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LITERATURE SEARCH

FOR

CERAMIC VACUUM TUBES

MASTER

MRI-2942-TR2

12 January 1977

Prepared for:

Energy Research and Development Administration
Division of Geothermal Energy
Washington, D. C. 20545

REA

DISCLAIMER

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William Cannon

Approved by: Ronald D Kelly
Ronald D. Kelly, Manager
Measurement and Analysis Department

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1.0 INTRODUCTION

A literature search has been conducted as a separate task of the Ultra High Temperature Amplifier project to locate documents relating to the application of ceramic vacuum tubes in high temperature environments. The use of ceramic electron tubes, which have been utilized for many years in aircraft and missile applications, offers the fastest, and, at present, the most reliable means of developing electronic geothermal logging tools[1]. The environments that electronic circuits must survive in geothermal applications are unique in regards to their severity. For an electronic device to be practical as a geothermal instrument it must operate over a wide temperature range (room temperature to 500°C), be extremely rugged, and have a relatively long life expectancy, at least in the hundreds of hours. As it turns out, ceramic electron tubes can easily have these characterists, and there was interest in both the armed forces and industry in the 1950's to develop tubes for operating in 500°C environments[2]. An equal development in other high temperature components is required, however, in order that the advantage of the availability of high temperature tubes can be fully utilized.

2.0 BACKGROUND

The development of ceramic electron tubes dates back to 1934, when Telefunken, Siemens and Halske and AEG began to experiment independently with ceramic sealing techniques[2]. The experiments utilized low loss materials (steatites) that had been developed in Germany for the electrical industry. By 1937, Telefunken developed special ceramics for sealing purposes and produced large quantities of ceramic microwave tubes during World War II.

After World War II, the technology and experience gained in Germany was made available in the United States and that pertaining to ceramic tube techniques was actively promoted through study contracts issued to tube manufactures by the Armed Services. The development of a ceramic version of a UHF tube Type 2C39 by General Electric Company, Eitel McCullough, Inc., and Machlett Laboratories of Raytheon, Inc., resulted from these early studies. Interestingly, these same three companies (Eitel McCullough is now EIMAC Division of Varian) are the three largest producers of ceramic electron tubes today in this country.

By 1952, the development of automatic production techniques for ceramic tubes was being promoted by government contracts, and in 1958, several ceramic tube types were available in sample lots. The full scale production of ceramic tubes followed in the early 1960's and centered on microwave and radar types, largely for aircraft and missile applications. The primary advantage of ceramic tubes that has evolved in these applications is their inherent ruggedness and immunity to shock and vibration.

The high temperature capability of ceramic tubes has always been recognized, and many of the early development types produced in the late 1950's were meant to operate in 500°C ambient temperatures (Table 1 of Reference 2). The commercial development and availability of other high temperature components such as resistors and capacitors, however, has not taken place and the excellent high temperature capability of the ceramic tube

envelopes has been looked upon as an extra bonus that is not particularly required. It has been both easier and cheaper to design adequate cooling than to design for ultra high temperatures. As a result, most of the commercially available ceramic tubes can not operate in ambients over 250°C due to limitations in the seals and cathode/anode structures.

3.0 LITERATURE SEARCH

As noted in the previous section, the development and use of ceramic electron tubes dates back more than 40 years to 1934. As a result there is a multitude of literature, including other literature searches and bibliographies, on ceramic tubes.

A literature search was initiated by utilizing the SDC Search Service data bases. The bases relating to engineering and electonics subjects include: 1) the National Technical Information Service (NTIS) prepared by the Department of Commerce and containing citations and abstracts of government sponsored R&D reports and other analyses prepared by federal agencies, contractors, and grantees. The file contains approximately 356,000 items dating from January 1970; 2) Engineering Index Monthly (Compendex) prepared by Engineering Index, Inc., covering all engineering and technical disciplines. The file contains approximately 500,000 citations and abstracts also dating from January 1970.

Both of the above named data bases were searched for citations relating to "Ceramic and/or Metal Electron Tubes" and "High Temperature Electronics." A total of 24 citations were found relating directly to ceramic tubes and 24 relating to high temperature electonrics. Computer printouts of the abstracts are given in Appendices A, B, and C.

A list of titles of all articles and reports relating to electron tubes in general was also requested and examined. Out of a total of 646 titles, abstracts of 39 which might pertain to high temperature applications were obtained. These abstracts while not directly related to ceramic tube applications are of general interest and are included in Appendices D and E.

The citations turned up in the computerized data banks coupled with extensive bibliographies in many of the referenced documents and in those found by backtracking through references provided over 1,000 titles of documents relating to the subject. While no attempt was made to review more

than a small portion of the documents, it rapidly became apparent that the primary goal of the survey, which was to locate documents relating to the application of ceramic tubes to high temperature environments, would not be very successful. As mentioned above, this is due to the fact that there has been no extensive development of other high temperature components (i.e., resistors, capacitors, and inductors) needed to make them practical in high temperature circuits.

The sparcity of recent literature (post 1970) is in marked contrast to the volumous amount that has appeared previously on the design, manufacture, and application of ceramic electron tubes. In part, this probably reflects that the use of ceramic vacuum tubes settled early into a few well defined applications in microwave and radar circuits and there has been nothing new to report.

A list of selected references in Section 4 of this report gives what is felt to be a representative sample of the large amount of literature available on ceramic electon tubes. Included in this list as Reference 2 is an excellent survey of the state of the development of ceramic tubes for operation at temperatures up to 500°C which was prepared by Kohl and Rice for the U. S. Air Force. This report also contains an extensive bibliography covering literature published prior to 1958 on ceramic tubes. Earlier in 1951, Kohl wrote a book on "Materials and Techniques for Electron Tubes" covering all aspects of electron tube technology including ceramic construction. A revised edition published in 1960 is listed as Reference 3. Other summaries on the applications of ceramics to electron tubes are given in References 4-7.

A comprehensive bibliography composed of unclassified reports appearing between October 1958 and January 1968 is given in Reference 8. A total of 238 references are given on the application of ceramics to both electron tubes and capacitors.

As can be seen by Appendix A, there has been very little unclassified government sponsored literature directly relating to ceramic tubes. The problems of seals between ceramic envelopes and metal electrodes is mentioned to some extent in the recent engineering literature (Appendix B). The development of ceramic regulator tubes took place in the late 1960's under NASA contracts. One development described in Reference 9 demonstrated the feasibility of operating Noble gasfilled voltage-regulator tubes at 800°C for periods up to 10,000 hours. High temperature voltage-regulator tubes, however, have not been put into production and are still laboratory items.

A survey of literature on High Temperature Electronics was made to determine if there were any references to utilizing ceramic tubes (Appendix C). The initial interest in utilizing ceramic tubes in ambient temperatures up to 500°C also spurred some interest in developing high temperature circuits. An early assessment of high temperature design is given in Reference 10. Since that time, there have been a number of developmental efforts for special high temperature components but no large scale availability due to a lack of real need. In recent years, the shift of the electronics industry to solid state devices which are inherently low temperature components has effectively killed most of the interest there may have been in ultra high temperature circuits. As indicated in Appendix C, however, there are some references in the recent literature on work being done to develop high temperature semiconductors.

4.0 SELECTED REFERENCES

1. A. S. Blum, "Approaches to High Temperature Electronics," Lawrence Livermore Laboratory, UCID-16613 (16 Oct 1974).

2. W. H. Kohl and P. J Rice, Jr., "Electron Tubes for Critical Environments," Final Report Prepared by Stanford Research Institute for Wright Air Development Center, Wright-Patterson Air Force Base, Ohio. WADC Tech. Report 57-434 (March 1958), ASTIA No. AD 151158.

3. W. H. Kohl, "Materials and Techniques for Electron Tubes," Reinhold Publishing Corporation, New York, 1960.

4. W. G. Robinson and E. C. Bloor, "A Survey of Electrical Ceramics," Proc. IEE, Volume 100, Pt 2A, No. 3, pp247-257, 266-275 (March 1953).

5. L. Navias, "Advances in Ceramics Related to Electron Tube Development," J. American Ceramic Society, Volume 37, pp329-350 (August 1954).

6. F. G. Diver, "Materials Used in Radio and Electronic Engineering--A Survey by the Technical Committee of the Institution, Pt 3-Ceramics," J. Brit Inst. Radio Engineers, Volume 15, pp506-517 (October 1955).

7. L. Mitchell, Ceramics (A Review of Recent Developments) Ind. and Eng. Chemistry, Volume 48, Pt 2, pp1702-1709 (September 1956).

8. Report DDC-TAS-68-76, "Ceramic Materials-Volume 7," (Electronic Devices), Defense Documentation Center (March 1969) ASTIA No. AD-851506.

9. N. D. Jones, "Development and Endurance Testing of High-Temperature Ceramic Voltage--Regulator Tubes," General Electric Co., NASA CR-1813 (April 1971).

10. R. B. Kieburtz, "High-Temperature Subassembly Design," Electronics, Volume 30, pp158-161 (May 1957).

APPENDIX A

CERAMIC ELECTRON TUBES

NTIS ABSTRACTS: JANUARY 1970 - PRESENT

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S.D.C.'S INTERNATIONAL SEARCH SERVICE

CERAMIC/METAL ELECTRON TUBES

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CERAMIC/METAL ELECTRON TUBES

AN - AD-A014 413/9SL
TI - The NRL Fluid-Cooled Helix Traveling-Wave Tube
TN - Final rept.
AU - Arnett, H. D.; Brown, H. E.; Jensen, J. T. Jr; Kyser, R. H.; Smith, S. T.
CS - Naval Research Lab Washington D C
PD - 31 Jul 75; 58p
PR - NTIS Prices: PC$4.25/MF$2.25
CC - 9A; 49D
DE - *Traveling wave tubes; Liquid cooling; Water cooling; Helixes; Electron tube parts; Microwave tubes; Copper; Ceramic materials; Tubes; Fluid flow
ID - NTISDODNRL
AP - U7522
RN - NRL-7899
PN - XF54-545; NRL-R06-45
TS - XF54-545-014
AB - In the conventional helix traveling wave tube the helix is supported by three or four ceramic rods between the helix and tube shell. The amount of average power attainable is limited by the amount of heat that can be conducted along the helix and across the ceramic supports. A fluid-cooled helix was designated that employs a helix made of copper tubing supported by hollow ceramic tubing brazed at each half turn of the helix. Several geometries of fluid flow and their effect on the RF design of the tube were tested. The cooling analyses indicate that it should be possible to dissipate at least five times as much power with the fluid cooling as with conventional thermal conduction for frequencies up through S-band. For some fluids the circuit RF losses increase rapidly with frequency above the operating frequency. This is useful for suppressing unwanted backward-wave oscillations. Experimental tubes were built and tested. Four kilowatts of average power was attained at 3 GHz in a design that was capable of octave bandwidth operation.

AN - AD/A-003 894/3SL
TI - Research on Photoelectronic Imaging Devices
TN - Annual rept. no. 4 (Finals)
AU - Sadasiv, G.; Lengyel, G.; Mardix, S.; Heimann, B.
CS - Rhode Island Univ Kingston Dept of Electrical Engineering*Army Electronics Command, Fort Monmouth, N.J.
PD - 1 Oct 74; 222p
PR - NTIS Prices: PC$7.25/MF$2.25
CC - 9A; 49E
DE - *Image tubes; *Photocathodes; *Cold cathode tubes; Semiconducting films; Epitaxial growth; Gallium arsenides; Germanium; Silicon; Silver compounds; Sulfides; Silicon dioxide; Adsorption; Oxygen; Cesium; Photoelectric materials; Quantum efficiency; Auger electron spectroscopy; Electron diffraction; Vidicons; Television cameras; Night vision; Courses(Education)
ID - Metal insulator semiconductors; Low energy electron diffraction; Silver sulfides; NTISDODA

AP - U7506
CG - DAAB07-69-C-0420
AB - The study of the activation processes for achieving negative electron affinity (NEA) in Ge-doped GaAs layers grown by liquid phase epitaxy is described. Apart from the III-V compounds, NEA has been reported in silicon. The literature suggests that the details of the adsorption of oxygen and Cs on the surface are of crucial importance in achieving NEA surfaces on silicon. A study is reported of the role of dislocations in the adsoprtion of oxygen on the Si (100) surface. Studies on silver sulfide targets for vidicons, and of the heterojunction structure Metal-Silicon Monoxide-Gallium Arsenide are also described. In the educational area a wide ranging set of courses was established to guide the student from the senior level to the advanced graduate stage in solid state physics, optics, electronics, information theory and signal processing.

