

A High Vacuum Electron Microscope for the Investigation SOV/48-23-4-19/21
of Cathodes.

influence upon the dissolving power of a microscope. Likewise, the dissolving power is influenced by the emitting cathode zone and the chromatic aberration of the immersion lens. The determination of the heterogeneity of the cathode emission by measuring the electron beam surpasses all other methods hitherto applied. Figure 3 shows the distribution of the current upon the emitting surface of a pressed cathode, taken by this method. There are 3 figures and 5 Soviet references.

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24805

S/048/61/025/006/005/010
B117/B212

26.2312

26.1640

9.3/10

AUTHOR: Druzhinin, A. V.

TITLE: Method of determining the work function of surface micro-sections of hot cathodes

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 25, no. 6, 1961, 730-734

TEXT: The present paper has been presented at the 3rd All-Union Conference on Electron Microscopy, held in Leningrad from October 24 to 29, 1960. It was shown that it is possible to determine the work function of a surface section uniquely if the focusing is correct and the aberration small, and if the values of the local current, the electron-optical magnification, and the cathode temperature are used. Under normal conditions, the maximum diameter of the electron beam is about 20μ . Therefore, all electrons emitted from sections located close to the axis will be collected in the image plane of the immersion objective without losses if there is no special opening. The divergence angle of the electrons which is denoted by β can be calcu-

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Method of determining the ...

lated from Abbe's formulas: $\sin \beta = \sin \alpha \sqrt{\frac{\epsilon}{U_\alpha}} \frac{1}{N}$, where N denotes the magnification of the immersion objective; U_α the plate potential; ϵ the thermal electron velocity; α the angle of inclination of the trajectories with respect to the axis at the cathode. Ref. 9 (Artsimovich L. A., Izv. AN SSSR, Ser. fiz. 8, No 6, 313 (1944)) has shown the validity of this formula. Assuming $N = 30$, $U_\alpha = 25 \cdot 10^3$ v, $\epsilon = 0.1$ ev, $\alpha = 90^\circ$, then $\beta = 6 \cdot 10^{-5}$.

If the divergence angle is small, all electrons will pass without losses through the projection lens of the electron microscope. The current from the image elements can be measured very easily if the beam catcher is located behind an opening in the center of the luminescent screen. From the calculated current density, the isothermal work function ψ_T of the respective cathode section can be found easily if one assumes that the current emitted is described by the Richardson equation:

$j = A(1 - \bar{R})T^2 \exp [- e\psi_T/kT]$. Thermodynamic considerations show that A has a universal character and is independent of the type of emitter (Ref. 10:

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Method of determining the ...

L. N. Dobretsov, Tr. fiz.-tekhn. in-ta AN USSR, 5, 26 (1953)). For pure metals it is usually assumed that $A = 120 \text{ a cm}^{-2} \text{ degree}^{-2}$ and $R = 0$. The resolution of the emission microscope and, therefore also of the method suggested is mainly determined by the chromatic aberration of the immersion objective ($\rho \approx \frac{\lambda}{E} = 0.05 \mu$ at $\epsilon = 0.1 \text{ ev}$ and a field potential at the cathode surface $E = 20 \cdot 10^3 \text{ v cm}^{-1}$) and also by the aberration caused by the distortion of the field. It has been shown that the latter is twice as large as the chromatic aberration. The measurement of the current from the central part of spots having a diameter of about one micron does not seem to have a larger error. Measuring the current from smaller spots where the boundary effects cannot be neglected is not a very reliable method. The resolution of the emission microscope can only be raised by increasing the field potential at the cathode surface. Active hot cathodes have been investigated with an electrostatic emission microscope (Ref. 5: Druzhinin A. V., Popov B. N., Izv. AN SSSR, Ser. fiz., 23, N^o4, 522 (1959)) having a vacuum of the order of $5 \cdot 10^{-7} \text{ mm Hg}$ and using a special opening. This opening limited the bombardment of the cathode with ions of residual gases. The

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pressed cathode was made of barium-calcium-tungstate powder (9.5% by weight) aluminium powder (0.5% by weight), and tungsten powder (Ref. 14: Mol'nikov A. I., Morozov A. V., Popov B. N., Makiakov A. A., Radiotekhnika i elektronika, 3, 322 (1958)). The investigations showed that besides emission distribution and work function also a slight change of the mean emission level can be observed macroscopically. The question of macroscopic emission distribution will be studied in another paper. After a certain thermionic activity of the cathode thermal equilibrium have been reached (observation temperature 940°-1100°C), the accelerating potential was turned on. The pressed cathode reached its steady emission state one minute after thermal equilibrium had been reached. The emission dropped to about one-tenth. The active spots of the cathode ($\phi_T = 2.2-2.3$ ev) are about one micron in diameter. The emission from the sections between the spots is essentially smaller and amounts to 1/40 - 1/70 of the spot emission ($\phi_T = 2.6-2.8$ ev). On the surface of a pressed cathode there are no sections with a high work function, which is characteristic for a tungsten surface with a small barium content. It is assumed that the tungsten grains are covered by a chemical compound with a relative small work function

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during production of the cathode. The emission of an active L-cathode (density of the emission current about 20 a cm^{-2} at $T = 1175^\circ\text{C}$) was studied at 950°C . Right after the thermal equilibrium had been reached, the current density showed the following values: for very active spots ($\varphi_T = 1.6 \text{ ev}$) 40 a cm^{-2} ; for spots of average activity ($\varphi_T = 2.0 \text{ ev}$) about 1 a cm^{-2} ; and for sections between spots ($\varphi_T > 2.75 \text{ ev}$) not more than $8 \cdot 10^{-4} \text{ a cm}^{-2}$. When investigating an L-cathode in an electron microscope, the possible change of distribution of the work function due to ion bombardment of the surface has to be taken into account. Nevertheless, the following characteristics of the emitting surface of an L-cathode can be stated as compared to a pressed cathode: the presence of very active spots having a work function of $\varphi_T = 1.6 \text{ ev}$; large distances between active spots; very strongly varying emission of individual cathode sections (according to the current, by a factor of more than 10^3). There are 1 figure and 14 references: 11 Soviet-bloc and 3 non-Soviet-bloc.

Card 5/5

10378

S/109/62/007/009/007/018
D409/D301

21 25 81
AUTHOR: Druzhinin, A.V.

TITLE: Electron-optical study of effective thermionic cathodes

PERIODICAL: Radiotekhnika i elektronika, v. 7, no. 9, 1962,
1547 - 1555

TEXT: The surface distribution of the emission current and of the work function of L-cathodes, compact tungsten cathodes and impregnated aluminate cathodes were studied by means of a high-vacuum emission microscope. The considerable emission inhomogeneity of the investigated types of cathodes is due to the existence of a mobile layer of adsorbed Ba-atoms of variable concentration. The experimental procedure is described. By measuring the current density of a certain element of the emission pattern, the current density of the cathode surface can be calculated; thereupon the work function is determined by means of Richardson's formula. The emission pattern of L-cathodes consists of very active spots with 40 A/cm^2 current-density, of spots of intermediate intensity, and of low-
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intensity spots. The distance between the very active spots is 5-7 microns. The emission pattern of the compact cathode is characterized by active spots with a diameter of about 1 micron and a work function $\phi_T = 2.15 - 2.25$ ev. The emission pattern of the impregnated cathode consists of coarse-grained portions of low intensity with $7 \cdot 10^{-4}$ A/cm² current-density, and of active spots. It was found that the active centers appear, as a rule, at the interface tungsten-aluminate. It can be assumed that the portions of highest activity of impregnated cathodes are related to the sites of higher Ba-concentration. The migration of barium with respect to molybdenum, was directly observed during electron-optical investigations of the emitting surfaces of compact and impregnated cathodes. The effective distance of migration did not exceed 5 microns. Hence the distortion of the electron beam and the broadening of the emitting surface cannot be due to the migration process. Further, the nature of the emitting surface was studied. In particular, the existence of condensed Ba-states was experimentally established. It is possible that the oxygen facilitates also the transition to the condensed phase, (in addition to the increase in Ba-concentration which it

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Electron-optical study of ...

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produces). The presence of a condensed phase on the surface of cathodes with poor emission, is paradoxical: low emission may result from too high Ba-concentration on a surface, larger than the optimal. Thus, cathode activity depends not only on the rate of liberation of free barium, but also on the surface state (the concentration of chemisorbed oxygen). Further, the authors studied the effect of spottiness on the operation of the cathode in the presence of a space charge. It was found that emission inhomogeneity has a considerable effect on the stability of operation of the cathode. There are 7 figures.

SUBMITTED: December 29, 1961

Card 3/3

ACC NR: AP7004915

(N)

SOURCE CODE: UR/0109/66/011/012/2262/2265

AUTHOR: Volodin, Yu. A.; Druzhinin, A. V.; Smirnov, V. A.

ORG: none

TITLE: Effect of the films of Pt-group metals on the oxide-coated-cathode emission

SOURCE: Radiotekhnika i elektronika, v. 11, no. 12, 1966, 2262-2265

TOPIC TAGS: electron tube cathode, oxide coated cathode, electron emission

ABSTRACT: Au and Pt proved inadequate as an anti-emission mask partly covering the electron-tube cathode. New experiments were conducted with Ir and Os as emission-preventing substances. Oxide-coated cathodes were prepared on a Ni - Ca base, and Ir, Os, Pt were sprayed by a special long-slit vaporizer. Some cathodes were partly coated with Pt, partly with Ir and had a central unmasked (emitting) area; emission pictures are shown. Some disk-type cathodes were completely coated with Pt and Ir films and tested for emission and life at 650C. Results: the emission from an Ir-coated (0.3-0.5- μ thick) cathode is about 1/300 of that of an uncoated cathode and persists for 1800 hrs; the emission from a similar Pt-coated cathode is about 1/10 of that of a normal cathode. Thus, the electron beams of specified shapes can be formed by masking off the oxide-coated cathodes with Ir or Os films; these films do not impair emission characteristics of adjacent areas and even facilitate their activation. Orig. art. has: 3 figures.

Card 1/1 SUB CODE: 09 / SUBM DATE: 28Mar66 / ORIG REF: 001

UDC: 621.385.032

DRUZHININ, A.Ya., inzh.

Switching two-phase asynchronous micromotors in a three-phase
network. Priborostroenie no.2:23 F '65. (MIRA 18:3)

157 AND 158 INDEX
 159 AND 160 INDEX
 PROCESSES AND PROPERTIES INDEX
 10

Oxidation of acetylene γ -glycols. 2,2,5,5-Tetraphenyl-3,4-diazotetrahydrofuran. P. A. Tikhomolov and A. E. Drushinina. *J. Gen. Chem.* (U. S. S. R.) 7, 800-72 (1937).

The oxidation of tetra-*p*-tolylbutanediol with CrO₂ to give a cyclic α -diketone (I) (C. A. 25, 2712^a) is extended to tetraphenylbutanediol (II) to det. the behavior of γ -diteritary acetylene glycols on oxidation and the possible effect of substituents on the color of cyclic diketones. II (5 g.), m. 193°, prepd. from Ph₂CO and MgBr \cdot C.MgBr in H₂O by the method of Lotzich (*J. Russ. Phys.-Chem. Soc.* 34, 242 (1902)), in glacial AcOH (25 ml.), with CrO₂ (2.50 g.) in 25 ml. 98% AcOH, added dropwise and with stirring gives after petr.-ether extn. of the reaction mixt. a dark red oil, which from EtOH gives (51% yield) 2,2,5,5-tetraphenyl-3,4-diazotetrahydrofuran (III), crimson-red crystals, sol. in benzene, Me₂CO, CHCl₃ and glacial AcOH, slightly sol. in EtOH; phenylhydrazine, C₁₂H₁₅N₃, orange-yellow needles from EtOH, m. 134°; crime; C₁₄H₁₇N₃, pale yellow crystals from MeOH, m. 710° (decomp.). Neither the diphenylhydrazine nor the dioxime could be prepd. The presence of 2 CO groups in III is proven by reaction with o-C₆H₄(NH₂)₂ to give the quinoxaline C₂₄H₁₈ON₄, crystals from benzene, m. 240-5°). I is much more highly colored than III, indicating that in this series also, substituents have some effect on color. Nine references. John Livak

ASS-31A METALLURGICAL LITERATURE CLASSIFICATION
 FROM SYMBOLS
 MATERIALS INDEX
 1954

DRUZHININ, B.

Prerequisites of high grade moving picture projection., Kinomekhanik, No 10,
1951.

DRUZHININ, B.

