NBS

Technical Note 171

BIBLIOGRAPHY ON ATMOSPHERIC ASPECTS OF RADIO ASTRONOMY

Including Selected References to Related Fields

WILHELM NUPEN

U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

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A complete listing of the Bureau's publications can be found in National Bureau of Standards Circular 460, Publications of the National Bureau of Standards, 1901 to June 1947 ($1.25), and the Supplement to National Bureau of Standards Circular 460, July 1947 to June 1957 ($1.50), and Miscellaneous Publication 240, July 1957 to June 1960 (includes Titles of Papers Published in Outside Journals 1950 to 1959) ($2.25); available from the Superintendent of Documents, Government Printing Office, Washington 25, D.C.

NATIONAL BUREAU OF STANDARDS
Technical Note

171

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BIBLIOGRAPHY ON ATMOSPHERIC ASPECTS OF RADIO ASTRONOMY

Including Selected References to Related Fields

Wilhelm Nupen

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MGA Staff members:

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A. V. .... André Vandenplas

Others:

IRE Absts. (Institute of Radio Engineers, Proceedings)
Bulletin Signaletique Absts.
Elec. Eng. Absts.
Physics Absts.
NASA Absts. (National Aeronautics and Space Administration)
CSIRO (Commonwealth Scientific and Industrial Research Organization. Div. of Radiophysics, Sydney, Australia)
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Library Symbols:

DBS....... U. S. National Bureau of Standards, Wash., D. C.
DGS ...... U. S. Geological Survey, Wash., D. C.
DLC ...... Library of Congress, Wash., D. C.
DWB...... U. S. Weather Bureau, Suitland, Maryland
DN-HO .... U. S. Navy Hydrographic Office, Suitland, Maryland

BIBLIOGRAPHY ON ATMOSPHERIC ASPECTS OF RADIO ASTRONOMY INCLUDING SELECTED REFERENCES TO RELATED FIELDS

INTRODUCTION

This is the fourth in a series of bibliographies being prepared by the M & GA staff of the American Meteorological Society for the Boulder Laboratories of the National Bureau of Standards. The first three were:

1. Bibliography on Ionospheric Propagation of Radio Waves (1923-1960). NBS Technical Note No. 84, October 1960. (1404 items)
2. Bibliography on Meteoric Radio Wave Propagation. NBS Technical Note No. 94, May 1961. (368 items)
3. Bibliography on Auroral Radio Wave Propagation. NBS Technical Note No. 128, January 1962. (297 items)

The present bibliography on Atmospheric Aspects of Radio Astronomy Including Selected References to Related Fields contains over a thousand abstracts or titles taken from the literature published between 1900 and 1961, incl., but the bulk of the literature follows the discovery by Jansky in 1932 of radiofrequency radiation from the sun, and especially the building of radio telescopes since World War II.

The subject matter in this bibliography is confined to the effects of the Earth's atmosphere on radiofrequency radiation from the sun, planets, stars, the galaxies and intergalactic space, or knowledge of atmospheric or ionospheric structure, composition, or physics.

Obviously only a small portion of the vast amount of current and past literature on radio astronomy is included in the above definition, yet in spite of this fact, and in spite of serious gaps in the coverage of the world's literature in this field, the selection of material has been quite rigorous in order that the volume of material would not get out of hand.

A small amount of material is included on propagation of radio waves in or from atmospheres of other planets, or reflections from these planets. Other borderline aspects of the broad field are also touched on but not treated exhaustively since the main emphasis is on the various influences exerted by the Earth's atmosphere on terrestrial or extra-terrestrial radiofrequency radiation.

The following detailed subject outline shows the scope and the many facets of the material included herein. A geographical, author, and chronological index are also included.

We wish to express appreciation for guidance given by the staff of the NBS Boulder Laboratories, particularly to Mr. Bradford R. Bean for valuable assistance in determining the scope and content of this and previous bibliographies on radio propagation. We also wish to thank Mrs. Doris Nickey for patient labor in typing and correcting the master copy of these four bibliographies, and to other members of the M&GA staff for their contributions.

The first three bibliographies listed above are available through the U. S. Department of Commerce, Office of Technical Services, Washington 25, D. C. This new publication, NBS Technical Note No. 171, is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Supplements to these bibliographies, and a compilation of material on tropospheric propagation of radio waves are in progress.

Any comments, criticisms, corrections, additions, or material for future radio propagation bibliographies should be addressed to:

Malcolm Rigby, Editor
Meteorological & Geoastrophysical Abstracts
P. O. Box 1736
Washington 13, D. C.

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1958 - (cont'd.) D-783, 795, 804, 816, 832, 834, 838, 849, 854, 876, 877, 880, 894, 904, 910, 913, 920, 923, 928, 929, 939, 944, 952, 953, 962, 965, 1010

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D-1 Aarons, Jules, The solar noise geophysical events relationship. International Council of Scientific Unions, Brussels, Eighth Report of the Commission for the Study of Solar and Terrestrial Relationships. Paris, 1954. p. 93-97. 25 refs. DWB--Summarizes recent work on "the statistical study of solar noise - ionospheric disturbances; the eclipse measurement of radio emissive and optically active solar centers; and the statistical differentiation between sunspot groups which produce increases in radio energy and magnetic variations, and sunspot groups which do not." (Met. Abst. 9A-45.)--C.E.P.B.

D-2 Aarons, J. and Barron, William R., Sudden absorption of atmospherics due to increase in cosmic ray intensity. Nature, London, 178(4527):277-278, Aug. 4, 1956. fig., 4 refs. DWB--Atmospheric noise recorded at Scituate, Mass., showed a sudden decrease at 0344 U.T. on Feb. 23, 1956, 4 min. after a S.I.D. As the decrease occurred at night it is attributed to a cosmic ray increase. Noise returned to pre-absorption level at 0830 U.T. (Met. Abst. 8.3-180.)--C.E.P.B.

D-3 Aarons, J.; Barron, W.R. and Castelli, J.P., Radio astronomy measurements at VHF and microwaves. Institute of Radio Engineers, N.Y., Proceedings, 46(1):325-333, Jan. 1958. 14 figs., table, 5 refs., eq. DLC--Radio astronomy measurements of atmospheric absorption, refraction, and scintillation, taken during the summer of 1956 and the spring of 1957, were made at 3.2 cm and 8.7 mm with the sun as the source, and at 218 Mc/s with solar energy and radiation from Cassiopeia A. Large tropospheric scintillations at angles below 3° made elevation accuracy difficult in the 8.7 mm and 3.2 cm bands. Refraction at 218 Mc/s was greater than at the microwave wavelengths. Scintillations at 218 Mc/s were present during periods of auroral activity. The information obtained has been useful in assessing radar angle-of-elevation accuracy and demonstrates the use of the sun and other celestial bodies as radiation sources for antenna pattern measurements. (Met. Abst. unpub.)--Authors' abstract.

D-4 Aarons, J.; Castelli, J.P.; Straka, Ronald M. and Kidd, William C. (all, A.F. Cambridge Res. Center, Bedford, Mass.), Observations on the solar eclipse of Oct. 2. Nature, London, 185(4708):230-231, Jan. 23, 1960. 4 figs., 2 refs. DWB--A preliminary report on the eclipse and scintillation data. Two points are evident from the scintillation records. First - the shadow patterns at 1300 Mc/s and 3000 Mc/s (generated by the radio frequency active areas on the sun, which, interfering with one another, normally decrease the amplitude of the scintillations) are not dependent on frequency. This point is somewhat at variance with work reported by KAZES (see ref. D-372). Second - within the distance between the centers of the two antennas, a single shadow pattern exists. This latter observation is generally in accord with work of STEINBERG and KAZES, (see ref. D-). (Met. Abst. 11L-313.)--E.Z.S.

D-5 Aarons, J.; Basu, S.; Kidd, W., and Allen, R. (all, Air Force Cambridge Research Lab., Office of Aerospace Research (U.S.A.F.), L.G. Hanscom Field, Bedford, Mass.), Very low frequency modulation of discrete frequency solar noise bursts. Nature, London, 191(4783):56-57, July 1, 1961. 4 figs., ref. DLC--In an effort to study the very-low-frequency details of different types of solar radio bursts, observations were made at the Sagamore Hill Radio Observatory, Massachusetts, on three distinct frequencies, 220 Mc/s 400 Mc/s and 3000 Mc/s with an 84-ft parabolic antenna. The magnetic tape records, taken to observed d-c to 600 c/s fluctuations, were analyzed over 5-550 c/s to detect enhancements of absorption in this range. The power spectra of the modulation envelope show that the high-frequency end of the very-low-frequency band is accentuated. Type II and type III bursts reveal marked attenuation over certain very low frequency bands. An isolated burst at 220 Mc/s was associated with a sharp and fast development on a particular band. (Met. Abst. unpub.)--R.B.

D-6 Aarons, J.; Whitney, H.E. (U.S.A.); Roger, R.S.; Thomson, J. (England); Bournazel, J.; Vassy, E. (France); Hess, H.A.; Rawer, K. (W. Germany); Landmark, B.; Tröim, J. (Norway); Hultqvist, B., and Liszka, L. (Sweden), Atmospheric phenomena noted in simultaneous observations of 1958 δ 2 (Sputnik III). Planetary and Space Science, 5(3):169-184, July 1961. 18 figs., 3 tables, 5 refs. DLC--Amplitude and Doppler records of the 20 Mc/s-transmissions of 1958 δ 2 (Sputnik III) were simultaneously made at six radio observatories in Europe. Several distinct phenomena were noted. A sharp decrease in amplitude, which lasted from ½ - 1½ min and was followed by an abrupt return of the signal, occurred at the same time at all stations. This phenomenon has been termed "Dropout," although indications of low-level signals were usually present, and is explained as a sudden decrease in transmitter power of the satellite perhaps when the satellite passed through a region of high electron flux. Another type of decrease in the signal was attributed to highly localized absorbing or scattering regions. A third phenomenon, recorded by techniques of simultaneous measurements, was observed in the occurrence of scintillating signals at some stations and Faraday fading at others. The overlap of the propagation path to each station recording the scintillations defines a vertical slab of ionospheric region responsible for the scintillations. The region is about 400-600 km in the horizontal plane but includes small scale irregularities of less than 1 km. (Met. Abst. unpub.) --Authors' abstract.

D-7 Aarons, J. and Castelli, J.P., Simultaneous scintillation observations on 1300 Mc and 3000 Mc signals received during the solar eclipse of Oct. 2, 1959. Institute of Radio Engineers, N.Y., Transactions. Antenna and Propagation, Vol. AP-9(4):390-395, July 1961. (Also issued: URSI Conference (1960). 6 figs., 11 refs. DLC--Very detailed measurements were taken at the USAF Cambridge Research Center's radio astronomy site at Hamilton, Mass., using three radiometers at 224 Mc, 1300 Mc and 3000 Mc. Scintillation of solar signals at 1300 Mc and 3000 Mc basically is not ionospherically dependent, rather is closely related to lower atmospheric winds and structure. It is suggested that the blob structure of the treposphere, possibly at tropopause height, forms into the concave lens focusing the energy and producing the scintillation. --W. N.

D-8 Acton, Loren W. (Dept. of Astro-Geophysics, Univ. of Colorado, and Nat. Bur. of Standards, Boulder, Colo.), Some relationships between short wave fadeouts, magnetic chrochets, and solar flares. Journal of Geophysical Research, 66(9):3060-3063, Sept. 1961. 3 figs., table, 3 refs. DLC--Correlations between the three classes of short wave fadeouts (S-SWF, slow S-SWF, and G-SWF) and associated magnetic crochets ("solar flare effects" or SFE's) were examined Jan. 1956 through Dec. 1959. The summarized results, presented graphically and in a table, are discussed briefly. --W. N.

D-9 Aitchison, G. J., and Weekes, K. (both, Cavendish Lab., Cambridge), Some deductions of ionospheric information from the observations of emissions from satellite 1957 α.2, Pt. 1, The theory of analysis. Journal of Atmospheric and Terrestrial Physics, N.Y., 14(3/4):236-243, June 1959. fig., 2 refs., 16 eqs. DWB, DLC. Also: Aitchison, G. J.; Thomson, J. H., and Weekes, K., Pt. 2, Experimental procedure and results. Ibid., p. 244-248. fig., 2 tables, 4 refs.

DWB, DLC--The launching of the first artificial earth satellite (1957 α) by the U.S.S.R. provided an opportunity of obtaining information about the ionosphere at heights above the F2 peak. The satellite emitted radio waves of frequency 20 and 40 Mc/s which were appreciably modified during their transmission through the ionosphere to the ground. It should therefore be possible to obtain information about the distribution of ionization by making suitable observations on the received wave. It turns out that the most useful quantities for this purpose are the Doppler frequency shift and the fading of the signal caused by the magneto-optical Faraday effect. It is the purpose of the first paper to develop an approximate theory of these two phenomena and to use it to interpret some observations. Conclusions given in the second paper are: (1) The analysis of the FARADAY fading suggests that the ionization density above the maximum of F2 at night decreases only slowly and that at 100 km above h_mF2 it has not decreased by more than 20%. These results are tentative because of the inaccurate knowledge of the orbit for 1957 α2 and because the analysis itself is only approximate. (2) The best Doppler records, although not sufficiently accurate for detailed analysis, do not appear to be in disagreement with these conclusions. (3) If full advantage is to be taken of the information available in the transmissions from future satellites, it is highly desirable that accurate orbit data should be available as a result of visual observations and that records of the Doppler effect should be made continuously and automatically at several receiving sites. (Met. Abst. 11F-1)--Authors' abstracts.

D-10 Alaska. University. Geophysical Institute, Abstracts of terrestrial phenomena observed following the solar flare of Feb. 23, 1956, Paper 03342, 1956. 4 p. mimeo. --Includes account of cosmic noise absorption. --CSIRO Abstract.

D-11 Allcock, G. McK. and Martin, L. H., Simultaneous occurrence of "dawn chorus" at places 600 km apart. Nature, London, 178(4539):937-938, Oct. 27, 1956. 3 figs., 3 refs. DWB--Observations on 273 simultaneous schedules at Wellington and Dunedin, 600 km apart on a geomagnetic meridian, show groups of whistlers on 106 occasions at Wellington and 64 at Dunedin, 56 being simultaneous within 0.1 sec. Variations with signal strength are shown; the wave range is less than an octave. (Met. Abst. 8.2-325)--C.E.P.B.

D-12 Allcock, G. McK., A study of the audio frequency radio phenomenon known as "Dawn Chorus." Australian Journal of Physics, 10(2):286-298, June 1957. 7 figs., 2 tables, 6 refs. DLC--

Examination of characteristics of "Dawn chorus" as related to magnetic activity, was conducted at Wellington, New Zealand, and at other stations during the period July 1955 - Oct. 1956. No correlation with whistlers was found, rather the experimental evidence favors the hypothesis that "Dawn chorus" propagated along the lines of the earth's magnetic field in the extraordinary magneto-ionic mode and apparently are clouds of positively charged particles of solar origin. -- W. N.

D-13 Allcock, G. McK. (Dominion Phys. Lab., Lower Hutt, New Zealand) and Morgan, M. G. (Dartmouth Coll., Hannover, N. H.), Solar activity and whistler dispersion. Journal of Geophysical Research, 63(3):573-575, Sept. 1958. 2 figs. DLC--Results of regular and simultaneous observations of whistlers at several locations in North America and in New Zealand are summarized in graphical form. The results are discussed as contributory evidence for the hypothesis that the earth revolves within the solar corona; a hypothesis suggested in 1959 by Ryle and by Chapman, as well as other research workers.--W. N.

D-14 Allcock, G. McK. (Dominion Physical Lab., Lower Hutt, New Zealand), The electron density distribution in the outer ionosphere derived from Whistler data. Journal of Atmospheric and Terrestrial Physics, New York, 14(3/4): 185-189, June 1959. 8 figs., table, 13 refs., 21 eqs. DWB, DLC--A method, using successive approximations, is given for finding the variation of electron density N with height h in the outer ionosphere, when the variation of whistler dispersion with geomagnetic latitude is already known. From the application of the method to specific whistler data, it is inferred that the electron density distribution in the outer ionosphere decreases exponentially with height at least in the height range 1000 to 13,000 km, and that during the period Jan. to May 1957 the equation describing the distribution within this height range was: $N \doteq 5.75 \times 10^4 \exp(-h/2640)$ where N is in cm^{-3} and h in km. (Met. Abst. 11F-2)--Author's abstract.

D-15 Allen, C. W., Observations of solar radio noise. International Council of Scientific Unions, Brussels, 7th Report of the Commission for the Study of Solar and Terrestrial Relationships, pub. Paris, 1951. p. 63-75. fig., 3 tables, 54 refs. DWB--Recent observations on 18-35,000 Mc/s are summarized. Quiet thermal noise, increasing with frequency, represents an apparent temperature (Ta) of 6400°K at 0.6 cm. Steady sunspot noise increases with sunspot area and gives a maximum at 600 Mc/s, Ta=90 X 10^6K. On meter wave lengths there are noise storms, and "bursts" with a line spectrum. (Met. Abst. 4.5-116)--C. E. P. B.

D-16 Al'pert, Ia.L., Rasprostranenie radiovolin: spetsializirorannyi bibliograficheskii spravochnik. (Radio wave propagation: specialized bibliographic reference book.) Moscow, Izdatel'stvo Akademii Nauk SSSR, 1949. 195 p. At head of t-p: Akademiia Nauk SSSR, Otdelenie Fiziko-Matematicheskikh Nauk. DLC--Fifty books are arranged chronologically by imprint, and over 1500 articles from periodicals are arranged under the following main headings: I. Propagation of radio waves over the earth's surface (291 refs.); II. Propagation of radio waves in the ionosphere (875 refs.); III. Propagation of the "celestial" ray (199 refs.); IV. Propagation of ultrashort waves (93 refs.); V. Propagation of radio waves in the troposphere (57 refs.); and VI. Investigation on sferics (99 refs.). In some cases, a section is subdivided. References are arranged chronologically within a section (or sub-section). Included are a list of 75 periodicals arranged by country (Russian, England, U.S., France, Germany, Italy, Japan, Australia, India, and Canada) with abbreviation and an author index alphabetically arranged. All titles are in the original language. Imprints cover the period from 1878-1948. (Met. Abst. 6D-27)--M.L.R.

D-17 Al'pert, Ia.L.; Chudesenko, E.F. and Shapiro, B.S., Rezul'taty issledovaniia vneshneĭ oblasti ionosfery po nabliudeniiam za radiosignalami pervogo iskusstvennogo sputnika Zemli. (Results of studies conducted in the outer regions of the ionosphere by observations of radio signals of the first artificial earth satellite.) Akademiia Nauk SSSR. Mezhduvedomstvennyi Komitet po Provedeniiu MGG, Predvaritel'nye itogi nauchnykh issledovaniĭ...sputnikov Zemli i raket, No. 1:40-108, 1958. 18 figs., 26 tables, 15 refs., 28 eqs. English summary p. 51. DWB--The method of research on the upper atmosphere by means of artificial earth satellites described in this paper is based upon the determination of the time of "radioset" and "radiorise" of the satellite. The distribution of the concentration of electrons in the outer ionosphere provides information about the properties of interplanetary gases. The trajectories of radio waves in the ionosphere and methods of investigating them are described in detail. Results of the theoretical calculations of the maximum horizontal distance of the receipt of radio signals are given. The calculations were made for a spherical earth, and the tabulation of the resulting elliptical integrals was carried out with a high-speed electronic computer. The calculations used the parabolic model of the lower ionosphere and the exponential decrease of the electron concentration in its outer part. In the analysis of the experimental data, the parameters of the lower ionosphere and the altitude of the artificial satellite were used and the maximum distances of signal reception were determined on the basis of ballistic data and other studies of the trajectories of the satellite. The electron concentration of the ionosphere N was found to decrease much slower after its maximum N_m than it increased to the maximum N_m. For the model $N_z \sim N_m e^{-xz}$, the value $X \simeq 3.5 \cdot 10^{-3}$ 1/km is obtained. This means that the number of electrons in the outer part of the ionosphere is approximately 3.6 more than in the lower part. Extrapolation of the observational data received for the altitudes $z \sim 300 \div 650 - 700$ km to $z \simeq 3000$ shows that with $z \sim 2000 - 3000$ km, $N \simeq 200 - 300$ el/cm^3. A curve of the density of neutral particles n(z) according to the lifetime of the electron and the time between different acts of ionization is drawn. It is concluded that the altitude of the "limits" of the atmosphere (region of contact with interplanetary space) is of the order of 2000 - 3000 km. Appendices contain the following: calculation of the maximum distance of distribution of waves in the approximation of geometrical optics and tables of maximum horizontal distance r_m (in km) for a series of given parameters. Met. Abst. 11E-7)--Authors' abstract and I.L.D.

D-18 Al'pert, Ia.L.; Dobriakova, F.F. et al., O nekotorykh rezul'tatakh opredeleniia elektronnoĭ kontsentratsii vneshneĭ oblasti ionosfery po nabliudeniiam za radiosignalami pervogo sputnika Zemli. (Some results of determining the electron concentration of the outer region of the ionosphere from observations of the radio signals of the first earth satellite.) Uspekhi Fizicheskikh Nauk, Moscow, 65(2):161-174, 1958. 9 figs., 28 eqs. DLC--Sputnik I broadcast at 40 Mc/s allowing calculations to be made of the electron concentration in the layers of the ionosphere by measuring the time of rising and setting of the satellite radio beam. Results of observations made at 6 places on Oct. 5, 6, and 7, 1957, are tabulated and analyzed. Methods of determining the radio paths in the ionosphere are reviewed from theoretical and practical viewpoints; then the details of calculating the distance of the object at the time of radio rising and setting are presented mathematically and graphically; followed by results of such analysis and, finally, a discussion of analysis of the determined electron concentration of the outer ionized layers and density of interplanetary gas (320 to 2450-km height). (Met. Abst. 11J-3)--M.R.

D-19 Al'pert, Ia.L., Ionosfera i iskusstvennye sputniki Zemli. (The ionosphere and artificial earth satellites.) Priroda, Moscow, No. 10:71-77, Oct. 1958. 3 figs. DLC--

The author discusses the pre-Sputnik knowledge on the concentration and density of electrons above the earth and the importance of more precise data on the distribution of electrons with altitude above 100 km, the effective frequency of collisions of electrons with other heavier gas particles, and the small-scale inhomogeneities in the atmosphere. The possible origins of these inhomogeneities, which are characterized by fluctuations of electron concentration, are considered, namely: ionospheric turbulence and longitudinal plasma waves. The special problems arising in the use of satellites to study the atmosphere are considered. These result from the use of radio signals to measure various parameters and the complexity of effects occurring in the vicinity of the satellite. The applications of the coherent Doppler method and of the method of observation based upon radio "rise" and "set" are discussed. (Met. Abst. 10. 10-200)--I. L. D.

D-20 Al'pert, Ia. L., Sostoianie vneshnei ionosfery. (The state of the outer ionosphere.) Priroda, Moscow, No. 6:86-87, June 1958. table, 3 foot-refs. DLC. Trans. into English by E. R. Hope issued as Canada. Defence Research Board Translation T-304-R, Sept. 1958. DWB--The method of radio observations on the first earth satellite is described briefly and the results of such observations at 6 points during Oct. 5, 6, and 7, 1957, are summarized. The electron concentration in the outer ionosphere diminished with altitude considerably more slowly than it increased in its lower portion. A table is presented giving the electron concentration N/cm^3 up to 3100 km and also the density of neutral particles per cm^3 up to the same height. The computation of the density of the latter is described. At distances of 2000-3000 km from the earth, the electron concentration is close to 10^3-10^2 electrons/cm^3 and the density of neutral particles is of the order of 1 per/cm^3. Hence the atmosphere approaches the properties of interplanetary gas at 2000-3000 km. The agreement between the data on the outer atmosphere obtained by means of rockets and lunar signals is compared with those obtained with the artificial earth satellite. (Met. Abst. 10. 10-201)--I. L. D.

D-21 Al'pert, Ia. L., Investigation of the ionosphere and of the interplanetary gas with the aid of artificial satellites and space rockets. Soviet Physics USPEKHI, N. Y., 3(4):479-503, Jan./Feb. 1961. 27 figs., 49 refs., 61 eqs. DLC. Transl. of original Russian by J. G. Adashko in Uspekhi Fizicheskikh Nauk, Moscow, 71(3/4):369-407, July 1960. DLC--Several methods of investigating the electromagnetic properties of the ionosphere and the interplanetary gas, by means of rockets and satellites, are discussed. The introduction contains a summary of experimental results, reviews the research problems and outlines approach for attack. The Doppler effects at radio frequency are treated, also the amplitude characteristics of radio signals from rockets and satellites. The satellite produced plasma perturbations are taken up next and systematically discussed in relation to sub-subjects under the above mentioned main topics. The development of radio and engineering methods, well organized in practical and theoretical aspects, will yield knowledge about the physical nature of the ionosphere and the space beyond. (Met. Abst. unpub.)--W. N.

D-22 American Geophysical Union. Special Committee on Cosmic-Terrestrial Relationships, Report of the Committee, 1954-1955. Harlan T. Stetson, chairman, American Geophysical Union, Transactions, 36(6):1061-1066, Dec. 1955. 18 refs. DWB, DLC--Reports by HELEN DODSON, D.H. MENZEL, E.O. HULBERT, H.W. WELLS, HERBERT RIEHL, E.M. BROOKS and S.A. KORFF cover investigations in fields of basic solar research (solar flares, etc.), solar-ionospheric relationships, radio-astronomy of sun, rocket ionospheric and UV solar spectrum studies, whistling atmospherics, cosmic rays, rainfall variations due to cosmic influences, and temperature variations with sunspot cycle. (Met. Abst. 8.3-46.)--M. R.

D-23 American Geophysical Union. Special Committee on Cosmic-Terrestrial Relationships, Report for the year ending June 30, 1956. Harlan T. Stetson, chairman. American Geophysical Union, Transactions, 37(4):491-496, Aug. 1956. 23 refs. DWB, DLC--Reviews are given of solar research by the Harvard Observatory and by the McMath-Hulbert Observatory, the work on radio astronomy, the upper atmosphere, solar radiation and audio-frequency atmospherics by the Naval Research Laboratory on relationship between solar activity and meteorological changes, on sunspot-weather correlations and on solar energy exchange in the atmosphere. (Met. Abst. 9A-102.)--I. L. D.

D-24 Anderson, D.S., Ionospheric studies from an analysis of satellite radio signals with an automatic tracking filter. Pennsylvania State Univ., Ionosphere Research Lab., Contract AF 33(616)-6157, Scientific Report No. 138, Sept. 1, 1960. 58 p. 15 figs. (including photos), 4 tables, 14 refs., numerous eqs. DWB--A brief survey is made of the methods used for ionospheric investigation. This includes a simple illustration of the theory of the dispersive Doppler experiment utilizing radio transmissions from earth satellites. Detailed descriptions of the equipment used to measure the dispersive Doppler frequency are given. In particular, an automatic tracking filter which was especially designed for this study is discussed. A preliminary study was made of data obtained utilizing this equipment. The primary data consists of total electron content, from which a thickness parameter was derived. The factors which influence this parameter were investigated and the results are reported. (Met. Abst. 11.12-366.)--Author's abstract.

D-25 Anderson, Lloyd J. (Smyth Res. Associates, San Diego, Calif.), VHF satellite signals received at extra optical distances. Institute of Radio Engineers, New York, Proceedings, 49(5):959-960, May 1961. 2 figs. DLC--Low angle refraction of radio waves, using 108, 162, and 216 Mc/s satellite signals, were experimentally measured in California June-Aug. 1960. The signals in most cases were received while the satellite was beyond the radio horizon; in two cases 1700 - 1900 miles beyond. No consistent frequency dependence, low attenuation and control radiosonde data favorably support a tropospheric ducting mechanism suggested. (Met. Abst. unpub.)--W. N.

D-26 Anderson, Roy E. (General Electric Co. General Eng. Lab., Schenectady, N.Y.), Sideband correlation of lunar and echo satellite reflection signals in the 900 Mc range. Institute of Radio Engineers, N.Y., Proceedings, 40(6):1081-1082, June 1961. 2 figs., table, 3 refs. DLC--The results of lunar reflection tests, as conducted by General Electric's Radio-Optical Observatory near Schenectady, N.J., and at Air Force Cambridge Research Lab., Bedford, Mass., are presented and discussed. The moon was illuminated at 915 Mc using double side band suppressed carrier modulation, reflections of which were received with a 28-ft antenna located at Schenectady. Amplitude fluctuations over the path were also measured. Correlation coefficients, using a digital computer, are tabulated and characteristic moon echo records reproduced. (Met. Abst. unpub.)--W. N.

D-27 André, Pierre; Kazès, Ilya and Steinberg, Jean-Louis, Mesure de l'absorption atmospherique sur 9350 Mhz utilisant le rayonnement radioeléctrique solaire. (Measurement of atmóspheric absorption at 9350 Mc/s using solar radioelectric radiation.) Academie des Sciences, Paris, Comptes Rendus, 242(17):2099-2101, April 23, 1956. fig., 4 refs., 2 eqs. DLC--Solar radiation at 9350 Mc/s undergoes an attenuation while the sun is setting. Only a part of this attenuation can be attributed to absorption by atmospheric oxygen and water vapor, a residual 35% remaining unexplained. (Met. Abst. 9A-103.)-- Trans. of authors' abstract.

D-28 Andrillat, Henri, Les températures électroniques des nebuleuses planétaires. (Electronic temperature of planetary nebulae.) Annales d'Astrophysique, Paris, Supplement, No. 1, 1955. 58 p. 11 figs., 20 tables, 51 refs., eqs. DLC, DWB--A detailed monograph giving the complete results of studies of the physics of planetary nebulae based on data for 24 nebulae obtained at Haute Provence Observatory (electronic temperature of 8000 to 27,000° were obtained) with a 120 cm telescope. Theory is reviewed in Pt. 1; in Pt. 2 the spectrophotometrically determined temperatures (methods, sources of error, accuracy, and comparison of results with those of other authors) are treated. On p. 20 the correction for atmospheric absorption, and on p. 21, for atmospheric dispersion, are discussed. Finally, the intensity of rays of hydrogen, helium, and (O III) at 5007 A is covered. In Pt. 3, continuous and discontinuous Balmer spectra of gaseous nebulae are treated (atmospheric absorption and dispersion on p. 43). Met. Abst. 11.6-77.)--M. R.

D-29 Appleton, Sir Edward and Hey, J. S., Solar noise. I. Philosophical Magazine, 37(265):73-84, Feb. 1946. 5 figs., table, 9 refs., 4 eqs. DLC--Based on evidence discussed, it is concluded that the radar-observed noise is propagation of electromagnetic waves from the sun, and not originated from violent perturbations of ionization in the ionosphere. The noise has been observed associated with solar flares and SWF's. --W. N.

D-30 Appleton, Sir E. and Hey, J. S., Circular polarization of solar radio noise. Nature, London, 158(4010):339, Sept. 7, 1946. 3 figs. --In this very brief note reference is made to earlier observations of 5 λ from sunspot areas. Experimental examination of solar radio noise at 85 Mc/s during sunspot activity (July 27 and 28, 1946) showed a circular left-handed polarization. The connection with local solar magnetic field is thus apparent. --W. N.

D-31 Appleton, Sir E. and Piggott, W. R., Ionospheric absorption measurements during a sunspot cycle. Journal of Atmospheric and Terrestrial Physics, 5(3):141-172, July 1954. 16 figs., 3 tables, 26 refs., 38 eqs. DWB--The results of measurements of absorption of radio waves in ionospheric reflection, made in S. E. England 1935-1953, are examined. [log ρ] (ρ = effective reflection coefficient) is related to radio wave frequency f, solar zenith distance X, and sunspot number R. Variation with f is accounted for by magneto-ionic theory. [log ρ] is proportional to (cos X)$^{0.75}$ instead of (cos X)$^{1.5}$ as simple theory predicts, but with occasions of excessive absorption on winter days associated with sporadic reflection below E layer. There is a direct relation with R, especially in summer. The absorbing layer is believed to be within D layer. It is probable that sudden ionospheric disturbances associated with solar flares are due to ionization increased 5-10 times in the normal absorbing layer (level of D layer) but D layer does not contribute substantially to diurnal magnetic variations. (Met. Abst. 5.11-66.)--C.E.P.B.

D-32 Appleton, Sir E., Finding things out with radio and rockets. Advancement of Science, London, 10:355-364, 1954. GB-MO --Good popular account of exploration of the atmosphere by balloon, radiosonde and rocket (mainly determination of temperature stratification) and of the ionosphere by radio pulses of different frequencies. Author continues with information from solar radiations and meteors, and ends with a discussion of the possibility of space travel. (Met. Abst. 6.9-84) --C.E.P.B.

D-33 Appleton, Sir E., Rocket sounding in the upper air: confirmation of results inferred from radio measurements. Wireless World, London, 61(9):406-407, Sept. 1955. 4 eqs. DLC--In connection with plans for the International Geophysical Year, the article briefly describes methods of measuring pressures and deducing temperatures, and of measuring electron density at a given height by the Doppler effect on the phase velocity of radio waves near the rocket emitter. (Met. Abst. 12E-77.)--C.E.P.B.

D-34 Appleton, Sir E. and Beynon, W.J.G., An ionospheric attenuation equivalence theorem. Journal of Atmospheric and Terrestrial Physics, 6(2/3):141-148, March 1955. 2 figs., 6 refs., 21 eqs. DWB--The phenomenon of radio wave attenuation by way of ionospheric partial reflections and scattering is examined theoretically, and an equivalence theorem, relating oblique incidence to vertical incidence phenomena, is derived. For radio frequencies well in excess of the equivalent critical frequency of the medium this may be written

$$[p]_{i_o}^{f} = \lambda [p]_o^{f \cos i_o},$$

where p is the fractional attenuation, f is the frequency, and i_o the angle of incidence in the oblique incidence case.

Where the radio wave electric vector is at right angles to the plane of propagation, λ is unity; when the electric vector lies in the plane of propagation, λ is equal to the usual obliquity factor cos 2 i_o. (Met. Abst. 6D-272.)--Authors' abstract.

D-35 Armier, G., L'ecoute des satellites artificiels au centre R.T.F. de Limours. (Monitoring of artificial satellites at the R.T.F. station at Limours.) L'Onde Electrique, Paris, 39(388/389):654-659, July/Aug. 1959. 5 figs., 2 tables. DLC--The article is divided into two parts: a) The monitorings: durations, sub-division, statistics, influence of orbital position, abnormal propagation; b) Measurement of frequencies. Emphasis is placed on the special details of the equipment used for 20 Mc/s. The method is completely automatic, the only adjustment is that of setting the receiver on frequency. A counter automatically records the frequency shift. The accuracy of one cycle is obtained for signals of less than 1 microvolt at the input of the receiver. The maximum speed of operation is about one complete measurement of frequency every 2 seconds. The study is concluded by the analysis of some curves showing frequency shift due to Doppler effect. (Met. Abst. 11.12-567.)--Author's abstract.

D-36 Astronomical Society of the Pacific, Abstracts of papers presented at the San Francisco meeting ...., June 17-18, 1959. Astronomical Society of the Pacific, San Francisco, Publications, 71(422):381-393, Oct. 1959. fig., 2 refs. DLC--Abstracts of 13 papers. Following are the titles of the papers: 1) Radar studies of the cislunar medium, 2) Recent tests with image tubes; 3) Orbits for planetary satellites from Doppler data alone; 4) The orbit of the spectroscopic binary tauri; 5) Satellite studies of outer atmospheric ionization; 6) Electric power for lunar stations; 7) An image-tube experiment at the Lick Observatory; 8) Sensitive detectors for radio astronomy; 9) Galactic orbits of stars; 10) The orbit and spectrum of HO 95635; 11) Whistlers in the extraterrestrial environment; 12) Magnetic compression in the geomagnetic field as measured by Pioneer I; 13) Spectroscopic investigations of multiple galaxies and clusters of galaxies. (Met. Abst. 11L-1.)--I.S.

D-37 Avignon, Yvette; Boischot, A. and Simon, P. (all, Observatory of Meudon), Caracteres d'une emission solaire remarquable observee le 4 novembre 1957 sur 169 MHz. (Characters of a remarkable solar emission, observed on Nov. 4, 1957 at 169 Mc/s) Annales d'Astrophysique, Paris, 21(5):243-249, Sept./Oct. 1958. 6 figs., 3 refs. English and Russian summaries p. 243. DWB, DLC--On Nov. 4, a very exceptional solar emission was observed at 169 Mc/s. Its unusual characteristics were very different than the ones characterizing noise storms and bursts generally associated with chromospheric flares. It is suggested that some of the observed fluctuations originated in a seeing phenomenon close to the earth. (Met. Abst. 10.10-85.)--Authors' abstract.

D-38 Avignon, Y. and Pick, Monique, Relation entre les emissions du type IV et d'autres formes d'activite solaire. (Relationship between type IV emissions and other forms of solar activity.) Academie des Sciences, Paris, Comptes Rendus, 248(3):368-371, Jan. 19, 1959. fig., table, 9 refs. DWB, DLC--Type IV emissions defined on metric waves are generally associated with large jumps on centimetric waves. It is shown that a slight connection exists between optical centers which give rise to type IV and centers of radioelectric storms. The frequent occurrence of two or three optical centers, giving several type IV's during the same period is also shown. (Met. Abst. 11.5-153.)--A.V.

D-39 Avignon, Y. and Pick, M., Relation entre les emissions solaires de rayons cosmiques et les sursauts du type IV. (Relationship between the solar emissions of cosmic rays and the Type IV jumps.) Academie des Sciences, Paris, Comptes Rendus, 249(22):2276-2278, Nov. 22, 1959. fig., 8 refs. DWB, DLC--A close relationship between the Type IV jumps of radioelectric radiation with intensity superior to a determined energy on the one hand, and the increase of cosmic radiation observed near the ground on the other hand, is established, taking into account the heliographic coordinates and the importance of the associated optical eruption. From this relationship it is inferred that an eruption probably produces cosmic rays observable near the ground when its importance is equal to 3 or 3^+, while corresponding to a jump of Type IV superior to 5 and when situated in the western part of the solar disk. The close relationship between Type IV jump and solar cosmic rays proves that the measurement of the importance of Type IV through its radiation in the field of the centimetric waves is very significant. (Met. Abst. 11.5-154.)--A.V.

D-40 Bailey, V.A. (U. of Sydney, Australia) and Goldstein, L. (U. of Ill.), Control of the ionosphere by means of radio waves. Journal of Atmospheric and Terrestrial Physics, London, 12(2/3):216-217, 1958. 8 refs. DLC--As a radio wave traverses an ionized gas, consequently raising its temperature, energy is produced. But in the absence of some source of ionizing energy the gaseous plasma disappears. Radio waves of sufficient intensity affect the ionization produced by solar radiation or other agencies in any region of the ionosphere, even when the temperature is as low as 250-300°K. When a rise in temperature has changed the rates of different processes of diffusion, attachment and recombination ionization can still be controlled by the establishment of radio stations on the ground, especially when the controlling waves have their frequencies near the gyrofrequency of electrons in the ionospheric region concerned. (Met. Abst. 10.6-171.)--N.N.

D-41 Bain, W.C., Observations on the propagation of very long radio waves reflected obliquely from the ionosphere during a solar flare. Journal of Atmospheric and Terrestrial Physics, 3(3):141-152, April 1953. 6 figs., table, 19 refs. MH-BH--Describes measurements of amplitude and phase of 16 kc/s sky wave,Rugby to Aberdeen. Normal diurnal variation of apparent height of reflection at normal and oblique incidence is shown and sudden field anomalies at Aberdeen and Edinburgh during solar flares illustrated. It is found that during a moderate flare with large zenith distance of sun there is a change of apparent reflection height for vertical but not for oblique incidence. Phenomena are attributed to a double structure of D layer, the lower layer (at 70 km) being responsible for oblique incidence propagation (including atmospherics)and the upper affected by solar radiation during a flare. (Met. Abst. 5.6-284.)--C.E.P.B.

D-42 Bain, W.C. and Shearman, E.D.R., Observations on the U.S.S.R. earth satellites and the study of radio wave propagation. Institution of Electrical Engineers, Proceedings, Pt. B, 106(27):259-263, May 1959. 5 figs., table, 8 refs., 3 eqs. DLC--Measurement of bearing, angle of elevation and Doppler frequency shift have been performed at Slough on transmissions from the Russian earth satellites. The examples considered here indicate that the observed phenomena can be accounted for satisfactorily in terms of our present knowledge of ionospheric propagation. A short section is included on orbital determination from the measurements. (Met. Abst. 11E-13.)--Authors' abstract.

D-43 Bain, W.C. (Radio Research Station, D.S.I.R., Slough), Irregular fading of satellite transmissions. Nature, London, 189(4759):129, Jan. 14, 1961. table, 2 refs. DWB--It has been suggested that the fact that irregular fading of satellite transmissions on 40 Mc/s from Sputnik I were not observed at Cambridge when satellite was south of 50°N was due, not to the absence of irregularities south of Cambridge, but to the southerly irregularities being incorrectly orientated to give appreciable power scattering to the receiver. Observations made at Slough on transmissions from Explorer 7 at a frequency of 20 Mc/s show frequent occurrences of irregular fluctuations although the satellite never reaches as far north as Slough. (Met. Abst. unpub.) --R.B.

D-44 Baldinger, E. and Schaetti, N., 9. Generalversammlung der Union Radio-Scientifique Internationale (U.R.S.I.) in Zurich (vom 11.-22. September 1950). (Ninth general meeting of the International Scientific Radio Union (U.R.S.I.) in Zurich (Sept. 11-22, 1950).) Zeitschrift für angewandte Mathematik und Physik, 2(3):212-214, May 15, 1951. MH-BH--

A brief report of the meeting including recommendations for further investigations to the following Commissions: II. Propagation in the troposphere (further investigation of influence of latitude, nature of ground and climate on refractive index, especially for short waves); III. Ionosphere and propagation of waves; IV, V. Radio noises of terrestrial origin and of extraterrestrial origin. (Met. Abst. 5.6-285.)--C.E.P.B.

D-45 Banerjee, D.K.; Surange, P.G. and Sharma, S.K. (all, Engr. Col., Banaras Hindu Univ.), Ionospheric observations at Banaras during the total solar eclipse on June 20, 1955. Journal of Scientific and Industrial Research, Sec. A, 14(11):517-521, Nov. 1955. 5 figs., 17 refs. DWB--Observations of intensity of radio signals on 30.5 and 30.7 m from Colombo and Delhi were made at Banaras during the total eclipse at Colombo, to see what effect the totality had on the ionosphere. Oblique and vertical incidence measurements gave data on variations in field strength, electron density, semithickness and height of lower boundary of F2 layer. Conclusions were: 1) duration of eclipse is less than that of ionospheric eclipse; 2) effect of absorbing regions in lower ionosphere is more pronounced in the eclipse area than at Delhi; 3) field strength of Colombo signals increased and at Delhi decreased during eclipse. Finally, it was concluded that the sudden increase in solar radiation at end of eclipse produced thermal expansion of the ionized layer. (Met. Abst. 7.11-290.)--M.R.

D-46 Banerjee, S.S.; Rajan, V.D. and Banerjee, P.C. (Benares Hindu Univ.), Some observations on the effect of solar eclipse on the F2 region of the ionosphere. Journal of Scientific and Industrial Research, New Delhi, 11B(5):197-198, May 1952. fig., 7 refs. DWB--An analysis of observations made with short wave radio signals both at the vertical and oblique incidence during the solar eclipse at Benares on Feb. 28, 1952, in order to determine the source of ionization in the F2 region. Evidence is presented indicating the possibility that the ionization in the F2 region observed during the eclipse is due to neutral particles emitted by the sun. (Met. Abst. 4.4-93.)--I.L.D.

D-47 Banerjee, S.S., The solar eclipse of June 30, 1954. Science and Culture, Calcutta, 20(1):2-3, 34, July 1954. DWB--Observations made at Phalodi, India (70 mi NW of Jodhpur) during the 1 min 8 sec of totality and for several days before and after the eclipse of June 30, 1954, are described. These include solar, ionospheric, radio noise, geomagnetic, eye, atmospheric electric potential gradient and conductivity, and ordinary meteorological observations at the surface and in the upper atmosphere by means of special and normal radiosondes. (Met. Abst. 6.6-323.)--M. R.