AN - Ad-785 403/7
TI - Electron-Beam Addressed Memory Research.
TN - Final rept. Mar 72-Jan 74
AU - Kelley, John; Moore, John S.
CS - Stanford Research Inst Menlo Park Calif*air Force Avionics Lab., Wright-Patterson Afb, ohio.
PD - Aug 74; 200p
PR - pc $5.50/Mf $2.25
CC - 9B; 62A
DE - *memory devices; *storage tubes; Addressing; Electron beams; Semiconductor devices; Metal oxide semiconductors; Electrostatics
ID - *electron beam addressed memories; Ntisdodaf
SA - Afal-Tr-74-176
AP - U7423
RN - Sri-Isu-1778
CG - F33615-72-C-1906
PN - Af-4150
AB - Work toward the realization of a practical operational Electron-Beam-Addressed Memory (ebam) is described. Consideration is given to the design of the various components. The electrostatic microcapacitor or 'mucap' medium is described and analyzed. Operation in the quasi-continuous mode is discussed and its importance in the attainment of device stability and target yield is outlined. Measurements on the storage medium are presented. Two pieces of equipment are described: the Sri-sponsored Analog System, designed for making storage target measurments, and an Ebam module, recently delivered to the Usaf avionics Laboratory. Design, construction, and performance of both systems are discussed. (author)

AN - Ad-784 747/8
TI - Principles of Formation of Atomic Vapor in a Thermionic Cathode (TRANSLATION)
AU - Trishin, G. v.; Morozov, V. n.; Shipitsyn, S. a.
CS - Army Foreign Science and Technology Center Charlottesville Va
PD - 13 May 74; 10p
PR - pc $4.00/Mf $2.25
CC - 7D
DE - *metal vapors; *silver; Atomization, Cathodes(electron tubes); dissociation; Spectral lines; Reaction kinetics, Lead(metal); bismuth; Translations; Ussr; substitution reactions; Emission
ID - Silver chloride; Ntisdoda
NO - Trans. of Zhurnal Prikladnoi Spektroskopii (ussr) v17 n2 p399-402 1972.
AP - U7423
RN - Fstc-Ht-23-399-74
AB - The kinetics of formation of the atomic vapors of silver in a cylindrical nickel thermionic cathode were investigated under various conditions. Intensity of the 3280.7 A silver line was used to determine atomic silver vapor concentrations. Using electroplated metallic silver, AgNo3 and AgCl, the latter with and without metallic lead and metallic bismuth, it was found that the silver vapor concentration was increased by reduction in the partial pressure of chlorine, through a substitution reaction between metallic lead or bismuth and AgCl, with a burst in intensity occurring in the silver emission line at the boiling temperature of the metal.

AN - Ad-163 648/9
TI - Sputtered Vapor Laser.
TN - Patent
AU - Willett, Colin S.
CS - Office of the Secretary of the Army Washington D c
PD - Filed 6 Jul 70, patented 16 Nov 71; 5p
PR - not available Ntis
CC - 20E; 80G; 46C; 90G
DE - (*gas lasers, *patents); Discharge tubes, Cathodes(electron tubes); Sputtering
ID - Pat-Cl-331-94-5; *metal vapor lasers; Helium cadmium lasers; Gpa
AP - U7320
RN - Pat-Appl-52 497; Patent-3 621 460
AB - The invention is a sputtered vapor laser which features two discharges within a single lasing apparatus. A secondary discharge is caused to occur between an anode and a hollow cathode whose surface is coated with a suitable lasing material. The sputtering action of the secondary discharge on the surface of the hollow cathode produces vapor of the lasing material inside the hollow cathode. The electric field set up by the cathode of the primary laser discharge acts to draw the vapor of the lasing material towards the primary cathode along the main plasma section of the laser to provide the required concentration of atoms in which to sustain laser oscillation.

AN - Ad-747 663
TI - Gallium-Arsenide-Phosphide Mis capacitor Fabrication and Radiation Studies.
TN - Technical rept.
AU - Phillips, D. H.; Grannemann, W. W.
CS - New Mexico Univ Albuquerque Bureau of Engineering Research
PD - May 72; 312p
PR - pc $6.00/Mf $0.95
CC - 9A; 20L; 18H; 13H; 66H
DE - (*capacitors, Manufacturing methods); (*diodes(semiconductor), Manufacturing methods); (*integrated circuits, Manufacturing methods); (*semiconductor devices, Radiation damage); Gallium arsenides; Phosphides; Field effect transistors; Hardening; Annealing; Sputtering; Oxidation-reduction reactions; Thermal stresses; Electron tubes
ID - Gallium phosphides; Metal oxide semiconductors; Metal insulator semiconductors; Radiation hardening; Schottky diodes; Transient radiation effects(electronics)
AP - U7220
RN - Ee-195(72)onr-005
CG - N00014-68-A-0158
AB - GaAsP mis capacitors were fabricated using several dielectric-growth processes, including Rf sputtering, wet oxidation, and dry oxidation of GaAsP. Depletion capacitance theory was used to calculate the neutron-induced carrier removal rate in GaAsP mis capacitors. Annealing experiments were performed to determine whether 'permanent' radiation damage could be annealed out of the GaAsP mis capacitors. Radiation testing of GaAsP mis capacitors and GaAsP diodes resulted in the development of a magnetic electron deflection tube, a telescoping drift tube, an electron-beam Tree test fixture, and a radiation-hardened line-driver amplifier. (author)

AN - Ad-744 050
TI - Seals.
TN - Report bibliography Jun 55-Jan 72.
CS - Defense Documentation Center Alexandria Va
PD - Jun 72; 241p
PR - pc $3.00/Mf $0.95
CC - 11A; 71B
DE - (*seals, *bibliographies); (*fuel seals, Bibliographies); Gas seals; Gaskets; Hydraulic seals; Oil seals; Plastic seals; Rubber seals; Manufacturing methods; Composite materials; Sealing compounds; O-rings; Glass seals; Hermetic seals; Metal seals; Vacuum seals; Rotary seals; High-pressure research; Adhesives; Bearings; Elastomers; Fuel tanks; Halocarbon plastics; Electron tubes; Ceramic materials
NO - Supersedes Rept. no. Ddc-Tas-70-41-1, Ad-706 000.
AP - U7215
RN - Ddc-Tas-72-44
AB - The bibliography is a compilation of references and Seals. Some of the topics covered are: Development of seals for

advanced-design-launching system, basic research in dynamic sealing, bearing and seal technology review, fluid seals for high-speed rotating equipment, dynamic shaft seals in space, hermetic seals in plastic bodied connectors, gasketing media at ultra-high pressure, study of O-Ring aging characteristics, and a vacuum seal for non-circular tubes. (author)

AN - Ad-735 224
TI - Emission Spectra of Alkali-Metal Molecules Observed with a Heat-Pipe Discharge Tube (REPRINT)
AU - Sorokin, P. P.; Lankard, J. R.
CS - Ibm Watson Research Center Yorktown Heights N Y
PD - 17 May 71; 7p
PR - reprint
CC - 7D; 59G; 80B
DE - (*alkali metals, Molecular spectroscopy); Molecules; Discharge tubes; Electron transitions; Fluorescence
ID - Emission spectra
SA - Arod-3318:81-P
AP - U7205
CG - Da-31-124-Aro(d)-205
PN - Da-2-0-061102-B-11-B
AB - Intense molecular emission spectra from vapors of each of the alkali metals with the exception of lithium have been observed using a new device, the heat-pipe discharge tube. For Na2, K2, and Br2 the total emission appears to be almost entirely comprised of transitions singlet Sigma(u)(+) to singlet Sigma(g)(+) from the first excited singlet state. For Cs2, emission from a low-lying triplet Pi(u) state appears to contribute as well. (author)

AN - N71-33317
TI - Kaufman Thruster Development at Lewis Research Center.
TA - Optimization of Mercury Electron Bombardment Thrusters in Sert Program
AU - Kerslake, W. r.; Reader, P. d.
CS - National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PD - 1971; 12p
PR - pc $3.00 Mf $0.95
CC - 21C; 81B
DE - *electric rocket engines; *electron bombardment, *mercury (metal); *optimization; *space electric rocket tests; Electrodes; Ionization chambers; Tube grids
NO - Conf- Proposed for Presentation At Symp. on Ion Sources and Formation of Ion Beams, Upton, N. Y., 19-21 Oct. 1971
AP - S0920
RN - Nasa-tm-x-67915; E-6539

AN - Ad-730 968
TI - Low-Noise cw Hollow-Cathode Zinc-Ion Laser (REPRINT)
AU - Jensen, R. C.; Collins, G. J.; Bennett, W. R. Jr
CS - Yale Univ New Haven Conn
PD - 4 Sep 70; 3p
PR - reprint
CC - 20E; 80G
DE - (*gas lasers, Zinc); Ions, Cathodes(electron tubes); Power spectra
ID - Ion lasers; *metal vapor lasers
SA - Afosr-Tr-71-2582
NO - Prepared in cooperation with Laser Sciences Corp., Bethel, Conn.
AP - U7122
CG - Af-Afosr-1750-69
PN - Af-9767
TS - 976702
AB - A study of the noise spectra of cw zinc-ion lasers using hollow cathode and more conventional discharges is reported. It is found in the present work that the hollow-cathode mode of operation has two very attractive advantages over previous discharge tube designs for use in zinc-ion lasers: First, the noise on the output beam is at a very much lower level; second, there is a substantial improvement in gain per unit length on transitions from high-lying states of the ion. (author)

AN - Ad-719 553
TI - Physical Electronics and Plasma Physics. (TRANSLATION)
CS - Army Foreign Science and Technology Center Charlottesville Va
PD - 18 Feb 71; 18p
PR - pc $3.00 Mf $0.95
CC - 20I; 20C; 80K; 80E
DE - (*plasma physics, Abstracts); Gas discharges; Ionization, Probes(electromagnetic); Electron tubes; Mass spectroscopy; Thermonuclear reactions; Thermionic emission; Secondary emission; Metal films; Surface properties; Ussr
ID - Translations; Plasma diagnostics
NO - Trans. of mono. Fizicheskaya Elektronika i Fizika Plazmy, Leningrad, 1968 p3-19.
AP - U7108
RN - Fstc-Ht-23-038-71
AB - A group of abstracts describes the activities of various groups at the A. F. Ioffe Institute of Physics and Technology, Academy of Sciences of the Ussr. The fields covered include thermoelectric emission, secondary electron emission in semiconductors, development of new types of mass spectrometers, adsorption and desorption of particles, use of autoemission microscopy, collisions of atomic particles, plasma physics (especially microwave, probe, optical and spectroscopic methods of studying plasma, heating of a plasma in a magnetic field, studies of turbulent plasma) and electric explosions.

AN - Ad-717 742
TI - Vibrational Relaxation of Co by Fe-Atoms.
TN - Research rept.
AU - von Rosenberg, C. W. Jr; Wray, Kurt L.
CS - Avco Everett Research Lab Everett Mass
PD - Dec 70; 23p
PR - pc $3.00 Mf $0.95
CC - 7D; 59G; 80B
DE - (*iron compounds, Relaxation time); (*metal carbonyls, Relaxation time); Shock tubes; Molecular energy levels; Vibration; Electron transitions; Carbon monoxide; Excitation
ID - *iron carbonyls; Molecular vibrations; Spin orbit interactions
NO - Sponsored in part by Defense Atomic Support Agency, Washington, D. C.
AP - U7106
RN - Aerl-Rr-345
CG - F19628-70-C-0144
PN - Af-5710
AB - Shock tube investigations on Fe(co)5 + Ar mixtures are described. Behind incident shocks we observe immediate decomposition of the iron pentacarbonyl to yield Fe and vibrationally cold Co; the Co is then very efficiently relaxed by the Fe-atoms. The results are interpreted to yield a relaxation time for Co infinitely dilute in Fe at 1 atm of P(tau)(co, Fe) of about 0.06 atm micro sec for T = 1400-2900K. This is believed to be the first measurement of vibrational relaxation by metal atoms. (author)

AN - Ad-850 447
TI - High Current Density Cathodes.
TN - Rept. no. 7 (final) 1 Jun 66-31 Aug 68
AU - Bondley, R. j.; Boyd, W. t.; Lock, R. g.; Nall, T. j.; Slivka, M. j.
CS - General Electric Co., Schenectady, N.y.
PD - Jan 69; 208p
PR - pc $3.00 Mf $0.95
CC - 9A; 66G
DE - (*cathodes(electron tubes), performance(engineering)); Tungstates; Nickel; Metal coatings; Zirconates; Life expectancy; X-ray diffraction analysis; Electron microscopy; Electron diffraction analysis; Barium compounds; Oxides; Thermionic emission, Reliability(electronics); Oxygen; Carbon dioxide; Carbon monoxide, Noise(radio); Vapors; Strontium compounds; Electron density
ID - High current density cathodes; Current density; Low current density; Cathode poisoning
SA - Ecom-02289-F
NO - Distribution Limitation now Removed.
AP - U7102
CG - Da-28-043-Amc-02289(e)
PN - Da-1-H-622001-A-055
TS - 1-H-622001-A-05501
AB - An experimental study was made of the critical factors and

mechanisms involved in achieving high-emission-density cathodes capable of long life and reliable operation in electron tubes. Detailed results of the work of the last reporting period of this investigation are included, along with a review of the more significant developments of the entire two-year program. All of the objectives of the program have essentially been met, and in some cases exceeded, resulting in a tungstate cathode which represents an advance in the state of the art for high current density emitters. Reliability and reproducibility were demonstrated by consecutively fabricating and life testing eighteen cathodes, no rejects or deviations were encountered, and initial characteristics were uniform for the entire group. (author)

AN - Ad-851 506
TI - Ceramic Materials. Volume Vii. electronic Devices.
TN - Report bibliography Oct 50-Jan 68.
CS - Defense Documentation Center, Alexandria, Va.
PD - Mar 69; 310p
PR - pc $6.00 Mf $0.95
CC - 11B; 71D
DE - (*ceramic materials, *bibliographies); (*electron tubes, Ceramic materials); (*capacitors, Ceramic materials); Ceramic capacitors; Tantalum capacitors; Electrolytic capacitors; Fixed capacitors; Variable capacitors; Transistors; Mica capacitors; Computer storage devices; Variable resistors; Cavity resonators; Transducers; Indexes
NO - Distribution Limitation now Removed. See also Volume 6, Ad-851 505 and Volume 8, Ad-685 700.
AP - U7101
RN - Ddc-Tas-68-76
AB - The bibliography is composed of 238 unclassified and limited annotated references on the use of ceramic materials in electronic devices. The volume is divided into two subtopics: electron tubes, and capacitors.