Safety device for a circular saw. Okhr. truda i sots. strakh.
3 no.9:65 S '60. (MIRA 14:4)

1. Vneshtatnyy tekhnicheskyy inspektor Leningradskogo oblsoprofa.
(Circular saws--Safety appliances)

DRUZHININ, B., inzh. (g. Leningrad)

Safety electric boards. Okhr. truda 1 sots. str.kh. 4 no.8:36
Ag '61. (MIRA 14:11)

(Electric switchgear)

DRUZHININ, B., inzh.

Fencing electric winches. Okhr. truda i sots. strakh. 5 no.7:38
Jl '62. (MIRA 15:7)

(Winches—Safety appliances)

S/133/61/000/007/011/017
A054/A129

AUTHOR: Druzhinin, B. I., Candidate of Technical Sciences
TITLE: Device for controlling the roll-passes of cold-rolling tube mills
PERIODICAL: Stal', no. 7, 1961, 633

TEXT: In the Yuzhnotrubby zavod (Southern Tube Plant) a device has been developed to gauge the inside of the roll-passes of the cold-rolling tube mills. The device consists of a massive cast stand, on which a frontal stationary and a rear movable support are mounted. The mandrel with the roll-pass is fixed in the centers of the supports and is connected with the rotating disk of the frontal support. With a wheel on the frontal support, via a gear, the roll-pass can be set into any position required by the control, according to the angular scale and nonius of the device. A gauging lever is fixed at radius r with a micrometric screw which moves a slide via the gauging lever. When a carriage, fixed on an axis, is rotated, the lever feels the surface of the roll-pass. Any deviation of the surface from the required condition is indicated by the oscillation of the lever and registered by an indicator. The gauging device can be removed radially. The disk has 1° scales, the nonius, fixed to the casing, is scaled by $6'$. The

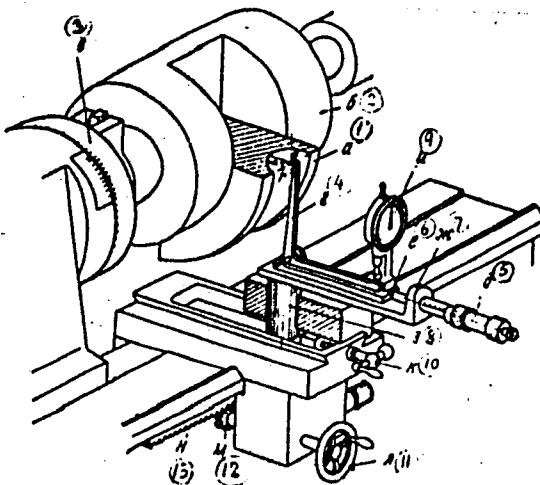
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Device for controlling the roll-passes of...

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gauging accuracy is ± 0.02 mm. There are 2 figures.

Fig. 1. The gauging device
Legend: (1) roll-pass design,
(2) mandrel, roll, (3) disk,
(4) gauging lever, (5) micro-
metric screw, (6) slide,
(7) carriage, (8) axis,
(9) indicator, (10) screw,
(11) wheel, (12) tooth wheel,
(13) toothed slat.



Card 2/2

ABADZHI, Kirill Ivanovich; DRUZHININ, Boris Ivanovich; ISAYEV, Boris Ivanovich; RUBINOV, A.D., kand. tekhn. nauk, retsenzent; TUMANOV, L.P., inzh., red.; LEYKINA, T.L., red. izd-va; PETERSON, M.M., tekhn. red.

[Checking relative positions of machine-part surfaces]
Kontrol' vzaimnogo raspolozhenia poverkhnostei detalei mashin. Moskva, Mashgiz, 1962. 113 p. (MIRA 15:10)
(Machinery--Construction) (Measuring instruments)

DRUZHININ, Boris Modestovich, inzh.; FREGER, D.P., red. 1zd-va;
GVIRTS, V.L., tekhn. red.

[Protective clothing, protective footgear and safety appliances; safety measures] Spetsodezhda, spetsobuv' i predokhranitel'nye prisposobleniia; zashchitnye sredstva. Pod obshchei red. N.A.Smirnova. Leningrad, 1962. 27 p.

(MIRA 15:10)

(Clothing, Protective)

(Occupations, Dangerous—Safety appliances)

ARSEN'YEV, L.B.; DRUZHININ, B.N., inzh., nauchnyy red.; KRYUGER, Yu.V.,
red. izd-va; STEPANOVA, E.S., tekhn.red.

[Production of precast reinforced concrete construction elements
and details; practices of leading enterprises] Proizvodstvo
sbornykh zhelezobetonnykh konstruktsii i detalei; iz opyta
raboty peredovykh predpriatii. Izd.2., ispr. i dop. Moskva,
Gos. izd-vo lit-ry po stroit. i arkh-it., 1957. 69 p. (MIRA 12:1)
(Precast concrete)

PEREL'SHTEYN, N.L., obshchiy red.; ~~DRUZHININ, B.M.~~, inzhener; nauchnyy red.;
CHERNASHKIN, V.G., kand. tekhn. nauk, nauchnyy red.; GRABINSKIY,
Ye.K., [deceased], inzhener, red.; IMMERMAN, A.G., kand. tekhn. nauk,
red.; RAFALOVICH, L.A., insh., red.; GORCHAKOV, A.V., otvetstvenyy
red.; ZLATOTSVETOVA, I.I., red.; VASILEVSKIY, B.A., tekhn. red.

[Using prestressed reinforced concrete; based on data from the Second
International Congress, Amsterdam, September 1955] Primenenie
napriazhenno armirovannogo zhelezobetona; po materialam Vtorogo
mezhdunarodnogo kongressa (g. Amsterdam, sentiabr' 1955 g.). Moskva,
1957. 322 p. (MIRA 10:12)

1. Russia (1923- U.S.S.R.) Ministerstvo stroitel'stva. Tekhnicheskoye
upravleniye. 2. Tsentral'noye byuro tekhnicheskoy informatsii (for
Zlatotsvetova). 3. Chlen-korrespondent Akademii stroitel'stva i
arkhitektury (for Perel'shteyn).
(Amsterdam--Prestressed concrete--Congresses)

DRUZHININ
KUREK, N.M., red.; SHERBAKOV, S.N., red.; ARSEN'YEV, L.B., red.;
BOBORYKIN, Ye.P., red.; VISHNEVSKIY, A.V., red.; GORCHAKOV, A.V.,
red. GUSHCHIN, V.M., red.; DRUZHININ, B.N., red.; LEPILIN, G.M.,
red.; PERNL'SHTEYN, N.L., red.; TESLYA-TESLENKO, V.P., red.;
AGRAMATOV, Yu.O., tekhn.red.

[Precast reinforced concrete members; planning and using] Sbornye
zhelezobetonnye konstruktsii; opyt proektirovaniya i primeneniya.
Moskva, TSentr. biuro tekhn.inform., 1958. 422 p. (MORA 11:5)

1. Russia (1917- R.S.F.S.R.) Ministerstvo stroitel'stva.
Tekhnicheskoye upravleniye.
(Precast concrete construction)

AZRILYANT, Yakov Markovich; ARSEN'YEV, Lev Borisovich; DRUZHININ, B.M.,
nauchnyy red.; BURMISTROV, G.N., red.; TCKER, A.M., tekhn.red.

[For young construction workers; handbook] Molodym stroiteliam;
spravochnoe posobie. Moskva, Vses.uchebno-pedagog.izd-vo Trud-
rezervizdat, 1959. 400 p. (MIRA 14:1)
(Building)

S/112/59/000/014/019/085
A052/A001

Translation from: Referativnyy zhurnal, Elektrotehnika, 1959, No. 14, p. 88,
29232

AUTHOR: Druzhinin, D. V.

TITLE: Repairs of Electric Machines Using Heat-Resistant Insulation on
Silicone Varnishes ✓

PERIODICAL: V sb.: Remont elektr. mashin i transformatorov. Chelyabinsk, 1958,
pp. 86-93

TEXT: A short description of technology of repairs of alternating current machines and heavy-duty direct current machines using fiberglass insulation and silicone varnishes. The following materials are used: glasmica-tape 0.1, 0.15 and 0.2 mm thick; glasmicanite 0.5 mm, glasmica-foil 0.3 mm, glas-varnish fiber 0.2 mm, glas tape 0.1, 0.15, 0.2 mm and other; silicone varnishes: impregnating EF-EBS, adhesive EF-5T, kiln drying cover enamel PKE-4 and air drying cover enamel PVE-2. ✓ When wound the stator sections are impregnated in EF-ZBS varnish and dried to the semimoist state. After being soldered with brazing solder, ✓

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S/112/59/000/014/019/085
A052/A001

Repairs of Electric Machines Using Heat-Resistant Insulation on Silicone Varnishes

insulated with glas tape and tested, the stator winding is impregnated by pouring EF-ZBS varnish. The drying in a furnace lasts > 12 hours at $180-200^{\circ}\text{C}$; after being covered with PVE-2 enamel it is dried at 100°C . Rotor winding is repaired similarly; glasmicanite and glas-asbestos are placed below and above the bandages, respectively; soldering is made with POS-60 solder. Silicone varnish insulation finds an ever increasing application for repairs of heavy-duty rolling mill motors and direct current generators. A description and a drawing of the press-cleat for baking semisections are given and the technology of insulation of the winding holder is described. The bandage is soldered with pure tin and sections with risers are soldered with OPS-60 solder. A wound armature is covered twice with PEE-2 enamel and dried by induction losses at $110-130^{\circ}\text{C}$.

M. I. K.

Translator's note: This is the full translation of the original Russian abstract.

Card 2/2

15-111-1

BC

Influence of lime and raw phosphates on podsolized soil and crop yields. D. V. Dymnikov (Trans. Sci. Inst. Fertilizers, Moscow, 1927, No. 45, 5-51).—Lime of podsolized soils decreases their acidity and increases the nitrate content; the water-soluble

phosphorus decreases, while the plant-phosphorus increases. Raw phosphate does not change the active acidity, but affects nitrate formation and increases the yields. The active acidity of podsolized soils is that reaction of water cultures at which the phosphoric oxide from raw phosphate becomes available to plants.

CHEMICAL ABSTRACTS.

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ASB-51A METALLURGICAL LITERATURE CLASSIFICATION

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PROCESSING AND PROPERTIES INDEX

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The value of the simplified Kappen method for determining absorbed bases. D. V. DRUZHININ AND Z. I. STROGANOVA. *Udobrenia i Urusha (Fertilizers and Crops)* 1, 164-9(1937).—A series of tests was made on various soils comparing the Kappen and Bobko-Aleksandri methods for detg. the absorbed bases. The methods checked very well. The authors suggest a rapid, approx. method: To 1 part of soil (25, 40 or 50 g) 3.5 parts of 0.1 N HCl is added, the mixt. is shaken for 1 min., allowed to stand 5 min., filtered and an aliquot taken and titrated with methyl orange as indicator. Tests with 16 different soils showed that the method checked very well with those of K. and of B.-A. Just as in the other methods the new method works best on soils free from lime and Ca phosphate and with a low content of absorbed bases. I. G. J.

