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Equipment and [illegible]

Ch. [illegible]II. Weld[illegible]
[illegible]. Weldin[illegible]
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[illegible]. Weldin[illegible]
[illegible]. Weldi[illegible]
[illegible]. Weldi[illegible]
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[illegible]. Weldi[illegible]

Ch. IX. [illegible] S[illegible]
[illegible]. [illegible]
[illegible]. Surfacing with [illegible]

Ch. [illegible]. [illegible]
[illegible]. Nature [illegible]
Features
[illegible]. Equipment [illegible]
[illegible]. Technol[illegible]

Card [illegible]

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Equipment and [illegible]

Ch. XI. Welding of Nonmet[illegible]
[illegible]. Welding [illegible]
[illegible]. Welding [illegible]

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[illegible]. [illegible]
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[illegible]. N[illegible]
Oxygen [illegible]
[illegible]. Prene[illegible]
[illegible]. Oxygen [illegible]
[illegible]. Materia[illegible]
[illegible]. Temperature [illegible]
[illegible]. Effect [illegible]
and [illegible]

Ch. XIII. Equipment and [illegible]
[illegible]. Universal manual [illegible]
[illegible]. Special-purpose [illegible]

Card [illegible]

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

Equipment and Methods

54. Machine torches
55. Instruments for oxygen
56. General-purpose machines for
57. Special-purpose machines

Ch. XIV. Technology of oxygen
58. Basic requirements
59. Basic considerations
60. Cutting regimes
61. Cutting steel of
62. Cutting steel of small
63. Deformations in oxygen cutting
64. Basic technological recommendations
cutting

Ch. XV. Oxygen Machining
65. Nature of the oxygen-machining
application

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

Equipment and Methods (Cont.)

66. Accessories for flame machining
67. Basic information on the technology and [illegible] of flame machining

Ch. XVI. Flux Cutting
68. Nature of the flux-cutting process
69. Equipment for flux cutting
70. Oxygen flux cutting of high-chrome steels
71. Cutting of cast iron, copper, and copper [illegible]

Ch. XVII. Special Types of Oxygen Cutting
72. Lance cutting
73. Underwater cutting
74. Electric-oxygen cutting

PART IV. SURFACE HARDENING AND METAL SPRAYING

Ch. XVIII. Flame Hardening
75. Nature of the surface-hardening process
76. Methods of flame hardening
77. Hardening equipment
78. Techniques of gas-flame surface hardening

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

Equipment and [illegible]

[illegible]. Measures [illegible]
harmful effects

[illegible]

AVAILABLE [illegible]

[illegible]

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

PHASE I BOOK EXPLOITATION SOV/6435

Petrov, Georgiy L'vovich, Viktor Nikolayevich Zemzin, and Fedor Grigor'yevich Gonserovskiy

Svarka zharoprochnykh nerzhaveyushchikh staley (Welding of Heat-Resistant Stainless Steels) Moscow, Mashgiz, 1963. 247 p. Errata slip inserted. 5500 copies printed.

Reviewer: I. A. Zaks, Engineer; Ed.: B. I. Bruk, Candidate of Technical Sciences; Ed. of Publishing House: G. N. Kurepina; Tech. Ed.: A. A. Bardina; Managing Ed. for Literature on Machine-Building Technology, Leningrad Department, Mashgiz: Ye. P. Naumov, Engineer.

PURPOSE: This book is intended for engineering personnel of plants, design bureaus, and scientific research establishments concerned with the manufacture and design of welded structures made from heat-resistant steels and alloys.

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

COVERAGE: The book reviews problems connected with welding of high-alloy heat-resistant chromium and chromium-nickel steels and some heat-resistant nickel alloys, and problems of welding these materials to low-alloy steels used in structures which operate at high temperatures. The introduction and chapters I, III, and IV were written by G. L. Petrov, chapters II and V by V. N. Zemzin and chapter VI by F. G. Gonserovskiy. No personalities are mentioned. Most of the 192 references are Soviet.

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Introduction 3

Ch. I. Heat-Resistant Steels and Alloys Used in Welded Structures 5
1. Complex of properties determining heat resistance 5
2. Methods for determining heat resistance 5

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L 9091-65 EWG(j)/EWT(m)/EPF(c)/EPR/EWP(k)/EWP(b) Pf-4/Pr-4/Pa-4 ASD(f)/ASD(m)-3

ACCESSION NR: AT4038449 JD/HM S/2563/63/000/229/0073/0082

AUTHOR: Petrov, G. L.; Yazykov, A. S.

B

TITLE: Redistribution of gases in the weld adjacent zone during welding of titanium alloys

27 18

SOURCE: Leningrad. Politekhnicheskiy institut. Trudy*, no. 229, 1963. Svarochnoye proizvodstvo (Welding production), 73-82

TOPIC TAGS: titanium, titanium alloy, welding, titanium alloy welding, gas distribution, cold fissure, dissolved hydrogen, dissolved oxygen

18 27

ABSTRACT: The authors note that cold fissures are detected in the weld adjacent zones in a number of titanium alloys. Considering the effect of hydrogen and oxygen on the formation of fissures in welded joints, hypotheses have been advanced to the effect that the fissures observed in the weld adjacent zones may be the result of local increases in the concentration of hydrogen and oxygen in connection with their redistribution in the welded joint as the temperature changes due to the different solubility of these elements in the different phases. In the welding of titanium alloys, such a redistribution is possible due to the coexistence of the solid and liquid phases in the fusion zone and the Ti_{α} and Ti_{β} phases during transformation in the solid state. The present article is concerned with an

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analysis of this problem. The character of the diffusion redistribution on the phase boundaries caused by the different solubility of any element in these phases is discussed. Characteristic isothermal curves for the phase transformation in the welding of titanium are derived. Cooling rates are calculated and the redistribution of hydrogen and oxygen on the boundary of maximum width of the transformation zone is computed. On the basis of a theoretical analysis and experimental determination of hardness by scratching, it is established that no local difference in oxygen distribution, caused by its different solubility in Ti_{α} and Ti_{β} in the zone of the thermal effect of the welded joints of single-phase titanium alloys, is observed. The hypothesis of the possible effect of such an oxygen redistribution on the formation of cold fissures is therefore not confirmed. The final non-uniformity in the hydrogen distribution due to its different solubility in Ti_{α} and Ti_{β} at the moment of contact of these phases over the thermal welding cycle was also found to be negligible. An experimental verification of the final distribution of the hydrogen by direct determination requires the development of local methods of analysis with the sample taken from a metal section no larger than approximately 0.5 mm in length. The authors also conclude that the non-uniformity of the hydrogen distribution as the result of its redistribution in the solid metal of the heat affected zone is small. At the moment of the precipitation of the hydrides below 300C, it is almost uniformly distributed, parti-

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ACCESSION NR: AT4038449

cularly under "soft" welding conditions, and the process of its redistribution can hardly promote an increased tendency of the metal of this zone toward the formation of cold fissures in the weld joints. Orig. art. has: 5 figures, 6 tables and 20 formulas.

ASSOCIATION: Leningradskiy politekhnicheskiy institut (Leningrad Polytechnical Institute)

SUBMITTED: 00 ENCL: 00

SUB CODE: MM NO REF SOV: 007 OTHER: 000

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[illegible], G.L.; [illegible]

Trajectory of the axis of a crystallite and the rate of crystal growth during the solidification of a welding bath. Trudy [illegible] no.229:83-[illegible] [illegible]

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

L 14974-65 EWT(m)/EPF(c)/EPF(n)-2/EPR/EWP(k)/EWP(b)/EWP(v)/EWP(t) Pf-4/Pr-4/Ps-4/Pu-4 IJP(c)/ASD(f)-2/ASD(m)-3 JD/HM/HIX

ACCESSION NR: AT4048085 S/0000/64/000/000/0273/0282

B

AUTHOR: Petrov, G.L., Shchipkov, M.D., Lebedev, A.I., Yazy*kov, A.S.

