GUBIN, A.I.; KITAYEV, A.M.; CHUDOV, A.S., inzh., retsenzent; CHERNYAK, V.S., inzh., red.

[Welding and soldering thin-walled pipes] Svarka i paika tonkostennykh truboprovodov. Moskva, Mashinostroenie, 1964. 110 p. (MIRA 17:7)

KULISHENKO, B.A.; KOCHEVA, G.N.; MILICHENKO, S.L.; IL'IN, V.P.; CHERNYAK, V.S., inzh., retsenzent

[Hard facing of metals; a worker's pocket handbook] Naplavka metallov; karmannyi spravochnik rabochego. Moskva, Izd-vo "Mashinostroenie," 1964. 130 p. (MIRA 17:7)

BREYTMAN, M.M.; SHEBEKO, L.P.; CHIKUNOV, A.I., inzh., retsenzent;
KUL'BERG, L.M., retsenzent; CHERNYAK, V.S., inzh., red.

[Economics, organization and planning of welding production]
Ekonomika, organizatsiia i planirovanie svarochnogo proizvodstva. Moskva, Izd-vo "Mashinostroenie," 1964. 207 p.
(MIRA 17:8)

GLIZMANENKO, Dmitriy L'vovich; CHERNYAK, V.S., nauchn. red.; MOKRETSOV, A.M., red.

[Gas welding and cutting of metals] Gazovaia svarka i rezka metallov. Izd.4. Moskva, Vysshaia shkola, 1964. 307 p. (MIRA 18:2)

RAKHMILEVICH, Z.Z.; ROTTE, A.E.; CHERNYAK, V.S.

Increasing the power of gas-motor compressors under conditions of exploitation. Mash. i neft. obor. no.5:32-35 '65. (MIRA 18:6)

1. Trest "Promenergo"; Vsesoyuznyy zaochnyy inzhenerno-stroitel'nyy institut, Moskva, i Novokuybyshevskiy neftepererabatyvayushchiy zavod.

ARONOV, M.A., inzh.; CHERNYAK, V.V., inzh.

Adjustment of the PZ-157 remote protection. Elek.sta. 28 no.12:78-79 D '57. (MIRA 12:3)

(Electric lines)

L 28466-66 EWT(m)/T/EWP(t)/ETI IJP(c) JD/DJ

ACC NR: AP6010275 SOURCE CODE: UR/0381/66/000/001/0073/0075

AUTHOR: Naumov, S. L.; Chernyak, V. V.

ORG: Kiev Institute of Civil Aviation Engineers (Kiyevskiy institut inzhenerov grazhdanskoy aviatsii)

TITLE: Electroinduction method of checking the depth of surface hardening on gear teeth

SOURCE: Defektoskopiya, no. 1, 1966, 73-75

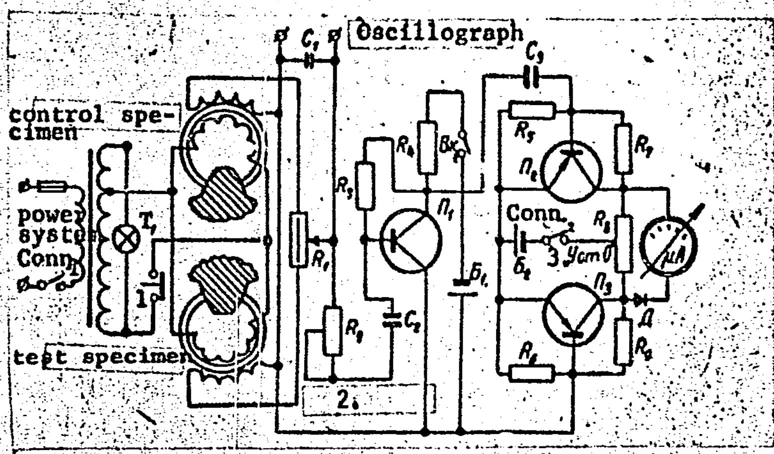
TOPIC TAGS: steel, flaw detection, nondestructive test, electromagnetic effect, magnetic permeability, surface hardening, metal hardening / 40Kh steel

ABSTRACT: The Laboratory of the Kiev Institute of Civil Aviation Engineers, in collaboration with the Krasnyy Ekskavator Excavator Plant, has developed an electromagnetic device for checking the depth of surface hardening on gear teeth of 40Kh steel based on the relationship between the magnetic permeability of gear material and the depth of surface hardening on gear teeth as compared with the magnetic permeability of a control specimen (nonhardened gear tooth). The difference between the magnetic permeabilities of the tested and control specimens is converted to electric voltage by means of a measuring unit (Fig. 1) represented by two differentially connected toroidal transformers (sensors), with the test specimen connected to one side and the

Card 1/3 UDC: 620.179.14

L 28466-66

ACC NR: AP6010275



1. "Test" button; 2. "Sensitivity" lever; 3. "Adjustment 0" lever

Fig. 1. Schematic circuit of device

APPROVED FOR RELEASE: 06/12/2000 CIA-RDP86-00513R000308610020-1"

L 28466-66

ACC NR: AP6010275

control specimen to the other. The magnetizing windings of the sensors are powered with commercial-frequency AC (6 v) via a stepdown transformer. The magnetizing current is 0.3 a. A distinguishing feature of this type of toroidal sensors is their insensitivity to the fringe effect; this dispenses with the need to position the sensor exactly at the center of the tooth. The recorder is represented by a dual push-pull amplifier with a pointer needle (microammeter, 0-300 μa). Mounted on the front panel of the device are: the pointer needle, the "Test" button, and the "Sensitivity" and "Adjustment 0" levers of the push-pull amplifier. An oscillograph can be connected to the device with the object of observing the measured voltage mismatch. The deflection of the pointer needle is the greater the greater the voltage mismatch at the sensor outputs is and, in its turn, the voltage mismatch is the greater the deeper the hardened layer on gear teeth is. Thus the device's readings can be calibrated directly in millimeters of depth of surface hardening. Orig. art. has: 3 figures.

SUB CODE: 13, 20, 11, 09/ SUBM DATE: 23Sep65/ ORIG REF: 004/

Card 3/3

S/190/60/002/009/023/023/XX
B004/B056

AUTHOR: Chernyak, V. Ya.

TITLE: A Modified Device for the Visual Measurement of Light Scatter in Solutions of Polymers or Albuminous Substances

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 9, pp. 1419-1425

TEXT: The author describes the new construction of a device operating with a Pulfrich photometer for measuring light scatter in polymer- or albuminous solutions. The construction is shown in Fig. 1. In I there is the mercury lamp 1, whose light falls through the object-glass aperture 3, by means of light filters 4 which are adjustable by a rotating shutter, and the light stop D_1 into the prismatic cuvette 5, which contains the standard solution, the temperature of which is measured by the thermometer T_1. The light then falls through the window 6 and the rectangular light stop D_2 into the thermostat 7. This vessel is made from brass sheets with blackened surface. The measuring cell with the liquid to be investigated

Card 1/4

is placed upon the rubber disk 9, where it is held in position by the water-jet pump connected to the connecting piece 10. 11, 12, 13 are the windows for observing the light scatter and its asymmetry (by means of the mirror 16) under angles of 45, 90, and 135°. At 15 there are the in- and outlet of the thermostat liquid. The cone 14 is hit by the direct light beam. From the angles given in the drawing it follows that interfering light effects are avoided. 17, 18 are the windows for the photometer III. Stabilization of the Hg-lamp is effected by means of a circuit using a CHЭ-220-0.5 (SNE-220-0.5) voltage-ferro-resonance stabilizer, regulating transformer, 1Б5-9 (1B5-9) barretters and rheostat. For the purpose of calculating the 90° scattering, R_{90}, the following equation is derived: $R_{90} = \Gamma n^2 x$. Here, Γ is the apparatus constant, which is determined by calibration, n^2 - the refraction coefficient, $x = N^*/N$ is the ratio of the photometer indication N^* for the standard solution, and N for the investigated solution. The author describes the calibration of the apparatus by means of cryoscopic benzene, which has been made available by S. A. Pavlova, and gives the measured results for water

APPROVED FOR RELEASE: 06/12/2000 CIA-RDP86-00513R000308610020-1"

A Modified Device for the Visual Measurement of Light Scatter in Solutions of Polymers or Albuminous Substances

S/190/60/002/009/023/023/XX
B004/B056

$\left[R_{90}\right]^{25^{\circ}C}_{546\ m\mu} = (0.90 \pm 0.10)\cdot 10^{-6}$, and carbon tetrachloride $(5.9 \pm 0.4)\cdot 10^{-6}$.