A58-51A METALLURGICAL LITERATURE CLASSIFICATION

GROUP	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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PROCESS AND PROPERTIES INDEX

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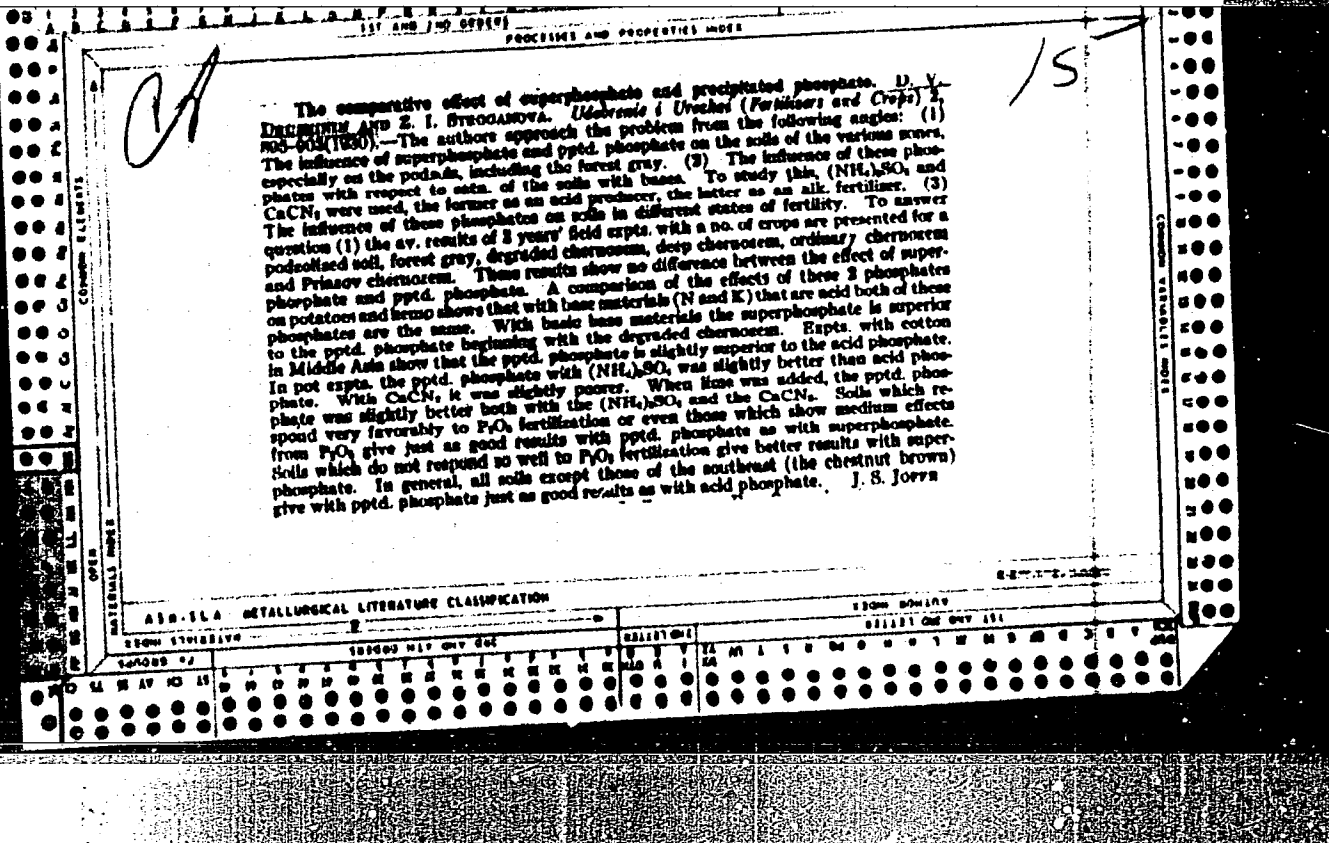
ca

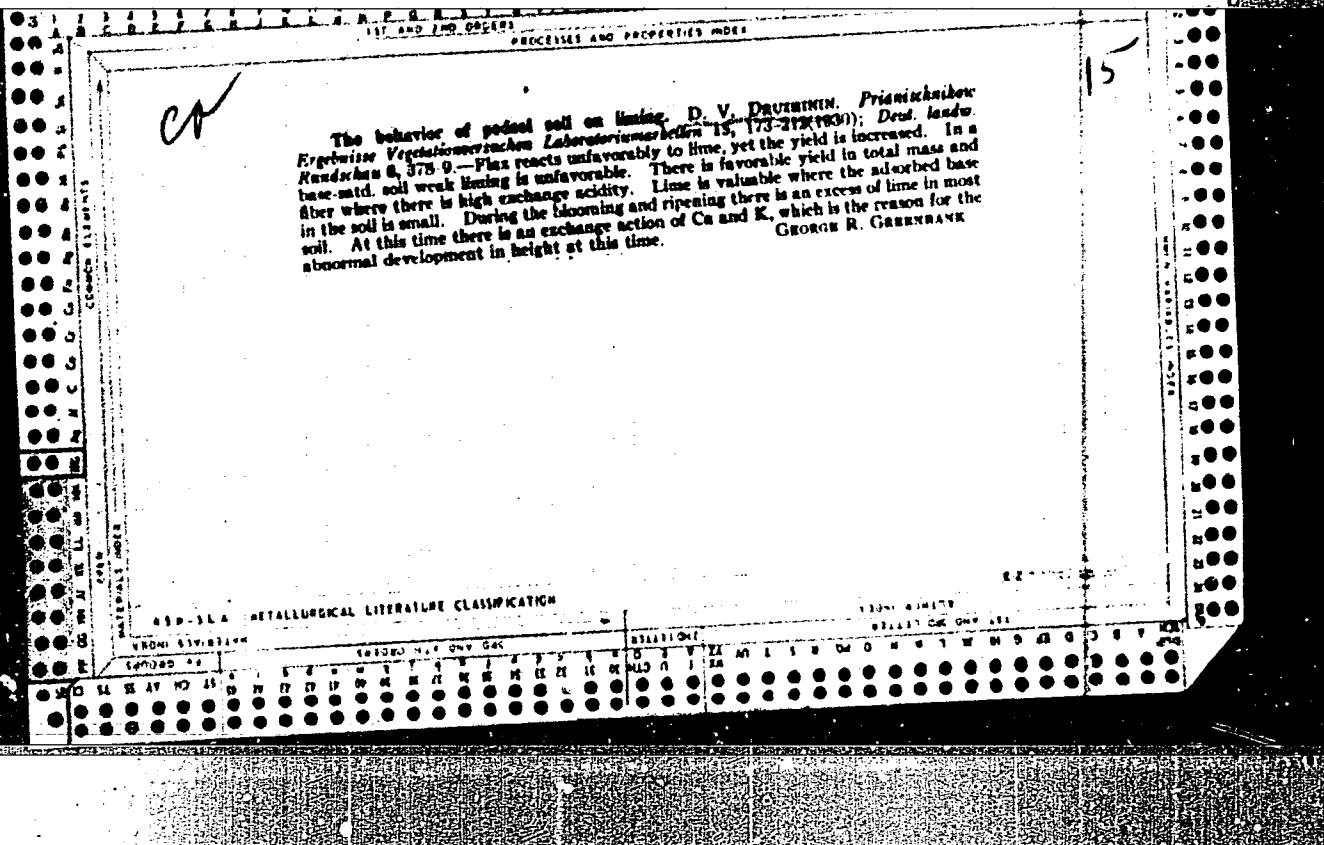
The role of peat in increasing the absorption capacity and buffer properties of soils.
 D. V. DUBINSKIY. *Colobaria i Uroshai (Fertilizers and Crops) 2, 645-646(1931).*
 From a series of pot expts. where peat, satd. with Ca, was used with or without fertilizers,
 with or without CaCl₂, on pasturized soils it was found that peat increases the buffer
 capacity and thus the absorption capacity of the soils. Especially is this important
 in connection with physiologically acid fertilizers. J. S. Jovan

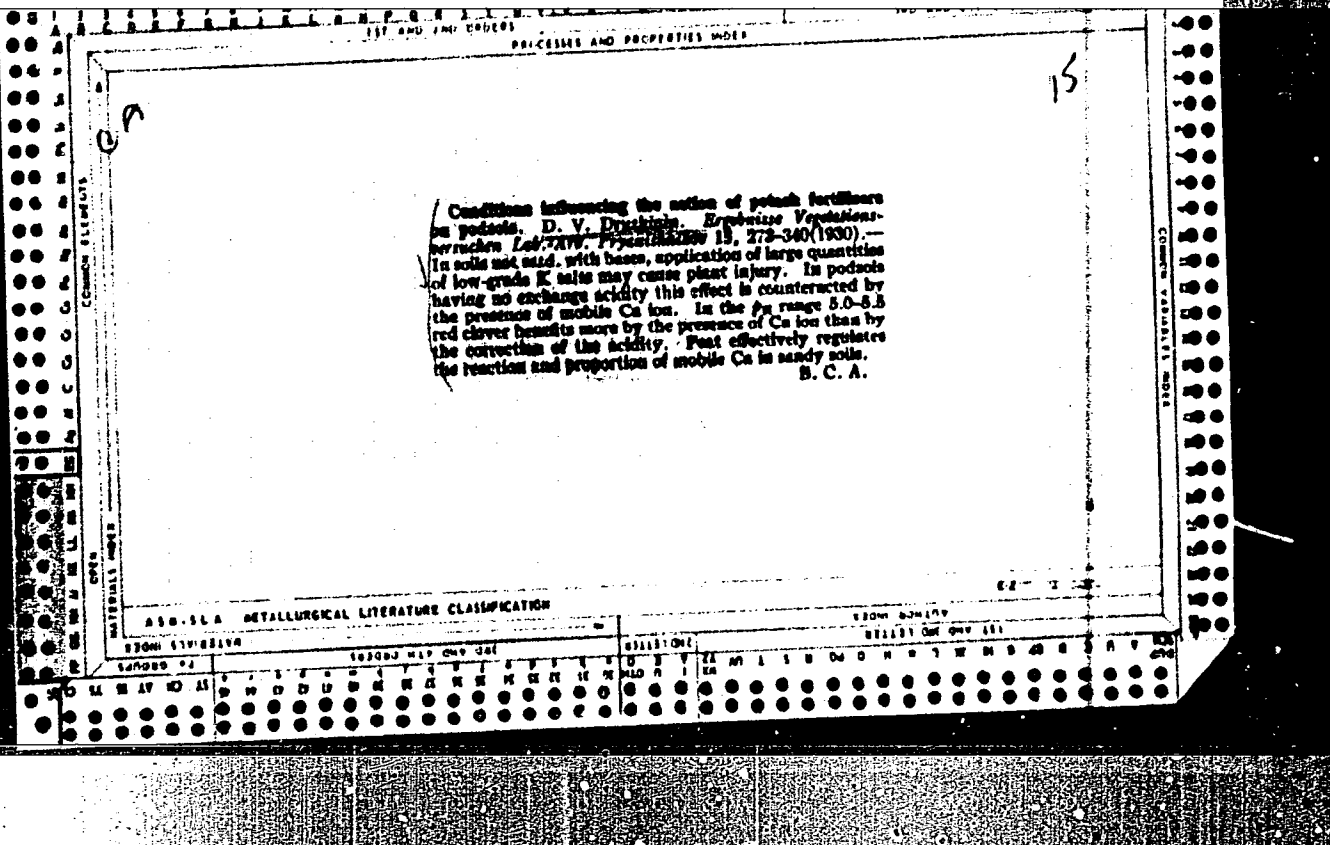
METALLURGICAL LITERATURE CLASSIFICATION

ALPHABETIC INDEX

SA	SB	SC	SD	SE	SF	SG	SH	SI	SJ	SK	SL	SM	SN	SO	SP	SQ	SR	SS	ST	SU	SV	SW	SX	SY	SZ	TA	TB	TC	TD	TE	TF	TG	TH	TI	TJ	TK	TL	TM	TN	TO	TP	TQ	TR	TS	TT	TU	TV	TW	TX	TY	TZ	UA	UB	UC	UD	UE	UF	UG	UH	UI	UJ	UK	UL	UM	UN	UO	UP	UQ	UR	US	UT	UU	UV	UW	UX	UY	UZ	VA	VB	VC	VD	VE	VF	VG	VH	VI	VJ	VK	VL	VM	VN	VO	VP	VQ	VR	VS	VT	VU	VV	VW	VX	VY	VZ	WA	WB	WC	WD	WE	WF	WG	WH	WI	WJ	WK	WL	WM	WN	WO	WP	WQ	WR	WS	WT	WU	WV	WW	WX	WY	WZ	XA	XB	XC	XD	XE	XF	XG	XH	XI	XJ	XK	XL	XM	XN	XO	XP	XQ	XR	XS	XT	XU	XV	XW	XX	XY	XZ	YA	YB	YC	YD	YE	YF	YG	YH	YI	YJ	YK	YL	YM	YN	YO	YP	YQ	YR	YS	YT	YU	YV	YW	YX	YZ	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZZ
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1ST AND 2ND GROUPS PROCESSES AND PROPERTIES INDEX 15

CA

Comparison of the action of ground phosphorite and superphosphate. D. V. Lyubshin and Z. I. Siroganova. *Minerals. Oudob. 1, 63-70 (1952); Zhurnal Industrii 33, 708.*—In soils of low alkali (50-60% bases) application of a double dose of ground phosphorite gives better results with cereals than superphosphates. These soils also require an intense liming (up to 35%), and it is therefore necessary to det. in each case the nature of the fertilizer treatment required (lime or phosphorite) or the best method of combining the 2 so as not to weaken the effects of the phosphorite; e. g., in strongly acid soils (peat, etc.), a phosphorite treatment can be followed by a moderate liming. With soils in which the alkali varies from 60 to 70% bases, and which in addn. lack P_2O_5 , a double dose of phosphorite gives at least as good results as a single dose of superphosphate; in such a case liming is of secondary importance. When the soil contains over 70% bases, superphosphate is preferable to phosphorite; but in the event of a pronounced P_2O_5 deficiency use of phosphorite is still rational, especially if a cereal crop is followed by a clover crop. A. Pajonca-Couture