TITLE: Some problems of welding titanium and titanium alloys

SOURCE: Soveshchaniye po metallurgii, metallovedeniyu i primeneniyu titana i yego splavov. 5th, Moscow, 1963. Metallovedeniye titana (Metallography of titanium); trudy* soveshchaniya, Moscow, Izd-vo Nauka, 1964, 273-282

TOPIC TAGS: titanium, titanium alloy, titanium alloy welding, titanium welding, argon arc welding

ABSTRACT: The weld seams of titanium and titanium alloys must pass very rigid requirements, both in relation to the weld metal and accuracy. The Kafedra svarochnogo proizvodstva Leningradskogo politekhnicheskogo instituta im. M.I. Kalinina (Welding Department of the Leningrad Polytechnical Institute) has therefore investigated the sources of oxygen and hydrogen saturation of the titanium seams, and the possibility of redistribution of these gases at the boundaries of the α and β crystals during welding and of residual deformations during argon arc welding of titanium alloys. The sources of oxygen and hydrogen are water vapor and/or the admixture of the inert gases used during welding. It was found that protection by argon does not prevent titanium oxidation at all the

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temperatures possible during fusion welding, even when there is no air present. During argon arc welding, the moisture in the argon may be the source of hydrogen penetration. This moisture can be eliminated by using titanium shavings. On the basis of tests, it is noted that the initial hydrogen concentration in the filling wire greatly affects the hydrogen concentration in the welded metal. On the basis of B. A. Movchan's equation and calculations according to N. N. Rikalin and G. L. Petrov, it is found that the maximum difference in oxygen and hydrogen concentration at the phase boundary is very low. The redistribution of oxygen and hydrogen may be only local. Coarse methods of testing the base metal, heated metal and weld seam did not show any increase in hardness. Theoretical calculations performed according to N. O. Okerblom gave results lower than those obtained during the tests. This is explained by the high value of the ratio between the yield point and rigidity modulus at normal temperature and its sharp drop as the temperature increases. The paper concludes that hydrogen may either be introduced into or removed from the titanium and titanium alloys depending on the partial pressure of the hydrogen in the gas phase. When the argon used for welding is additionally purified, there is no hydrogen saturation. Pure argon thus ensures satisfactory quality

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of the welded metal. The AN-T3 flux does not protect the surface against oxygen. Argon arc welding thus ensures the best weld seams without requiring redistribution of oxygen and hydrogen at the weld. Residual deformation during the argon arc welding of titanium alloys is determined by the specific linear energy of welding, and by the thermal, physical and mechanical properties of the welded alloy. The proposed method of calculation permits one to find the residual deformation during argon arc welding of titanium alloys with sufficient accuracy. Orig. art. has: 6 figures, 3 tables and 7 equations.

ASSOCIATION: Kafedra svarochnogo proizvodstva Leningradskogo politekhnicheskogo instituta im. M.I. Kalinina, (Welding Department, Leningrad Polytechnical Institute)

SUBMITTED: 15Jul64 ENCL: 00 SUB CODE: MM

NO REF SOV: 010 OTHER: 000

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L 39758-65 EPA(s)-2/EWT(m)/EWP(v)/T/EWP(t)/EWP(k)/EWP(b)/EWA(c) Pf-4

ACCESSION NR: AP4047010 JD/HM S/0135/64/000/010/0001/0006 23 B

AUTHORS: Petrov, G.L. (Doctor of technical sciences); Million, A. (Candidate of technical sciences)

TITLE: The processes of hydrogen distribution in weld joints of mild and low-alloy steels 16 18

SOURCE: Svarochnoye proizvodstvo, no. 10, 1964, 1-6 4

TOPIC TAGS: steel, low alloy steel, weld joint, hydrogen distribution, permeability, weld affected zone, austenitic structure, pearritic ferritic structure

ABSTRACT: The authors developed a method of bringing about a quantitative distribution of hydrogen in weld joints at different post-cooling periods as well as its complete removal from the weld joints of mild and low-alloy steels having a different hardenability. The method is applicable when the hydrogen permeability is identical in all weld-affected zones where hydrogen diffusion occurs such as in steels that do not harden during welding and in specimens with an electrode for the production of low-carbon non-hardening welds. The

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ACCESSION NR: AP4047010

quantitative character of the process of hydrogen distribution was found to be independent of the type of the ferritic-pearlitic electrode cover and of the amount of hydrogen that passes into the joint during welding. With very high hydrogen concentration, welds produced by austenitic electrodes may pass on a part of the dissolved hydrogen to the weld-affected zones. With hydrogen contents under 10 to 11 cm/100 g, the hydrogen does not pass into the weld-affected zone. The initial distribution of hydrogenis attributed to the substantial solubility of hydrogen in the weld-affected zone above the Ar point and after austenitic decomposition takes place the hydrogen diffusion during the short cooling period is comparatively low. In single-pass welding combined with intensified cooling, the character of the initial hydrogen distribution is independent of the type of the parent or filler metal. However, the structure in the different weld-affected sections influences the character of the distribution processes. A martempered structure acts as a barrier inhibiting the penetration of hydrogen. Lowering temperatures to -78 C inhibits the displacement of hydrogen by about 56 times as compared to room temperature, when austenitic welds do not displace hydrogen at all.

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ACCESSION NR: AP4047010

The employment of wet electrodes causes the displacement of hydrogen in high concentrations. In ferritic-pearlitic welds the hydrogen concentration in the weld-affected zone is initially heightened at room temperature and decline sets in within 2 to 3 hours, enhancing the tendency towards cold cracking near the fusion surface. In austenitic welds the hydrogen concentration in the weld-affected zone near the fusion surface is lowered with time leading to a gradual increase in the resistance to crack formation. Orig. art. has: 10 figures and 4 tables.

ASSOCIATION: Leningradskiy politekhnicheskiy institut im. M. I. Kalinina (Leningrad Polytechnic Institute)

SUBMITTED: 00 ENCL: 00 SUB CODE: MM

NR REF SOV: 007 OTHER: 005

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APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

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PETROV, Vladilen [illegible], [illegible], [illegible], [illegible], [illegible]
IBKOZ, [illegible], [illegible], [illegible]; [illegible], [illegible], [illegible]
VLASOVA, Z.V., [illegible].

[Welding and [illegible] of stainless steel] Svarka [illegible] nerzhaveiushchikh [illegible]. [illegible], [illegible], [illegible].
([illegible])

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

PETROV, G.L., doktor tekhn.nauk, MILLION, A., kand.tekhn.nauk

Hydrogen distribution processes in welded joints of carbon and low alloy steels. Svar.proizv. no.1 1-6 Ja '64. (MIRA 18:1)

1. Leningradskiy politekhnicheskiy institut im. M.I.Kalinina.

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L 23417-66 EWP(e)/EWT(m)/EWP(w)/EWA(d)/EWP(v)/T/EWP(t)/EWP(k) IJP(c) JD/HW/JH
ACC NR: AP6004134 (N) SOURCE CODE: UR/0125/66/000/001/0001/0005

AUTHOR: Prozorovskiy, Ye. V.; Petrov, G. L.

ORG: none

TITLE: Problems of the arc welding of boron-treated austenitic chromium-nickel alloys

SOURCE: Avtomaticheskaya svarka, no. 1, 1966, 1-5

TOPIC TAGS: arc welding, boron, austenite steel, chromium base alloy, nickel base alloy, crack propagation, oxidation

ABSTRACT: Argon arc welding, automatic submerged arc welding and manual welding of steels containing various proportions of B (0.005-2.0%) was carried out to determine the effect of B on the structure of the metal of Cr-Ni welded joints. The probability of the oxidation of various elements is determined by their affinity toward oxygen and, in this connection, submerged arc welding based on the use of the flux 48-OF-6 (varying content of SiO_2), with wire electrodes containing various concentrations of B and Ti, established that the affinity of B toward oxygen is greater than that of Si, smaller than that of Al and roughly equal to that of Ti (Fig. 1). During welding with electrodes coated with a relatively oxidation-resistant layer of calcium fluoride which is usually employed in the welding of Cr-Ni austenitic steels, the burnout

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ACC NR: AP6004134

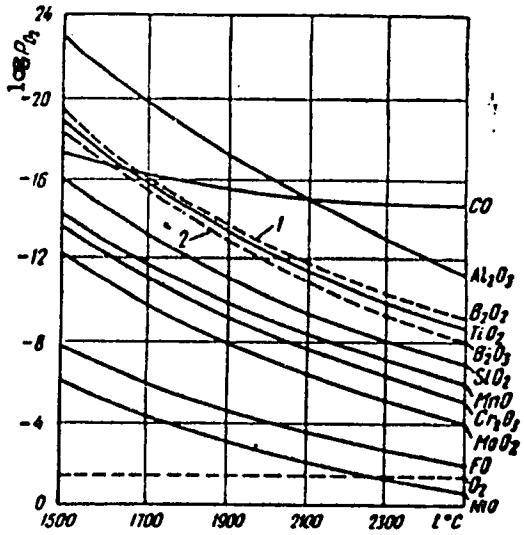

Fig. 1. Dissociation pressure of free oxides as a function of temperature.