D-48 Basler, Roy P., The aurorally associated ionospheric absorption of cosmic radio noise. Alaska. Univ. Geophysical Institute, NSF Grant G 14133, Scientific Report No. 1, May 1961. 63 p. 13 figs., 2 tables, 25 refs., eqs. DWB (M(051) A323sct)--The riometer records of 27.6 Mc/s cosmic noise from the Alaskan IGY stations are used to study the phenomenon of aurorally associated absorption. The emphasis of the work is on the comparison of the auroral absorption recorded at different latitudes, and the primary result is the definition of an auroral absorption zone. This zone is compared to the analogous visual auroral zone, and the geomagnetic latitude of maximum intensity of the absorption zone is found to be near College (64.65°) whereas the latitude of the peak of the visual zone is near Ft. Yukon (66.69°). The auroral absorption zone is more pronounced during magnetically disturbed periods, but daily and seasonal variations are generally the most effective secondary factors determining its character. Absorption is found to exhibit a daytime maximum at all stations, and a winter maximum in auroral absorption is observed at College. Possible interpretations of the discrepancy between the absorption and visual zones are suggested in terms of the relation of these zones to the primary auroral particles. --Author's abstract.

D-49 Bauer, Siegfried J. and Daniels, Fred B. (both, U.S. Army Signal Res. & Dev. Lab., Ft. Monmouth, N.J.), Measurements of ionospheric electron content by the lunar radio technique. Journal of Geophysical Research, Wash., D.C., 64(10):1371-1376, Oct. 1959. 7 figs., 9 refs., eqs. DLC--Measurements of the Faraday rotation of lunar radio echoes on a frequency of 151 Mc/s are used to determine the time variation in the total ionospheric electron content. Absolute values of ionospheric electron content are determined from these measurements in conjunction with information on the electron content below the F2 peak computed from vertical incidence sounding data. Diurnal, day-to-day, and seasonal variations in the total electron content are presented. The ratio $n_a : n_b$ of the number of electrons above the F2 peak to that below is found to be in the order of 4 to 5 during three summer nights (June) before sunrise and about equal to 3 after sunrise. For two days in Nov. the ratio $n_a : n_b$ is found to be equal to about three both before and after sunrise. Possibilities of inferring other characteristics of the upper ionosphere from observed variations in the total electron content are briefly discussed. (Met. Abst. 11F-9.)--Authors' abstract.

D-50 Bazzard, G.H. (DSIR Radio Res. Station, Slough), Short-term differences in the behaviour of two daily indices of solar activity during the IGY. Journal of Atmospheric and Terrestrial Physics, London, 18(4):290-296, Aug. 1960. 2 figs., 4 tables, 13 refs., eq. DLC--The variations in the daily values of the flux of solar radio noise at λ 10.7 cm (Φ) and the E, layer character figure (J_E) have been studied for the period of the IGY. It is found that Φ lags behind J_E by about 14 hrs. The ratio J_E/Φ fluctuates above and below its normal value, and the reasons for these changes have been examined. Troughs in J_E/Φ are attributed partly to increases in geomagnetic activity which cause a decrease in J_E, and partly to the presence of active regions on the sun's disk which tend to emit relatively more radio noise than the quiet sun. Peaks in J_E/Φ are associated with the absence of these active areas. (Met. Abst. 11.12-45)--Author's abstract.

D-51 Beckmann, B., First results of satellite observations for information. Nachrichtentechnische Zeitschrift, 12:335-343, July 1959. Unchecked. --A review of earlier radio and radar observations of earth satellites, and a summary of results obtained relating to ionospheric phenomena are given. --IRE Abst. 3495.

D-52 Beer, Arthur (ed.), Vistas in astronomy. London, Pergamon Press, 1955. 2 vol. (Vol. 1, 776 p. Vol. 2, p. 779-1770). figs., tables, refs., bibliogs, eqs. Indexes in Vol. 2. (Special Supplements, No. 3 and 4, to the Journal of Atmospheric and Terrestrial Physics). DLC (QB3.B35), DWB (520.82 B415v). Review by H.H. Voigt in Die Naturwissenschaften, Berlin, 45(17):427, Sept. 1, 1958. Review by B. Vorontsov-Vel'iaminov in Astronomicheskii Zhurnal, Moscow, 35(3):496-498, May/June 1958. --Vol. I of this series of "Compendiums" on astronomy and astrophysics included 7 sections: organization, history, dynamics, theory, instruments, radio astronomy, and solar physics. The second volume covers sections 8-16 (including 100 articles by authorities): solar-terrestrial relations, geophysics, planetary systems, stellar astronomy, photometry, spectroscopy, novae, galaxies, and lastly, cosmogony and cosmology. The section on solar-terrestrial relations (p. 779-826) contains 6 articles on the ionosphere (SIR EDWARD APPLETON), absorption of radio waves in the ionosphere (J.A. RATCLIFFE), solar flares (M.A. ELLISON), M-regions and solar activity (M. WALDMEIER), the corpuscular radiation of the sun (M.J. SMYTH), and solar cosmic rays (P.M.S. BLACKETT). In the section on geophysics there is an article on thunderstorm (E.T.PIERCE), atmospheric CO_2 (LEO GOLDBERG), infrared spectrum of atmosphere (T.W. WORMELL), the O_3 layer and the 9.6 μ O_3 band (R.M.GOODY and C.D. WALSHAW), O_3 near the North Pole (A.E. DOUGLAS et al.), upper atmosphere rocket soundings (S.F.SINGER), geomagnetic storms and bays (SYDNEY CHAPMAN), and the airglow (DANIEL BARBIER). In the section on the planetary system, LUIGI G. JACCHIA and F.L. WHIPPLE have an article on the Harvard photographic meteor program, MIROSLAV PLAVEC has one on the evolution of meteor streams, and H.C.VAN de HULST has one on the zodiacal light. Finally, in the last section (16) F.A.PANETH has an article on the frequency of meteoritic falls through the ages, and HAROLD C.UREY one on the origin and properties of the moon's surface. Each article is abstracted separately and will be run in later issues of MAB. Extensive bibliographies accompany many of the articles, and illustrative material in the form of diagrams, photographs and tables are interspersed throughout the text. (Met. Abst. 10. 10-6.)--M. R.

D-53 Behr, A. and Siedentopf, H., Sonnenüberwachung. (Solar Survey.) Naturwissenschaften, 39(2):28-38, Jan. 1952. 13 figs., 3 tables, 20 refs. DWB--The various sources and types of radiation from the sun, and their terrestrial effects are summarized in a diagram. Types, distribution and variations of sunspots are described, then faculae, eruptions, protuberances and filaments. Observations of the sun's corona are described in detail, then the highly variable non-thermal radio emissions of centimeter and meter waves. Examples of "synoptic" charts show sunspot groups, faculae, filaments, eruptions and isophotoes of the "green" corona. A list of publications of regular solar data concludes this useful summary. (Met. Abst. 4. 5-248.)--C. E. P. B.

D-54 Beliaev, N.A., The refraction of extra-terrestrial radio waves in the atmosphere. (In Russian). Astronomicheskii Zhurnal, Moscow, 32(4):359-372, July-Aug. 1955. (Transl. by E.R.Hope. Can. Direc. of Sci. Inf., Ser. April 1958. 16 p.)--Theoretical treatment for the case of a quiet undisturbed ionosphere. --Bull. Sign. Abst.

D-55 Berkner, Lloyd V. (Carnegie Inst. of Wash.), Signposts to future ionospheric research. U. S. Air Force. Cambridge Research Center, Geophysical Research Papers, No. 12:13-20, 1952. DWB--A survey of the progress in ionospheric research beginning with GAUSS a century ago, furthered by discoveries of MAXWELL and MARCONI and later by CHAPMAN, APPLETON, TUVE and others. The concept of the atmosphere as a series of heat engines, developed by WULF, is extended to include the F region as a fourth heat engine. Future efforts should be along the lines of investigating chemical and photochemical problems, thermo-dynamic processes, atmospheric movements, auroral physics, radio astronomy, and evolution of the earth's atmosphere (and consequent evolution of life on earth). (Met. Abst. 4.4-97) --M.R.

D-56 Berkner, L.V. (Associated Universities, Inc.), The instrumented earth satellite. Science and Culture, Calcutta, 22(10):553-554, April 1957. DWB, DLC--Seven major experiments planned for the U.S. earth satellite are listed and those plans for radioastronomical observations, micrometeorite and ionospheric studies are explained in more detail. (Met. Abst. 11J-16.)--M.R.

D-57 Berkner, L.V. (Pres., Assoc. Universities, Inc., N.Y.), IRE enters space. Institute of Radio Engineers, N.Y., Proceedings, 47(6):1048-1052, June 1959. 2 refs. DWB--Man's escape from the confines of his planet offers him revolutionary opportunities for performing whole new ranges of scientific experiments, notably in such fields as astronomy, physics, and geophysics. Electronics, because it provides the vital nerve system for such experiments, will be at the very center of these new exploits in space. Moreover, earth satellites, possibly in a 24-hr equatorial orbit, promise to open a new era in global communications in which almost limitless bandwidths may become available at relatively low cost. Space will become a major part of the activities of the IRE and its members in the future. Already there is developing a need for international planning of space age communications standards and of regulations for utilizing satellites for man's greatest benefit. (Met. Abst. 11.5-181.)--Author's abstract.

D-58 Beynon, W.J.G. and Brown, G.M. (eds.), Miscellaneous radio measurements. International Geophysical Year, 1957/1958, Annals, 3(IGY Instruction Manual):293-381, 1957. figs., tables, refs., eqs. Contents: Horner, F.: The measurement of atmospheric radio noise, p. 295-314. Morgan, M.G.: Whistlers and dawn chorus, p. 315-336. Lovell, A.C.B.; Forsyth, P.A. and Harang, L.: Radio reflections from aurorae, p. 337-341. Lovell, A.C.B.: Apparatus for radio-echo meteor survey, p. 342-345. Bowles, K.L.: Ionospheric forward scatter, p. 346-360. Peterson, A.M.: Ionospheric back scatter, p. 361-381. DWB--This manual gives a thorough treatment of all aspects of measurement of atmospheric radio noise (theory, equipment, observation methods, collection of data in centers, etc.), sferics, tweeks, whistlers, the dawn chorus, multiple whistlers, radio reflections from auroras, radio meteor surveys and ionospheric scatter (forward and backward) for use in IGY program. Samples of observation forms and records, and elegant photos of equipment are included. (Met. Abst. 9.9-31.)--M.R.

D-59 Bhonsle, R.V. and Ramanathan, K.R. (both, Physical Res. Lab., Ahmedabad), Studies of cosmic radio noise on 25 Mc/s at Ahmedabad. Journal of Scientific and Industrial Research, Sec. A, New Delhi, 17(12), Special Supplement, Dec. 1958. p. 40-45. 5 figs., 4 tables, 6 refs. DWB, DLC--The results discussed were obtained from March 1957 to Feb. 1958. The method of analysis was to check the cosmic noise intensity at a local hour, finding the corresponding sidereal time, obtaining extra terrestrial intensity from the (25Mc/s) curve and then calculating the absorption. The separate contributions of the D and the F2 layers are discussed in relation to the total attenuation. It was found that D absorption can be $<$ foF2. Ionospheric irregularities alone are not responsible for the excess attenuation observed in early night hours. (Met. Abst. 11E-18.)--W.N.

D-60 Bhonsle, R.V. and Ramanathan, K.R. (Physical Res. Lab., Ahmedabad, India), Magnetic storms and cosmic radio noise on 25 Mc/s at Ahmedabad (23°02'N; 72°38'E). Planetary and Space Science, N.Y., 2(2/3):99-103, April 1960. 4 figs., table, 2 refs. DWB--Analyzing the intensities of cosmic radio noise on 25 Mc/s at Ahmedabad, it was found that during days of magnetic storms there was, in addition to the usual variation of intensity due to the diurnal changes in D region ionization and F region absorption, a further variation. This resulted in a decrease in the attenuation on the first two days of the storm and an increase in the attenuation on the third day. The decreased attenuation is most clearly seen in the first half of the night on the first and second days after the commencement of a storm and is associated with a decrease in F scatter. (Met. Abst. unpub.)

D-61 Bierman, L. and Lüst, R., Radiation and particle precipitation upon the earth from solar flares. Institute of Radio Engineers, N.Y., Proceedings, 47(2):209-210, Feb. 1959. table, 5 refs. DLC--A brief survey of the main features of solar emissions in connection with solar flares is given: ultraviolet and X-ray radiation, corpuscular emission, radio frequency radiation, and relativistic particles. For these different components of nonthermal emissions the energies are estimated and their effects in the ionosphere are briefly discussed. (Met. Abst. 11.8-58.)--Authors' abstract.

D-62 Blackband, W.T. (Radio Dept., Roy. Aircraft Establishment, Farnborough, Hants), Radio communication with a lunar probe. Royal Society of London, Proceedings, Ser. A, 253(1275):511-515, Dec. 29, 1959. 3 figs., table, 2 refs., eqs. DWB, DLC--In the design of a communication system between the lunar probe and the earth the study of the radio noise is of importance. The paper treats the chief sources of radio noise, the variation of the noise with galactic coordinates and the variations of galactic noise with the frequency. A lunar probe might transmit 10 W at a distance of 400,000 km. The signal-to-noise ratio could be improved in three ways: 1) increasing the transmitted power, 2) using a larger receiving aerial, and 3) stabilizing the axes of the probe so that a directive transmitting aerial would be carried with its signal beamed toward the earth. (Met. Abst. 11.12-483.)--E.K.

D-63 Blackband, W.T.; Burgess, B.; Jones, I.L. and Lawson, G.J. (all, Radio Dept. Royal Aircraft Estab., Farnborough, Hants), Deduction of ionospheric electron content from the Faraday fading of signals from artificial earth satellites. Nature, London, 183(4669):1172-1174, April 25, 1959. 2 figs., table, ref. DWB--There are two classes of fadings involved: (1) those due to change in energy flux at the receiving aerial and (2) those accompanying a rotation of the plane of polarization of this energy. The results of a method used to interpret the fading records of Sputnik I and Sputnik 2 taken at Farnborough and Cambridge show good agreement of the values of electron content when compared with those deduced from ionograms taken at Slough and Inverness. The method of analysis discussed here is reliable. The results are shown in a table and two graphs. (Met. Abst. 11E-22.) --W.N.

D-64 Blum, Émile-Jacques; Denisse, Jean-François and Steinberg, Jean-Louis, Étude des orages radioélectriques solaires de faible intensité. (Study of solar radioelectric storms of weak intensity.) Académie des Sciences, Paris, Comptes Rendus, 232(5):387-389, Jan. 29, 1951. 3 figs., ref. DWB --A study of solar radioelectric storms of low intensity which were observed upon a frequency of 164 Mc/sec has revealed that days of low activity are characterized by the appearance of jumps of given amplitude and duration. It is asserted that intense radioelectric solar storms are produced by the superposition of jumps. (Met. Abst. 3.2-197.)--I.L.D.

D-65 Blum, É.-J.; Denisse, J.F. and Steinberg, J.L., Résultat des observations d'une éclipse annulaire de soleil effectuées sur 169 Mc/s et 9, 350 Mc/s. (Observational results of the effects of an annular solar eclipse at the frequencies of 169 Mc/s and 9.350 Mc/s.) Annales d'Astrophysique, 15(2):184-198, 1952. 8 figs., 8 refs. DWB--The results of observations with 3.2 and 178 cm wavelength during the solar eclipse of Sept. 1, 1951 in the French Sudan are presented and discussed. At 3.2 cm the distribution of luminosity increases toward the limb of the disk. At 178 cm the apparent diameter of the sun by far surpasses the apparent optical diameter, and the distribution of luminosity is not symmetrical. (Met. Abst. 4.7-212.)--W.N.

D-66 Blum, É.-J.; Denisse, J.F. and Steinberg, J.L., Influence de l'ionosphère sur la réception du rayonnement galactique de fréquence 29.5 Mc/s. (Influence of the ionosphere on the reception of galactic radiation at frequency 29.5 Mc/s.) Academie des Sciences, Paris, Comptes Rendus, 238(17): 1695-1697, April 26, 1954. 3 figs., 2 refs. DLC--Observations over 1949-1950 show that galactic radiation on 29.5 Mc/s is attenuated by the ionosphere. This may be attributed in part to occulation by the F2 layer and in part to supplementary absorption by the D layer.--El. Eng. Absts.

D-67 Boischot, A. and Warwick, J.W. (both, High Altitude Obs., Univ. of Colorado), Radio emission following the flare of Aug. 22, 1958. Journal of Geophysical Research, Wash., D.C., 64(6):683-684, June 1959. 2 figs., ref. DWB, DLC--An evaluation of the radio emission on 18 and 40 Mc/s following the flare seen on the Sun on Aug. 22, 1958, is presented from the observations of the High Altitude Observatory, Univ. of Colorado, taking into account the observations on 60 Mc/s from Harvard College Observatory, Fort Davis, Texas; on 169 Mc/s from Nancy, France; on 470 Mc/s from the National Bureau of Standards, Boulder, Colo.; and on 2800 Mc/s from Ottawa, Canada. A small flare, importance 1+, was in progress, when the great flare, importance 3 or 3+, appeared at 1417 UT, and this second flare was still continuing at 1700 UT. The radio emission showed an intense outburst, coinciding with the flare as illustrated on diagrams from 14h 20 m to 16h 20m UT for 18, 40, 60, 169, 470, and 2800 Mc/s, uncorrected for antenna gain. The complete records on a small time base are corrected for the effect of lobe, and presented along with ANDERSON's 1958 cosmic ray data. The spectrum differed from that of typical outbursts observed after great flares, by the great intensities reached on 40 and 18 Mc/s. Two different types of emission are indicated: 1) the burst appearing on 2800 and 470 Mc/s with decreasing intensity and frequency disappears near 100 Mc/s; 2) a long enduring continuum appears later on frequencies lower than 200 Mc/s. The increase of cosmic rays corresponds better to this second part of radio emission. The type II emission on metric wavelengths, which generally immediately follows the flare, is very weak or non-existent. The probability of a group of type III bursts is suggested. (Met. Abst. 11.12-46.)--O.T.

D-68 Bok, Bart J. (Dept. of Astronomy, Harvard Univ.), New science of radio astronomy. Scientific Monthly, Wash., D.C., 80(6):333-345, June 1955. 5 figs., 7 photos. DLC--A nontechnical review of the entire field of radio astronomy from its first beginnings in 1931 when JANSKY, of Bell Telephone, discovered radio radiation from the Milky Way over entire range from 1 cm to 30 m, thus extending our tools for astronomy from a range of 1000 to 30,000 A (5 octaves) to 12 more octaves of the emission spectrum. Antennas have grown from 31 ft in 1937 (REBER at Wheaton, Ill.) to 50 ft at N.R.L. in Wash., D.C., and 75 ft by Dutch to 250 ft at Jodrell Bank by Univ. of Manchester, Eng. Effects of sun on earth's atmosphere are more easily studied by radio frequency radiation variations since they are so sensitive and extreme in variation. Study of discrete sources, the 21 cm line of neutral hydrogen and future of radio astronomy in U.S. are discussed at some length. (Met. Abst. 7.2-76.) --M.R.

D-69 Booker, Henry G. (Cornell Univ., Ithaca, N.Y.), Atmospheric scattering of radio waves, with an application to radio astronomy (and discussion). U.S. Air Force. Cambridge Research Center, Geophysical Research Papers, No. 11:171-174, 1952. 7 refs. DWB--A theory of atmospheric scattering (after BOOKER and GORDON, 1950) is applied to the ionosphere in the hope of explaining "scattering in the E region, auroral phenomena and scattering in the F region at times of ionospheric storms". The scattering of radio waves by isotropic turbulence in the ionosphere is considered. (Met. Abst. 6D-113.)--M.R.

D-70 Booker, H.G., On the level at which fading is imposed on waves reflected vertically from the ionosphere. Journal of Atmospheric and Terrestrial Physics, 7(6):343-344, Dec. 1955. 4 refs. DWB--The observed width of the autocorrelation function at lower frequencies is 6-7 times that given by theory. Hence, the level of the ionospheric irregularities causing fading is where the local wave length is 6-7 $\times \lambda^{\circ}$. (Met. Abst. 7.3-298.)--C.E.P.B.

D-71 Booker, H. G. (Cornell Univ.), Turbulence in the ionosphere with applications to meteor trails, radio star scintillation, auroral radar echoes, and other phenomena. Journal of Geophysical Research, Wash., D.C., 61(4):673-705, Dec. 1956. 11 figs., 43 refs., 63 eqs. Also issued in Journal of Atmospheric and Terrestrial Physics, London, Special Supplement, Pt. 2, 1957, publ. 1958. p. 52-81. DLC--Two scales of turbulence are discussed, since large eddies are responsible for forward scattering phenomena and small eddies for back scatter. Molecular diffusion theory forms the basis for small scale eddy formulas; Richardson's number is used for the large scale eddies. Large eddies have time constants of 40 to 100 seconds; small eddies about 0.4 sec near 100 km. Large eddies have a scale of 1.6 km, small eddies about 1.3 meters. The coefficient of eddy diffusion in meteor trails is less than 10 for small eddies and increases to 10^4 for large eddies. The large eddies responsible for radio star scintillation are located near 200 km. The turbulence power in watt/kg is given as 5×10^{-4} in the troposphere, 25 at the meteoric level and 1000 at the scintillation level. (Met. Abst. 10.8-131.)--S. Fritz

D-72 Booker, H. G., The use of radio stars to study irregular refraction of radio waves in the ionosphere. Institute of Radio Engineers, N.Y., Proceedings, 46(1):298-314, Jan. 1958. 19 figs., 41 refs., 42 eqs. DLC--Thirteen basic conclusions are reached after reviewing the observations and the theory of radio star scintillation. They cover the methods of observation, observational results, the frequency variation of amplitude scintillations, the diurnal and seasonal variations of amplitude scintillations, the variation of amplitude scintillations with zenith angle, scintillation rate and phase, the drift of irregularities, the size of irregularities and the means whereby they are correlated. (Met. Abst. 11E-26.)--N. N.

D-73 Booker, H. G. (Electrical Eng., Cornell Univ., Ithaca, N.Y.), Phenomena of radio scattering in the ionosphere. (In: American Academy of Arts and Sciences, Atmospheric explorations. Cambridge, M.I.T., 1958. p. 101-125. 24 figs., 35 refs.) DLC (QC961.A4)--The nature of the ionosphere and VHF radar reflection records is reviewed and illustrated and nine of the various scattering mechanisms and phenomena explained: 1) fading of quiet echoes; 2) "spread F" phenomenon; 3) aspect-sensitive echoes; 4) twinkling of point cosmic radio source noise; 5) long duration meteor trail echoes; 6) echoes from below the E region; 7) VHF scatter communication; 8) echoes from auroral ionization; and 9) "sporadic E" phenomena. Many recorder records, graphs and histograms vividly illustrate the nature of these phenomena. The one factor which seems to be common to all of these anomalous conditions in the various ionized media is turbulence, so it is hoped that explanations may be forthcoming in terms of statistical turbulence theory. (Met. Abst. 11E-25.)--M. R.

D-74 Booker, H. G. (Cornell Univ., Ithaca, N. Y.), A local reduction of F region ionization due to missile transit. Journal of Geophysical Research, Wash., D.C., 66(4): 1073-1079, April 1961. 6 figs., 7 refs. DLC--When Vanguard II was fired from Cape Canaveral, close to 1100 EST, peculiar echoes were received at intervals between 1102½ - 1130 at the monitoring station (approximately 300 km distant) using an ionosphere sounder. The phenomenon is interpreted as produced by the hot exhaust of the passing missile, and is also discussed in relation to spread F and radio star scintillations. --W. N.

D-75 Bost, R. (Nat. Lab. of Radio Electricity, Bagneux/Seine), Influence de l'éclipse du 30 juin 1954 sur la propagation des atmosphériques sur la fréquence de 27 kc/s. (Influence of the June 30, 1954 eclipse on the propagation of atmospherics on the 27 kc/s frequency.) (In: Solar eclipses and the ionosphere: a symposium... ed. by W. J. G. Beynon and G. M. Brown, London, Pergamon, 1956. p. 132-136. 3 figs.) DWB--A brief account is given of recordings of atmospherics on several frequencies during the eclipse of June 30, 1954. Quite pronounced enhancement was observed for the weaker atmospherics on 27 kc/s, but no eclipse effects were observed at frequencies in the range 4-12 kc/s. (Met. Abst. 9.6-289.)--Author's abstract.

D-76 Bowles, Kenneth L., Incoherent scattering by free electrons as a technique for studying the ionosphere and exosphere: observations and theoretical considerations. U.S. National Bureau of Standards, NBS Report 6070, Sept. 18, 1959. 39 p. 12 figs., table, 17 refs., 12 eqs. DWB (621.384 U585in). Also issued as: AGARDograph, Paris, No. 42:223-241, May 1959. 10 figs., table, 15 refs. -- Incoherent scattering by the free electrons of the ionosphere has been predicted and offered as a technique for measuring the electron density profile both below and above the F region maximum. This paper reports observations which confirm the existence of the incoherent scatter and show that its intensity is essentially the predicted value. The observed Doppler broadening is considerably smaller than predicted. In the second part of the paper an explanation for the reduced Doppler broadening is offered. The scatter is explained as arising from statistical fluctuations of electron density, the distribution of which is controlled by the positive ions. Computations of the temporal autocorrelation function, and related power spectrum, of the scatter are presented. An additional possibility of using the incoherent scatter for mass spectrometer measurements of the ionic constituents is outlined. (Met. Abst. 11F-13.) --Author's abstract.

D-77 Bowman, G. G. (Univ. Queensland, Brisbane), Sunrise and eclipse effects on the ionosphere at Brisbane. Australian Journal of Physics, Melbourne, 13(1):52-68, March 1960. 17 figs., 4 tables, 8 refs. DLC--A rotating spaced-loop direction finding system, located at Brisbane, has been operated to investigate sunrise effects by using pulsed 3.84 Mc/s transmissions, (a) at normal incidence and (b) at oblique incidence. For oblique incidence recording the transmitter was located at Armidale (bearing 202° and distant 355 km from Brisbane). Evidence is presented which suggests the formation (at both E and F2 layer levels) of several frontal irregularities, spaced some tens of kilometers apart, extending in directions parallel to the sunrise line and traveling, relative to the earth, with this line. These fronts pass overhead at Brisbane approximately half way between the 90 km level and ground level sunrise times. In the post sunrise period, F2 layer spreading on the two hop trace appears, and the spreading width increases for about 2 hrs, suggesting an F2 layer ripple structure, with increasing ripple amplitude. The post sunrise sporadic E occurrence suggests frontal irregularities, lying close to the sunrise line direction, soon after sunrise, but indicates a swing in direction as time progresses. Rotating-loop normal incidence transmissions were also used to investigate effects due to an eclipse of the Sun, at Brisbane, on April 8, 1959. Post eclipse E and F2 layer frontal irregularities, oriented in directions close to the line representing the end of eclipse in the region of Brisbane suggest a mechanism operating as the eclipse ends, which is similar to that operating at sunrise. The possibility that the ripple structure which produces night-time spread F at Brisbane is generated at sunrise, is discussed. (Met. Abst. 11.10-142.)--Author's abstract.

D-78 Bracewell, Ronald N. and Preston, George W. (both, Berkeley Astronomical Dept., Univ. Calif.), Radio reflection and refraction phenomena in the high solar corona. Astrophysical Journal, Chicago, 123(1):14-29, Jan. 1956. 14 figs., table, 19 refs., 13 eqs. DWB, DLC--At the lowest frequencies used in radio astronomy, e.g., at 18 Mc/s, the sun has not yet been observed; but if existing data are correct, it presents a number of curious features: (a) the size of the sun as a radio frequency source is two to three times the size of the visible sun, but in place of a sharp limb, there is merely a gradual fading away into the background; (b) a zone of sky is occulted by the sun, and, because significant effects of refraction reach farther out into the corona than the effects of absorption, the occulted zone is some nine times larger than the photosphere; (c) the sun exhibits an occulting disk whose diameter is six times that of the photosphere and which differs from the emitting disk in having a sharp limb; (d) the discrepancy in size between the occulted zone and the occulting disk is associated with apparent displacement of the unocculted sky toward the sun by refraction; (e) within the occulting disk the sun behaves as a convex reflector, mirroring the whole of the unocculted sky. The reflection of the Galaxy, though greatly diminished in size, remains comparable as a radio source with the emitting sun itself. If observed with existing aerials, which are incapable of resolving the solar emission from the galactic reflection, the sun should apparently exhibit a marked annual variation of flux density. (Met. Abst. 9A-106.)--Authors' abstract.

D-79 Bracewell, R. N., Radio interferometry of discrete sources. Institute of Radio Engineers, N. Y., Proceedings, 46(1):97-105, Jan. 1958. 4 figs., 13 refs., eqs. DLC--Salient features of the theory and practice of radio interferometry are presented with special attention to assumptions and to the specifically two-dimensional aspects of the subject. The measurable quantity on an interferometer record is defined as complex visibility by generalization from an analogous quantity in optical interferometry. Subject to conditions on antenna size and symmetry, the observed complex visibility is equal to the normalized two-dimensional Fourier transform of the source distribution, with respect to certain variables, S_x and S_y, which are defined. This transform is in turn identically equal to the complex degree of coherence Γ between the field phasors at the points occupied by the interferometer elements. The correlation between the instantaneous fields, and that between the instantaneous intensities are less general parameters which are, however, deducible from Γ. A theorem is proved according to which only certain discrete stations on a rectangular lattice need be occupied for full determination of a discrete source distribution. Procedures in interferometry are discussed in the light of this result and an optimum procedure is deduced. Current practice is considered overly conservative, e. g., independent data in the case of the sun are obtainable only at station spacings of about 100 wavelengths on the ground, a fact which hitherto has not been taken into account. (Met. Abst. unpub.)--Author's abstract.

D-80 Bracewell, R. N. and Stableford, C. V., Critical frequency, refractive index, and cone of escape in the solar corona. Institute of Radio Engineers, N. Y., Proceedings, 46(1): 198-199, Jan. 1958. fig., 4 refs. DLC--Since propagation and escape of radio waves in the solar corona have much in common with propagation in the ionosphere, the nomograms presented are offered to facilitate the calculations of numerical results. --W. N.

D-81 Bracewell, R. N. and Garriott, O. K. (both, Radio Propagation Lab., Stanford, Univ. Calif.), Rotation of artificial earth satellites. Nature, London, 182(4638):760-762, Sept. 20, 1958. 7 figs., 3 refs., eqs. DLC--The influence of rotation of an artificial satellite on its earth bound radio signal is discussed. Representative examples of regular fading of the 20 and 40 Mc/s signals from Sputnik I, as recorded when the satellite passed Stanford, are given along with a brief theoretical discussion on elimination of rotational effects. Features of the field strength of Sputnik III, of June 14, 1958, indicate that the problem was then solved. (Met. Abst. unpub.)--W. N.

D-82 Bracewell, R. N. (Radioscience Lab., Stanford Univ.), Communications from superior galactic communities. Nature, London, 186(4726):670-671, May 28, 1960. fig., 6 refs. DWB--DRAKE (1959) has described equipment under construction to look for transmissions from advanced societies elsewhere in the Galaxy. He plans to look at Ceti and Eridani. It seems more reasonable that we look for probes sent here, and we in turn send probes. The important thing for us is to be alert to the possible interstellar origin of unexpected signals and be prepared to communicate with the sender. (Met. Abst. 11.12-491.)--E. Z. S.

D-83 Bracewell, R. N., Correcting noise maps for beamwidth. (In: Menzel, Donald H., ed., The radio noise spectrum. Cambridge, Mass., Harvard Univ. Press, 1960. p. 141-150. 5 refs., eqs. DWB--Two kinds of practical problems arise in correcting noise maps for beamwidth which are referred to as "smoothing" and "sharpening." The first of these arises when we have a detailed survey available and wish to find what we would observe with a beam wider than that used for the survey. The second comes up when we are given the data from a survey made with an antenna having a known radiation pattern and we wish to ascertain what would have been observed had we used an antenna with a narrower beam. We consider first the discrete interval theorem which is valuable for the handling of two-dimensional data since it enables numerical work to be done at rather coarse discrete intervals without loss of accuracy. One section of this paper is devoted to exploration of the procedure for smoothing survey data to yield values appropriate to broader circular asymmetric beams. Practical numerical details are dealt with in a section on adjustment of scale factors and finally the sharpening procedure is discussed. (Met. Abst. unpub.)--E. Z. S.

D-84 Bremmer, H., Exploring the atmosphere with radio waves. Philips Technical Review, 22(3):61-70, Jan. 14, 1960. 2 figs., 29 refs. DLC--This is a compressed version of the author's inaugural address as extramural professor at the Eindhoven Technische Hogeschool, Feb. 12, 1960. The general review of scientific accomplishments is discussed in terms of the ionosphere as a hypothesis to explain the range of radio waves, sounding in the ionosphere, the space above 400 km, transition of the atmosphere to interplanetary gas, ionospheric winds, radar observation of meteors, and atmospheric tides.--W. N.

D-85 Brenan, I. N. (Nuffield Radio Astronomy Lab., Univ. of Manchester), The correlation of radio source scintillation in the Southern and Northern Hemispheres. Journal of Atmospheric and Terrestrial Physics, London, 19(3/4):287-289, Dec. 1960. fig., table, 10 refs. DWB--This research note presents the results of a comparison of scintillation observations made during the IGY at the Royal Society Base, Halley Bay, Antarctica, and the simultaneous observations made at Jodrell Bank in England. The positions of the stations and their coordinates are given in tabular form. The comparison was made in order to determine whether or not the scintillation activity in high southern latitudes is related to the activity in northern latitudes, and the results, graphically presented, show the correlation coefficient as +0.37 for 388 pairs of observations. This coefficient is compared with other values published on the day to day correlation of scintillation activity and the resulting theoretical implications are discussed. (Met. Abst. unpub.)--I. S.

D-86 Brenan, P. M. (Jodrell Bank Experimental Station, Univ. of Manchester), Ionospheric drifts determined from radio-star scintillation observations. Royal Society of London, Proceedings, Ser. A, 256(1285):222-229, June 21, 1960. 5 figs., 8 refs. DLC--Spaced receiver observations of radio star scintillation were made at the Royal Society Base, Halley Bay, during the I. G. Y. A technique is described whereby ionospheric velocities can be deduced from the motion of the diffraction pattern on the ground. These velocities were approximately toward the west in the first part of the night, and toward the east for the rest of the night and most of the next day. The reversals in direction of motion occurred at 0030 and 1630 L.M.T. Lift speeds were of the order of 400 m/s in the evening, falling to 100 m/s after easterly motions had been established. Both the time of midnight reversal and the drift speed correlate well with Evan's (1959) measurements of motions of auroral forms. (Met. Abst. unpub.)

D-87 Briggs, B.H. (Cavendish Lab., Cambridge), Diurnal and seasonal variations of spread-F ionospheric echoes and the scintillations of a radio star. Journal of Atmospheric and Terrestrial Physics, London, 12(2/3):89-99, 1958. 7 figs., table, 12 refs. DLC--A comparison is made of the spread F ionospheric echoes observed at Slough (52°N) and Inverness (57°N). It is found that the degree of spreading is greater at the station of higher latitude. The diurnal and seasonal variations are similar at the two stations. The diurnal and seasonal variations of the scintillation index of the radio star in Cassiopeia are explained in terms of measured ionospheric parameters (spread-F index and critical frequency) together with the change of zenith angle of the source. A large seasonal anomaly, which was previously thought to exist, is found to be much reduced when all the relevant factors are taken into account. (Met. Abst. 10.2-168.)--Author's abstract.

D-88 Briggs, B.H. (Cavendish Lab., Cambridge), A study of the ionospheric irregularities which cause spread-F echoes and scintillations of radio stars. Journal of Atmospheric and Terrestrial Physics, London, 12(1):34-45, 1958. 5 figs., 4 tables, 22 refs. DLC--A study is made of the correlation between the occurrence of spread F echoes at Slough, Inverness and Oslo. It is concluded that the ionospheric irregularities which cause the spreading occur in patches which have dimensions of the order of 500 km in a NS direction, and considerably greater in the EW direction. There is an indication that these "bands" of irregularities may lie along lines of magnetic latitude, and the fact that they tend to occur in the same geographical position on successive nights at two places is investigated. The results are found to be consistent with the same picture of the spatial distribution of the irregularities causing the scintillations which are at heights near 300 km. (Met. Abst. 9.11-163.)--Author's abstract.

D-89 Brito-Infante, José M. (Escuela de Electronica, Armada de Chile, Vina del Mar, Chile), Elimination of ionospheric refraction effects. Institute of Radio Engineers, N.Y., Proceedings, 49(9):1451-1452, Sept. 1961. table, ref., 6 eqs. DLC--Describes a simple method of eliminating ionospheric refraction effects upon signals emitted from a mobile high altitude radio transmitter. By this method, an orbiting satellite can, in effect, be located by direct analysis of the Doppler effect of the satellite transmitted radio signals as demonstrated. (Met. Abst. unpub.)--W. N.

D-90 Brockman, M. H.; Buchanan, H. R.; Choate, R. L. et al., Extraterrestrial radio tracking and communication. Institute of Radio Engineers, N. Y., Proceedings, 48(4):643-654, April 1960. 10 figs., 5 tables, 11 refs., numerous eqs. DLC--When the U. S. Army lunar program was initiated in 1958, the Jet Propulsion Laboratory (JPL) was assigned the responsibility for the upper rocket stages and the payload. Payload responsibility included radio tracking and communication with the lunar probe. JPL's Microlock system, used for communicating with the early Explorer satellites, did not have sufficient range to perform this mission. Therefore, a new radio system designated TRACE (E) (Tracking and Communication, Extraterrestrial) was designed. To the best knowledge of the authors, the TRACE (E) system is the first deep space communication link to provide accurate tracking and telemetry data at lunar distances. The design principles of the TRACE (E) system are presented in this paper in conjunction with a description of the equipment and actual performance data taken during the Pioneer IV lunar mission in March 1959. The TRACE (E) system is an integral part of the NASA/JPL radio tracking station located near Goldstone Lake north of Barstow, Calif. Future plans for improving the performance of the TRACE (E) system are indicated. (Met. Abst. 11.10-40.)--Authors' abstract.

D-91 Brockman, James (Nat. Bur. of Standards., Boulder Lab., Colo.), Solar disturbances and radio communication forecasts. Sky and Telescope, 21(6):322-326, June 1961. 9 figs. DLC--An account of the 3+ solar flare of Nov. 12, 1960, which disrupted the atmosphere and the earth's magnetic field for almost 10 days. Illustrative of the present day forecast service is how the forecaster J. Weldon, at the World Warning Agency at Fort Belvoir, Va., reacted after being taken by surprise and immediately transmitted his successful forecasts. --W. N.

D-92 Brown, Robert Hanbury and Lovell, A. C. B., Exploration of space by radio. N. Y., John Wiley, 1958. 207 p. 132 figs. (incl. photos), 6 tables, bibliogs. DLC (QB475.B7. Review by T. Krishnan in Journal of Scientific Research, New Delhi, Ser. A, 18(3):141-142, March 1959. --A new, semi-technical textbook on the astronomical, theoretical, instrumental, observational and specialized aspects of radio astronomy, nicely illustrated with photographs of radio telescopes, equipment, instruments, records, graphs, etc.

Separate chapters are devoted to the galactic and extragalactic radio emissions, the hydrogen line, scintillation of radio stars, solar radio emissions, meteors, radio and the aurora, the moon, planets, earth satellite, and finally, a description of the Jodrell Bank radio telescope and the program of research. Techniques are thoroughly discussed in Ch. 3, and ionospheric-geomagnetic effects on radio emissions from space in Ch. 6. The chapter on radio observations of the aurora is especially complete. (Met. Abst. 10.7-9.)--M.R.

D-93 Brown, R.H. and Hazard, C. (both, Nuffield Radio Astronomy Labs., Jodrell Bank), Radio emission from normal galaxies, Pt. 2, A study of 20 spirals at 158 Mc/s. Royal Astronomical Society, London, Monthly Notices, 122(6):479-490, 1961. 3 figs., 3 tables, 9 refs., 5 eqs. DLC--A survey has been made of the radio emission at 158 Mc/s from 20 bright spiral galaxies. A radio index R has been defined by the equation $R = m_r - m_{pg}$, where m_r and m_{pg} are the radio and photographic magnitude respectively. The results indicate that R is a function of the inclination and galactic latitude of a galaxy and it is suggested that this effect is due to the absorption of light. The mean value of R for spirals of type Sb and Sc is + 1.3 with an r.m.s. dispersion $\pm$ 0.7. No significant difference was found between the mean values of R for the two types of galaxies. (Met. Abst. unpub.)--Authors' abstract.

D-94 Brown, S.B. and Petrie, W., The effect of sunrise on the reflection height of low frequency waves. Canadian Journal of Physics, 32(1):90-98, Jan. 1954. fig., 3 tables, 12 refs., 23 eqs. DLC--The observed sudden changes of phase and amplitude of 16 kc/s waves transmitted over distances of 540 km are discussed in relation to the geometry of the system at the change-over from night time to day time reflection height (95 km and 70 km respectively). The effect cannot be due to photoionization of atmospheric molecules, but may be due to removal of electrons from negative oxygen ions by visible and near infrared radiations; calculations are presented giving support to this view. The rate of fall of the reflection height is discussed. --IRE Abst. 2092.

D-95 Bruce, G.E.R. (Electrical Research Association Lab., Leatherhead, Surrey), The energy radiated by radio galaxies. Institution of Electrical Engineers, Journal, 7(80):513, Aug. 1961. 3 refs. DLC--The electric field and discharge theory explain the amount, as well as how the energy radiated by radio galaxies transform globular or elliptical galaxies into irregular or spiral ones, as suggested by the author in 1944. Consultation of available literature is advisable prior to postulations. --W.N.

D-96 Bruzek, A. (Fraunhofer Institut, Freiburg i. Br.), Die Radiowellenstrahlung der Sonne, II, Der m-Wellenlangenbereich. (Radio wave radiation of the sun, Pt. 2, The meter wave region.) Umschau, Frankfurt a. M., 22(50): 684-686, Nov. 1959. 5 figs., 2 foot-refs., 8 refs. DLC--Studies of the long lived radio wave radiation have shown that the intensity of the "quiet" meter wave radiation and its distribution over the solar disk varies from day to day. In the meter region there exists also local centers of intensified quiet radiation. Its effective radiation of about 2×10^6 degrees indicates a thermal origin. The radio storms constitute another long level but restless radiation. The meter wave bursts consist of five types. Type I bursts have a life several tenths of a second to one second; a band width of 4 to 7 MHz and they do not change their frequency. The type III bursts have a similarly brief duration but at a band width of 10 MHz, they manifest a rapid frequency drift of about 20 MHz/sec. Type II bursts are powerful radiation outbursts with apparent temperatures of 10^{11} to 10^{14} degrees which often extend over the spectral region of 8.5 to 33 met. The type IV bursts consist of a rapid rise in radiation intensity with circularly polarized radiation following a type II burst. (Met. Abst. 11.9-110.) --I.L.D.

D-97 Budden, K.C. and Ratcliffe, J.A. (Cavendish Lab., Cambridge, England), An effect of catastrophic ionospheric disturbances on low-frequency radio waves. Nature, London, 140(3555):1060-1061, Dec. 18, 1937. 2 figs., 3 refs. DLC --Recordings of long standing of the down-coming wave at 16 kc/s were analyzed and compared in relation to time of fadeouts, increases in spherics and magnetic anomalies on the same day. The results presented in curves show a marked effect of LF waves at the 70 km level. --W.N.

D-98 Budden, K.G. and Yates, G.G., A search for radio echoes of long delay. Journal of Atmospheric and Terrestrial Physics, 2(5):272-281, 1952. 23 refs. DWB--An unsuccessful search was made for echoes delayed 3-15 sec. The cause of such echoes is discussed and they are tentatively attributed to "the propagation of guided waves over long curved paths formed by belts of ions outside the earth but fixed relative to it." (Met. Abst. 4.4-100.)--C.E.P.B.