COMMON ILLUMINANTS

NATIONAL ARCHIVES

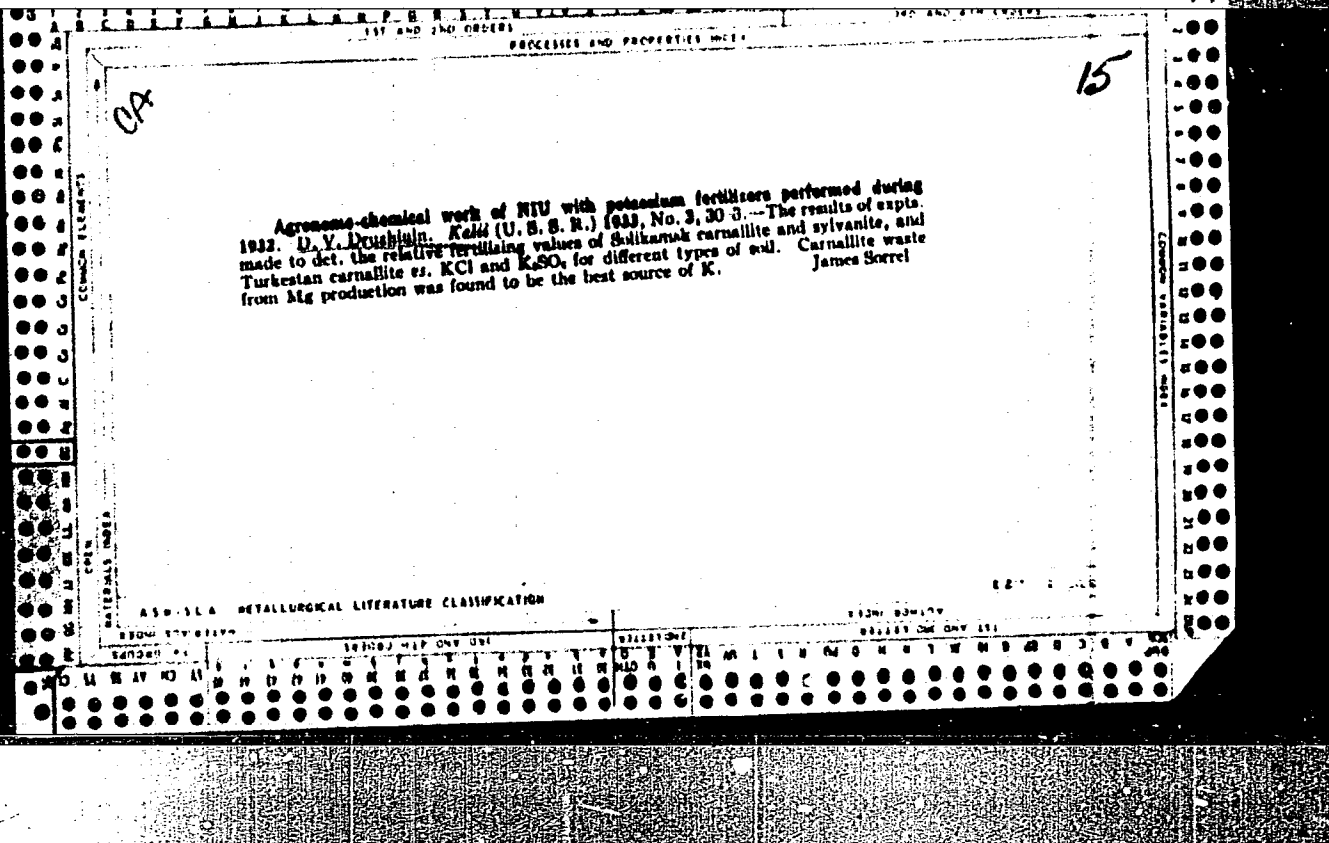
MIN. 31A METALLURGICAL LITERATURE CLASSIFICATION

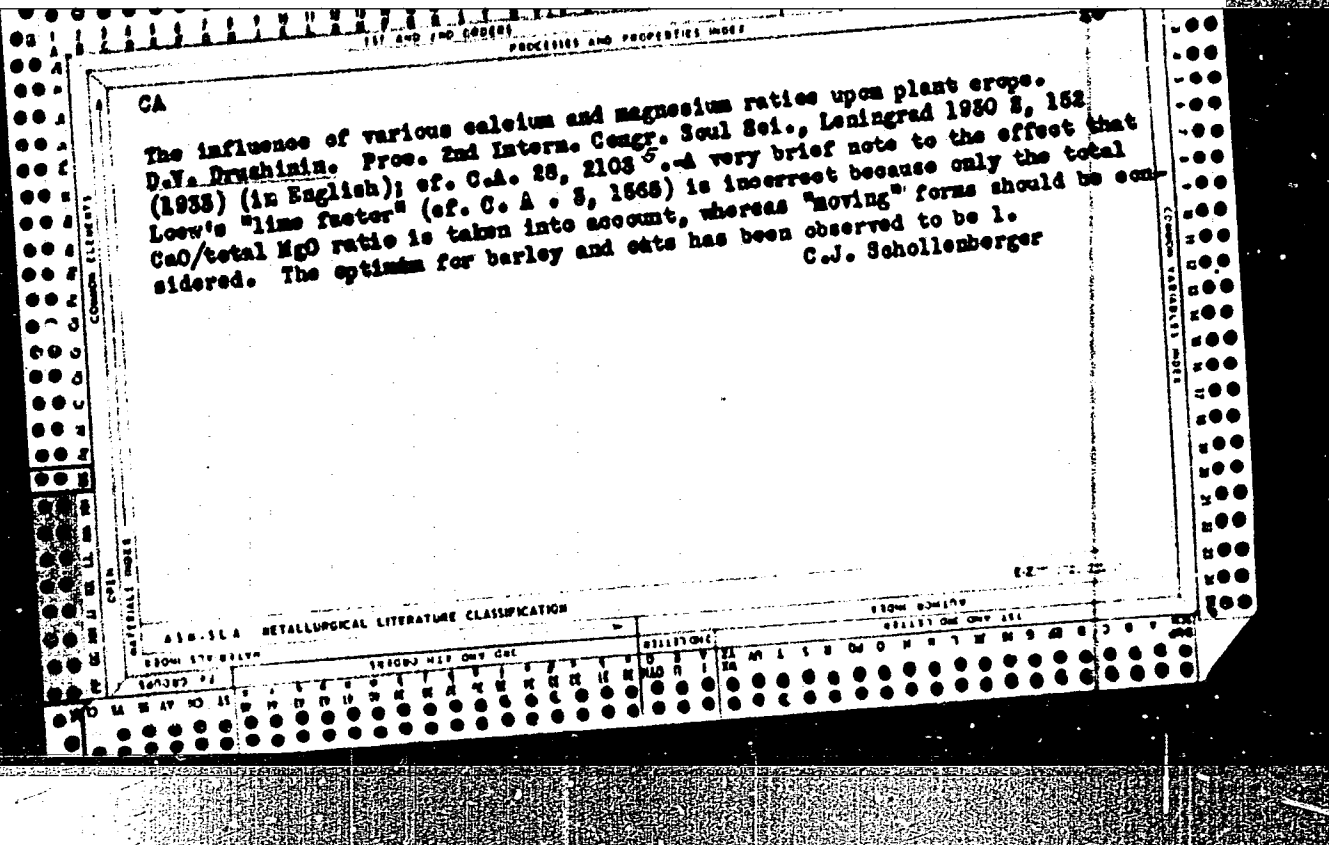
1ST AND 2ND GROUPS PROCESSES AND PROPERTIES INDEX

15

1ST AND 2ND GROUPS PROCESSES AND PROPERTIES INDEX

15





SIGNIFICANCE OF CALCIUM AND MAGNESIUM IN FERTILISING AND LIMING OF SOILS. D. V. Drushinin and V. G. Shvadidenkov (Trans. Sci. Inst. Fertilisers, Moscow, 1933, No. 118, 28-44).—In pot experiments, oats, barley, and peas give normal yields even when the sol. and mobile Ca is much $>$ Mg is required by Loew. The yield is decreased when mobile Ca:Mg is $<$ 1:2—2.9. For neutralising acidity Mg Limestone is superior to Ca limestone without fertilizer. A complete fertilizer reacts more efficiently with CaCO_3 . MgO and CaO equally stimulate nitrification. CaO alone added to an unsaturated soil does not increase H_2O -sol. Mg.

Ch. Abs.

A 52-514 METALLURGICAL LITERATURE CLASSIFICATION

FROM SOURCE

FROM SYNONYMS

CALCIUM

SEE ALSO SEE QV 101

111 AND 2ND GROUPS
PROCESSES AND PROPERTIES INDEX

15

CH

The significance of sodium in fertilizers for increased yields of sugar beets on a number of soils. D. V. Drushkin. *Khimiya i Selskaya Promyshlennost' (Moscow)* 1935, No. 1, 63-65.—Sylvite is superior to the concd. K salts as a source of K₂O. Its superiority decreases whenever NaNO₃ is substituted for NH₄ sulfate which indicates the effect of the Na of the sylvite. The NaNO₃ is especially efficient for beets on degraded and deep chernozems, being superior to (NH₄)₂SO₄ and Ca(NO₃)₂. On gray forest loams the nitrate and sulfate are almost alike, sulfate being a little better. This is ascribed to the differential content of Na in the various soils. Similar favorable results with Na-contg. fertilizers are noted on table beets. It is pointed out that in connection with nitrogenous fertilizers contg. no Na the addn. of NaCl is feasible.

J. S. Joffe

ASD-31A METALLURGICAL LITERATURE CLASSIFICATION

COMMON ELEMENTS

COMMON TABLET INDEX

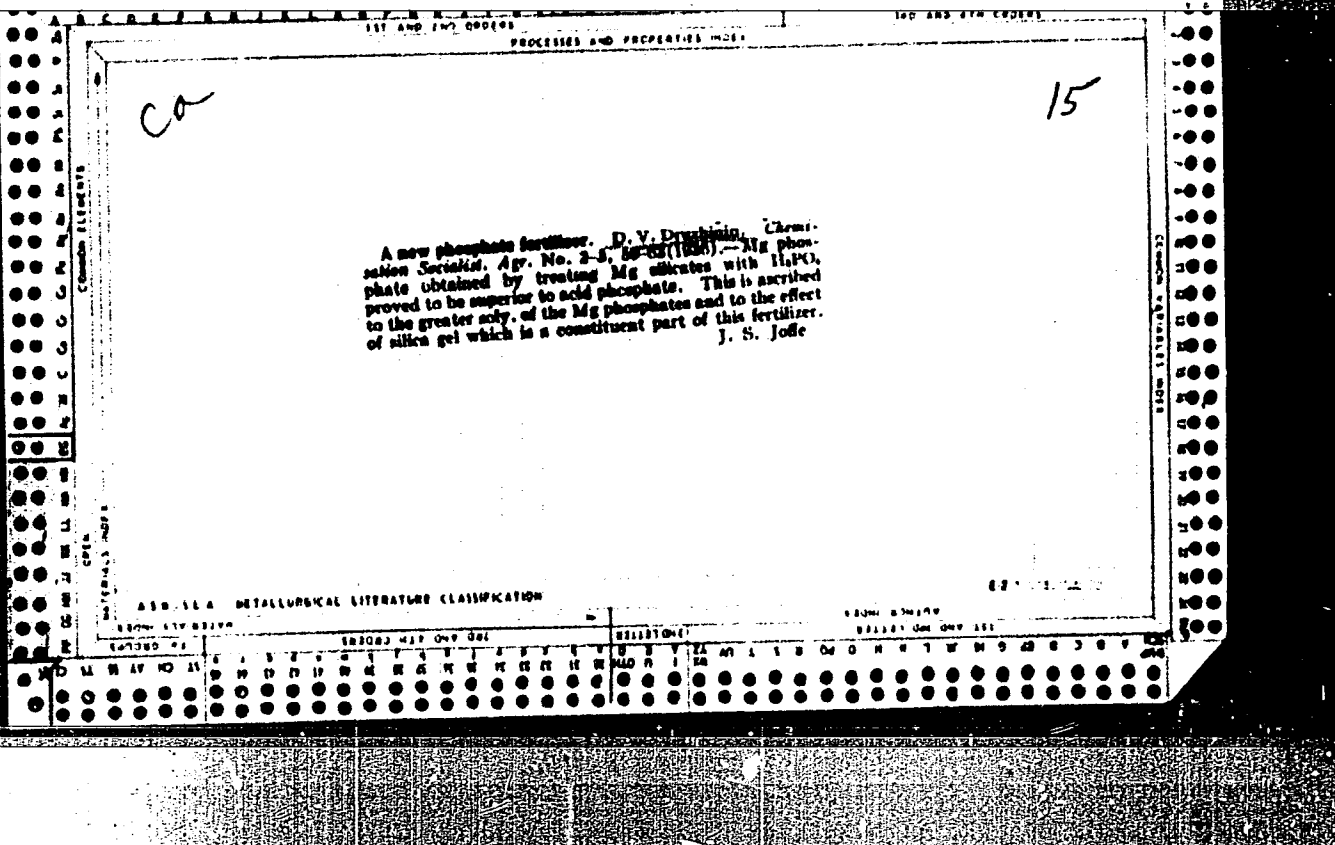
LITERATURE NO.