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ACC NR: AP6004134

(oxidation) of B in the electrode rod is ~0.7%. Thus, B is an extremely active element with respect to oxygen, and even small amounts of oxidizing agents (e.g. oxides of elements with smaller affinity toward oxygen) may lead to considerable losses of B during welding. The burnout of B from metal may be reduced in two ways: by using more energetic deoxidizing agents than B (e.g. Al) or by treating the slag with boron oxides. Treatment with B of Cr-Ni steels in the austenitic class as well as of welded joints of an analogous composition leads to the appearance of Cr-rich borides in the structure. This contributes to a change in the ratio between the ferrite- and austenite-forming elements in the solid solution. Accordingly the authors propose formulas for taking into account the corresponding changes in the composition and volume of the solid solution and in the equivalent values of Cr and Ni. When the metal of purely austenitic welded joints contains minute amounts of B (0.01-0.35% B), it is extremely prone to form hot cracks. On the other hand, if it contains 0.35-1.5% B, it is sufficiently resistant to hot cracking. Orig. art. has: 4 figures, 3 formulas, 2 tables.

SUB CODE: 11, 13, 20/ SUBM DATE: 08Jul65/ ORIG REF: 011/ OTH REF: 002

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

ACC NR: AP6035501 (A) SOURCE CODE: UR/0135/66/000/011/0013/0015

AUTHOR: Borovushkin, I. V. (Engineer); Petrov, G. L. (Doctor of technical sciences)

ORG: Leningrad Polytechnic Institute im. M. I. Kalinin (Leningradskiy politekhnicheskiy institut)

TITLE: Effect of hydrogen on crack formation in the weld-adjacent zone in hardenable steels

SOURCE: Svarochnoye proizvodstvo, no. 11, 1966, 13-15

TOPIC TAGS: hardenable steel, steel, welding electrode, weld evaluation, material fracture, hydrogen, weld defect / 11KhN4MDA steel

ABSTRACT: Specimens of 11KhN4MDA hardenable steel were welded with ferritic or austenitic electrodes containing various amounts of hydrogen. To obtain different hydrogen contents, the electrodes were outgassed at different temperatures. Ferritic E70-type electrodes were held for 5 hr at 100, 300 or 490C, which produced a hydrogen content in the weld of 8, 4 and 0.5 $cm^3/100$ g, respectively. Austenitic Kh16N25M6F2-type electrodes were held for 5 hr at temperatures of 350 or 100C or left in the as-delivered condition, producing hydrogen content

Card 1/2 UDC: 621.791.052.019:669.788:669.1 -194

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

ACC NR: AP6035501

of 6, 12 and 20 $cm^3/100$ g, respectively. Static bend tests showed that in welds made with ferritic electrodes, fractures occurred about 0.5 mm from the weld and that an increase of hydrogen content from 0.5—1.0 to 8—9 $cm^3/100$ g decreased the breakdown load by 50%. Fractures of the austenitic welds occurred in the weld zone, and a reduction of hydrogen content from 20 to 6 $cm^3/100$ g increased the breakdown load by about 150%. Austenitic welds were found to be less sensitive to hydrogen embrittlement. For example, specimens welded with ferritic electrodes containing 8 $cm^3/100$ g hydrogen, and specimens welded with austenitic electrodes containing 20 $cm^3/100$ g hydrogen, broke under the same load of 1200 kg after 10 or 25 min, respectively. Orig. art. has: 3 figures and 1 table.

SUB CODE: 11, 13/ SUBM DATE: none/ ORIG REF: 006/
OTH REF: 006

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IGNATOV, V.A.; PETROV, G.[illegible].

Auto-ad[illegible]ography [illegible]
austenitic chromium-[illegible] steels. [illegible]
(MIRA [illegible])

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

PETROV, G.L.; SHCHERBAKOV, M.

Effect of linear energy [illegible]
weld zone metal [illegible]
[illegible]

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

PETROV, G.L.; IGNATOV, V.A.

Autoradiographic investigation of the distribution of niobium in the weld-affected zone of Kh18N10B steel. Avtom. svar. 18 no.4:15-19 Ap '65. (MIRA 18:6)

1. Leningradskiy politekhnicheskiy institut imeni Kalinina.

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L 61835-65 EWT(m)/EWP(w)/EPF(n)-2/EWA(d)/EWP(v)/T/EWP(t)/EWP(k)/EWP(z)/EWP(b)/
EWA(c) Pf-4/Pab IJP(c) JD/RM/RW/JG

ACCESSION NR: AT5014462 UR/2563/65/000/245/0042/0050

AUTHOR: Ignatov, V. A.; Petrov, G. L.

TITLE: Autoradiographic studies of niobium distribution in welding compounds of chrome-nickel austenite steels

SOURCE: Leningrad. Politekhnicheskiy institut. Trudy, no. 245, 1965. Svarochnoye proizvodstvo (Welding production), 42-50

TOPIC TAGS: niobium distribution, autoradiography, austenite steel, chromium nickel steel, steel welding, steel niobium content, welded steam piping, niobium migration

ABSTRACT: Welded steam piping made of austenite chrome-nickel steels often shows a tendency towards brittle intergranular rupture (so-called local disruption) in a zone directly adjacent to the alloy boundary (V. N. Zemzin, Energomashinostroyeniye, 1958, no. 4, pp. 41-45; F. E. Asbury, C. Mitchell, L. H. Toft, British Welding Journal, 1960, 7, N 11, p. 667-668). Earlier investigations showed that austenite chrome-nickel steels, containing the strong carbide producers Ti and Nb, exhibit an intrinsic tendency to local disruption whenever they contain carbon above its austenite solution limit. However,

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L 61835-65

ACCESSION NR: AT5014462

2

contradictory opinions persist concerning the migration of Nb and Nb-containing compounds from the weld into the surrounding regions (A. V. Ratner, P. M. Gura, R. Ye. Mazel', Teploenergetika, 1962, no. 8, p. 12-17; G. L. Petrov, Neodnorodnost metalla svarnykh soyedineniy, L., Sudpromgiz, 1963, p. 204). Consequently, the authors applied the autoradiographic method to the problem and found that there is no significant migration of Nb, neither during the welding process nor during prolonged high-temperature aging. This confirms the qualitative conclusions based on the calculations of diffusion mobility of alloying elements within steel. This means that the strong carbide producers Ti and Nb cannot be responsible for the observed tendencies towards local disruption. The results also show that within the weld, Nb is distributed quite unevenly and is located mostly in interdendritic sections and on the crystallite boundaries. Experiments with reduced Nb yielded results which coincide qualitatively with earlier data by L. S. Livshits and L. P. Bakhrakh (Svarochnoye proizvodstvo, 1959, no. 1, p. 20-22). Orig. art. has: 2 formulas, 5 figures, and 1 table.

ASSOCIATION: Leningradskiy politekhnicheskiy institut im. M. I. Kalinina (Leningrad Polytechnic Institute)

SUBMITTED: 00 ENCL: 00 SUB CODE: MM

NO REF SOV: 012 OTHER: 002

Card 2/2

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

L 61836-65 EWT(m)/EWP(w)/EWA(d)/EWP(v)/T/EWP(t)/EWP(k)/EWP(z)/EWP(b)/EWA(c)
PF-4 IJP(c) MJW/JD/HM
ACCESSION NR: AT5014463 UR/2563/65/000/245/0059/0065

28
26
B+1

AUTHOR: Petrov, G. L.; Shchipkov, M. D.

TITLE: The influence of the linear energy consumption on the structure and hardness of the metal in the weld zone during the welding of Alpha-titanium alloy

SOURCE: Leningrad. Politekhnicheskiy institut. Trudy, no. 245, 1965, Svarochnoye proizvodstvo (Welding production), 59-65

TOPIC TAGS: weld metal hardness, weld zone structure, specific energy effect, linear energy consumption, titanium alloy welding, Alpha titanium

ABSTRACT: Welding compounds of technical Ti and some of its α-alloys may exhibit reduced mechanical properties in the weld zone as a result of structural transitions. An earlier paper reported on the influence of linear energy consumption during welding of technical titanium 2 and 4.5 mm thick (S. M. Gurevich, Avtomaticheskaya svarka, Kiev, 1956, p. 18-21). The present investigation aimed at establishing the relation between the hardness and the characteristics of these structural transitions within the weld zone during argon arc and automatic welding of 20 to 30 mm thick alloy #3 under flux. Tests showed that: 1) the zone of thermal influence increases with an increase in linear energy consumption

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L 61836-65

ACCESSION NR: AT5014463

2

(per unit length of the weld). These variations are independent of the type of arc welding; 2) with an increase in energy consumption from 260 to 5,500 cal/cm the hardness of the metal seam increases slightly with a corresponding decrease in hardness within the thermal influence zone; 3) at low energy consumption and relatively fast cooling rates, the weld metal has a fine-grained primary β-phase with α-phase formation at the boundary; within the grains one finds fine needles of the α'-phase martensite. An increase in energy consumption increases the size of the primary β-phase grains while the α-phase takes the form of a thin lattice along the boundaries of the stretched-out primary grains; 4) in the zone of thermal influence, in the case of low energies one observes fine-grained polyhedral structures with a significant number of α'-phase sections having a fine needle-shaped martensite structure. Increases in energy consumption lead to increases in grain size and to a certain fractionation of the α-phase grains. The amount of α'-phase is decreased, leading to the observed decrease in hardness; and 5) 9 months' aging did not produce any noticeable changes. Orig. art. has: 4 figures, 1 formula and 2 tables.