******** END OF OFF-LINE PRINT ********

APPENDIX B

CERAMIC ELECTRON TUBES

ENGINEERING INDEX ABSTRACTS: JANUARY 1970 - PRESENT

NUMBER OF CITATIONS - 10, OCTOBER 12, 1976

1.
TI - AXIALLY BALANCED CERAMIC- METAL SEALS IN THE DESIGN OF TRANSMITTING TUBES
OT - ROWNOWAZONE OSIOWO ZLACZA CERAMIKA- METAL W KONSTRUKCJACH LAMP NADAWCZYCH
AU - GUTOWSKI, R; MASLANKIEWICZ, W; MILOSZ, J
SO - ELEKTRONIKA V 12 N 6 1971 P 225-9
SH - ELECTRON TUBES--TRANSMITTING
AN - 72-54955
AB - RESULTS OF THE MATHEMATICAL ANALYSIS OF THE STRESSES PRODUCED IN CERAMIC- METAL SEALS ARE PRESENTED. THE TYPE AND DIMENSIONS OF SEALED MATERIALS ARE TAKEN INTO ACCOUNT. IN POLISH.
CC - 714

2.
TI - DEVELOPMENT AND ENDURANCE TESTING OF HIGH- TEMPERATURE CERAMIC VOLTAGE- REGULATOR TUBES
AU - JONES, ND
AA - GENERAL ELECTRIC CO, SCHENECTADY, NY
SO - NASA CONTRACT REP CR-1813 APR 1971, 40 P
SH - ELECTRON TUBES--CERAMIC
XR - VOLTAGE REGULATORS
AN - 72-22887
AB - THE LONG- TERM PERFORMANCE CAPABILITY OF INERT GAS FILLED VOLTAGE- REGULATING TUBES WAS EVALUATED IN A HIGH- TEMPERATURE HIGH- VACUUM ENVIRONMENT. THE FEASIBILITY OF OPERATING THESE TUBES AT A WALL TEMPERATURE OF 800 C AT 0. 05 AMP CURRENT AND AT A STABLE RUNNING VOLTAGE OF 110 V O- C WAS DEMONSTRATED FOR PERIODS EXCEEDING 10,000 HR. TESTS AT ROOM TEMPERATURE INDICATED A STABLE RUNNING VOLTAGE OF 108 V. A VARIATION OF THE TUBE RUNNING VOLTAGE OF LESS THAN PLUS OR MINUS 2% OVER THE CURRENT RANGE OF 0. 025 TO 0. 075 AMP WAS ACHIEVED.
CC - 633; 714

3.
TI - NEW FAMILY OF CERAMIC THYRATRONS
AU - MENDWN, H; SCOLES, GJ
AA - E.E.V. CO, LTD, CHELMSFORD, ENGLAND
SO - INT CONF ON GAS DISCHARGES, SEPT 15-18 1970. INST ELEC ENG CONF PUBL N 70, LONDON, 1970 P 552-60
SH - ELECTRON TUBES--THYRATRON
AN - 72-13120
CC - 714

5. TI - HIGH RELIABILITY CERAMIC- METAL SEALS FOR TRAVELING- WAVE TUBES
AU - BARRY, TF; SKROBINSKI, FB
AA - RCA ELECTRONIC COMPONENTS, HARRISON, NJ
SO - IEEE 10TH CONF REC ELECTRON DEVICE TECHNIQUES, SEPT 23-24 1970, NEW YORK CITY, NY, 1971 P 174-6
SH - ELECTRON TUBES--TRAVELING WAVE
XR - VACUUM AND VACUUM EQUIPMENT--SEALS; ELECTRON TUBES MANUACTURE
AN - 71-62371
AB - THE INFLUENCE OF MATERIALS AND JIG DESIGN ON THE QUALITY OF TWT CERAMIC- METAL SEALS IS REVIEWED. ASSEMBLY TECHNIQUES THAT USE NOVEL JIG DESIGNS AND DUCTILE COPPER BRAZING ARE DESCRIBED. THESE TECHNIQUES YIELD CRACK- FREE CERAMIC- METAL SEALS THAT CAN WITHSTAND SEVERE THERMAL SHOCK TESTS; THEIR STRENGTH EXCEEDS THAT OF THE METAL COMPONENTS OF THE SEAL.
CC - 619; 633; 704

6. TI - DIFFUSION BRAZING OF CERAMIC- SUPPORTED SLOW- WAVE STRUCTURES FOR CROSSED- FIELD DEVICES
AU - DETRO, RG; DOYLE, EM; MOATS, RR
SO - IEEE 10TH CONF REC ELECTRON DEVICE TECHNIQUES, SEPT 23-24 1970, NEW YORK CITY, NY, 1971 P 171-3
SH - ELECTRON TUBES--AMPLIFIERS
XR - AMPLIFIERS--MICROWAVE
AN - 71-62180
AB - AN IMPROVED METHOD IS DESCRIBED FOR BRAZING THE SLOW- WAVE STRUCTURE OF A MIROWAVE CROSSED- FIELD AMPLIFIER IN S- BAND OR C- BAND ONTO AN ARRAY OF CERAMIC BARS WHICH INSULATE IT FROM THE BASE BLOCK. THE METHOD WAS DEVELOPED, KEEPING IN MIND THAT THE ESSENTIAL PART OF THE AMPLIFIER FUNCTIONING IS THAT ELECTRONS INTERCEPT THE SLOW- WAVE STRUCTURE, AND IT IS NECESSARY THAT THE CERAMICS CONDUCT THE HEAT THUS GENERATED INTO THE BASE BLOCK, WHICH IS LIQUID- COOLED.
CC - 714

4. TI - MICROSCOPIC TECHNIQUES FOR ANALYZING CERAMIC- METAL SEAL FAILURES
AU - BERRY, T
AA - RCA ELECTRONIC COMPONENTS, HARRISON, NJ
SO - IEEE 10TH CONF REC ELECTRON DEVICE TECHNIQUES, SEPT 23-24 1970, NEW YORK CITY, NY, 1971 P 177-9
SH - VACUUM AND VACUUM EQUIPMENT--SEALS
XR - ELECTRON TUBES--MANUFACTURE
AN - 71-62372
AB - A DETAILED PRESENTATION IS MADE OF THE TECHNIQUES USED AT RCA FOR THE POLISHING AND MICROSCOPIC EVALUATION OF CERAMIC- METAL SEALS.
CC - 619; 633; 714

---

7. TI - NEW CHANNEL TYPE ELECTRON MULTIPLIER USING A CERAMIC SEMICONDUCTOR
AU - TOYODA, M; MATSUMOTO, H; WAKINO, K; MORI, M
AA - KOBE UNIV, JAPAN
SO - IEEE 10TH CONF REC ELECTRON DEVICE TECHNIQUES, SEPT 23-24 1970, NEW YORK CITY, NY, 1971 P 109-14
SH - ELECTRON TUBES--ELECTRON EMISSION
XR - ELECTRON TUBES--PHOTOMULTIPLIER; X-RAYS
AN - 71-62195
AB - A NEW MULTIPLIER IS DESCRIBED WHOSE ENTIRE TUBE CONSISTS OF ANY OF THE CERAMIC SEMICONDUCTORS OF BARIUM TITANATE FAMILY, WHICH ARE SECONDARY ELECTRON EMISSIVE MATERIALS. THE NEW TUBE HAS A HIGH GAIN OF ABOUT 10^8. IT CAN ALSO BE USED AS A DETECTOR OF X- RAYS AND OTHER RADIOACTIVE RAYS, AND AS A PHOTOMULTIPLIER WHEN COMBINED% WITH PHOTOELECTRON EMISSIVE MATERIALS. THE METHOD OF MAKING THE NEW MULTIPLIER, AND ITS FUNDAMENTAL CHARACTERISTICS AND ADVANTAGES, IN COMPARISON WITH THOSE OF CONVENTIONAL ONES, ARE DESCRIBED. 7 REFS.
CC - 714; 932

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8. TI - CERAMIC CATHODE RAY TUBES
AU - BRAMALL, DH
AA - RANK PRECISION INDUSTRIES LTD, KENT, ENGLAND
SO - SOC INFORM DISP, 11TH NAT SYMP, INFORM DISP, EVOL & ADVAN, LOS ANGELES, CALIF, MAY 1970 P 68-9
SH - ELECTRON TUBES--CATHODE RAY
AN - 71-44551
CC - 714
CONTINUE PRINTING? (YES/NO)

USER:
Y

PROG:

9. TI - DEVELOPMENT AND ENDURANCE TESTING OF HIGH- TEMPERATURE CERAMIC RECTIFIERS AND THYRATRONS
AU - JONES, ND
AA - GENERAL ELECTRIC CO, SCHENECTADY, NY
SO - NASA CONTRACT REP CR-1684 OCT 1970, 59 P
SH - ELECTRON TUBES--THYRATRON
XR - ELECTRIC RECTIFIERS--TESTING; CERAMIC PRODUCTS
AN - 71-29094
AB - THE LONG- TERM PERFORMANCE CAPABILITY OF GAS- FILLED CERAMIC RECTIFIERS AND THYRATRONS WAS EVALUATED IN A HIGH- TEMPERATURE, HIGH- VACUUM ENVIRONMENT. THE THYRATRON DESIGN UTILIZED WAS BASED ON INVESTIGATIONS CONDUCTED EARLIER UNDER CONTRACTS NAS 3-2548 AND NAS 3- 6469, RESPECTIVELY. THE FEASIBILITY OF OPERATING THESE THYRATRONS AT WALL TEMPERATURES OF 650 TO 750 C AT 3200 HZ WITH 2000 PEAK FORWARD AND INVERSE VOLTS, AND AT 15 AVERAGE AMP, WAS DEMONSTRATED FOR PERIODS EXCEEDING 10,000 HR.
CC - 704; 714; 812

10. TI - SIMPLIFIED CRT CERAMIC GUN ASSEMBLIES
AU - BELL, A
AA - STROMBERG DATAGRAPHICS, INC, SAN DIEGO, CALIF
SO - IEEE-CONFERENCE REC OF 9TH CONFERENCE ON TUBE TECHNIQUES, NEW YORK CITY, NY, SEPT 17-18 1968 P 285-8
SH - ELECTRON TUBES--CATHODE RAY
AN - 70-23270
AB - METHOD OF ELECTRON GUN ASSEMBLY WHICH ASSURES CORRECT MECHANICAL ALIGNMENT AND SPACING OF ELEMENTS THROUGHOUT THE LIFE OF A CATHODE-RAY TUBE IS DESCRIBED. CONCEPT MAKES USE OF A PRECISION GROUND AND SLOTTED CERAMIC TUBE AND VARIOUS CERAMIC SPACERS TO ALIGN PRECISELY THE ELECTRON GUN COMPONENTS. THE FABRICATION METHOD DESCRIBED PROVIDES REDUCED ASSEMBLY TIME AND ASSURES THE CONCENTRICITY, ORTHOGONALITY, AND SPACING OF THE CRITICAL ASSEMBLIES MAKING UP THE ELECTRON GUN. OSMC CHARACTRON SHAPED BEAM TUBE, AROUND WHICH DEVELOPMENT OF THE CERAMIC GUN CONCEPT WAS CENTERED, IS DESCRIBED.
CC - 714

APPENDIX C

HIGH TEMPERATURE ELECTRONICS

NTIS ABSTRACTS: JANUARY 1970 - PRESENT

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AN - AD-A022 096/2SL
TI - Research in Materials Science. I. Optoelectronic Materials and Components: Miniaturized Thin Film Laser Sources and Modulators. II Superconducting Transition Metal Alloys. III. Chemical Synthesis Using High Temperature Lithium Vapor Species
TN - Semi-annual technical rept. no. 1, 1 Jul-31 Dec 75
AU - Epstein, D. J.; Rose, R. M.; MacVicar, M.; Lagow, R.
CS - Massachusetts Inst of Tech Cambridge Center for Materials Science and Engineering Office of Naval Research, Arlington, Va.*Advanced Research Projects Agency, Arlington, Va.
PD - 31 Dec 75; 96p
PR - NTIS Prices: PC$5.00/MF$2.25
CC - 20F; 20L; 7D; 46C; 46D; 99F
DE - *Scientific research; *Materials; Laser materials; Optical materials; Electrooptics; Optical pumping; Light emitting diodes; Fluorides; Oxides; Rare earth elements; Superconductors; Transition metals; Crystal growth; Tunneling(Electronics); Synthesis(Chemistry); Organometallic compounds; Lithium compounds; Polymerization
ID - Optical modulators; NTISDODN
AP - U7610
CG - N00014-75-C-1084; ARPA Order-2994
AB - No abstract available.

AN - AD-A019 862/2SL
TI - Turbine Engine Telemetry Analysis
TN - Final rept. 30 Apr-1 Nov 75
AU - Adler, Alan J.
CS - Acurex Corp Mountain View Calif*Air Force Aero-Propulsion Lab., Wright-Patterson AFB, Ohio.
PD - Nov 75; 66p
PR - NTIS Prices: PC$4.50/MF$2.25
CC - 21E; 9F; 81D; 97H; 45C
DE - *Gas turbines; Telemetering transmitters; Microelectronics; Reliability(Electronics); Resistors; Capacitors; Integrated circuits; Digital systems; Transistors; High temperature; Hybrid circuits
ID - NTISDODAF
SA - AFAPL-TR-75-95
AP - U7606
CG - F33615-75-C-2055
PN - AF-3066
TS - 306613
AB - Turbine engine telemetry (miniature radio transmitters, mounted on rotating engine components to telemeter physical measurement data) were analyzed with the goals of achieving standardization, reduced costs and higher operating temperature. The report contains: the results of a telemetry-user survey and recommended standards for both packaging and function; and, results of a brief exploration of the problems associated with operating microelectronic circuitry at temperatures up to 200C, including 200C functional test data on 18 typical microelectronic

components.

