenergetika, 4, 58-60, Ap 1955

Abstract : The author discusses earlier statements (reported in this journal, Nos. 1, 3 and 7 1954) made by several participants in the discussion who maintained that the maximum pressure in boilers should not exceed 170 atm pressure, with the feed-water temperature reaching 250°C. Yet the problem of fuel saving necessitates the mastering of the operation of units with super high and even critical pressure. The solution of problems connected with high pressure equipment on an experimental basis is strongly recommended. Some difficulties in operating

GORSHKOV, A.S.

I.N. Butakov's error in plotting power balance and calculating indices for power production. Izv. TPI 89:133-135 '57. (MIRA 10:12)
(Power engineering) (Butakov, I.N.)

GORSHKOV, A.S., kand.tekhn.nauk.

Jubilee of famous Czech engineering school. Teploenergetika 4 no.11:87-88 N '57. (MIRA 10:10)
(Czechoslovakia--Universities and colleges)

BAKULOV, Ye. I.

"Prospects and Economic Indices of District Heating Development in the USSR." report presented at the 14th Sectional Meeting of the World Power Conference, Montreal, Canada, 7-12 Sep 1958.

GORSHKOV, A.S., kand. tekhn. nauk

Determining the parameters and characteristics of high-capacity heat generating equipment of electric power plants. Energomashinostroenie 4 no.10:9-11 O '58. (MIRA 11:11)
(Electric power plants--Equipment and supplies)

AUTHOR: ~~Gorshkov, A.S.,~~ Candidate of Technical Sciences SOV/96-59-4-19/21

TITLE: The Main Directions of Scientific Investigations in the All-Union Thermo-Technical Institute in 1959 (Glavnyye napravleniya nauchnykh issledovaniy VTI v 1959 g)

PERIODICAL: Teploenergetika, 1959, Nr 4, pp 92-95 (USSR)

ABSTRACT: The general tasks confronting the power industry are briefly reviewed. The general lines of the research plan are then given. The work will be done in the 30 laboratories of the Institute which, apart from the district heating and oil laboratories, are included in the fuel, furnace, boiler, turbine, metallurgical, water, thermal automatics and thermal physics divisions. The Institute has its own heat and electric power station with boiler installations for super critical steam conditions, a gas turbine and other experimental equipment as well as many rigs in the actual laboratories. Full scale investigations are made in actual power stations and these take up about 40% of the total scientific work carried out in the Institute. The Eastern Branch of the Institute has been set up in Chelyabinsk to strengthen scientific and technical help

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The Main Directions of Scientific Investigations in the All-Union Thermo-Technical Institute in 1959 SOV/96-59-4-19/21

to Ural and Siberian Power Engineering, it has furnace-boiler and turbine divisions and also groups working on thermal-automatics, water-chemical problems and metals. The main themes in the research plan are then given as follows: study of the characteristics of power fuels, the removal of moisture from fuels; the intensification of combustion processes and use of new types of furnaces; prevention of harmful effects due to ash and sulphur in fuel; investigations of large boiler installations; improvement of the salt balance and steam-water cycle of power stations; prevention of internal corrosion in the steam-water cycle of power stations; investigations of large steam turbine installations; automation of the control of thermal processes in unit type sets. A brief review is then given of the conditions for the further development of district heating. A brief

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The Main Directions of Scientific Investigations in the All-Union Thermo-Technical Institute in 1959 SOV/96-59-4-19/21

account is also given of work on gas turbines and on preparatory work for large atomic power stations.

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GORSHKOV, A.S., kand.tekhn.nauk

Scientific and engineering assistance in setting up thermal power plants according to the plan of the State Commission for the Electrification of Russia. Teploenergetika 7 no. 12:8-11 D '60. (MIRA 14:1)

1. Vsesoyuznyy teplotekhnicheskiy institut.
(Electrification) (Electric power plants)

GORSHKOV, A.S., red.; DOROSHCHUK, V.Ye., red.; KUZNETSOV, N.V., red.; MELKYEV, A.S., red.; BORUNOV, N.I., tekhn. red.