ASSOCIATION: Leningradskiy politekhnicheskiy institut im. M. I. Kalinina (Leningrad Polytechnic Institute)

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

Card 2/2 NO REF SOV: 006 OTHER: 000

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

L 61837-65 EWT(m)/EPF(c)/EWA(d)/EWP(v)/T/EWP(t)/EWP(k)/EWP(z)/EWP(b)/EWA(c)
Pf-4/Pr-4 LIP(c) MJW/JD/HM UR/2563/65/000/245/0066/0076
ACCESSION NR: AT5014464

38
35
B+1

AUTHOR: Petrov, G. L.; Rylov, L. F.

TITLE: Comparative studies on the effect of the thermal welding cycle on the properties of certain low-alloy steels

SOURCE: Leningrad. Politekhnicheskiy institut. Trudy, no. 245, 1965. Svarochnoye proizvodstvo (Welding production), 66-76

TOPIC TAGS: low alloy steel, thermal welding cycle, steel strength, steel density, weld zone structure, low carbon steel

ABSTRACT: The most dangerous changes in the basic metal properties caused by thermal influences near welds are in the area immediately adjacent to the actual seam. The present paper reports the results of a study and of estimates of the influence of thermal welding cycles on several low-carbon low-alloy construction steels. All steel samples (A1, A2, A3 and A4) proved to be sensitive to thermal influences from manual or automatic welding. The changes in numerous physical properties (e.g. lowering of specific gravity with a simultaneous increase in hardness and rigidity) agreed well with observed structural changes. Reductions in density may play an important role in conjunction with the possible increased

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L 61837-65

3

ACCESSION NR: AT5014464

retention of hydrogen. Finally, after heating up to 1250-1350C, a region of minimum plasticity was observed along the cooling branch at about 200-300C. Orig. art. has: 1 formula, 6 figures, and 4 tables.

ASSOCIATION: Leningradskiy politekhnicheskiy institut im. M. I. Kalinina (Leningrad Polytechnic Institute)

SUBMITTED: 00 ENCL: 00 SUB CODE: MM

NO REF SOV: 003 OTHER: 001

Card 2/2

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

L 45569-65 EWT(d)/EWP(e)/EPA(s)-2/EWT(m)/EPF(n)-2/EWP(c)/EWG(m)/EWA(d)/EWP(v)/EPR/T/EWP(t)/EWP(k)/EWP(z)/EWP(b)/EWP(1)/EWA(c) Pf-4/Ps-4/Peb/Pu-4 DIAAP/IJP(c) MJW/JD/JG/AT/WH

ACCESSION NR: AP5010174 UR/0125/65/000/004/0015/0019

AUTHOR: Petrov, G. L. (Doctor of technical sciences); Ignatov, V.A. (Engineer)

TITLE: Autoradiographic investigation of the niobium distribution in the weld-affected zone in Kh18N10B steel

SOURCE: Avtomaticheskaya svarka, no. 4, 1965, 15-19

TOPIC TAGS: weld affected zone, welding, autoradiography

ABSTRACT: Nb distribution in an 18-8-B-type steel in its initial state, after welding and after a 600—1360C thermal treatment, was investigated by a micro-autoradiographic method using the Nb^{95} isotope. Forged 24x45x60-mm steel bars were welded with 4-mm electrodes which yielded a IKh19N11M3F-type metal. The welded bars were cut into templets and treated thermally. These findings are reported: (1) The welding heat does not result in a Nb redistribution which would be conducive to precipitation of Cr carbides at the grain boundaries;

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

L 45569-65

ACCESSION NR: AP5010174

3

the initial Nb distribution remains practically intact up to the very boundary of fusion; (2) Nb is redistributed between the grains and their boundaries only upon a thermal treatment: at 1360C for over 5 min; at 1300C, over 0.5 hr; at 1200C, 2 hrs; at 850C, dozens of hrs; (3) With 0.02% C content, the Nb carbides are practically undetectable in the steel which testifies to the fact that such a concentration approximately corresponds to the maximum solubility of C in the 18-8 steel. Orig. art. has: 4 figures and 4 tables.

ASSOCIATION: Leningradskiy politekhnicheskiy institut im. M. I. Kalinina (Leningrad Polytechnic Institute)

SUBMITTED: 07Dec64 ENCL: 00 SUB CODE: MM

NO REF SOV: 007 OTHER: 003

Card 2/2

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

PETROV, L.P.

[illegible]
made of [illegible]. [illegible]

[illegible] Glavnyy [illegible]. Kombinata po [illegible] kamennougol'nogo bassyna.

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

ACCESSION NR: AP4017727 S/0294/63/001/003/0462/0464

AUTHORS: Petrov, V. A.; Chekhovskoy, V. Ya.; Sheyndlin, A. Ye.

TITLE: Experimental determination of the degree of blackness of niobium in the temperature interval 1200--2500K

SOURCE: Teplofizika vy*sokikh temperatur, v. 1, no. 3, 1963, 462-464

TOPIC TAGS: niobium, blackness, degree of blackness, hemispheric blackness, monochromatic blackness, integral blackness, pyrometry, micropyrometry

ABSTRACT: Results are presented of an experimental determination of the integral hemispheric and monochromatic ($\lambda = 0.66 \times 10^{-6}$ m) degree of blackness of niobium in the temperature interval 1200--2500°K. There are very little published data on its optical properties and particularly the degree of blackness. The measurements were made on a specimen in the form of an electrically-heated thin-

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

ACCESSION NR: AP4017727

wall tube with outside diameter 9 mm, wall thickness 0.5 mm and length 300 mm. The experimental setup, the apparatus, and the measurement procedure were described elsewhere (Teplofizika vy*sokikh temperatur v. 1, No. 1, 1963). All experiments were made in a vacuum 10^{-3} N/m^2. The experimental error is estimated at ±4%. In addition, a check was made on the blackness of the tube when viewed from the end, as is sometimes done to determine the true temperature. The results show that the degree of blackness of a hole drilled in a tube is 0.89--0.90 and that to improve the results it is necessary to use a small hole and a micropyrometer. Both the monochromatic degree of blackness and the integral degree of blackness exhibits a noticeable increase in degree of blackness during the initial heating. The accuracy of the measurement of the monochromatic degree of blackness is estimated at ±11% at 1300K and ±7% at 2300K. The data are compared with those by others and the reasons for the discrepancies discussed. Orig. art. has: 2 figures and 4 tables.

Card 2/5

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

ACCESSION NR: AP4017727

ASSOCIATION: Nauchno-issledovatel'skiy institut vy*sokikh temperatur (Scientific Research Institute of High Temperatures)

SUBMITTED: 05Oct63 DATE ACQ: 23Mar64 ENCL: 02

SUB CODE: PH NR REF SOV: 001 OTHER: 004

Card 3/5

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

DEMYANTSEVICH, V.P. Prinimal uchastiye PETROV, G.L., doktor tekhn. nauk; DUBOVA, T.N., kand. tekhn. nauk, retsenzent; SHCHIPKOV, M.D., kand. tekhn. nauk, red.; DENINA, I.A., red. izd-va; SPERANSKAYA, O.V., tekhn. red.

[Metallurgical and technological principles of arc welding]Metallurgicheskie i tekhnologicheskie osnovy dugovoi svarki. Moskva, Mashgiz, 1962. 295 p. (MIRA 16:3)
(Electric welding)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

PETROV, Georgiy L'vovich; ZEMZIN, Viktor Nikolayevich; GONSEROVSKIY, Fedor Grigor'yevich; KUREPINA, G.N., red. izd-va; BARDINA, A.A., tekhn. red.