AN - AD-A017 284/1SL
TI - High Field Conduction and Breakdown in Aprotic Liquids
TN - Technical rept.
AU - Proud, J. M.; Auborn, J. J.
CS - Gte Labs Inc Waltham Mass*Office of Naval Research, Arlington, Va.
PD - Sep 75; 17p
PR - NTIS Prices: PC$3.50/MF$2.25
CC - 7D; 99F
DE - *Sulfur; *Liquids; Electrical conductivity; Viscosity; Temperature; Hexanes; Tunneling(Electronics); Dielectric strength
ID - Aprotic liquids; *Sulfur chlorides; Liquid sulfur; Nanosecond pulses; *Dielectric breakdown; Insulating oil; Dielectric liquids; NTISDODN
AP - U7601
RN - TR-2
CG - N00014-74-C-0215
PN - NR-359-570
AB - Energetic electron processes may exist in aprotic liquids due to the absence of C-H molecular bonds. Two liquids, molten sulfur and S2C12, have been investigated. Evidence for high field tunneling and a liquid phase Townsend alpha-process is found in liquid sulfur. Nanosecond pulse breakdown data provides additional evidence for liquid phase electron avalanche behavior in S2C12. The nanosecond breakdown statistics are compared for hydrocarbon as well as aprotic liquids.

AN - AD-A015 849/3SL
TI - Deep Borehole Operation of the Borehole Seismometer System, Model 36000
TN - Special technical rept. Aug-Jan 75
AU - Douze, E. J.; Sherwin, John R.
CS - Teledyne Geotech Garland Tex*Air Force Technical Applications Center, Patrick AFB, Fla.
PD - 15 Mar 75; 105p
PR - NTIS Prices: PC$5.25/MF$2.25
CC - 8K; 14B; 48F
DE - *Seismographs; Seismometers; *Boreholes; Operation; High temperature; High pressure; Reliability(Electronics); Test methods; Modification; Signal to noise ratio; Performance(Engineering); Wyoming
ID - *Seismic noise; Long period seismometers; NTISDODAF
AP - U7525
RN - TR-75-2
CG - F08606-74-C-0013
AB - The project described was concerned primarily with, first, the modification of the Borehole Seismograph System, Model 36000, to operate under the high pressure and high temperature environment encountered in boreholes up to 3000 m (10,000 ft) deep, and secondly, various studies of signals and noise as a function of

depth. Modification of the instrument, along with required auxiliary equipment was relatively straightforward and consisted primarily of substitution of high-reliability, 105C components for some of the standard units in the electronics sections. Actual operations were carried out at a deep borehole site near Pinedale, Wyoming during the period from April through December 1974. Data from three different long-period (LP) seismographs were recorded for analysis - a conventional surface LP system using 10 kg mass seismometers and galvanometer-phototube amplifiers, a standard Model 36000 at a fixed depth of 46 m (150 ft) and a deep-hole Model 36000 at various depths from 46 m to 914 m (3000 ft).

AN - AD-A009 782/4SL
TI - Lithium-Inorganic Electrolyte Batteries
TN - Quarterly rept. no. 5, 16 Sep-15 Dec 74
AU - Holleck, Gerhard L.; Turchan, Michael J.; Toland, David E.
CS - Eic Inc Newton Mass*Army Electronics Command, Fort Monmouth, N.J.
PD - Apr 75; 30p
PR - NTIS Prices: PC$3.75/MF$2.25
CC - 10C; 97D
DE - *Primary batteries; Lithium; Thionyl chloride; Chemical analysis; Sulfur; Reliability(Electronics); Reduction(Chemistry); Electrodes; Gas chromatography; Cathodes; Nickel; Platinum; Gold; Carbon black; Storage; Temperature; Protective coatings
ID - *Lithium cells; Lithium chlorine cells; High energy batteries; Lithium tetrachloroaluminates; Aluminates/tetrachloro; NTISDODA
SA - ECOM-74-0030-5
NO - See also report dated Jan 75, AD/A-005 057.
AP - U7514
RN - C-401-5
CG - DAAB07-74-C-0030
PN - DA-1-T-161102-A-34-A
TS - 1-T-161102-A-34-A-02
AB - An all-inorganic electrolyte, lithium primary battery operable over the temperature range -40 to +160F is being evaluated. The desired energy density is 150 watt-hours per pound of total battery weight and the desired power density is 50 watts per pound. Sulfur is a reaction product of Li/SOCl2 cells. Fifty percent (50%) of the total sulfur content of reacted SOCl2 is found by chemical analysis of elemental sulfur. Sulfur is quite soluble in the electrolyte. Analysis by gas chromatography indicates that SO2 is a reaction product, but no other major volatile products are formed. Reduction of SOCl2 on Ni, Pt, Au and C is a complex, potential dependent process. Surface layers are formed on all these electrodes and interfere with reduction of SOCl2. After high temperature storage, Li/SOCl2 batteries showed severe voltage delays and voltage depression due to Li electrode polarization. The protective film on Li breaks only locally leading to localized anodic Li dissolution at high current densities.

AN - AD-A008 676/9SL
TI - PbSnTe High Reliability
TN - Final technical rept.
AU - Guimento, A.
CS - Barnes Engineering Co Stamford Conn*Army Mobility Equipment Research and Development Center, Fort Belvoir, Va.
PD - 26 Jul 71; 6p
PR - NTIS Prices: PC$3.25/MF$2.25
CC - 17E; 63C
DE - *Infrared detectors; Semiconductors; Lead compounds; Tin compounds; Tellurides; Reliability(Electronics); Temperature
ID - Lead tellurides; Tin tellurides; NTISDODA
AP - U7513
CG - DAAK02-72-C-0438
PN - DA-15763719-DK-70
AB - This report consists of data sheets giving the detector parameters of ten single element PbSnTe infrared detectors. The goal was to provide devices capable of high temperature storage and vacuum integrity. Efforts were directed at meeting the temperature requirements for class 1 equipment of MIL-STD-810B.

AN - AD/A-005 057/5SL
TI - Lithium-Inorganic Electrolyte Batteries
TN - Quarterly rept. no. 4, 17 Sep 73-16 Sep 74
AU - Holleck, Gerhard L.; Turchan, Michael J.; Cogley, David R.
CS - Eic Inc Newton Mass*Army Electronics Command, Fort Monmouth, N.J.
PD - Jan 75; 58p
PR - NTIS Prices: PC$4.25/MF$2.25
CC - 10C; 97D
DE - *Primary batteries; Carbon black; Cathodes; Reliability(Electronics); Chemical reactions; Lithium; Chlorine; Chlorides; Sulfur compounds; Corrosion; Temperature; Electrodes; Reduction(Chemistry)
ID - *Lithium cells; Lithium chlorine cells; Thionyl chloride; High energy batteries; Lithium aluminum chlorides; NTISDODA
SA - ECOM-74-0030-4
NO - See also Quarterly rept. no. 3, AD-786 673.
AP - U7508
RN - C-401-4
CG - DAAB07-74-C-0030
PN - DA-1-T-161102-A-3-A
TS - 1-T-161102-A-3-A-02
AB - An all-inorganic electrolyte, lithium primary battery operable over the temperature range -40 to +160F is being evaluated. The desired energy density is 150 watt-hours per pound of total battery weight and the desired power density is 50 watts per pound. At all temperatures, capacity is limited by polarization of the carbon electrode. Prolonged storage at 160F results in severe voltage delays and lower steady-state discharge voltages upon discharge at room temperature. Both the voltage delays and the lower discharge voltages are attributable to polarization of the Li electrode. Corrosion of Li in SOCl2 is more severe in

practical stainless steel cells than in glass containers under high purity conditions. Reduction of SOCl2 on Ni, stainless steel, or C is a complex, potential dependent process. LiCl is a major constituent of electrode surface films formed upon reduction in SOCl2/LiAlCl4 solutions.

AN - UCID-16613
TI - Approaches to High Temperature Electronics
AU - Blum, A. S.
CS - California Univ., Livermore Lawrence Livermore Lab.
PD - 16 Oct 74; 8p
PR - NTIS Prices: PCS4.00/MF$2.25
CC - 09A; 49D; 49H
DE - Electron tubes; Electronic equipment; High temperature; Semiconductor devices
ID - NTISAEC
AP - N3103
CG - W-7405-eng-48
AB - For abstract, see NSA 31 03, number 08128.

AN - Ad-786 673/4SI
TI - Lithium - Inorganic Electrolyte Batteries.
TN - Quarterly rept. no. 3, 16 Mar-15 Jun 74
AU - Cogley, David R.; Turchan, Michael J.; Holleck, G. I.
CS - Eic Inc Newton Mass'army Electronics Command, Fort Monmouth, N.j.
PD - Sep 74; 49p
PR - pc $3.75/Mf $2.25
CC - 10C; 97D
DE - *primary batteries; Carbon black; Cathodes, Reliability(electronics); corrosion; Chemical reactions; Lithium; Chlorine; Chlorides Sulfur compound; Temperature, Performance(engineering)
ID - *lithium cells; Lithium chlorine cells; Thionyl chloride; High energy batteries; Lithium aluminum chlorides; Ntisdoda
SA - Ecom-74-0030-3
NO - See also report dated May 74, Ad-779 477.
AP - U7425
RN - C-401-3
CG - Daab07-74-C-0030
PN - Da-1-T-161102-A-34-A-02
TS - 1-T-161102-A-34-A-0243
AB - An all-inorganic electrolyte, lithium primary battery operable over the temperature range -40 to +160F is being evaluated. The desired energy density is 150 watt-hours per pound of total battery weight and the desired power density is 50 watts per pound. Severe Li electrode polarization was observed in experimental cells after one week's storage at 160F. Li electrode corrosion was more severe in stainless steel cells than under high purity conditions in glass containers. Potential scans on Ni, stainless steel, and C show that Socl2 reduction is a complex, potential-dependent process. Carbon is the best catalyst

for SocI2 reduction at anodic potentials. In the 'passive region,' significant cathodic currents are observed on carbon below 1 V. the major part of the films formed is LiCl. Sulfur is a reaction product of Li/SocI2 cells. At -40F, cell voltage is limited by the carbon electrode. (modified author abstract)

AN - Ad-782 281/0
TI - High Pressure Transducer.
TN - Technical rept.
AU - Miller, G. kirby
CS - Gte Sylvania Inc Mountain View Calif Electronic Systems Group-Western Div
PD - 15 Jun 74; 107p
PR - pc $4.50/Mf $1.45
CC - 9A; 17A; 49C; 63A
DE - *transducers; *hydrophones; Electrical properties; Sensitivity; Environmental tests; Temperature, Performance(engineering), tolerances(mechanics); coaxial cables, Reliability(electronics); electrets; Computer programs; Fortran
ID - Ntisdodn
NO - See also Ad-906 983.
AP - U7419
RN - Tr-3
CG - N00014-72-C-0307
AB - The primary purpose of the study is to measure and evaluate the performance of an electret coaxial cable transducer as a hydrophone. This includes any possibel environmental effects on performance such might be caused by depth pressure, temperature, and motion-caused turbulence.

AN - N74-18810/3
TI - Research on Materials for Advanced Electronic and Aerospace Application.
TN - Semiannual Status Report, 1 Jan. - 30 Jun. 1973.
CS - Rice Univ., Houston, Tex.
PD - 30 Jun 73; 29p
PR - pc $4.50/Mf $1.45
CC - 14B
DE - *magnetic recording; *materials tests; *optical data processing; *polymers; Aerospace environments; Electronics; High pressure; High temperature research; Technology utilization
ID - Nasa
AP - S1210
RN - Nasa-Cr-137234; Sasr-28
CG - Ngr-44-006-001
AB - Research data are reported on optical and magnetic data processing, hydrogen in metals and stress corrosion phenomena, and polymers and materials at high temperatures and pressures.