INDEXED BY

SYMBOLS

SUBJECT INDEX

ALPHABETIC INDEX



PROCESSES AND PROPERTIES INDEX

ca

The influence of sodium on the yield and quality of sugar beets. A. A. Shirubov and D. V. Druzhinin. *Chemization Socialisticheskoy Agr. (U. S. S. R.)* 1986, No. 11, 21-7.

1 Pot and field expts. with NaCl and Na₂SO₄ additions to fertilizers or substitutions for K fertilizers show that on degraded Chernozem Na increased the sugar content of sugar beets. I. S. Ioffe

15

Common Elements

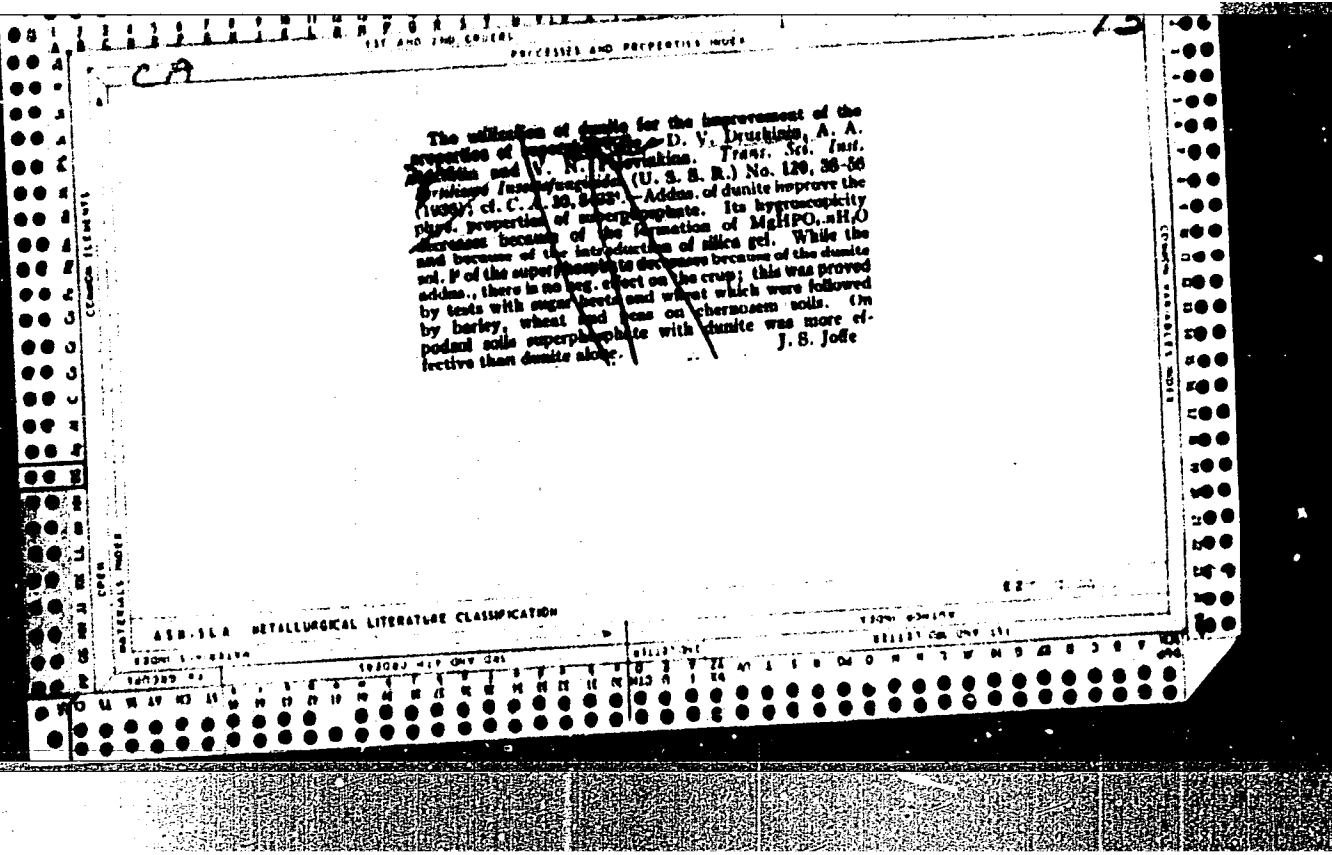
ASS. S.L.A. METALLURGICAL LITERATURE CLASSIFICATION

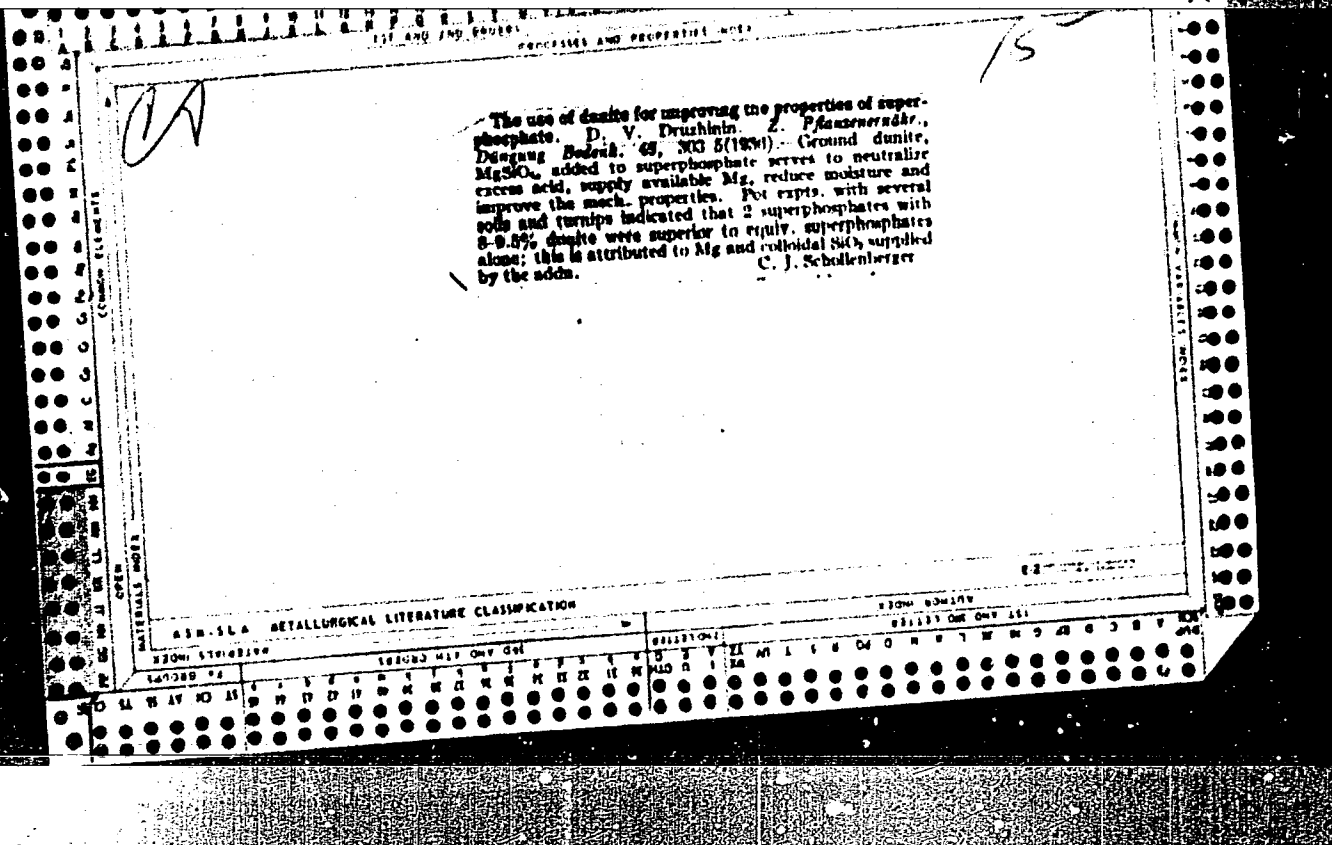
SEARCHED BY DATE

INDEXED BY DATE

RECEIVED BY DATE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
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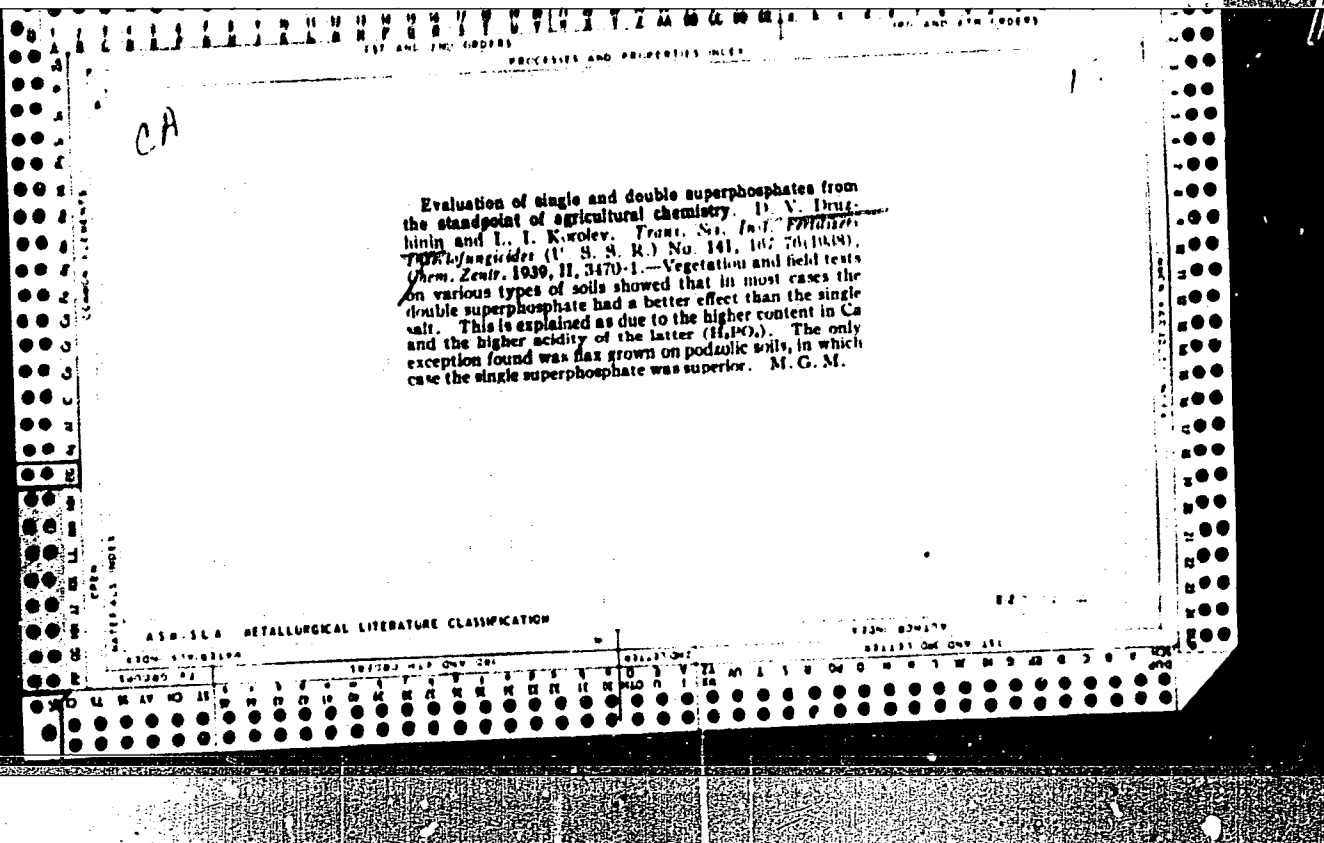
10-11-1

Forms of potassic fertilizers in the third
 five-year plan. D. Y. DAVYDIN (Bull. Acad. Sci.
 U.S.S.R. Ser. Chem., 1958, 361-377).—Various
 forms of K fertilizers from the Solikamsk deposits
 are discussed. Recommendations of grades suitable
 for a no. of crops are made. A. G. P.

ASB.SLA METALLURGICAL LITERATURE CLASSIFICATION

DATE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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USSR/Soil Science - Mineral Fertilizers.