D-99 Bugnolo, Dimitri S., Radio star scintillation and multiple scattering in the ionosphere. Institute of Radio Engineers, New York, Transactions, Vol. AP-9(1):89-96, Jan. 1961. 8 figs., 10 refs., 46 eqs. DLC--

The transport equation for the expectation of the photon density function, as applied to multiple scattering in the ionosphere, is used here to predict the mean squared scattering angle and corresponding size of the ionospheric irregularities as measured on earth. The results derived, based on a Gallet model for turbulence in the underside of the F layer at night time conditions, are applicable to other models as well. --From Author's abstract.

D-100 Bureau, R., Effect of catastrophic ionospheric disturbances on low-frequency radio waves. Nature, London, 141(3571): 646, April 9, 1938. fig.--Very brief note on observations at 12, 17, 22, 27 and 30 kc/s at Paris, St. Cyr, and Rabat, France, on Nov. 6, 1936, confirming Budden and Ratcliff's results. (See ref. D-97.)

D-101 Burgess, R.E. and Fowler, C.S., Solar activity and ionospheric effects. Comparison from May to Nov. 1948. Wireless Engineer, London, 29(341):46-50, Feb. 1952. 4 figs., table, 3 refs. DLC--Observations of ionospheric propagation conditions on long waves (191 kc/s) and short waves (18.89 Mc/s) were compared with observations of solar noise bursts (on 30, 42, 73 and 155 Mc/s) and with the appearance of solar flares and sunspots. Detailed study of the correlation between these phenomena was made and statistical conclusions are presented. (Met. Abst. 6D-116.)--M.L.R.

D-102 Burkard, O. (Inst. for Met. and Geophysics, Graz Univ.), Radio reflexions from the moon and solar corona. Nature, London, 183(4669):1180, April 25, 1959. 5 refs., 3 eqs. DWB--A revised formula for the plane of polarization which is based upon the assumption that there are some hundred electrons per c.c. in the space around the earth is given here. The "old" formula for the rotation of the plane of polarization is also given in this brief discussion. The modification is based on Sputnik I researches. (Met. Abst. 11.10-97.)--W.N.

D-103 Burrows, Charles R. (Dir. School Elec. Engr., Cornell Univ.), Radio astronomy. Electronics, Albany, N.Y., 22(2):75-79, Feb. 1949. 5 figs., 13 refs. DWB. Also in: Cornell Univ. School of Electrical Engineering, Contract N6onr-264, T.O. 6, NR077-321, Radio Astronomy Report No. 3, Feb. 1949. (5 p.) 5 figs., 13 refs. DWB--A broad informative presentation of the subject and its various aspects with the focus on radio astronomy as a useful tool for the radio engineer, the astronomer and the meteorologist. (Met. Abst. 9A-7.)--W.N.

D-104 Cain, J. C.; Shapiro, I. R.; Stolarik, J. D. and Heppner, J. P. (all, Space Sci. Div., Goddard Space Flight Center, NASA, Greenbelt, Md.), A note on whistlers observed above the ionosphere. Journal of Geophysical Research, 66(9):2677-2680, Sept. 1961. 4 figs., 11 refs. DLC--The sensing coil of the proton precession magnetometer carried on the Vanguard III satellite, also served as an antenna for detecting audio frequency electromagnetic waves. A preliminary analysis is given for about 100 whistlers observed Sept. 18 through Dec. 12, 1959, at low altitudes over the altitude range 510 to 3750 km. About 90% of the whistler occurrences are between 6 P. M. and 6 A. M. local time, indicating a low nighttime absorption by the ionosphere. The intensity of the H component of the wave is estimated to be between 0.01 and 0.5 gamma, with that of a few signals exceeding 1 gamma. --Authors' abstract.

D-105 Carnegie Institution of Washington, Yearbook, No. 54, July 1, 1954/June 30, 1955. Wash., D.C., 1955. 311 p. figs., tables, bibliogs. DWB--Reports of departmental activities and cooperative studies: Mount Wilson and Palomar Observatories, p. 3-38, 3 tables, bibliog., p. 36-38. Department of Terrestrial Magnetism, p. 41-94, 17 tables, bibliog. p. 91-94. Solar research (photography, sunspot and magnetic studies, and solar spectrum investigations) at Mount Wilson and other observatories is outlined. Work in radio astronomy of Jupiter, the sun, and galaxies and ionospheric effects on radio frequency radiation is described. Cosmic ray investigations (by S. E. Forbush) are summarized. (Met. Abst. 8. 1-37.)--M. R.

D-106 Carnegie Institution of Washington, Yearbook, No. 56, July 1, 1956-June 30, 1957. Wash., D.C., 1957. 425 p. figs., tables, bibliogs. Reports of departments and special studies: p. 37-75, Mount Wilson and Palomar Observatories. p. 81-87, Dept. of Terrestrial Magnetism. p. 149-252, Geophysical Laboratory. DWB--The report on the Mt. Wilson and Palomar Observatories describes the work in progress and some of the results of solar research (solar photography, sunspot activities, solar magnetic fields, geomagnetic relations, radio sources, etc.). The report of the Department of Terrestrial Magnetism goes into radio astronomy research -- radio emissions from the sun, Jupiter and Venus, upper air winds and radio star scintillations, etc. The IGY program is outlined. Extensive bibliographies accompany each report. (Met. Abst. 10. 5-23.)--M. R.

D-107 Carpenter, Martha (Stahr), Bibliography of radio astronomy. Cornell Univ. School of Electrical Engineering, Contract N6onr-26406, Radio Astronomy Report No. 2, Dec. 15, 1948. 44 p. Also First Supplement, issued as Radio Astronomy Report No. 4, July 1, 1949. 25 p. And Second Supplement, issued as Radio Astronomy Report No. 10, Feb. 15, 1950. 25 p. --The first issue contains 117 references, mostly annotated, and pertaining wholly or in part to that phase of radio astronomy which deals with radio frequency radiations from extraterrestrial sources. The references are arranged chronologically and then alphabetically by authors within the following 6 sections: 1. Observations of galactic noise; 2. Observations of solar noise; 3. Theory of emission of radio waves by the galaxy; 4. Theory of the emission of radio waves by the sun; 5. Theory and description of instruments; and 6. Reviews. The first supplement includes a total of 67 references numbered consecutively to the former bibliography. The second supplement contains 51 references, follows the same arrangement as previously but includes an additional section on observations of radio frequency radiation from the moon. --W. N.

D-108 Carpenter, Martha (Stahr), Bibliography of extraterrestrial radio noise. Issued as part of the Report of Commission V to the 9th General Assembly of the International Scientific Radio Union. Cornell Univ. School of Electrical Engineering, Contract N6onr-26406, Radio Astronomy Report No. 11, Aug. 15, 1950. 129 p. 280 refs. Also Supplement for 1950, issued as Part of the Report of Commission V to the 10th General Assembly of the International Scientific Radio Union. Pub. as Radio Astronomy Report No. 12, Aug. 1952. 63 p. "77 items which appeared in 1950."--The annotated references are classified according to: (A) Radiation from the sun; (B) General galactic radiation; (C) Radiation from "discrete sources"; (D) Radiation from the moon. In each section the works are divided into (1) observations, and (2) theories and interpretations, and chronologically within each subsection. Also a section on miscellaneous items and one on reviews are included. Many of the abstracts are from standard journals and about half by the author. An author index is appended. Titles are given in the original language (except Russian titles which are given only in English translation).

Note: A bibliographic reference mentions that Radio Astronomy Report No. 13 brought the bibliography up to date through 1951. Also Supplement for 1952. Issued as Cornell Univ. School of Electrical Engineering, Contract Nonr-40122, Research Report EE371, April 15, 1958. 1 vol. incl. tables. Available from ASTIA as its AD-204-812. (UNCHECKED).

Note: In 1957, the Australia Commonwealth Scientific and Industrial Research Organization., Div. of Radiophysics, brought out its Radio Astronomy bibliography, 1954-1956, as a "tentative bridging of the gap between existing and projected publications of the Cornell Univ. Bibliography of extraterrestrial radio noise." --M. R. and D. G.

D-109 Carru, H.; Gendrin, R. and Reyssat, M. (all, Centre National d'Etude de Telecommunications, Departément Communications et Detection Spatiales, Issy-les-Moulineaux), A transatlantic communication via Echo I satellite. Nature, London, 189(4761):268-271, Jan. 28, 1961. 5 figs., 5 refs. DWB--This paper describes in detail a successful experiment involving communication, using continuous wave transmissions between Holmdel (New Jersey) and Issy-les-Molineaux (France) which took place on Aug. 18, 1960. The fact that this was the only successful attempt in 12 trials may have been due to a lack of the necessary signal strength. The signal in this case was received for about 1 min. The amplitude trace is illustrated. In order to make some comparison with the theoretical prediction the position, distance and Doppler effect for the time were computed. From the Doppler curves the transmitted frequencies are estimated. Examination of the amplitude record showed that the reflectivity to the coating is almost ideal and that the received signals are free from rapid fading. (Met. Abst. unpub.) --R. B.

D-110 Chapman, J. H. and Molozzi, A. R. (Defence Res. Telecom. Estab., Ottawa, Canada), Interpretation of cosmic noise measurements at 3.8 Mc/s from satellite 1960 η 1. Nature, London, 191(4787):480, July 29, 1961. table, 2 refs. DLC --Tentative analysis of the field strength variations according to locations were made. The brief discussion is based on the following assumptions as causes of the variation: (1) variation of the antenna's radiation resistance; (2) restriction in angular aperture of the antenna; and (3) variation of cosmic noise power over the sky. Very brief tabulated results are given since a detailed report is to be published. --W. N.

D-111 Chapman, Sydney, The sun, the earth's atmosphere, and radio transmission. Nature, London, 119(2994):428-429, March 19, 1927. --A general informative article on propagation of radio waves through the atmosphere and the effect of solar activity directly responsible for the variable conditions of radio communication. --W. N.

D-112 Chapman, S. and Little, C. Gordon, The nondeviative absorption of high frequency radio waves in auroral latitudes. Journal of Atmospheric and Terrestrial Physics, 10(1):20-31, Jan. 1957. 3 tables, 21 refs., 14 eqs. DWB --In auroral latitudes the nondeviative absorption of high frequency radio waves is much more irregular, and often much stronger, than in subauroral latitudes. It is greater and more frequent by day than by night; this is the converse of the daily variation of magnetic activity. The electrons that produce the absorption in subauroral latitudes are mainly caused by solar ultraviolet light; in auroral latitudes, often the major source is bombardment of the atmosphere by solar gas. According to J. A. VAN ALLEN's new interpretation of the soft radiation observed by himself and his colleagues in auroral latitudes, down to 50 km, a small minority of the primary bombarding particles generate X-rays, which penetrate further than the particles themselves. It is here suggested that the layer ionized by these X-rays is an important factor in the daytime radio absorption. Also, as D. R. BATES has pointed out, Lyman-alpha radiation will be generated by the auroral protons; ionization of nitric oxide molecules by this radiation may also contribute appreciably to the absorption. The same processes of ionization will occur likewise at night, .and often still more strongly; however, loss of the electrons to form negative ions by attachment is countered by photodetachment during the day, but not at night. Very tentative tables are given, based on these ideas, indicating ionospheric conditions consistent with greater daytime absorption than at night, even when the nighttime bombardment is twenty times more intense than that by day. The corresponding absorption relaxation times, and daily variation of magnetic disturbance, will be examined in a later note. (Met. Abst. 8.6-179.)--Authors' abstract.

C-113 Chapman, S., The earth in the sun's atmosphere. Scientific American, N. Y., 201(4):64-71, Oct. 1959. 10 figs. (incl. photos). DWB, DLC--The magnitude of our Earth and the extent of its surrounding atmosphere as well as the density of the solar atmosphere is discussed. Although a knowledge of the physical Earth and of the astronomical science associated with the earth dates back over 2000 years, little was known of the significance of the conductivity that exists between the earth's and the sun's atmosphere, their electron densities, and of the violent prominences in the photosphere that emit energy which, in turn, is carried away by convection within the solar atmosphere. The present report covers the achievements made along these lines during the IGY. It describes numerically the density and intensity of the electrons in the solar atmosphere, turbulent waves and temperature rises within the solar region. Close to our earth it is recorded that over 9000 electrons, and the same number of protons, per cu in. exist. This means that in the interstellar space these figures range from 10 to 200 per cu in. The article indicates that the hot energizing solar gas steadily streams into our earth's atmosphere and the deflected particles of such gases give birth to the observed luminous aurora. Some of it is trapped in the outer belts of the atmosphere. Photographs of the corona, the zodiacal light, etc., as well as graphical illustrations of the earth's temperatures in degrees Kelvin, the electron densities per cu in. and the reflection of radio waves from the ionosphere as recorded in the Propagation Laboratory in Boulder, Colo., are included. (Met. Abst. 11.9-73.)--N. N.

D-114 Chechik, P.O., Radiotekhnika i elektronika v astronomii. (Radiotechnique and electronics in astronomy.) Moscow, Gosenergoizdat, 1953. 103 p. 76 figs., 22 tables, footrefs., bibliog. (38 refs.) p. 102-103. Massovaia Radiobiblioteka, No. 189. DLC (QB475.C45)--This small technical text contains chapters on various aspects of time (or longitude) on earth and its radio dissemination or determination; on meteors and their study by radio; on lunar, solar and galactic investigations by radio, on the significance and application of photo-elements in astronomy and their measurement. The effect of the ionosphere, ionospheric winds, solar influences in magnetic field of earth and radio frequency radiation from sun and space are all treated. All references are to Soviet literature. (Met. Abst. 8H-28.) --M. R.

D-115 Chestnov, F.I., Zagadka ionosfery. (Enigma of the ionosphere.) Moscow, Gosud. Izdat. Tekhniko-Teoreticheskio Literary, 1954. 54 p. 24 figs. Nauchno-populiarnaia Biblioteka, No. 70. DLC--The detailed structure of the ionosphere is described and shown in an original schematic diagram. Ionization, twilight, night sky light, aurora, diurnal effects, magnetic field, magnetic storms in ionosphere, solar effects, radio propagation (long and short wave), ionospheric soundings by radio impulses, sunspot effects, forecasts of radio propagation, meteor traces, radio radiation from stars and rocket exploration of ionosphere are treated in condensed popular technical form. (Met. Abst. 6D-235.)--M. R.

D-116 Child, C.H. (North American Aviation, Inc., Downey, Calif.), Requirements for data transmission from a Martian Reconnaissance Vehicle. Advances in the Astronautical Sciences, New York, Vol. 5, 1959, issued 1960. p. 261-277. 12 figs., table, 10 refs., 4 eqs. DWB (629.1388 A512pro), DLC (QB1.A26)--An analysis is presented of the requirements for a communication system on a Solar System Reconnaissance Vehicle. The effects of various noise sources are evaluated in terms of their influence on operating frequencies. Transmitter power levels, receiver sensitivity, and noise figure properties are discussed in terms of present and projected developments. An operating frequency of approximately 850 Mc is recommended on the basis of maximum anticipated advances in the state of the art during the next 3 to 5 years. In terms of these advances, it appears that a transmitter power supply weight of approximately 300 lbs will be required to produce an rf power output of approximately 10 kw. Lesser degrees of advancement would cause the weight to increase to approximately 500 lb and the required power output to increase to approximately 60 kw. The problem of heat dissipation, based upon 50% conversion efficiency, is left to the airframe structures and thermodynamics groups. (Met. Abst. 11.12-481.)--Author's abstract.

D-117 Chivers, H.J.A. and Greenhow, J.S. (both, Univ. of Manchester, Jodrell Bank Experimental Station), Auroral ionization and the absorption and scintillation of radio stars. Journal of Atmospheric and Terrestrial Physics, N.Y., 17(1/2):1-12, Dec. 1959. 6 figs., 15 refs. DWB, DLC--The absorption of the radiation from extraterrestrial radio sources, when observed at low elevations to the north of Jodrell Bank (geomag. lat 56°), is discussed. At lower culmination the Cygnus radio source is at an elevation of only 4°, and the line of sight to the source then passes through the ionosphere near the zone of maximum auroral activity. Combined observations of the source intensity at 36 Mc/s and 100 Mc/s, and of radar back-scatter echoes at 36 Mc/s, have been made using the 250 ft steerable telescope. The absorption and certain back-scatter echoes can be related to an ionized layer at a height of the order of 100 km, associated with auroral activity. It is shown that with a high sensitivity radar equipment at 36 Mc/s, weak auroral type echoes from irregularities in the E region aligned along the earth's field occur on about 40% of all days at quite low geomagnetic latitudes. The suggestion is made that the scintillation of radio stars observed from latitudes similar to that of Jodrell Bank is not due entirely to irregularities in the F region, but that there is a large contribution from these aligned irregularities at E region heights. (Met. Abst. 11.7-163.)--Authors' abstract.

D-118 Chivers, H. J. A. and Wells, H. W. (both, Jodrell Bank Experimental Station, Manchester Univ.), A new ionospheric phenomenon. Nature, London, 183(4669):1178, April 25, 1959. fig., 5 refs. DWB--In order to eliminate man-made noise and interferences, a special study of some unusual radiations began at Jodrell Bank in Oct. 1958. Five separate total power receivers, slightly differing, but near 80 Mc/s were used; three receivers were at Jodrell Bank, the other two at separate sites at 1 km distance. Some ten instances of isolated increase of the noise level were recorded by some of the instruments while others simultaneously recorded decrease during the period Jan. 3-10, 1959. Again, on March 25, 1959, at 1400 U.T. a very striking isolated event occurred. Facsimile recordings are given. Preliminary investigations of these rare, seemingly precursors of stepped-up solar activity and subsequent magnetic storms and auroras, show no unusual solar or terrestrial effect or relationships. (Met. Abst. 11F-21.)--W. N.

D-119 Chivers, H. J. A. (Univ. of Manchester, Jodrell Bank Exper. Sta.) and Wells, H. W. (Carnegie Inst., Wash.), Observations of unusual radio frequency noise emission and absorption at 80 Mc/s. Journal of Atmospheric and Terrestrial Physics, N. Y., 17(1/2):13-19, Dec. 1959. 2 figs. 2 tables, 11 refs. DWB, DLC--Unusual radio frequency noise emissions at 80 Mc/s have been identified during periods of solar activity. The noise enhancements may be classified as (1) smooth, bay-like disturbances lasting for approximately 1 hr which occur in both day and night hours; and (2) abrupt increases, often of large but fluctuating amplitude which occur within a few hours of local midnight. The smooth enhancements occur almost simultaneously with the absorption of radiation in a sector of the northern sky. These effects could be caused by transit of high velocity streams of charged particles which produce emission from F region levels and absorption in the E region or below. The abrupt noise bursts at night are from the northern sky and seem to be associated with pronounced changes in the horizontal component of the earth's magnetic field. The noise may be a form of "auroral" radiation or may arise from propagation of solar noise outbursts from the sunlit to the dark hemisphere. (Met. Abst. 11.7-164.)--Authors' abstract.

D-120 Chivers, H. J. A. (Jodrell Bank, Univ. Manchester), Observed variations in the amplitude scintillations of the Cassiopeia (23N5 A) radio source. Journal of Atmospheric and Terrestrial Physics, London, 19(1):54-64, Sept. 1960. 10 figs., 2 tables, 6 refs. DLC--

Continuous monitoring of the radio source in Cassiopeia (23N5A) on a frequency of 79 Mc/s has made possible an analysis of the variations of radio star scintillations observed from Jodrell Bank (latitude 53°N). Monthly average daily variations are presented as functions of solar time, and the mean daily variations averaged over a year are evaluated as functions of both solar and sidereal time. An effect due to the geomagnetic latitude at which the observations were made, is demonstrated. Since records are available for over 4 years, the variations of scintillations with the sunspot cycle has been studied, and it has been found that in years of high solar activity scintillations show a strong seasonal dependence with maximum activity at the equinoxes. When examined over this long period, there is a strong negative correlation between scintillations and the occurrence of spread F echoes. Evidence has been obtained that the angular size of the Cassiopeia source is sufficiently large to produce scintillations different from those expected of a point source. (Met. Abst. 11.12-33.) --Author's abstract.

D-121 Chivers, H. J. A. (Univ. of Manchester), The simultaneous observation of radio star scintillations on different radio frequencies. Journal of Atmospheric and Terrestrial Physics, London, 17(3):181-187, Feb. 1960. fig., 2 tables, 14 refs. DLC--A comprehensive study of the phenomenon of radio star scintillation has been made over the range 26 Mc/s to 408 Mc/s, by recording simultaneously on at least two frequencies within this frequency range. With records obtained over a wide range of scintillation conditions, it has been possible to test the theoretical laws governing the frequency dependence of scintillation amplitude and rate. It is established that under extreme conditions these laws no longer hold. A study of the probability amplitude distribution of scintillations covers a wide range of mean scintillation amplitudes. The smaller scintillations have a Gaussian or Rayleigh amplitude distribution, but with increasing scintillation activity, discontinuities appear in the distribution obtained. Under the most intense conditions a net attenuation of the source is observed. The cross correlation coefficient between records has been determined over a frequency ratio of 3:1 and the results are compatible with those of other workers. (Met. Abst. 11.12-32.)--Author's abstract.

D-122 Chivers, H. J. A. (Nuffield Radio Astron. Lab., Jodrell Bank, Univ. of Manchester), A statistical study of ionospheric drifts measured by the radio star scintillation technique. Journal of Atmospheric and Terrestrial Physics, 21(4):221-224, July 1961. 3 figs., 8 refs. DLC--

Plottings of 627 determinations of drift motions as observed during the 18 month period of IGY at three Jodrell Bank stations, spaced about 1 km and using 80 Mc/s. Sudden reversal of direction occurred about 2300 local time and the complementary reversal at less definite time next day. --W. N.

D-123 Christiansen, W. N.; Hindman, J. V.; Little, A. G. et al., Radio observations of two large solar disturbances. Australian Journal of Scientific Research, Ser. A, Physical Sciences, 4(1):51-62, March 1951. 6 figs., 7 tables, 4 refs. DLC--Two exceptionally large radio frequency disturbances of Feb. 17 and 21-22, 1950, were observed in Australia on seven frequency bands ranging from 62 to 9400 Mc/sec. The time of commencement and the duration of disturbances in the various frequencies are shown graphically. The relationship to fade-outs, solar and magnetic disturbances is also discussed and illustrated by records made in Australia. (Met. Abst. 9A-14.)--W. N.

D-124 Christiansen, W. N. and Mathewson, D. S., Scanning the sun with a highly directional array. Institute of Radio Engineers, N. Y., Proceedings, 46(1):127-131, Jan. 1958. 6 figs., 12 refs. DLC--A survey is given of the very highly directive equipment and methods which have been devised to obtain details of the distribution of radio emission over the solar disk. A new instrument is described; it operates on a wave length of 21 cm and gives, for the first time, radio pictures of the sun. This radio heliograph combines principles of the multi-element interferometer and the Mills Cross. It consists of 64 parabolic antennas, 19 ft in diameter, arranged along two lines, each 1240 ft in length, in form of a cross. Multiple pencil beams about 3 ft wide arc are produced by the system; by means of these the sun is scanned television wise. The radio heliograph is being used to produce daily pictures of the sun. (Met. Abst. unpub.)--Authors' abstract.

D-125 Chubb, T. A.; Friedman, H. and Kupperian, J. (U.S. Naval Res. Lab., Wash., D.C.), A Lyman alpha experiment for the Vanguard satellite. (In: Van Allen, James A. (ed.), Scientific uses of earth satellites. Ann Arbor, Univ. of Michigan Press, 1956. p. 147-151. 2 figs., 6 refs.) DWB, DLC--Lyman alpha measurements to determine relation of sudden ionospheric disturbances to solar flares and radio fadeouts will be made with equipment developed by N. R. L. and tested several times in rocket flights. The system weighs $<$600 g and has an operating life of $>$ 500 hours. It measures a narrow range of spectrum from 1100 to 1340 A, where 95% of the solar radiation is concentrated in the hydrogen Lyman alpha line. Wiring, storage device for information, orbital relations, etc. are described and illustrated. (Met. Abst. 12. 5-62.)--M. R.

D-126 Chubb, T. A.; Friedman, H.; Kreplin, R. W. and Kupperian, J. E., Jr. (all, U. S. Naval Res. Lab., Wash., D. C.), Lyman alpha and X-ray emissions during a small solar flare. Journal of Geophysical Research, Wash., D. C., 62(3):389-398, Sept. 1957. 4 figs., 2 tables, 7 refs. DLC--A rocket instrumented to measure Lyman alpha and X-rays was fired while a small flare was in progress on June 20, 1956. The rocket reached peak altitude about 10 min after the flare was first seen visually. An unusually high X-ray flux was observed extending to a short wave length limit of 3A. Although the flare was still visible in H α Lyman alpha was not appreciably different from normal. (Met. Abst. 9. 9-118) --Authors' abstract.

D-127 Chubb, T. A.; Friedman, H.; Kreplin, R. W. and Kupperian, J. E., Jr., Rocket observation of X-ray emission in a solar flare. Nature, London, 179(4565):861-862, April 27, 1957. 3 refs. DWB--Rocket observations in past 7 years have shown that quiet sun radiates sufficient X-ray energy between 10-100 A to account for E region and sufficient UV (1215 A) for normal D region ionization between 70-90 km. "Rockoon" ascents are described, fired by radio at 80, 000 ft when a flare occurred; observations were obtained for one small flare and are discussed. Ionospheric disturbances are attributed to X-ray flares. (Met. Abst. 8. 7-209.)--C. E. P. B.

D-128 Chvojková, Eliška and Link, F. (both, Astron. Inst., Ondřejov, Czechoslovakia), Echos lunaires sur 20 Mhz et structure de l'ionosphere. (Lunar echoes at 20 MHz and the structure of the ionosphere.) Bulletin of the Astronomical Institutes of Czechoslovakia, Prague, 5(5):99-104, 1954. 4 figs., 2 tables, 5 refs., 16 eqs. Russian summary p. 104. DLC--A simple theory is proposed for the penetration of waves coming from outer space. This theory is in better agreement with measurements made in Australia than BREMMER's theory, as it accounts for attenuation by refraction. (Met. Abst. 11E-35.)--Transl. of authors' abstract.

D-129 Chvojková, E., Propagation of radio waves from cosmical sources. Nature, London, 181(4602):105, Jan. 11, 1958. 2 figs., 3 refs., 2 eqs. DWB--Examines the propagation of a radio wave from an unionized medium (where its path is rectilinear) through a spherical ionized shell. The rectilinear part of the ray path is rotated about the center of curvature of the ionized layer by the angle of refraction

$$R = \frac{90^\circ}{\pi} \left(\frac{f^c}{f}\right)^2 \frac{\sin i}{\cos^3 i_o} \sigma$$

where i_o - the angle of incidence of the rectilinear parts of the ray path; σ - equivalent thickness of the layer; f^c - critical frequency of the layer and f - wave frequency. R depends only on i_o, f^c/f and the content of free electrons present in the layer; it is independent of the electron distribution within the layer. (Met. Abst. 11E-36.)--N. N.

D-130 Chvojková, E. (Astronomical Inst., Czechoslovak Acad. of Sci., Prague), Investigation of the ionosphere using signals from earth satellites. Nature, London, 182(4646): 1362-1363, Nov. 1958. fig., eq. DWB--Author discusses some possible effects of the ionosphere on radio signals from artificial satellites. Various theoretical modes of long distance propagation around the Earth are considered. Author believes a satisfactory answer to the question of what mode of propagation is preferred could probably be given by a detailed study of the Doppler curves, of direction finding measurements and the variation of band-width of the received signal when the satellite is deep below the horizon. (Met. Abst. 12.7-126.)--M.L.R.

D-131 Chvojková, E., The antipodal reception of Sputnik III. Institute of Radio Engineers, N.Y., Proceedings, 47(6): 1144, June 1959. fig., 4 refs. DWB--Antipodal reception of Sputnik signals at Stanford, Calif., on 20 Mc was reported by O. K. GARRIOTT and O. G. VILLARD between two afternoon passes, arriving from the SE. Conditions under which the signal propagates around the world in either of two ionized layers (a) without reflection or escape, (b) with escape only, and (c) with return to earth, are discussed and illustrated and an explanation given of why the antipodal point is the best for return to earth: at this point transmission can occur with equal probability regardless of which great circle path is followed. Preferred direction of arrival depends on ionospheric conditions at points where ray first touches ionosphere and leaves it, respectively. Critical frequency of layer must increase from point where ray first enters ionosphere in order to prevent escape at next upward penetration of ionosphere. In mid-latitudes levels containing the same electron density must be more curved than the earth. No arrival can be expected from polar directions because of rare polar ionosphere which would allow escape before mid-latitudes were reached; or from the south, but SW in forenoon and SE in afternoon would be preferred. SW passage would be less frequent than SE, since these SW rays would have to pass the region where the critical frequency falls to its morning minimum. In the sunset (P. M.) region turbulence might produce multipath propagation, but this would not destroy antipodal reception. Therefore, at Stanford frequent antipodal reception in summer afternoons from SE would be expected. (Met. Abst. 11E-37.)--M. R.

D-132 Coates, G.P. (Astronautics Sec. Advanced Projects Group, Hawker Siddeley Aviation, Ltd.), Reconnaissance satellites. Spaceflight, London, 3(3):100-104, May 1961. 2 figs. DLC--Points out that important value of satellites in large-scale cloud cover investigations, and military reconnaissance. Article restricts itself to an investigation of the image forming processes and their possible achievements when used in a satellite, and covers the following topics: 1) Orbits of reconnaissance satellites; 2) Photographic observation; 3) Capability of an existing camera; 4) Extraction of information from the photographic satellite; 5) external limitations on photographic system; and 6) Television and radar system. (Met. Abst. unpub.) --Author's abstract.

D-133 Coates, Robert J., Absorption by clouds at 8.6 mm wavelength. American Physical Society, Bulletin, Ser. 2, 1(2): 98, Feb. 24, 1956. DLC--Clouds produce attenuation of 0 - 3 db. Simultaneous optical and radio measurements were taken during a solar eclipse. Abstract of paper from 1956 APS Southwestern meeting, Feb. 24-25, 1956.--CSIRO abstract. (Unchecked).

D-134 Coates, R. J., The measurement of atmospheric attenuation at 4.3 mm. U.S. Naval Research Laboratory, Report No. 4898, April 2, 1957. DLC--Uses 4.3 mm radio telescope to monitor solar radiation as sun rose or to measure thermal radiation from atmosphere. Good agreement between the value obtained for absorption using the two methods.--CSIRO abstract. (Unchecked).

D-135 Coates, R.J. (U.S. Naval Res. Lab., Wash., D.C.), Measurements of solar radiation and atmospheric attenuation at 4.3 mm wavelength. Institute of Radio Engineers, N.Y., Proceedings, 46(1):122-126, Jan. 1958. 7 figs., table, 10 refs., 3 eqs. DLC--Solar radiation and atmospheric attenuation were measured at 4.3 mm wavelength. The sun was scanned with a radio telescope consisting of a 10 ft precision paraboloid antenna (6.7 min beamwidth) and a Dicke type radiometer. Atmospheric attenuations were determined from the change in received solar radiation with changing elevation of the sun and from direct measurements of the thermal radiation from the atmosphere. The measured attenuations at the zenith for clear skies were between 1.6 and 2.2 db. At 4.3 mm wavelength, the sun (when it is free of sunspots) appears to be a uniform disk nearly one percent larger than its optical size. From a large number of measurements over a period of 6 months, the solar brightness temperature was found to be 7000°K with an uncertainty of about 10%. Sunspot regions are slightly brighter than the quiet areas; the largest observed enhancement is 2%. (Met. Abst. unpub.)--Author's abstract.

D-136 Cocconi, Giuseppe and Morrison, Philip (both, Cornell Univ., Ithaca, N.Y.), Searching for interstellar communication. Nature, London, 184(4690):844-846, Sept.19, 1959. eqs. DLC--The most promising search for radio signals from the possibly existing intelligent beings on other planets, apparently is the 21 cm λ (1420 Mc/s) of the neutral hydrogen. It is suggested that preparations be made to receive radio signals from our fellow space men. This can be done with our present radic equipment. --W. N.

D-137 Cohen, Marshall H., Interpretation of radio polarization data in terms of Faraday rotation. Cornell Univ. School of Electrical Engineering, Contract AF 19(604)-73, Research Report EE 295, May 30, 1956. 20 p. 3 figs., 10 refs., 27 eqs.--A simple graphical presentation of HATANAKA's theory of Faraday dispersion due to a finite receiver bandwidth is made. Two-frequency and two-bandwidth experiments to measure dispersion are considered, and the analysis of a two-bandwidth experiment is discussed in detail. The validity of the high frequency approximation is established for the solar corona, even for the region just above the plasma level, as long as $y \ll 1$, and $z \approx 0$. BUDDEN's criterion for independence of magneto-ionic modes is applied to two corona models. Using the Allen-Baumbach formula for electron density and a polar field of one gauss, the dipole magnetic field model yields uncoupled modes all the way from the plasma level to the limiting region at the bottom of the earth's ionosphere. With an irregular dipole field the modes are uncoupled if the gradient of magnetic field is very much less than a limit which is proportional to wavelength, and depends on the height above the photosphere. At $(r/r_0) = 2$ and $\lambda = 1$ meter, for example, it is 1 gauss in 25 kilometers. (Met. Abst. 8.3-344.)--Author's abstract.

D-138 Cohen, M.H., Radio astronomy polarization measurements. Institute of Radio Engineers, N.Y., Proceedings, 46(1):172-183, Jan. 1958. 8 figs., 30 refs., 64 eqs. DLC--This survey includes various polarization measuring schemes discussed in terms of the Stokes parameters. The methods are grouped according to number of component measured. The Faraday effects discussed include several experiments for finding the parameters involved. The ionosphere, solar corona, and Crab nebula are discussed in terms of possible Faraday rotation effects, using Mayer, MacCullough and Slomaker's 3.15 cm observations and the optical results to analyze lower frequency attempts to find polarized radiation. A graphical presentation of Hatanaka's dispersion theory readily demonstrates that one polarization determination allows limits to be placed on the axial ratio and polarization percentage at the source, and on the ray path integral of longitudinal magnetic field times electron density. With suitable assumptions, measurements at two frequencies or with two bandwidths will fix the three quantities. (Met. Abst. unpub.)--Author's abstract.

D-139 Cohen, M.H. (Center for Radiophysics and Space Res., Cornell Univ., Ithaca, N.Y.), High frequency radar echoes from the Sun. Institute of Radio Engineers, N.Y., Proceedings, 48(8):1479, Aug. 1960. 4 refs. DLC--Brief calculation showing how quite small, high limb objects with sufficient field may be seen with a 400 Mc space radar such as suggested by W.E. Gordon. (Met. Abst. unpub.)--W.N.

D-140 Corcuff, Y., Choix d'un paramètre caractérisant les sifflements radioelectriques. (Choice of a parameter characterizing radioélectric whistlers.) Annales de Geophysique, Paris, 16(1):128-139, Jan./March 1960. 8 figs., 6 tables, 6 refs. French and English summaries. DLC--D, the dispersion of the whistlers, which is proportional to the path length of the energy, has been taken as their character number. The D-dispersion is expressed in the form

$$D = \frac{1}{c}\sqrt{\frac{e}{2}} \int \sqrt{\frac{N}{H}}\, ds$$

where N - density of ionization along the trajectory, and H - intensity of the terrestrial magnetic field. The scattering of D depends on the frequency of the waves received. Consequently, the analysis of the long whistlers leads to consideration of the dispersion as frequency dependent, and so to specify the frequency for which it is calculated. 4 kc/s and zero frequencies seem especially interesting. The methods which may be used to determine the dispersion of any whistler in both cases are described and discussed. (Met. Abst. 11.10-206.)--A.V. and author's abstract.

D-141 Cornell University, Ithaca, N.Y., School of Electrical Engineering, Statistical analysis of solar noise observational data. Contract W19-122 ac-41, Contract N6onr-26406, NR 077-321 (Radio astronomy and solar noise), Joint Report No. 1, May 15, 1950. 26 p. 10 figs., 5 tables, 7 eqs. DWB--Solar noise data were obtained almost daily during two hours local noon time from July to Oct. 1949. Through statistical analysis, some characteristic values were deduced and are presented in distribution curves featuring the relation between the principal states of the sun (1, very quiet; 2, small activity; 3, medium activity; 4, large activity), base level, burst power and total power radiated from the sun at 205 Mc. The curves may be valuable in comparison with data of the sun's activity to be obtained at other periods of observation. (Met. Abst. 9A-11.)--W.N.

D-142 Cornell University, Ithaca, N.Y. School of Electrical Engineering, Establishment and instrumentation of a Radio Frequency Solar Observatory in the Alamogordo, New Mexico area. Contract W19-122 ac-41, Quarterly Reports, No. 6-12, Sept. 30, 1949-June 30, 1951. Also Final Report, Handbook of Maintenance and Operating Instructions. Dec. 15, 1951. 8 pieces, tables, graphs. DWB--Various phases of development work in building and equipping this solar observatory are reported in the separate progress reports (1-8). Report No. 9 gives the results of a conference on solar noise held at Cornell Univ., July 12-13, 1950, and some theoretical studies on theory of radio frequency-thermal radiation from the sun for the case of zero magnetic field, allowing for variation in index of refraction. Report No. 10 gives quantitative results of correlation between solar noise and terrestrial phenomena (magnetic storms, radio fade outs, etc.). Report No. 11 indicates that continuous daily observations made on 200 and on 50 Mc since Dec. 22, 1950 and coordinated with data obtained at Ithaca, showing identical time and characteristics, indicate solar origins rather than ionospheric modification as source. Subsequent observations (in Report No. 12) bear out the conclusion that eruptive prominences produce almost simultaneous increase in radio emissions from the sun at two distant stations. Comparative records are shown. The Final Report comprises a handbook for maintenance, and operating instructions for the solar radio observatory. Each piece of equipment is described and illustrated, and instructions given for installation, maintenance and operations, including theory. (Met. Abst. 7.1-44.)--M.R.

D-143 Cottony, H. V. and Johler, J. R., Cosmic radio noise intensities in the VHF band. Institute of Radio Engineers, Proceedings, 40(9):1053-1060, Sept. 1952. 8 figs., 2 tables, refs., 7 eqs. DLC--Diurnal, seasonal and frequency characteristics of cosmic radio noise (including both solar and galactic noise) as affecting the operation of hf and vhf radio communication systems were investigated in continuous measurements during 1948 and 1949 at the National Bureau of Standards. Antenna and receiver used in the measurements and methods of evaluation are described. The apparatus is shown in diagrams. Sample records and tabulated data of normal cosmic noise are presented. Normal cosmic noise intensities were found to be constant. Abnormal high noise levels were observed in conjunction with unusual solar activity and are shown in transcribed records. (Met. Abst. 9A-18.)--G. T.

D-144 Coutrez, Raymond, Radioastronomie. (Radioastronomy.) Uccle, Observatoire Royal de Belgique, 1956. 383 p. 170 illus., 18 tables, 451 refs. DLC (QB475.C6). The 10 chapters of this book were issued successively in Ciel et Terre, Brussels, 72(1/2), Jan./Feb. 1956 through 73(5/6), May/June 1957.--The first chapter of this excellent semitechnical series of articles on radio astronomy takes up the history of the science, the atmospheric factors affecting the absorption of the radio waves (excellent schematic diagram shows factors affecting absorption up to 1000 km in all wave lengths of the emission spectrum) radio telescopes, places of origin, and relation to other radiations; II, thermal origin of waves and, finally, PLANCK's law. Ch. III takes up antennas and polarization of waves; Ch. IV circuits wave guides, interferometers and effect of atmospherics; Ch. V receivers and amplifiers; Ch. VI, a long review of current knowledge of all types of radiation from the sun and variations due to sunspots, eruptions, coronal observations, etc. (95 refs.); Ch. VII concentrates on solar radio radiation in all its aspects (83 refs.) with many charts and records. Ch. VIII goes into the physics of galaxies and radio stars (53 refs.) and what we have learned about the differential spiral motions of nebulas or the Milky Way. The bulk of the literature in this field (up to 1955) is reviewed and ample illustrative material reproduced from these works. Ch. IX takes up more about galactic and extragalactic radio emissions, and Ch. X planetary and meteoric radio waves. (Met. Abst. 9A-108.)--M. R.

D-145 Covington, Arthur E., Microwave sky noise. Journal of Geophysical Research, 55(1):33-37, March 1950. 4 figs., 7 refs. MH-BH--Radiation of 2800 mc was received from empty sky, equivalent to a temperature of ca. 50°K but with short time bursts from zenith. Examples are described, associated with magnetic disturbances, with aurora overhead and once with a sudden ionospheric disturbance. (Met. Abst. 4.9-113.)--C.E.P.B.

D-146 Covington, A.E. (Nat. Res. Council, Ottawa, Canada), Solar emission at 10 cm wavelength. (In: Paris Symposium on Radio Astronomy, July-Aug. 1958, (Proceedings), pub. Stanford Univ. Press, 1959. p. 159-165. 6 figs., 4 refs. DLC--Radio emission from the solar disk has been observed daily at the laboratories of the National Research Council of Canada in Ottawa, since 1947. The results are interpreted in terms of a daily level of flux and of bursts of noise that may appear during the day. A plot of the monthly means for the past 11 yr period, is shown and discussed. Burst types, simple and complex, as well as impulsive bursts and long enduring bursts are described. The compound interferometer is described. High resolution drift curves were obtained. The series of drift curves from June 27 to July 1, 1958, show the effect of solar rotation and of the rapidly changing features upon the solar disk. The drift curves for the two days after the long enduring burst of June 28 show several spots placed upon a uniformly raised level. This has been taken as an indication of the undisturbed solar disk for the period, and measures 8% wider than the photospheric disk. (Met. Abst. unpub.)--E.Z.S.

D-147 Covington, A.E. and Harvey, Gladys A. (Radio and Electrical Engineering Div., National Research Council, Ottawa, Canada), 10.7 cm solar noise burst of Nov. 20, 1960. Physical Review Letters, N.Y., 6(2):51-52, Jan. 15, 1961. fig., table, 5 refs. DLC--Two sets of 10.7 cm solar noise observations obtained at the Radio Observatory of the National Research Council, Ottawa, Canada, are described in this note. A 13 meter parabolic reflector and a radiometer which records the solar emission from the whole disk from sunrise to sunset were used for the first set of observations. The second set of solar observations was made with a 185 meter aperture interferometer system with fan shaped beam 1' east west by 2° north south. Comparison of flare and burst features is presented in tabular form. (Met. Abst. unpub.)--I.S.

D-148 Covington, A.E. and Harvey, G.A. (both, Nat'l. Res. Council, Ottawa), The visibility of the 10 cm radio emissive region and its application in finding the 10 cm quiet sun. Astrophysical Journal, Chicago, 132(2):435-451, Sept. 1960. 10 figs., 3 tables, 13 refs., 2 eqs. DWB, DLC--The 10 cm radio emission from 26 individual regions of sunspot activity was measured at the National Research Council, Ottawa, Canada, with an 8 min of arc fan shaped antenna beam during a portion of 1952 when relatively few sunspots were present. On the average, the radio emissive region appears on the eastern limb from 1 to 2 days before the visible sunspots and remains from 1 to 2 days longer on the western limb; the radio emission attains its maximum value 2 days before the region reaches the central meridian, and the sunspot area 4 days before the region reaches the central meridian. For individual regions of radio emission, a scatter diagram of radio flux versus sunspot area shows that there is a component of emission which is independent of area. This has led to a new expression in which the total daily flux from the solar disk is expressed empirically as the sun of three components: the first is the solar background; the second is related to the number of sunspot groups upon the disk; and the third is related to the area of the sunspots present. Values for the quiet sun for the years 1948-1956 have been derived. (Met. Abst. 11L-87.)--Authors' abstract.

D-149 Covington, A.E.; Harvey, G.A. and McNarry, L.R., The solar noise burst of Nov. 12, 1960. Canadian Journal of Physics, Ottawa, 39(4):635-636, April 1961. 2 figs. DWB, DLC--This is a note on the intense burst of solar radio noise which accompanied the flare of Nov. 12, 1960. The observations made at the discrete frequencies of 2800 Mc/s and 48 Mc/s at the Radio Observatory of the Radio and Electrical Engineering Div. of the National Research Council are presented, and the related data described. A reconstruction of the high frequency burst is shown in graphic form and a photo plate shows a portion of the low frequency record. (Met. Abst. unpub.)--I. S.