AN - Ad-774 753/8
TI - High Temperature Solid State Pressure Transducers for Military Jet Engine Environments.
TN - Final technical rept. Mar 72-Oct 73
AU - Vick, Gerald L.; House, J. h.
CS - Conrac Corp Duarte Calif
PD - Oct 73; 36p
PR - pc $3.25/Mf $1.45
CC - 14B
DE - *transducers; Pressure; Solid state electronics; Jet engines; High temperature; Strain gages; Silicon; Military applications
ID - *pressure sensors; Af
SA - Affdl-Tr-73-145
AP - U7408
CG - F33615-72-C-1179
PN - Af-1987
TS - 198702
AB - The document reports the work performed to apply advance design and fabrication techniques to the economic development of high temperature solid state pressure transducers for military jet engine enviroments. Improvements in a previously developed high temperature solid state pressure transducer have been made in a number of areas. Media compatibility has been extended from clean air to conductive and mildly corrosive liquids and gases. Cost effective reductions to warrant production have been achieved. Accuracy has been improved by introduction of nonlinear temperature compensation. The operating temperature range has been extended from 660F to 750F with survival proven to 930F. (author)

AN - Ad-765 504/6
TI - Fast Warmup Quartz Reference Oscillator.
TN - Final rept. 1 Jun 71-31 Jan 73
AU - Greenhouse, Harold M.; McGill, Robert L.; Clark, Daniel P.
CS - Bendix Corp Baltimore Md Communications Div
PD - Jun 73; 113p
PR - pc $4.25/Mf $1.45
CC - 9A; 66B; 49B
DE - (*crystal oscillators, Quartz resonators); High frequency; Temperature control; Resistors; Metal films, Microminiaturization(electronics); Miniature electronic equipment; Design
ID - Film resistors; A
SA - Ecom-0265-F-71
AP - U7320
RN - 471-1045-984
CG - Daab07-71-C-0265
PN - Da-1-S-662705-A-058
TS - 1-S-662705-A-05802
AB - The report covers the work in developing a miniature fast warmup quartz oscillator for use in planned tactical communication equipment. The report includes design, fabrication, and

performance details of such a device. Electrical, thermal mechanical, and microelectronic design criteria are given in sufficient detail to allow trade-offs with respect to performance goals. To keep the size of this stable 5 Mhz oscillator within one cubic inch, microelectronic techniques are employed. The resonator is held at its upper turn point and is enclosed in a specially designed isothermal enclosure. The enclosure is held at a constant uniform temperature by a proportional temperature control circuit so that the enclosure is the oven for the resonator. Located on top of the enclosure, and maintained at a constant temperature, are the oscillator, heating transistors, the temperature controller for the enclosure, and a second control circuit. (modified author abstract)

AN - Ad-764 530/2
TI - High-Power Density Hydrazine Fuel Cells
AU - Icenhower, D. e.; Urbach, H. b.
CS - Naval Ship Research and Development Center Annapolis Md
PD - Jun 73; 16p
PR - pc $2.75/Mf $1.45
CC - 108; 97D
DE - (*fuel cells, *hydrazine); Oxygen; Temperature, Reliability(electronics); Polarization; Asbestos
ID - *hydrazine fuel cells; N
AP - U7319
RN - Nsrdc-3934; Nsrdc-27-381
PN - Sf35-431
TS - Sf35-431-005
AB - A hydrazine-oxygen fuel cell was operated under moderate conditions of temperature and concentration at power densities up to 600 watts per square foot (1000 amperes per square foot at 0.6 volt), at this output, a power efficiency of 32% was obtained at 70C at less than molar hydrazine concentration. Power efficiencies exceeding 48% were obtained over a power density range from 40 to 200 watts per square foot by matching the temperature and hydrazine concentration optimally to the electrical load. The three major components of cell polarization were examined. Critical resistance losses were minimized by use of a 0.010-inch asbestos matrix which was more than adequate to prevent leakage of oxygen to the anode at moderate differential pressures. A projected cell thickness of 0.1 inch and a power density of 200 watts per square foot correspond to a calculated stack power-volume ratio of 16 kilowatts per cubic foot. (modified author abstract)

AN - Ad-763 840
TI - Physics of Semiconductor Luminescence and High-Temperature Semiconductors.
TN - Final rept. 1 Jun 68-14 Mar 73
AU - Rediker, Robert H.; Fonstad, Clifton G.
CS - Massachusetts Inst of Tech Cambridge Dept of Electrical Engineering
PD - 2 Jul 73; 23p
PR - pc $3.25/Mf $1.45
CC - 20L; 80N
DE - (*semiconductors, Luminescence); Silicon; Germanium; Gallium arsenides; Aluminum compounds; Photodiodes; Lasers; Tin compounds; Oxides; High-temperature research; Photoconductivity; Band theory of solids, Tunneling(electronics); Crystal growth; Electrical properties; Optical properties; Secondary emission
ID - Tin oxides; Aluminum arsenides; Metal insulator semiconductors; Af
SA - Afosr-Tr-73-1211
AP - U7318
CG - Af-Afosr-1571-68
PN - Af-9763
TS - 976301
AB - A new luminescence modulation effect was observed in Si and Ge and a new negative resistance phenomenon discovered in Ge. The intrinsic energy band levels in (al,Ga)as were studied as a function of alloy composition, and the modulation of (al,Ga)as luminescence by surface fields investigated. Higher quality crystals of the wide band-gap semiconductor stannic oxide than previously available were grown and extensive studies were undertaken of Sn02's electrical and optical properties, crystal growth, and device technology. (author)

AN - Ad-820 729
TI - 300 C semiconductor for Power Devices.
TN - Interim technical rept. no. 4, 1 Apr-30 Jun 67
AU - Krassner, L.
CS - Radio Corp. of America, Somerville, N.j. Electronic Components and Devices.
PD - Sep 67; 25p
PR - pc $6.00/Mf $0.95
CC - 9A; 66H
DE - (*crystal rectifiers, Power equipment); High-temperature research; Epitaxial growth; Gallium arsenides; Crystal lattice defects; Surface properties, Failure(electronics); Substrates; Phosphides
NO - Distribution Limitation now Removed.
AP - U7214
CG - Af 33(615)-5352
AB - Vapor-phase, epitaxial p-n junctions have been grown of gallium arsenide and gallium arsenide-phosphide alloys. Rectifiers were completed and sealed using the etching, metalization, and soldering processes developed. Thermal cycling tests to 300C were completed successfully, and high-forward-current tests encourage

the conclusion that rectifiers with smaller areas than those planned originally can fulfill contract goals.

AN - Ad-818 309
TI - Investigation of Maintenance-Free High Rate, Nickel-Cadmium Batteries for Aircraft Application.
TN - Quarterly technical progress rept. no. 4, 1 Mar-1 Jun 67
AU - Kantner, Edward; Lennon, Hugh J.; Wouk, Victor; Gladstone, Bruce
CS - Gulton Industries, Inc., Metuchen, N. j. alkaline Battery Div.
PD - Jun 67; 63p
PR - pc $6.00/Mf $0.95
CC - 10C; 67A
DE - (*storage batteries, Helicopters); Cadmium; Battery separators; Design; Logic circuits; Electronic relays; Voltage; Temperature, Modules(electronics); Packaging; Energy; Nickel; Flight testing; Maintenance; Thermal analysis; Storage; Low-temperature batteries
ID - *nickel cadmium batteries; High rate batteries
NO - Distribution Limitation now Removed.
AP - U7214
RN - Ab-3100-40
CG - Af 33(615)-5357
PN - Af-8173
TS - 817304
AB - The objective of the program was to develop an integrated power system consisting of a hermetically sealed, maintenance-free, nickel, cadmium battery and associated charge control-charge conditioning unit for aircraft application. The system must be capable of delivering high rate discharges for engine starting. Charge acceptance of sealed nickel-cadmium batteries to a fixed voltage was determined at temperatures from +20 F to -40 F. The high rate charge-discharge behavior of polypropylene separators in sealed cells was investigated from 0F to 140F. A summary of flight test data on a Uh-1(u)f helicopter is presented. (author)

AN - Ad-819 853
TI - Accelerated Testing of High Reliability Parts. Volume I.
TN - Final rept. 17 Dec 65-17 Dec 66
AU - Walsh, T.; Best, G.
CS - General Electric Co., Philadelphia, Pa. Missile and Space Div.
PD - Jun 67; 209p
PR - pc $3.00/Mf $0.95
CC - 14D; 14B; 73C
DE - (*electronic equipment, Tests), Reliability(electronics); Resistors; Capacitors, Diodes(semiconductor), Failure(electronics); Glass capacitors; Ceramic capacitors; Mica capacitors; Semiconductors; Electric currents; Temperature; Voltage
ID - Accelerated tests
SA - Radc-Tr-67-71-Vol-1
NO - Distribution Limitation now Removed.
AP - U7211

CG - Af 30(602)-3968
PN - Af-5519
TS - 551902
AB - Long term tests to 30,000 hours were continuted to provide correlation data for accelerated test results. A theory of life governing processes for electronic parts is given. The data are analyzed and presented to provide estimates of the life governing processes for each part type. A physics of failure study of mica, ceramic, porcelain, and glass capacitors was also performed and the results are included. (author)

AN - Ad-736 265
TI - Design and Operational Characteristics of a High-Speed (millisecond) System for the Measurement of Thermophysical Properties at High Temperatures (REPRINT)
AU - Cezairliyan, Ared
CS - National Bureau of Standards Washington D C
PD - 19 Nov 70; 13p
PR - reprint
CC - 14B; 73D; 86V
DE - (*measuring devices(electrical + electronic), High-temperature research), Test equipment(electronics); Data processing systems; Thermal properties; Electrical properties
ID - *electric conductors; Thermophysical properties
SA - Afosr-Tr-72-0204
AP - U7206
PN - Af-9750
TS - 975001
AB - Design and constructional details of a high-speed system for the measurement of selected thermophysical properties of electrical conductors at temperatures above 2000 K in experiments of subsecond duration are described. Operational characteristics of such a system are given. Various phenomena that affect the design and successful operation of the system are discussed and, whenever possible, quantitative results are given. Certain experimental checks to assess the operation of the system are also described. (author)

AN - Ad-734 785
TI - High Temperature Infrared Detectors for Aircraft Fire Detection.
TN - Final rept. 1 Jan-30 Sep 71
AU - Entine, G.; Mitchell, C. R.; Wald, F. V.; Cocks, F. H.
CS - Tyco Labs Inc Waltham Mass
PD - Dec 71; 95p
PR - pc $3.00 Mf $0.95
CC - 17E; 1B; 63C; 51G
DE - (*infrared detectors, Reliability(electronics)); (*aircraft fires, Detection); Films; Tellurium alloys; Cadmium alloys; Photodiodes; Manufacturing methods; Photoelectric materials; Signal-to-noise ratio
ID - Cadmium tellurides

SA - Afapl-Tr-71-89
AP - U7204
RN - C-111
CG - F33615-71-C-1084
PN - Af-3048
TS - 304807
AB - CdTe photodetectors capable of operating continuously at 750F were developed. The detectors at temperature could detect a photosignal of 100 micron W/square centimeters with a signal to noise ratio of fourteen to one with an output impedance of 500ohms. The detectors had peak sensitivity near 0.9micron and were quite insensitive above 1.2 micron, making them ideal for operation as aircraft engine fire detectors. (author)

AN - Ad-732 495
TI - High Energy Density, Long Life Secondary Battery (silver-Zinc) Assembly Bb 634 ()/U.
TN - Final rept. 31 Oct 68-15 Oct 71
AU - Sparks, Richard H.
CS - Elpower Corp Santa Ana Calif
PD - Oct 71; 116p
PR - pc $3.00 Mf $0.95
CC - 10C; 67A
DE - (*storage batteries, Design), Reliability(electronics); Environmental tests; Vibration; Drop testing; Temperature; Humidity; Liquid immersion tests; Zinc; Silver; Mechanical drawings; Test methods
ID - *silver zinc cells; *zinc cells; Bb-534/u batteries
SA - Ecom-0093-F
AP - U7201
CG - Daab07-69-C-0093
PN - Da-1-T-662705-A-053
TS - 1-T-662705-A-05302
AB - The purpose of the contract was the design, development, nd testing of the silver-zinc battery assembly Bb 534 ()/U. This battery assembly is a military-ruggedized design consisting of four (4) Bb 461 ()/U batteries stacked side by side in the man-pack configuration. The battery assembly is rated at 24 volts and 9.0 ampere hours or 12 volts and 18.0 ampere-hours. The design goals were successfully accomplished. The environmental tests included vibration, shock, drop tests, and high and low temperature, humidity, immersion, and altitude. In addition these batteries were subjected to a complete range of electrical tests. The final report outlines the design and development program and fully documents the battery assembly design. Complete engineering drawings are included in the final report as well as artist's visualization of the battery assembly. (author)

AN - Ad-727 761
TI - High Temperature Electronics.
TN - Final technical rept. 11 Nov 69-15 May 71
AU - Campbell, R. B.; Berman, H. S.; Loftus, W. D.; Hardies, C. E.
CS - Westinghouse Electric Corp Pittsburgh Pa Astronuclear Lab
PD - Jul 71; 79p
PR - pc $3.00 Mf $0.95
CC - 9E; 9A; 66H
DE - (*transistor amplifiers, High-temperature research); (*field effect transistors, Silicon carbides); Aircraft equipment; Manufacturing methods; Resistors; Diffusion; Circuits
SA - Afapl-Tr-71-46
AP - U7118
CG - F33615-70-C-1053
PN - Af-3048
AB - The fabrication of a silicon carbide (siC) junction field effect transistor (j-Fet) was shown practicable. Several amplifier designs were breadboarded with silicon devices to study the required parameters. A simplified building block amplifier was constructed and tested. (author)

AN - Ad-710 952
TI - Engineering evaluation of low temperature high rate Reserve magnesium perchlorate batteries.
TN - Technical rept.
AU - Almerini, Achille L.; Nordell, Carl A.
CS - Army Electronics Command Fort Monmouth N J
PD - Jul 70; 27p
PR - hc $3.00 Mf $0.65
CC - 10B; 67A
DE - (*primary cells, *magnesium); (*electrolytes, *perchlorates); (*water-activated batteries, Magnesium); Design; Manganese compounds; Mercury compounds; Cold weather tests, Reliability(electronics)
ID - *reserve batteries; *magnesium manganese dioxide cells; *magnesium mercury oxide cells; Magnesium perchlorates; *magnesium cells
AP - U7020
RN - Ecom-3307
PN - Da-1-T-662705-A-053
TS - 1-T-662705-A-05302
AB - An engineering evaluation program successfully demonstrated the feasibility of magnesium perchlorate electrolyte batteries in meeting high rate and low temperature requirements of telemetry systems in Army warheads. More effort is needed, however, to achieve a single battery design and electrolyte formulation that will work over the entire temperature range of -40F to +140F. While both manganese dioxide or mercuric oxide batteries were satisfactory, the former show more favorable voltage characteristics. Further design work is recommended to achieve optimum cell and battery construction features and to optimize such critical factors as electrolyte formulation, volume and

methods for fast and uniform activation. (author)