J

Abs Jour : Ref Zhur Biol., No 22, 1958, 100063

the P_2O_5 content in comparison with the waste land, but changed the remaining fertility indices very insignificantly, approximating them to the corresponding indices of the waste land. Introducing NPK at the rate of 90 and NPK at the rate of 45 kg plus 20 t/ha of manure increased the pH, the hydrolytic acidity (excluding the subarable horizon, where the latter decreased) and the P_2O_5 content and decreased the saturation degree by bases the quantity of water-stable aggregates and the humus content in comparison with the waste land. The total moisture capacity under these circumstances did not change. The perennial grasses assisted in a large accumulation of different forms of N in both soil horizons and in a larger harvest of oats in comparison with annual grasses.

. -- O.P. Medvedeva

Card 2/2

- 58

USSR/Cultivated Plants. Cereals.

M

Abs Jour: Ref Zhur-Diol., No 17, 1958, 77581.

Author : Druzhinin, D.

Inst :

Title : Conditions which Influence the Content of Nitrogen
in the Grain of Spring Crops.

Orig Pub: S. kh. Sibiri, 1958, No 1, 27-29.

Abstract: No abstract.

Card : 1/1

9

DRUZHININ, D.V.

Errors and agrometeorological bulletins of the Kemerovo
Hydrometeorological Bureau. Meteor. i gidrol. no.2:57 F
'56. (MIRA 9:6)
(Kemerovo--Meteorology, Agricultural)

DRUZHININ, D.V.

Corn cultivation and soil moisture [with French summary in insert].
Pechvevedenie no.5:43-49 My '56. (MLRA 9:9)

1. Marinskaya sel'skokhozyaystvennaya opyt'naya stantsiya.
(Corn (Maize)) (Soil moisture)

DRUZHININ, F.A.

Work practices of the Em. IAroslavskii mine working a five
day week. Ugol' 40 no.4:11-14 Ap '65. (MIRA 18:5)

1. Nachal'nik shakhty im. Yem.Yaroslavskogo, trest Leninugol'.

Velocity of the reaction between hydrogen sulfide and some metal oxides. V. P. Yankov and E. D. Drahobin (Dobrota Ind. Inst.), *J. Applied Chem. (U.S.S.R.)* 23, 627-4 (1950) (in Russian).—The rate of absorption of H_2S (20% in air) by 0.05–0.15 g. samples (grain size 1.5–2 mm.) of MnO_2 (prepd. from 1% $MnSO_4$ + 8% $KMnO_4$ at 60°), PbO_2 (from $Pb(OAc)_2$ + $CaOCl_2$), and yellow HgO (from $HgCl_2$ + $NaOH$, cold) was measured statically at 20°. The amounts absorbed (moles H_2S per mole oxide) after 1, 5, 25, 60 min. were: MnO_2 , 1.03, 1.2, 1.45, 1.51; PbO_2 , 0.54, 0.90, 1.12, 1.39; HgO , 0.63, 0.61, 0.72, 0.76. The relative slowness of the reaction with PbO_2 is due to its great compactness. Red HgO reacts extremely slowly, 1 mole absorbing, after 0.5, 2.0, 3.0, 7.0 hrs., 0.09, 0.18, 0.33, 0.63 moles H_2S . In dynamic absorption, in a stream of air, contg. 0.25–4.0 mg. H_2S per l., flowing at the rate of 200 ml./sq. cm. of sorbent section, the protective effect of layers 10, 20, 30, and 40 mm. deep, listed: with MnO_2 , 10, 22, 76, and 125 min.; with PbO_2 , 24, 76, 120, and 184 min. The nearly doubled duration of the protective effect of PbO_2 is evidently due to its high d.

N. Thon

ASG-110 METALLURGICAL LITERATURE CLASSIFICATION

ESTABLISHED

FROM SYMBOL

FROM SYMBOL

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DRUZHININ, F.-G.

ISSR/Metals - Analysis, Slags

Nov 50

"Fluoride Method for Determination of Calcium Oxide in the Open-Hearth and Blast-Furnace Slags," I. V. Granovskiy, F. G. Druzhinin, Metallurgical Plant Plant I. V. Stalin

"Zavod Lab" No 11, pp 1304-1307

Method, where sodium fluoride is used during slag-dissolving process, shortens anal time to 20-25 min. Possibility has been established for using porcelain instead of platinum dishes. Advantage of method is possibility of Ca detn from sep sample, including

180772

ISSR/Metals - Analysis, Slags (Contd)

Nov 50

detn in insol silicates, which, in regular course of anal, require long fusing operation. Accuracy is quite satisfactory and amounts to $\pm 2-3\%$ of quantity to be detd.

180772

DRUCHININ, F.G.; MITYANIN, V.P.

Automatic analysis of blast furnace gases by gas chromatography.
Zav. lab. 30 no.5:531-533 '64. (MIRA 17:5)

1. Donetskij filial Ukrainakogo nauchno-issledovatel'skogo
instituta metallov.

DRUZHININ, F.I., mashinist elektrovoza

Devices for sustaining constant pressure in main air pipes
of the locomotives are required. Elek.i tepl.tiaga 3 no.9:38
S '59. (MIRA 13:2)

1. Depo Barabinsk, Omskaya doroga.
(Locomotives)

DRUZHININ, G. H.
DRUZHININ, G., insh.

Conveying machinery for the Moscow Basin. Mast. ugl. 6 no.12:16
D '57. (MIRA 11:1)
(Moscow Basin--Coal mines and mining)
(Conveying machinery)

DEUZHININ, Georgiy Aleksayevich; KOLOMIYTSYEV, A.D., otv.red.;
LOMILINA, L.N., tekhn.red.

[KS-3 scraper conveyer] Srebnkovyi konveier KS-3. Moskva,
Ugletekhisdat, 1959. 24 p. (MIRA 12:6)
(Coal mining machinery)

YAGUDIN, A.M., inzh.; DRUZHININ, G.A., inzh.

The use of short driven concrete piles in the construction
of petrochemical enterprises. Prom. stroi. 40 no.9:35-38
'62. (MIRA 15:11)

~~(Piling (Civil engineering))~~
(Petroleum refineries)

BAKUSHINSKAYA, O.A.; DRUZHININ, G.N.; Prinizhala uchastiye: LIFANT'YEVA, K.S.

Searching for methods of processing molasses of various quality
with the addition of growth promoting agents. Trudy TSNIKHP
no.8:162-166 '60. (MIRA 15:8)

(Yeast)

AUTHOR

DRUZHININ G.V.

TITLE

The Calculation of the Operation Security of Systems with a Great
Number of Elements. 103-7-9/11(Ekspluatatsionnyy raschet nadezhnosti raboty sistem, soderzhashech-
ikh bol'shoye chislo elementov-Russian)

PERIODICAL

Avtomatika i Telemekhanika, 1957, Vol 18, Nr 7, pp 678-680 (U.S.S.R.)

ABSTRACT

The methods of calculation as mentioned in publications can not be used for the real operation conditions in industry, aviation and shipping as they had been calculated on a purely theoretical basis. Operation conditions can considerably influence the time of operation of system elements, and the elements were perhaps formed several years before being used and might have been stored under unfavourable conditions. The system elements may either be suddenly put out of action or their quality may deteriorate gradually. Here only the gradual putting out of action is dealt with as a sudden one is not subject to such prediction. The law is deduced according to which the reliability of the system can be calculated. This can be calculated by means of the formula given in case that the average time of operation T_k of the system, the average square of deviation of the time of operation of the σ_T element and the number of elements n of the system are known. The probability of the damaging effect y of the system within the time T can be determined by means of $\frac{y}{n} = \frac{1}{2} - \Phi(x)$; here is the tabu-

Card 1/2

The Calculation of the Operation Security of Systems
with a Great Number of Elements.

103-7-9/21

lated Laplace-function $f(x)$ and $x = \frac{T_k - T}{\sigma_T}$.

Here the time of the intact operation of the system can be
calculated by means of $T = T_k - \sigma_T x$. σ_T is determined by means
of two measurements of the δ parameter which every element
has (e.g. the slope of the tube -characteristic). This way the de-
pendence of the system for further operation can be forecast after
every prophylactic investigation.
(3 illustrations and 1 Slavic reference).

ASSOCIATION Not Given.
PRESENTED BY
SUBMITTED 3.11.1956
AVAILABLE Library of Congress.
Card 2/2

DRUZHININ, G. V.

AUTHOR: Druzhinin, G. V. (Moscow)

103-12-7/12

TITLE: Calculation of the Reliability of Automatic
Electric Systems (Metod rascheta nadezhnosti raboty
apparatury).PERIODICAL: Avtomatika i Telemekhanika, 1957, Vol. 18, Nr 12,
pp. 1136-1138 (USSR)

ABSTRACT: In this paper a method is given, which takes into consideration an arbitrary form of the law of time-distribution for an operation without breakdown of the elements and the circumstance that the systems often consist of elements of different type. Such a method is obtained, if the process of the occurrence of breakdowns is considered as a single flow of identical events with a variable parameter. The fact of the occurrence of breakdowns are identical events in that respect, that here only their existence or absence is of interest. A primary breakdown of each element can lead to the breakdown of further elements, but these secondary defects are not considered. The occurrence of primary breakdowns is considered as an independent event. For each element an intensity of breakdown $\lambda(t)$ is used. This denotes the mathematical expectation value of the number of breakdowns per

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Calculation of the Reliability of Automatic Electric Systems 103-12-7/12

unit of operation time per element for the number of elements still in operation. The dependence of the intensity of the occurrence of breakdowns on the operation time (number of cycles) of an element can be divided into three periods: 1) in the first period a great number of breakdowns occur, which essentially can be traced to "production causes". 2) The intensity of breakdowns decreases and the defects show an accidental character. 3) The intensity of the defects increases with time at the expense of wear and continued operation without exchange of an element, becomes uneconomical. It can be assumed, that the probability of the occurrence of defects in a short interval $(t, t + \Delta t)$ is asymptotically proportional to Δt , depends on t and is independent of the preceding defects. Therefore the probability of the occurrence of a breakdown in the interval $(t, t + \Delta t)$ can be written in the form $\lambda(t) \Delta t$. The formula for the probability $p(t)$ is deduced, according to which, if the statistical curve of $\lambda(t)$ is known, the operation reliability during a given time t , or, at a given

Card 2/3

Calculation of the Reliability of Automatic Electric Systems 103-12-7/12

probability $p(t)$ the time of operation without breakdown can be found. Next, a system consisting of m heterogeneous elements is investigated and the corresponding formulae are derived for this case. By this procedure, the computation of the operation reliability of a system consists of the summation of the breakdown-intensity of the elements and of the finding of the value of $p(t)$ in the table of the exponential function (or of the value of $\lg P(T)$ for the determination of the breakdown-free time T at a given probability $P(T)$. There are 1 figures and 1 Slavic references.

SUBMITTED: February 7, 1957

AVAILABLE: Library of Congress.

Card 3/3

AUTHOR: Druzhinin, G.V. (Moscow) SOV/24-58-6-15/35
TITLE: Stand-by Apparatus in Circuits Containing Contact Elements
(Rezervirovaniye skhem s kontaktnymi elementami)
PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh
Nauk, 1958, Nr 6, pp 96-98 (USSR)
ABSTRACT: In the papers of Bebiashvili (Ref 1) and Sinitza (Ref 2)
dealing with the problem of providing permanent stand-by
equipment (without change-over switches) the failure was
considered of an element which does bring about automatic
disconnection of that element without influencing the
stand-by circuits. The aim of this paper is to consider
the methods of providing stand-by contact circuits, taking
into consideration the type of failure of individual
elements. Thereby, under contact elements the author
understands elements the operation of which consists of
closing or opening circuits. Two types of failures may

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SOV/24-58-6-15/35

Stand-by Apparatus in Circuits Containing Contact Elements

occur: 1) a circuit which should be closed remains open;
2) a circuit which should be open remains closed.
Separate and overall stand-by circuits as well as
individual stand-by circuits are considered from the
point of view of probability of failure.

There are 2 figures and 3 references (2 Soviet and
1 English)

SUBMITTED: September 10, 1957

Card 2/2

DRUZHINIY, V.V.

9(2)

p. 3

PHASE I BOOK EXPLOITATION

SOV/1722

Nadezhnost' radioelektronnoy apparatury; sbornik statey (Reliability of Electronic Equipment; Collection of Articles) Moscow, Izd-vo "Sovetskoye radio," 1958. 144 p. Number of copies printed not given.

Compiler: I.V. Grushin; Ed.: V.G. Masharova; Tech. Ed.: A.A. Sveshnikov.

PURPOSE: The book may be useful to engineering personnel working with electronic equipment.