D-150 Cox, H. W., Radio propagation and the Sun. British Astronomical Association, Journal, 56(5):92-93, May 1946. DLC--Interference in the 4-6 m λ band in Great Britain and elsewhere was caused by solar flares during the latter part of Feb. and the beginning of March 1942. The brief review also includes effects on radio wave reflection from various ionospheric layers as observed in many parts of the world during the solar eclipse July 9, 1945. --W. N.

D-151 Cranshaw, T.E.; Galbraith, W. and Porter, N.A., Cosmic ray observations during the flare of Feb. 23, 1956. Journal of Atmospheric and Terrestrial Physics, London, 8(4/5):274-276, May 1956. 3 figs. Also: Lambie, M. and Elliot, H., Cosmic rays and the solar flare of Feb. 23, 1956. p. 277-278. table, ref. Also: Marsden, P.L.; Berry, J.W.; Fieldhouse, P. and Wilson, J.G., Variation of cosmic ray nucleon intensity during the disturbance of Feb. 23, 1956. p. 278-281. fig., 2 tables, 3 refs. Also: Belrose, J.S.; Devenport, M.H. and Weekes, K., Some unusual radio observations made on Feb. 23, 1956. p. 281-286. 5 figs., 4 refs. Also: Gold, T. and Palmer, D.R., The solar outburst Feb. 23, 1956: observations by the Royal Greenwich Observatory. p. 287-291. 4 figs., table, 2 refs. Also: Ellison, M.A. and Reid, J.H., A long wave anomaly associated with the arrival of cosmic ray particles of solar origin on Feb. 23, 1956. p. 291-293. 2 figs. DWB--Records at Harwell showed a sudden rise of coincidence rate to three times normal at 0345 ± 2 min on Feb. 23. In London the increase was 120% at 0345 - 0400, and at Leeds the nucleon intensity rose to 47 times normal in the same period. At Cambridge the sky wave on 16 and 71 Kc/s behaved abnormally and there was a sudden drop in average intensity of atmospherics at 0345; these are attributed to a sudden change in the height of reflection and amplitude. Conditions were still markedly abnormal at sunrise but recovered during the night. Cosmic ray counts and atmospherics at Hurstmonceux showed similar fluctuations. At Abinger a magnetic storm began suddenly on Feb. 25. A photograph of the flare at Kodaikanal is included. At Edinburgh long wave atmospherics decreased suddenly but galactic noise was steady. (Met. Abst. 7.10-1.)--C.E.P.B.

D-152 Crary, J.H.; Helliwell, R.A. (both, Stanford Univ.) and Chase, R.F. (Boeing Airplane Co., Seattle Wash.), Stanford-Seattle whistler observations. Journal of Geophysical Research, Wash., D.C., 61(1):35-44, March 1956. 6 figs., 4 refs., 4 eqs. DLC--Simultaneous observations of times of occurrence of whistlers were made at Seattle, Wash. and Stanford, Calif., two hours every week from Oct. 1951 to Oct. 1952. Times were measured to an accuracy of about ± 1 sec. The objective was to determine the percentage of whistlers received at either station which were coincident at both. A total of 318 whistlers was received at Stanford and 283 at Seattle during simultaneous observations. The occurrence rate of whistlers (during a two hour period) varied from 0 to roughly 55 per hour at Stanford and from 0 to 70 per hour at Seattle. The correlation between the occurrence rates was poor. The number of true coincidences was found by subtracting the number of chance coincidences from the number of total coincidences. A method for computing the number of chance coincidences from a knowledge of the time intervals between whistlers at the one station was derived. The analysis showed that approximately 22% were observed simultaneously at both stations. This result is examined in relation to possible theories of whistler origin and propagation, and is shown to support the Storey-Eckersley theory. (Met. Abst. 8.3-95.)--Authors' abstract.

D-153 Croft, T. A. and Villard, O. G., Jr. (Stanford Univ., Radio Sci. Lab., Calif.), An HF radar search for possible effects of earth satellites upon the upper atmosphere. Journal of Geophysical Research, 66(10):3109-3118, Oct. 1961. 8 figs., 6 refs. DLC--Describes control experiments to check ionospheric disturbances assumed to be caused by the passage of artificial satellites. Equipment and method used to record 133 passages of Sputnik III and 6 of Echo I are described. The disturbances observed, without exception, were of natural origin. --W. N.

D-154 Dagg, M., The correlation of radio star scintillation phenomena with geomagnetic disturbances and the mechanism of motion of the ionospheric irregularities in the F region. Journal of Atmospheric and Terrestrial Physics, 10(4):194-203, 1957. 9 figs., 13 refs. DWB--F-region drift velocities measured by scintillations of radio source in Cassiopeia at Jodrell Bank showed marked correlation with K-indices (mean of Eskdalemuir and Lerwick). Rapid changes of fluctuation, compared with magnetograms, showed close correlation of rate with V, and on some occasions of amplitude with H. Results support MARTYN's theory that observed drifts in F region are not air motions but are due to interaction of earth's magnetic field with an electric field from lower levels. (Met. Abst. 8.8-189.)--C. E. P. B.

D-155 Dagg, M., Diurnal variations of radio star scintillations, spread F, and geomagnetic activity. Journal of Atmospheric and Terrestrial Physics, 10(4):204-214, 1957. 7 figs., 11 refs. DWB--Aerial at Jodrell Bank directed at Cassiopeia, and receiver, are described and scintillation records shown. Monthly and average diurnal variations of scintillation occurrence and amplitude, occurrence of spread F at Inverness, and summation of magnetic K indices, are shown for Aug. 1954-July 1955. Maximum scintillation occurs about 2130, several hours earlier than spread F maximum. A marked correlation is found between scintillation rate amplitude and geomagnetic activity. (Met. Abst. 8.8-190.)--C. E. P. B.

D-156 Dagg, M. (East African Agri. and For. Res. Org., Kenya), The origin of the ionospheric irregularities responsible for radio star scintillations and spread F, Pt. 1, Review of existing theories. Journal of Atmospheric and Terrestrial Physics, London, 11(3/4):133-138, 1957. 24 refs. DLC--The present state of knowledge about the irregularities responsible for radio star scintillations is summarized, and the existing theories of the origin of these irregularities are discussed. All of the suggestions are shown to be inadequate to explain the observed features of scintillations and spread F. It is shown that any ionizing agent from outside the earth's atmosphere is unlikely to be responsible for the ionospheric irregularities that cause radio star scintillations, and that the mechanism for their production must be sought in the terrestrial atmosphere. (Met. Abst. 9. 10-167.)--Author's abstract.

D-157 Dagg, M. (East African Agri. and For. Res. Org., Kenya), The origin of the ionospheric irregularities responsible for radio star scintillations and spread F, Pt. 2, Turbulent motion in the dynamo region. Journal of Atmospheric and Terrestrial Physics, London, 11(3/4):139-150, 1957. 5 figs., 22 refs., eqs. DLC--A theory is presented which attributes the occurrence of ionospheric irregularities in the F region to turbulent wind motion in the dynamo region at a height of 110-150 km. The resulting turbulent component of the electric potential field produced is communicated to the F region, as suggested by MARTYN (1955), where magneto-electric forces then cause the ionization to form eddies. It is suggested that the absence of daytime scintillations is due to the inhibition of turbulent flow by large temperature gradients during the day. The theory is then compared in detail with observations and shown to be capable of explaining all the major features of radio star scintillations, together with such diverse results as the long term correlation of scintillation amplitude with magnetic activity and the variation in the occurrence of spread F and scintillations at different parts of the earth over the sunspot cycle. (Met. Abst. 9. 10-168.)--Author's abstract.

D-158 Daniels, Fred B. and Bauer, Siegfried J. (both, U.S. Army Signal Engineering Labs., Fort Monmouth, N.J.), Measurement of the ionospheric Faraday effect by radio waves reflected from the moon. Nature, London, 181(4620):1392-1393, May 17, 1958. 2 figs., 2 eqs. DWB--Using the rotation of the plane of polarization of radio echoes from the moon, it is possible to determine the change in total electron content of the ionosphere. This is a report on such an experiment made the night of Jan. 8-9, 1958. Results indicated a change about

2. 2 times that computed for a parabolic layer using vertical sounding data recorded at the transmitting site. (Met. Abst. 11F-25.)--Based on Physics Abstracts No. 5543, 1958.

D-159 Daniels, F.B. and Bauer, S.J., Faraday fading of earth satellite signals. Nature, London, 182(4635):599, Aug. 30, 1958. 2 refs., eq. DWB--Note on British attempts to estimate ionospheric integral electron content up to the satellite's height by means of rate of fading due to the Faraday effect. Too high values were obtained which may be explained by the omission of the satellite's radial velocity component in the theoretical expressions. (Met. Abst. 11E-40.)--W. N.

D-160 Daniels, F.B. and Bauer, S.J., The ionospheric Faraday effect and its applications. Franklin Institute, Journal, 267(3):187-200, March 1959. 7 figs., 8 refs., 7 eqs. DLC--The theory and Faraday effects are outlined and analyzed. Since the rate of fading of satellite signals depend on both integrated and local electron density at the height of the satellite, these quantities are determinable if satellite transmission is simultaneously received at two or more stations. The discussion includes expressions for the fading rate and effects of orbital parameters. --W. N.

D-161 Daniels, F.B., Radar determination of the scattering properties of the moon. Nature, London, 187(4735):399, July 30, 1960. 2 refs., 4 eqs. DLC--J. Feinstein's equations, in which he used Huygen's principle to study the general problem of reflection from a plane surface having random irregularities that are functions, both of space coordinates and of time, were applied with minor modifications to lunar radio echoes. (Met. Abst. 8J-49.)--S. N.

D-162 Das, A.K. and Sethumadhavan, K., Eruptive prominence of Feb. 26, 1953, and associated radio noise burst. Nature, London, 172(4375):446-447, Sept. 5, 1953. 4 figs., 3 refs. Also: Davies, R.D., Radio observations at the time of an ascending solar prominence. Ibid., p. 447-448. DWB--Both notes refer to a prominence which broke off from sun's surface about 0510 hr. Spectrograms at Kodaikanal, India, show details of spiral motion and structure. Three solar noise bursts were recorded on 100 Mc/s at Kodaikanal and on several wave lengths at Sydney, Australia. (Met. Abst. 9A-28) --C. E. P. B.

D-163 Das, A.K. and Narayana, J.V. (both, Kodaikanal Obs., Kodaikanal), Momentary bursts of cosmic radiation. Indian Journal of Meteorology and Geophysics, New Delhi, 11(1): 50-56, Jan. 1960. table, 6 refs. DWB, DLC--A standard Kolhorster cosmic ray apparatus with photographic recorder has been in continuous operation since March 1956. A table gives the dates of momentary bursts of cosmic radiation, the time, voltage drop during burst, solar flares, solar radio emissions and radio fadeouts which occurred simultaneously or within reasonable time to be thought to be associated. It seems probable that every solar flare is accompanied by emission of cosmic rays and these are greatly dispersed by the local magnetic field of the spots and are further deviated by the magnetic field of the earth. (Met. Abst. 11. 11-41.) --E.Z.S.

D-164 Dauvillier, Alexandre, Puissant flux solaire nocturne de rayons cosmiques pénétrants. (Powerful flux of penetrating cosmic rays from the sun at night.) Académie des Sciences, Paris, Comptes Rendus, 242(11):1399-1401, March 12, 1956. 2 refs. Also: Bureau, Robert and Bertrand, Maurice, Perturbation exceptionnelle du rayonnement solaire le 23 février 1956 vers 0345 T.U. (Unusual disturbance of solar radiation on Feb. 23, 1956 around 0345 G.m.t.) Ibid, 242(16):2025-2027, April 16, 1956. fig. DLC--A solar cosmic ray flux of unusual intensity was measured by DAUVILLIER at Bagneres on Feb. 23, 1956, starting at 03 h 43 min. The phenomenon was observed on three instruments (including a radio telescope) sensible to various cosmic ray components. This recording of high energy positive nuclei in the dark hemisphere is offered as definite proof of a geomagnetic effect. It also appears that a midget star like the sun is capable of emitting particles having far higher energy than assumed previously. BUREAU and BERTRAND report decreases in radio propagation at various locations in France (especially on 11,000 m wave length) which coincided almost perfectly with the cosmic ray flux observed by DAUVILLIER. He also mentions ionospheric and radio propagation anomalies observed at various stations throughout the world. (Met. Abst. 9I-18.)--G.T.

D-165 Davies, J.G.; Evans, J.V.; Evans, S. et al. (all, Jodrell Exp. Station, Manchester Univ.), Radar observations of the second Russian earth satellite (Sputnik II 1957β). Royal Society of London, Proceedings, Ser. A, 250(1262):367-376, March 24, 1959. 3 figs., 2 tables, 7 refs. DWB, DLC--A description is given of the radar observations of the second Russian earth satellite (Sputnik II, 1957β) using the 80 m steerable radio telescope at Jodrell Bank on frequencies of 36 and 100 Mc/s. An investigation of the fading characteristics of the echoes suggests that the observed fading arises from (i) Faraday rotation, (ii) ionospheric scintillation, (iii) rotation of the satellite. Evidence is produced which suggests that (i) was not the principal cause of the fading under the conditions of these experiments, and that (ii) the scintillation effects arise in a diffracting region at a height not greater than 220 km, which is contrary to the results obtained in the study of the scintillation of radio stars. The effect (iii) seems to have been responsible for most of the observed fading and it would appear that the satellite was rotating about an axis which was nearly perpendicular to its major axis. The effective scattering area of the satellite at 100 Mc/s was of the order of 15 m^2 but at 36 Mc/s it varied between 10 and 500 m^2. From this it is concluded that the satellite was a long object having a reradiation polar diagram with one major and many minor lobes. No evidence was obtained to indicate that the satellite produced any ionization detectable at these frequencies, although it was observed as late as the third orbit before final burn up. Successful contacts were made on only about one-quarter of the transits observed. It has been possible to establish in retrospect whether the satellite passed through the main beam of the aerial. Such an analysis shows that on many occasions where no echoes were obtained the telescope was correctly positioned, and the failure to obtain echoes on these occasions is attributed to deep fading introduced by the rotation of the satellite and by Faraday rotation of the plane of the radio waves. (Met. Abst. 11.2-76.)--Authors' abstract.

D-166 Davies, Kenneth (Nat'l. Bur. of Stands., Boulder, Colo.), A study of 2 Mc/s ionospheric absorption measurements at high latitudes. Journal of Geophysical Research, Wash., D.C., 65(8):2285-2294, Aug. 1960. 7 figs., 3 tables, 20 refs., 7 eqs. DLC--Ionospheric absorption (L) at high latitudes is studied using the published data on 2.0 Mc/s at five Canadian stations during 1957 and 1958. The seasonal and diurnal variations are considered, and it is found that a pronounced winter anomaly in noon absorption occurs at Churchill but not at Resolute Bay. The diurnal variations indicate that the dependence of absorption on solar zenith angle decreases with increase of latitude. The distribution of midnight absorption with latitude shows that, although the maximum occurs in the auroral zone, high absorption is also encountered over the polar cap. A study of the duration of long lasting blackouts shows that in summer the duration is longer as the latitude increases. (Met. Abst. 11.11-50.)--Author's abstract.

D-167 Davies, Rodney Deane, An analysis of bursts of solar radio emission and their association with solar and terrestrial phenomena. Royal Astronomical Society, Monthly Notices, 114(1):74-92, 1954. 14 figs., 7 tables, 20 refs. DWB--Solar radio emission records on seven frequencies in the range 60 to 10,000 Mc/s were studied over a period of 18 months. The analysis, which includes a number of histograms, shows that many of the properties of bursts change with frequency. A study of the time delay between bursts on different frequencies revealed that 3000 Mc/s bursts often occur first; a simultaneous up and down movement of ionized material from the level of zero refractive index at that frequency is postulated. It is found that bursts were more frequent than flares, fadeouts and crotchets and that they almost always accompanied these effects. The commencement of bursts appears to be simultaneous with that of flares and crotchets but precedes that of fadeouts by about two minutes. In addition, there is a rough correlation between the intensity of bursts, flares, fadeouts and crotchets. (Met. Abst. 6.9-182.)--Author's abstract.

D-168 Davies, R. D. and Palmer, H. P., Radio studies of the universe, Foreword by A. C. B. Lovell. Princeton, N. J., Van Nostrand, 1959. 200 p. figs., photos, bibliog. p. 189-192. DLC (QB475.D3). Review in Weather, London, 14(11): 370, Nov. 1959. --This book, written for the "intelligent non-scientist," contains a discussion of astronomy and an outline of optical astronomy. In addition to the chapters on radio methods of observation, studies of radio sources, the radio universe, radio waves from the milky way and the sun, it contains explanations on exploring the planetary system with radar and probing the Earth's high atmosphere. An appendix provides the reader with a brief explanation of basic concepts such as the Doppler shift, blackbody radiation, and the Faraday effect. Finally, a glossary of terms used in context is included. Separate bibliography for each chapter. (Met. Abst. 11.12-36.)--E. Z. S.

D-169 De Feiter, L. D., De exosfeer: atmosferische fluittoontjes en radiostraling uit de aardse korona. (The exosphere: atmospheric whistlers and radio radiation from earth's corona.) Hemel en Dampkring, The Hague, 58(7/8):161-181, July/Aug. 1960. 10 figs. DWB, DLC--Radio waves follow remarkable paths when they cross the earth's atmosphere; they move from one hemisphere to the other. Related to atmospheric whistlers are the very low frequency emissions in the earth's atmosphere caused by magnetic storms and polar light. The study of the two phenomena has been of great interest in the research on the exosphere. The author gives an historical account of whistlers, observed for the first time in 1888 in

Austria, and also describes the instrumentation, especially the antenna. STOREY differentiated between short and long whistlers and the article explains this difference. Whistler phenomenon and nose whistlers are explained theoretically; the relation between whistlers and the outer parts of the atmosphere is shown. One chapter gives a very good description of the exosphere and of rising whistlers, odd shaped whistlers, hooks, etc. The article ends by giving some consideration to the observations made in this field. (Met. Abst. 12.5-116.)--A.V.

D-170 de Groot, T. (Sonnenborgh Obs., Utrecht, Netherlands), Spectra of short lived transients in solar noise at 400 Mc/s. (In: Paris Symposium on Radio Astronomy, July-Aug. 1958, (Proceedings), pub. Stanford Univ. Press, 1959. p. 245-247. 2 figs. DLC--The solar work at the radio observatory near Dwingeloo is concentrated on the investigation of relatively small bursts which, having the aspect of elementary phenomena, could give some insight into the way in which they are related to their immediate cause. The duration of single bursts and their spectral profiles were investigated. The spectral profiles obtained thus far have half-power bandwidths ranging from 4 to more than 14 Mc/s, about half of them have a Gaussian shape and an average bandwidth of $\pm$ 2.5 Mc/s, the remainder consist of various irregular forms with bandwidths of the order of 12 Mc/s. The spectral work illustrates the use of narrow band spectrometry with a low time constant as a means of getting a detailed knowledge of the microbursts. Comparison with simultaneously obtained broad-band spectra will be necessary to complete the picture. (Met. Abst. unpub.)--E.Z.S.

D-171 de Groot, T., Dynamic spectra and polarization of small bursts in solar radio emission. Bulletin of the Astronomical Institutes of the Netherlands, 15(502):229-236, Dec. 30, 1960. 12 figs., 4 refs. DLC--High speed recordings of noise storms and storm bursts were taken with an 8 channel radio polarimeter with a total band width of 15 Mc/s at 390, 330, and 274 Mc/s, respectively. It appears that the intensity of single storm bursts can be written as $I(f, t) = I_1(f). I_2(t)$, where I_1 and I_2 are symmetric profiles with average half power widths of 6 Mc/s and $0^s.18$, respectively. These values are independent of the frequency in this region. Noise storms may be regarded as a superposition of these single bursts in the f, t-plane with a high density. Lesser burst activity, prevalent at the higher frequencies, suggests a clustering tendency of storm bursts, which may be due to less favorable transmission conditions in the solar corona, allowing only glimpses of noise storms to be observed. An individual noise storm is, among other things, characterized by peculiarities in the shape of its complex bursts, according to the way in which single storm bursts are superposed. Polarization does not seem to be an inherent property of noise storms. Sometimes they are accompanied by incidentally occurring unpolarized broad banded bursts with durations of the order of a second and time shifts from 0 - 0.02 Mc/s, which may be weak type III's. (Met. Abst. unpub.)--Author's abstract.

D-172 Dellinger, John Howard (U.S. Nat'l. Bur. of Standards, Radio Section), A new cosmic phenomenon. Science, 82(2128):351, Oct. 11, 1935. DLC--Brief note on the phenomenon involving all HF radio transmissions over the illuminated half of the globe. Sudden disappearance and reappearance of radio communication at 54 day intervals permits forecasting of the phenomenon, apparently caused by some solar emanation lasting only a few minutes. Regular observations and reports on this phenomenon are suggested. --W. N.

D-173 Dellinger, J. H., Sudden disturbances of the ionosphere. National Bureau of Standards, Journal of Research, 19(2): 111-114, Aug. 1937. 10 figs., table, 30 refs. DLC--This is the first detailed report on the solar effect, discovered by the author in 1935, manifesting itself as a complete fading of HF radio communication for a period of minutes up to hours, and by perturbations of terrestrial magnetism and earth currents. The report is based on world wide cooperation, by analyzing the records of the several contributing stations. --W. N.

D-174 Dellinger, J. H., International cooperation in radio research - - URSI and IRE. Institute of Radio Research, N. Y., Proceedings, 44(7):866-872, July 1956. DLC--URSI (Int. Sci. Radio Union) deals with scientific and IRE with engineering and development aspects of radio science. IRE was established in 1912 in the U. S., whereas URSI was established in 1919 at the same time as IUGG under the Int. Research Council (later ICSU). Five presidents include A. E. KENNELLY (1932-4) and E. V. APPLETON (1934-52). Places and dates of 11 General Assemblies 1922-1954, and the 7 Commissions are listed (Sec. II. is Tropospheric Propagation; III. Ionospheric Propagation; IV. Terrestrial Noise; V. Radio Astronomy). National Committees, the work and structure of the U. S. National Committee and some of the accomplishments of URSI, including the idea for IGY in 1957/8, are described. Joint committees with IUGG, etc., accomplish much in ionospheric and related research. (Met. Abst. 9A-109.)--M. R.

D-175 De Mastus, Howard and Wood, Marion (Sacramento Peak Obs., Nat'l. Bur. of Standards, Boulder, Colo.), Short wave fadeouts without reported flares. Journal of Geophysical Research, 65(2):609-611, Feb. 1960. fig., 2 tables, 2 refs. DLC--A reexamination of Sacramento Peak flare patrol films obtained on days when SWF occurred without flares reported. Of the 15 cases examined, 12 were closely time associated with outstanding H α events; 2 so poor as to render statement useless and one without association. --W. N.

D-176 de Mendonca, F.; Villard, O. G., Jr. and Garriot, O. K. (all, Radioscience Lab., Stanford Univ., Stanford, Calif.), Some characteristics of the signal received from 1958 δ 2. Institute of Radio Engineers, N. Y., Proceedings, 48(12): 2028-2030, Dec. 1960. 4 figs., table, 7 refs. DLC--The existence of specific irregularities such as in the scintillation, field alignment and skip distance in the electron density of the ionosphere is discussed as a result of the spectrum analysis of the signals received from 1958 δ 2. During June 1958 through April 1959 over 200 passages of the satellite and its vertical incidence ionograms were recorded at Stanford University. Various combinations of scintillation were made and are tabulated. They show that scintillation always accompanied spread F. Some backscatter records obtained also show echoes from field aligned ionization at a range of about 1000 km to the north. The report illustrates the build-ups, in pairs, of complex signal strength variations as the satellite passed into the "skip" region at a height below the F region maximum density. Such a paired formation is explained on the basis of magneto-ionic theory and depends upon the magnitude of the component of the earth's magnetic field resolved along the direction of the ray at the reflection height in the ionosphere. --N. N.

D-177 Denisse, Jean-François, Relation entre l'activité géomagnetique et l'activité radioélectrique solaire. (Relation between geomagnetic activity and radioelectric activity.) Annales de Geophysique, Paris, 8(1):55-64, Jan./March 1952. 3 figs., 13 refs. English summary p. 55. DWB--Following daily measurements of solar radiation on 158 Mc/s, made at Marcoussis from 1948 to 1950, the effect of solar active centers on radioelectric and geomagnetic intensity is analyzed. Among solar energy centers, discrimination is made between radioelectrically active and inactive centers. The former are found to be followed 2-3 days after their passage through the central solar meridian by increased geomagnetic activity, while the latter have no geomagnetic effect. (Met. Abst. 6. 6-214.)--G. T.

D-178 Denisse, J. F., Les centres solaires d'activité radioélectrique et leur influence sur l'activité géomagnétique. (Solar centers of radioelectric activity and their influence on geomagnetic activity.) Ciel et Terre, 69(3/4):53-67, March/April 1953. 6 figs., table, 15 refs. DWB, DLC--Major centers of solar activity are classified into groups A (radio emissive centers) and B (non-emissive). From data obtained in continuous measurements of solar radioelectric activity on 158 Mc at the Laboratoire des Études de la Marine à Marcoussis (Paris) since 1948, centers of group A are selected on the basis of an index accounting for intensity and variability. A correlation is established between solar radioelectric emission and subsequent intensification of geomagnetic disturbances. It is also shown that solar centers of group B have an attenuating effect on geomagnetic activity. The applicability of these results to the prediction of geomagnetic and ionospheric disturbances is suggested. Correlations between magnetic and solar activity analyzed by other authors are discussed. (Met. Abst. 9K-23.)--G. T.

D-179 Denisse, J. F., Relations entre les phénomènes solaires et terrestres. (Relations between solar and terrestrial phenomena.) Academie des Sciences, Paris, Comptes Rendus, 236(19):1856-1858, May 11, 1953. 2 figs. DWB--In an earlier paper (see ref. D-177) the author and his collaborators produced evidence to the effect that sunspots involving strong radioelectricity are accompanied by an increase of geomagnetic activity, while a decrease of geomagnetic activity takes place when sunspots (even if they are large) are electrically inactive. In support of this theory, the author now presents two curves based on a more extensive statistical material (1948-1950) than those presented in the previous papers. Details regarding the relative time of increasing and decreasing magnetic and electric activity are discussed. (Met. Abst. 9K-24.)--G. T.

D-180 de Witt, J. H. and Stodola, E. K., Detection of radio signals reflected from the moon. Institute of Radio Engineers, Proceedings, 37(3):229-242, March 1949. 18 figs., 4 refs., 36 eqs. DLC--Describes research work at U. S. Army Signal Corps at Evans Signal Laboratory, Belmar, N. J., since 1945 and up to date. Moon reflections were obtained with equipment for which formulas and curves, showing the attenuation between transmitting and receiving antennas, are presented and discussed. Quantitative treatment is given of the moon reflected pulse shape and intensity. --W. N.

D-181 Dicke, Robert H. and Beringer, Robert, Microwave radiation from the sun and moon. Astrophysics Journal, Astrophysics Journal, 103(3):375-376, May 1946. fig. DLC--A radiometer provided with an 18 in. parabolic reflector aerial of gain 6000 was used to measure the sun's electromagnetic radiation at a wavelength of 1.25 cm during the partial eclipse of July 9, 1945. The observed intensities fit well with those obtained by assuming the sun in this radio region to a uniform disc of optical size at 10,000°K. Similar measurements on the nearly full moon give an effective temperature of 292°K.

D-182 Dieminger, Walter (Univ. of Göttingen), The electromagnetic environment of the atmosphere and nearer space. International Symposium on the physics and Medicine of the Atmosphere and Space, San Antonio, Texas, Nov. 1958, Proceedings of the 2nd Symposium, pub. N.Y., John Wiley, 1960. p. 91-99. 5 figs., 19 refs. DLC, DWB--A discussion of the electromagnetic environment of the atmosphere and nearer space. The first part of the chapter is confined to a discussion of the facts brought to light by the investigation of the phenomena on the ground and in the upper atmosphere. In the second part some of the guesses about conditions in interplanetary space are mentioned. From the point of view of space travel it may be concluded that the electromagnetic environment is not a serious obstacle to interplanetary travel. The magnetic fields and the electric currents involved are efficient on an interplanetary scale only. Measured in earthly dimensions, they are far too weak. Also, the densities of slow corpuscular streams from the sun and of the ring current are far too small to affect a space vehicle in a catastrophic manner. However, there might be a noticeable influence on the drag in regions of very low density. The screening effect of the ionosphere for wavelengths above a certain limit would make it necessary for communication systems to be based on very high frequency in space travel, and the space traveller will have to renounce the reception of most broadcasting stations as soon as he passes the ionosphere. On the other hand, the sky will be open for all radio frequency emissions originating from stars and galaxies. (Met. Abst. unpub.)--E.Z.S.

D-183 Dinger, Harold E. (Naval Research Lab., Communication Branch, Radio Div.), Whistling atmospherics. U.S. Naval Research Laboratory NRL Report 4825, Sept. 14, 1956. 37 p. numerous figs., 20 refs., 2 eqs. Price: $1.25. DWB--Since 1953 NRL has been observing and recording audio frequency atmospherics and their correlation with other geophysical phenomena. Beginning in April 1955, the diurnal variation in both whistler activity and the occurrence of "dawn chorus" has been determined. Whistler coincidence at several locations has been recorded in an attempt to prove L. R. O. STOREY's theory on the mode of propagation of these atmospherics. Many whistlers of unusual character have been spectro-analyzed for the purpose of extending present theory to cover the general case. Plans have been formulated for synoptic observations at a number of selected locations during the International Geophysical Year. (Met. Abst. 9.4-281.)--Author's abstract.

D-184 Dodson, Helen W. (McMath-Hulbert Obs. Univ. of Mich.), Relations between flares and 1.5 meter solar radiation. International Council of Scientific Unions, Brussels, Commission for the Study of Solar and Terrestrial Relationships, Rome, Sept. 1952, Procès-Verbal et Communications, pub. 1953. p. 12. DWB--A brief note that disturbances on 1.5 m are associated with H α flares. The typical form is a distinct "early" burst at the commencement of the flare and a "late" disturbance at or after maximum H α radiation. The early burst coincides with high velocity ejection of hydrogen and ionized calcium. (Met. Abst. 9A-30.)--C.E.P.B.

D-185 Dodson, H. W.; Hedeman, E. Ruth and Owren, Leif (McMath-Hulbert Obs., Michigan Univ. and School of Elec. Eng., Cornell Univ.), Solar flares and associated 200 Mc/s radiation. Astrophysical Journal, 118(2):169-196, Sept. 1953. 10 figs., 12 tables, foot-refs. DWB--Study of 200 Mc/s solar radiation for the times of 194 flares indicates distinctive radio events associated with 78% of the flares. The flare associated distinctive events can be divided into ten descriptive types or categories: major burst, major burst with second part, minor burst, minor burst with second part, micro burst, group of bursts, series of bursts, noise storm in progress, onset of noise storm, and rise in base level. In addition, there is the designation "null," or no distinctive event. Consideration of the time relationships between flares and 200 Mc/sec events suggests that two quite different types of phenomena may be represented in the flare associated 200 Mc/sec radiation. The first or "early" phenomena includes very sudden, relatively isolated, burstlike features which occur close to the time of start of the flare. The second or "late" phenomenon includes the more gradual rises in base level and onsets of noise storms. These usually start at or after the time of flare maximum. The "early" and "late" phenomena can occur in conjunction with each other, or either of the two can occur separately. The importance of the flare, position on the solar disk, and accompanying ionospheric disturbances are considered with respect to the form and energy excess of the flare associated 200 Mc/sec events. The various aspects of the complex flare phenomenon, as observed photographically and visually, are discussed. An association is suggested between the high-velocity ejections observed at the onset of certain flares and the occurrence of a major burst at 200 Mc/sec. From the point of view of the parameters considered in this paper, the flares for which there were no distinctive events on the 200 Mc/sec records constitute a random sample from the entire set of 194 flares. (Met. Abst. 9A-31.)--Authors' abstract.

D-186 Dodson, H. W.; Hederman, E. R. (McMath-Hulbert Obs., Michigan Univ.) and Covington, A. E. (Nat'l. Res. Council, Canada), Solar flares and associated 2800 Mc/sec (10.7 cm) radiation. Astrophysical Journal, 119(3):541-563, May 1954. 13 figs., 5 tables. DWB--Study of 2800 Mc/sec solar radiation at the time of 213 flares and 173 subflares has shown distinctive radio events associated with 57% of the flares and 19% of the subflares. The flare-associated distinctive events at 2800 Mc/sec can be described by essentially the same types and categories already used to report outstanding disturbances at this radio frequency: single bursts; single-simple bursts with and without a postburst increase; single-complex bursts with and without a postburst increase; gradual rises and falls of flux. In addition, there is the designation "null" or no distinctive event, There is strong evidence that there is an outstanding event or disturbance in 2800 Mc/sec radiation. One is a sudden burst-type feature which occurs during the rise to maximum of the H α flare. The other is the more gradual rise and fall of flux and "postburst increase," which lasts as long as, or longer than, the flare itself. Both types of phenomena appear to start the H α flare. Flares associated with large "postburst increases" or "gradual rises and falls" show a high concentration toward the central part of the solar disk. This is not the cause for the strictly "burst-type" disturbances. The importance of the flare, the position of the flare on the solar disk, and accompanying ionospheric disturbances are considered with respect to the form and energy excess of the associated events at 2800 Mc/sec. (Met. Abst. 6.6-215.)--Authors' Abstract.

D-187 Dodson, H. W. (McMath-Hulbert Obs., Univ. of Michigan), Studies at the McMath-Hulbert Observatory of radio frequency radiation at the time of solar flares. Institute of Radio Engineers, N. Y., Proceedings, 46(1):149-159, Jan. 1958. 12 figs., 4 tables, 11 refs. DLC--The complex flare phenomenon is described in terms of its photographic aspect of Ha spectroheliograms, associated prominence activity, terrestrial effects, and the general pattern of radio frequency emission. Flare-associated events at 2800 and 200 mc are reviewed, and the association between flares and the onset of 200 mc noise storms is discussed. Records of 2800 and 200 mc radiation at the time of 277 flares are compared. Flare events at frequencies less than 200 mc are considered and a study of 496 flares at 80 mc is summarized. An effort is made to compare reports of dynamic spectra at radio frequencies with flare data and single frequency records. The apparently close association between flares with "major early bursts" at frequencies $\leqslant$ 200 mc and geomagnetic disturbances is discussed. (Met. Abst. 11.5-157.)--Author's abstract.

D-188 Dolbear, D. W. N.; Elliot, H. and Dawton, D. I., The cosmic ray intensity and radio fadeouts. Journal of Atmospheric and Terrestrial Physics, 1(3):187-188, 1951. 6 refs. MH-BH--The effect of small solar flares, causing short radio fadeouts on cosmic ray intensity, was examined by superposing curves of cosmic radiation at Manchester before, during and after 35 fadeouts between 9 h and 16 h S.M.T. and 69 between 16 h and 9 h. Daytime results showed an increase of cosmic rays by 0.3% at time of fadeout; at night this effect did not appear. (Met. Abst. 2.9-95.)--C.E.P.B.

D-189 Douglas, J. N.; Huguenin, G. R. and Lilley, A. E., A very low frequency radio experiment for satellite and probe transportation. Yale University. Observatory, Contract AF 19 (604)-3059, Final Report, Jan. 1960. 36 p. numerous figs. (incl. photos), numerous tables, 3 refs. numerous eqs.--The objectives of Contract AF 19(604)-3059 are: theoretical and experimental investigations of the ionospheric regions above the maximum of the F2 layer, by utilizing observations of extraterrestrial low frequency radio noise made in rocket probes and satellites. The following sources of VLF radiation are examined: general cosmic environment, synchrotron radiation, plasma and shock waves, Čerenkov radiation, parametric oscillations, free-free transitions, solar disturbances, non-thermal planetary radiation, and terrestrial disturbances. Based upon predicted VLF intensities to be expected from cosmic sources of radiation performance specifications on the antennae and radiometers are developed. Three complete satellite payloads have been constructed for rocket probe and satellite transportation. Each payload operates at 13.25, 7.0, 2.2 and 0.7 Mc. Ground based radiometers and ground based transmitters have been constructed for terrestrial correlation studies and "closed-loop" tests of ionospheric leakage. (Met. Abst. 11.12-583.)--Authors' abstract.

D-190 Dowden, R.L. and Goldstone, G.T. (both, Commonwealth Ionospheric Prediction Serv., Hobart, Tasmania), "Whistler mode" echoes remote from the conjugate point. Nature, London, 183(4658):385-386, Feb. 7, 1959. fig., 3 refs., 2 eqs. DLC--An investigation, sponsored by the Australian National Committee of the I. G. Y. has been made of the Eckersley-Storey theory on whistler propagation. This theory predicts that whistler mode signals from Tokyo (20° N geomagnetic latitude) would return to the Earth's surface at a point near Darwin in the Northern Territory, some 3500 km from Hobart, Tasmania (51°S geomagnetic latitude). Yet, when echoes of very low frequency radio signals were established on 17.44 kc/s in Tokyo with delays of approximately 0.2 s, they were later detected at Hobart. It is suspected that the echoes must have traveled via the whistler mode from Tokyo to the vicinity of Darwin and thence to Hobart through the Earth-ionosphere wave guide mode. Details are discussed. (Met. Abst. 11.12-327.)--N. N.

D-191 Drake, Frank D. and Ewen, H.I., Broad band microwave source comparison radiometer for advanced research in radio astronomy. Institute of Radio Engineers, N.Y., Proceedings, 46(1):53-60, Jan. 1958. 11 figs., 13 refs., 5 eqs. DLC--A travelling wave tube radiometer operating at 8000 Mc with a bandwidth of 1000 Mc and sensitivities of the order of 0.01°K is described. The radiometer is more than one order of magnitude more sensitive than other existing radiometers operating at 8000 Mc. The very serious effects of gain fluctuations, acting on small residual signals, when trying to achieve very high sensitivities, are discussed. A means of eliminating such effects by introducing compensating noise has been found successful. Radio observations with this radiometer in conjunction with a 28 ft parabolic reflector have shown that: (1) the predicted sensitivity is achieved; (2) zero level stability is extremely high; (3) it has been possible to detect in detail the distribution of radio brightness at this wavelength in the vicinity of the galactic plane; (4) radiation from the planets Jupiter and Saturn has been detected, this being the first detection of Saturn as a radio source; (5) radiation from two planetary nebulas has been detected, this being the first detection of these objects as radio sources. (Met. Abst. unpub.)--Authors' abstract.

D-192 Drake, F.D., How can we detect radio transmissions from distant planetary systems? Sky and Telescope, 19(3):140-143, 1959. 3 figs. DLC--A formula is given for distance of detection of cosmic radio signals, by means of which it is proven that our present radio equipment is capable of receiving signals from other possibly existing civilizations in space. Our search for radio contact with extraterrestrial beings ought to be confined to between 1000 and 10,000 Mc, or rather at 1420 Mc, the frequency of the 21 cm interstellar hydrogen line, will prove satisfactory. --W. N.

D-193 Dueño, Braulio (Univ. of Puerto Rico, College of Agric. and Mech. Arts, Mayaguez), Low angle fluctuations of the radio star Cassiopeia as observed at Ithaca, N. Y., and its relation to the incidence of sporadic E. Journal of Geophysical Research, Wash., D.C., 61(3):535-540, Sept. 1956. 4 figs., 2 refs. DLC--Low angle fluctuation data of the radio star Cassiopeia for the period comprised between Sept. 1954 to Aug. 1955, have been compared with ionospheric sounder data from Ottawa, Canada. A remarkable relation between the incidence of fluctuations and sporadic E has been observed for the month of Dec. 1954. The coincidence of Es and fluctuations were found, in general, to be very good during the midwinter period and poor afterward. The pierce-through region for ionospheric layers at a height of 400 km comes out approximately 1500 km north of Ithaca. In this region the normal sun controlled forms of ionization should be a minimum during the midwinter period. It is reasonable to expect that layers at the 120 km level should be most influential in causing fluctuations during this period. Several fluctuationless days were recorded during this midwinter period and practically none at other times. (Met. Abst. 9A-111.)--Author's abstract.

D-194 Dumont, Rene, L'ionosphère et l'optique géométrique des ondes courtes. (The ionosphere and the geometric optics of short waves.) Paris, Dunod, 1958. 100 p. 33 figs., 11 refs. (Monographies Dunod, No. 3) DWB (M10.535 D893io), DLC (QC879.D85) Review in La Méteorologie, Paris, Ser. 4, No. 49:75, Jan./March 1958. --A pocket-size textbook giving basic and up-to-date information on the ionosphere and its formation, structure, radio wave propagation, sounding by vertical pulses and by study of photochemistry, absorption, geomagnetic fluctuations, optical phenomena, meteors and rockets. Characteristics of the different layers, applications to long distance radio propagation, forecasting of ionospheric and radio propagation conditions, etc., are discussed. Aurora, airglow, sunspots, satellites, ionospheric tides and various theories are treated incidentally. Numerous schematic diagrams, an author and subject index are included. (Met. Abst. 10.10-17.)--M. R.

D-195 Dungey, J. W. (Sydney Univ., School of Physics, N. S. W.), Bailey's theory of sunspot noise. Journal of Atmospheric and Terrestrial Physics, London, 4(4/5):148-162, 1953. 10 refs., 58 eqs. DWB--The exact formulation of BAILEY's theory for a nonuniform ionized gas is described and the boundary conditions are explained. A direct calculation is made of the rate of exchange of energy between the motion of the electrons and the wave. The intensity of the radiation arising from a transient disturbance is calculated and it is found that the intensity can become very large when the wave gains energy from the electrons. The general nature of the electron flow and the order of magnitude of the electron velocity needed for amplification to occur are discussed. (Met. Abst. 9A-32.)--Author's abstract.

D-196 Dyce, R.B. (Stanford Res. Inst., Menlo Pk., Calif.), Faraday rotation observations of the electron content of the exosphere (Summary only). Journal of Geophysical Research, Wash., D.C., 65(9):2617-2618, Sept. 1960. table, 4 refs. DLC--The polarization twist imposed on 106.1 Mc/s radio waves by the ionosphere has been investigated by using the moon as a passive reflector. This has been done with a view of learning the total electron column density even at altitudes above the known ionosphere. Because the antenna is capable of being continuously directed at the moon for 12 consecutive hrs, observations are possible from the predawn ionization minimum to the noontime maximum. (Met. Abst. 11.12-438.)--Author's abstract.

D-197 Dyce, R.B. and Hill, R.A. (both, Stanford Res. Lab., Menlo Park, Calif.), Lunar echoes received on spaced receivers at 106.1 Mc. Institute of Radio Engineers, N.Y., Proceedings, 48(5):934-935, May 1960. fig., table, 9 refs. DLC--Brief discussion of tests conducted at Stanford Research Institute in Jan. and April 1958, purporting to measure the sizes of the lunar patches and the possible speed of motion of their reflected energy along the earth's surface. Two interspaced antennas were directed at the moon at 15 min intervals, using precomputed values of azimuth and elevation. The uncorrelated fluctuations (shown in graph) imply that radio communication via the moon is possible with a diversity distance of about 1 km at right angles to the ray. (Met. Abst. unpub.)--W. N.

D-198 Easton, R.L. and Votaw, M.J. (both, U.S. Naval Res. Lab., Wash., D.C.), Vanguard I IGY satellite (1958 Beta). Review of Scientific Instruments, N.Y., 30(2):70-75, Feb. 1959. 11 figs., 2 tables, 3 refs. DWB, DLC--

The instrumentation used, the measurements obtained, and the uses of the Vanguard I satellite are described. This satellite contains two transmitters, one powered by batteries for about three weeks and one powered by solar cells (still operating). From the transmitted frequencies temperature information and rotation rates are obtained. The transmitted signals are also used to determine the satellite orbit. An approximate free orbital lifetime of 200 years is predicted. (Met. Abst. 10.10-92.)--Authors' abstract.