AN - Ad-702 838
TI - A resonator for measuring dielectric parameters at high Temperatures (TRANSLATION)
AU - Batura, V. G.; Grinenko, V. G.; Moiseev, V. K.
CS - Foreign Technology Div Wright-Patterson Afb Ohio
PD - 19 Dec 69; 6p
PR - hc $3.00 Mf $0.65
CC - 14B; 9A; 945
DE - (*test equipment(electronics), High-temperature research); (*cavity resonators, Design); (*dielectrics, Dielectric properties); Patents; Ussr
ID - Translations
NO - Edited trans. of Patent (ussr) 228 128 p1-2, 7 Aug 67, by H. Peck.
AP - U7010
RN - Ftd-Ht-23-567-69
PN - Ftd-7230178
AB - An Author Certificate has been issued for a resonator designed for measuring the parameters of dielectrics at high temperatures. It consists of a cylindrical water-cooled tunable cavity resonator, systems for excitation and removal of Shf energy serving for measuring the specimen parameters, and a specimen holder. To permit simultaneous Shf-heating and measurement of the dielectric parameters of the specimen, the resonator wall opposite the specimen contains four rectangular openings in which are mounted wave laminated filters for insertion of the Shf heating energy. (author)

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APPENDIX D

ELECTRON TUBES - GENERAL

NTIS ABSTRACTS: JANUARY 1970 - PRESENT

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AN - AD-892 432/6SL
TI - Small-Signal Amplification
TN - Final rept. 1 Feb 70-30 Nov 71
AU - Dean, Raymond H.
CS - Rca Labs Princeton N J
PD - Mar 72; 113p
PR - NTIS Prices: PC$5.50/MF$3.00
AV - Distribution limitation now removed.
CC - 9E
DE - (*Microwave amplifiers; Signals); Transistor amplifiers; Microwave oscillators; Gallium arsenides; Integrated circuits; X band; Gain; Bandwidth; Phase modulation; Space charge; Field effect transistors; Thickness; Radiofrequency; Traveling wave tubes; Epitaxial growth; Transistors; Negative resistance circuits; Doping; Dielectric properties; Electric fields; Substrates; Electron density; Information theory
ID - Current density; Constants; Dielectric properties; Gunn effect; Schottky barrier transistors; Signal processing; *Small signal amplifiers; Transferred electron amplifiers; Traveling wave transistors; NTISDODXD
SA - AFAL-TR-72-18
AP - D7622
RN - PRRL-72-CR-2
CG - F33615-69-C-1788
PN - AF-4460
AB - The significance of this research to the Air Force is the availability of a new versatile, general-purpose solid-state microwave amplifier for frequencies above 3 GHz. In the prototype traveling-wave transistor, a transistor-like input launches a traveling space-charge wave, which grows exponentially as it moves along in a thin layer of n-GaAs to a relatively distant output. At the output the signal is enhanced further by built-in negative resistance. The long distance between input and output makes it feasible to optimize input and output independently and minimizes the feedback capacitance which often limits gain and bandwidth in high-frequency devices. Twelve experimental units show broad-band net gain in X-band, with 14 to 26 dB built-in isolation. One unit exhibits instantaneous net gain from 6.7 to 15.3 GHz; another yields 28 dB at 9.2 GHz. All devices are good for linear microwave signal processing: voltage-controlled phase modulation at constant net gain, or voltage-controlled gain modulation at constant phase. Different bias conditions make possible threshold-sensitive saturated-amplitude amplification of pulses or sinusoids, for logic or digital functions. A related two-terminal reflection amplifier has been demonstrated also. (Author)

AN - AD-A026 382/2SL
TI - Technological Progress in Electronic Components: A Life Cycle Support Problem
TN - Student project rept.
AU - Garrison, Carroll Eugene
CS - Defense Systems Management School Fort Belvoir Va
PD - May 76; 66p
PR - NTIS Prices: PC$4.50/MF$2.25
CC - 15E; 9E; 9A; 74E
DE - *Life cycles; *Electronic equipment; *Logistics; Weapon systems; Transistors; Integrated circuits; Electron tubes; Microprocessors; Technology; Monolithic structures(Electronics); Chips(Electronics); Gates(Circuits); Logic circuits; Radio receivers
ID - NTISDODXA; NTISDODSD
AP - U7618
RN - DSMS-PMC-76-1
AB - Given the current rate of technological change in electronic components, repair parts support over the total life cycle of a weapons system or item of electronic equipment in the defense inventory is becoming increasingly difficult. The technological evolution of a selected group of components, including receiving vacuum tubes, transistors, integrated circuits and micoprocessors is briefly reviewed. Case histories of life cycle support problems are used to emphasize circumstances encountered when changes in technology result in either a discontinuance, or a reluctance to continue production. The significance of governmental dependence upon commercial production bases is indicated. Approaches to design and support planning which may reduce future problems caused by technological change are discussed and ranked. Specific examples of current application of these approaches are included. A relevant new DOD Directive, concerned with diminishing sources of supply and material shortages, is introduced. This Directive, in draft, is currently being staffed with DOD Components. This study should serve as a useful source of information to acquisition managers and others responsible for systems development and support planning. (Author)

AN - AD-A025 147/0SL
TI - Shock and Vibration Evaluation of ML-8094/199 Tube Container
AU - Brown, Richard V.
CS - Air Force Packaging Evaluation Agency Wright-Patterson AFB Ohio
PD - May 76; 22p
PR - NTIS Prices: PC$3.50/MF$2.25
CC - 13D; 9A; 94G
DE - *Electron tubes; *Shipping containers; High voltage; Rectifiers; Shock resistance; Shock tests; Vibration; Fragility; Handling; Drop tests
ID - NTISDODXA; NTISDODAF
AP - U7615
RN - DSPT-76-16
PN - AFPEA-76-P7-13

AB - The Defense Electronic supply Center (DESC) reported that excessive damage had been experienced during shipment of ML-8094/199 High Voltage Rectifier tubes from the Connecticut based manufacturer to Peterson Field, Colorado. The main objectives of this study were twofold: (1) Determine if the present pack will protect the tube when subjected to rough handling tests as prescribed by MIL-P-116; and (2) Determine if the pack could be modified to afford increased protection to the tube. The results of this study indicated that the present pack will protect the tube during the rough handling tests, but the modified pack will provide protection beyond the failure drop height of 42 inches from the present pack. (Author)

AN - AD-A020 854/6SL
TI - Department of Defense AD HOC Vacuum Tube Support Group
TN - Final rept
CS - Dod Product Engineering Services Office Alexandria Va
PD - Jun 75; 96p
PR - NTIS Prices: PC$5.00/MF$2.25
CC - 15E; 9A; 74E
DE - *Electron tubes; *Inventory analysis; Military requirements; Supplies; Military equipment
ID - NTISDODSD
AP - U7608
AB - The DoD Ad Hoc Vacuum Tube Support Group was established to: (a) identify specific tubes presently out of production and/or in short supply, as well as those anticipated to be in this position in the future; (b) determine equipment applications, projected equipment life, and rate of tube replacement; (c) develop practical and economical alternatives to the worsening problem of diminishing production sources for needed replacement tubes. This report contains a chronology of the activities and accomplishments of this joint group and its conclusions and recommendations.

AN - PB-241 397/9SL
TI - Technical Research and Technical Information Reports. Part 7
TN - Rept. for 1948-58
AU - Deitz, Jules
CS - Federal Communications Commission, Washington, D.C. Research and Standards Div.
PD - 1958; 91p
PR - NTIS Prices: PC$4.75/MF$2.25
CC - 17B; 20N
DE - *Electromagnetic radiation; Spurious radiation; Ship antennas; Television receivers; Radio receivers; Frequency modulation; Position finding; Radio transmission; Medium frequencies; Electron tubes; Radiofrequency interference
ID - NTISFCC
NO - See also PB-241 396.
AP - U7513

RN - FCC/OCE/XRS-74-07
AB - Includes technical information reports Spurious and Harmonic Radiation; Performance of Shipboard Antennas at 500Kc; Radiation From TV and FM Receivers; Variation of Bandwidth with Audio Frequency for a Frequency Modulated Emission; and Technical Research Reports: List of Commercially Available Transmitting Tubes Capable of Operation Above 300 MC; A Study of Radiolocation Systems as Used in Offshore Oil Prospecting; Various Aspects of Bandwidth; A Means of Estimating the Radiation from and Interference Potentiality of a Hypothetical Radiolocation Station; Computation of Correlation Factors Between Instruments Used in Measuring Radiated Noise; Television Broadcast Receiver Harmonic Oscillator Radiation Interference.

AN - COM-74-51229/4SL
TI - Tabulation of Published Data on Electron Devices of the U.S.S.R. Through December 1973
TN - Final technical note
AU - Marsden, Charles P.
CS - National Bureau of Standards, Washington, D.C. Electronic Technology Div.
PD - Nov 74; 133p
PR - NTIS Prices: PC-GPO/MF$2.25-NTIS
AV - Paper copy available from GPO as 13.46:835.
CC - 09A; 49D; 49H; 86V
DE - *Electron tubes; *Semiconductor devices; *Catalogs(Publications); Thermocouples; USSR
ID - NTISCOMNBS
NO - Supersedes NBS-TN-715, COM-72-50665.
AP - U7505
RN - NBS-TN-835
PN - NBS-4250654
AB - The tabulation includes published data on U.S.S.R. electron devices as collected from publications, mostly handbooks, published by the various ministries and institutes of the U.S.S.R. Information is given on all active devices ranging from receiving to microwave devices, semiconductor devices, and miscellaneous devices such as photographic flash tubes and thermistors.

AN - Com-74-70224/2
TI - Census of Manufactures: 1972 (preliminary Report), electron Tubes, Transmitting, Sic 3673.
CS - Bureau of the Census, Washington, D.C.
PD - Feb 74; 7p
PR - not available Ntis
CC - 5C; 91J; 96A; 86I
DE - *electron tubes; *manufacturing; *census; *industries; Manufacturers census; Manufacturers shipments; Expenses, Employment Tables(data)
ID - Ntiscomcen

AP - U7420
RN - Mc72(p)-36D-7
AB - The reports, issued for each of 450 manufacturing industries (or groups of industries), provide preliminary industry totals for quantity and value of products shipped, value added by manufacture, cost of materials, expenditures for new plant and equipment, and employment. Tables present U.S. industry totals for general statistics; geographic division and state industry totals for general statistics; quantity and value of individual products shipped; and quantity and cost of materials consumed by establishments in the industry. The data are presented for 1972 with comparable historical data. For individual reports, see below

AN - Com-74-70222/6
TI - Census of Manufactures: 1972 (preliminary Report). electron Tubes, Receiving Type, Sic 3671.
CS - Bureau of the Census, Washington, D.c.
PD - Jan 74; 7p
PR - not available Ntis
CC - 5C; 91J; 96A; 86I
DE - *electron tubes; *manufacturing; *census; *industries; Manufacturers census; Manufacturers shipments; Expenses, Employment Tables(data)
ID - Ntiscomcen
AP - U7420
RN - Mc72(p)-36D-5
AB - The reports, issued for each of 450 manufacturing industries (or groups of industries), provide preliminary industry totals for quantity and value of products shipped, value added by manufacture, cost of materials, expenditures for new plant and equipment, and employment. Tables present U.S. industry totals for general statistics; geographic division and state industry totals for general statistics; quantity and value of individual products shipped; and quantity and cost of materials consumed by establishments in the industry. The data are presented for 1972 with comparable historical data. For individual reports, see below

AN - Bdx-613-931(rev.)
TI - Protection of Glass Tubes in Epoxy Encapsulation.
AU - Steele, J. w.
CS - Bendix Corp., Kansas City, Mo. (usa).
PD - Mar 74; 78p
PR - pc $7.00/Mf $1.45
CC - 11C; 71E
DE - (*silicones, *protective coatings); (*glass, *thermal cycling); (*rubbers, Protective coatings); Design; Electron tubes; Epoxides; Failures; Surface coating
ID - Ntisaec
AP - N3001
CG - At(29-1)-613
AB - For abstract, see Nsa 30 01, number 02310.

AN - Sla-73-553
TI - Bibliography on Vacuum Switch Tube, Vacuum Arc, and Vacuum Breakdown Literature.
AU - Grissom, J. t.
CS - Sandia Labs., Albuquerque, N. mex.
PD - May 73; 48p
PR - pc $3.00/Mf $1.45
CC - 9A; 20C; 66D; 80E
DE - (*switches, *bibliographies); (*electric arcs, Bibliographies); (*breakdown, Bibliographies); Anodes; Cathodes; Electron tubes; Low pressure
ID - Aec
AP - N2806
AB - For abstract, see Nsa 28 06, number 15161.