COVERAGE: The authors discuss the necessity of determining the reliability of component elements of various electronic systems and describe methods of calculating the probability of faults in trigger circuits, amplifiers, rectifiers, and other vacuum-tube devices. No personalities are mentioned. References appear at the end of all but one article.

TABLE OF CONTENTS:

Zimin, V.A. Reliability of Operation of Standard Elements of the High-speed Electronic Computer (BESM)
The author explains methods of checking computer operation and discusses

3

Card 1/4

Reliability of Electronic (Cont.)

SOV/1722

the reliability of operation of such standard elements as trigger circuits, pulse-forming circuits, pulse rectifiers, phase inverters, cathode followers, diodes, and amplifiers with pulse delay. There are 3 references, all Soviet.

Zimin, V.A. Life of Vacuum Tubes in

Elements of the High-speed Elec-

tronic Computer (BESM)

27

The author discusses the results of studying the reliability of computer vacuum tubes at the USSR Academy of Sciences in 1952-1954. He also explains the stability of tube parameters, operating conditions, and tube life. There are 2 references, both Soviet.

Sinitsa, M.A. Problems of Using Stand-by Radio Electronic Equipment

40

The author describes methods of reserving and connecting stand-by equipment, and presents a mathematical analysis of probabilities of faults and discusses the effectiveness of using stand-by equipment. There are 5 references, 3 of which are Soviet [including 2 translations], and 2 English.

Card 2/4

Reliability of Electronic (Cont.)

SOV/1722

- Levitin, S.M. Underheating and Noise Parameters as Indices of Gradual Impairment of Tube Characteristics 75
The author studies static tube characteristics under conditions of underheating and explains the effect of noise on operation and life of vacuum tubes. A discussion of a system for testing vacuum tubes is also presented. There are 4 references, all Soviet.
- Kuznetsov, S.M. Criterion and Method of Evaluating Reliability of Components of Radio Electronic Systems 92
The author presents a mathematical analysis of the reliability criterion and describes methods of evaluating the reliability of electronic system components. He also discusses the disadvantages of such a method. There are 17 references, all Soviet [including 2 translations].
- Druzhinin, G.V. Methods of Calculating System Reliability 116
The author explains analytical and graphical methods of calculating reliability of electronic system components. There are 5 references, 3 of which are Soviet, and 2 English.

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Reliability of Electronic (Cont.)

SOV/1722

Babenko, A.A. Reliability Parameters of Electronic Equipment

131

The author discusses the probability of the occurrence of faults in electronic equipment and explains the necessity of determining the reliability of various components. There are no references.

AVAILABLE: Library of Congress (TK780.N3)

JJ/lrb
7-6-59

Card 4/4

AUTHOR: Druzhinin G. V. (Moscow)

SOV/24-58-11-18/42

TITLE: Dependence of the Effectiveness of Providing Standby Capacity on the Operation Time of the System
(Zavisimost' effektivnosti rezervirovaniya ot vremeni raboty sistemy)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1958, Nr 11, pp 83-86 (USSR)

ABSTRACT: A system is considered with an active standby, i.e. one which is fitted with a switching system for switching off the defective and switching on the reserve element. It is assumed that the basic and the reserve circuits have equal operating conditions. For providing standby equipment for equally reliable parts of the system with an initial probability of failure $Q_0(t)$ and applying equally reliable switching systems, the mathematical expression of the reserve function can be written thus:

$$R(Q_0) = 1 - \left\{ 1 - [1 - (1 - q_n)(1 - Q_0)^{1/m}]^k \right\}^m \quad (1)$$

where q_n is the probability of failure of the circuits of the switching system serving the standby section;
 m - number of standby sections;

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Dependence of the Effectiveness of Providing Standby Capacity
on the Operation Time of the System

SOV/24-58-11-18/42

k - number of used equipment assemblies.
The reserve functions calculated by means of this formula are graphed for several systems in Fig.2. The service time of the system is of great importance also when selecting a method of increasing the reliability of the system. If it is necessary to choose between increasing the reliability of the system by applying standby components and assemblies or by making the system of specially selected, highly reliable, components, it is possible to determine by simultaneous solution of two equations the necessary operation time of the system for which both these methods are equivalent. Fig.5 represents an example of the graphical solution of such a problem; the respective service time T is determined by the point of intersection of two curves. Thus, the operation time of the system is an important parameter which must always be taken into account. There are 5 figures and 6 references, 5 of which are Soviet, 1 English.

SUBMITTED: February 6, 1958
Card2/2

8(2); 9(2)

PHASE I BOOK EXPLOITATION

SOV/3434

Druzhinin, Georgiy Vasil'yevich

Rele vremeni (Time Relays) Moscow, Gosenergoizdat, 1959. 76 p.
(Series: Biblioteka po avtomatike, vyp. 9) 17,000 copies
printed.

Ed.: V.I. Ivanov; Tech. Ed.: K.P. Voronin; Editorial Board:
I.V. Antik, S.N. Veshenevskiy, V.S. Kulebakin, A.D. Smirnov,
B.S. Sotskov, Ye. P. Stefani, and N.N. Shumilovskiy.

PURPOSE: The booklet is intended for high and medium level
technical personnel engaged in the automation of manufactur^{ing}
processes. It may also be useful to advanced students.

COVERAGE: The booklet discusses the principle of operation and
special features of various types of time relays. The following
types are described: time relays with electric delay (mag-
netic attenuation, capacitor, magnetic amplifier); time relays
with electrothermal delay (thermal expansion thread, bimetallic
strip, thermistor); and time relays with electrochemical delay.
Examples of relays manufactured by industry are presented.

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Time Relays

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No personalities are mentioned. There are 32 references: 24 Soviet (1 of which is a translation), 3 English, and 5 German.

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JP/mg
4-27-60

S/024/59/000/06/017/028
E023/E235

AUTHOR: Druzhinin, G. V. (Moscow)
TITLE: Reliability of Components of Automatic Systems
PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye
tekhnicheskikh nauk, Energetika i avtomatika, 1959,
Nr 6, pp 141-150 (USSR)
ABSTRACT: Random functions (linear) and the usual statistical
methods are applied to consider reliability, frequency
of servicing and replacement etc. The treatments are
entirely general and no detailed or numerical results
are given. There are 3 figures and 3 references, 2 of
which are Soviet and 1 English.
SUBMITTED: October 1, 1959 ✓

Card 1/1

AUTHOR: Druzhinin, G.V.

SOV/106-59-7-11/16

TITLE: Short Communication: Classification of Reserve Systems

PERIODICAL: Elektrosvyaz', 1959, Nr 7, pp 72 - 73 (USSR)

ABSTRACT: With the development of the theory of reserve systems, comprehensive classification of such systems becomes ever more necessary. In this article an attempt is made to produce such a classification. The classification is based on the reaction of the reserve system to an operational failure. Existing systems use two methods.

- 1) Change-over switches are used to switch out the faulty operational part and switch in the reserve. The author calls this system an "active" reserve.
- 2) The system is designed so that failure of an element does not affect the working of the system. The author calls this system a "passive" reserve.

Passive reserve systems generally require more redundant elements than the active but the active reserve demands switching time between the failure of an element and its replacement. Both systems use various methods for connecting-in the reserve elements or circuits. These can

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Short Communication: Classification of Reserve Systems ^{SOV/106-59-7-11/16}

be classified as follows:

a) Total: consists of a reserve of all the system in toto.

b) Partial: consists of a reserve of specific parts of the system.

c) Autonomous: consists of several independent systems meeting the one and same operational requirement. This is always a passive reserve.

d) Individual: consists of replacement of single elements of the operational system by reserve elements.

e) Intra-element: consists of internal connections of the elements in reserve (down to molecular).

Active reserves can also be classified according to the condition of the reserve system, viz.

i) loaded reserve: both the working and the reserve system are in the functional condition;

ii) Reduced load: the reserve system is under reduced load conditions.

iii) Unloaded reserve: the reserve system is not functional until the working system failures. The classification system

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is shown diagrammatically in the figure.

SOV/106-59-7-11/16
Short Communication: Classification of Reserve Systems

There are 1 figure and 9 references, 2 of which are English
and 7 Soviet.

SUBMITTED: February 27, 1958

Card 3/3

AUTHOR: G.V. Druzhinin SOV/109- -4-3-16/38
TITLE: Increasing the Reliability of Condensers (Rezervirovaniye kondensatorov)
PERIODICAL: Radiotekhnika i Elektronika, 1959, Vol 4, Nr 3, pp 463-467 (USSR)
ABSTRACT: It is assumed that the faults in condensers are either in the form of a short or an open circuit. It is, therefore, suggested that the reliability of a condenser can be increased if it is formed of a number of units; for example, two units are connected in series and a number of such combinations are then connected in parallel (see Fig 1). If one of the units becomes faulty (either a short or an open circuit), the condenser capacitance changes, but the device is not entirely out of action. In fact it is possible to arrange the construction of the condenser in such a way that the fault of one of the units does not change the capacitance beyond the prescribed tolerances. For the condenser of Fig 1 which is formed of k sections, it is possible to determine the increase in the reliability produced by the sectional construction. If the probability of a short is z and

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Increasing the Reliability of Condensers

that of an open circuit is y , the full probability of the breakdown of a section is given by:

$$y = z = \frac{1}{2} q; \quad (1)$$

The probability of an open circuit for k sections is given by Eq (2) or approximately by Eq (3). The probability of a short circuit for k sections is given by Eq (4) or approximately by Eq (5). Consequently the overall probability of a breakdown if $q \ll 1$ is expressed by:

$$Q_0 = q^k + \frac{1}{4} kq^2 \quad (6)$$

Assuming that the probability of a fault of a single unit of the condenser of Fig 1 is q^* , the increase in the reliability of the multi-unit condenser can be expressed by Eq (7). This can approximately be written as Eq (8). The above equations can be related to the operating voltages of the condensers. The results are shown graphically in Figs 2, 3 and 4. Fig 2 illustrates the probability of a breakdown as a function of the operating

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SOV/109- -4-3-16/38

Increasing the Reliability of Condensers

voltage. Fig 3 shows the increase in the reliability as a function of the operating voltage for various values of k . Fig 4 shows the increase in the reliability as a function of time.

There are 4 figures and 4 references, 4 of which are Soviet and 1 English.

SUBMITTED: November 14, 1957

Card 3/3

16,6800
6,4600

S/024/60/000/04/013/013
E140/E463 82214

AUTHOR: Druzhinin, G.V. (Moscow)
TITLE: Faults in Automatic Systems⁹ with Ageing of Breakdown
of Elements
PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh
nauk, Energetika i avtomatika, 1960, No.4, pp.189-194

TEXT: A mathematical treatment of the statistics of systems with large quantities of a small number of different types of elements. The work is a continuation of earlier work (Ref. 1). It is assumed that each element has a "decisive parameter" which determines the time of failure. This parameter depends on the physical nature of the element and on its role in the system as a whole. The author seems principally concerned with analogue systems; he assumes that the random functions describing the reliability of the system are linear, uniform and normally distributed. (This case is more complicated than that of digital elements, where the Poisson distribution may be utilized.) There are 1 figure and 9 references: 8 Soviet and 1 English.

SUBMITTED: February 9, 1960
Card 1/1

DRUZHININ, G.V. (Moskva)

Prediction of the preservation of automatic elements and systems with vectorial determining parameters. Izv.AN SSSR.Otd tekhnauk.Energ.i avtom. no.2:165-170 Mr-Ap '61. (MIRA 14:4)
(Electronic apparatus and appliances)

22256

S/109/61/006/005/003/027
D201/D303

13.2920 (1161,1344)

AUTHOR: Druzhinin, G.V.

TITLE: Load-sharing stand-by elements of electronic circuits

PERIODICAL: Radiotekhnika i elektronika, v. 6, no. 5, 1961,
716 - 722

TEXT: At present the complexity of electronic equipment is outpacing the reliability of its components and the problem of reliability of such equipment becomes increasingly urgent. This problem is represented here in the form of abstract mathematical models of redundant circuit elements. The problem of the practical realization of stand-by circuitry is not, however, reflected in literature which was pointed out by N.G. Bruyevich (Ref. 1: O nadezhnosti i tochnosti avtomaticheskogo proizvodstva (On the Reliability and Accuracy of Automated Production) Izv. AN SSSR, Dtd. tekhn. n. Energetika i Avtomatika, 1959, 4). Nowadays, it indicates the application of redundant elements, where the failure of one or several sec-

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Load-sharing stand-by ...