[Welding of heat-resistant stainless steels] Svarka zharoprochnykh nerzhaveiushchikh stalei. Moskva, Mashgiz, 1963. 247 p. (MIRA 16:5)

(Steel, Stainless--Welding)
(Steel, Heat--Resistant--Welding)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

PETROV, Georgiy L'vovich; BRUK, B.I., kand. tekhn. nauk, retsenzent; TIMOFEYEV, A.N., inzh., retsenzent; LEMYANTSEVICH, V.P., kand. tekhn. nauk, nauchnyy red.; OSVENSKAYA, A.A., red.; KRYAK VA, D.M., tekhn. red.

[Inhomogeneity of the metal in welded joints] Neodnorodnost' metalla svarnykh soedinenii. Leningrad, Sudpromgiz, 1963. [illegible] MIRA 16:3

(Welding--Testing) (Metallography)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

PETROV, G.L.; YEFIMOV, L.A.

Formation of transition layers near the interfusion boundaries in the welding of carbon and low-alloy steels with austenite electrodes. Trudy LPI no.216:122-129 '61. MIRA 14:1
(Steel--Welding)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

PETROV, G.L.

Distribution of segregating impurities in the crystallized metal of welded joints. Trudy LPI no.216:83-101 '61. (MIRA 14:1)
(Welding--Testing
(Crystallization)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

[illegible]

[illegible] the welding of carbon steels.

[illegible] Complete translation

[illegible]

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

TITLE:

PERIODICAL:

TEXT:

Card 1/2

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

[illegible]

[illegible] tion depends [illegible] related [illegible] lower growth [illegible] of the [illegible] being welded [illegible] greater width of the zone with the reduced liquation-additive content in the neighborhood of the fusion boundary, and to its greater relative increase at the central parts of the seam metal. There are 32 references.

V. Tarisova

[Abstracter's note: [illegible]]

Card 2/2

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

PETROV, G.L. (Leningrad); MAKAROV, A.G. (Leningrad)

Tendency of aluminum-zinc-magnesium alloys to the formation of hot cracks during welding. Avtom.svar. 14 no.9:24-32 S '61. (MIRA 14:8)

(Aluminum-zinc-magnesium alloys--Welding)
(Welding--Defects)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

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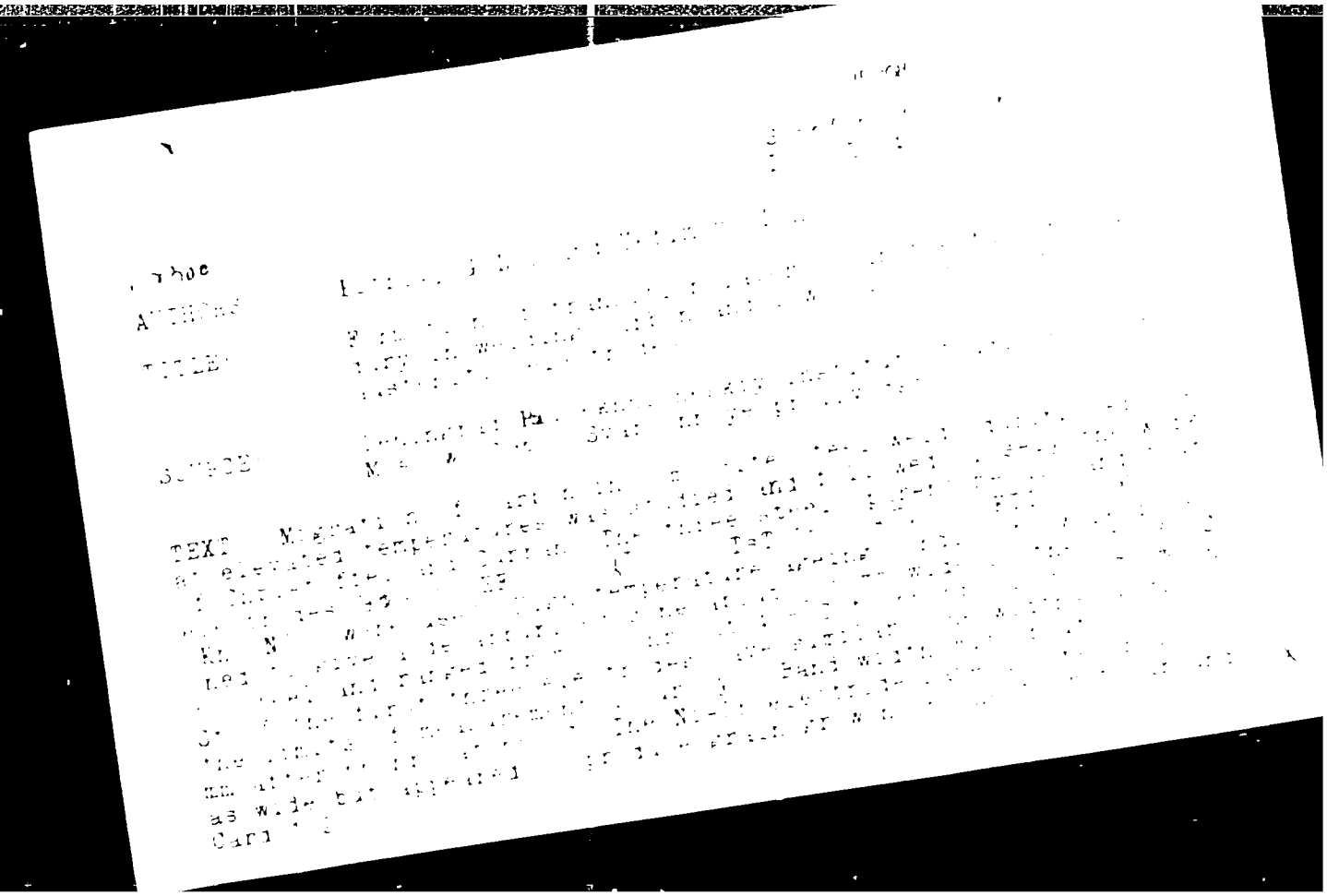

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

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APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

PETROV, G.L., kand.tekhn.nauk; KOZLOV, R.A., inzh.; BARYSHNIKOV, A.P., inzh.

Certain metallurgical characteristics in the welding of manganese-aluminum steels. Svarka 2:9-21 '59. (MIRA 14:5)
(Manganese steel--Welding) (Aluminum-manganese alloys--Welding)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

26481

S/125/61/000/009/005/014
D040/D113

1 2300 2708 2515, 2808 1573

AUTHORS: Petrov, G.L., Makarov, A.G. (Leningrad)

TITLE: On the tendency of aluminum-zinc-magnesium alloys to the formation of hot cracks during welding

PERIODICAL: Avtomaticheskaya svarka, no. 9, 1961, 24-32

TEXT: The article presents data obtained in experiments the purpose of which was to find suitable filler metal composition for high strength Al-Zn-Mg alloys similar to the German alloys "3415" and "3420". The hot-cracking tendency of Al-Zn-Mg alloys was compared to this tendency in Al-Mg systems which are used for welded structures. The comparison was carried out at MVTU im. Baumana (MVTU im. Bauman) by a method proposed by N.N.Prokhorov [Abstracter's note: The method is not described], where Al-Zn-Mg alloys were found more prone to hot cracking than Al-Mg. Reference is made to investigations of N.F.Lashko and S.V.Lashko-Avakyan (Ref. 1: N.F.Lashko and S.V.Lashko-Avakyan, Svarivayemyye legkiye splavy /Weldable light alloys/, Sudpromgiz, 1960) who also stated hot cracking tendency in Al-Zn-Mg welds.

Card 1/4

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

On the tendency ....

The effect of different contents of alloy elements (Mn, Cr, Ti, Fe, Si, Zr) was determined on cast ring samples in chill molds, and subsequently verified in welding. The results of these experiments are given in Figs. 4, 5, 6, 7. The following conclusions are drawn: (1) High-strength Al-Zn-Mg alloys have a considerable tendency to hot cracks in fusion welding; (2) This tendency increases when the Mg content increases in relation to Zn content below $\frac{Mg}{Zn} \approx \frac{30}{70}$. The crack resistance becomes sufficiently high when the Mg content exceeds 2.5 - 3% at Zn content of 4.2-6.2%; (3) The effect of up to 0.6% Mn and up to 0.4% Cr is insignificant. The Fe, Si content ratio must be higher than 1, and the content of Fe and Si must be relatively low; (4) Additions of Ti and Zr raise the crack resistance considerably. The effect of Zr is sufficiently high when about 1.5% is included. Ti content below 0.3% did not eliminate hot cracks in the weld metal produced by the argon-arc process; (5) Sufficiently high mechanical properties were obtained in multilayer deposits produced by a nonconsumable electrode in the argon-arc process with filler metal containing about 4-4.5% Zn, 3% Mg and 0.5% Zr. There are 9 figures, 1 table and 5 references: 4 Soviet and 1 non-Soviet bloc.