D-199 Ehmert, Alfred and Revellio, K. (both, Max-Planck Inst., für Physik der Stratosphäre, Weissenau bei Ravensburg), The influence of the solar eclipse of June 30, 1954 on low-frequency atmospherics. (In: Solar eclipses and the ionosphere: a symposium... ed. by W. J. G. Beynon and G. M. Brown. London, Pergamon, 1956. p. 126-131. 7 figs., 2 refs.) DWB--Records of atmospherics on 13 kc/s obtained at Weissenau during the solar eclipse are compared with other European records. For small atmospherics from distant centers, the variations show a distinct peak during the eclipse. This peak is absent for stronger atmospherics of the same frequency and also for higher frequencies from nearer discharge centers. Narrow sector d. f. observations at Payerne and Zürich, together with meteorological information, enable the source of these atmospherics to be located near the Azov Sea and the Caucasus at distances from 2000 to 2500 km. Best transmission occurred when the sun was more than 75% obscured at both reflection points for the doubly reflected waves. (Met. Abst. 9.6-291.)--Authors' abstract.

D-200 Ehmert, A. and Revellio, K., Solare Ultrastrahlung und ionosphärische D-Schicht am 23 February1956. (Solar cosmic rays and the ionospheric D layer on Feb. 23, 1956.) Zeitschrift für Geophysik, Würzburg, 23(3):113-134, 1957. 4 figs., 26 refs., eqs. DLC (QC801.Z4)--The outburst of solar cosmic rays on Feb. 23, 1956, caused a strong attenuation of longwave atmospherics on the night side of the earth. A discussion of our own and other records shows that the beginning follows immediately the first arrival of this solar radiation. The electron density caused by the ionization of these cosmic rays is sufficient to cause the observed attenuation. But this attenuation continued after the decrease of cosmic ray intensity for several hours. It is suggested that negative ions formed by attachment of electrons to 02 have a long life at night in low concentration and that at every time a small fraction of them is liberated for a short time. These electrons continue attenuation. (Met. Abst. 11F-35.)--Authors' abstract.

D-201 Elgarøy, Øystein, Frequency drift of short-time transients in solar radio noise. Nature, London, 180(4591):862, Oct. 26, 1957. fig., ref. DWB--Preliminary records on 199 and 200.5 Mc/s at Oslo are analyzed and some conclusions drawn. (Met. Abst. 9A-151.)--C.E.P.B.

D-202 Elgarøy, Ø., Duration of transients in solar radio noise. Nature, London, 180(4590):808-809, Oct. 19, 1957. fig., 2 refs. DWB--Records of solar noise storms on 200 Mc/s with a bandwidth of 0.3 Mc/s show that bursts can be resolved into several pips with a rather sharp peak at 0.28 sec. They have a tendency to occur in groups; when wavelength is doubled mean duration is halved. (Met. Abst. 9A-150.)--C.E.P.B.

D-203 Elgarøy, Ø. (Inst. of Theoretical Astrophysics, Univ. of Oslo), Observations of the fine structure of enhanced solar radio radiation with a narrow band spectrum analyser. Nature, London, 184(4690), Supp. No. 12:887-888, Sept. 19, 1959. 3 figs., 3 refs. DWB--A narrow band swept receiver was set up at Harestua to study the pips of enhanced solar radio radiation. The operation of the receiver is explained and the observations are described. On Aug. 18 a very remarkably fine structure was found in the 200 Mc/s radiation. The observations of storm bursts are discussed and shown in 3 photographs. (Met. Abst. 11.12-49.)--I.S.

D-204 Ellis, G.R.A., On the propagation of radio waves through the upper ionosphere. Journal of Atmospheric and Terrestrial Physics, London, 9(1):51-55, July 1956. fig., 2 tables, 7 refs., 7 eqs. DWB--Since it is likely that electron densities of more than 0.1 electron per cm^3 exist at distances of several thousand kilometers from the earth, the propagation of the two low frequency extraordinary modes through the ionosphere is improbable. Of the five possible ways in which waves can penetrate the lower ionosphere, we therefore have only three which can also penetrate the upper ionosphere. Of these three, the oblique longitudinal ordinary mode can produce only second order observational effects in the absence of strong discrete sources of extra-terrestrial radiation, since its angular range is only about 1 degree (ELLIS, 1956). The low frequency limit for the observation of cosmic radio emission will, therefore, in general be that given by foF2, and the observation of these radiations from below the ionosphere is unlikely at frequencies much less than 1 Mc/s. (Met. Abst. 7.11-158.)--Author's abstract.

D-205 Ellis, G. R. A. (Radio Res. Labs., C.S.I.R.O., Australia), The trapping of cosmic radio waves beneath the ionosphere. Journal of Atmospheric and Terrestrial Physics, London, 13(1/2):61-71, Dec. 1958. 11 figs., 5 refs., 4 eqs. DLC --The observation of cosmic radio noise at frequencies less than the local ionospheric critical frequency is discussed. It is shown that this effect may adequately be explained in terms of the trapping of the radiation between the ionosphere and the ground. Wherever there is a horizontal gradient of critical frequency in an ionospheric layer, incoming extra terrestrial radiation may be reflected by the layer after one ground reflection and may subsequently propagate by hop transmission for large horizontal distances beneath the layer. A method of calculating the amplitude of the trapped radiation at any distance is given, allowing for all possible modes. (Met. Abst. 10.10-197.)--Author's abstract.

D-206 Ellis, G. R. A. and Cartwright, D. G. (both, Commonwealth Scien. & Indust. Res. Organiz., New So. Wales), Directional observations of radio noise from the outer atmosphere. Nature, London, 184(4695, Supp. No. 17):1307-1308, Oct. 24, 1959. fig., table. DWB--Observations made of the radio emission of the Earth's outer atmosphere in the frequency band of 2-40 kc/s by a newly developed technique for continuously monitoring the occurrence of such phenomena are described. The bursts of low frequency noise have a relatively narrow spectrum. Their likely mechanism is described. It appears possible to estimate the size of the virtual sources of very low frequency radiation. (Met. Abst. 11.12-320.)--A. H. K.

D-207 Ellis, G. R. A.; Cartwright, D. G. and Groves, J. R. V., Spaced observations of radio noise from the outer atmosphere. Nature, London, 184(4696, Supp. No. 18):1391-1392, Oct. 31, 1959. fig., ref. DWB--It was suggested by G. R. A. ELLIS in Planetary and Space Science that during some types of radio noise storms in the Earth's outer atmosphere, the source of noise may remain in constant position in right ascension. In this case the arrival of the storm will be recorded at the same local time at places of different longitude rather than simultaneously. In a majority of the cases noise bursts were recorded simultaneously at Camden and Adelaid. A distinct time delay was observed only during a major geomagnetic storm and aurora. (Met. Abst. 11.12-321.)--A. H. K.

D-208 Ellis, G. R. A. (C. S. I. R. O., Camden, Australia), Directional observations of 5 kc/s radiation from the earth's outer atmosphere. Journal of Geophysical Research, D. C., 65(3):839-843, March 1960. 3 figs., 2 tables, 5 refs. DLC--Low frequency radio noise bursts associated with geomagnetic disturbances have been observed with a network of direction finding receivers in southeastern Australia during Sept. and Oct. 1959. Over a range of longitudes from 135° to 155°E, 18 noise bursts came from apparent sources at latitudes greater than 42°S. On 8 occasions, isolated, discrete noise sources with an average geographical size of 550 km were detected at latitudes between 34°S and 42°S. (Met. Abst. 11. 12-322.)--Author's abstract.

D-209 Ellis, G. R. A. (C. S. I. R. O., Australia), Geomagnetic disturbances and 5 kilocycles per second electromagnetic radiation. Journal of Geophysical Research, Wash., D. C., 65(6):1705-1710, June 1960. 6 figs., 12 refs. DLC--A comparison is made between variations of the geomagnetic field and bursts of 5 kc/s radio noise recorded at Camden, N. S. W., between June 1958 and Oct. 1959. During this period 8 noise storms were recorded. All occurred during the main phase of a geomagnetic storm, beginning on the average 3 hours after the start of the main phase. Of 97 isolated noise bursts of less than 4 hours' duration, 43 were associated with positive bays in the record of the magnetic H component. No consistent delay between the noise burst and the bay was observed. Noise bursts were not in general associated with geomagnetic micropulsations of less than 1 minute period, although some correlation with quasi-sinusoidal magnetic variations with periods between 10 and 60 minutes was noted. During the period of the observations 30 magnetic sudden commencements were followed by noise bursts or storms after an average delay of 8. 5 hours. On four occasions, a noise burst started immediately after a sudden commencement occurring between 1200 and 1800 hrs GMT. (Met. Abst. 11. 12-310.) --Author's abstract.

D-210 Ellison, Mervyn Archdall, Source points of radio noise bursts associated with solar flares. Nature, London, 167(4258):941-942, June 9, 1951. 12 refs. DLC--Discussion of a number of recent observations of visible flares followed after a lag by radio noises, and their meaning in solar physics. Author discusses exact relation between visible radiation from flares and radio noise apparently from the same source point. (Met. Abst. 3. 3-141.)--C. E. P. B.

D-211 Ellison, M. A. (Royal Obs., Edinburgh), The H α radiation from solar flares in relation to sudden enhancements of atmospherics on frequencies near 27 Kc/s. Journal of Atmospheric and Terrestrial Physics, London, 4(4/5):226-239, 1953. 5 figs., 2 tables, 18 refs. DWB--The development curves of 10 solar flares observed in H α light are compared with the sudden enhancements of atmospherics (S. E. A. s) generated by them. In confirmation of earlier work (1950), an average time lag of 7 min is established between the maximum of the flare and the maximum of the resulting S. E. A. This is interpreted as an effect of "sluggishness" in the response of the D layer (at a height of about 75 km) to the ionizing radiation from the flare. An analysis is made of the association of S. E. A. s with 413 flares of Classes 1, 2 and 3 during a period of 4 years. In the hours between 0900 and sunset 51% of Class 1 flares, 88% of Class 2 flares and all Class 3 flares have associated S. E. A. s. The percentage association is higher during the middle of the day and in the afternoon than in the early morning hours. It is also higher in winter than in summer. It is emphasized that three or four 27 kc/s recorders well distributed in longitude would give almost complete coverage for the recording of major flares; the method might profitably be used during the International Geophysical Year of 1957. (Met. Abst. 7.4-133.)--Author's abstract.

D-212 Ellison, M. A. (Royal Obs., Edinburgh), The sun and its influence: an introduction to the study of solar-terrestrial relations. London, Routledge and Kegan Paul, 1955. 235 p. 54 figs., 9 plates, 9 tables, bibliog. p. 225-230. Price: 21 sh. DLC (QB531. E4 1955). Review by J. Pepper in Royal Meteorological Society, Quarterly Journal, 82(354): 549-550, Oct. 1956. Review by F. Steinhauser in Archiv fur Meteorologie, Geophysik und Bioklimatologie, Ser. A, 9(3):428-430, 1956. DLC--The latest discoveries in various fields of astro- and geophysics connected with solar-terrestrial relationships (not including solar-weather relations) are woven into this systematic yet readable book on the sun, its radiations, atmosphere, disturbances, etc., and their effects on cosmic ray, geomagnetic, ionospheric, and auroral and radio phenomena or disturbances. Many excellent schematic drawings, photos and tables are included. (Met. Abst. 8.7-6.)--M. R.

D-213 Ellison, M. A. (Royal Obs., Edinburgh), Solar flares. (In: Beer, Arthur (ed.), Vistas in astronomy. pub. London, 1955-56. Vol. 2:799-807. 4 figs., 14 refs.) DLC, DWB (520.82 B415v)--A review of the progress during the past 25 yrs. and present knowledge of solar flares and their relation to sudden disturbances in the ionosphere, fade-outs, radio noise, etc. General properties of solar flares, flare spectra, ionospheric effects and radio emission are discussed at some length and recent theoretical work reviewed. (Met. Abst. 11D-37.)--M. R.

D-214 Ellison, M. A. (Royal Obs., Edinburgh). Sudden ionospheric disturbances in relation to solar flare radiations. (In: Solar eclipses and the ionosphere: a symposium... ed. by W. J. G. Beynon and G. M. Brown, London, Pergamon, 1956. p. 180-183. 6 refs.) DWB--A solar flare emits a burst of ultraviolet radiation which has immediate repercussions in the D and lower E regions. The operative wavelengths are still uncertain; but L α (1216 Å) radiation at the higher levels and X-rays ($\sim$5 Å) at lower levels seem probable. Comparisons have been made between the development curves of the S. I. D.'s and of the H α radiation of the flares which caused them. On the assumption that the ultraviolet follows the same variation with times as the H α light, some deductions can be made about the relaxation times and the maximum ionization at various levels. (Met. Abst. 9.1-175.)--Author's abstract.

D-215 Ellison, M. A. (Prof. Astronomy, Dublin Inst. for Advanced Studies), The sun and its influence: an introduction to the study of solar-terrestrial relations. 2d ed. rev. London, Routledge and Kegan Paul, 1959. 237 p. figs., tables, foot-refs., bibliog. p. 227-232. DWB (523.7 E47s). Review by C. W. Allen in Nature, London, 186(4718):69, April 2, 1960.--The first (1955) edition of this small book has been slightly revised and updated to include preliminary material on the subject of solar-terrestrial relations emanating from the IGY. The subjects treated in a readable manner are: solar radiation, solar activity, solar atmosphere, ionosphere, solar flares and their effects on the earth's atmosphere, effects on geomagnetism, the aurora, radio waves from the sun and, finally, cosmic rays. Appended are tables or theory for finding mass of the sun, radiation laws and sun temperature, Zürich sunspot numbers for 200 yrs, radio flux from sun and radio propagation in ionosphere and corona. Extensive references arranged by chapters are also appended. (Met. Abst. 11.9-6.)--M. R.

D-216 Elsasser, H., Die Szintillation der Sterne. (The twinkling of stars.) Die Naturwissenschaften, Berlin, 47(1):6-10, Jan. 15, 1960. 9 figs., table, 18 refs. DLC--General survey and discussion of the results obtained during the last years in the study of the twinkling of stars: methods of measurement and reduction; use of the secondary electron multiplier; no agreement concerning the determination of the magnitudes; brightness twinkling: good frequency spectra obtained until 0.1 Hz, but uncertain and disturbed below 0.1 Hz; dependence on the aperture of telescope, the zenith distance and the altitude above sea level from where observations are done. On the Jungfraujoch the deviation σ reaches only 55% of the σ measured at sea level. Interesting information on the directional twinkling as a function of zenith distance was obtained. Discussion of a correlation between brightness and directional twinkling and of Hosfeld's experiment; twinkling and wind speed: Mikesell's diagram, brightness changes for various frequencies and wind force. Correlation is sometimes possible. Discussion of the results obtained at the Boyden Station (March-Sept. 1956) with Danjon's visual method. Author takes into account the influence of the whole atmosphere. The deviation of the refractive index from the mean value reaches 10^{-8} while the temperature variations reach 10^{-2} degree. The lower layers of the atmosphere exert the strongest influence on the directional twinkling, whereas brightness is influenced by the part of the atmosphere comprised between 8 and 12 km. (Met. Abst. 11.8-55.)--A.V.

D-217 Erickson, W.C. (Convair Scientific Res. Lab., San Diego, Calif.), Observations of 26.3 Mc/s solar radio noise during Aug. 1959. Journal of Geophysical Research, Wash., D.C., 66(6):1773-1780, June 1961. 3 figs., 6 refs. DLC --Decameter wavelength observations of the solar noise storm during the latter portion of Aug. 1959 were obtained at this laboratory. These data displayed several characteristics not apparent in the observations at shorter wavelengths. First, we observed decameter wavelength emission before the meter wavelength emission was observed. Second, intense decameter wave emission ended on Aug. 25, whereas intense meter wavelength emission persisted until Sept. 3. Third, our observations indicate quite uniform emission. We did not observe the intense amplitude scintillations found by other observers. Our observations tend to confirm the identification of this disturbance as a type I noise storm. Even at decameter wavelengths, the emission region appeared to be of small angular diameter, and low in the corona. --Author's abstract.

D-218 Evans, John W. (Upper Air Res. Obs., Sunspot, N. Mex.), Solar influence on the earth. Smithsonian Institution, Wash., D.C., Annual Report, 1954, pub. 1955. p. 189-200. DWB, DLC--The author has given a broad general coverage of the entire field of solar-terrestrial-ionospheric-magnetic relationships in this James Arthur lecture given under the auspices of the Smithsonian Institution on May 27, 1954. Models and effects are described and illustrated by homely and sometimes humorous analogies. The different kinds of radiation reaching the earth from the quiet and disturbed sun are emphasized and their effects on ionosphere-atmosphere and radio touched upon. The purpose of the new Air Force Cambridge Research Center Observatory at Sunspot, N. Mex., on Sacramento Peak at 9000 ft is stated to be merely to learn more about the sun. (Met. Abst. 8.4-317.) --M. R.

D-219 Fan, C. Y.; Meyer, P. and Simpson, J. A. (all, Univ. Chicago), Preliminary results from the space probe Pioneer V. Journal of Geophysical Research, Wash., D.C., 65(6): 1862-1863, June 1960. 2 figs., 2 refs. DLC--Solar flare particles producing ionization in the polar atmosphere for many hours are not stored in the geomagnetic field. Evidence has been found for the solar production of energetic electrons by processes other than solar flares. Bremsstrahlung was measured in Pioneer V. (Met. Abst. 11.12-99.)--E. Z. S.

D-220 Faust, H., Importance of artificial satellites for meteorology. Universitas, Stuttgart, 2(1):93-94, 1958. DWB--Density, temperature, and composition of the rare atmosphere at 200-300 mi are among the important information that can be gained better from a satellite slowly spiraling toward the earth than from one entirely outside the earth's atmosphere. Incident and reflected radiation, UV and cosmic rays during solar eruptions, effect of ozone layer, and other data which will materially aid in short and even in long range weather forecasting will be provided by a series of satellites whose economic benefits will far outweigh the cost, high though this is. (Met. Abst. 10.7-91.)--M. R.

D-221 Feinstein, Joseph, Some stochastic problems in wave propagation, Pt. 1. Institute of Radio Engineers, Professional Group on Antennas and Propagation, Transactions, Vol. AP2(1):23-30, Jan. 1954. 5 refs., 43 eqs. DLC--The effect of random height variations associated with a conducting surface upon the characteristics of reflected wave energy is ascertained by the methods of physical optics. Average received power, its variance, angular and frequency power spectra, and the field correlation pattern are determined in terms of the statistical parameters of the surface. Volume type problems are treated by ascertaining the effect of refractive index fluctuations within a slab upon an emergent wave front, and then generalizing to a continuous medium. The results are applied to various problems encountered in tropospheric and ionospheric wave propagation. --Author's abstract.

D-222 Fensler, W.E.; Senior, T.B.A. and Siegel, K.M. (all, Michigan Univ.), Exploring the depth of the surface layer of the Moon from a radar space observatory. Aero/Space Engineering, N.Y., 18(11):38-41, Nov. 1959. 4 refs., 5 eqs. DLC--The method given here involves the determination of the power reflection coefficient at different wavelengths; this coefficient is a function of the number and depth of any layers present and of the electromagnetic constants associated with these layers. Using the mathematical formula for the reflection coefficient of a layered structure, these quantities can be calculated from measured values of the power return at different wavelengths. It is suggested that this experiment be carried out by placing a radar-equipped satellite in orbit around the Moon; data on the power reflection coefficient could be telemetered back to earth for analysis. The feasibility of the whole system is discussed. (Met. Abst. 11.12-180.)--Authors' abstract.

D-223 Ferraro, V.C.A., Geophysical aspects of solar flares. Nature, London, 175(4449):242-244, Feb. 5, 1955. DWB--Summary of Geophysical Discussion at Royal Astronomical Society on Nov. 26, 1954. H.W. NEWTON described effects of solar electromagnetic and particle radiation. J.S. HEY described distribution of solar flares across disc with associated radio bursts on 4.1 m. M.A. ELLISON dealt with the flash of UV radiation generated by a flare and sudden ionosphere disturbances. He attributed crochet currents to increased conductivity and an independent current system at base of D layer, about 60-70 km. K. WEEKES discussed distribution of extra ionization during a solar flare, finding the greater part in 95-100 km with independent ionization near 70 km. H. ELLIOTT discussed increases of cosmic rays during intense solar flares. (Met. Abst. 6.7-27.)

D-224 Fetner, E.M. (RCA), Shock-layer attenuation data collected from missile tests at the Atlantic missile range. Planetary and Space Science, N.Y., 6:225, June 1961. Abstract only. The paper was presented at the Plasma Sheat Symposium, Boston, Mass., Dec. 7-9, 1959. --The problem of propagating electromagnetic energy through shock layer ionization has been a concern of theorists for the past several years. Theory on the subject has been fairly well explored. Also, some experimental data have come from laboratory shock tube tests. However, not until recently has this re-entry phenomenon been actually observed.

During the past year data at telemetry and S-band frequencies from several IRBM and ICBM tests have been collected. Samples of these data and other related information, such as velocity and altitude, are presented.

D-225 Fleming, John Adam (ed.), Terrestrial magnetism and electricity. Contributors, J. Bartels and others. (Reprinted with corrections.) N.Y., Dover Publications, (1949). numerous figs., tables, eqs. (Physics of the Earth, v. 8). DLC--An excellent reference work on all aspects of the subject. It contains 12 chapters written by experts in the field, and a comprehensive bibliography of 1523 refs. in ch. 13. Three chapters particularly applicable to this bibliography are: ch. 9, Berkner, L.V., Radio exploration of the earth's outer atmosphere (p. 439-491). Ch. 10, Hulburt, E.O., The upper atmosphere (p. 492-572). Ch. 13, Harradon, Harry Durward, Bibliographic notes and selected references (p. 679-778). Section D of the bibliography (p. 749-758) contains 183 references to works on the ionosphere. The bulk of the material was published in the 1920's and 1930's. (Met. Abst. 6D-30.)--M.L.R.

D-226 Fokker, A.D.; de Munck, J.C. and de Feiter, L.D. (all, Netherlands Postal and Telecommunications Services, The Hague), Eclipse observations of solar radio-frequency radiation on 200, 545, 3000, and 9100 Mc/s. (In: Solar eclipses and the ionosphere: a symposium... ed. by W.J.G. Beynon and G.M. Brown. London, Pergamon, 1956. p. 272-274. fig.) DWB--A brief summary is presented of solar radio noise observations on four frequencies during the eclipse of June 30, 1954. In the case of the frequencies 545 and 200 Mc/s, the duration of the radio eclipse exceeded that of the optical eclipses by about 10 and 13 min., respectively. For the higher frequencies the durations of the radio and optical eclipses are approximately equal. In most cases, maximum phase of the radio eclipse occurred some minutes later than that of the visual eclipse. (Met. Abst. 9A-162.)--Authors' abstract.

D-227 Fokker, A.D., Een zeldzaam radiofenomeen op de zon. (An unusual solar radio phenomenon.) Hemel en Dampkring, The Hague, 56(6):115-116, June 1958. fig. DWB, DLC--On Nov. 4, 1957, an unusual solar burst was observed at Nederhorst den Berg (Netherlands) at 8.48 U.T. The solar radio noise on 200 M Hz increased strongly: after 40 minutes the intensity was 1000 times higher than normal and it continued to increase for 5 hours. No "Dellinger effect" was noted and the increasing radio radiation presented very characteristic intensity oscillations. From the recordings on 4 - 11 - 57, it was stated that the intensity fluctuations had a completely different character than usually recorded from the sun. The author gives a photo of the recording. --A. V.

D-228 Fokker, A. D., Ruis-actieve gebieden op de zon. (Regions of noise activity on the sun.) Hemel en Dampkring, The Hague, 57(6):139-151, June 1959. 12 figs. DWB, DLC--The radio emission on meter wave lengths, with irregularly varying intensity is discussed. The article is greatly based on the radio astronomy observations carried out during recent years at the P.T.T. radio receiving station NERA at Nederhorst den Berg (Netherlands). A description is given of the interferometer used, receiving on 1.18 m wave length. A study is made of the effect of sunspots on radio storms; the measurement of the polarization of radio emission (linear or elliptic) and the role of magnetic fields in the corona on the circular polarized radio emission. Figures are presented of recordings of radio emission and of clockwise, counterclockwise, and mixed polarization with the corresponding interferometer positions. (Met. Abst. 11.8-79.)--A. V.

D-229 Forbush, S. E. and Burke, B. F. (both, Dept. of Terrestrial Magnetism, Carnegie Institution of Washington), Absorption of cosmic radio noise at 22.2 Mc/sec following solar flare of Feb. 23, 1956. Journal of Geophysical Research, Wash., D.C., 61(3):573-575, Sept. 1956. fig., 2 footrefs. DLC--A phase switching interferometer measured the absorption at 22.2 Mc/s from the radio source Virga A. The intensity on Feb. 23, 1956 at 0430 GMT was less than 0.1 the intensity on Feb. 22, 1956. Cosmic ray intensity showed similar effects. The measurements were made near Washington, D.C. Comparison with other type of measurements suggests the absorbing material for 22.2 Mc/s was above the F2 layer and may have been in the form of a localized cloud. (Met. Abst. 12.6-172.)--

D-230 Forsyth, P. A. and Paulson, K. V. (both, Univ. of Saskatchewan, Saskatoon, Sask.), Radio star scintillations and the auroral zone. Canadian Journal of Physics, Ottawa, 39(4):502-509, April 1961. 4 figs., 13 refs. DWB, DLC--A continuous series of observations of scintillations of the radio star, Cassiopeia A, carried out at Saskatoon at a frequency near 53 Mc/s over a period of nearly 4 yrs has been analyzed. The altitude angle dependence of the scintillations was very strong in 1955 but weak in 1958. This behavior suggests that the scintillations are not produced in a uniform layer of the atmosphere. It seems more likely that the scintillations arise most strongly in regions of the atmosphere closely associated with the auroral zone and that these regions migrate southward during years of intense sunspot activity.

D-231 Fricker, S.J.; Ingalls, R.P.; Mason, W.C. et al., Computation and measurement of the fading rate of moon reflected UHF signals. U.S. National Bureau of Standards, Journal of Research, Sec. D, 64(5):455-465, Sept./Oct. 1960. 11 figs., table, 8 refs., 41 eqs. DWB, DLC--A method is described for predicting the fast fading rate of moon reflected signals. It is based entirely upon considerations of the observer-moon positions and relative motions. Experimental results which are in good agreement with the computed fading rates have been obtained from a moon-reflection experiment at a frequency of 412 Mc/s. Some possible implications of this method of interpreting fading rates are given. (Met. Abst. 11L-124.)--Authors' abstract.

D-232 Friedman, H. and Chubb, T.A., Solar X-ray emission and the height of the D layer during radio fade-out. (In: Physical Society of London, Physics of the ionosphere. London, 1955. p. 58-62.) table, 14 refs. DWB (M10.535 C748)--Rocket measurements show that Lyman alpha radiation of hydrogen is the major source of ionization in normal D layer and that solar X-rays contribute to the uppermost portions. Evidence exists that X-rays as short as 1-2 Å, together with enhanced Lyman alpha radiation, are generated during a solar flare. The largest flares are accompanied by sudden phase anomalies which indicate a lowering of the reflecting ceiling for long waves by as much as 15 km. To produce the necessary ionization at the lower levels, L α intensity would need to increase by 10^4 during the flare, reaching a peak value of 10^3 erg cm^{-2} sec^{-1}. An X-ray flux of only 10^{-5} erg cm^{-2} sec^{-1} would form the required reflecting layer at 60 km. (Met. Abst. 12.1-116.)--Authors' abstract.

D-233 Frihagen, J. and Trøim, J. (both, Norwegian Defence Res. Estab.), Scintillations of the 20 Mc/s signal from the earth satellite 1958 δ II. Journal of Atmospheric and Terrestrial Physics, London, 18(1):75-78, April 1960. 3 figs. DLC--This note gives some preliminary results which have been obtained at Kjeller, 60° N 11° E, in connection with a study of scintillations of the signals from the earth satellite 1958 δ II. It is well known that studies of the movements and structure of the diffraction pattern formed over the ground by radio signals either reflected from or transmitted through the ionosphere, may give information about the structure and movements of the irregularities of the electron density in the ionospheric layers. However, when use is made of the signals transmitted from a satellite like 1958 δ II, which itself moves with a velocity far greater than the velocity of the ionospheric irregularities, an amplitude pattern is produced over the ground which moves with a velocity determined by: (i) the velocity of the satellite and (ii) the height of the irregularities producing the scintillations as compared with the height of the satellite. It would, therefore, seem possible to obtain information on the height of the irregularities from observations of scintillations of satellite signals. The discussion in this note is divided between the scintillations which are produced in the F region and those which are produced in the E region. Only 20 Mc/s recordings have so far been made. (Met. Abst. 11.12-367.)--Authors' introduction.

D-234 Fuster, Arsenio, Influencia planetaria en la percepción de la radiación. (Planetary influence in the perception of radiation.) Las Ciencias, Madrid, 19(4):834-840, Oct./ Dec. 1954. 5 figs. DLC--An attempt to determine roughly the effect of the incidence of sunspots, eclipses, planetary configurations, etc., on ionospheric or radio propagation phenomena, based on 1946, 1947, and 1948 data, and to explain effects with aid of schematic diagrams. (Met. Abst. 6.8-144.)--M. R.

D-235 Gallet, Roger M. (Nat'l. Bur. Standards, Boulder, Colo.), Aerodynamical mechanisms producing electronic density fluctuations in turbulent ionized layers. Institute of Radio Engineers, N. Y., Proceedings, 43(10):1240-1252, Oct. 1955. 8 figs., table, 7 foot-refs., bibliog. p. 1252, numerous eqs. DLC--Various radio effects of the turbulence in the low ionosphere are discussed with a view toward determining the order of magnitude of the turbulence parameters in this region. These effects include vhf scattering, sporadic E layer phenomena, and diffraction patterns in reflection. The required electron density fluctuations $(\Delta N \quad N)^2$ fluctuate around 10^{-4} and the scale of the turbulence l is roughly 100 to 200 m. The latter quantity measured directly in the troposphere is of about the same order of magnitude. The underlying purpose of the paper is to study the aerodynamical mechanisms of turbulence. Pressure fluctuations result from the "collisions and extensions between turbulent eddies" in a uniform gas, or from vertical transport in the atmosphere with its varying pressure. It is shown that such pressure fluctuations are too small, by a factor of about 10^{-4}, to produce the observed density fluctuations. However, the vertical transport mechanism produces two other effects which are independent of the energy of the turbulence and are of the right order of intensity. First, in a nonadiabatic atmosphere the vertical transport of air masses produces fluctuations of temperature. These, in turn, give rise to air density fluctuations, and proportional electron density fluctuations. Second, fluctuations of electron density result directly from transport in the presence of a gradient of electron density. These two effects, for the same uniform turbulence, occur at different levels in an ionospheric layer. They are sufficient to explain the stratification properties of sporadic E. An expression for the scale of turbulence is obtained from the gradients of winds circulating in the low ionosphere. Hence, the properties of sporadic E phenomena should be interpreted in terms of meteorological factors (winds, synoptic masses of air, fronts, etc.). It is pointed out that the same transport mechanisms are acting in the troposphere, the gradients of water vapor content playing the role of the gradients of electron density. (Met. Abst. 7.8-262.)--Author's abstract.

D-236 Gallet, R. M., The very low frequency emissions generated in the earth's exosphere. Institute of Radio Engineers, N.Y., Proceedings, 47(2):211-231, Feb. 1959. 15 figs., 2 tables, 13 refs., 14 eqs. DLC--Naturally occurring, very low frequency signals not associated with lightning discharges, and strongly correlated with solar activity, have been recognized nearly as long as the atmospheric whistlers which have their genesis in lightning discharges. Whereas whistlers have been satisfactorily explained, until recently these other phenomena have not. From the examination of a large quantity of high resolution spectrograms, it has been deduced that a major fraction, if not all, of the other "noises" are excited in the exosphere by streams and bunches of high speed ionized particles precipitating into the ionized atmosphere in the presence of the earth's magnetic field. The electromagnetic waves excited are then propagated in the manner of whistlers. The excitation mechanism is similar to the operation of a travelling wave tube. Two frequencies are simultaneously generated, and are given by:

$$\omega = \frac{\omega H}{2}\left[1 \pm \left\{1 \pm \left(\frac{\omega p}{\omega H}\ \frac{V}{c}\right)^2\right\}^{\frac{1}{2}}\right].$$

Their values depend only on the three parameters: local electronic density in the exosphere, local magnetic field intensity, and particle velocity V. For a large range of conditions, corresponding to middle latitude observations, the low frequency explains many types of noise, and reduces to $W_1 = \left(\frac{V}{C}\right)^2 \quad \frac{WP^2}{WH}$. Most of the observations require particle velocities of the order of 10,000 km/sec. The shape of the spectrum is also very sensitive to the ambient electronic density distribution. A model in which the ratio of electron density to magnetic field strength is almost constant, along a line force in most of the exosphere, seems indicated by several types of noise. Such a model satisfies also the whistler data. The problem of the production of bunches and streams or particles is briefly discussed. (Met. Abst. 11.10-221.)--Author's abstract.

D-237 Gallet, R.M. and Helliwell, R.A., Origin of "very-low-frequency emissions." U.S. National Bureau of Standards, Journal of Research, Sec. D, 63(1):21-27, July/Aug. 1959. 4 figs., 2 tables, 14 refs., 9 eqs. DLC, DWB--Selective traveling wave amplification in the outer ionosphere is postulated to explain very-low-frequency emissions, a class of very low frequency (1 to 30 kc/s) natural noise. By analogy with the mechanism of traveling wave tubes, low level ambient noise in the outer ionosphere is amplified in streams of incoming ionized solar particles at frequencies for which the stream and wave velocities are equal. Required velocities are in the range 0.01 to 0.1 c (where c is the velocity of light). Streams with densities of the order of one electron per cubic centimeter would provide sufficient energy. Phenomena which can be explained qualitatively by the theory are the hiss, quasi-constant tones, dawn chorus and related transients, and very long trains of whistler echoes. A quantitative example shows how the theory can reproduce the general form of certain characteristic discrete spectra "hooks" of emissions, and how this leads to definite values of particle velocity and a law for the distribution of electron density in the outer ionosphere. (Met. Abst. 11F-45.)--Authors' abstract.

D-238 Gallet, R.M. and Utlaut, W.F. (both, Nat'l. Bur. of Standards, Boulder, Colo.), Evidence on the laminar nature of the exosphere by means of guided high frequency wave propagation. Physical Review Letters, N.Y., 6(11):591-594, June 1, 1961. fig., table, 16 refs. DLC--Results of a series of experiments are reported concerning the laminar structure of the exosphere for testing the existence and properties of the sheets at large distances, with the suggestion to use this method for the determination of the permanent ring current, observed in Explorer VI and Pioneer V measurements. Experiments were conducted from late April to June 1960 to observe the signal propagation and backscattering from the ground at the point in the other hemisphere which is the magnetic conjugate of the transmitter. Table shows the summary of one set of data. (Met. Abst. unpub.)--E. K.

D-239 Garriott, Owen K. (Stanford Univ.), The determination of ionospheric electron content and distribution from satellite observations, Pt. I, Theory of the analysis. Journal of Geophysical Research, Wash., D.C., 65(4):1139-1150, April 1960. 9 figs., 11 refs., 31 eqs. Pt. 2, Results of the analysis. Ibid. p. 1151-1157. 7 figs., 9 refs., 10 eqs. DLC. Also issued in International Geophysical Year 1957/1958. IGY World Data Center A (for) Rockets and Satellites (National Academy of Sciences, Wash., D.C.), IGY Satellite Report Series, No. 10, Jan. 1960. 65 p. 23 figs., 21 refs., 58 eqs. DWB (621.1388 161sa)--The results of observations of the radio transmissions from Sputnik III (1958 δ 2) in an 8 month period, are presented. The measurements of integrated electron density are made in two ways, described in part 1. The measurements reveal the diurnal variation of the total ionospheric electron content; also the ratio of the total content to the content of the lower ionosphere below the height of maximum density in the F layer is obtained. An estimate of the average electron density profile above the F layer peak is made possible by the slow variation in the height of the satellite due to rotation of the perigee position. The gross effects of large magnetic storms on the electron content and distributions are found. (Met. Abst. 11.12-368.)--Author's abstract.

D-240 Garriott, O. K. and Little, C. G. (Nat'l. Bur. of Standards, Boulder, Colo.), The use of geostationary satellites for the study of ionospheric electron content and ionospheric radio wave propagation. Journal of Geophysical Research, Wash., D.C., 65(7):2025-2027, July 1960. 9 refs. DLC--This paper describes a proposed radio propagation experiment utilizing a geostationary satellite. The experimental methods for determining the total electron content of the ionosphere are discussed, and the advantages and capabilities of the methods are summarized. Other possible studies utilizing the satellite transmissions are also outlined. (Met. Abst. 11.12-369.)--Authors' abstract.

D-241 Gates, David M., Preliminary results of the National Bureau of Standards radio and ionospheric observations during the International Geophysical Year. U.S. National Bureau of Standards, Journal of Research, Sec. D, 63(1): 1-14, July/Aug. 1959. 11 figs., 2 tables, 18 refs. Also shorter version issued as NBS radio, ionosphere, and airglow observations during IGY, in American Geophysical Union, Transactions, 40(4):391-401, Dec. 1959. 8 figs. DLC, DWB--A review is given of the activities of the National Bureau of Standards during the IGY. The equipment used on each project is described and preliminary results of the observations are given. The following areas of research are discussed: (1) World Warning Agency, (2) Ionospheric Vertical Sounding Stations, (3) VHF Propagation, (4) VHF Equatorial Forward Scatter, (5) Radio Noise Network, (6) Radio Satellite Observations, (7) Airglow Observations, and (8) World Data Center for Airglow and Ionosphere. (Met. Abst. 11E-53.)--Author's abstract.

D-242 Gendrin, Roger, Generation de bruits très basse fréquence dans l'exosphère par effet Čerenkov. (Very low frequency noise generated in the exosphere by Čerenkov effect.) Académie des Sciences, Paris, Comptes Rendus, 251(10):1122-1123, Sept. 5, 1960. fig., 6 refs. DWB, DLC--The path travelled by the energy of a very low frequency wave can be directed along the magnetic field Ho; either when the normal to the wave is directed itself along Ho, or when the angle 0 agrees with the relation Cos 0 = 2 x where 0 is the angle to the magnetic field of the normal on the wave, and x the variable denoting the frequency of the electromagnetic wave. The Cerenkov effect, caused by relatively slow particles (10, 000 km/s) from solar origin, is capable of emitting selectively each frequency under the angle 0 complying with the relation Cos 0 = 2 x. The total energy propagates then in the second mode. At the same time the particle emits all the frequencies. Those propagating at the same speed and following the same path cause a noise of mostly constant amplitude in a large frequency band as long as the interaction between the particles and the exosphere continues. --A. V.

D-243 Gerson, Nathaniel C. (Geophysical Res. Dir., Cambr., Mass.), A note on the conference on ionospheric physics. U.S. Air Force. Cambridge Research Center, Geophysics Research Papers, No. 11:13-14, 1952. DWB--The author, in his introductory remarks to the conference reports, brings out the fact that physicists have neglected many important fields of research, such as were represented in this conference (physics of the high atmosphere and study of planetary atmosphere) while concentrating on nuclear and cosmic ray research. The atmosphere is considered as comprising several shells; the ionosphere (80-400 km), the mesosphere (400-1000 km) and the exosphere (above 1000 km). Specific problems which are being solved are: dissociation and recombination processes, correlation of solar and ionospheric phenomena, improvement of spectroscopic methods and microwave observational techniques. (Met. Abst. 4.10-107.)--M. R.

D-244 Gerson, N. C. (Arctic Comm. U.S. Nat'l. Comm. IGY), Periodicities in solar radio noise emission. Australian Journal of Physics, Melbourne, 12(3):299-300, Sept. 1959. fig., table, 4 refs. DLC--A note indicating the presence of sweeper trains in the work of ROBERTS (1958) in which he described solar radio wave emissions in the range 40-80 Mc/s. In a reproduction of his Figure I the elements of several sweeper trains (A-E) are indicated. Periods of the trains are tabulated. (Met. Abst. 11.12-51.)--I. S.

D-245 Gerson, N. C. (Arctic Committee, USNC for IGY) and Gossard, W. H. (U.S. Dept. of Defence), Sweepers. Journal of Atmospheric and Terrestrial Physics, London, 17(1/2):82-85, Dec. 1959. 2 figs., table, eq. Comment by J. M. Watts, Ibid., 18(1):81, April 1960. DWB, DLC--In studying whistlers recorded at Palo Alto, Calif. it was found that most atmospherics in the hf band sweep through a finite frequency interval from high to low frequencies although some run from low to high frequencies. The source is possibly the sun (solar bursts of type II or type III). Those at night may be trapped in ionosphere. These have been named "sweepers." Various types of sweeper activity are shown graphically, covering most of the frequency spectrum from 2 to 30 Mc/s and possibly at lower or higher frequency. These types are normal or decreasing frequency, reverse (increasing frequency); fast (change $\gg 500$ kc/s^2), slow (< 25 kc/s^2) and irregular. Those observed on mornings of Nov. 11-14, 1958 and March 13, 1959 are shown graphically. Peak occurrence is at 24.0 Mc/s and majority from 23-265 Mc/s. Many sweepers occur in trains with intervals between 4 to 140 sec. A diurnal variation was found in rate of occurrence and distribution of sweepers by frequency. At the lowest frequencies sweepers may be identified with whistlers. (Met. Abst. 11.12-332.)--M. R.

D-246 Ghose, A.K.; Roy, K.M.; Gupta, S.K. et al., On radio measurements at Jabalpur during the solar eclipse of June 30, 1954. Institution of Telecommunication Engineers, New Delhi, Journal, 1(1):20-26, March 1955. 5 figs., 4 refs. DBS--Observations were made from June 27-July 1, 1954 (5 days) at Jabalpur, India, on: 1) field strength of Moscow Radio (20 m); 2) angle of incidence of reflected wave of Moscow Radio; and 3) intensity of atmospheric noise at 0.6 mc/s from direction of belt of totality. Observations on other than eclipse dates are used as control. Path to Moscow was 5000 km. Shadow belt lay between 2 points. Records show increase in field strength (rapid at time of eclipse, reaching 2nd point of reflection) then sudden drop, then sudden rise accompanied by severe fading. Unstable F2 conditions are due to rapid succession of events at time of eclipse. Double hop transmission changed to single hop and vice versa between 1827 and 1927 of I.S.T. Noise level was higher than normal and angle of reflected ray varied more on eclipse day than normal. (Met. Abst. 7.7-250.)--M.R.

D-247 Gibson, John E., Lunar thermal radiation at 35 KMC. Institute of Radio Engineers, N.Y., Proceedings, 46(1):280-286, Jan. 1958. 9 figs., 12 refs., eqs. DLC--Measurements of the thermal radiation of the moon were made at a frequency near 35 kmc to investigate further the variation of the radio wavelength brightness temperature with lunar phase first observed by Piddington and Minnett at 24 Kmc. Comparison of the results with calculations by Jaeger suggests the lunar surface is composed of a layer of fine dust of very low thermal conductivity, the average depth of which is estimated as one inch or more. (Met. Abst. unpub.)--Author's abstract.

D-248 Ginzburg, V.L., O vliianii mezhduelektronnykh soudarenii na pogloshchenie radiovoln v F-sloe i v solnechnoi korone. (The influence of collision among electrons on absorption of radiowaves in F layer and in the solar corona.) Zhurnal Tekhnicheskoi Fiziki, Moscow, 21(8):943-947, Aug. 1951. 10 refs., 9 eqs. DLC--Using the previous results obtained by himself and other authors, the author derives a formula for the calculation of the frequency of the impacts between electrons and molecules. The use of this formula, however, requires the knowledge of the temperature of the ionized layer, or other corresponding data, which must be obtained independently of the measurement of the absorption of the radio waves. In principle, as the author shows, the measurements of this absorption might be sufficient to determine the frequency of electron-electron impacts, but this could hardly be applied in actual practice, because the electron-electron impacts would have but very little influence upon the absorption in comparison with the electron-molecule impacts, unless the wavelength is very much larger than 200 m, and this does not seem to be of practical interest. The author suggests, however, that means for the measurements necessary for the calculation of the frequency of electron-molecule impacts in the ionized layers could be devised. (Met. Abst. 6D-65.)--Physics Abstracts, No. 338, 1953.