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y

tions (elements) of the circuit does not impair the working of the whole installation, since the remaining elements perform the same function as the non-redundant elements: All sections and blocks of the installation remain in the same electrical regime both before and after the failure of one of them. Such an application of redundant elements may be called functional reservation. Again the reliability can be improved by reserving the elements of electronic circuits according to the load. This method is discussed in the present article. The load sharing scheme is the one in which the failure of one of the components results in the failure of the whole circuit and the electrical load which should have been carried by one of the non-redundant components is shared by all the elements together. Two simplest possible arrangements of such a scheme are shown for the case of condensers and for wire wound resistors. With the load sharing the rate of failure of stand-by elements of the circuit becomes much lower owing to a smaller electric load which becomes shared between all the components of the circuit: Each capacitor is subjected to half the voltage, each resistor dissipates half the

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Load-sharing stand-by ...

power originally intended to be dissipated by one acting component only. On the other hand the rate of failures of the reserve circuit is equal to the sum of the rates of failure of individual components

$$P_0(t) = \prod_{j=1}^k p_j(t) = \exp\left[-\sum_{j=1}^k \lambda_j(t)\right] = \exp[-\Lambda t] \quad (1)$$

where $P_0(t)$ - the probability of correct working during time t of the redundant circuit; $p_j(t)$ - the probability of same during time t of the j -th component of the stand-by circuit; λ_j - the rate of failure of the j -th element of same; Λ - the rate of failure of the whole stand-by cct; k - the number of elements in this circuit. When the cct consists of one kind of element only -- which is normal in practice -- then

$$\Lambda = k \lambda \quad (2)$$

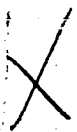
follows. Published experimental data of Dzh. Konnor (Ref. 7: Raschet riska primeneniya skhemnykh elementov. Vopr. Radiolokatsionnoy

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Load-sharing stand-by ...

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Tekhniki 1957, 4, 15) and A. Wulfsberg (Ref. 8: The price of reliability in airborne electronic equipment IRE Trans. Reliabil. and Qual. Control, 1957 PGRQC - 9, 1, 9) usually depict the rate of failure of components due to the load and ambient temperature θ usually in the form of graphs. The rate of failures of the stand-by circuit in which the load γ is distributed between k elements is given by

$$\lambda_s = k\varphi\left(\frac{\gamma}{k}, \theta\right) \quad (4)$$

It is shown that the increase in the reliability of components connected in the load sharing circuit can be achieved only when the dependence of the failure rate on the relative electric load is a non-linear one which also means that there may be cases when this reliability is lower. In general the load sharing stand-by principle may be applied for increasing the reliability of heavily loaded components or of components of not too high a quality nominally loaded. The question of when the load sharing principle would be ex-
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Load-sharing stand-by ...

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pedient always confronts the designer, when he has to choose one of the two simplest ways of attaining a high reliability of components either to apply high quality non-reserved elements with higher than required ratings or to apply stand-by components using the load sharing principle. Two alternatives are available: a) the design for the minimum limiting factor C with a given limiting value of the rate of failure λ_{lim} . Two values of factor C have to be evaluated, corresponding to two ways in which the required reliability can be achieved taking given values of X (load) and θ . In order that the rate of failure should not exceed its limiting value λ_{lim} , it is necessary for the electric load of the component to be below the limit load determined by

$$X_{nom\ lim} = \frac{X}{\gamma_{lim}} \tag{9}$$

Using subscript 3 for components having a higher than nominal rating
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Load-sharing stand-by ...

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ing and subscript 4 for elements in the load sharing the stand-by scheme, the relative electric load of every component of the stand-by cct. should be smaller than the limit load $\gamma_{\Delta lim}$ as found from

$$\lambda_{lim} = k \varphi \left(\frac{\gamma_{\Delta lim}}{k}, \theta \right). \quad (10)$$

Its value is found from the graph $\lambda = \varphi(\gamma, \theta)$ which can be drawn by rewriting Eq. (10) in the form of

$$\frac{\lambda_{lim}}{k} = \varphi \left(\frac{\gamma_{\Delta lim}}{k}, \theta_1 \right). \quad (11)$$

b) The design for maximum reliability with a given limiting value of the limiting factor C_{lim} in this case one has to evaluate and compare the values of the rate of failure as corresponding to two methods of increasing the reliability i.e. using the limiting factor C_{lim} and the conditions of operation X, θ . In the last part of the

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Load-sharing stand-by ...

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article the mixed load sharing and functional design of the stand-by component circuitry is briefly discussed. In this method, the reliability of stand-by circuits is increased since in the case of failure of one or of several components of the cct., the function of these elements are taken over by the remaining components and concurrently the load is shared and all components are under rated. In such a scheme it is necessary to take into account changes in the circuitry due to the failure of any of its components. For most of the components their failure can be usually reduced to two extreme cases: Open and short circuit. It is possible, therefore, in an approximate analysis of circuits using the mixed design principle, to use the methods as given by G.V. Druzhnin (Ref. 3: Rezervirovaniye skhem s kontaktnymi elementami (Stand-by Schemes with Contact Elements) Izv. AN SSSR, Otd. Tekhn, n. 1958, 6, 96), and (Ref. 5: Primeneniye rezervirovaniya pri konstruirovanii kontaktnykh elementov (Use of Stand-by in Constructing Contact Elements) Sb. Statey "Nadezhnost' Radioelektronnoy Apparatury" Izd. Sovetskoye Radio 1960). For the design of make and break components. In

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• Load-sharing stand-by ...

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general, a successful design of mixed stand-by circuitry can be achieved only if every circuit is assessed on its own. There are 6 figures, and 8 references: 5 Soviet-bloc and 3 non-Soviet-bloc. The references to the English-language publications read as follows: C.J. Creveling, Increasing the Reliability of Electronic Equipment by the use of redundant circuits, Proc. I.R.E. 1956 April; A. Wulfsberg, The Price of Reliability in airborne electronic equipment, I.R.E. Trans. Reliab. and Qual. Control, 1957, PGRQC-9 1, 9; and D.J. Connor, Raschet riska primeneniya skhemnykh elementov (Calculation of the Risk of Using Circuit Elements), Vopr. radio-lokatsionnoy Tekhniki, 1957, 4, 5 [Abstracter's note: The last English-language reference is given here in its Russian translation].

SUBMITTED: October 14, 1960

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24413

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S/024/61/000/002/013/014
E191/E181

AUTHOR: Druzhinin, G.V. (Moscow)

TITLE: Prediction of the reliability of elements and systems of automatic control having vectorial determining parameters

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Energetika i avtomatika, 1961, No.2, pp. 165-170

TEXT: Reliability is defined as the capability of elements and systems to remain in a serviceable condition during storage or in operation. Statistical treatment of reliability considers random processes of change of the determining parameters of the element owing to wear or ageing. In the present author's earlier papers (Ref.1: same journal, 1959, No.6, and Ref.3: same journal, 1960, No.4) it was assumed that each element is defined by a single determining parameter. There are instances when an element or system is defined by several determining parameters (vectorial determining parameter). It then becomes necessary to consider vectorial random processes of change of the determining parameters and the statistical limits of the elements. The purpose of the

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Prediction of the reliability of

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investigation is the prediction of reliability of elements and systems from the condition of the elements at present. First, the characteristics of vectorial determining parameters and the statistical limits of elements are formulated. The reliability of elements with vectorial determining parameters is derived. It is thought that vectorial determining parameters are hardly likely in practice to have more than three components. Assuming a vectorial determining parameter with mutually independent components and a normal distribution, the approximate prediction (from a minimum number of measurements of element parameters) of the distribution law of the element endurance is discussed. Finally, the reliability of systems is derived having vectorial determining parameters of their elements and of the systems themselves. A sufficiently simple solution can be obtained only provided the components of the vectorial determining parameters are independent of each other.

There are 3 Soviet references.

SUBMITTED: October 14, 1960

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37828

S/103/62/023/005/009/011
D407/D301

16.8000

AUTHOR: Druzhinin, G.V. (Moscow)
TITLE: On prophylactic operations for automation devices
PERIODICAL: Avtomatika i telemekhanika, v. 23, no. 5, 1962,
631 - 643

TEXT: A method is considered for determining the time-table of prophylactic operations by means of experimental data on the maladjustment of automation devices during their operation. As a measure of reliability of apparatus one takes the probability P that a device functions properly during a period t . The course and the effects of the maladjustment process are considered, without discussing its reasons. The principal characteristic of the controlled process (e.g. accuracy, sensitivity, etc.), which is a measure of the performance of the device and determines the need for prophylactic work, is called the determining controlled parameter. This parameter is a polar random function of time $W_1(t)$, all whose realizations pass through a single non-random point (the pole). Although it is possible (in principle) to determine the distribution law
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On prophylactic operations for ...

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$f(t)$ of the period in which the device functions properly, or other reliability characteristics, yet many difficulties arise in practice. Therefore it becomes necessary to use approximate methods for reliability investigations. In particular, it is convenient to use statistical linearization of nonstationary random processes of maladjustment. In order to determine the mean value m_b and the standard deviation σ_b (which approximately describe the maladjustment process) by means of experimental data, it is necessary to measure at one instant at least, the values of the controlled parameter of many similar devices. In addition, it is necessary to know the time t_0 and the result w_0 of the preceding prophylactic operation. Further, the reliability of devices with a single limit of the tolerance field is discussed. In this case the distribution law $f(t)$ is determined by 2 numerical characteristics: The relative rate of maladjustment α and the relative parameter-reserve β . The particular case $m_b = 0$ is of special interest. The reliability function $P(T)$ can be used for solving 2 problems: To determine, from the probability P that the device remains serviceable during the interval between prophylactic operations, the corresponding interval itself,

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On prophylactic operations for ...

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and the converse problem. The pertinent formulas are derived. These formulas are used to establish the probabilistic nature of the characteristic time of wear θ . The distribution law $f(t)$ can be approximately determined according to the values of the probability density at the 5 points: $0, T_1, \theta, T_M, \infty$; (T_1 is found as the root of an equation, and T_M is the most likely value of the time of prophylactic operations). Further, the reliability of devices with 2 limits of the tolerance field is considered. In this case an optimal initial value of the controlled parameter may exist, for which the probability that the device remains serviceable during a given period T , is maximal. In conclusion, by measuring (at a given moment) the values of the controlled parameter of a group of similar devices, it is possible to determine (by the above methods), the time when the next prophylactic operation has to be carried out, and to find the optimal parameter value. There are 6 figures, 1 table and 5 Soviet-bloc references.

SUBMITTED: August 5, 1961

Card 3/3

ACCESSION NR: AP3002609

S/0280/63/000/003/0045/0049

AUTHOR: Drushinin, G. V. (Moscow)

TITLE: Investigation of intermittent faults in technical systems

SOURCE: AN SSSR. Izv. Otd. tekhn. nauk. Tekhnicheskaya kibernetika, no. 3, 1963, 45-49

TOPIC TAGS: intermittent fault, reliability

ABSTRACT: By an "intermittent fault" is meant such a fault (malfunction) after which the system remains intact. It is recommended that in evaluating reliability, both the intensity of a final fault and the intensity of an intermittent fault be taken into account. As intermittent faults can occur both during the system operation and during its standstill, not only the reliability but also the preparedness for operation should be considered. A formula describing the intensity of an intermittent fault is proposed. Due to the inadequacy of information on

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ACCESSION NR: AP3002609

intermittent faults now available, it is suggested that the value of the intensity of such faults be set by law or determined by balancing the higher cost of the equipment against the cost of the damage caused by intermittent faults. Orig. art. has: 1 figure and 16 formulas.

ASSOCIATION: none

SUBMITTED: 05Feb63

DATE ACQ: 16Jul63

ENCL: 00

SUB CODE: CO, IE

NO REF SOV: 001

OTHER: 000

Card 2/2.

DRUZHININ, G.V. (Moskva)

Distribution of time in work performance. Izv. AN SSSR. Tekh.
kib. no.6:139-149 N-D '63. (MIRA 17:4)

DRUZHININ, I. (Leningrad)

"Lavsan" is a friend of the surgeon. Mest.prom.i khud.promys.
3 no.2:12-13 F '62. (MIRA 15:2)
(ARTERIES—SURGERY)(PLASTICS IN MEDICINE)

USSR/Microbiology. Antibiosis and Symbiosis. F-2
Antibiotics

Abs Jour : Ref Zhur-Biologiya, No 1, 1957, 545
Author : I. D. Druzhinin
Inst :
Title : Modification in the Typhoid-Paratyphoid
 Bacteria Caused by Sintomycin.
Orig Pub : Vracheb, delo, 1955, No 10, 961-966
Abstract : Bacteria of the typhoid-paratyphoid group
 acquired resistance to sintomycin slowly
 and to an inconsiderable degree. At the
 same time great changes occurred in their
 morphological, cultural, byochemic, anti-
 genic, and pathogenic properties.

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