Experiments with γ-globulin, furnished by the Moskovskiy NII epidemiologii, mikrobiologii i gigiyeny (Moscow Scientific Research Institute of Epidemiology, Microbiology and Hygiene), carried out by N. D. Papush, revealed a linear interrelation between light scatter and concentration. The author thanks G. Ya. Rozenberg for discussions. There are 4 figures and 11 references: 6 Soviet, 3 US, and 2 German.

ASSOCIATION: Tsentral'nyy institut gematologii i perelivaniya krovi (Central Scientific Research Institute of Hematology and Blood Transfusion)

SUBMITTED: April 20, 1960

Card 3/4

S/190/60/002/009/023/023/XX
B004/B056

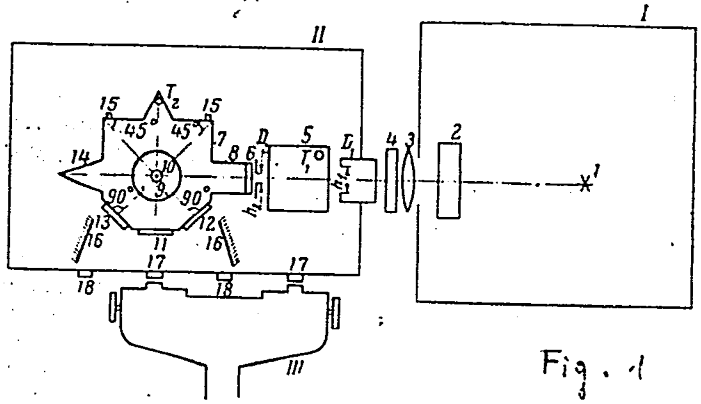


Fig. 1

Card 4/4

CHERNYAK, V.Ya.; POLYSHINA, T.V.

Determining the molecular weight of polyglucin. Med. prom. 15 no.8: 39-43 Ag '61. (MIRA 14:12)

1. TSentral'nyy ordena Lenina institut gematologii i perelivaniya krovi Ministerstva zdravookhraneniya SSSR.
(DEXTRAN)

S/243/62/000/002/001/001
I021/I221

AUTHOR: Polushina, T. V., Chernyak, V. Ya. and Rozenberg, G. Ya.

TITLE: Production of polyglucine (blood substitute) by the method of controlled synthesis Report I

PERIODICAL: Meditsinskaya promyshlennost, SSSR, no. 2, 1962, 15-19

TEXT: Since polyglucine, a fermentation product of *Leuconostoc mesenteroides* or *dextranicum* cannot be used as a blood substitute, because of its high molecular weight, the authors have obtained polyglucine of a low molecular weight (60000-80000) by way of direct synthesis with the aid of *Leuconostoc mesenteroides* strain Sf-4. The fermentation medium contained: 15% saccharose and 1, 1, 5, or 2% polyglucine with a molecular weight of 15000 to 56000 as primer. Polyglucine with a molecular weight of 60000-80000 was obtained by the above method by way of adding to the fermentation medium 2% of polyglucine with a molecular weight of 15000-23000. The yield of the above fraction was from 80 to 90% of all polyglucine synthesized. There are 3 tables.

ASSOCIATION: Tsentral'niy ordena Lenina institut gematologii i perelivaniya krovi) (Central Lenin Institute of Hematology and Blood Transfusion)

SUBMITTED: April 11, 1960

Card 1/1

ALEKSEYEV, G.A., prof.; GRINSHPUN, L.D.; FLEYSHMAN, Ye.V.; CHERNYAK, V.Ya.

Macroglobulin reticulolymphomatosis (Waldenström's disease). Terap. arkh. no.7:17-24 Jl '62.
(MIRA 15:8)

1. Iz 3-y kafedry terapii (zav. - chlen-korrespondent AMN SSSR prof. I.A. Kassirskiy) TSentral'nogo instituta usovershenstvovaniya vrachey.

(MACROGLOBULINS)

MOKEYEVA, R.A.; RUTBERG, R.A.; CHERNYAK, V.Ya.; MALLER, A.R.; PAPUSH, N.D.; SOBOLEVA, Yu.G.; RAKHMAYEVA, V.A.; KHUTSISHVILI, G.E.

Use of plasmapheresis in macroglobulinemic reticulosis; Waldenström's disease. Probl. gemat. i perel. krovi 9 no.12:33-40 D '64 (MIRA 18:1)

1. Gematologicheskaya klinika (zav. - prof. M.S. Dul'tsin) i laboratoriya fraktsionirovaniya belkov (zav. - prof. G. Ya. Rozenberg) TSentral'nogo ordena Lenina instituta gematologii i perelivaniya krovi (direktor - dotsent A. Ye. Kiselev), Moskva.

NANKINA, V.P.; KOFMAN, Ye.B.; CHERNYAK, V.Ya.; KALAMKAROVA, M.B.

Products of the proteolysis of heavy meromyosin possessing adenosine triphosphatase activity. Biokhimiia 29 no.3:424-431 My-Je '64. (MIRA 18:4)

1. Institut biologicheskoy fiziki AN SSSR i Institut gematologii i perelivaniya krovi Ministerstva zdravookhraneniya SSSR, Moskva.

ROZENBERG, G.Ya.; VISSARIONOVA, V.Ya.; MIKHAYLOVA, Yu.M.; PAPUSH, N.D.; CHERNYAK, V.Ya.

Isolation of properdin from bovine blood serum and study of its properties. Biul. eksp. biol. i med. 60 no.11:45-48 N '65. (MIRA 19:1)

1. Laboratoriya fraktsionirovaniya belkov krovi (zav. - prof. G.Ya. Rozenberg) TSentral'nogo ordena Lenina instituta gematologii i perelivaniya krovi (direktor - dotsent A.Ye. Kiselev) i kafedra infektsionnykh bolezney (zav. - prof. K.V. Bunin) I Moskovskogo ordena Lenina meditsinskogo instituta imeni I.M. Sechenova.

Submitted October 11, 1963.

Chernyak, V.Z.

TOKAREVICH, K.N.; CHERNYAK, V.Z.

Materials on the study of leptospiral jaundice. Report No.6: Outbreak of leptospiral jaudice among dogs in a Leningrad kennel. Trudy Len.inst.epid. i mikrobiol. 9:49-54 '47. (MLRA 10:9)

1. Iz laboratorii po izucheniyu leptospirozov (zav. K.N.Tokarevich) Instituta im Pastera (direktor F.I.Krasnik) i iz kafedry patologicheskoy anatomii Leningradskogo veterinarnogo instituta (zav. - prof. V.Z.Chernyak)

(LENINGRAD--WEIL'S DISEASE) (DOGS--DISEASES AND PESTS)

CHERNYAK, V. Z.

A. A. Gusev and V. Z. CHERNYAK are co-authors of the article "Mycosis of Air Sags (gutturomycosis, acrocosis,) in Horses". (Veterinariya, No. 3, 1948, p. 20-21) /Item No. 16145/ This article also appears in the collection 'Nauch-Prakt. raboty voyen-vet. Sluzhby'. Moscow, 1948, p. 100-102. /Item No. 3509/ They also wrote the article "Equine Necrotic Rhinitis" which appears in the collection 'Nauch-Prakt. raboty voyen-vet. Sluzhby', Moscow, 1948, p. 99-100. /Item No. 3510/

SO: Letopis' Zhurnal'nykh Statey, 1948, Unclassified

BFB

CHERNYAK V. Z. and DOBIN, M. A.

"On thrombosis of the celiac aorta and its branches during infectious anemia of horses," In symposium: Nauch.-prakt. raboty voyen-vet. sluzhby, Moscow, 1948, p. 102-03

SO: U-3850, 16 June 53, (Letopis 'Zhurnal 'nykh Statey, No. 5, 1949).

CHERNYAK (PROF.) V. Z.