[Increasing the steam parameters and operating capacity of units in heat engineering] Povyshenie parametrov para i moshchnosti agregatov v teploenergetike; sbornik statei. Moskva, Gos. energ. izd-vo, 1961. 513 p. (MIRA 15:3)
(Electric power plants--Equipment and supplies)
(Steam turbines)

GORSHKOV, A.S., kand.tekhn.nauk

Work of the All-Union Heat Engineering Institute in the development of the country's power engineering. Teploenergetika 8 no.10:19-22 O '61. (MIRA 14:10)

1. Vsesoyuznyy teplotekhnicheskiy institut.
(Power engineering)

GORSHKOV, A.S., kand.tekhn.nauk

Basic ways of saving fuel in power systems. Teploenergetika 9 no.10:2-9 O '62. (MIRA 15:9)

1. Vsesoyuznyy teplotekhnicheskiy institut.
(Power engineering)

GORSHKOV, A.S., kand. tekhn. nauk; LANIN, I.S., kand. tekhn. nauk; SOKOLOV, Ye.Ya., doktor tekhn. nauk, prof.

Development of heating from central stations in the U.S.S.R. Teploenergetika 10 no.12:74-77 D '63. (MIRA 17:8)

1. Vsesoyuznyy ordena Trudovogo Krasnogo Znameni teplotekhnicheskiy institut imeni Dzerzhinskogo, Severo-zapadnyy politekhnicheskiy institut i Moskovskiy energeticheskiy institut.

GORSHKOV, A.S.

109-8-9/12

AUTHORS: Braginskiy, V.B., Gvozdover, S.D., Gorshkov, A.S., and Trofimenko, I.T.

TITLE: Mutual synchronization of reflex klystrons without producing amplitude and frequency discontinuities. (Vzaimnaya sinkhronizatsiya otrazhatel'nykh klistronov bez skachkov amplitudy i chastoty.)

PERIODICAL: Radiotekhnika i Elektronika, 1957, Vol.II, Nr 8, pp.1048-1052 + 1 plate (USSR)

ABSTRACT: One of the shortcomings of reflex klystrons is their comparatively narrow tuning range. It has been found, however (Ref.1) that it is possible to operate these klystrons in parallel, thus widening their operating range. In the following it is proposed to carry out a more detailed investigation. The experimental system, shown in Fig.1, consists of two reflex klystrons having operating frequencies f_1 and f_2 and operating voltages u_1 and u_2 such that $f_2 - f_1 = \Delta f$ and $u_2 - u_1 = \Delta u$ where Δf and Δu are comparatively small quantities; the klystrons have a coupling coefficient k. For a given pair of klystrons, Δf, Δu and k are well defined quantities. The process of synchronization can be represented as shown

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Mutual Synchronization of Reflex Klystrons Without Producing Amplitude and Frequency Discontinuities.

diagrammatically in Fig.2. Experimental investigation was carried out on two klystrons operating on waves lengths in the vicinity of 10 cm and their resonators had quality factors of the order of 200. It was found that outside the permitted values of Δu, Δf and k, the operation of the klystrons is accompanied by the discontinuities of amplitude and frequency, such as shown in Fig.3B, while within the range of the permissible values their operation proceeds smoothly (see Fig.3a). The results can be represented as shown in Fig.4, where the synchronous operation of klystrons is represented in the Δu versus Δf plane. It is seen that for very low coupling coefficients, such as $Qk < 0.014$ where Q is the quality factor of a klystron, the synchronization is almost impossible. An increase in k leads to a continuous synchronization but only over a certain range of the values of Δu and Δf. For values of $Qk > 3$ the coupling becomes overcritical and amplitude and frequency jumps occur. The output power as a function of output frequency for a pair of klystrons is shown by two experimental graphs given in Fig.5. It is

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109-8-9/17

Mutual Synchronization of Reflex Klystrons Without Producing Amplitude and Frequency Discontinuities.

seen that it is possible to obtain an almost constant output power over detuning ranges of about 40 Mc/s. There are 5 figures and 4 references, of which 2 are Slavic.

ASSOCIATION: Department of Physics of the Moscow State University imeni M.N.Lomonosov. (Fizicheskiy Fakul'tet Moskovskogo Gosudarstvennogo Universiteta im. M.V. Lomonosova)

SUBMITTED: November 29, 1956.

AVAILABLE:

Card 3/3

9.4230 (1532)

S/141/61/004/002/011/017
E192/E382

AUTHORS: Akhmanov, S.A., Gorshkov, A.S. and Trofimenko, I.T.