AN - Ad-765 971/7
TI - Handbook on Gas-Filled Tubes (TRANSLATION)
AU - Gurley, D. s.
CS - Army Foreign Science and Technology Center Charlottesville Va
PD - 30 Jun 73; 218p
PR - pc $13.00/Mf $1.45
CC - 9A; 66D; 49D
DE - (*discharge tubes, Handbooks); Electron tubes; Thyratrons; Mercury lamps; Lighting equipment; Rectifiers; Ussr
ID - Ignitrons; Translations; A
NO - Trans. of mono. Spravochnik po Ionnym Priboram, Kiev, 1970, by Brun.
AP - U7320
RN - Fstc-Ht-23-327-73
PN - Fstc-T7023012301
AB - Data are presented on the parameters, types of systems and operating comditions of the most widespread domestically produced gas-filled tubes. The principles of operation and construction of each class of tube is briefly described. Circuit configurations are given for certain tubes. Data are given on tubes applicable to electronics and radio engineering (stabilitrons, thyratrons), industrial power rectification equipment (mercury-filled tubes), domestic and industrial illumination (lamps of types Ld, prk, drsh, etc.) and computer and other fields of technology (decatrons, nuclear radiation counters and the like). (author)

AN - Ad-754 962
TI - Selected Material from Soviet Technical Literature, October 1972
AU - Hibben, Stuart G.
CS - Informatics Inc Rockville Md
PD - 15 Dec 72; 195p
PR - pc $3.00/Mf $0.95
CC - 5B
DE - (*scientific research, *ussr); Abstracts; Lasers; Shock waves; Shock tubes; Hypersonic flow; Supersonic flow; Thermodynamics;

Explosion effects; Seismology; Electron beams; Materials; Cybernetics
ID - Neodymium lasers; Ruby lasers
SA - Afosr-Tr-73-0033
NO - See also report dated 31 Oct 72, Ad-751 956.
AP - U7306
CG - F44620-72-C-0053; Arpa Order-1622-3
AB - The report includes abstracts and bibliographic lists on major contractual subjects that were completed in October, 1972. The major topics are: laser technology, effects of strong explosions, geosciences, and particle beams. Sections on material science and a biocybernetics bibliography have been included. To avoid duplication in reporting, only laser entries concerning high-power effects are routinely included, since all current laser material appears regularly in the quarterly bibliographies. An index identifying source abbreviations and an author index to the abstracts are appended. (author)

AN - Ad-754 926
TI - Evaluation and Analysis of the 6950 Electron Tube Pack.
TN - Technical rept.
AU - Loper, Joseph D.
CS - Air Force Packaging Evaluation Agency Wright-Patterson Afb Ohio
PD - Jan 73; 32p
PR - pc $3.75/Mf $0.95
CC - 13D; 9A; 69M; 66D
DE - (*electron tubes, *packaging); (*packing materials, Reliability), Shock(mechanics); Vibration; Springs; Effectiveness; Protection; Isocyanate plastics; Test methods; Environmental tests
ID - Package cushioning systems
AP - U7306
RN - Dspt-45
PN - Af-71-27-C-4
AB - The objective of the study was to evaluate the shock and vibration protection provided by the shipping container and spring suspension cushion system used in packaging the type 6950 electron tube. If it were found that the container system provided insufficient protection for the tube, the study would be directed toward the development of a new or modified pack. A deficiency in the form of a highly resonant condition was detected during vibration testing at 4.0 Hz. Therefore, several methods of attenuating the vibration were developed and evaluated. The results of the evaluation indicated that the use of polyurethane 'detuning snubbers' was the most effective and efficient method of reducing the resonant condition. (author)

AN - Pb-213 755/2
TI - Electronic Products Technical Notes. Volume I. (fy 1971 and 1972).
TN - Final rept.
CS - Bureau of Radiological Health, Rockville, Md. Div. of Electronic Products.
PD - Dec 72; 32p
PR - pc $3.00/Mf $0.95
CC - 6R; 57V
DE - (*radiation measuring instruments, Radiation hazards); Radiation warning systems; Test equipment; Tests; Television equipment; Microwaves; Horn antennas; Electron tubes; X rays; Monitors; Ovens; Safety devices
ID - Microwave ovens
NO - Includes Brh/dep-N71-2 thru Brh/dep-N72-5.
AP - U7305
RN - Brh/dep-N71-1; Brh/dep-N72-6
AB - Technical Notes included are: evaluation of a Rayguard High-Voltage Warning Device for Color Tv monitoring, Circuitry for a 3-Second Response Time in the Narda 8110 Microwave Survey Instrument, A program for Calculating Near-Zone Gain of Pyramidal Horn Antennae, Static Testing of High Voltage Rectifier Tubes for X-ray Emission, Problems of Power Measurement Using Non-Square-Law Detectors, Direct-Print Paper: a new Material for X-ray Imaging, Test Method for Fluoroscopic Beam Alignment, Modification of Electronic X-ray Pulse Counter, and Switch Failure Monitoring Device. (author)

AN - Com-72-50665
TI - Tabulation of Published Data on Electron Devices of the U.s.s.r. Through December 1971.
TN - Technical note
AU - Marsden, Charles P.
CS - National Bureau of Standards, Washington, D.c. Electronic Technology Div.
PD - Jun 72; 109p
PR - pc-Gpo/Mf $0.95-Ntis
CC - 9A; 66; 86V
DE - (*electronic equipment, Ussr); Data; Electron tubes; Semiconductor devices; Integrated circuits; Rectifiers; Thermocouples; Thermistors
NO - Supersedes Nbs-Tn-526, Com-71-00065.
AP - U7216
RN - Nbs-Tn-715
AB - The tabulation includes published data on U.s.s.r. electron devices as collected from publications, mostly handbooks, published by the various ministries and institutes of the U.s.s.r. information is given on all active devices ranging from receiving to microwave devices, semiconductor devices, and miscellaneous devices such as photographic flash tubes and thermistors. (author)

AN - N72-14236
TI - Microwave Device Investigations.
TA - Devices for Generation, Amplification, and Detection of Microwave and Millimeter Wave Energies
TN - Semiannual Progress Report, 1 Apr. 1971 - 1 Oct. 1971
AU - Haddad, G. I.; Lomax, R. J.; Masnari, N. A.; Shabde, S. B.
CS - Michigan Univ., Ann Arbor. Electron Physics Lab.
PD - Nov 71; 59p
PR - pc $3.00/Mf $0.95
CC - 9E; 66B
DE - *microwave amplifiers; *microwave equipment; *microwave sensors; *millimeter waves; Avalanche diodes; Electron tubes; Junction diodes; Signal detectors; Solid state devices; Varactor diodes
AP - S1005
RN - Nasa-cr-125072; Sapr-10
CG - Ngl-23-005-183; Proj. 084000

AN - Ad-701 083
TI - Conical electrostatic probes in a continuum flowing plasma.
TN - Technical rept.
AU - Dukowicz, John K.
CS - Cornell Aeronautical Lab Inc Buffalo N Y
PD - Jan 70; 62p
PR - hc $3.00 Mf $0.65
CC - 20I; 93S
DE - (*plasma medium, *probes); Conical bodies; Electron density; Supersonic flow, Incompressible flow; Shock tubes
ID - *electrostatic probes; Plasma diagnostics
AP - U7007
RN - Cal-An-2755-Y-1
CG - Dahc60-68-C-0016
AB - A theory is presented for electrostatic probes used in continuum flowing plasmas under conditions when charged particle diffusion effects can be neglected in comparison with the effects of convection and the electric field. The theory is applied to the case of a 10 degree half-angle conical probe in an incompressible, inviscid flow field. Calculated results are presented for a range of parameters. The theoretical results are compared with the results of shock tube experiments with conical probes in which the electron number density was measured independently by microwave interferometers operated at Ka-band and X-band. It is found that while the qualitative behavior of the probe current is well described, the electron number density predicted by the theory is approximately twice the expected value on the average. This discrepancy is believed to be primarily due to the difference between the actual supersonic flow field and the assumed flow field. (author)

AN - Ad-722 606
TI - A List of Reports Published Under Contract N6onr-251(07).
TN - Final rept.
CS - Stanford Univ Calif Stanford Electronics Labs
PD - 4 Feb 58; 11p
PR - pc $3.00 Mf $0.95
CC - 9A; 4A; 66D; 55A
DE - (*electronics, bibliographies); (*atmospheric sounding, Bibliographies); Electron tubes; Scientific research; Electronic equipment
AP - U7112
CG - N6onr-251(07)
PN - Nr-373 360

AN - Sc-Rr-70-497
TI - Computer aided design of microwave triode oscillators
AU - Chaffin, R. j.
CS - Sandia Labs., Albuquerque, N. mex.
PD - Jul 70; 42p
PR - hc $3.00 Mf $0.65
CC - 9E; 66B
DE - (*microwave oscillators, Triodes); Electron tubes; Microwave tubes; Feedback circuits; Design
ID - *computer aided design
AP - N2420

AN - Ad-705 848
TI - Electron-Tube-Type operational amplifiers for an Analog computer complex
AU - Polonnikov, D. E.; Chernychev, R. N.
CS - Foreign Technology Div Wright-Patterson Afb Ohio
PD - 31 Mar 70; 18p
PR - hc $3.00 Mf $0.65
CC - 9B; 9E; 52A; 66B
DE - (*analog computers, *feedback amplifiers); Gain; Accuracy; Electron tubes; Ussr
ID - *operational amplifiers; Translations
NO - Edited machine trans. of mono. Sredstva Analogovoi i Analogo-Tsifrovoi Vychislitelnoi Tekhniki (analog and Analog-Digital Computer Technology) Moscow, 1968 p106-115, by Charles T. Ostertag.
AP - U7013
RN - Ftd-Mt-24-53-70
PN - Ftd-6050205
TS - Dia-T68-05-02
AB - Described are three groups of amplifiers with gains ranging from 10,000 to 4,000,000.

AN - Ad-698 165
TI - Low-Power electronic tubes type 30Ts6S for a broad range of applications. (TRANSLATION)
CS - Army Foreign Science and Technology Center Washington D C
PD - 10 Nov 69; 12p
PR - hc $3.00 Mf $0.95
CC - 9A; 913
DE - (*electron tubes, Standards), Reliability(electronics); Specifications; Ussr
ID - Translations
NO - Trans. of Russian State Standard Gost 8078-67 21 Oct 67.
AP - U7003
RN - Fstc-Ht-23-303-69
AB - The article outlines specifications for testing low-power electronic tubes of type 30Ts6S. Testing specifications for vibration, heat-stability, humidity-stability are included. Tests for short circuiting, breakdown, and guaranty of durability are shown as well. There are details of requirements for testing under various heat conditions. More details of vibration testing are also included. (author)

AN - Ad-698 163
TI - Type 5Ts4C Low-Powered electron tube for widely used devices. (TRANSLATION)
CS - Army Foreign Science and Technology Center Washington D C
PD - 10 Nov 69; 13p
PR - hc $3.00 Mf $0.95
CC - 9A; 913
DE - (*electron tubes, Rectifiers); Standards; Ussr
ID - Translations
NO - Trans. of Russian State standard Gost 8079-67.
AP - U7003
RN - Fstc-Ht-23-304-69
AB - The document establishes standards for the physical configuration and electrical characteristics of the type 5Ts4C dual-plate vacuum rectifier tube. A detailed chart outlines testing standards and conditions including maximum and minimum specifications for tube electrical parameters. (author)

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APPENDIX E

ELECTRON TUBES - GENERAL

ENGINEERING INDEX ABSTRACTS: JANUARY 1970 - PRESENT

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COMPENDEX ABSTRACT NUMBERS

TI - SEMIAUTOMATIC TEST STAND FOR ELECTRON TUBES.
AU - Kakurin, E. G.; Kakurina, E. E.; Brazhe, K. K.
SO - Meas Tech v 17 n 10 Oct 1974 p 1608-1610
SH - ELECTRON TUBE TESTING
AN - 75-051619
AB - A system is described which minimizes the number of operations involved in the testing of electron tubes by means of switches that can be set to different tube types. The entire allocation of all specification voltages to the electrodes of the tested tube is realized by the rotation of a switch, greatly reducing the time spent in the testing of electron tubes and eliminating the possibility of random operator errors.
CC - 714
JC - MSTCAL

TI - Electron Tubes.
OT - LAMPY ELEKTRONOWE.
AU - Hennel, Jan
AA - POLITECHNIKA WARSZAWSKA, POL
SO - Elektronika v 14 n 1-2 1973 p 44-47
SH - ELECTRON TUBES
AN - 73-039530
AB - The advantages of electron tubes and their superiority for certain applications are discussed, with emphasis on their use in the microwave region. Research work in this field performed in Poland is reported. Future developments are considered. 15 refs. In Polish.
CC - 714
JC - EKNTBZ

TI - ELECTRON TUBES IN MODERN MILLIMETER WAVE TECHNOLOGY.
AU - Gross, F.; Poebl, K.
AA - SIEMENS, MUNICH, GER
SO - Microwave J v 15 n 3 Mar 1972 7 p between p 41 and 55
SH - ELECTRON TUBES, MICROWAVE
AN - 73-023467
AB - Physical processes, millimeter waves in communications, performance, output power and efficiency, frequency tuning and stability, spurious modulation and noise, levelling, supply voltages, size and weight and resistance to mechanical shock are considered for electron tube.
CC - 714
JC - MCWJAD