PA 21/49T93

USSR/Medicine - Blood Vessels Nov 48
Medicine - Anemia, Infectious

"Method for Determining the Resistance of Blood Vessels in Horses With Infectious Anemia," Prof V. Z. Chernyak, Leningrad Vet Inst, 1½ pp

"Veterinariya" No 11

Describes method in detail, with sketch of apparatus used.

[redacted] 21/49T93

ChERNYak, V. Z.

23545. O NALIChII PRI BRONKhOMIKOZAKh U LOShADEY IZMENENIY, OBNARUZhIVAYeMYKh PRI BRONKhAL'NOY ASTME U ChELOVEKA. (K ETIOLOGII I PATOGENEZU MIKROBRONKhITOV LOShADEY). SBORNIK NAUCh TRUDOV (LENINGR. VET. IN-T), VYP. 10, 1949, C. 139-52.-BIBLIOGR: 23 NAZV.

SO: LETOPIS NO. 31, 1949.

ChERNYaK, V. Z.

23544. VERMINOZNYY EOAINCFIL'NYY MENINGO-ENTSEFALIT U OSLA. SBORNIK NAUCh. TRUDOV (LENINGR. VET. IN-T), VYP. 10, 1949, C153-55

SO: LETOPIS NO. 31, 1949.

CHERNIAK, V.Z.

KATSNEL'SON Z. S.; CHERNIAK, V. Z.; ROZHNOV, D. I.

Histological observations on regenerative processes in the horse liver following damage by infection. Doklady Akad. nauk SSSR. 81 no. 3:465-468 21 Nov 1951 (CIML 21:3)

1. Presented by Academician K. I. Skryabin 17 October 1951.
2. Leningrad Veterinary Institute.

CHERNYAK, V. Z., DOBIN, M. A., KOKURICHEV, P. I.

"Fundamentals of Legal Veterinary Inspection" Moscow-Leningrad. Sel'khozgiv, 1951

SOURCE: Veterinariya, Jan 1952; Trans # 155

CHERNYAK, V. Z. (Prof.), and SHAKALOV K. I. (Prof.), YANNUSKIN L. V. (Prof.), GOLOSHTAPOVA U. N., BOCHAROV I. A. (Prof.), SINEV A. V. (Prof.)

Veterinary's Guide Moscow, 1953

CHERNYAK, V. Z.

"On paratyphoid in dogs", (Professor, Head of the Department of Pathological Anatomy). Collected Works No. 14, of Leningrad Veterinary Institute USSR Ministry of Agriculture, P 46, Sel'khozgiz, 1954.

CHERNYAK, V.Z.; KUPRITE, O.A.; VLASOVA, L.P.

Infectious hepatitis in dogs. Veterinariia 32 no.4:59-62 Ap '55.
(MLRA 8:5)

1. Leningradskiy veterinarnyy institut.
(HEPATITIS, INFECTIOUS) (DOGS--DISEASES)

CHERNYAK, V.Z.

Hemolytic disease in newborn animals. Veterinariia 33 no.8:85-88 Ag '56. (MIRA 9:9)

1.Leningradskiy veterinarnyy institut.
(Domestic animals--Diseases and pests)(Hemolysis and hemolysins)
(Veterinary medicine)

CHERNYAK, Valentin Zakharovich; GOL'DSHTEYN, S.A., red.; MOLODTSOVA, N.G., tekhn.red.

[Pathoanatomical diagnosis of communicable diseases of farm animals] Patologoanatomicheskaia diagnostika infektsionnykh zabolevanii sel'skokhoziaistvennykh zhivotnykh. Izd. 2-e, ispr. i dop. Moskva, Gos. izd-vo sel'khoz. lit-ry, 1957. 286 p. (MIRA 11:4)

(Communicable diseases in animals)
(Veterinary medicine--Diagnosis)

U

COUNTRY	: USSR
CATEGORY	: General Problems of Pathology. Tumors. Comparative Oncology. Animal Tumors
ABS. JOUR.	: RZhBiol., No. 23 1958, No. 107063
AUTHOR	: Chernyak, V.Z.; Guseva, N.V.
INST.	: Leningrad Veterinary Institute.
TITLE	: A Case of "Cauliflower Disease" (Papillomatosis) in the Eel.
ORIG. PUB.	: Sb. rabot. Leningr.vet.in-ta, 1957, vyp.16, 161-164.
ABSTRACT	: No Abstract.

CARD: 1/1

Author : Chornyck V.Z.
Inst : ~~Not Given~~
Title : Materials on Leukemia in Mammals. First Report. On Leukemia of Cattle.

Orig Pub : Sb. rabot. Lenningr. vet. in-t, 1957, vyp. 16, 71-75.

Abstract : No abstract

Card : 1/1

KUZNETSOV, G.S., prof., otv. red.; BOCHAROV, I.A., prof., red.; VOKKEN, G.G., prof., red.; TSION, R.A., prof., red.; DMITROCHENKO, A.P., prof., red.; SINEV, A.V., prof., red.; FEDOTOV, B.N., prof., red.; CHERNYAK, V.Z., prof., red. Prinimali uchastiye: NIKOL'SKIY, S.N., prof., red.; KHEYSIN, Ye.M., prof., red.; GUSEV, V.F., dots., red.; KOLABSKIY, N.A., dots., red.

[Papers presented at the Conference on Protozoological Problems Dedicated to the 90th Anniversary of the Birth of Professor V.L. IAkimov] Sbornik rabot Nauchnoi konferentsii po protozoologicheskim problemam, posviashchennaia 90-letiiu so dnia rozhdeniia professora V.L.IAkimova. Leningrad, 1961. 292 p. (MIRA 15:6)

1. Nauchnaya konferentsiya po protozoologicheskim problemam, posvyashchennaya 90-letiyu so dnya rozhdeniya professora V.L. Yakimova. 2. Stavropol'skiy sel'skokhozyaystvennyy institut (for Nikol'skiy). 3. Institut tsitologii Akademii nauk SSSR (for Kheysin). 4. Leningradskiy veterinarnyy institu (for Kolabskiy).

(Protozoology--Congresses)

CHERNYAK, Valentin Zakharovich; DOBIN, Mendel' Aronovich; KOKURICHEV, Pavel Ivanovich; POLYAKOV, P.Ya., red.; BARANOVA, L.G., tekhn. red.

[Legal veterinary expertise] Sudebno-veterinarnaia ekspertiza. 3., ispr. i dop. izd. Leningrad, Sel'khozizdat, 1963. 254 p. (MIRA 16:7)

(Veterinary jurisprudence)

CHERNYAK, Ya. N. DECEASED c.'59 1962/6

Ceramics

see ILC

1. CHERNYAK, Ya. O., Eng.

2. USSR (600)

4. Gases - Analysis

7. Rational organization of gas analysis for boilers. Rab. energ. 2 no. 10, 1952

9. Monthly List of Russian Accessions, Library of Congress, January 1953, Unclassified.

CHERNYAK, Yakov Solomonovich; BOCHENOV, Yevgeniy Iosifovich; SVYATITSKAYA, K.P., vedushchiy red.; POLOSINA, A.S., tekhn.red.

[Maintenance and repair of the equipment of petroleum refineries] Remont oborudovaniia neftegazopererabatyvaiushchikh zavodov. Moskva, Gos.nauchno-tekhn.izd-vo neft. i gorno-toplivnoi lit-ry, 1960. 383 p. (MIRA 13:12)

(Petroleum refineries--Equipment and supplies)

Chernyak, Yakov Solomonovich
Remont Oborudovaniya Neftegazo-Pererabatyvayushchikh zavodov [BY]Ya. S. Chernyak and Ye. I Bochenov.
Moskva, Gostoptekhizdat, 1960.
383 p. Illus,, Diagrs., Graphs, Tables. 23 cm.
Bibliography: p. 381

LEYBO, Anatoliy Nikanorovich; KHESIN, Emmanuil Borisovich; CHERNYAK, Yakov Solomonovich; SEVAST'YANOV, M.I.; DOVZHUK, G.T.; SOLGANIK, G.Ya., ved. red.; VORONOVA, V.V., tekhn. red.