SUBMITTED: September 21, 1960

Card 2/4

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

PETROV, G.L., kand.tekhn.nauk; SMOLKIN, S.Sh., inzh.

Relation between thickness tolerances and the relative weight of electrode coatings. Svar.proizv. no.9:32-35 S '60. (MIRA 13:8)

1. Leningradskiy politekhnicheskiy institut im. M.I.Kalinina.
(Electrodes)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

KOZLOV, R.A. (Leningrad); PETROV, G.L. (Leningrad)

Some problems involved in welding with use of austenitic manganese-aluminum electrodes. Avtom.svar. 13 no.7:33-42 Jl '60. (MIRA 13:7)

(Electric welding)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

82806

S/125/60/000/007/003/010
A161/A029

18.7200

AUTHORS: Kozlov, R.A.; Petrov, G.L. (Leningrad)

TITLE: Some Aspects of Welding With Austenitic Manganese-Aluminum Electrodes

PERIODICAL: Avtomaticheskaya svarka, 1960, No. 7, pp. 33 - 42

TEXT: Austenitic steel electrodes alloyed by manganese are since long being used in the USSR and abroad. The experiments described in the article were undertaken to study the processes of recovery of silicon and carbon from oxides in welding with electrodes containing a considerable quantity of aluminum. As the ferrite content determines in a high degree the resistance of austenitic-ferritic steel structure against hot cracking, the ferrite content was kept on a constant level. It was stated that to prevent hot cracking in steel with high carbon content (0.68%), the alpha-phase content has to be raised to 4.7%. A higher alpha content leads to abrupt drop of plasticity and cold cracking. The effect of summary content of aluminum and silicon on the alpha-phase content in weld metal at 19 - 21% Mn content is illustrated in simplified form in a diagram (Fig. 8). It can be seen that the austenitizing effect of carbon in Mn-Al metal is less strong than in Ni-Cr metal. To reduce the tendency to hot cracks weld

Card 1/3

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

82806

S/125/60/000/007/003/010
A161/A029

Some Aspects of Welding With Austenitic Manganese-Aluminum Electrodes

metal must have 0.5% of the alpha phase, and to prevent too high loss of plasticity and toughness the upper limit of the alpha phase content must also be limited. This upper limit is at 3 - 4% for steel with high carbon content and 6 - 7% for low-carbon steel. A new electrode grade has been developed, called ЭА-48м/18 (EA-48m/18), the composition of which is not specified. As the industry cannot produce welding wire with component contents within narrow limits, the coating must be adjusted accordingly to the wire. The following summary conclusions were made: 1) the quantity of silicon and carbon reduced in weld metal depends in direct proportion on the quantity of dry residue of water glass and marble in coating; 2) increasing carbon content in weld metal at constant alpha-phase content raises the strength but reduces plasticity and toughness and hence raises the tendency to hot cracking (pure austenitic weld metal with low carbon content is sufficiently resistant to hot cracks); 3) raising alpha-phase content in austenito-ferritic metal lessens hot cracking, but higher alpha-phase content may cause cold cracks; 4) manganese-aluminum electrodes produce weld metal with aluminum, silicon and carbon content within comparatively narrow limits, and therefore the coating composition must be different for a different composition of wire. There

Card 2/3

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

82806

S/125/60/000/007/003/0[illegible]
A161/A029

Some Aspects of Welding With Austenitic Manganese-Aluminum Electrodes

are 8 graphs and 9 references: 8 Soviet and 1 German.

SUBMITTED: January 11, 1960

Card 3/3

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

LASHKO, Nikolay Fedorovich; LASHKO-AVAKYAN, Sof'ya Vasil'yevna; PETROV, G.L., nauchnyy red.; KAZAROV, Yu.S., red.; TSAL, R.K., tekhn.red.

[Weldable light alloys] Svarivaemye legkie splavy. Leningrad, Gos.soiuznoe izd-vo sudostroit.promyshl., 1960. 439 p. (MIRA 13:7)

(Light metals--Welding)

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

Translation from: Referativnyy Zhurnal, Elektrotekhnika, 1957, Nr 1, p. 204 (USSR) 112-1-1334

AUTHOR: Petrov, G.M.

TITLE: Linear Electronic Analog Computers Manufactured by the Plants of the Ministry of Machine-and-Instrument Building and the Experience of their Operation (Lineynyye elektronnyye modeli, vypuskayemyye zavodami Ministerstva mashinostroyeniya i priborostroyeniya i opyt ikh ekspluatatsii)

PERIODICAL: Tr. 2-go Vses. soveshchaniya po teorii avtomat. reg. i upravleniya, Moscow - Leningrad, 1955, 3, pp. 39-46. Vystupleniya, pp. 70-71

ABSTRACT: The article describes serial d-c computers ИПТ-4, ИПТ-5, and МПТ-9, on which systems of simple differential equations with constant and variable coefficients in a natural and a transformed time-scale are solved. The computing

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blocks of these analyzers which perform integration, summation, amplification and change of sign, perform these mathematical operations with an accuracy of ± 0.2 to 0.5 per cent. The variable coefficients are introduced in the form of step-curves with the help of hundred tap voltage dividers and step-switches. The computation is repetitive. The operating scale of voltages representing variable magnitudes is equal ± 100 v. The ИПТ-4 matrix-type analyzer computes systems of differential equations up to the 6-th order with 25 constant and 25 variable coefficients; the duration of computing processes is up to 150 sec.; operational amplifiers are built on the basis of 3-stage d-c amplifier УПТ-4 with a 40,000 forward gain, with a 150 to 200-c transmission band in the presence of a negative feedback, amplifiers drift reduced to the input, equal to 2 to 3 mv for 10 min.; the variable coefficients given in terms of time functions, may be introduced by steps of 0.1; 0.15; 0.5; 0.75; 1 and 1.5 sec.; the accuracy of setting up the permanent coefficients is up to 3 places.

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Linear Electronic Analog Computers (Cont.)

The ИПТ T-5 computer is a structural type machine and differs from the ИПТ T-4 by the design of the solving units, the setting up of the problem, smaller dimensions and price; it can compute systems up to the 9-th order with 18 variable and 18 constant coefficients. The МПТ T-9 computer is a structural type machine containing 48 operational units (of which 16 are integrating); 48 units of constant coefficients; 48 units of variable coefficients; computes systems up to the 16-th order; the duration of the investigated processes is up to 400 sec, it has an automatic zero stabilization of the operational amplifiers; the given graphs of variable coefficients may be approximated by step curves having different laying out spacings along the time axis. It is indicated that

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

PETROV, G. M., Engineer

[illegible] Small Nonlinear [illegible] a paper presented at the [illegible] Conference on Methods of Development of [illegible] Mathematical Machine [illegible] and Instrument Building. [illegible] March [illegible].

Translation No. [illegible]

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Petrov, G.M.

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Application of Semiconductor Diodes in Circuits of Nonlinear Units of Electrical Analogue Apparatus. G. M. Petrov. (Avtomatika i Telemekhanika, Aug. 1956, Vol. 17, No. 3, pp. 707-716.)

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

AUTHORS: Petro[illegible]

TITLE: On the Construction of an "Operation Amplifier" With Semiconductor Elements (O postroyenii operatsionnogo usilitelya na poluprovodnikovykh elementakh)

PERIODICAL: Priborostroyeniye, 1958, Nr 3, pp. 4-8 (USSR)

ABSTRACT: The operation amplifiers are the main elements of modern electric model-apparatus and they provide considerable simplification and improvement when applying semiconductor elements.

These amplifiers according to their structure are electronic regulators with a high amplifying coefficient, which also include a negative regenerative coupling. At present there are two possibilities to accomplish the negative regenerative coupling without electron-beam tubes: the first one by using a voltage amplifier which has a highly resistive inlet and a low-resistance outlet with a common ground bar. The second possibility requires a current amplifier with a low-resistance inlet and a highly resistive outlet.

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

On the Construction of an "Operation Amplifier" With Semiconductor Elements 119-3-2/14

Both types of amplifiers are capable of operation.