TI - RESIDUAL GASES IN ELECTRON TUBES.
AU - van Aller, G.; Wulms, C. J. G. H.; Marquard, K.; Jedlicka, M.; Hellier, S. J.; Kansky, E.; Jeric, S.; Oliver, M.; Boutot, J. P.
SO - Residual Gases in Electron Tubes, London and New York, Academic Press, 1972, Proc. 4th Int, Held in Florence, Italy, Apr 14-17, 1971. 399 p
SH - ELECTRON TUBES
XR - ELECTRIC LAMPS
AN - 73-017905
AB - Gas Desorption Phenomena in X-Ray Image Intensifiers. By G. van Aller and C. J. G. H. Wulms. Influence of Various Getter Types on Residual Gases, Cathode Activity and Life Expectancy of Vidicon TV Pick-up Tubes. By K. Marquard. Residual Gases and Fatigue in Photocathodes. By M. Jedlicka. Measurement of Gaseous Impurities in Alkali Metal Vapour Generated by a Dispenser. By S. J. Hellier. Residual Caesium Vapour Pressure in Photo-Electronic Tubes. By E. Kansky and S. Jeric. Stability of the Tri-Alkali Photocathode in an Alkali-Free Environment. By M. Oliver. Gas Release from Microchannel Electron Multiplier Arrays. By J. P. Boutot.
CC - 707; 714

TI - RESIDUAL GASES IN ELECTRON TUBES.
AU - Comsa, G.; Choumoff, P. S.; Bernadet, H.; de Chernatony, L.; Singleton, J. H.; Barosi, A.; Biguenet, C.; Attia, E. A.; Beck, A. H. W.; Smith, J. K.; Friedel, R.; Meinel, F. K.; Tuck, R. A.; Mellor,; H; 707, 714
SO - Residual Gases in Electron Tubes, London and New York, Academic Press, 1972, Proc. 4th Int, Held in Florence, Italy, Apr 14-17, 1971. 399 p
SH - ELECTRON TUBES
XR - ELECTRIC LAMPS
AN - 73-017904
AB - Behaviour of Ions in a BAG Tube. By G. Comsa. High Pressure Ionization Gauge with Extended Low Limit of Measurement. By P. S. Choumoff and H. Bernadet. Perturbational Limitations to the Attainment of UHV. By L. de Chernatony. Gas Sources and Pumping Processes in Electronic Power Tubes. By J. H. Singleton. Gettering Activity of Some Single Phases Present in the Zr-Al Alloy System. By A. Barosi. Influence on Residual Atmosphere During Exhaust of Hydrocarbons Used in Mechanical Forepumps. By C. Biguenet. Exhaust Processing and Test Operation of a Vacuum Switch Tube. By E. A. Attia. Residual Gas Effects in a 25 kW Ceramic Envelope Klystron. By A. H. W. Beck and J. K. Smith. Thermionic Cathodes under the Bombardment of Ions. By R. Friedel and F. K. Meinel. Gas Poisoning of Osmium-Coated Tungsten Cathodes under Realistic Operating Conditions. By R. A. Tuck. Long-Term Stability of Corona Discharge Stabilizer Tubes. By D. J. Mellor. Vacuum Problems of Photoelectric Devices. By J. D. McGee.
CC - 707; 714

TI - RESIDUAL GASES IN ELECTRON TUBES.
AU - van den Berg, J.; Boelens, P. R.; Cayless, M. A.; della Porta, P.; Rabusin, E.; Rees, J. M.; Johnston, R. B.; Coaton, J. R.; Castello, G.; Pesente, P.; Charlton, M. G.; van Dien, J. B.; Chisholm, T. H; 707; 714
SO - Residual Gases in Electron Tubes, London and New York, Academic Press, 1972, Proc, 4th Int, Held in Florence, Italy, Apr 14-17, 1971, 399 p
SH - ELECTRON TUBES
XR - ELECTRIC LAMPS
AN - 73-017903
AB - Poisoning of Thermionic Cathodes by Oxygen Gas and Argon Ions. By J. van den Berg and P. R. Boelens. Residual Gases in Lamps. By M. A. Cayless. Mercury Release and Gettering in Fluorescent Tubes. By P. della Porta and E. Rabusin. New Gettering Technique for Tungsten Halogen Lamps. By J. M. Rees, R. B. Johnston, J. R. Coaton and M. A. Cayless. Analysis of Gaseous Impurities in the Filling Gas of Fluorescent Lamps by Gas Chromatography with a Helium Detector. By G. Castello and P. Pesente. Method for Opening Sealed Vacuum Devices for Residual Gas Analysis. By M. G. Charlton and J. B. van Dien. Use of a Channel Electron Multiplier with a Residual Gas Analyser. By T. Chisholm, J. Hobregtse, G. F. Weston and E. E. Windsor.
CC - 707; 714

TI - RESIDUAL GASES IN ELECTRON TUBES.
AU - Giorgi, T. A.; della Porta, P.; Turnbull, J. C.; Maneville, J.; Millet, J. P.; Obert, M.; Neuville, J.; Nakanishi, H.; Kai, J.; Koitabashi, M.; van Bakel, A. M.; Fransen, J. J. B.; De Biasio, M. P.; H; 707; 714
SO - Residual Gases in Electron Tubes, London and New York, Academic Press, 1972, Proc, 4th Int, Held in Florence, Italy, Apr 14-17, 1971, 399 p
SH - ELECTRON TUBES
XR - ELECTRIC LAMPS
AN - 73-017902
AB - The 34 papers comprising the proceedings report, discuss research work into problems and phenomena connected with residual gases in electron tubes. Modern trends in electron tube manufacture are closely pursued with particular attention given to residual gas problems in color television picture tubes, special tubes and photo-electronic devices. The papers also cover residual gas problems in lamps. Descriptions of the latest gettering techniques designed to overcome the harmful effects of unwanted gases in both electron tubes and lamps are also included. Following is a listing of titles and authors. Present Knowledge on the Gaseous Ambient in Colour-Picture Tubes. By P. della Porta. Molecular Gas Flow in Color-Picture Tubes. By J. C. Turnbull. Defective Cathode Emission in Colour TV Tubes Caused by Fluorine Contamination. By J. Manville, J. P. Millet, M. Obert and J. Neuville. Emission Decay Phenomenon in a Picture Tube as Related to a Glass Bulb. By H. Nakanishi, J. Kai and M.

Koitabashi. Automatic Apparatus for Determining Sorption Properties of Getter Films in Picture Tubes. By A. M. van Bakel and J. J. B. Frasen. Evaluation of Getter Film Characteristics in Television Tubes by Means of Sorption Tests. By T. A. Giorgi and M. P. De Biasio. Barium Getter in Operating Pentodes. By H. J. R. Perdijk. Influence of Gas Ambient on the Emission Characteristics of Thermionic Cathodes. By E. Biro.
CC - 707; 714

TI - ELECTRON TUBES GO FROM STRENGTH TO STRENGTH.
AU - Willshaw, W. E.
AA - GEC ELECTRONIC TUBE CO
SO - Electron Power v 18 Jun 1972 p 212-218
SH - ELECTRON TUBES
AN - 72-007751
AB - Advances in the performance of a variety of electron tubes are briefly outlines. Particular types covered include gas-discharge tubes, microwave tubes, power klystrons, traveling-wave tubes, light-display devices, projection display tubes, and light-pickup devices. 45 refs.
CC - 714
JC - ELPWAQ

TI - Electron tube with negative mutual conductance
OT - Lampa elektronowa o ujemnej konduktancji wzajemnej
AU - MATUSEWICZ, A
AA - INSTYTUT RADIOKOMUNIKACJI POLITECHNIKI, DANZIG, POLAND
SO - Elektronika v 12 n 5 1971 p 177-81
SH - ELECTRON TUBES--Pentode
AN - 72-47982
AB - A circuit is described which has the properties of a pentode with negative slope of the characteristic. The circuit is analyzed and some applications are proposed. In Polish.
CC - 714

TI - Electron tubes for satellites, space probes and earth stations
AU - POEBL, K; PROMMER, A
AA - SIEMENS AG, MUNICH, WEST GERMANY
SO - Seimens Rev v 38 n 1 Jan 1971 p 7-11
SH - SPACE VEHICLES--Communications Systems
XR - SATELLITES--Electronic Equipment; SPACE VEHICLES--Electronic Equipment; SATELLITES--Communication Systems
AN - 72-35139
AB - The activities in the tube sector for the radiocommunication equipment of ground stations, satellites and space probes, are reviewed. 10 refs.
CC - 655; 715; 716; 718

TI - Indication of influence of temperature on the gain of an electron tube multiplier without a window
OT - Mise en evidence de l'influence de la temperature sur le gain d'un multiplicateur tubulaire d'electrons sans fenetre
AU - BARAT, C
AA - CENTRE D'ETUDE SPATIALE DES RAYONNEMENTS, TOULOUSE, FRANCE
SO - Nucl Instrum Methods v 87 n 2 Oct 15 1970 p 247-52
SH - COUNTERS--Accessories
FT - ELECTRON MULTIPLIERS
AN - 72-02934
AB - The gain of 20 units of different channel electron multipliers is studied as a function of temperature for variable applied voltages and incident fluxes. The devices show an exponential reduction of gain when the temperature decreases dating from 50 C, upper limit of utilization. This reduction depends on the contamination of the layer and it is necessary to obtain accurate and stable characteristics to find a rapid desorption device of the inner channel surface. THe interpretationof this law shows that the output current is proportional to the conduction layer current. In French.
CC - 944
JC - NUIMA

TI - Investigation of causes of interelectrode insulation damages in low- power electron tubes
OT - Badanie przyczyn wystepowania zlej izolacji miedzyelektrodowej w lampach elektronowych malej mocy
AU - ANDRACZKE, A; BANASZCZYK, R; MAGDZIAK, H
AA - POLITECHNIKA WARSAW, POLAND
SO - Elektronika v 11 n 7-8 1970 p 279-80
SH - ELECTRON TUBES--Manufacture
AN - 72-04347
AB - Article describes the causes of failure and damage. Experimental results are presented about the effect of such factors as the use of magnesium and the state of vacuum on the number of tubes having bad insulation. In Polish.
CC - 714

TI - Recent trends in vacuum studies for electron tubes
AU - VENEMA, A
AA - PHILIPS RES LABS, EINDHOVEN, NETHERLANDS
SO - Proc of 4th Int Vacuum Congr Pt 1, Manchester, Apr 17-20 1968, Inst Phys & Phys Soc, London, England, Conf Ser n 5 p 267-70
SH - ELECTRON TUBES
XR - VACUUM AND VACUUM EQUIPMENT
AN - 71-05753

TI - Residual gases in electron tubes after storage
AU - ZIKES, V
AA - RES INST FOR VACUUM ELECTRONICS, PRAGUE, CZECHOSLOVAKIA
SO - Vacuum v 19 n 10 Oct 1969 p 445-9
SH - ELECTRON TUBES--Materials
XR - VACUUM AND VACUUM EQUIPMENT
FT - OUTGASSING
AN - 70-58156
AB - An omegatron residual gas analyzer was used in a study of compositiin of gases in electron tubes immediately after fabrication and later on after storage. After being stored and then operated, an electron tube increases partial pressure of hydrogen about 14 times greater than if operated immediately after fabrication. The source of hydrogen is traced to an evaporated barium film from the cathode deposited on the inner anode surface. Hydrogen was related at rate of 1x10- **7 liter Torr/ sec.
CC - 633; 714
JC - VACUA

TI - Cross-fertilization of electron tube technology with other device technologies
AU - REED, L
AA - EIMAC DIVISION OF VARIAN, SAN CARLOS, CALIF
SO - IEEE-Conference Rec of 9th Conference on Tube Techniques, New York City, NY, Sept 17-18 1968 p 89-97
SH - ELECTRIC EQUIPMENT
AN - 70-23088
AB - Several major electron tube techniques which have resulted in the conception and up-grading of 'new' devices are reviewed. Devices discussed are gas laser, high-power lamps, IR reflectors, ordnance devices such as exploding-bridge wire and nuclear batteries, and high-density heat flux diode. Potential use of pyrolytic graphite, boron nitride, niobium and other space age materials in simple planar triode structures is discussed.
CC - 704

TI - Cooling of a high-power electron tube in a space vehicle
AU - CONWAY, EC; WILMARTH, RW
AA - GENERAL ELECTRIC CO, KING OF PRUSSIA, PA
SO - IEEE-Conference Rec of 9th Conference on Tube Techniques, New York City, NY, Sept 17-18 1968 p 182-90
SH - ELECTRON TUBES--Traveling Wave
AN - 70-23230
AB - Thermal control system has been designed, built, and tested to provide cooling for a traveling wave tube (TWT) mounted in a spacecraft. The system was designed to demonstrate the capability of heat pipes to provide high thermal conductance paths for 750 w, dissipated at the TWT collector, to flow to a flat plate radiator where the heat can be radiated to space. Test results

AB - are included, showing the system thermal performance in several modes of operation for varying power dissipations. The results of failure of one, two, three, or all four pipes are presented. Also included is an analytical investigation of the weight and area requirements of both passive and heat pipe space radiators.
CC - 714

TI - New special electron tubes
OT - Neue Spezialroehren
AU - ANON
SO - Int Elektronische Rundschau v 23 n 7 1969 p 188-90
SH - RADIO COMMUNICATION
XR - EXHIBITIONS--West Germany; ELECTRON TUBES--Magnetron; RADIO TRANSMITTERS; TELEVISION TRANSMITTERS
AN - 70-01340
AB - Details on radio and television transmitter tubes, magnetrons, traveling- wave tubes and TV camera tubes etc used for radio communication and of particular interest are described on basis of exhibits at Hanover Fair (April 26 to May 4 1969) and of publications by manufacturers. TV picture tubes and cathode- ray tubes for oscilloscopes are not included in this report. In German. From Science Abstracts.
CC - 711; 712; 713; 714; 716; 717

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