[Handbook for petroleum refinery mechanics] Spravochnik mekhanika neftepererabatyvaiushchego zavoda. Moskva, Gostoptekhizdat, 1963. 801 p. (MIRA 16:7)
(Petroleum--Refining)

CHERNYAK, YE.

USSR/Forestry - Forest Economy. K-4

Abs Jour : Ref Zhur - Biol., No 2, 1958, 5892

Author : Chernyak, Ye.
Inst : —
Title : Reconstruction of Low Value Saplings in Volhynia [Volyn']

Orig Pub : Gorsko stopanstvo, 1957, 13, No 4, 153-155 (Bulgarian)

Abstract : No abstract.

Card 1/1

ACCESSION NR: AP4042522 S/0109/64/009/007/1258/1269

AUTHOR: Logunov, L. A.; Rudneva, N. K.; Chernyak, Ye. B.

TITLE: Inverted diodes

SOURCE: Radiotekhnika i elektronika, v. 9, no. 7, 1964, 1258-1269

TOPIC TAGS: semiconductor, semiconductor diode, inverted diode, inverted diode parameters

ABSTRACT: The parameters of inverted diodes intended for small-signal detection and pulse-circuit work are considered. Formulas for forward and reverse switching times are developed with the diode inductance neglected; the switching time of a Ge inverted diode proper is estimated to be 0.12 nsec, and that of the same diode operating in a computer, 0.22-0.25 nsec. The functioning of an inverted diode as a detector is analyzed. Formulas for the current-voltage characteristic, the peak current, and the voltage at peak current, which connect

CHERNYAK, Ye. F.

Cand Agr Sci - (diss) "Increase in the productivity of bogged pine planting by means of drainage in the Western Poles'ye of the Ukrainian SSR." Khar'kov, 1961. 18 pp; (Ministry of Agriculture Ukrainian SSR, Khar'kov Order of Labor Red Banner Agr Inst imeni V. V. Dokuchayev); 200 copies; free; (KL, 7-61 sup, 253)

PETRIRINA, I.V.; CHERNYAK, Ye.I.

Soils of the lower Yakokit Basin. Trudy Inst. biol. IAFAN SSSR no.5:5-44 '58.

(Yakokit Valley--Soils) (MIRA 12:7)

APPROVED FOR RELEASE: 06/12/2000 CIA-RDP86-00513R000308610020-1"

TETERINA, L.V.; CHERNYAK, Ye.I.

Brief characteristics of basic soil types in the lower Yakokut Valley and their agricultural use. Izv. Sib. otd. AN SSSR no.5:110-122 '58. (MIRA 11:9)

1. Yakutskiy filial AN SSSR.
(Yakokut Valley--Soils)

CHERNYAK, Ye.N., inzhener.

Large blocks in the erection of ore-dumping transporter bridges. Stroi.prom. 32 no.7:27-31 Jl '54. (MLRA 7:7)

1. Trest Stal'montazh.
(Transporter bridges)

CHERNYAK, Yu.A.; MARCHENKO, V.A.; KORSUNSKIY, L.M., kand.tekhn.nauk

Electromagnetic flowmeter with a standard secondary instrument. Avtom.i prib. no.1:56-59 Ja-Mr '63. (MIRA 16:3)

1. Ukrainskiy gosudarstvennyy proyektnyy institut "Tyazhpromavtomatika" (for Chernyak, Marchenko). 2. Khar'kovskiy gosudarstvennyy institut mer i izmeritel'nykh priborov (for Korsunskiy).

(Flowmeters)

CHERNYAK, Yu.A.; MARCHENKO, V.A.

Improved circuit of an electromagnetic flowmeter. Avtom. i prib. no. 1:53-55 Ja-Mr '64. (MIRA 17:5)

ACCESSION NR: AP5001742 S/0302/64/000/004/0041/0042

AUTHOR: Chernyak, Yu. A.

TITLE: Electromagnetic flowmeter with a current-type output

SOURCE: Avtomatika i priborostroyeniye, no. 4, 1964, 41-42

TOPIC TAGS: flowmeter, electromagnetic flowmeter

ABSTRACT: To eliminate error-introducing noise in an electromagnetic flow sensor, an ac-dc signal conversion was suggested ("Control," July, 1961, pp. 113-115). Based on this principle, a new measuring device has been developed in which a transistorized static compensator with a phase-sensitive synchronous detector is used for filtrating the useful signal of an electromagnetic se..sor. The output d-c signal of the synchronous detector is converted into a-c by a transformer modulator and then compared with the flow signal by means of a compensating transformer. With the measuring device at a distance of 2 m or

Cord 1/2

L 22134-65

ACCESSION NR: AP5001742

less from the sensor, the claimed error is 0.5% or lower. Orig. art. has: 1 figure and 3 formulas.

ASSOCIATION: UGPI "Tyazhpromavtomatika"

SUBMITTED: 00 ENCL: 00

SUB CODE: IE NO REF SOV: 002 OTHER: 001

Cord 2/2

CHERNIYAK, Yu. B.

"Generalization of Experience Acquired by Innovators at the Karaganda Coal Beneficiation Combine."

report presented at the Conference on Benefication of Useful Minerals, sponsored by the Learned Council of the IGD, AS USSR, Balakhash/Karagands, 29 Nov - 4 Dec 1960.

CHERNYAK, Yu.B.

Coal preparation plants of the Karagandaugleobogashchenie Trust during the seven-year plan period. Ugol' 36 no.9:9-10 S '61. (MIRA 14:9)

1. Nachal'nik proizvodstvenno-tekhnicheskogo otdela tresta Karagandaugleobogashcheniye.
(Karaganda Basin--Coal preparation plants)

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AUTHOR: Chernyak, Yu. B.

TITLE: Approximation Method of Calculating Detection Characteristics in Multichannel Systems With Correlated Noises by Selecting Amplitudes According to Their Greatest Values

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol 5, Nr 2, pp 198-205 (USSR)

ABSTRACT: Setting Up the Problem. Useful information (the signal) in multichannel systems is present in one or several channels, while noise is present in all channels, which leads to losses. Magnitude of losses depends on the number of channels and on how the method of consolidating them was selected. To detect a signal by using the coefficient of probability involves complex and impractical operations. The present article submits a simple operation widely used in plotting multichannel systems, namely, a method of selecting envelope amplitudes according to their maximum values. The presence of a signal is

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assumed when at least one of the amplitude envelopes $r_1, r_2 \ldots r_n$ exceeds the threshold U_o. Possible errors, as usual, are false detection or omission of signal. Envelopes at the output from n-channels are described by the n-dimensional distribution law: $W_{ns}(r_1, r_2 \ldots r_n)$ if the signal is present, or $W_n(r_1, r_2 \ldots r_n)$ if the signal is absent. The magnitude of threshold U_o in relation to noise q^2 must be so selected that the probability of a false detection or omission should not exceed the given values P_F and $(1 - P_D)$. It is evident that:

$$P_F = 1 - \int_0^{U_0}\int_0^{U_0} \ldots \int_0^{U_0} W_n(r_1, r_2, \ldots, r_n)\, dr_1 \ldots dr_n, \quad (1)$$

$$P_D = 1 - \int_0^{U_0}\int_0^{U_0} \ldots \int W_{ns}(r_1, r_2, \ldots, r_n)\, dr_1 \ldots dr_n. \quad (2)$$

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It is assumed that at the channel input (with overlapping frequency characteristics and equal transmission band) white noise is present. In this case the envelopes at the channel output are correlated, and the distribution of envelopes at the output of each channel follows Rayleigh's law, with uniform dispersion σ^2:

$$W_1(r) = \frac{r}{\sigma^2} e^{-r^2/2\sigma^2}. \qquad (3)$$

To solve the problem of signal detection, one must: (1) find threshold U_o for a given P_F; (2) U_o being known, find the relation between P_D and the signal-to-noise ratio. To solve the first problem, one must find the integral of (1). In the case of

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channels with independent noise (1) is reduced to:

$$P_F = 1 - (1 - e^{-U_0^2/2\sigma^2})^n, \qquad (5)$$

However, for correlated noises the integral cannot be taken even in the simplest case when n = 2. One must note that, for the latter case, an expansion of (1) into series is known:

$$P_F = 1 - (1 - \rho^2) \sum_{n=0}^{\infty} (\rho^n \gamma_n)^2, \qquad (6)$$

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where

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$$\gamma_n = \frac{1}{n!}\int_0^z x^n e^{-x} dx; \qquad z = \frac{U_0^2}{2\sigma^2(1-\rho^2)}$$