A further suggestion for an operation amplifier without tubes, a combination of an alternating current amplifier with a direct current amplifier of the type M M is discussed in detail. 15 such amplifiers were constructed and investigated by experiment. It has to be mentioned especially that the amplifiers operate constantly up to +40°C.

For the solution of practical problems 6 integrating and 6 "summing up" "operation amplifiers" were connected according to a given scheme, which makes it evident that an electric model-apparatus can be constructed by using semiconductor amplifiers. There are 12 figures, 2 tables.

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1. Amplifiers--Construction 2. Semiconductors--Application

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

PETROV, G.M.; POPOV, V.A.

Designing operational semiconductor amplifiers. Priborostroenie no.3:8-12 Mr '58. (MIRA 11:4)
(Electric current rectifiers)

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

AUTHORS: Petrov, [illegible] M., [illegible] V., [illegible]

TITLE: Small Size Mathematical Analog [illegible] MN [illegible]
Semi[illegible] Mat[illegible]
mashina MN - [illegible]

PERIODICAL: Prib[illegible] SSS

ABSTRACT: A computer [illegible] with [illegible] and
by NII[illegible] [illegible] Lazunir, V. A. [illegible]ov,
triodes. [illegible]
V. S. Step[illegible] and I. [illegible] contributed in the finishing
[illegible] serve for
[illegible] a [illegible]
[illegible] Apart from [illegible]
features:
1. [illegible]
[illegible]s.
[illegible] quantity.
[illegible]

Card [illegible]

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

Small Size Mathematical Analog Computers MN-[illegible] [illegible]
With Semiconductors

[illegible]

Card [illegible]

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

Small Size Mathem[illegible] MN [illegible]
With Semicondu[illegible]

Am[illegible] kilocycles [illegible]

[illegible] kilocycle [illegible]

[illegible] MN [illegible]

[illegible] 4,[illegible]

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

Small Size Mathematical Analogy Computers MN - [illegible]
With Semiconductors

subassemblies [illegible] of the computer MN - [illegible] solution of [illegible] different examples [illegible] are also solvable in different way. The deviation [illegible] computer with respect to the maximum value was not more than [illegible] and with respect to the average quadratic error 1- [illegible]. When the computer was [illegible] respect to error the voltage was [illegible] V. The application of semiconductors [illegible] mathematical analogy computers [illegible] [illegible] to the [illegible] principle. [illegible] figures.

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84696

S/[illegible]

9.3210 (1013, 1031, 1067)

AUTHORS Dyatlov L. I. and Petr[illegible] I. M.

TITLE Using Operational Amplifiers for Increasing the Input Resistance of Measuring Circuits

PERIODICAL Izmeritel'naya tekhnika 1960, No. 10, pp. 4[illegible]

TEXT In order to avoid load errors the circuit must possess a linear link, called matching circuit in the following explanations. This circuit has a transfer coefficient of 1 ± (0.01 0.1)% a natural resistance of at least megohms and a low zero drift of below 1 mv. Special amplifier circuits were made for the purposes mentioned. In this paper it is shown that the matching circuit may also be built up on the basis of two conventional operational amplifiers for d.c. which were put in the circuit with positive feedback. The principal matching circuit is shown next (Fig. 1); its fundamental equations are written down and the errors are analyzed. The dependence of the input resistance of the circuit on the values ΔK_2 for K. = 1 and R_c = 0.5 megohm is shown in Fig. 2. The dependence of the absolute amplifier error on the inner resistance of the

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S/115/62/00[illegible]
B0[illegible]/B058

Using Operational Amplifiers for Increasing the Input Resistance of Measuring Circuits

signal source can be seen from Fig. 3. The inner resistance of the input signal source does not exert any influence on the input resistance of the matching circuit but it influences considerably the errors conditioned by zero drift and mains current of the amplifier. In this connection it is considered suitable to use amplifiers with a lowest possible zero drift and low mains currents. The d.c. amplifier of the type УПТ [illegible] (UPT [illegible]), developed by the otdel elektromodelirovaniya (Department of Electrical Simulation) of the NII schetmash (Nauchno issledovatel'skiy institut schetnykh mashin (Scientific Research Institute of Computers) where the matching circuit was also tested (see Fig. [illegible]) is considered to be the most suitable one. In conclusion it is stated that the analysis and experimental investigation of the coordinating circuit by means of two operational d.c. amplifiers showed that the d.c. voltage sources may be coordinated by means of it. This holds for sources showing an inner resistance of maximum [illegible] megohms with circuits with an input resistance of up to [illegible] kilohms. There are 4 figures and [illegible] references [illegible] Soviet.

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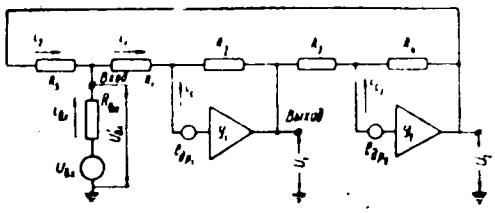

Фиг 1

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

Using Operational Amplifiers for Increasing the Input Resistance of Measuring Circuits

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Text to Fig. 1: Y_1 and Y_2 - operational d.c. amplifier

R_{1-5} - feed-back resistors

$e_{\partial p^1}$, $e_{\partial p^2}$ - e.m.f. of the drift

i_{c_1}, i_{c_2} - grid current amplifier

$U_{вх}$ - feed voltage

U_1 - exit voltage

$R_{вх}$ - resistor

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L 26418-66 EWT(d)/EWP(1) IJP(c) GG/BB

ACC NR: AM5017155 Monograph UR/

Ushakov, V. B.; Petrov, G. M.; Basov, Ye. P.; Popov, V. A.; Lakunin, N. B.; Moskalenko, G. V.; Sabayev, G. N.

The MN-14 electronic nonlinear analog computer (Elektronnaya nelineynaya analogovaya vychislitel'naya mashina MN-14) Moscow, Izd-vo "Mashinostroyeniye," 1965. 232 p. illus., biblio. 3300 copies printed.

TOPIC TAGS: analog computer, analog computer system, computer control system, computer component/MN-14 analog computer

PURPOSE AND COVERAGE: This book is intended for engineers, technicians, and scientists concerned with the problems of development and practical application of analog computers. It may also be useful to students in this field at schools of higher education. The MN-14 nonlinear electronic analog computer, developed at the Scientific Research Institute of Computer Machine Building, is described. It is used to model dynamic systems described by common nonlinear differential equations up to the 30th order with a large number of nonlinear relationships. The MN-14 computer may also be used to solve engineering construction problems as well as for scientific investigations in various fields of the national economy. The principles of the computer's design and its circuit characteristics are discussed. Basic units and structural assemblies are described and the methods used in the preparation of the problems solved by the computer are covered. Considerable attention is paid to the problems of increasing the computer's practical application by means of introduction of additional equipment into its system. The names of

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ACC NR: AM5017155

Ushakov V. B., Doctor of Technical Sciences, and G. M. Petrov are listed as the leaders.

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Ch. VIII. Possibilities of Further Computer Development -- 219

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ACCESSION NR: AP5018071 UR/0020/65/163/001/0050/0053

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B

AUTHOR: Kotel'nikov, V. A.; Aleksandrov, Yu. N.; Apraksin, L. V.; Dubrovin, V. M.; Kislik, M. D.; Kuznetsov, B. I.; Petrov, G. M.; Rzhiga, O. N.; Frantsesson, A. V.; Shakovskoy, A. M.