D-249 Giordmaine, J. A. and Alsop, L. E. (both, Dept. Physics, Columbia Univ.); Mayer, C. H. (U. S. Naval Res. Lab., Wash., D. C.) and Townes, C. H. (Dept. Physics, Col. Univ.), A maser amplifier for radio astronomy at X-band. Institute of Radio Engineers, N. Y., Proceedings, 47(6):1062-1069, June 1959. 8 figs., 3 tables, 19 refs., 23 eqs. DWB--The design and operating characteristics of a maser radiometer for use in radio astronomy at 3 cm wavelength are discussed. The operating system which is described, has a band width of 5.5 Mc and an input noise temperature, including background radiation into the antenna, of about 85°K. An rms fluctuation level of about 0.04°K is attained using an averaging time of 5 sec. A discussion of the factors determining the sensitivity of such devices is presented. (Met. Abst. 11.9-106.)--Authors' abstract.

D-250 Gledhill, J. A., The behavior of the ionosphere over Cape Town and Johannesburg during the annular solar eclipse of Dec. 25, 1954. Journal of Atmospheric and Terrestrial Physics, N. Y., 16(3/4):367-375, Nov. 1959. 7 figs., table, 11 refs. DWB, DLC--Data are presented showing the variation of the critical frequencies for the ordinary ray in the E, F1, and F2 regions at Cape Town and Johannesburg during the eclipse of Dec. 25, 1954. The maximum obscuration was 79% at Cape Town and 68% at Johannesburg. It was not possible to deduce a solar model which would account satisfactorily for the data from both stations and those from Grahamstown, published earlier. Reasons are given for believing that oblique reflections affected the records and it is pointed out that the plot of foE vs. foF1, used by MINNIS to justify neglect of the reflections, is in fact not linear throughout an eclipse. There is some evidence for a high value of the recombination coefficient, 4×10^{-8} cm^3/sec, in the E layer. (Met. Abst. 11D-41.)--Author's abstract.

D-251 Gledhill, J. A. (Dept. of Physics, Rhodes Univ., Grahamstown, So. Africa), The effects of a solar eclipse on a stratified ionosphere. Journal of Atmospheric and Terrestrial Physics, N. Y., 16(3/4):360-366, Nov. 1959. 3 figs., table, 7 refs. DWB, DLC--The effects of an eclipse on a simple three layer ionosphere, in which the recombination coefficient decreases with height, have been computed. The results are displayed in the form of a contour map and show relatively large tilts of the iso-electronic surfaces near the layer maxima. The development of a "valley" between the F1 and F2 layers after the maximum of the eclipse is of particular interest. It is pointed out that such a valley may cause considerable errors in the interpretation of the behavior of the F2 layer. (Met. Abst. 11D-40.)--Author's abstract.

D-252 Golay, M. J. E. (The Perkin-Elmer Corp., Norwalk, Conn.), Note on the probable character of intelligent radio signals from other planetary systems. Institute of Radio Engineers, N. Y., Proceedings, 49(5):959, May 1961. ref., eq. DLC --Detection of radio signals intelligently transmitted from other planets and aimed at the earth is now subject to serious experimental investigations. Since the use of the 1421 Mc line of hydrogen appears feasible for interplanetary radio communication, a method is outlined by which the hypothetical space signals can be checked whether or not they are coherent. (Met. Abst. unpub.)--W. N.

D-253 Gold, Thomas (Harvard College Obs.), Energetic particle fluxes in the solar system and near the earth. Astrophysical Journal, Suppl. Ser., Chicago, 4(44):406-416, June 1960. 5 figs., 9 refs. DLC--Two modes of propagation of high energy particles can move quickly along all the orbits that are accessible to them in the existing field. Another and much slower mode of propagation; in which the cosmic ray particles gain access to new regions of space only at the speed at which magnetic fields are convected around by the motion of ordinary gas masses. A figure illustrates suggested shapes of magnetic field lines resulting from a chromospheric outburst. Curves show the large decrease of signal strength in high latitude ionospheric scatter and cosmic noise receiver during the event of Feb. 23, 1956. A set of curves shows ionospheric scatter records, showing the occurrence of a flare of importance 3+ and a sudden commencement of a magnetic storm nearly coincident with a Forbush decrease, as well as the enhanced ionospheric absorption. The Van Allen flux as recorded in Pioneer III with a Geiger counter is shown. (Met. Abst. 11.12-230.)--E. Z. S.

D-254 Goldstein, Samuel J., Jr. (Harvard College Obs.), The angular size of short lived solar radio disturbances. Astrophysical Journal, Chicago, 130(2):393-399, Sept. 1959. 4 figs., 2 tables, 7 refs., 3 eqs. DWB, DLC--A wide band two-element adding interferometer which accepts simultaneously the radiation in the range 105-140 Mc/s was used to observe short lived solar disturbances. The angular size of type I bursts was found to be less than 1.6 min of arc. The average angular size of type III bursts in three clusters was 3.2 min, and for four other clusters an average lower limit of 3.3 min was obtained. The theory of these measurements is explained. (Met. Abst. 11.9-111.)--Author's abstract.

D-255 Gonze, R. and Pourbaix, E., Altitudes de radiation. (Radiation heights.) Ciel et Terre, Brussels, 76(11/12): 394-402, Nov./Dec. 1960. 6 figs., 9 refs. DWB, DLC--Statement of a new method, still in progress, which permits to establish the radiation heights in the solar atmosphere for the various radio frequencies, according to geomagnetic observations made at Manhay and to observations on 600 and 153 MHz made at Humain and on 27 KHz at Uccle. All the results are in fair agreement and it seems admissible that, in the instance of quiet or little disturbed solar conditions, the difference of radiation height in connection with electron density is relatively constant. Certain radioelectric recordings enabled the determination of apparent variation of the radiation height difference during the development of an important solar flare. Finally, the close parallelism is pointed out between the apparent variation of the radiation height difference and the development of radioelectric surges, as well during the time when these latter are increasing as when they are decreasing. (Met. Abst. unpub.)--A.V.

D-256 Goodman, J. and Lebenbaum, M., A dynamic spectrum analyzer for solar studies. Institute of Radio Engineers, N.Y., Proceedings, 46(1):132-135, Jan. 1958. 4 figs., 6 refs. DLC--A spectrum analyzer of the type originally built by Wild and Sheridan is described. The analyzer covers the range of 90 Mc to 580 Mc at a rate of 3 sweeps per second in three overlapping bands. The output information is presented on three high resolution oscilloscopes in a frequency intensity display, and the time axis is provided by the continuous motion of the film used to photograph the displays. Modifications and improvements are suggested. (Met. Abst. unpub.)--Authors' abstract.

D-257 Gopal Rao, M.S.V. and Rao, B. Ramachandra (both, Andhra Univ., Waltair), Effect of solar eclipse of June 20 1955 on long distance shortwave transmissions. Current Science, Bangalore, 24(12):408, Dec. 1955. fig., 3 refs. DLC--Signal strength data as obtained between 0700 and 1000 hr and during night on 9.52 Mc/sec at Waltair (lat. $17^{\circ}41'$) by a Hallicrafters type 5x-42 receiver show some peculiarities when the records before, during and after the eclipse were compared. Insignificant influence of the D region absorption on signal strength is shown and sudden fading during eclipse is discussed briefly. (Met. Abst. 8.1-356.)--W.N.

D-258 Gopal Rao, M.S.V.; Rao, B. Ramachandra and Ramachandra Rao Pant, P. (all, Andhra Univ., Waltair, S. India), Fading of C.W. signals as a means of spread F study. Current Science, Bangalore, 29(8):304-305, Aug. 1960. fig., table, 6 refs. DWB, DLC--In recent years considerable evidence has been accumulated to show that ionospheric irregularities are the cause of radio star scintillations. The irregularities can be used to study spread F irregularities. An experiment is described when C.W. signals from Colombo radio station in Ceylon were recorded by Hollicrafters receiver type in combination with a conventional D.C. amplifier. During the months of Jan. and Feb. 1959, 100 C.W. records were taken. All these records show an increase in fading rate whenever spread F is observed. (Met. Abst. unpub.)--A.H.K.

D-259 Gordon, W.E., Incoherent scattering of radio waves by free electrons with applications to space exploration by radar. Institute of Radio Engineers, N.Y., Proceedings, 46(11):1824-1829, Nov. 1958. fig., 6 refs., 13 eqs. DWB--Free electrons in an ionized medium scatter radio waves weakly. Under certain conditions only incoherent scattering exists. A powerful radar can detect the incoherent backscatter from the free electrons in and above the earth's ionosphere. The received signal is spread in frequency by the Doppler shifts associated with the thermal motion of the electrons. On the basis of incoherent backscatter by free electrons, a powerful radar, but one whose components are presently within the state of the art, is capable of: 1) measuring electron density and electron temperatures as a function of height and time at all levels in the earth's ionosphere and to heights of one or more earth's radii; 2) measuring auroral ionization; 3) detecting transient streams of charged particles coming from outer space; and 4) exploring the existence of a ring current. The instrument is capable of 1) obtaining radar echoes from the sun, Venus, and Mars and possibly from

Jupiter and Mercury; and 2) receiving from certain parts of remote space hitherto undetected sources of radiation at meter wavelengths. (Met. Abst. 11. 2-169.)--Author's abstract.

D-260 Graham Smith, F. (Mullard Radio Astronomy Obs., Cambridge), The spectrum of galactic radio emission. Nature, London, 191(4796):1381, Sept. 30, 1961. 4 refs. DWB, DLC--TUNMER and HOYLE have accounted for the general radio emission from the Galaxy as the synchroton radiation of high energy electrons in a magnetic field. In this note it is shown that the expected energy spectrum of the cosmic ray electrons is not consistent with the observed radio spectral index. (Met. Abst. unpub.)--R. B.

D-261 Grant, Lewis J., Jr., A suggested design project on an orbit rocket. Journal of Space Flight, 3(1):1-5, Jan. 1951. 2 refs. DLC--A suggestion and an outline for planning an "orbiter" for the purpose of obtaining necessary information and data to make possible the establishment of a space ship. Meteorological data that may be obtained by instruments aboard the "orbiter" are: variability of the solar constant, air density, albedo of earth, and cloud pattern over a long period of time (from 500 miles up); auroras, power, size and ionization potentials of cosmic rays, long period recording of meteor hits (and the orbiter itself), temperature drop in the earth's shadow, and conditions of radio reception on the "orbiter." (Met. Abst. 4. 4-48.)--W. N.

D-262 Graves, Carl D. (Space Technology Labs., Inc., L. A., Calif.), Radio propagation measurements using the Explorer VI satellite. (Summary only). Journal of Geophysical Research, Wash., D. C., 65(9):2585-2587, Sept. 1960. 4 refs., 6 eqs. DLC--This paper presents the results of an experiment to measure the electron density above the ionosphere. The experiment utilized two coherent signals, one VHF and one UHF, transmitted from the Explorer VI satellite. The evidence of our data is that the electron concentration in the vicinity of the satellite, 18, 000 km above the earth, was unusually high, of the order of 10^4 electrons/cm^3. However, the results were influenced by unexpectedly high correction factors and possibly by an intense world-wide magnetic storm that occurred during the measurement period. (Met. Abst. 11. 12-370.)--Author's abstract.

D-263 Gringauz, K.I.; Kurt, V.G.; Moroz, V.I. et al. (all, Radio Eng. Inst. Acad. Scien., USSR), Resul'taty nabliudeniĭ poluchennye pri pomoshchi lovusbek zariazhennykh chastits na sovetskikh kosmicheskikh raketakh do R = 100,000 km. (Results of observations of charged particles observed out to R = 100,000 km, with the aid of charged particle traps on Soviet space rockets.) Astronomicheskiĭ Zhurnal, Moscow, 37(4):716-735, July/Aug. 1960. 11 figs., 3 tables, 26 refs., 11 eqs. English summary p. 716. DLC. Transl. in Soviet Astronomy AJ, New York, 4(4):680-695, Jan./Feb. 1961. DLC--Results of the reduction measurements made with the aid of trielectrode ion traps mounted in the Soviet space ships launched on Jan. 2 and Sept. 12, 1959, are presented. Rocket trajectories out to R < 100,000 km were studied. The potential of the container, which was immersed in a hydrogen plasma and subject to the action of electrons present in the radiation belts and to short wavelength radiation of solar origin, is discussed. Values for the container potential, computed with different values assigned to temperature, plasma concentration, and density of photo-current at the container surface, are tabulated. The plasma density was estimated with the ion trap outer grid at zero potential. The motion of the container and the effect of radiation belt electrons on collector currents were calculated. Since all of the ion traps were insensitive to the radiation belt environment (as shown by the absence of sizeable negative currents in all of the traps), it is concluded that the flux of radiation belt electrons over the region R < 50,000 km does not exceed 3.10^7 cm^{-2} sec^{-1} for electrons of energy E > 200 ev. In the region 50,000 km < R < 75,000 km, negative currents were recorded in all the traps, corresponding to an electron flux at energy E > 200 ev of about 2.10^8 cm^{-2} sec^{-1}, which supports the existence of a new, ulterior radiation belt. An ion density of the order of several hundred ions/cm^3 was found out to 15,000 km. The density falls off farther out, and only an estimate can be offered for the upper limit of density at R < 20,000 – 22,000 km, n_i < 30 – 60 cm^{-3}. This supports the view that polarization of the zodiacal light is entirely due to the dust component, while the high electron density found from studies of atmospheric whistlers relates to the geocorona. (Met. Abst. unpub.)--Authors' abstract.

D-264 Gringauz, K.I. and Rudakov, V.A., Izmerenie elektronnoĭ konsentratsiĭ v ionosfere po vrashcheniiu plokosti poliarizatsiĭ radiovoln, izluchaemykh s raket. (Determination of electron concentration in the ionosphere from rotation of the plane of polarization of radio waves emitted by rocket.) Akademiia Nauk SSSR, Doklady, 132(6):1311-1313, 1960. 2 figs., 2 refs., 2 eqs. DLC--

Two formulas for calculation of the distribution of radio-waves in the ionosphere considering the magnetic field of the earth. The rocket (unmanned) launched Aug. 27, 1958, reached 450 km. Calculation methods based on consideration of Faraday effects. Part of a graph showing the level of signals at various frequencies. Profile shows correlation between calculated and obtained data. (Met. Abst. unpub.)--E. Z. S.

D-265 Gringauz, K. I., Raketnye izmereniia elektronnoĭ kontsentratsii v ionosfere pri pomoshchi ul'trakorotkovolnovogo dispersionnogo interferometra. (Rocket measurements of the electron density in the ionosphere using ultrashort wave dispersion interferometers.) Iskusstvennye Sputniki Zemli, Moscow, No. 1:62-66, 1958. 4 figs., 8 refs., 4 eqs. DLC--The author presents the results of measurements of the vertical distribution of electron concentration in the ionosphere from high altitude geophysical rockets released in the U. S. S. R. during 1954-1955 – one rocket attained a height of 473 km. The determination of electron concentration involved the use of a dispersion interferometer to measure the dispersion of radio waves emitted by a rocket. The rocket, which was released at a small angle to the vertical, was equipped with a transmitter emitting radio waves in the ultraviolet range with a frequency of f_1 and $f_2 = P f_1$. The radio waves from the rocket were received at two points on the earth and the phase differences and level of oscillations received were recorded continuously. The coordinates of the rocket were measured simultaneously by optical radio methods and the ionosphere was probed by means of a panoramic ionosphere station close to the point of rocket release. The results of measurements, which are presented, concern frequencies of $f_1 = 48 \times 10^6$ H_z and $f_2 = 144 \times 10^6 H_z (P = 3)$. The coefficient of refraction N_1 was computed by the equation

$$N_1 \approx 1 - \frac{Ne^2}{2\pi m f^2}$$

(N - effective concentration of electrons, e and n - charge and mass of electron, = frequency in H_z.) The phase difference of the two receivers referred to the higher frequency is given by

$$\phi = \frac{2\pi p f_1}{c} \int_0^L \left(\eta p f - \eta f_2 \right) dl.$$

The variation of ϕ with variation of L from L to L + Δ L, taking into account η_1 is given by

$$\Delta\phi = \frac{e^2}{mef_1}\left(\frac{P_2 - 1}{p}\right)\int_L^{L+\Delta L} N\,dl$$

and the mean value of N over Δ L is given by

$$N_{mean} = \frac{1}{\Delta L}\int_2^{L+\Delta L} N\,dl = \frac{cmf_1}{c^2}\;\frac{p}{P^2 - 1}\;\frac{\Delta\phi}{\Delta L}$$

The rockets were released in middle latitudes. The results of the measurements relative to the region lying below the maximum F ionization indicate that a clearly marked E layer does not exist. The active height, at which radio waves of the ionospheric station in the F layer are reflected, lies 50-150 km lower than the active heights recorded by the ionospheric station. (Met. Abst. 11E-56.) -- I.L.D.

D-266 Gruber, S. (M.I.T., Camb., Mass.), Statistical analysis of radio star scintillation. Journal of Atmospheric and Terrestrial Physics, London, 20(1):59-71, Feb. 1961. 7 figs., 7 refs., 9 eqs. DLC--Radio star scintillation data are analyzed by statistical techniques to find the autocorrelation functions and power density spectra of the fluctuations in amplitude and phase. Interpretation is given in terms of a drifting phase changing screen as postulated by BOOKER, RATCLIFFE and SHINN. It is shown how the drift velocity of the irregularities in ionospheric electron density that lead to the scintillations, as well as the mean square amplitude and phase of the fluctuations, may be obtained from these records. --Author's abstract.

D-267 Guier, William H. and Weiffenbach, George C. (both, Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.), Theoretical analysis of Doppler radio signals from earth satellites. Nature, London, 181(4622):1525-1526, May 31, 1958. 2 tables, 2 eqs. DWB--A brief description is given of the method of determining the orbit of an artificial satellite from measurements of the Doppler shift of its radio signals. A detailed description of the present analysis will be published in the future. (Met. Abst. 12.2-45.)--N. N.

D-268 Gustafsson, Georg; Egeland, Alv and Aarons, Jules, Audio frequency electromagnetic radiation in the auroral zone. Journal of Geophysical Research, Wash., D.C., 65(9):2749-2758, Sept. 1960. 9 figs., table, 18 refs. DLC--During three one-month periods, continuous spectrograms of the electromagnetic energy in the spectral region between 10 cps and 10 kc/sec were recorded in Kiruna, Sweden. The records were examined from the viewpoint of background energy. Throughout the entire frequency band studied, there is a low daytime signal level and a nighttime maximum. The ratio of the maximum to minimum amplitude varies as a function of frequency (the higher maximum-to-minimum ratio occurs at the lower frequency range of 20 to 200 cps) and with the season of the year. It is concluded that the daytime ionosphere absorbs the energy throughout the entire spectrum studied. It was found that, although strong deviations of the signal level from the normal were often associated with geomagnetic disturbances, there was a general lack of correlation between magnetic index and low frequency noise, except in the 10- to 45-cps frequency range. The origin of the background signals is probably two-fold, atmospherics from great distances, as well as magnetic and exospheric fluctuations contributing to the lower band. On eleven occasions, electromagnetic radiation associated with micropulsations of the earth's magnetic field was detected. Two frequency bands were identified; one centered at 750 cps, which is the gyro frequency for protons at an altitude of 100 km above Kiruna; and the other ranging between 1.8 and 4.5 kc/s, which has been identified as hiss. On all but one of the occasions when emissions were detected, the 750 cps signals were quite stable in frequency. During four of the longest periods when radiation was recorded, the low frequency emissions were received between two phases of a magnetic storm; micropulsations were simultaneously evident on the Kiruna magnetograms. (Met. Abst. 11.12-324.)--Authors' abstract.

D-269 Hachenberg, Otto, Sonnentätigkeit und Ausbreitung der elektrischen Wellen in der Erdatmosphäre. (Solar activity and propagation of electrical waves in the earth's atmosphere.) Leipzig, Urania-Verlag, 1955. 27 p. 10 figs. Gesellschaft zur Verbreitung Wissenschaftlicher Kenntnisse. Vortragsreihe Naturwissenschaften, Vol. 13. DLC--A pamphlet giving the basic material, with illustrations, of a popular science lecture on the ionospheric structure, ionospheric propagation of radio waves and sounding by impulses or waves, and solar ionizing influences on the ionosphere. The separate layers (D, E, F1 and F2) and their formation are treated in detail, and records are reproduced showing variations and characteristics of these layers, or disturbances in the layers. (Met. Abst. 7.11-6.)--M.R.

D-270 Hachenberg, O. and Krüger, A. (both, Heinrich-Hertz-Inst., der Deutschen Akad. Wissenschaften zu Berlin), The correlation of bursts of solar radio emission in the centimetre range with flares and sudden ionospheric disturbances. Journal of Atmospheric and Terrestrial Physics, N.Y., 17(1/2):20-33, Dec. 1959. 9 figs., 2 tables, 16 refs. DWB, DLC--From statistical investigations of solar flares, of bursts of solar radiation in the centimetre range and of the accompanying effects of sudden ionospheric disturbances (SID) recorded during the first 6 months of the IGY, it follows that there exists a close correlation between bursts in the centimetre range and SID. Only those flares, which give rise to a centimetre burst, are also able to cause a SID. Both flares and the ionizing radiation of the ionospheric D layer have their origin in the chromosphere. The close correlation confirms our view that the ionizing radiation, as well as the centimetre radiation of the flares, are generated by super thermal electrons. The ionizing radiation is evidently a "Bremsstrahlung" of the X-ray region. (Met. Abst. 11D-44.)--Authors' abstract.

D-271 Hachenberg, O. and Volland, H., Vergleich zwischen 3.2 cm Radiostrahlung der Sonne und ionosphärischer Dampfung im D-Gebiet während einer Sonneneruption. (Comparison between 3.2 cm radio emission from the Sun and ionospheric damping in the D layer during a solar eruption.) Zeitschrift für Astrophysik, Berlin, 47(2):69-80, 1959. 4 figs., table, 12 refs., 24 eqs. DLC--The time variation of the nondeviative absorption in the ionospheric D layer during a sudden ionospheric disturbance (Mögel-Dellinger effect) is compared with the radio burst on 3.2 wavelength caused by the corresponding solar flare. Using the continuity equation for the ionospheric electron density, the intensity variation of the ionizing radiation can be determined. It is found that this intensity variation is in qualitative agreement with the intensity variation of the 3.2 cm emission. Thus the hypothesis is strongly supported, that the 3.2 cm emission and the ionizing radiation responsible for the D layer both originate from the same gaseous volume in the solar atmosphere, and are both generated by similar emission mechanisms. (Met. Abst. 11.12-53.)--Authors' abstract.

D-272 Haddock, F.T., Introduction to radio astronomy. Institute of Radio Engineers, N.Y., Proceedings, 46(1):3-12, Jan. 1958. 3 figs., 106 refs. DLC--A general description of the nature of radio astronomy, its differences from optical astronomy, a review of the earliest beginnings of galactic and solar astronomy, and a listing of other important observational discoveries are given. A nearly complete bibliography (106 entries) of these early publications and of the principal review books and papers on radio astronomy is given. Some practical aspects and instrumental developments of possible interest to radio engineers are pointed out. The papers (50) in the present issue of the Proceedings of the IRE are discussed generally and individually. A brief discussion of some new results on solar burst spectra obtained at the Radio Astronomy Observatory at the University of Michigan, is presented. Jansky's 14.6 m rotatable directional antenna and his 31 ft reflector are illustrated. (Met. Abst. unpub.)--Author's abstract.

D-273 Haddock, F.T. (Mich. Univ., Ann Arbor), Report on URSI Commission V: Radio astronomy. National Research Council, Wash., D.C., Publication, No. 581: 115-118, 1958. Also issued as Institute of Radio Engineers, Proceedings, 46(7):1373-1375, July 1958. DWB, DLC--The Commission on Radio Astronomy is concerned with international exchange of scientific data, theory, programs of investigations and coordination of observational programs on an international scale, continuous monitoring of solar radio emissions, radio emission, coordination of ursigrams, etc. Radio astronomers from over a dozen nations attended the conference. A summary is given of the work done recently in study of solar radio research, radio sources, radio propagation, radio waves in the Galaxy and radio planetary system emissions from the planets. (Met. Abst. 11.6-145.)--M.R.

D-274 Hagen, John P. and Hepburn, Nannielou, Solar outbursts at 8.5 mm wavelength. Nature, London, 170(4319):244-245, Aug. 9, 1952. fig., table, 9 refs. DWB--During May through Sept. 1951, 5 bursts of solar radiation on 8.5 m were recorded at Washington, 4 accompanying flares and sudden ionic disturbances. Records are shown. (Met. Abst. 4.9-104.)

D-275 Hagen, J.P. (Naval Res. Lab., Wash., D.C.), The exploration of outer space with an earth satellite. Institute of Radio Engineers, N.Y., Proceedings, 44(6):744-747, June 1956. 5 figs. DLC--

Sometime during the coming Geophysical Year (July, 1957 to Dec. 1958) an attempt will be made to launch an artificial satellite in an orbit around the earth. The Office of Naval Research has been assigned the responsibility to perform this task and has established Project Vanguard in the Naval Research Laboratory to carry it out. The Dept. of Defense turned to the Navy to manage this triservice project because of its extensive experience in upper atmosphere research with rockets. The satellite which Project Vanguard intends to launch in an orbit is a small one, yet must be a research vehicle. The National Committee for the IGY of the National Academy of Sciences has established a panel which is concerned with the nature of the scientific experiments to be done in the vehicle. Work is in progress, not only on the vehicles, but on the experiments to be done in the satellite. Experiments conducted in an artificial earth satellite circling the earth in the outer tenuous region of our atmosphere can greatly increase our knowledge of the atmosphere --its structure, its constituents, and the powerful radiations, both electromagnetic and corpuscular, that impinge upon it and help determine its state. (Met. Abst. 8.1-133.)--Author's abstract.

D-276 Hagen, J.P. (Naval Research Lab.), Radio tracking, orbit and communication for the earth satellite. Aeronautical Engineering Review, N.Y., 16(5):62-66, March 1957. 3 figs. DLC--A chain of receiving stations, extending from Washington, D.C. to Santiago, Chile, is being set up to create a radio fence which will intercept a satellite each time it circles the earth. This system was chosen to prove that a satellite is in orbit and to derive geophysical information from perturbations of that orbit. (Met. Abst. 9.7-71.)--Author's abstract.

D-277 Hakura, Y. and Goh, T., Pre-SC polar cap ionospheric blackout and type IV solar radio outburst. Japan. Radio Research Laboratories, Journal, 6:635-650, Oct. 1959. --Short wave radio blackouts in polar cap regions are often found to occur well before the sudden commencement of magnetic storms and this phenomenon is closely correlated with the occurrence of type IV solar RF bursts. A possible explanation of these effects is given which is consistent with other related phenomena such as cosmic ray storms. IRE Abst. 1223

D-278 Hamburg. Meteorologisches Observatorium, Ionosphären-Bericht. (Ionospheric report.) First issue received, v. 5, no. 1, Jan. 1/10, 1953. Latest issue seen, v. 6, no. 37, Dec. 27/31, 1954. 4 p. per issue. graphs. Issued with collaboration of the Arbeitsgemeinschaft Ionosphäre, at Darmstadt. DWB--Routine features: current data and review of earth magnetic and ionospheric disturbances, relative sunspot numbers, schematic sunspot charts, limiting frequency of the F2 layer, geomagnetic amplitudes, solar eruptions, bursts, corona observations, maximum frequency of the sporadic E layer, geomagnetic characteristics, ultraradiation and radiation of longest waves. (Met. Abst. 6D-173.)--A. A.

D-279 Hame, T. G. and Kennaugh, E. M. (both, Ohio State Univ.), Recordings of transmissions from the Satellite 1958 Δ 2 at the Antenna Laboratory, Ohio State University. Institute of Radio Engineers, N. Y., Proceedings, 47(5, Pt. 1):991-992, May 1959. fig., table, 2 refs. DWB--Observations of the radio transmissions from the Russian Satellite 1958 Δ 2 (Sputnik III) were carried out at the Antenna Laboratory Field Station, Ohio State University, Columbus. The signal characteristics of transmissions from Sputnik I on 20.005 mc and that of Sputnik III are compared. During Nov. 1958 to Jan. 1959, the period varied between 39 and 52 seconds. It was observed that a severe amplitude fading, not due to Faraday rotation, had become superimposed on the transmission from Sputnik III. This is illustrated in two orthogonal polarization graphs. (Met. Abst. 11E-59.)--N. N.

D-280 Harang, L. and Pedersen, K., Drift measurement of the E layer during the solar eclipse June 30, 1954. Journal of Atmospheric and Terrestrial Physics, 10(1):44-45, Jan. 1957. 2 figs., ref. DWB--Records on 2 Mc/s of E layer drift at Kjeller, Norway, on June 30 are compared with those on July 1 and 2. On eclipse day a normal E layer was embedded in an Es layer at a somewhat greater height. During eclipse drift changed from NE-SW and back again. (Met. Abst. 8.6-182.)--C. E. P. B.

D-281 Harang, L. and Tröim, J. (both, Norwegian Defence Res. Estab., Kjeller, Norway), An example of heavy absorption in the VHF band in the Arctic ionosphere. Planetary and Space Science, N. Y., 1(2):102-104, April 1959. 3 figs., ref. DWB--From records of meteor echoes on 40 Mc/s and of scintillations from the Cassiopeia source on 45 Mc/s, it is shown that on July 7, 1958, in the early morning hours, a very heavy absorption appeared. The meteor echoes disappeared completely and the radiation from Cassiopeia diminished to less than 1/5 of its normal value. The observations were made at Tromsö (ϕ = 70°N) and in the direction toward the auroral zone. A great geomagnetic storm appeared with a sudden commencement at 08.40 MET, the geomagnetic storm started about 5 hr after the absorption effect of the ionosphere had started. (Met. Abst. 11.12-439.)--Authors' abstract.

D-282 Harris, I.; Jastrow, R. and Cahill, W.F. (all, Theoretical Div., Nat'l. Aero. and Space Admin., Wash., D.C.), Determination of satellite orbits from radio tracking data. Institute of Radio Engineers, N.Y., Proceedings, 47(5, Pt. 1):851-854, May 1959. fig., 2 tables, 9 eqs. DWB--A computer program has been developed which permits an approximate determination of a satellite orbit for a minimal amount of tracking data. (Met. Abst. 11.6-151.)--Authors' abstract.

D-283 Harrison, V.A.W. (Radio Res. Station, Slough), Ionospheric effects associated with the solar flare of July 10, 1959. Nature, London, 186(4720):228-229, April 16, 1960. 3 figs., 3 refs. DWB--On July 10, 1959, Sydney Observatory reported a class 3+ solar flare lasting from 0210 to 0410 U.T. The Cable and Wireless, Ltd., receiving station at Singapore also experienced a sudden fadeout of all radio circuits at 0210 U.T., the circuits not being reestablished until between 0415 and 0430 U.T. Ionospheric changes associated with the flare were observed at Singapore by using an automatic ionosonde. Calculations and deductions suggest that the enhanced ionization of the F2 layer on July 10 can reasonably be attributed to the effects of the solar flare. (Met. Abst. 11.12-429.)--E.Z.S.

D-284 Hartz, T.R., Radio star scintillations and the ionosphere. Canadian Journal of Physics, Ottawa, 33(8):476-482, Aug. 1955. 5 figs., 6 refs. DWB, DLC--The observed intensity at the surface of the earth of radiation at a frequency of 50 Mc/s from a radio star has been studied. A relationship is shown to exist between the fluctuations, or scintillations, in this observed radiation intensity and the angle of its incidence on the 400 km level of the earth's ionosphere. The occurrence of these scintillations is compared with other ionospheric phenomena as determined by vertical soundings from the earth. The probable cause of the fluctuations has been localized to a source in the high ionospheric regions. (Met. Abst. 11E-60.)--Author's abstract.

D-285 Hartz, T. R., A solar noise outburst of Jan. 15, 1955. Nature, London, 175(4464):908-909, May 21, 1955. DWB --A large noise outburst from the sun was recorded on 50 Mc/s at Ottawa on Jan. 15, 1955. It was followed by an intense ionospheric storm and an intense auroral display on Jan. 17-18. (Met. Abst. 6.8-20.)--C.E.P.B.

D-286 Hartz, T. R., Solar-terrestrial relations. Canada. Defence Research Telecommunications Establishment, RPL Report No. 23-2-3, Feb. 1958. 61 p. 40 figs., 2 tables, 75 refs. At head of t-p: Defence Research Board. DWB (M(055) C212rpL)--The interrelation of phenomena on the sun and in the earth's ionosphere has been studied in order to establish a causal dependence which could result from travelling solar particles. In addition to the examination of a variety of data from a number of sources, an extensive r-f noise recording program was undertaken to provide information on those regions of the solar and terrestrial atmospheres from which optical data were not available. The occasion on which there was an influx of solar particles into the earth's ionosphere were established from magnetic data, from optical observations of the Polar Aurora, and from h-f and v-h-f radio observations close to the auroral zone. On the basis of these data the ionospheric disturbances for a 12 month period were related to prior distinctive solar events that were considered capable of producing the high energy particles. The selection was made from the optical, spectroscopic and radio data available. It was found that solar flares, eruptive prominences, and disappearing filaments were the most frequent sources of Earth reaching particles, and that large sunspots contributed only occasionally to ionospheric disturbances. Moreover, the radio noise data permitted a fairly reliable estimate of the particle velocities in the solar corona, which could be used to predict the probability of subsequent terrestrial effects of the ejected particles. A correlation coefficient of 0.65 was found between probabilities predicted from the solar information and observed ionospheric disturbances which occurred two or three days later. The observational evidence on the solar noise bursts and on ionospheric storms could be explained only on the basis of a considerable distribution of velocities for the particles ejected from the sun. It was shown that a Maxwellian distribution of corpuscular velocities was a probable one. Moreover, the observations indicated that particles are frequently emitted from the sun with a distribution of velocities, but that only in the case of very large phenomena are there sufficient particles with the high energies necessary to overcome the sun's gravitational field and reach the earth. --Author's abstract.

D-287 Harvard Univ. Harvard College Observatory, The effects of the terrestrial atmosphere on radio waves from outer space: Report on a conference held at Harvard, May 10, 1956. 9 p. mimeo. Unchecked.

D-288 Haskell, R. E. and Holt, E. H. (both, Rensselaer Polytechnic Institute, Troy, N. Y.), Representation of propagation parameters for the plasma in a magnetic field. Institute of Radio Engineers, N. Y., Proceedings, 49(10): 1584, Oct. 1961. 4 figs., 3 refs., 4 eqs. DLC--The effect of a dc magnetic field is discussed and demonstrated by extending the plane propagation field curves by Bachyinski et al to 3-D models given. (Met. Abst. unpub.)--W. N.

D-289 Hatanaka, Takeo, Faraday effect in the earth's ionosphere with special reference to polarization measurements of solar radio emission. Cornell Univ. School of Electrical Engineering, Contract AF 19(604)-73, Scientific Report, No. 5, Aug. 30, 1955. 18 p. 5 figs., 8 refs., 34 eqs. Also pub. as Astron. Society of Japan, Publication, 8(2):73-86, 1956.--The author and co-workers found that the polarized bursts from the sun were a mixture of a randomly polarized and an elliptically polarized component, with the ellipticity dependent on position of source in the sun's disk. The axis of the ellipse is rotated somewhat by the Faraday effect in the earth's ionosphere, but unless total electron density along path of radio wave through ionosphere is known, the original orientation of the axis cannot be obtained. The paper deals with the calculation of the Faraday effect in the ionosphere. The general expression is given and then applied to the simple case when the only effect is the rotation of the axis of the ellipse. (Met. Abst. 11E-62.)--M. R.

D-290 Hatanaka, T., Issledovaniia Solntsa v Iaponii. (Solar studies in Japan.) Priroda, Moscow, No. 8:77-81, Aug. 1959. 7 figs. DLC--This review of solar studies made in recent years in Japan includes detailed information on investigations of solar activity carried out by optical methods and with the aid of radio waves. The optical observations are made at the Tokyo Astronomical Observatory of Tokyo University, while the radioastronomical studies are performed by both the Tokyo observatory and the Institute of study of Atmospheric Phenomena at Toyokava near Nagoya. Numerous photos and graphs illustrating the text are included. (Met. Abst. 11. 12-83.)--A. M. P.

D-291 Haviland, R.P. (Special Defense Projects Dept., General Electric, Philadelphia), What the future holds for the earth satellite. General Electric Review, Schenectady, N.Y., 59(5):10-16, Sept. 1956. 10 figs., 2 tables. DLC--The possible orbits and respective areas of the earth which could be seen from a satellite at 300 mi, 4000 mi; or the areas over which a satellite at 22,300 mi height could relay radio or TV signals from hemisphere to hemisphere or within the Western Hemisphere are shown on maps. Tables give distances of vision, field of view, etc., for heights of 257, 620, 1210, 2222, 4000, 7650, 19,000 and 22,300 mi. Weather charting and forecasting possibilities are also considered. Hurricanes, clouds, albedo and solar radiation could be measured or observed from such a station. (Met. Abst. 9.1-94.)--M.R.

D-292 Haviland, R.P. (Missile and Space Vehicle Dept., General Electric Co., Philadelphia, Pa.), Doppler shift effects in space propagation. Institute of Radio Engineers, N.Y., Proceedings, 49(11):1694-1695, Nov. 1961. ref., 11 eqs. DLC--In a solar ionosphere, various effects of changes in the propagation medium may become imperative, hence, five non-steady-state cases are theoretically examined, and their individual Doppler shifts estimated. (Met. Abst. unpub.)--W.N.

D-293 Hayre, H.S. (Univ. of N. Mexico, Albuquerque), Radar scattering cross section applied to Moon return. Institute of Radio Engineers, N.Y., Proceedings, 49(9):1433, Sept. 1961. 10 refs., 5 eqs. DLC--This brief theoretical calculation, as applied to pulse radar and compared with the radar equation, indicates a rough effective moon surface rather than a quasi-smooth surface as is assumed by some other research workers.--W.N.

D-294 Herbays, E. and Coutrez, R., Fréquences réservées pour la radioastronomie. (Reserved frequencies for the radioastronomy.) International Scientific Radio Union, Brussels, Bulletin d'Information, No. 121:14-19, May/June 1960. DLC--Report of the efforts of the radioastronomers to obtain the safeguard of the frequency bands used for radioastronomical observations. The International Union of Telecommunications made a study of this question introduced in the form of two resolutions expressed at the 11th General meeting of the ISRU in 1954. Mention is made of the frequency bands reserved for radioastronomy in the different regions into which the globe has been divided. The end of this article constitutes a summary of the recommendations made by the ISRU for the safeguard of the frequencies used for radioastronomical observations.--A.V.

D-295 Herrinck, Paul (Chef du Bureau de Geophysique du Service Meteorologique du Congo Belge et du Ruanda-Urundi), Analyze de la variation annuelle et semi-annuelle de la frequence critique de la couche F2 a Leopoldville-Binza. (Analysis of the annual and semi-annual variation of the critical frequency of the F2 layer at Leopoldville-Binza.) (In: Angola. Servico Meteorologico, Miscelanea geofizica, Luanda, 1956. p. 155-162. 4 figs., 2 tables.) DWB--Since only the annual and semi-annual amplitude variations are important, it is shown how good local foF2 forecasts can be made by considering each hour of the day, and using average foF2 values derived from sunspot forecasts. --G. T.

D-296 Hewish, A. (Mullard Radio Astron. Obs., Cavendish Lab.), Extrapolation of the number-flux density relation of radio stars by Scheuer's statistical method. Royal Astron. Soc., London, Monthly Notices, 123(2):167-181, 1961. 12 figs., 6 refs. DLC--An attempt is made to assess the usefulness of Scheuer's statistical method of analyzing the records derived from a phase switching receiver. A Monte Carlo technique is described which enables the probability distribution of recorded deflections to be computed in EDSAC for any assumed distribution of radio sources. Some typical models are considered and it is concluded that, subject to a small enough receiver noise, the statistical method gives information about the source distribution at flux densities considerably lower than those at which the sources may be counted individually. The method is applied to observations at 178 Mc/s using the method of aperture synthesis. It is shown that the log N-log S relation cannot have a uniform slope of -1. 5. A slope of -1.8 yields good agreement provided the source density is suitably truncated at small flux densities. --Author's abst.

D-297 Hewish, A., The diffraction of galactic radio waves as a method of investigating the irregular structure of the ionosphere. Royal Soc. of London, Proceedings, Ser. A, 214(1119):494-514, Oct. 9, 1952. 13 figs., tables, 16 refs., 6 eqs. DWB--Amplitudes of 1.4 -8 m waves from 4 radio stars at 2 points 1 km apart show that variations of phase and amplitude are due to steady drift of an irregular wave pattern, which can be regarded as caused by ionospheric irregularities 2-10 km across with a variation of electron content of about 5 X 10^9 per cm^2, in a thin layer at a height of about 400 km. They are most pronounced about midnight. The irregular part of the ionosphere has a wind-like motion; the E-W component varies from + 500 m/s to -500 m/s. The average is about 300 m/s at 0-1 h, decreasing to 150 at 4-5 h. Large speeds are associated with magnetic disturbances. (Met. Abst. 4. 10-110) --C. E. P. B.

D-298 Hewish, A. (Cavendish Lab., Cambridge), The Scintillation of radio stars. (In: Beer, Arthur (ed.), Vistas in Astronomy. London, Pergamon Press, 1955. Vol. 1:599-606. 2 tables, 19 refs.) DLC (QB3. B35)--The intensity and apparent position of radio sources are observed to fluctuate in a manner analogous to the scintillation of visual stars.

Experiments are described which show that the scintillation is caused by diffraction of the incoming waves by irregularities of electron density in the upper ionosphere. The origin of the irregularities is not known and the solution may raise problems of astronomical interest. A phenomenon similar to scintillation occurs when a radio source is viewed through the solar corona, and this fact enables deductions to be made about the irregular structure of the corona at distances in the range 5-15 solar radii. (Met. Abst. 10.3-201.)--Author's abstract.

D-299 Hey, J.S., Solar radiations in the 4-6 metre radio wavelength band. Nature, London, 157(3976):47-48, Jan. 12, 1946. Note by F.J.M. Stratton, Ibid., p. 48. DLC--Hey reports on the observation of solar radiations of the order of 10^5 times the power expected from the sun (assuming that the sun behaves as a perfect blackbody radiator at a temperature of $6000^{\circ}K$) on Feb. 27 and 28, 1942, by radar receiving equipment working at various wavelengths in the 4-6 m band. Evidence that the disturbance was caused by electromagnetic radiations of solar origin was obtained by the bearings and elevations measured independently by receiving sets at widely separated points (Hull, Bristol, Southampton, Yarmouth). It was determined that the noise power received from the sun was of the order of 10^{-13} watt per sq m per megacycle bandwidth. STRATTON states that solar flares were observed on Feb. 21, 27, 28 and March 1, at Mendon; a sudden fadeout on Feb. 28, and a magnetic storm on March 1. The radio noise reported by HEY was the earliest terrestrial phenomena observed preceding the above events. (Met. Abst. 9A-6.)--M.L.R.

D-300 Hey, J.S., Radio astronomy. Royal Astronomical Society, Monthly Notices, 109(2):179-214, 1949. 6 figs., 3 tables, numerous refs., 8 eqs. DLC--A progress report outlining the fundamentals of radio transmission and reception in the m and cm bands, and discussing technique and results in the radar observation of meteor trails and of the moon, and in the investigation of galactic and solar radio noise. A full bibliography is appended. (Met. Abst. 9A-8.)--Physics Abstracts, No. 1388, 1950.

D-301 Hey, J.S., Solar radio emissions at 4 metres wavelength during 1947-50 inclusive, and their relation to solar activity. International Council of Scientific Unions. Commission for the Study of Solar and Terrestrial Relationships, Rome, Sept. 1952, Proces-Verbal et Communications, pub. 1953. p. 16. DWB--Analysis of bursts of solar radio emission shows an average lag of a few minutes after solar flares, but some bursts precede the flares. The average order of occurrence of onset and maxima is set out. (Met. Abst. 9A-36.)--C.E.P.B.