For small values of P_F series (6) converges slowly, and a greater number of terms must be considered. The solution of the second part of the problem amounts to the calculation of (2) when U_0 is known. However, the calculation of (2) can be simplified substantially. The method consists in consolidation of the channels by selecting the channel with the greatest magnitude of the envelope amplitude. This channel (with a negligible error $P_D > 0.5$) is the one containing the signal. It amounts to a problem of detecting a signal in a one-channel system with

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a known threshold U_0:

$$P_D = 1 - \int_0^{U_0} W_{1s}(r)\,dr, \tag{7}$$

where

$$W_{1s}(r) = \frac{r}{\sigma^2} e^{-\frac{r^2+s^2}{2\sigma^2}} I_0\left(\frac{rs}{\sigma^2}\right), \tag{8}$$

with s = amplitude of signal. In the present work, the author finds an asymptotic expression for $P_F < 10^{-2}$ when n = 2, and analyzes an approximation method for calculating the probability of false alarm in a multichannel system. (2) Asymptotic Expression for Integral Two-Dimensional Distribution

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of Amplitudes. For a two-channel system, Eq. (1) is reduced to:

$$P_F = 1 - \int_0^{U_0}\int_0^{U_0} W_2(r_1, r_2)\, dr_1 dr_2, \quad (9)$$

where $W_2(r_1, r_2)$ is given by (4). At the same time,

$$P_F = P\{r_1 \text{ or } r_2 > U_0\} = P\{r_1 > U_0\} + P\{r_2 > U_0\} - P\{r_1 \,\&\, r_2 > U_0\}. \quad (10)$$

Following a series of operations and substitutions, the following asymptotic expression for P_F is obtained:

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$$P_F \simeq e^{-\beta^2/2}\left\{2 - \frac{1+\rho}{2\sqrt{\rho}}\left[1 - \operatorname{erf}\left(\sqrt{\frac{1-\rho}{2(1+\rho)}}\beta\right)\right]\right\}. \quad (19)$$

which is valid when two conditions are complied with:

$$\beta > 1, \quad \frac{\beta^2\rho}{1-\rho^2} > 1. \quad (20)$$

which is usually the case. A comparison of the probability of a spurious signal P_F calculated according to (19), with exact values P_F^T found from (9) by numerical calculation, is shown in a table. The error of (19) does not exceed 0.5% when $\beta \geqslant 3.0$ and $\rho \geqslant 0.5$. Figure 1 shows a diagram

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of probabilities of false alarms for P_F from 10^{-2} to 10^{-8} when ρ = 0; 0.7; 0.9; 1.0, all calculated according to (19). From the latter, an important conclusion can be made: With a decrease in the magnitude of a false alarm, the influence of noise correlation decreases, too.

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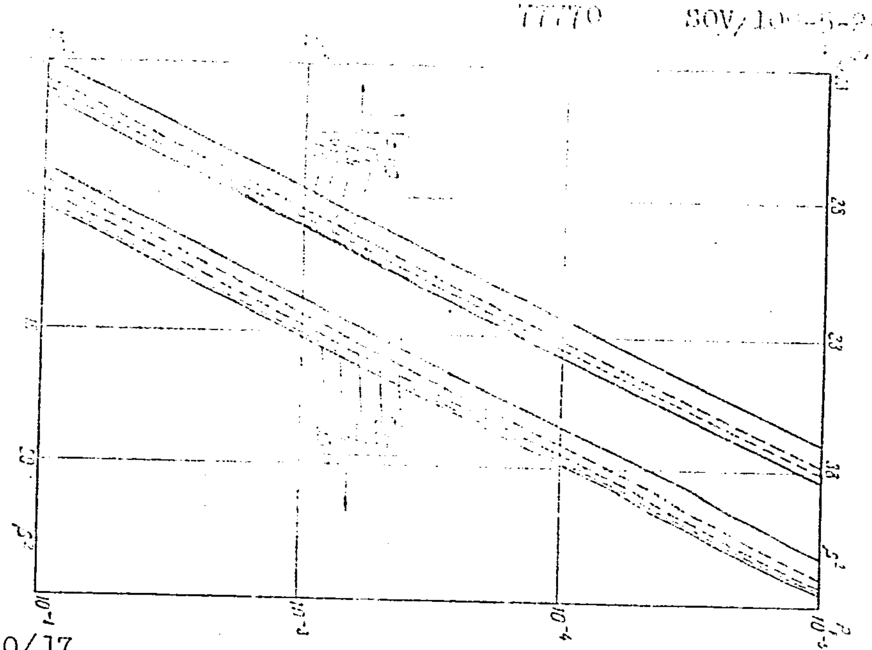

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Fig. 1. See Caption on Card 11/17.

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Caption to Fig. 1.

Fig. 1. Probability of false alarm in a two-channel system for various coefficients of correlation.

To evaluate the influence of noise correlation at different levels of a false alarm, the author considers relations:

$$\alpha = \frac{P_{F\ \mathrm{for}\ \rho=0} - P_F}{P_{F\ \mathrm{for}\ \rho=0}}. \qquad (21)$$

$$P_F = P_{F\ \mathrm{for}\ \rho=0}(1 - \alpha), \qquad (22)$$

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where quantity a can be considered as a relative correction resulting from noise correlation. Comparing (21) and (22), the following expression is obtained:

$$\alpha = \frac{1+\rho}{4\sqrt{\rho}}\left[1 - \mathrm{erf}\left(\sqrt{\frac{1-\rho}{2(1+\rho)}}\beta\right)\right]. \qquad (23)$$

which is valid under conditions (20) ($\rho = 0$, $a = 0$). Figure 2 shows on a double logarithmic scale the dependence of a on the magnitude of probability of false alarm in each channel:

$$P_o = e^{-\beta^2/2}$$

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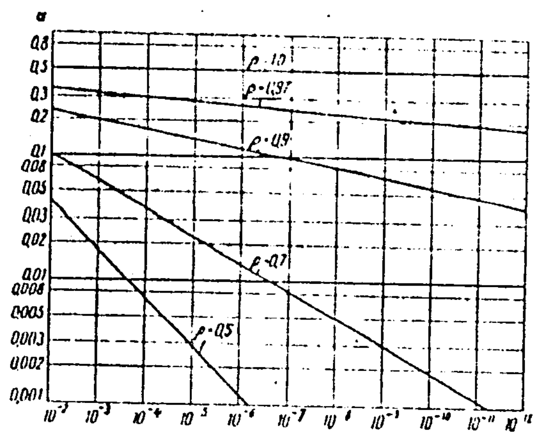

Fig. 2. Influence of correlation at various levels of false alarm.

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(3) Multichannel System. Assuming that there are n channels with correlated noise, the authors find an expression for P_F:

$$P_F = P\{A_1 \text{ or } A_2 \text{ or } A_3 \dots \text{ or } A_k \dots \text{ or } A_n\}. \quad (24)$$

according to known rule of the theory of probability:

$$P_F = P\{A_1 \text{ or } A_2 \dots \text{ or } A_n\} = S_1 - S_2 + S_3 - \dots \pm S_n, \quad (25)$$

where

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$$S_1 = \sum_{i=1}^{n} P(A_i);$$

$$S_2 = \sum_{i=1}^{n} \sum_{k=1}^{n} P(A_i \& A_k), \quad i < k;$$

$$S_3 = \sum_{i=1}^{n} \sum_{k=1}^{n} \sum_{j=1}^{n} P(A_i \& A_k \& A_j), \quad i < k < j;$$

$$\cdots\cdots\cdots\cdots\cdots\cdots$$

$$S_n = P(A_1 \& A_2 \ldots \& A_n).$$

In cases when nonadjacent channels are not too strongly correlated, the probability of a triple coincidence is P(A_i and A_j and A_k). Neglecting a triple coincidence, we have:

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$$P_F \simeq nP_0 - \sum_{i=1}^{n} \sum_{k=1}^{n} P(A_i \& A_k), \quad i < k, \tag{26}$$

where

$$P(A_i \& A_k) = \frac{1 + \rho_{ik}}{2\sqrt{\rho_{ik}}} \left[1 - \mathrm{erf}\left(\sqrt{\frac{1 - \rho_{ik}}{2(1+\rho_{ik})}}\, \beta \right) \right] e^{-\beta^2/2}, \tag{27}$$

$$P_0 = P(A_i) = e^{-\beta^2/2}, \quad i = 1, 2, \ldots, n.$$

The above expressions under conditions (20) permit approximate determination of the false alarm and, thus, the detection characteristic of a multichannel system with correlated noises by selecting the amplitudes according to their greatest values. In conclusion, the author recapitulates the essence of

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Eqs. (26) and (27). The asymptotic expression (19) for the integral distribution of the envelope amplitudes of the two-dimensional normal process is developed. The influence of correlation for the above method of signal treatment decreases rapidly with the increase of the threshold level. There are 2 figures; 1 table; and 6 references, 2 Soviet, 4 U.S. The U.S. references are: W. W. Peterson et al., The Theory of Signal Detectability, IRE Trans., 1954, PGIT-4, 9, 171; W. Hoffman, The Joint Distribution of Successive Outputs of Linear Detectors, J. Appl. Phys., 1954, 25, 8, 1006; H. Stras, Diversity Reception With Correlated Signals, J. Appl. Phys., 1956, 27, 1, 93; K. Miller, R. Bernstein, An Analysis of Coherent Integration and Its Application to Signal Detection, IRE Trans., 1957, IT-3, 4, 237.

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AUTHOR: Yu. B. Chernyak

TITLE: Detection of a Signal of Unknown Frequency and Arbitrary Initial Phase in the Presence of White Noise

PERIODICAL: Radiotekhnika i Elektronika, 1960, Vol 5, Nr 3, pp 366-375 (USSR)

ABSTRACT: This paper analyzes a receiver designed for a rectangular shape signal reception with unknown carrier frequency and arbitrary initial phase on a background of white noise. The receiver consists of a set of filters with overlapping frequency characteristics covering the given interval. The filter outputs are detected and combined. Fig. 1 shows the schematic layout of the receiver. The best combination of filter outputs could be determined from the equation of the probability coefficient, but the calculations are too complicated.

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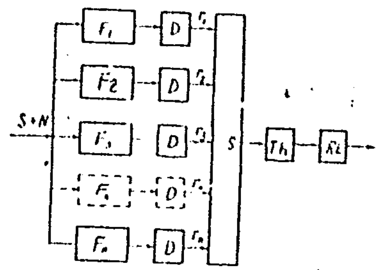

Fig. 1. Block-diagram of receiver. (F) Filter; (D) linear detector; (S) selector scheme per maximum; (Th) threshold device; (Re) relay.

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Taking the above in consideration the scheme

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presented uses the simplest method, selection of envelope amplitudes per maxima. Thus, each time when at least one amplitude envelope exceeds the threshold the signal is considered detected. The threshold value is determined as explained in a previous paper of the author (see this Journal 1960, 5, 2, 198). Too close spacing of filters causes a strong signal correlation in adjacent filters. In the selected method the losses due to an increased number of filters increase, but the losses due to detuning of the signal decrease. The present paper analyses not only the optimum filters, but also filters of two limit types: one, with the frequency characteristic of a single resonance circuit LC, and the other, idealised filter with rectangular frequency characteristic and a linear phase characteristic.
1. Calculation of signal-to-noise ratio at the filter output. At the receiver input a combination $y(t)$ of a rectangular radio-pulse $u(t)$ and additive

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white noise n(t) with a spectral density N_0 is present.

$$y(t) = u(t) + n(t), \quad (1)$$

where

$$u(t) = \sqrt{\frac{2E}{T}} \cos(\omega t + \varphi) \quad \text{при } 0 < t < T; \quad (2)$$

E - pulse energy; T - pulse width; ω - frequency of carrier; φ - random phase. Assumed $\omega T \gg 1$, and that the envelope has a physical meaning. The signal-to-noise ratio q^2 at the filter output is determined by the filter type and the maximum detuning of frequency ω with respect to the resonance ω_0 of the filter:

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$$q^2 = q_0^2 \left(\frac{R_\Delta}{R_0}\right)^2, \qquad (3)$$

where q_0^2 - peak ratio signal-to-noise in absence of mistuning; $R\Delta$ - envelope at filter output for maximum detuning $\Delta\omega = \omega - \omega_0$; R_0 - envelope at output for $\Delta\omega = 0$. Over the covered range of B cps n filters are used. Then the detuning of adjacent filters:

$$\Delta = \frac{2\pi B}{n}, \qquad (4)$$

but the maximum possible signal frequency detuning is:

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$$\Delta\omega = \frac{\Delta}{2} = \frac{\pi B}{n}. \qquad (5)$$

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A. Optimum filter. Pulse characteristic is:

$$h(t) = u(T-t) = \sqrt{\frac{2E}{T}} \cos[\omega_0 (T-t) - \varphi_0], \qquad (6)$$

where ω_0 - a certain fixed value of signal frequency. For this filter:

$$q_0^2 = \frac{2E}{N_0}. \qquad (7)$$

For a detuning of carrier frequency with relation to ω_0 the output voltage is:

$$U_{out}(t) = \frac{2E}{T} \int_0^T \cos(\omega t + \varphi) \cos(\omega_0 t + \varphi_0)\, dt = R_\Delta (T) \cos\psi. \qquad (8)$$

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The square of the envelope ratio is:

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$$\left[\frac{R_\Delta(T)}{R_0(T)}\right]^2 = \left[\frac{\sin\frac{\Delta\omega T}{2}}{\frac{\Delta\omega T}{2}}\right]^2 = \left[\frac{\sin\frac{\pi BT}{2n}}{\frac{\pi BT}{2n}}\right]^2. \quad (9)$$

B. Filter with a resonance type of frequency characteristic. Has a transmission coefficient:

$$K(i\omega) = \frac{1}{1 + i\frac{\omega - \omega_0}{\Omega}}, \quad (10)$$

where $\omega_0/2\pi$ is filter resonance frequency; $2\Omega/2\omega$ is full bandwidth of 3db level. The filter bandwidth Ω is to be so selected that q_0^2 is maximum. The optimum

$$\Omega_0 = \frac{1.257}{T}. \quad (13)$$

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here

$$q_0^2 = 0{,}8\frac{2E}{N_0}, \qquad (14)$$

$$\left[\frac{R_\Delta(T)}{R_0(T)}\right]^2 = \frac{1 + e^{-2\Omega_0 T} - 2e^{-\Omega_0 T}\cos\Delta\omega T}{(1 - e^{-\Omega_0 T})^2\left[1 + \left(\frac{\Delta\omega}{\Omega_0}\right)^2\right]} = \frac{2{,}12 - 1{,}12\cos\pi\frac{BT}{n}}{1 + \left(2{,}5\frac{BT}{n}\right)^2}. \qquad (15)$$

C. Rectangular filter. Transmission coefficient

$$K(i\omega) = \begin{cases} e^{-i(\omega-\omega_0)t_0} & \text{for } |\omega - \omega_0| \leqslant \Omega, \\ 0 & \text{for } |\omega - \omega_0| > \Omega, \end{cases} \qquad (16)$$

where $\omega_0/2\pi$ is resonance frequency; $2\Omega/2\pi$ is passband width; t_0 is group retarding time. For $\Delta\omega = 0$ maximum of q_0^2 will be achieved at moment

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$t = t_o - T/2$ at optimum band:

$$\Omega_0 = \frac{4{,}3}{\tau}, \quad (18)$$

and

$$q_0^2 = 0{,}825\,\frac{2E}{N_0}. \quad (19)$$

For optimum

$$\left[\frac{R_\Delta(t)}{R_0(\tau)}\right]^2_{max} = \frac{J_1^2 + J_2^2}{1{,}66}, \quad (20)$$

where

$$J_1 = \frac{1}{\pi}\int_{\Omega_t}^{\Omega_t+4{,}3} \frac{\sin y \cos\left(\frac{\pi}{4{,}3}\,\frac{BT}{n}\right) y}{y}\,dy, \quad (21)$$