TITLE: Frequency-division at Ultrahigh Frequencies by Means of Travelling-wave Tubes

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, 1961, Vol. 4, No. 2, pp. 309 - 318

TEXT: The problem of developing efficient and reliable frequency-dividers for the UHF range is still considered to be unsolved, in spite of the need for such devices. Frequency-dividers for these frequencies can be based on the same principle as those employed at radio frequencies. In general, it is required to develop dividers having comparatively large operating bandwidths. The authors are of the opinion that a travelling-wave tube (TWT) with separate helices (see Fig. 1) can be used as a frequency-divider for UHF. In this device the electron beam passes through a number of helices which are used for wide-band amplification of different frequencies; the potential of each helix is chosen so as to obtain optimum interaction between the beam and the helix. The tube of Fig. 1

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consists of: 1 - electron gun; 2 - electron beam; 3, 4, 5 and 6 - delay helices and 7 - collector. The signals to be amplified can be applied to the inputs of various helices; in the same way, it is possible to effect mixing or multiplication. The separate portions of the tube can be bridged-over with external feedback circuits. The preceding "stages" can be used for injecting the signals which interact with the oscillations of the system. It is possible to eliminate almost completely the effect of the oscillations on the signal. A TWT with separate helices should, therefore, result in a flexible device permitting an efficient mixing of signals and it should have some advantages as compared with klystrons (Ref. 1 - Ye.N. Bazarov, M.Ye. Zhabotinskiy, Radiotekhnika i elektronika, 1956, 1, 680; Ref. 2 - H. Lyons - J. Appl. Phys., 21, 59, 1950). A regenerative frequency-divider and a resonance frequency-divider based on this type of tube were investigated experimentally. The regenerative frequency-divider or mixer gave a division ratio of 3:4, the input frequency being 4 200 Mc/s; this tube was in the form of

a two-helix TWT. The first helix of the tube was used for wideband amplification (bandwidth of 600 Mc/s) of signals at frequencies around 4 000 Mc/s, while the second helix was employed for the amplification of signals in the frequency range 1 500 - 1 000 Mc/s. The signal and the local oscillator frequencies were applied to a common waveguide which was matched with the first helix; this helix was terminated with a matched load, whose function was to eliminate any tendency to self-excitation. The difference-frequency signal was obtained by means of a coaxial cable, which was matched with the output of the second helix. In the design of this frequency-divider or mixer attention was paid to the investigation of its transfer coefficient and its operating bandwidth. The experiments showed that it was possible to obtain operating conditions under which considerable gain could be obtained in the process. The transfer coefficient was between 15 - 20 db (and even 30 db) over a wide range of frequencies (a bandwidth of 400 Mc/s). The frequency characteristics of such a mixer are illustrated in Fig. 2. This shows the transfer coefficient of the mixer as a

function of the input frequency f_1 signal and the difference frequency f_2. The local oscillator frequency for the experiment illustrated in this figure was f_r = 4 225 Mc/s; the collector current for the Curve(a) was 1.1 mA and for the other curve it was 1.8 mA. It was found from the experiments that the value of the transfer coefficient increased with increasing collector currents; however, at comparatively large currents it was possible to observe the regenerative effect. Optimum conditions with regard to maximum efficiency of the signal mixing were achieved when the operating voltage of the first helix was about 30 - 40 V lower than that corresponding to the maximum of the TWT gain. The overall conversion gain exceeded the gain of TWT in both the helices by at least 5 db. It had been shown earlier by one of the authors et al (Ref. 7 - Radiotekhnika i elektronika, 1960, 5, 1736) that the parametric effects could play a significant part in the operation of a TWT mixer. The difference-frequency of the mixer corresponds to the difference-frequency of a travelling-wave parametric

amplifier. In fact, the parametric-amplification conditions represent an optimum for a TWT mixer. Consequently, the magnitude of the mixer transfer coefficient can be estimated on the basis of the formulae derived for the parametric waveguide amplifying systems (Ref. 5 - P.K. Tien - J. Appl. Phys., 29, 1958, 1347; Ref. 6 - W. Loisell, G. Quate - Proc. IRE, 46, 707, 1958; Ref. 8 - W. Loisell - J. Electron. and Control, 6, 1, 1959). However, the overall transfer coefficient in an actual TWT mixer is determined by the frequency-conversion process as well as the gain in the first and second helices. The second divider is based on the resonance of the second kind and the harmonic locking effect. An experimental tube of this type was constructed. The first helix of this tube was used for injecting the signal to be divided into the electron beam, the frequency being 2f = 6 000 Mc/s; the second helix formed a delay system with an external feedback and was tuned to the frequency of f = 3 000 Mc/s. The frequency of the oscillator was primarily determined by the resonance frequency of the resonance circuit in the feedback loop, which suppressed the