D-302 Hey, J.S. and Hughes, V.A., Solar radio asymmetry at 4 metres wavelength. Nature, London, 173(4408):771, April 24, 1954. 3 refs. DWB--In 1948 HEY, PARSONS and PHILLIPS found that bursts of radio emission on 4.1 meters occurred more often associated with flares on eastern than western half of the sun. In 1953 DODSON, HEDEMAN and OWREN did not find this effect on 1.5 m. HEY and HUGHES now point out that this result is to be expected because absorption coefficient is proportional to 2^2 and the difference may be still further increased by refraction. Asymmetry increased in 1950-51 when recurrent M-type magnetic storms were becoming prominent, but observations had to be discontinued in 1951. (Met. Abst. 9A-54.)--C.E.P.B.

D-303 Hey, J.S. (Radio Research Estab., Malvern, England), Solar radio eclipse observations. (In: Beer, Arthur, ed., Vistas in astronomy. London, Pergamon Press, 1955. Vol. 1:521-531. 5 figs., 1 table, 28 refs., eq.) DLC (QB3. B35)--The observation of the emission from the Sun at radio wavelengths can provide knowledge of the localized regions of bright radio emission and of the distribution of radio brightness across the quiet Sun. From the latter it is possible to derive the distribution of electron density and temperature in the chromosphere and corona by measurement at centimetre and metre wavelengths, respectively. Observations of solar radio emission at eclipses have been made since 1945 and the results are discussed. (Met. Abst. unpub.)--Author's abstract.

D-304 Hibberd, F.H. (Cavendish Laboratories, Cambridge), The effect of the ionosphere on the Doppler shift of radio signals from an artificial satellite. Journal of Atmospheric and Terrestrial Physics, London, 12(4):338-340, 1958. fig., 5 eqs. DLC--An idealized case of spherically stratified ionosphere and a spherical earth is discussed with Snell's law applied to the earth of a satellite emitted radio wave. (Met. Abst. 12.7-125.)--W.N.

D-305 Hibberd, F.H. (Univ. New England, Armidale, N.S.W. Australia), The Faraday fading of radio waves from an artificial satellite. Journal of Geophysical Research, Wash., D.C., 64(8):945-948, Aug. 1959. fig., 5 refs., 7 eqs. DLC--Faraday fading of signals from an artificial satellite is analyzed in terms of the difference between the Doppler shifts of the ordinary and extraordinary components in the ionosphere. A procedure is outlined for determining the vertical distribution of electron density in the upper ionosphere. Explanations are given for the apparently excessive values of electron content yielded by measurements of Faraday fading and for the observation that the rate of Faraday fading is not exactly inversely proportional to the square of the wave frequency. (Met. Abst. 11F-55.)--Author's abstract.

D-306 Hibberd, F.H. and Thomas, J.A., The determination of the electron distribution in the upper ionosphere from satellite Doppler observations. Journal of Atmospheric and Terrestrial Physics, N.Y., 17(1/2):71-81, Dec. 1959. 7 figs., 4 refs., 15 eqs. DWB, DLC--It is shown how the electron distribution in the upper regions of the ionosphere may be determined from simultaneous measurements of the Doppler shifts of radio signals of two different frequencies received from an artificial satellite. The method is illustrated in detail by computations made on the 20 and 40 Mc/s signals from Sputnik I. (Met. Abst. 11E-64.)--Authors' abstract.

D-307 Hilton, W.F. (Hawker Siddeley Aviation, Great Britain), A proposal for a British communications satellite. The New Scientist, London, 8(203):907-909, Oct. 6, 1960. 5 figs. DLC--Use of artificial satellites to receive a radio signal from one part of the earth and relay it to another could be extremely economical. With 90% launching success and a 22 yr life of a satellite the cost of transatlantic telephone calls could be cut to one fortieth of the present cost. Wave lengths of 300 Mc/s up to 11,000 Mc/s could be used. A discussion is given of the coverage that could be given by various types of orbit. It is suggested that a system of six satellites could give complete coverage over the whole earth. A description is given of a suitable satellite which would carry two radio transmitter-receivers each of 45 watts radiofrequency power. Solar cells would be used to give a 500 watts d.c. electrical power. A method of stabilizing the satellite so that the radio power could be directed as required is suggested. There appears to be a good technical case for Britain to enter upon a program of design and construction of a communications satellite. (Met. Abst. 12.7-77.)--R.B.

D-308 Hitchcock, R.J.; Evans, G.O. and Naismith, R., Sunspot-cycle variations in the discrepancies between predicted and observed frequencies for use in radio communication. Institution of Electrical Engineers, London, Proceedings, Pt. B, 107(35):423-426, Sept. 1960. 6 figs., foot-ref. DLC (TK1.14)--A marked variation occurs over the sunspot cycle in the discrepancies between predicted F2-4000 km m.u.f.

and the observed times of fade-in and fade-out on an 18.4 Mc/s Bombay-London circuit. This is particularly marked in summer and is attributed to the influence of the sporadic E layer, although there is no marked sunspot-cycle effect attributed to this layer. Any assessment of the accuracy of predictions analyzed on the assumption of F layer propagation must be considered in relation to the phase of the sunspot cycle to which it refers. (Met. Abst. 11L-245.) --Authors' abstract.

D-309 Hoffman, W.C. (Hughes Res. Lab., Malibu, Calif.), A report on the symposium on the use of space vehicles at the fall 1958, URSI meeting. Planetary and Space Science, N.Y., 1(3):238-248, Aug. 1959. 13 figs. DWB--A symposium, under the chairmanship of A.H. Shapely, was held on "The use of Space Vehicles" during the fall 1958 meeting at Pennsylvania State University. Six others joined the panel. The present paper briefly reports on the discussion and presents the pertinent graphical illustrations. The chairman, in his opening remarks, reviewed the recent history of satellite radio experiments. The symposium was conducted on the following plan: Five classes of experiments would be discussed; a short five minute introduction for each type being given by the panel members directly concerned, after which the subject would be thrown open to discussion by any interested member of the audience. The five classes of experiments and the speakers for each were: (1) VLF satellite measurements (R.A. HELLIWELL and C.G. LITTLE). (2) Ion probes (J.C. SEDDON and MRS. SAGALYN). (3) Faraday rotation measurements (C.G. LITTLE and J.C. SEDDON). (4) Topside ionospheric sounders (W. PFISTER and O. GARRIOTT). (5) Studies of anomalous propagation (W. PFISTER and O. GARRIOTT). (Met. Abst. unpub.)--I.S.

D-310 Hood, Harold C. (Pacific Coast Editor), Spacemen may communicate with gamma rays. Electronics, N.Y., 35(2): 28-29, Jan. 12, 1962. 3 figs. DWB, DLC--J.E. Eersken (Aerospace Corp.) predicts a jam-free space-to-space and space-to-earth radio communication at around 10^{13} Mc/s frequency, using gamma rays, a by-product from the nuclear reactor powered satellites and space bases of the future. (Met. Abst. unpub.)--W.N.

D-311 Hope, E.R., Spiral patterning of solar corpuscular precipitation. Nature, London, 177(4508):571-572, March 24, 1956. 2 figs., table, 6 refs. DWB--Plots of radio blackout distribution by G.m.t. agree with isochrons of 'morning' maximum of magnetic disturbance in the Arctic. The Russian isochrons (world time) and the isochrons of maximum percent of blackout in summer (G. m. t. and l. m. t.) are shown and discussed. (Met. Abst. 7.8-112.)--C.E.P.B.

D-312 Horner, F., Radio noise from planets. Nature, London, 180(4597):1253, Dec. 7, 1957. 3 refs. DWB--J.D.KRAUS suggested that high frequency radio noise received from Jupiter and Venus may originate in discharges similar to terrestrial lightning (Nature, 178:33, 1956). The author of the present note compares amplitudes of sferics and of planetary radio noise and finds the latter to be considerably larger than might be expected on the basis of KRAUS's hypothesis. The discrepancy could be explained by larger storm areas on the two planets and superposition of several discharges. But before the hypothesis could be accepted an explanation would have to be found for the fact that radio noise from Venus and Jupiter is received in the form of bursts rather than of continuous noise. (Met. Abst. 9A-154.)--G.T.

D-313 Houston, R.E., Jr.; Ross, W.J. and Schmerling, E.R., Some effects of intense solar activity on radio propagation. Journal of Atmospherics and Terrestrial Physics, 10(3):136-139, March 1957. 4 figs., 2 refs. DWB--Observations on 75 kc/s at vertical incidence at Ionosphere Research Lab. (Pa.) during solar flare of 0300 UT on Feb. 23, 1956, are reported. No significant change of group height was noted. Phase height showed a rapid decrease of 8 km beginning 2238 ± 3 LMST and lasting an hour. A large increase of absorption occurred 15 min after visual observation of the solar event. (Met. Abst. 10.4-156.)--C.E.P.B.

D-314 Hoyle, Fred, Some recent researches in solar physics. Cambridge, England, University Press, 1949. 134 p. 8 figs., 36 tables, refs., 2 append. (Cambridge Monographs on Physics) MH-BH, DLC--A technical treatise intended for the astrophysicist and concerned mainly with the theoretical aspects of solar physics and solar terrestrial relationships. Separate chapters include a discussion of: (1) sun spots and the solar cycle (11 yrs), (2) observational data and (3 & 4) theory of the chromosphere and corona, (5) the magnetic field and convective circulation of the sun, (6) terrestrial magnetic storms, the aurora and the earth's ionosphere, and finally, (7) the emission of radio waves from the sun. Appendices and supplementary notes include material on nomenclature and symbols, the origin of the solar magnetic field and the aurora. (Met. Abst. 2.1-94.) --M.R.

D-315 Huang, Chun-Ming (Radio Wave Res. Lab., Taipei, China), Some abnormalities in the variations of F2 layer critical frequency during the period of high solar activity of solar cycle 8-19. Journal of Geophysical Research, Wash., D.C., 65(3):897-906, March 1960. 16 figs., 2 tables. DLC--Some abnormalities in the variations of foF2 were observed at Taipei during the period of very high solar activity of solar cycle 8-19. They are the saturation effect of foF2 (i.e., the increasing rate of foF2 with respect to sunspot number is nearly zero at high solar activity), the occurrence of post-sunset peak of foF2, and the increase of foF2 during the ring eclipse. In this report variations of these phenomena are described, the close relationship existing among them is examined, and a probable explanation is given. (Met. Abst. 11.10-152.)--Author's abstract.

D-316 Huang, Su-Shu (Institute for Advanced Study, Princeton, N.J.), Some astronomical aspects of life in the universe. Sky and Telescope, 21(6):312-316, June 1961. 6 figs., 2 tables.--Only through radio communication may the possibly existing extraterrestrial and intelligent beings be reached. The frequency of the 21 cm neutral hydrogen line may be used to establish contact by means of codes suggested. Author believes that "no more than one or two percent of stars may have at one time or another supported intelligent life." Our neighbor stars, Tau Ceti and Epsilon Eridani, satisfy his criteria for possible existing civilizations.--W.N.

D-317 Huber, P.W. (NASA, Wash., D.C.), Experiments with plasmas produced by alkali metal seeded cyanogen-oxygen flames for study of electromagnetic wave propagation at the Langley Research Center. Planetary and Space Science, N.Y., 6:172-179, June 1961. 15 figs., 3 refs. DWB--This article gives the status of the work done at the Langley Research Center of the National Aeronautics and Space Administration. Methods and equipment to study the topic, both theoretically and experimentally, are designed to comprehend the mechanisms of the interactions within the plasma layer and the electromagnetic wave. The utility of the alkali seeded cyanogen-oxygen flame to produce controlable conditions is reflected in the successful results obtained. --W.N.

D-318 Hultqvist, Bengt, On the interpretation of ionization in the lower ionosphere occurring on both day and night side of the earth within a few hours after some solar flare. Tellus, 11(3):332-343, Aug. 1959. 9 figs., 3 tables, 23 refs., 6 eqs. DLC--The absorption effect following solar flares may be interpreted as being caused by a high energy ion beam of very small density emitted from the sun, the ions moving in Störmer orbits. --IRE Abst. 2374

D-319 Hultqvist, B. and Ortner, Johannes (both, Kiruna Geophysical Obs., Sweden), Observations of intense ionization of long duration below 50 km altitude after some strong solar flares. Nature, London, 183(4669):1179-1180, April 25, 1959. fig., 7 refs. DWB--On July 7 and Aug. 16, 22 and 26, 1958, very strong absorption was measured with C. G. LITTLE's riometer (relative ionospheric opacity meter) at Kiruna Geophysical Observatory, Sweden. The observation succeeded the outbreak of 3+ solar flares by a few hours. The maximum daytime absorption was 15 db in three of the cases. The results are presented in facsimile riometer recordings and discussed in support of the hypothesis that the ionizing agent was sun-emitted protons from the flares. (Met. Abst. 11D-60.)--N. N.

D-320 Hund, August, Short wave radiation phenomena. 1st ed. New York, McGraw-Hill, 1952. 2nd vol. (1332 p.). 394 figs., 97 tables, 1009 eqs., bibliog. p. 1288-1301. DLC--This valuable work covers theoretical and experimental contributions from the discovery of the electromagnetic wave to their applications in radio communication and in guided missiles. In its two volumes, the nine chapters are broken down in sections under Subject Headings: Chapter (1) Fundamental concepts and relations of currents and electromagnetic fields; (2) Space electromagnetic fields of elementary electric and magnetic dipoles; (3) Fundamental methods used in electromagnetic theory; (4) Propagation characteristics; (5) Transmission lines and radiation; (6) Unobstructed space radiation; (7) Space radiation in the presence of electromagnetic obstruction; (8) Electromagnetic diffraction; and (9) Wave guides and cavities. Cross references are provided. The three last chapters are particularly of radio-meteorological interest. The appendix provides a list of the symbols used and an extensive bibliography. (Met. Abst. 4.4-278.)--W. N.

D-321 Huntley, H. E., Radio astronomy in the tropics. Nature, London, 172(4368):108, July 18, 1953. ref. DWB--Account of a radio-astronomy observatory at Achimota, near Accra, Gold Coast, started Jan. 1952. Program includes hour-by-hour recordings of F layer disturbances, solar activity and coordinates of radio stars. (Met. Abst. 4.11-38.)--C. E. P. B.

D-322 Hutchinson, H. P. and Arendt, P. R., Ionospheric scintillations of satellite signals. Institute of Radio Engineers, N. Y., Proceedings, 48(4):670-671, April 1960. 7 figs., ref. DLC--The scintillation of satellite emitted radio signals has been observed using two different techniques, namely, Doppler shift frequency measurements and radio direction finding. In this shortened version of a more complete paper, there are given the results obtained using Doppler shift measurements only. Variations from a smooth Doppler shift curve obtained during individual orbits give a measure of the frequency scintillation occurring and thus of the roughness of the ionospheric path between the satellite and the observer. As expected, these variations are a function of frequency, and they become less as the frequency is increased. (Met. Abst. 11. 12-371.)--Authors' abstract.

D-323 Huxley, L. G. H. (Univ. of Adelaide), A discussion of the motion in nitrogen of free electrons with small energies with reference to the ionosphere. Journal of Atmospheric and Terrestrial Physics, N. Y., 12(1/2):46-58, Oct. 1959. 4 tables, 6 refs., 28 eqs. DWB, DLC--In this paper measurements of diffusion and drift of slow electrons in pure nitrogen carried out by Crompton and Hall, are discussed. The discussion is restricted to the range of energies of the electrons between that of thermal equilibrium and four times that value. From the behavior of the coefficient of diffusion D it is concluded that in elastic collisions between electrons and nitrogen molecules, the collisional cross section A is proportional to the speed c of the electron; namely, $A = 3.29 \times 10^{-23}$ c cm^2. From this result an accurate expression is derivable for the velocity of drift W in terms of the parameter Z/P and the mean energy of agitation of the electron. The measured rate W at which electrons with energy Q lose energy in collisions with molecules is accurately described by a formula that ascribes these losses of energy chiefly to the excitation of changes in the rotational states of the molecules. A formula in close agreement with the measurements is derived for the dependence of the mean energy of agitation of the electrons upon Z/P. The significance of the measurements for ionospheric studies is considered with particular reference to the interpretation of measurements of radio wave interaction. It is shown that the values of the molecular concentration in the height range 82 to 90 km above the ground, found by means of radio wave interaction, are consistent with the A. R. D. C. model atmosphere (MINZER and RIPLEY, 1956). (Met. Abst. 11D-63.)--Author's abstract.

D-324 Hyde, Margaret O., Exploring earth and space: the story of the I. G. Y. Illus. by Clifford N. Geary. N. Y., Whittlesey House, 1957. 160 p. DLC (QC801. 3. H9)--A readable and accurate account of the IGY and its various phases including chapters on earthquakes, volcanoes, the Antarctic, oceanographic research, weather control; atomic, cosmic and solar energy or applications; rockets, satellites and radio-astronomy; the airglow, aurora, balloons (manned and with animals or pilot radio and instruments). Geomagnetism, gravity, climatic changes, the ionosphere, glaciers, tidal waves, etc., are treated incidentally. (Met. Abst. 9. 4-24.) --M. R.

D-325 Ikhsanov, R. N. (Main Astronom. Obs., Acad. Sciences, USSR), On the nature of Cyg I. Soviet Astronomy AJ, N. Y., 4(6):923-928, May/June 1961. fig., 2 tables, 16 refs., 2 eqs. DLC. Transl. of original Russian in Astronomicheskii Zhurnal, Moscow, 37(6):988-993, Nov./Dec. 1960. DLC--The absorption in the path from radio sources is determined on the basis of a simultaneous analysis of radio and optical data. The distance to the sources is determined and the physical possibility of their existence at such distances is discussed. It is shown that at least an appreciable fraction of radio emission of the principal component of Cyg I is due to the emission of the nebula associated with IC 1318. (Met. Abst. unpub.)--Author's abstract.

D-326 Ingalls, R.P.; James, J.C. and Stone, M.L. (all, MIT, Lincoln Lab.), Study of UHF space communications through an aurora using the Moon as a reflector. Planetary and Space Science, N.Y., 7:272-285, July 1961. 11 figs., 15 refs. DWB, DLC--Lunar CW transmissions from College, Alaska, were received at Millstone Site, Westford, Mass., and at Shirley Bay site, near Ottawa, Ontario, where identical receivers were used. Every one-half hour lunar transmissions, at 440 Mc/s, were conducted for 20 min and during the remaining 10 min a radar search at 398 Mc/s was made; the equipment calibration was checked at the receiving sites. The results presented in graphs show the effects of a quiet and an aurorally disturbed ionosphere on the propagation of UHF signals into space. Also confirms and extends earlier results of moon reflection characteristics. --W. N.

D-327 Inoue, Yuji (Tech. Res. Inst., Nat'l. Defense Agency, Tokyo), On the importance of the resonance lines of atomic oxygen to the ionospheric ionization. Journal of Atmospheric and Terrestrial Physics, London, 15(1/2):85-88, Sept. 1959. eqs. DLC--A new interpretation of the effective recombination coefficients of an electron in the ionosphere is advocated. A new theory for the ionization mechanism in the ionosphere is also brought forward. The resonance lines of atomic oxygen are of 1302 - 1306 A, $3s^{3S^o} - 2p^{3P}$, and 1025. 7 A, $3d^{3D^o} - 2p^{3P}$. These lines were observed at 115 km as a strong emission. The new theories of the ionosphere are discussed, relating to the interpretation of the formation of these emission lines in the ionosphere. (Met. Abst. 11. 9-118.)--Author's abstract.

D-328 International Geophysical Year, 1957/1958. IGY World Data Center A (for) Solar Activity, High Altitude Observatory, Boulder, Colo., Intermediate reports of surges and active prominence regions, Oct.-Dec. 1958. Its IGY Solar Activity Report Series, No. 7, June 1, 1959. unpaged (1 p. per day). Entirely tables. Also Jan.-March 1959. Ibid., No. 8, Sept. 1, 1959. unpaged. Entirely tables. Also April-June 1959. Ibid., No. 9, Feb. 22, 1960. unpaged. Entirely tables. DWB (523. 74 I612so)--These are the original, uncorrected data compiled from the daily reports of various observations during the period Oct. 1958 to June 1959. (Met. Abst. 11. 9-74.)--N. N.

D-329 International Geophysical Year, 1957/58. Japanese National Committee for the IGY, Compilation of data in Japan for atmospheric radio noise during the International Geophysical Year 1957/58. Ueno Park, Tokyo, Japan, National Committee of the IGY, Science Council of Japan, March 1960. 156 p. figs., tables. DWB (551.C6 I13ja)--A compilation of atmospheric radio noise data which includes tables and curves of noise level values and cumulative amplitude distribution curves for the period Sept. 18, 1957 to Dec. 17, 1958. Brief notes explain the distribution of stations, methods and schedules. Block diagrams of apparatus and symbols used are included. The data were collected in Japan during the International Geophysical Year. (Met. Abst. 13. 1-46.)--E. Z. S.

D-330 International Scientific Radio Union, 11th General Assembly, The Hague, Aug. 23-Sept. 2, 1954, Proceedings, Vol. 10, Pt. 5, Commission No. 5 on Radio Astronomy, 1955? 113 p. tables, refs. DWB--Membership of the Commission on Radio Astronomy and subcommissions (Solar Radio Emissions, Terminology, Basic Solar Index and Standardization of Equipment and Measurements), a list of 27 reports and papers submitted, reports of subcommissions, reports of national committees of Australia, Canada, Finland, France, Germany, Great Britain, Italy, Japan, Netherlands, Spain, Sweden, Switzerland and U.S., address of M. LAFFINEUR, President, minutes of sessions, etc., are included in report along with numerous references to literature published in each country. (Met. Abst. 9A-57.)--M. R.

D-331 International Telecommunication Union, Revision des donnees sur les bruits atmospheriques radioelectriques. (Revision of the data on the atmospheric radio-electric noises.) Prepared by the International Radio Consultative Committee (and its Report No. 65, issued Geneva, 1957.) 34 p. 27 figs., 14 refs.--In preparing this report, a greater account was taken of the data gathered during a period of great solar activity than of those relative to a period of weak solar activity. In spite of the reasons which allow us to believe that the phase of the solar cycle will have an influence on the degree of the noise at its reception, it has not been possible to put into evidence a satisfying correlation between the sunspots and the data available on the noise. As often as possible, the forecasts are based on actual measurements. The report deals successively with basis parameters, graphically represented parameters, factors intervening in forecasts, variations in the degree of the noise within a section, fine structure of the atmospheric noise and use of the data. (Met. Abst. 10D-59.)--A.V.

D-332 Israël, Hans, Sonne und Erde. (Sun and earth.) Naturwissenschaftliche Rundschau, 3(3):101-106, March 1950. 8 figs. DWB--The source of solar energy, its effect on the upper atmosphere and on radio transmission and the possible relationship between sunspots and weather are discussed and illustrated. The spectral distribution of energy at different heights, ionization in different regions of the ionosphere and the relation of sunspots to rainfall, tree rings and the height of Lake Victoria are among the illustrations presented. (Met. Abst. 2.4-60.)--M.R.

D-333 Istomin, V.G., Radiochastotnyi mass-spektrometr dlia issledovanii ionnogo sostava verkhnei atmosfery. (Radio frequency mass spectrometer for investigating the ion content of the upper atmosphere.) Iskusstvennye Sputniki Zemli, Moscow, No. 3:98-112, 1959. 15 figs., 19 refs. DLC, DWB. Summary in U.S. National Aeronautics and Space Administration, Technical Translations, F-8:9, April 1960. Complete transl. to be issued in the Technical Translations series.--Detailed description of the radio frequency mass spectrometer used to determine the ionic composition of upper atmosphere. Data on the mass spectrum of positive ions in the ionosphere at an altitude up to 855 km were obtained from Sputnik III and from high altitude rockets. The mass determination range of the device is from 6-48 atomic mass units and the scanning time for the whole range is 1.7 sec. (Met. Abst. 11.12-373.)--E.K.

D-334 Iwai, Akira and Outsu, Jinsuke, On an investigation of whistling atmospherics in Japan. Nagoya. Univ. Research Institute of Atmospherics, Proceedings, 4:29-47, Dec. 1956. 17 figs., 3 tables, 9 refs., eqs. DWB--As part of the Study Program of I. G. Y., we have prepared an observation of whistling atmospherics. Since Jan. 1956, continuous observations of whistlers have been made at Toyokawa (geomag. lat. 24.5°). Simultaneous observations at Toyokawa and Wakkanai (geomag. lat. 35.3°) were made for one month beginning July 13, 1956. The results obtained in the analysis of the dispersion of whistlers were essentially similar to those reported by STOREY. But, at Toyokawa, long whistlers, whistler trains and whistler pairs have not been observed, only short whistlers being observed. The greater part of the observed whistlers occurred in winter; in other seasons it was scarcely possible to detect them. At Wakkanai, long whistlers and whistler pairs have been observed this summer, but whistler trains have not been observed during this period. (Met. Abst. 9.4-282.)--Authors' abstract.

D-335 Iwanowska, Wilhelmina, Fale radiowe pochodzenia kosmicznego. (Radio waves of cosmic source.) Przeglad Meteorologiczny i Hydrologiczny, Warsaw, No. 2-4:3-10, Dec. 1948. fig. English summary p. 10. DWB--The entire spectrum of radiation from the ultraviolet to the long wave radio frequencies (10^{-5} to 10^{5} cm) is shown graphically and a general discussion of theories as to their origin (solar and cosmic) and the influence of magnetic fields of sun and earth thereon, included. The relation of sunspots and other factors to radio emissions is also reviewed. (Met. Abst. 2.7-182.)--M. R.

D-336 Jacchia, L. G., Solar effects on the acceleration of artificial satellites. Smithsonian Institution. Astrophysical Observatory, Special Report No. 29, Sept. 21, 1959. 15 p. 4 figs., 2 tables, 8 refs. DWB--Four types of fluctuations are described and explained. Those following the rhythm of the solar flux at 2800 Mc probably reflect variations in atmospheric density caused by variable short wave solar radiation. A slow fluctuation connected with the position of the perigee with respect to the sub-polar, reflects a difference in the density profiles of the bright and dark hemispheres of the earth. Transient fluctuations accompanying magnetic storms should reflect a heating of the atmosphere through some interaction with corpuscular radiation. Erratic fluctuations of unexplained origin indicate a connection with conditions in the radiation belts. The diagrams illustrate the correspondence of the different accelerations by each solar disturbance. The secular accelerations for three satellites, as well as relative positions of sun and perigee for them, are shown in tables. (Met. Abst. 11.12-550.)--O. T.

D-337 Jackson, J. E., Effect of oblique propagation paths upon the NRL rocket studies of the ionosphere. U.S. Naval Research Laboratory, NRL Report, 4960, July 23, 1957. 15 p. 7 figs., 3 tables, 7 refs. (Upper Atmosphere Research Report, No. 29). DWB (M11 U58u)--Results of ten years of vertical propagation tests from signals emitted by rockets are reviewed and the anomalous conditions discovered when paths were inadvertently oblique, discussed in detail. Effects due to the earth's magnetic field, to reflected rays and rocket roll are considered for the vertical case and effects due to bending of rays considered for the oblique case, as exemplified by the flight of Aerobee-Hi-NRL-50. The corrections for electron densities as calculated from this oblique case are also treated. These corrections are 1) for changing electron density along successive propagation paths, and 2) variation in angle between propagation path and geomagnetic field (near peak of path). (Met. Abst. 12.4-129.)--M. R.

D-338 Jacobs, George (Dept. Editor, CQ), DX and the sun, Pt. 1-2. CQ, Radio Amateur's Journal, N. Y., 9(7):15-18, 60-61, July 1953 and 9(8):20-21, 59, Aug. 1953. 7 figs., photo. DWB--This article has been written for the "DX-hound", the radio amateur ever eager to pick up a station from Distance X (the greatest possible distance) over high frequency ionospheric radio communication. Pt. I gives basic knowledge on sunspot cycles and ionospheric conditions and on their effect on radio propagation. Diagrams showing past and present sunspot cycles and correlation between sunspot numbers and critical frequencies are presented. Daily and seasonal solar variations and their effects are also discussed and illustrated. Pt. II explains the role of the ionosphere in absorption of radio waves of varying length and the effect of solar activity on this absorption; a forecast of general propagation conditions is given for 1953-56. (Met. Abst. 6D-182.) --G. T., M. R.

D-339 Jansky, Karl Guthe, Directional studies of atmospherics at high frequencies. Institute of Radio Engineers, N. Y., Proceedings, 20(12):1920-1932, Dec. 1932. 14 figs., table, 6 refs. DLC--Describes a series of experiments as conducted at Holmdel, N. J., from Aug. 1931 in order to study the direction of arrival and the intensity of static using a 14.6 m radio system, which is illustrated and described in block diagrams. Three distinct groups of static were recorded: 1) From local thunderstorms; 2) from the Heaviside layer; and 3) from unknown source. The latter with an intensity $\not>$ 0.39 microvolt per meter for 1 Kc band width. Apparently this static is associated somehow with the sun. Closer studies are required. --W. N.

D-340 Jansky, K. G., Radio waves from outside the solar system. Nature, London, 132(3323):66, July 8, 1933. ref. DLC--Based on new records the author found that the source of static is a region stationary with respect to the stars, the right ascension of this region is established within ± 30 min. Mention is made to the earlier assumption (1932) that the source of static was somehow associated with the sun which was disproved. --W. N.

D-341 Jansky, K. G., Electrical disturbances apparently of extraterrestrial origin. Institute of Radio Engineers, N. Y., Proceedings, 21(10):1387-1398, Oct. 1933. 9 figs., 3 refs. DLC--Electromagnetic waves of an unknown origin were detected during a series of experiments on atmospherics at high frequencies. Directional records have been taken of these waves for a period of over a year. The data obtained from these records show that the horizontal component of the direction of arrival changes approximately 360° in about 24 hrs in a manner that is accounted for by the daily rotation of the earth. Furthermore, the time at which these waves are a maximum and the direction from which they come at that time changes gradually throughout the year in a way that is accounted for by the rotation of the earth about the sun. These facts lead to the conclusion that the direction of arrival of these waves is fixed in space; i. e., that the waves come from some source outside the solar system. Although the right ascension of this source can be determined from the data with considerable accuracy, the error not being greater than $\pm 7.5^\circ$, the limitations of the apparatus and the errors that might be caused by the ionized layers of the earth's atmosphere and by the attenuation of the waves in passing over the surface of the earth are such that the declination of the source can be determined only approximately. Thus the value obtained might be in error by as much as $\pm 30^\circ$. The data given for the coordinates of the region from which the waves seem to come show a right ascension of 18 hrs and a declination of -10°. (Met. Abst. 9A-1.)--Author's abstract.

D-342 Jansky, K. G., A note on the source of interstellar interference. Institute of Radio Engineers, N. Y., Proceedings, 23(10):1158-1163, Oct. 1935. 2 figs., 4 refs. DLC--Enhanced radiation energy was observed whenever the antenna was directed at the Milky Way, perhaps because of the greater star density. Another plausible explanation is that the enhanced radiation is due to secondary radiation caused by high speed particle bombardment from the stars. --W. N.

D-343 Jansky, K. G., Minimum noise level obtained on short wave radio receiving systems. Institute of Radio Engineers, N. Y., Proceedings, 25(12):1517-1530, Dec. 1937. 13 figs., 15 refs. DLC--Experiments with radio equipment developed at the Holmdel Radio Laboratories, New Jersey, of Bell Telephone Laboratories Inc., are described. The purpose was to check the noise level in absence of atmospheric and man made interference on radio communication. The extraterrestrial noise observed on 14 m, 16.7 m, and on 32.2 m comes from the Milky Way.--W. N.

D-344 Jansky, C. M., Jr., The beginnings of radio astronomy. American Scientist, New Haven, Conn., 45(1):5-12, Jan. 1957. photo. DLC--A biography of KARL GUTHE JANSKY (1905-1950). Recounts briefly family history, his brother's education and circumstances under which he became an employee of the Bell Telephone Laboratories in 1928. Reviews KARL JANSKY's work from 1928-1932 which led to the discovery which furnished the foundation for the science of radio astronomy. Closes with the statement that KARL JANSKY's "philosophy of life was that of a true scientist - perserverence, the accumulation of data, objectivity in analysis, modesty, credit to others for their contributions, and a willingness to leave the ultimate evaluation of one's work to the future." (Met. Abst. 9A-167.)--M. L. R.

D-345 Jansky, C. M., Jr., The discovery and identification by Karl Guthe Jansky of electromagnetic radiation of extraterrestrial origin in the radio spectrum. Institute of Radio Engineers, N. Y., Proceedings, 46(1):13-15, Jan. 1958. 2 refs. DLC--December 1957 marks the 25th anniversary of the completion of Karl Guthe Jansky's field studies which proved that electromagnetic waves in the radio spectrum of extraterrestrial origin were reaching the earth. April 1958 will mark the 25th anniversary of the date on which this basic discovery was disclosed in full to the scientific world. This paper describes briefly the steps which led to Jansky's basic discovery, some of the important results of later studies in radio astronomy, and the relationship between pure and applied science illustrated by the basic discovery and subsequent work in this field. (Met. Abst. unpub.)--Author's abstract.

D-346 Japan. Science Council. Ionosphere Research Committee, Catalogue of disturbances in ionosphere, geomagnetic field, field intensity of radio wave, cosmic ray, solar phenomena and other related phenomena, No. 10, the 31st cooperative observation, June 10-July 10, 1951. (1951?) 39 p. graphs, tables. DWB--This observation period is especially interesting owing to a great solar eruption with two severe magnetic storms and a conspicuous decrease of cosmic ray intensity.

A photo of the eruption is added and the observation results are presented in numerous graphs and tables. (Met. Abst. 6D-71.)--A. A.

D-347 Jasik, Henry (Jasik Labs., Westbury, N. Y.), A wide band antenna system for solar noise studies. Institute of Radio Engineers, N. Y., Proceedings, 46(1):135-142, Jan. 1958. 11 figs. DLC--A wide band antenna system has been developed as part of a sweep frequency spectrum analyzer for solar noise studies in the 100 mc to 600 mc frequency range. The antenna system consists of an equatorially mounted 28 ft paraboloid illuminated by a unique feed combination which operates over the frequency range in three over-lapping bands. Development of the antenna system has been carried out with the aid of scale models and two full size systems have been constructed. The resulting antenna has an effective area which is reasonably constant over the entire range before reflection losses are considered. The feed configuration is described and performance characteristics are given. (Met. Abst. 11.8-54.)--Author's abstract.

D-348 Jaye, W.E.; Dyce, R.B. and Leadabrand, R.L. (all, Stanford Res. Inst. Menlo Park, Calif.), Radar echoes obtained from Earth satellites 1957 Alpha and 1957 Beta. Planetary and Space Science, N. Y., 5(1):50-58, Jan. 1961. 7 figs., 7 refs., 2 eqs. DWB--On 16 occasions, radar echoes were obtained from the first Russian earth satellite, 1957 Alpha, by allowing the satellite to pass through the antenna beam, which was aimed at the point of closest approach. Forty-eight echoes were obtained from 1957 Beta, the largest apparent cross section being 437 m^2. A median cross section of 1.8 m^2 was obtained. The echo exhibited a cyclic amplitude fluctuation which was observed to be as low as 0.1 c/s and as fast as 0.9 c/s. Although calculations indicate that ionospheric Faraday rotation was present in many cases, the amplitude fluctuation of the back scattered echo generally prevented its identification. One occasion is reported of a rapid, irregular amplitude fluctuation imposed on the echo by aurora. (Met. Abst. unpub.)--Authors' abstract.

D-349 Jelley, J.V., Čerenkov radiation and its applications. Published for the United Kingdom Atomic Energy Authority. N. Y., Pergamon Press, 1958. 304 p. figs., tables, bibliog. (p. 289-296), eqs. Price: $10.00. DWB, DLC (QC475.J42). Review by E.P. Kincks in Science, Wash., D.C., 129(3358): 1273, May 8, 1959.--The first thorough review in book form of the theoretical, experimental and applied aspects of this peculiar form of radiation named Čerenkov radiation after its discoverer. The field is narrow but touches on nuclear physics, optics, high frequency radio techniques, astrophysics and cosmic rays. The faint, bluish-white light, given off by transparent objects in proximity to radioactive sources, was first noticed in 1910 by MADAM CURIE, was studied by L. MALLET in 1926-1929, but was not identified and explained until 1934-1938. Applications to measurement of speed of high energy particles, night airglow, cosmic rays, etc., arose from the use of the photomultiplier and the resulting scintillation counter. Generation of microwaves by Čerenkov radiation is also considered. The photomultiplier and Čerenkov detectors are treated in detail. Optical considerations, design of counters, Čerenkov radiation in the atmosphere, gas counters and miscellaneous aspects are treated in several chapters. Light pulses from the night sky were discovered during cosmic ray shower in 1953. (Met. Abst. 11B-65.)--M. R.

D-350 Jelley, J. V. (Atomic Energy Res. Estab., Harwell, Eng.), Čerenkov radiation in the atmosphere. Planetary and Space Science, N. Y., 1(2):105-111, April 1959. 4 figs., table, 18 refs., 6 eqs. DWB--The bursts of large numbers of electrons produced in the atmosphere by cosmic ray air showers give rise to Čerenkov radiation in the air. The showers are, therefore, accompanied by light pulses of short duration; these may be detected quite easily with simple apparatus on a clear dark night. This phenomenon, which was discovered by the author and his colleagues in England in 1953, has been studied in more detail by two groups, one in the U. S. S. R. and one in Australia. In this article, the writer reviews the theoretical and experimental work that has been done up to the present time, and discusses the potentialities and limitations of the technique as a new tool for cosmic ray research. The paper concludes with a few remarks on the future possibilities in this field, and the likely technical developments. (Met. Abst. 11.2-198.)--Author's abstract.

D-351 Jennison, R. C., The radio exploration of space. British Interplanetary Society, Journal, 14(6):307-314, Nov./Dec. 1955. DLC--The general principles and applications of radio astronomy are outlined, and reference is made to the various types of radio telescopes in use at present. A short account is given of the detection of meteor activity, the aurora, and the moon by radar techniques; the remainder of the paper describes the various aspects of radio astronomy associated with the emission of radio noise. (Met. Abst. 9A-77.)--Author's abstract.

D-352 Jennison, R.C. (Nuffield Radio Astronomy Obs., Jodrell Bank), Radio astronomy from artificial satellites. The New Scientist, London, 8(211):1450-1452, Dec. 1, 1960. 4 figs. --The part of the spectrum from which extraterrestrial signals are observable at the earth's surface is limited. Very little is known about the spectrum of frequencies below about 15 Mc/s. Observations from satellites in these frequency bands have not yet been made because of the difficulties of producing a sufficiently large aerial. A solution to this problem would be the use of long lengths of conducting material in the form of a sprung coil of concave section which could disgorge itself rapidly to form a long straight conducting element. An alternative would be wires mounted on reels with weights at their ends which, when released, would extend straight outward under the action of centrifugal force. --R.B.

D-353 Johnson, Francis S. (Lockheed Aircraft Corp., Palo Alto, Calif.), Temperatures in the high atmosphere. Annales de Geophysique, Paris, 14(1):94-108, Jan./March 1958. 11 figs., 15 refs. French and English summaries p. 94. DLC--The temperature distribution of the high atmosphere is discussed on the assumption that the ionosphere is heated primarily by solar radiation and that the temperature distribution is controlled by thermal conduction. A model is presented which agrees well with the rocket observations and with most of the radio observations, and in which the thermal conduction is consistent with the absorption of solar energy. The amounts of solar energy are in agreement with the rocket observations in those spectral regions in which observations have been made. However, no observations have been made in the spectral region which is most important with regard to controlling the temperature of the F region of the ionosphere. The amount of solar energy which must be assumed to be present in this spectral region in order to give a thermally consistent model with temperatures as high as those required by rocket and radio observations is not unreasonable from an astrophysical viewpoint. (Met. Abst. 12E-115.)--Author's abstract.

D-354 Johnson, F.S. (Lockheed Missiles and Space Div., Calif.), The exosphere and upper F region. Journal of Geophysical Research, Wash., D.C., 65(9):2571-2575, Sept. 1960. 4 figs., 19 refs. DLC--The view is presented that the outer portion of the earth's ionosphere, through which radio whistlers propagate, has its origin in the earth's atmosphere rather than in interplanetary space. The outer portion of the earth's neutral particle exosphere is dominated by neutral atomic hydrogen which is escaping steadily from the earth's atmosphere. Some of this neutral atomic hydrogen reacts with atomic oxygen ions near the base of the exosphere, giving rise to hydrogen ions. Diffusive equilibrium is the dominant factor controlling the relative concentration of ions and neutral particles near the base of the exosphere. At higher levels, the geomagnetic field exerts an influence in that it causes the ions and electrons to rotate with the earth, and the centrifugal force modifies the force of gravitational attraction appreciably. The ion electron plasma through which the radio whistlers propagate is hydrostatically supported within the magnetic tubes of force. (Met. Abst. 11.12-400.) --Author's abstract.

D-355 Johnson, F.S. (ed.) (Lockheed Aircraft Corp., Palo Alto, Calif.), Satellite environment handbook. Stanford, Calif., Stanford Univ. Press, 1961. 155 p. figs., tables, eqs., refs. at end of each chapter. DLC--This handbook contains a comprehensive summary of available data describing the geophysical environment encountered by artificial Earth satellites. The major satellite environment factors, the structure of the upper atmosphere and the ionosphere, penetrating particle radiation, solar radiation, micrometeorites, radio noise, thermal radiation from Earth, and geomagnetism are discussed, and existing data are evaluated. The various known sources of the penetrating radiations found in space are summarized by type of radiation, flux, particle energy. Comments and references for each type are included. The following supplementary data are included in the appendix: solar system data; earth satellites and space probes to April 24, 1961; conversion factors; and useful physical constants. (Met. Abst. unpub.)--E.Z.S.

D-356 Johnson, M.H. (Rad. Lab., Univ. of Calif.), The connection between lunar height changes and lunar currents in the E layer. Journal of Geophysical Research, 59(2):247-251, June 1954. 4 refs., 15 eqs. MH-BH--The height changes produced by vertical electronic diffusion in the presence of negative ions are examined in some detail. Application of the results to the E layer shows that a previous qualitative discussion remains valid. (Met. Abst. 6D-247.)--Author's abstract.

D-357 Jones, I.L. (Cavendish Lab., Cambridge), Further observations of radio stellar scintillation. Journal of Atmospheric and Terrestrial Physics, London, 19(1):26-36, Sept. 1960. 6 figs., 17 refs. DLC--Observations are described of the scintillation of the radio signal received from the radio star in Cassiopeia on a frequency of 38 Mc/s. Further experimental results are presented to support SPENCER's (1955) evidence that the irregularities responsible for the radio stellar scintillation are elongated with their long axes along the lines of force of the earth's magnetic field. An estimate of the size of the irregularities in the ionosphere is made, and a marked decrease in the long axis of the irregularities is found as the elevation of the radio source decreases. Evidence is put forward which suggests that turbulence is unimportant on most occasions in the region responsible for the scintillation. (Met. Abst. 11.12-34.)--Author's abstract.

D-358 Jones, Robert E., Ionosphere research. Pennsylvania. State College, Ionosphere Research Laboratory, Contract AF 19(122)-44, Final Report, March 25, 1949-Jan. 31, 1955. Jan. 31, 1955. 105 p. bibliog. Mimeo. DWB--Over 200 reports and scientific papers, which have emanated from this project in 5½ yrs, are listed and abstracts given on all of the scientific reports. Personnel and history of the project are also outlined. The investigations cover a wide range of studies on the ionosphere, especially the lower ionosphere. These are listed and discussed under the following heads: 1) Low frequency (long wave) studies; 2) Electromagnetic studies (wave solutions, coupling theory and total polarization); 3) Ionospheric physics (solar and high atmospheric physics, D region viscosity, dynamics of ionized media, effect of vertical ion transport); 4) Ionospheric properties (coupling phenomena, E layer characteristics, ionospheric winds and wave interaction); 5) Applied propagation investigations (oblique incidence studies); 6) Extra terrestrial studies (ring current and electrodynamics of very high atmosphere); and 7) Long wave equipment development. (Met. Abst. 72.1.)--M.R.