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$$J_2 = \frac{1}{\pi} \int_{0,t}^{0,t+4,3} \frac{\sin y \sin\left(\frac{\pi}{4,3}\frac{BT}{n}\right) y}{y}\, dy. \qquad (22)$$

In Eq. (21) and (22), moment t must be so selected that $J_1^2 + J_2^2$ is maximum for a fixed value of BT/n. The curves show that for given values of BT and n the ratios $(R\Delta/R_0)^2$ practically do not differ. Knowing this ratio and q^2 at the filter output it is possible to calculate q_0^2 from (3), and $2E/N_0$ at the receiver input (from (7), (1?), (19)) 2. Selecting number of filters and construction of detection characteristics. Assuming a certain number n of filters and a given probability P_F of

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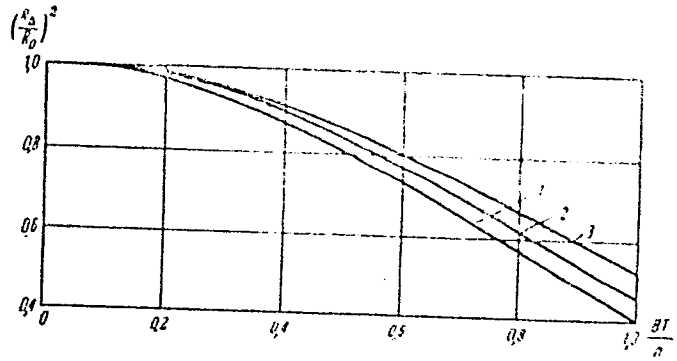

Fig. 2. $(R\Delta/R_o)^2$ vs. detuning, (1) optimum filter; (2) resonance filter; (3) rectangular filter.

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spurious signal, the probability P_o of spurious signal in each channel can be determined:

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$$P_F = \left[n - \sum_{\substack{i=1 \\ i<k}}^{n} \sum_{k=1}^{n} P_{ik} \right] P_0, \tag{23}$$

where

$$P_{ik} = \frac{1 + \rho_{ik}}{2\sqrt{\rho_{ik}}} \left[1 - \mathrm{erf} \left(\sqrt{\frac{1 - \rho_{ik}}{2(1 + \rho_{ik})}} \beta \right) \right]; \tag{24}$$

$P_0 = e^{-\beta^2/2}$ is probability of spurious signal in each channel; β is normalized threshold; ρ_{ik} is coefficient of mutual noise correlation at the output of filters i and k. For the input of filters m and 1, having transmission coefficients $K_m(\omega)$ $e^{i\varphi_m(\omega)}$ and $K_l(\omega)$ $e^{i\varphi_l(\omega)}$ in the presence of white noise

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$$\rho^2_{ml} = Q^2_{ml} + S^2_{ml}, \qquad (25)$$

where

$$Q^2_{ml} = \frac{\left[\int\limits_0^\infty K_m(\omega) K_l(\omega) \cos[\varphi_m(\omega) - \varphi_l(\omega)]\, d\omega\right]^2}{\int\limits_0^\infty K^2_m(\omega)\, d\omega \int\limits_0^\infty K^2_l(\omega)\, d\omega}, \qquad (26)$$

$$S^2_{ml} = \frac{\left[\int\limits_0^\infty K_m(\omega) K_l(\omega) \sin[\varphi_m(\omega) - \varphi_l(\omega)]\, d\omega\right]^2}{\int\limits_0^\infty K^2_m(\omega)\, d\omega \int\limits_0^\infty K^2_l(\omega)\, d\omega}. \qquad (27)$$

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Using (25), (26), (27) the following equations are developed:

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$$\rho_{ik}^2 = \left[\frac{\sin\frac{(i-k)\pi BT}{n}}{\frac{(i-k)\pi BT}{n}}\right]^2 \quad \text{for ideal filters} \quad , i,k=1,2,\ldots,n; \tag{28}$$

$$\rho_{ik}^2 = \frac{1}{1+\left[\frac{(i-k)\,2{,}5BT}{n}\right]^2} \quad \text{for resonance filters}, \; i,k=1,2,\ldots,n; \tag{29}$$

$$\rho_{ik}^2 = \begin{cases}\left[1-\frac{|i-k|\,BT}{1{,}37\cdot n}\right]^2 & \text{for } \frac{|i-k|\,BT}{1{,}37\cdot n} \leq 1 \\ 0 & \text{for } \frac{|i-k|\,BT}{1{,}37\cdot n} > 1\end{cases} \quad \text{for rectangular filters}, \; i,k=1,2,\ldots,n. \tag{30}$$

From (23) to (30) the probability of a spurious signal in each channel may be determined, and also the normalized threshold

$$\beta^2/2 = -\ln P_0,$$

where

$$\beta = U_0/\sigma.$$

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In the receiver the filters are combined per maximum values of envelopes. Therefore, the further problem is deduced to a single channel system with a known threshold U_o. The probability of correct detection is:

$$P_D = \int_{U_o}^{\infty} W_{sN}(r)\,dr, \qquad (31)$$

where

$$W_{sN} = \frac{r}{\sigma^2} e^{-\frac{r^2+s^2}{2\sigma^2}} I_0\left(\frac{rs}{\sigma^2}\right); \qquad (32)$$

σ^2 is noise dispersion at output; s is signal amplitude at filter output. If the probability of correct detection is given, $q^2 = s^2/\sigma^2$ can be determined. Using (3), (7), (14), and (19) $2E/N_o$

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at the receiver input can be calculated.

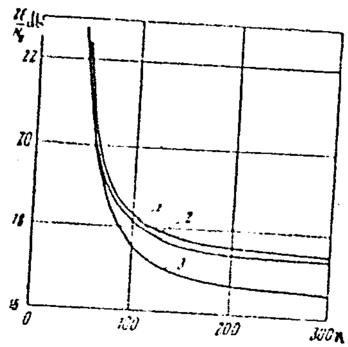

Fig. 3. Threshold signal for various numbers of filters (BT = 60, $P_D = 0.9$, $P_F = 10^{-4}$). (1) Resonance filters; (2) rectangular filters; (3) optimum filters.

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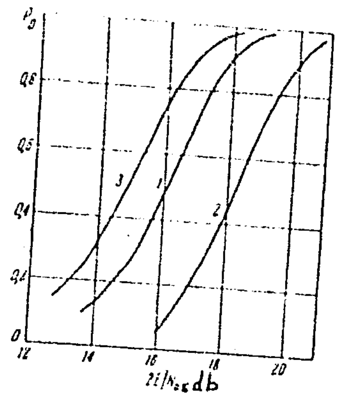

Fig. 4. Detection characteristics (BT = 60, $P_F = 10^{-4}$). (1) Receiver with 150 resonance filters; (2) broadband receiver with incoherent accumulation; (3) optimum receiver.

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Calculations for the above figures were made up to $(R\Delta/R_0)^2 = 0.97; 0.976; 0.98$ - for optimum, resonance, and rectangular filters, respectively.
3. Evaluation of detection effectiveness. Because characteristics of the optimum receiver are not known, the evaluation of the detection effectiveness is made by comparing with a broadband receiver and a receiver which is close to the optimum for detection of one of k possible frequencies within the given interval. A. Broadband receiver with incoherent accumulation--having a rectangular pulse of T duration, and energy level E at the input, white noise with a spectral density N_0. Additional filtration on video-frequency is used for improvement of reception characteristics.

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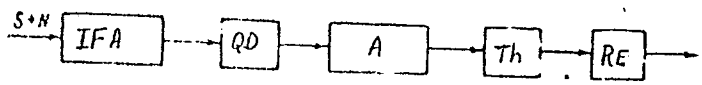

Fig. 5. Block-diagram of broadband receiver. (IFA) intermediate frequency amplifier with band; (QD) quadratic detector; (A) accumulator; (Th) threshold; (Re) relay.