TITLE: Radar observations of Venus in the Soviet Union in 1964

SOURCE: AN SSSR. Doklady, v. 163, no. 1, 1965, 50-53

TOPIC TAGS: radio wave reflection, Venus radar observation, radio emission measurement, radar observation, radio astronomy

ABSTRACT: Radar observations of Venus at 40 cm were conducted between 11 and 30 June 1964 by the Institute of Radio Engineering and Electronics of the Academy of Sciences USSR. Frequency modulation and periodic linear frequency modulation of radiated signals were employed. Paramagnetic and parametric amplifiers were used at the receiver output. Signal analysis was performed by means of a 20-channel analyzer with a filter bandwidth of 1.2 cps for each channel. The reflected signal spectrum and measurements of the radial velocity of the motion of Venus were determined on the basis of the Doppler shift of the signal spectrum of the central frequency in relation to the radiation frequency. Frequency manipulation

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was effected with the radiating signal shaped as two alternating telegraphic pulse packets at two carrier frequencies differing either by 62.5 or by 2000 cps. At each frequency, pulse duration and the intervals between transmissions were 4.096 sec. Radio wave reflection from the Venusian surface and measurements of the distance to Venus were effected with linear frequency modulation. The results of the measurements of the distance to Venus and of the radial velocity of its motion are shown in Fig. 1 of Enclosure, with the vertical sections showing rms error values, which till 23 June did not exceed 15 km for 5 min of observation (at a deviation of 4 kc) and after 23 June did not exceed 2 km (at a deviation of 32 kc). Measurement error for velocity did not exceed 2.5 cm/sec. Signal propagation time was calculated with an accuracy of ±5 μsec, and Doppler frequency, with an accuracy of ±0.05 cps. The total rms error value for the initial data was ±400 km. The energy distribution of signals reflected from Venus depending on distance ΔR is shown in Fig. 2. The following conclusions are drawn: 1) The width of the Doppler spectrum of the reflected signal caused by the rotation of Venus does not exceed 15 cps. 2) The Venusian reflection factor averages 19%. 3) The energy in the central band of 1 cps is approximately one half of the energy of the whole spectrum. 4) The orientation of the Venusian axis of rotation is practically perpendicular to the orbital plane. Orig. art. has: 4 figures. [DW]

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ACCESSION NR: AP5018071

ASSOCIATION: Institut radiotekhniki i radioelektroniki Akademii nauk SSSR (Institute of Radio Engineering and Electronics, Academy of Sciences SSSR)

SUBMITTED: 12Apr65 ENCL: 02 SUB CODE: DC, AA

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ENCLOSURE: 01

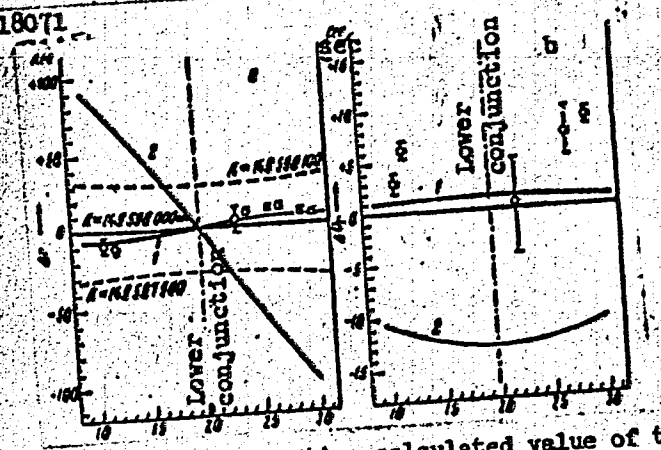

Fig. 1. (a) Variation in the relative calculated value of the distance to Venus and (b) the radial velocity of Venusian motion

Δr - Difference between the measured and calculated distance from the measuring point to the closest point on the surface of Venus; Δv_r - difference between the measured and calculated radial velocity of Venusian reflection center in relation to the measuring point.

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ENCLOSURE: 02

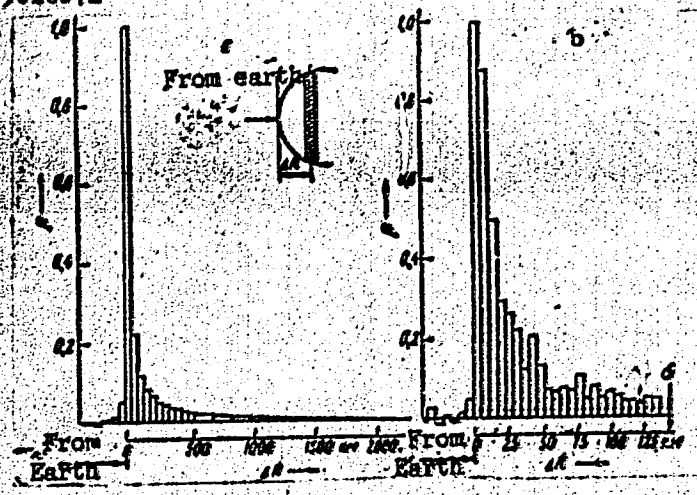

Fig. 2. Energy range distribution of signals reflected from Venus obtained by linear frequency modulation (a) with a deviation of 4 kc (σ = 0.0025 for narrow filters and σ = 0.0014 for wide filters) and (b) with a deviation of 32 kc

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USHAKOV, V.B., doktor tekhn. nauk; PETROV, G.M., kand. tekhn. nauk; BASOV, Ye.P.; [illegible], V.A.; LAKUNIN, [illegible]; [illegible] SKALENKO, [illegible]; SABAUEV, [illegible]; ABIDOVA, [illegible], [illegible], red.

[The MN-[illegible] nonlinear electronic analog computer. Elektronnaia nelineinaia analogovaia [illegible] mashina. MN-[illegible]. Moskva, Mashin[illegible] [illegible]

[illegible]

1. Nauchno-issled[illegible] [illegible] institut [illegible] mashin[illegible] stroyeniya (for [illegible]).

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

AKULINICHEV, I.T.; BABSKIY, Ye.B.; GEL'SHTEYN, G.G.; PETROV, G.M.; SKACHKOVA, A.I.; UTEY, N.I.; USHAKOV, V.B.

Electronic modeling of the electricactivity of the heart. Biofizika, 4 no.3:354-360 '59. (MIRA 12:7)

1. Nauchno-issledovatel'skiy institut schetnogo mashinostroyeniya, Institut grudnoy khirurgii AMN SSSR, Moskva i Institut normal'noy i patologicheskoy fiziologii AMN SSSR, Moskva.
(ELECTROCARDIOGRAPHY,
electronic model of electric activity of heart (Rus))

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

AKULINICHEV, I.T.; BABSKIY, Ye.B.; GEL'SHTEYN G.G.; LAKUNIN N.B.; MOSKALENKO, G.V.; PETROV, G.M.; USHAKOV V.B.

Cardiocyclography. Biofizika 4 no. 4:490-495 '59. (MIRA 14:4)

1. Nauchno-issledovatel'skiy institut schetnogo mashinostroyeniya, Institut grudnoy khirurgii AMN SSSR i Institut normal'noy i patologicheskoy fiziologii AMN SSSR, Moskva.
(ELECTROCARDIOGRAPHY)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

AKULINICHEV, I.T.; BABSKIY, Ye.B.; GEL'SHTEYN, G.G.; PETROV, G.M.; SKACHKOVA, A.I.; UTEY, N.I.; USHAKOV, V.B.

Reproduction of the electrocardiogram by an electronic model system. Biofizika 4 no.5:589-594 '59. (MIRA 14:6)

1. Iz otdela elektromodelirovaniya Nauchno-issledovatel'skogo instituta schetnogo mashinostroyeniya, Instituta grudnoy khirurgii AMN SSSR i laboratorii klinicheskoy fiziologii Instituta normal'noy i patologicheskoy fiziologii AMN SSSR, Moskva.
(ELECTROCARDIOGRAPHY)

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

BABSKIY, Ye.B.; KARPMAN, V.L.; PETROV, G.M.; SKACHKOVA, A.I.

Use of an electronic differentiating unit in physiological research. Biofizika 4 no. 6:743-749 '59. (MIRA 14:4)

1. Institut normal'noy i patologicheskoy fiziologii Akademii meditsinskikh nauk SSSR, Moskva.
(ELECTRONIC APPARATUS AND APPLIANCES) (PHYSIOLOGY—[illegible])

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

PETROV, G.M.

Selecting stars for determining the azimuth of a transit instrument of the time service. Izv.GAO 21 no.2:71-76 '58. (MIRA 13:4)

(Astronomy, Spherical and practical)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

PETROV, G.M.

Catalog of right ascensions of 101 stars with declinations from 75° to 90° for the equinox 1950.0. Izv.GAO 21 no.2:77-93 '58. (MIRA 13:4)

(Stars--Catalogs)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001240420016-1

PETROV, G. M.: Master Phys-Math Sci (diss) -- "A catalogue of right ascensions of 1[illegible]1 stars with declinations of [illegible] for the epoch and the equinox of 19[illegible]". Leningrad, 19[illegible]. [illegible] (Main Astronomical Observatory of the Acad Sci USSR), 1[illegible] copies (KL, N[illegible], [illegible], [illegible])

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KOTEL'NIKOV, V.A.; APRAKSIN, L.V.; VOYTOV, V.O.; GOLUBTSOV, M.G.; DUBROVIN, V.M.; ZAYTSEV, N.M.; KORENBERG, Ye.B.; MINASHIN, V.I.; MOROZOV, V.A.; NIKITSKIY, N.I.; PETROV, G.M.; RZHIGA, O.N.; SHAKHOVSKOY, A.M.

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