undesired oscillation modes. Depending on the damping of the attenuator, which was connected in the feedback circuit, the operating conditions of the TWT could be such as to produce oscillations or potential instability (resonance of the second kind). This system has two advantages as compared with a klystron divider: 1) the signal to be divided is introduced into the electron beam by means of a separate helix and this results in an efficient interaction between the signal and the tube and permits a 40-50 db decoupling between the tube and the signal source; 2) the relative frequency drift of the divider can be made smaller than in the klystron. In particular, this drift can be made as low as 3×10^{-6} if the tube is supplied from a battery and the effective quality factor of its resonator is $Q_N = 3 \times 10^2$. The above results show that TWT frequency-dividers with separate helices have considerable advantages; in particular, it is possible to obtain large operating bandwidths. On the other hand, it should be pointed out that the harmonic locking effect and the resonance of the

n-th kind is probably of little use in practice since this type of frequency-division can be efficiently performed by semiconductor diodes with nonlinear capacitance (Ref. 10 - D. Leenov, A. Uhlir - Proc. IRE, 47, 1724, 1959). The authors express their gratitude to D.K. Akulina for great help in this work and for discussing the results. The authors also thank S.D. Gvozdover for his constant interest in this work. There are 5 figures and 11 references: 3 Soviet and 8 non-Soviet. Two of the four latest English-language references not quoted in the text are: Ref. 3 - R. de Grasse, G. Wade - Proc, IRE, 45, 1013, 1957 and Ref. 9 - C. Page, Proc. IRE, 46, 1738, 1958.

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TITLE: Parametric Phenomena in Wave Systems With Long Electron Beams

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TEXT: The phenomenon of parametric regeneration which was first investigated by L.I.Mandel'shtam and his associates (Ref.1) in systems with lumped constants may also occur in wave systems (Ref.2). The considerable interest in wave systems with modulated parameters is due to the prospects of building stable amplifiers and frequency converters with a very wide band which are simple to tune and are unidirectional. In principle, it is possible to obtain in the wave systems noise characteristics which are the same as those obtained in parametric circuit amplifiers. One of the possible variants of wave systems with modulated parameters are wave systems with long electron streams. First, a freely drifting beam of electrons represents a form of transmission line; modulation of the current density by a strong pump signal is

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analogous to some extent to the modulation of the distributed parameters of a transmission line (Ref.3 and 4). Another example of a waveguide system in which the modulation of the density of the electron beam can lead to parametric effects is a system consisting of a beam of electrons linked with a delay system. Wave systems with long electron beams are at present one of the most suitable fields for studying parametric phenomena in wave systems, since it is difficult to produce purely distributed wave systems with semiconductors and ferrites. In this paper the results are briefly described of experiments on parametric amplification and transformation of the frequency in wave systems with long electron beams in which the interaction of the electrons with the high frequency field in the longitudinal direction is utilized (see also earlier work of the authors, Ref.5 and 6). The experiments were made in the centimetre ($f_c \simeq 3000 - 3500$ Mc/s, frequency of $f_H \simeq 6000$ Mc/s) and the decimetre ($f_c \simeq 1000 - 1800$ Mc/s, $f_H \simeq 3000 - 3500$ Mc/s) ranges. In the experimental set-up both the pump source and the signal were introduced into the electron beam by means of sections of helical lines. The main beam of the electrons first passed

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through the first helix in which it was modulated by the pump signal and then into the second part of the tube where it interacted with the signal. The interaction was realized either in a drift tube (for feeding in and for extracting the signal, small sections of helical lines were used) or in the helical line. The power of the pump signal at the input and the output of the first helix was monitored; measures were provided for filtering the pump signal on the indicating apparatus. The block schematic is given. The parametric amplification was clearly observed in systems of both types for powers of the pump source varying between 200 μW and 1W. A common feature was the very wide band of the parametric amplification. Thus, in the decimetre range, the amplification was in a band of about 500 to 600 Mc/s with very little change in the gain for the band of the pump source of 200 to 300 Mc/s. In conclusion, the following is stated. Parametric amplification in wave systems with electron beams extends over a very wide band; for pump signal powers of 10 to 100 mW in systems with lengths not exceeding the dimensions of ordinary TWT, a real gain of about 20 db and more can be achieved. Comparison of the experimental data with results of

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