According to the statistical theory of detection, the best video-filter is the one permitting determination of the probability coefficient for amplitude envelopes. Curve 2 of Fig. 4 gives the characteristic of a broadband receiver ($P_F = 10^{-4}$, $M = BT = 60$) consisting of an intermediate frequency amplifier with band B, quadratic detector

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and integrator, incoherently accumulating signals during time T. Comparison of curves 1 and 2 shows that the receiver with a filter assortment has a threshold signal of approximately 2.2 db lower than a broadband receiver. B. Optimum receiver. It is assumed that the receiver must detect a rectangular pulse of width T and power E on the background of white noise having a spectral density N_0; carrier frequency with unknown initial phase can have any value of the possible k values, with pulse spectra not overlapping. Assuming pulse spectrum width 2/T, we get k = BT/2. The theoretical calculations for determining the probability coefficient are rather complicated. The optimum receiver consists of a number of optimum filters, each for a certain probable frequency. The threshold of such a receiver cannot be higher than the threshold of an optimum receiver for detecting a signal which can have any frequency within a certain interval with unknown initial phase. Therefore, comparing the detection characteristics of this receiver and

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the one analysed before, it is possible to evaluate it as compared with the optimum. The problem under these conditions is actually reduced to detection of a signal in a multi-channel system, whose channels have independent noises, but the signal appears in one channel only. For such a system selection of amplitudes per maxima gives results close to the optimum. The block diagram of such a receiver is given by the same Fig. 1, but the filter frequency characteristics do not overlap. Matched filters with rectangular frequency characteristic can be used. Curve 3 on Fig. 4 illustrates the detection characteristic of such an "optimum" receiver. Conclusions. 1. A receiver consisting of a system of correspondingly spaced and matched filters is adequately effective for reception of pulse signals of unknown carrier frequency and arbitrary initial phase, and for selection of amplitudes by their maxima. 2. Using filters of Π - type frequency characteristics does not show

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any advantages as compared with simple resonance characteristics and the same number of filters. 3. For a given interval of frequency B and pulse duration T, the number of filters should be equal to (2 to 3) BT, independent of the shape of frequency characteristic. Yu. B. Kobzarev and V. A. Lander helped. There are 5 figures; and 11 references, 9 Soviet, 3 U.S. The U.S. references are: W. W. Peterson, T. G. Birdsall, W. G. Fox, The Theory of Signal Detectability, IRE Trans., 1954, PGIT-4, 9, 171; J. Pachares, A Table of Bias Levels Useful in Radar Detection Problems, IRE Trans. 1958, IT-4, 1, 38.

SUBMITTED: March 5, 1959

Card 22/22

69893
S/109/60/005/04/004/028
E140/E435

6.9000

AUTHOR: Chernyak, Yu.B.

TITLE: Cross-Correlation of Noise Voltages at the Outputs of Amplifiers with Overlapping Frequency Characteristics

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol 5, Nr 4, pp 551-561 (USSR)

ABSTRACT: The cross-correlations of the instantaneous values of noise voltages and their envelopes are found by a spectral method, together with the joint distribution of the envelopes at the outputs of two channels of given frequency characteristics and input-noise energy spectrum. The dependence of the correlation factor of the instantaneous values of noise voltages and their envelopes on the detuning of two resonant amplifiers with an arbitrary number of stages is found. The following special cases are considered: two single-stage resonant amplifiers; two n-stage amplifiers; two amplifiers with Gaussian frequency characteristics. From the analysis the author concludes that the joint distribution of noise at the outputs of a two-channel system differs from the joint distribution of the

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Cross-Correlation of Noise Voltages at the Outputs of Amplifiers with Overlapping Frequency Characteristics

envelopes at the output of a single-channel system only by other values of the envelope of the correlation factor. Resonant amplifiers of more than five stages may be approximated by a Gaussian curve and a linear phase characteristic. The cross-correlation of the envelopes at the outputs of resonant amplifiers at identical instants of time is defined by the value of the square or the fourth power of the amplitude characteristic at the point of intersection of the frequency characteristics. There are 4 figures and 6 references, 5 of which are Soviet and 1 a translation from English into Russian.

SUBMITTED: April 13, 1959

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40934

S/109/62/007/007/002/018
D271/D308

6,9800

AUTHOR: Chernyak, Yu. B.

TITLE: Linear properties of a system composed of a broad-band limiter and filter

PERIODICAL: Radiotekhnika i elektronika, v. 7, no. 7, 1962, 1073-1076

TEXT: Problems of signal transmission by a combination of ideal amplitude limiter and filter are studied. The signal is both amplitude and phase modulated and presence of strong Gaussian interference is assumed. The limiter removes amplitude modulation and leaves phase information undistorted; it can be represented as a non-linear device, with a constant output, followed by a bandpass filter rejecting all higher harmonics; signal spectrum is contained in the frequency spectrum of Gaussian interference. Random phase distortion at the limiter output is discussed; it is determined by the relative positions of signal and interference vectors and by their amplitude; the cosine of the distortion angle depends linearly

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on the signal-to-interference ratio at the input of the limiter. The discussion of the linear filter response leads to the conclusion that averaged response of the limiter-filter system to excitation by a weak signal and strong interference is identical with the response of a linear filter to a 'pure' signal; further analysis shows that the above is also truewhen several signals, phase and amplitude modulated, act at the input of the system together with a strong interference; the superposition principle is valid for the system. Conditions of reliable signal detection in the presence of interference and of the linearity of the system discussed are coincident only when limiting is performed over a sufficiently wide frequency band. As an example, the necessary value of the product of interference spectrum at the input and signal duration is 100. There are 3 figures.

SUBMITTED: January 11, 1962

6,9200
6,9700

39425
S/109/62/007/008/004/015
D409/D301

AUTHOR: Chernyak, Yu.B.

TITLE: Sensitivity, accuracy and resolution of multi-channel receivers with wide-band limiter

PERIODICAL: Radiotekhnika i elektronika, v. 7, no. 8, 1962, 1302-1310

TEXT: Statistical methods are used for studying the effect of amplitude limiting on the sensitivity, accuracy and resolution of a multichannel receiver, which is designed for detecting radiosignals of arbitrary amplitude and phase modulation and for measurement of unknown signal parameters in the presence of Gaussian noises. It is shown that the sensitivity losses, due to the wide-band limiter, are negligible (about 1 db), and that the accuracy of measuring the carrier frequency and the delay time, decreases by 10% only. First, the ideal case is considered in which the arrival time τ of the signal, it's frequency ω and initial phase φ are known at the receiving end. In order to determine the presence or absence of the sig-

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nal, the voltage X at the output of the matched filter is compared with the threshold β, determined by the given false-alarm probability. If $X > \beta$, then the signal is present. X can be approximated (by virtue of the Central Limit Theorem), by the normal voltage with mean $\overline{X}$ and variance σ_X. From the obtained expressions, it follows that the noise power at the correlator output does not depend on the spectral density N_0 of the noises at the limiter input, and hence on the noise level at the receiver input and the channel gain to the limiter input. This property is particularly useful in automatic-detection devices. If the signal-to-noise ratio q at the limiter input is small

$$q^2 \leqslant 0.5, \tag{13}$$

then the noise power is independent of the signal amplitude. In an earlier work by the author it was shown that condition (13) does not contradict the requirement of reliable signal detection. The parameter

$$\varkappa = \left(\frac{\overline{X}}{\sigma X}\right)^2 = \frac{\pi}{4}\left(\frac{2E}{N_0}\right) \tag{15}$$

fully characterizes the sensitivity of the receiver (E denotes the signal energy). From the obtained formulas it follows that the sensitivity loss is negligible (1 db), which is in agreement with the results of other investigators, and that the magnitude of the losses does not depend on the form of the signal. Further, the case of a signal with random initial phase is considered. Here, too, the false-alarm probability does not depend on N_0 and decreases with broadening of the noise spectrum at the limiter input. The sensitivity loss is also 1 db. In the case of a signal with unknown parameters (ω and τ), the sensitivity is expressed by the parameter:

$$\varkappa(\Delta\omega, \tau) = \frac{\pi}{2} \frac{E}{N_0} \left|\chi(\Delta\omega, \tau)\right|^2, \qquad (27)$$

where χ is Woodword's indeterminacy function. The loss is also 1 db. The larger the ratio E/N_0 and the narrower the peak of the function χ, the more accurate the measurements and the resolution. Wide-band limiting practically does not affect the resolution and accuracy of measuring ω and τ. Conclusions: Amplitude limiting should be carried out in that part of the receiver in which the