D-359 Kakinuma, Takakiyo, Polarization of solar radio bursts at microwave frequencies, Pt. 1. Nagoya Univ. Research Institute of Atmospherics, Proceedings, 5:71-80, March 1958. 6 figs., 2 tables, 6 refs. DWB--The intensity and polarization of solar radio bursts have been observed at 9400, 3750, 2000 and 1000 Mc/s since July 1957. In this paper the results of observations during 6 months are described. In most bursts at microwave frequencies, the difference in the intensity of two circularly polarized components is observed. At 3750 Mc/s, the bursts of small degree of polarization (less than 10%) are predominant, compared with other frequencies. At 200 and 1000 Mc/s the circularly polarized bursts were occasionally observed, but not at 9400 and 3750 Mc/s and at 3750 Mc/s the linearly polarized components were not observed. In most bursts observed at four frequencies, the sense of polarization reverses near 3750 or 2000 Mc/s and the degree of polarization is generally small at 3750 Mc/s. At 9400 Mc/s, it seems that the sense of polarization correlates with the position of the source on the solar disk. Further observations will be continued to investigate the relation between them. (Met. Abst. 10.3-202.)--Author's abstract.

D-360 Kakinuma, Takakiyo (Nagoya Univ.) and Hiei, Eijiro (Tokyo Astron. Obs.), Unusual decrease of microwave solar radio emission during flare on Nov. 30, 1959. Astronomical Society of Japan, Tokyo, Publications, 12(1):117-123, 1960. 3 figs., 2 refs.--Unusual decrease of microwave solar radio emission on Nov. 30, 1959, observed at the Research Institute of Atmospherics, Nagoya University is reported, together with the optical observations of the associated flare made at the Tokyo Astronomical Observatory. (Met. Abst. 11L-95.)--Authors' abstract.

D-361 Kallmann, H. K. (Calif. Univ., Los Angeles), The continuous layer formation in the atmosphere under the influence of solar radiation. Physical Review, 90(1):153-154, April 1, 1953. 2 figs., 5 refs. DWB--The continuous increase or decrease of electron density with height under influence of a quiet and a disturbed sun was investigated. The results, presented in diagrams, correspond to the order of magnitude of frequencies as used by the radio technician for E layer reflections. (Met. Abst. 5.5-235.)--W. N.

D-362 Kallmann, H. K., Tentative absorption and emission spectra of the atmosphere. California. Univ. Institute of Geophysics, Contract AF 19(604)-111, Scientific Report, No. 2, June 30, 1954. 29 p. almost entirely tables, 52 refs. DWB--Tables of upper atmosphere absorption and emission spectra have been prepared. The absorption spectrum covers a wavelength range from 24 microns to about 300 A. The emission spectra start at 2.8 and end at 3100 A. The spectra are arranged in decreasing order of wavelengths. The presentation of these tables is based on an extensive literature survey made on the subject; 52 references are given. It should be pointed out, however, that the identification of the element absorbing or emitting a certain wavelength in several cases is doubtful and might be open to discussion. Whenever possible, approximate heights, where these absorption or emission in the atmosphere may occur, are indicated. Here again, these heights are only tentative. Nevertheless, it is hoped that these tables may be useful to workers in various fields of upper atmospheric research. (Met. Abst. 7.1-221.)--Author's abstract.

D-363 Kallmann, H. K.; Kellogg, W. W.; Rapp, R. R. and Greenfield, S. M., Scientific use of an artificial satellite. Rand Corporation, Santa Monica, Calif., Paper 733, Sept. 6, 1955. 22 p. 26 refs. DWB (M055 R186p)--An early review of general areas where there are possible uses for earth satellites in studies of solar radiation, in the UV and X-ray region, electron density measurements; pressure, density and atmospheric composition measurements; cosmic rays, albedo of the earth, artificial seeding of the atmosphere, geodetic measurement, and cosmic or solar high frequency radio noise. (Met. Abst. 11J-83.)--M. R.

D-364 Kamiya, Yoshiko (Physical Inst., Nagoya Univ.) and Wada, Masami (Inst. of Physical and Chemical Research), Cosmic ray storms and solar radio outbursts. Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere and Space Research in Japan, 13(2):105-111, 1959. 4 figs., 2 tables, 9 refs. DLC--Relations between the type of solar radio outburst, cosmic ray storm and magnetic storm are studied using the data obtained during IGY, and the following results are obtained. 1. Almost all cosmic ray storms are associated with Type IV solar radio outbursts. 2. The other types of outbursts are not related to cosmic ray storms. 3. The size of a cosmic ray storm is independent of the meridian distance of the radio outburst, but that of a magnetic storm depends on it. From these results, it can be concluded that a large corpuscular cloud with magnetic field is emitted simultaneously with Type IV solar radio outburst occurrence and it has a small core which is the cause of the magnetic storm. (Met. Abst. 11.8-89.) --Authors' abstract.

D-365 Kamiyama, Hiroshi (Tohoku Univ.), Variation of the effectiveness of the solar flare according to its location. Tohoku University, Science Reports, 5th Ser., Geophysics, 4(1): 1-4, June 1952. 3 figs., 2 tables, 5 refs. MH-BH--A statistical method is adopted for investigation of the longitudinal effect of a solar eruption upon radio communication. Six hundred and forty eruptions were observed and analyzed during the past four years. The most pronounced effect was found at $30^{\circ}E - 10^{\circ}W$ decreasing to a half beyond both 50° meridians. Results are presented in curves and tables. (Met. Abst. 5.3-308.)--W. N.

D-366 Karpov, A. N., Izmenenie sily radiosignalov vo vremia solnechnogo zatmeniia 30 iiunia 1954 goda. (Change of radio signal intensity during the solar eclipse of June 30, 1954.) Priroda, Moscow, 44(5):113, May 1955. fig. DLC--Reception of short wave radio signals during solar eclipses when radiation flow is shut off by the moon is one of the methods of studying the ionized oxygen layer. Such a study was carried out on the morning of June 30, 1954, at the Stalingrad Medical Institute during reception of radio signals from the Moscow radio station with about 25 m wave length. The received signals were compared with signals of a 2 scale sound generator enabling to change smoothly the frequency and level of the signals within one decibel. It has been established that during the eclipse the intensity of the signals decreased by 48 decibels, and dropped almost to zero at the midpoint of the eclipse. An attached graph shows that the attenuation curve of the radio signal reception coincides almost completely with the phases of the eclipse. This denotes the comparatively large speed of recombination of ionized particles in the atmosphere in the absence of solar radiation, and the great sensitivity of the layer to all changes of solar activity. (Met. Abst. 9A-78.)--A. M. P.

D-367 Kato, Yoshio; Kamiyama, H. and Kikuchi, Takehiko, Report on the result of the observation of the signal strength during the partial solar eclipse of Sept. 12, 1950. Sendai, Japan. Tohoku Univ., Science Report, 5th Ser. Geophysics, 3(2):53-56, Sept. 1951. 3 figs., 2 tables. DWB--Measurements of the signal strength of radio waves were made during the half month in which the partial solar eclipse occurred in order to study the behavior of the lower ionosphere. (Met. Abst. 6D-75.)--A. A.

D-368 Kato, Yoshio and Watanabe, Tomiya (both, Geophysical Inst., Tohoku Univ., Sendai), Studies on P.S.C. (Polar sudden commencements). Japan. Science Council. Ionosphere Research Committee, Report on Ionosphere Research in Japan, 10(2):69-80, 1956. 6 figs., 2 tables, 18 refs., 10 eqs. DWB--Facts obtained from observations of p.s.c. suggest that its origin is outside the ionosphere. Particularly, the daily behavior of the horizontal perturbing vector of p.s.c. can be explained by the shielding effect of the non-uniform ionosphere. (Met. Abst. 11F-64.)--Authors' abstract.

D-369 Kazantsev, A. N. (Academy of Sciences of the U.S.S.R.), Absorption and electron distribution in the F2 layer determined from measurements of transmitted radio signals from earth satellites. Planetary and Space Science, N.Y., 1(2): 130-135, April 1959. 6 figs., 3 refs., 7 eqs. DWB--Comparison is made between measured field strengths of transmitted signals from earth satellites and those theoretically predicted when the transmitter position is in the region of maximum electron concentration of the F2 layer, below it, and above it. The observed absorption value agrees best for a biparabolic distribution with exponential continuation with $K = 8 \times 10^{-3}$ where the electron concentration is given by $N = N_o e^{-kh}$. The number of electrons per column in the upper region of the F2 layer is deduced to be 1.5×10^{13} electrons per cm^2. This value is compared to the findings of BURGESS. Curves are given of field strengths at distances greater than 10,000 km. At distances of 16,000 km the formation of ionospheric wave guides makes possible the transmission of radio signals. (Met. Abst. 11E-74.)--Author's abstract.

D-370 Kazès, Ilya and Steinberg, J.L., Etude du rayonnement radioelectrique solaire sur 9350 MHz au voisinage du coucher et du lever soleil. (Study of radio electric solar radiation at 9350 MHz at the vicinity of sunset and sunrise.) Academie des Sciences, Paris, Comptes Rendus, 240(5): 493-495, Jan. 31, 1955. 2 figs. DLC--A study of atmospheric absorption and refraction. CSIRO Abstract.

D-371 Kazès, I., Etude de la scintillation du soleil observee sur la longueur d'onde de 3.2 cm. (Study on solar scintillation observed on 3.2 cm wavelength.) Academie des Sciences, Paris, Comptes Rendus, 245(6):636-639, Aug. 5, 1957. 2 figs., 3 refs. Also: Kazes, I. and Steinberg, Jean-Louis, Etude de la scintillation du soleil observee avec plusieurs antennes sur la longueur d'onde de 3.2 cm. (Study of solar scintillation observed with several antennas on 3.2 cm wavelength.) Ibid., 245(7):782-785, Aug. 12, 1957. 3 figs., 2 refs. DWB--Fluctuations in solar radiation at 3.2 cm wavelength are shown to be of atmospheric origin. Effects of solar activity, wavelength and zenith distance on these fluctuations are discussed. According to the second paper the fluctuations were identified as shadow zones whose movements showed qualitative agreement with winds at the height of the tropopause. (Met. Abst. 9A-171.)--G.T.

D-372 Kazès, I. and Steinberg, J.L., Etude de la scintillation du soleil observee avec plusieurs antennes sur la longueur d'onde de 3.2 cm. (Study of the sun's scintillation observed by means of several antennae on 3.2 cm wavelength.) Academie des Sciences, Paris, Comptes Rendus, 245(7):782-785, Aug. 12, 1957. 3 figs., 2 refs. DLC--Scintillation measurements made with three receivers located at variable distances allowed to state precisely the average size (170 m) of cast shadows on the soil and to compare their speed with the wind velocity at tropopause altitude. In spite of the distance between stations, and the differences of several hours existing between meteorological and radioelectrical observations, winds of same directions are always observed. Scintillations are very likely produced in the low atmosphere at an altitude close to the irregularities responsible for optic scintillations. (Met. Abst. 10.1-344.)--A.V.

D-373 Kell, R.E. (Cornell Aeronautical Lab.), The effect of Doppler broadening upon radar cross section of a plasma surrounded body. Planetary and Space Science, N.Y., 6:225, June 1961. Abstract only. The paper was presented at the Plasma Sheat Symposium, Boston, Mass., Dec. 7-9, 1959. --The radar signal scattered from a plasma may be considered as the vector sum of the signals scattered from the individual electrons of the plasma. If the electrons have a component of motion radial with respect to the radar, the signal from each electron will possess a Doppler shift in accordance with its radial velocity, and an originally monochromatic illuminating electromagnetic wave will be scattered as a non-monochromatic spectrum of waves, where the spectral distribution represents the distribution of radial velocity for the electrons. The effects of Doppler spectral broadening upon radar cross section will be discussed, and experiments to determine the magnitude and shape of the broadened spectrum will be described.

D-374 Kellogg, William W. (Rand Corp., Santa Monica, Calif.), IGY rockets and satellites: a report on the Moscow meetings, Aug. 1958. Planetary and Space Science, N.Y., London, 1(1):71-84, Jan. 1959. 5 refs. DLC--This report summarizes the proceedings of the Technical Symposia on Rockets and Satellites. Tremendous strides have been made in the exploration of the upper atmosphere and the space beyond by new vehicles. In the summary, the subject matter rather than the vehicle is the central theme. The summary includes chapters on: 1) atmospheric structure; 2) electromagnetic properties of the ionosphere; 3) cosmic and auroral particles; 4) solar and stellar ultraviolet and X-ray radiation; 5) micrometeorites; 6) biological experiments; 7) rocket and satellite instrumentation and special applications; 8) reviews of rocket programs; and 9) satellite programs. (Met. Abst. 11I-161.)--E.K.

D-375 Kellogg, W.W., Review of IGY upper air results. Rand Corp., Santa Monica, Calif., Paper 1717, June 5, 1959. 21 p. 5 figs., numerous refs. DLC--Recent findings concerning conditions in the stratosphere, mesosphere, and ionosphere are discussed in that order. In the lower stratosphere, improved balloon soundings have made it possible to draw constant pressure charts up to the 10 mb level. Rapid warming processes and the use of ozone and radioactive debris as tracers are briefly discussed. For the higher atmosphere, density and pressure values obtained from rockets and satellites and compiled by KALLMANN (Rand Paper 1591, Jan. 1959) are reproduced to illustrate mean conditions. Diurnal variations in density revealed by NRL rocket observations at Ft. Churchill, and recent data on atmospheric composition from the Univ. of Michigan and NRL are discussed. In the final section, solar terrestrial relationships are taken up, with special mention of the close correlation of 10 to 20 cm radio emanations from the sun with satellite observed densities. (Met. Abst. 11I-160.)--R.S.Quiroz.

D-376 Kelly, Joseph J. (Martin Co., Md.), Earth satellites. Weatherwise, Boston, 8(5):121-122, Oct. 1955. photo. DWB--The value of an earth satellite to meteorology is discussed. Suggested measurements include analysis of specific infrared band from earth, "strength and direction of the high frequency radio communications link as it sweeps through the atmosphere," measurement of solar radiation outside the atmosphere, influence of meteoric dust upon the attenuation of radiation. (Met. Abst. 8.6-63.)--I.L.D.

D-377 Kelso, John M., Doppler shifts and Faraday rotation of radio signals in a time varying, inhomogeneous ionosphere. Pt. 1: Single signal case. Journal of Geophysical Research, 65(12):3909-3914, Dec. 1960. fig., 8 refs., 24 eqs. Also: Pt. 2: Two signal case. Ibid., 66(4):1107-1115, April 1961. DLC--Equations are derived for the frequency shift of a radio signal transmitted to the ground from a space vehicle in or above the ionosphere. The principal restriction on the generality of the results is that the ionosphere is treated as quasi-isotropic; i.e. the ray paths are obtained by methods which would be exact in a slowly varying isotropic medium, but the refractive index is permitted to be a function of ray direction (implying an anisotropic ionosphere). The following conditions prevail: (a) the (slowly varying) ionosphere may be a general function of three spatial coordinates of time; (b) the vehicle may follow an arbitrary (nonrelavistic) trajectory; (c) the magnetic field, which characterizes the dependence of the refractive index on direction, may have arbitrary form. The same conditions as for Pt. 1 are used in Pt. 2. Equations are obtained for the time rate of change of the phase difference between two signals whose refractive indices are slightly different. The results are applied to the frequency shifts experienced in a two frequency Doppler experiment of the Seddon-Jackson type, and to the determination of the rate of Faraday rotation of the plane of polarization. --Author's abstract.

D-378 Kent, G. S. (Cavendish Lab., Cambridge), High frequency fading observed on the 40 Mc/s wave radiated from artificial satellite 1957 α. Journal of Atmospheric and Terrestrial Physics, N. Y., 16(1/2):10-20, Oct. 1959. 8 figs., 9 refs., eq. DWB, DLC--A study has been made of high frequency fading observed on the 40 Mc/s wave radiated from the first Russian satellite (1957 α). This fading had a frequency of a few cycles per second and it is concluded that it was produced by the passage of the waves through irregularities in the F region of the ionosphere. The size and spatial distribution of these irregularities have been examined, and it is found that they are about 1 km in size and that they occur at heights above about 250 km. They usually occur at latitudes greater than 50°N and are more concentrated toward the north. It is likely that their density is controlled by magnetic rather than geographic latitude and there is a tendency for them to be grouped into large areas. These have dimensions of several hundred kilometers and are elongated along the parallels of latitude. Comparison is made of the properties of these irregularities with those believed to be responsible for radio-stellar scintillation and spread F echoes. (Met. Abst. 11E-75.)--Author's abstract.

D-379 Kerr, F. J. and Shain, C. A., Moon echoes and transmission through the ionosphere. Institute of Radio Engineers, Proceedings, 39(3):230-242, March 1951. 12 figs., table, 29 refs., 16 eqs. DLC--Over a year's time, thirty experiments of moon echoes of about 20 Mc frequency were carried out, and these conclusions were drawn: (1) echo intensities lower than expected; (2) minimum altitude of echo higher than expected; (3) anomalous values of echo intensities and minimum detection altitude correlate with foF2; (4) slow fading was consistent with ionospheric origin; (5) fast fading was associated with the moon's libration; (6) millisecond pulses were elongated on reflection from moon, and (7) ray deviations of several degrees in vertical plane apparently occurred. (This paper is of interest to meteorologists because of its negative aspects.) (Met. Abst. 2H-212.)

D-380 Kerr, Frank J.; Shain, C. A. and Kraus, John D., Reflexion of radio waves from the moon. Nature, London, 179 (4556):433, Feb. 23, 1957. 2 refs. DWB--KERR and SHAIN found reflection of 14 m waves from moon of level to be expected from a nonabsorbing isotropic moon; there is no evidence of the specular reflection postulated by KRAUS. KRAUS suggests that reflection was from a cloud of charged particles temporarily associated with the moon. (Met. Abst. 10.2-111.)--C. E. P. B.

D-381 Kerr, F. J., Radio echoes from sun, moon and planets. Handbuch der Physik, Berlin, 52:449-464, 1959. 8 figs., table, numerous refs., 11 eqs. DWB--A review of knowledge up to 1958 of radar echoes and their characteristics, or possible characteristics, when reflected from the moon (since 1946), the sun and the planets (if and when accomplished), and from the ionosphere aurora, meteors, whistlers, etc. Future possibilities are as challenging as the actual performance is remarkable. Radio communications via the moon are discussed in some detail and references cited systematically. (Met. Abst. 11H-73.)--M. R.

D-382 Khaikin, S. E., Radioastronomiia i izuchenie vselennoi. (Radioastronomy and the study of the universe.) Priroda, 45(8):5-14, 1956. 6 figs. (incl. photos). DLC--The author discusses the radio wave radiation of various cosmic bodies both heat radio wave radiation, non-heat radio wave radiation and the theories accounting for radio waves of non-heat origin, the conditions for the propagation of radio waves and the characteristics of radio telescopes, including their sensitivity and resolving power. (Met. Abst. 9A-163.)--I. L. D.

D-383 Kiepenheuer, Karl, The sun. Ann Arbor, Michigan, Univ. of Michigan Press, 1959. 160 p. 76 figs. (incl. photos). DLC (QB521.K613). Transl. by A. J. Pomerans of the original German, Die Sonne, issued Berlin, Springer-Verlag, 1957. 150 p. figs. (Verstandliche Wissenschaft, Vol. 68) DLC (QB521.K6). Review by Ralph Shapiro in American Meteorological Society, Bulletin, 41(5):281-282, May 1960. --A well illustrated and not-too-technical text on the nature of the sun as the only star we can observe in detail, and its relation to terrestrial phenomena. Solar physics, solar research, the solar system (planets, comets, meteors, zodiacal lights, dust and gas); the sun's surface (granulation); solar radiation (use, solar constant, solar temperature, spectrum, spectroscope, chemical composition of sun); solar spectrographs and telescopes; eclipses; sunspots and solar changes (magnetic fields, faculae, flares, filaments, storms, prominences, corona); the interior of the sun; radio waves and bursts and, finally, solar terrestrial and weather relations. (Met. Abst. 11.2-15.)--M. R.

D-384 Kimpara, Atsushi (Nagoya Univ.), S. I. D. phenomena on Nov. 22, 1952. Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere in Japan, 7(4):158, Dec. 1953. DWB--Brief note reporting S. I. D. phenomenon at time of low solar activity, revealing close correlation of solar flares with outburst of solar radio waves. Atmospherics were found to increase an hour before the solar flare. (Met. Abst. 6.8-159.)--G. T.

D-385 Kimpara, A., The sudden ionospheric disturbances on Nov. 22, 1952. Nagoya. Univ. Research Institute of Atmospherics, Proceedings, 2:40-52, Jan. 1954. 11 figs., 5 tables. Append. p. 48. DWB--Despite the period of lower solar activity, a striking S. I. D. phenomenon was observed on Nov. 22, 1952, which revealed the close correlation of solar flare with outbursts of solar radio waves, Dellinger fadeout in short wave communication, characteristic crochets in three components of magnetograms, fadeout of echoes in ionospheric measurements, and an abnormal increase of the intensity of atmospherics at very low frequencies. The author made a detailed study of these relations and found an advance increase of the intensity of atmospherics about an hour before the solar flare. He appends similar results obtained in a more active period (April, May 1952) as a reference, and discusses their characteristics and correlations. (Met. Abst. 6D-249.)--Author's abstract.

D-386 King, G. A. M. (Geophysical Obs., Christchurch, New Zealand), The ionospheric E layer at Cape Hallett. Journal of Atmospheric and Terrestrial Physics, London, 16(1/2): 186-187, Oct. 1959. table. DWB, DLC--Ionograms from April 20 - Aug. 14, 1958 for studying the variations with solar zenith angle of foE using 1-2 Mc/s frequency facilitating separation of UV ionization and that from particle influx are compared against values expected from a model ionosphere. The calculated values of foE are in good agreement with the observed ones. (Met. Abst. 11.12-381.)--W. N.

D-387 Kisliakov, A. G., Rezul'taty eksperimental'nogo issledovaniia radioizlucheniia Luny v chetyrekhmillimetrovom diapazone voln. (Results of an experimental study of radio emission of the Moon in the four millimeter diapason.) Astronomicheskii Zhurnal, Moscow, 38(3):561-563, May/June 1961. 7 figs., 9 refs., 3 eqs. Russian and English summaries p. 561-562. DLC. Transl. into English in the corresponding issue of Soviet Astronomy AJ, N. Y. --Data of the radio emission of the Moon in the four millimeter diapason, obtained during the summer of 1960 by the "Elbrus" expedition of the Radio Physical Institute, are given. It is found that the phase variations of radiation intensity of the Moon can be approximated satisfactorily by the relation $T_\pi = 230 + 73 \cos(\pi t - 24^\circ)\,^\circ K$. The derived results agree with the theory developed for a unilayer model of the lunar surface. (Met. Abst. unpub.)--Author's abstract.

D-388 Kirshnamurthi, M.; Sivarama Sastry, G. and Seshagiri Rao, T. (all, Physical Lab. Osmania Univ., Hyderabad), Radio emission from the sun at 30 Mc/s. Journal of Scientific and Industrial Research, Sec. A, New Delhi, 17(12), Special Supplement, Dec. 1958. p. 71-73. table, 5 refs. DWB, DLC--The observations tabulated and discussed were conducted from May 1 to Aug. 31, 1958 by instrumentation described in detail. No radiation from the direct sun was observed, indicating its temperature at this frequency $<$ 52,000°K since the minimum detectable difference between source and background is calculated to be 40,000°K. Enhanced radiation was observed 40 times, of which only four could be associated with flares. (Met. Abst. 11.6-146.)--W. N.

D-389 Kitchen, F. A. and Joy, W. R. R. (both, Royal Naval Scientific Service), Some effects of the fine structure of the ionosphere on transmissions received from the Russian earth satellite 1958 β. Nature, London, 181(4626):1759-1761, June 28, 1958. 3 figs., table, 7 refs. DWB--After some simultaneous direction finding and Doppler frequency shift measurements had been made on the radio transmissions from the Russian satellite 1958 β, on a frequency of 20.005 Mc/s with the initial object of obtaining the parameters of local tracks and those of the orbit, the authors set up a table for Portsdown, England, during the period May 16-22, 1958. Interesting anomalies observed then are listed. (Met. Abst. 10.8-95.)--N. N.

D-390 Klee, Ernst (Munich), Satellitenprogramm der Volkssternwarte Munchen. (Satellite program of the National Astronomical Observatory at Munich.) Naturwissenschaftliche Rundschau, Stuttgart, 11(1):7-8, Jan. 1958. fig. DWB, DLC--In order to record the continuing line emitted by Sputnik at a frequency of 40.002 MHz after it had ceased to broadcast at 20.005 MHz, the National Astronomical Observatory obtained a new receiver which includes the region 30-180 MHz with an entrance sensitivity of 0.1 μV. With this receiver 36 curves were obtained during the period Oct. 10-Oct. 24, 1957. The diagram (reproduced in this paper) shows a satellite passage on Oct. 13th. The curves show a distinct maximum at 22 hrs 13 min 47 sec, that is, 17 sec after passing over Paris. A marked impulse peak is apparent at 22 hrs 16 min 45 sec as the satellite enters the U.S.S.R. The intensity of this signal which attains 2/3 of its maximum at a distance of about 1000 km may indicate that a measurement signal is emitted either from the satellite or from a ground station at the same frequency. (Met. Abst. 11.1-111.)--I. L. D.

D-391 Klein, M.M.; Greyber, H.D.; King, J.I.F. (all, Missile and Space Vehicle Dept., Gen. Elec. Co., Phila.) et al., Interaction of a non-uniform plasma with microwave radiation. Planetary and Space Science, N.Y., 6:105-115, June 1961. 7 figs., 7 refs., 50 eqs. DWB--The topic is discussed in terms of normal and non-normal incidence of radiation. The latter case in the short wavelength region only. Absorption coefficient varies insignificantly, remains large over range of angles of incidence, dropping off rapidly beyond 45°. --W. N.

D-392 Klinger, Hans Herbert, Solare und kosmische Radiowellen. (Solar and cosmic radio waves.) Experientia, Basel, 8(9): 325-336, Sept. 15, 1952. 14 figs., 3 tables, refs., eqs. English summary p. 336. DWB--After discussing the physics of black body radiation and its reception, author describes and illustrates solar radio radiation of 3 types — constant thermic radiation from the spot-free sun, sunspot radiation and eruptive radiation. Cosmic radio waves are also discussed and analyzed. (Met. Abst. 4.9-105.)--C.E.P.B.

D-393 Knuth, Robert; Klinker, Ludwig; Schmelovsky, Karl Heinz (all, Obs. fur Ionosphärenforschung, Kühlungsborn) et al., Die Elektronenkonzentration in der ausseren Ionosphäre: Messungen des Sommers 1959. (The electron concentration in the outer ionosphere: measurements in the summer of 1959.) Beiträge zur Geophysik, Leipzig, 70(4):201-212, 1961. 6 figs., table, 10 refs., eqs. German and English summaries p. 201. DWB, DLC--From Faraday fading measurements during summer 1959 the formerly received results are generally confirmed. The diurnal variation of electron content deduced from two-hourly means has a slight but distinct minimum just after noon. The observed decrease in electron content since summer 1958 is not significant. The plasma scale heights for summers 1958 and 1959, calculated by different methods, agree in a sufficient manner. The total electron number decreases toward south (mean value 0.6%/100 km). This gradient shows diurnal variations with the maximum at noon. Former investigations about statistical relations between the irregular variations of electron content and those of foF2 are continued. For the disturbed periods of July and Aug. 1959 marked pre-storm increases are found as formerly reported. (Met. Abst. unpub.)--Authors' abstract.

D-394 Ko, H.C., The distribution of cosmic radio background radiation. Institute of Radio Engineers, N.Y., Proceedings, 46(1):208-215, Jan. 1958. 12 figs., table, 34 refs. DLC--The results of a survey of cosmic radio background radiation at 250 Mc, using the Ohio State University 96 - helix radio telescope, are described. Eight maps for frequencies from 64 Mc to 910 Mc are presented. Radio maps made at other frequencies by various groups are summarized. Comparisons of the maps showed consistent features represented by three symmetrical distributions and several irregular ones discussed. (Met. Abst. unpub.)--From Author's abstract.

D-395 Ko, H.C. (Radio Obs., Dept. of Elec. Eng., Ohio St. Univ.), Amplitude scintillation of extraterrestrial radio waves at ultra high frequency. Institute of Radio Engineers, N.Y., Proceedings, 46(11):1872, Nov. 1958. 3 figs. DWB --Radio stars exhibit fluctuations because of the irregularities in the earth's ionosphere. These irregularities have different radio frequency refractive indexes and thus present some important effects on the propagation of radio waves. Scintillation measurements made from Ohio State University Radio Observatory (lat. 40°01' N; long. 83°03' W) are reported. This is a preliminary report on research that is continuing. (Met. Abst. 11.7-166.)--N.N.

D-396 Ko, H.C., Amplitude scintillation of radio star at ultra-high frequency. Institute of Radio Engineers, N.Y., Proceedings, 48(11):1871-1880, Nov. 1960. 13 figs., 22 refs., eq. DWB--Experimental results of the Cygnus A observations at 915 Mc, as conducted at the Ohio State Univ. Radio Observatory, Oct. 1957-Sept. 1958, are presented graphically and discussed. The observational equipment described included at 400 ft diameter parabolic antenna rotationally tracking Cygnus A from rising to setting. The radio meter was a UHF total power low noise type. The fluctuation rate of scintillation was about 1/2 to 8 peaks per minute and averaged about 15% near horizon. Scintillation decreased rapidly with increased elevation angle, showed marked seasonal but insignificant diurnal variation. K index correlation with fluctuation rate at 915 Mc existed in winter months only. Marked effects of auroras and geomagnetic disturbances indicate mainly ionospheric and, but partially, tropospheric origin of scintillation at 915 Mc.--W.N.

D-397 Koeckelenbergh, A., L'eruption chromospherique du 9 avril 1956 et ses phenomenes associes. (The chromospheric eruption of April 9, 1956, and its associated phenomena.) Ciel et Terre, Brussels, 75(1/2):28-33, Jan./Feb. 1959. 2 figs., 2 pl., 6 refs. DLC--

On April 9, 1956, a particularly intense chromospheric eruption was observed at the Royal Observatory of Belgium. A solar radio jump on 169 MHz was recorded at the same time, at the radio astronomical station at Humain-Rochefort (Belgium) and a practically general disturbance was noted on short waves. The author gives the observation conditions, the optical data and the radioelectric observations made on 169 MHz as concerns this phenomenon. He examines the ionospheric effects and the geomagnetic effects and compares the data gathered. The ionospheric disturbance was preceded by optical, geomagnetic and radioelectric phenomena on meter waves. It began at the moment of the maximum emission on the H line. It probably is connected with a simultaneous reinforcement of this line and of the ultraviolet L line or the solar X radiation. (Met. Abst. 11D-73.)--

D-398 Koeckelenbergh, A., Evolution d'un filament sombre lors de l'eruption solaire du 16 Juillet 1959 (16 h 08 m TU). (Evolution of a dark surge at the time of the solar eruption on July 16, 1959 (16 h 08 m UT).) Ciel et Terre, Brussels, 76(7/8):216-220, July/Aug. 1960. fig., 3 plates, 8 refs. DWB, DLC--Description of the eruption of July 16, 1959, which occurred in a zone of heliographic coordinates 14 N 22 W. At the same time an important dark surge developed which showed a considerable asymmetry of the H α line profile. There is reason to believe that it was an arch shaped prominence. The author gives a summary of the phenomena associated with this eruption. The conditions of ionospheric propagation were highly disturbed from July 15, and a magnetic disturbance was observed on July 17 at the geomagnetic station of Manhay (Belgium). Again a marked agreement was observed between the sudden enhancement of sferics and the optical eruptions. (Met. Abst. 11L-283.)--A.V.

D-399 Komesaroff, M.M. (Div. of Radiophysics, C.S.I.R.O. Univ. Grounds, Chippendale, N.S.W.), Polarization measurements of the three spectral types of solar radio burst. Australian Journal of Physics, Melbourne, 11(2):201-214, June 1958. 6 figs., 2 tables, 8 refs., eqs. DLC--A swept-frequency technique was used for measuring the polarization of solar radio bursts occurring at the beginning of the present sunspot cycle. Of special interest were the results for bursts of spectral type III. Contrary to the inference drawn from earlier work, it was found that many of these bursts are highly polarized. Furthermore, there were strong indications that the polarization is produced at the radiation source and is not imposed by propagation conditions in the overlying media. (Met. Abst. 10.2-224.)--Author's abstract

D-400 Komesaroff, M.M. and Shain, C.A., Refraction of extra-terrestrial radio waves in the ionosphere. Nature, London, 183(4675):1584-1585, June 6, 1959. fig., 5 refs., 3 eqs. DLC--New expressions derived for refraction, taking into account the effects of horizontal gradients in electron density and considering the magnitude of the uncertainties involved in the necessary approximations are demonstrated. The analysis is restricted to the case of a transit radio telescope. The astronomical value of the ionospheric refraction corrections, the observed and corrected positions are indicated graphically. (Met. Abst. 11E-81.)--From authors' text.

D-401 Korowski, E.T. (General Electric Co.), The region behind a body moving through a rarefied ionized atmosphere. Planetary and Space Science, N.Y., 6:223-224, June 1961. Abstract only. The paper was presented at the Plasma Sheath Symposium, Boston, Mass., Dec. 7-9, 1959.--Physical arguments indicate that charge density gradients will exist some distance behind and possibly a short distance to the side of a body moving at high speed through the ionized layers of the upper atmosphere. The medium is taken to be highly rarefied gas composed of ions and electrons. An unsteady model is set up, wherein the ion and electron density profiles, which are obtained as a function of space and time, correspond to the profiles at a given cross section aft of the body in the actual problem. The Boltzmann equation with electric effects taken into account is utilized and solutions are obtained numerically. Perturbations on the velocity distribution functions are calculated over small increments of time which then yield the magnitude of the electric effect over the next time increment. Calculations indicate that the charge density gradients extend several body radii downstream. These gradients are inherent to the rarefied flow over any vehicle and can significantly alter its detectability by electromagnetic signals.

D-402 Koster, J.R. (Univ. College of Ghana, W. Africa), Radio star scintillations at an equatorial station. Journal of Atmospheric and Terrestrial Physics, London, 12(2/3):100-109, 1958. 4 figs., 4 tables, 10 refs. DLC--Radio star scintillations have been observed at a frequency of 45 Mc/s over a period of 4 yrs at an equatorial station with a phase switching interferometer. Scintillation effects are found to be very severe, the output from even intense radio stars often dropping to zero. Scintillation occurs only at night, and is of nearly daily occurrence near sunspot maximum, correlating positively with the sunspot cycle. It correlates highly with the occurrence of spread F echoes, but with no other geophysical phenomena. It is as yet unclear whether the observed results are due to absorption of the signal or can be accounted for by the impression of a much larger phase deviation on the emergent wave front by the diffracting screen responsible for scintillation. The phenomenon correlates highly with the transequatorial scatter of radio signals observed near sunspot maximum. (Met. Abst. 10.2-331.)--Author's abstract.

D-403 Krasovskii, V.I., Sovetskie issledovaniia ionosfery pri pomoshchi raket i iskusstvennykh sputnikov Zemli. (Soviet exploration of the ionosphere by rockets and artificial earth satellites.) Iskusstvennye Sputniki Zemli, Moscow, No. 2:36-49, 1958. 15 figs., 16 refs., 4 eqs. DLC. Transl. into English issued in Artificial Earth Satellites, issued N.Y., Plenum Press; London, Chapman & Hall, 1960. Vol. 2:45-62. --A review of the principal studies in the ionosphere by means of rockets and artificial earth satellites carried out in the U.S.S.R. The methods for making these studies involved the use of the disperse interferometer which measured the radio waves radiated from the rocket and the satellite, the direct measurement of the concentration of charged particles in the ionosphere, and the transmission of the reading by telemetric systems. The apparatus are described with the aid of diagrams and photographs and the results of individual rocket and satellite ascents are presented in graphs. The ionization above the maximum of the F2 layer declines very slowly with height so that the altitude scale for ionizing particles is very large; at 475 km an ionization of about 10^6 electrons mets/cm^3 was recorded on Feb. 21, 1958; at 795 km the concentration of positive ions reached 1.9×10^5 ion/cm^3 on May 15, 1958. The effective temperature of electrons in the F region and above was higher than the temperature of the environment. The ionosphere below the maximum of the F region, in contrast to its model, constructed on the basis of ionospheric probing from the earth, does not have sharply demarcated layers but is characterized by a small maxima with monatomic increase in electron density up to the maximum of the F2 layer. The maximum of the F2 layer, and in general the ionization below this region, is 50-150 km below the values of the usual ionospheric probing from the earth. The equations for computing the mean electron density at a given elevation, the current of the collector in the direct determination of ion concentration, and the deceleration potential are presented in appendices. (Met. Abst. 11F-70.)--I.L.D.

D-404 Krasovskii, V.I.; Kushner, Iu. M.; Bordovskii, G.A.; Zakharov, G.F. and Svetlitskii, E.M., The observation of corpuscles by means of the third artificial satellite. Planetary and Space Science, N.Y., 5(3):248-249, July 1961. Transl. by R. Matthews of original Russian in Iskusstvennye Sputniki Zemli, Moscow, No. 2:59, 1958. ref. DLC--Two corpuscular stream indicators in the third Soviet satellite gave intense signals May 15, 1958. Although too early to make any conclusive statement, the observation may perhaps be explained as upper air electron acceleration as a result of the varying magnetic fields in the solar corpuscular stream. Day time increase in electron fluxes is explained tentatively too. --W.N.

D-405 Kraus, John D. and Ko, H.C., A detailed radio map of the sky. Nature, London, 175(4447):159-161, Jan. 22, 1955. 2 figs., 5 refs. DWB--A mercator map of radio brightness of the sky on 250 Mc/s at Ohio is given. The galactic nucleus stands out as a sharp peak, profiles through which are shown. (Met. Abst. 9A-79.)--C.E.P.B.

D-406 Kraus, J.D., Distribution of radio brightness across the Andromeda nebula. Nature, London, 175(4455):502-503, March 19, 1955. 2 figs., 5 refs. DWB--Discussion with average profiles of radio brightness compared with optical brightness. The latter shows a smaller area for the nebula. (Met. Abst. 9A-80.)--C.E.P.B.

D-407 Kraus, J.D.; Ko, H.C. and Stoutenburg, D.V., A fluctuating celestial radio source at 240 megacycles per second. Nature, London, 176(4476):304-305, Aug. 13, 1955. fig., 2 refs. DWB--A radio source near the antigalactic center increased by a factor of 6 in fluctuations with a period of 2-3 min. The fluctuations are believed to be intrinsic. (Met. Abst. 9A-81.)--C.E.P.B.

D-408 Kraus, J.D. (Radio Obs., Ohio State Univ.), Planetary and solar radio emission at 11 meters wavelength. Institute of Radio Engineers, N.Y., Proceedings, 46(1):266-274, Jan. 1958. 12 figs., 16 refs. DLC--Observations are described of radio emissions from the Sun, Jupiter, and Venus, during 1956 and early 1957 at a wavelength of 11 m. Records are presented of solar 11 meter radiation at the time of a large (importance 3) flare on Aug. 31, 1956, and during other periods of solar activity. The effect of scintillation on records of radio stars also is illustrated. A number of records of impulsive radiation from Jupiter at both slow and fast recorder speeds is shown. Many of the short pulses consist of distinct pairs or triplets. An echo mechanism to explain the multiple pulses is postulated and observed trends in pulse separation compared to those expected with such a mechanism. The stronger Jupiter pulses indicate a peak radiated radio power at the source of the order of 10 kilowatts per cps bandwidth. Observations of 11 m radio emission from Venus are described and one record is presented for which the probability is only about one in a hundred thousand that it is due to a random process instead of Venusian radiation. (Met. Abst. 11.5-158.)--Author's abstract.

D-409 Kraus, J.D. and Dreese, E.E., Sputnik I's last days in orbit. Institute of Radio Engineers, Proceedings, 46(9): 1580-1587, Sept. 1958. 7 figs., foot-refs., 2 eqs. DLC--Observations during the last days of Sputnik I's orbiting are presented. These observations were made at the Ohio State Univ. Radio Observatory, using a simple CW reflection technique. The data suggest that the breakup of an artificial satellite upon its re-entry into the denser atmosphere ia a complex phenomenon in which a sequential series of events may occur over a period of days. Graphs of the average height of the satellite and its associated fragments as a function of time are presented, and some conclusions are drawn as to the details of the actual breakup phenomenon. (Met. Abst. 10.4-76.)--Authors' abstract.

D-410 Kraus, J.D. and Crone, W. Reed (both, Radio Obs., Ohio State Univ.), Apparent observations of solar corpuscular clouds by direct continuous wave reflexion. Nature, London, 184(4691):965-966, Sept. 26, 1959. 2 figs., 5 refs. DWB--A paper reporting the details of several unique Doppler signals recorded at the Ohio State University Radio Observatory on the morning of April 15, 1959. It is held that the signals may possibly be due to the reflection of continuous wave signals from fast moving solar corpuscular clouds passing in the vicinity of the Earth. Instrumental details of the receiver and particulars of recordings are given. Two photographs of swept frequency record of Doppler signals at different times are shown. A large solar flare which occurred on April 13, and a number of terrestrial phenomena occurring on April 15 are noted as suggestive of Doppler reflections from solar corpuscular clouds. (Met. Abst. 12.4-117.)--Authors' abstract.

D-411 Kraus, J.D.; Higgy, Robert C.; Scheer, Donald J. et al. (all, Radio Obs. Ohio State Univ., Columbus, Ohio), Observations of ionization induced by artificial earth satellites. Nature, London, 185(4712):520-521, Feb. 20, 1960. 2 figs., 4 refs. DWB--While monitoring a remote CW station at the Ohio State Univ. it was found that large enhancements of signals often occur at the times near approach of an artificial earth satellite. The enhancements are of such magnitude as to indicate extensive ionization with scattering cross section several orders of magnitude greater than the physical cross section of the satellite. A possible hypothesis is that the satellite encountered regions of high particle density in the auroral zone scattering material into ionized clouds or streams which travelled closer to columns with reflections from these clouds causing many of the observed signals enhancements. While signals from the satellite dropped to a very low level for about 1 min, then rose again, the decrease in signal coincided with the beginning of the radar traces suggesting the possibility that the ionized particles encounters or produced at this time resulted in absorption or scattering of the signal from the satellite, while the particles acted as reflecting or back scattering medium for the radar signals. (Met. Abst. unpub.)--E.Z.S.

D-412 Kraus, J.D.; Higgy, R.C. and Crone, W.R., The satellite ionization phenomenon. Institute of Radio Engineers, N.Y., Proceedings, 48(4):672-678, April 1960. 5 figs., table, 7 refs. DLC--A number of observations are presented which show a close correlation between CW reflected HF signals and passes of artificial earth satellites. The periodic (nonrandom) occurrence of the signal bursts and the symmetry of some burst sequences are indicative of satellite related phenomena. The occurrence of a variety of satellite related Doppler effects are described and several satellite ionization mechanisms are also discussed. The possible relation of the satellite phenomenon to prior solar activity is mentioned. (Met. Abst. 12.6-106.)--Authors' abstract.

D-413 Kraus, J.D. (Radio Obs., Ohio State Univ., Columbus), Apparent radio radiation at 11 m wavelength from Venus. Nature, London, 186(4723):462, May 7, 1960. 3 refs. DWB--A critical review of preliminary communications referring to the reception of 11 m radiation from the planet Venus in 1956. The author's conclusion is that to determine the existence or nonexistence of such radiation beyond any doubt, further observations are needed using a better equipment than was available in 1956. (Met. Abst. 11.12-65.)--E.K.

D-414 Kraus, J. D. (Ohio State Univ. Radio Obs., Columbus), Evidence of satellite induced ionization effects between hemispheres. Institute of Radio Engineers, N.Y., Proceedings, 48(11):1913-1914, Nov. 1960. 2 figs., 10 foot-refs. DWB--The sporadic ionization observed at a remote CW station at the Ohio State Univ. Radio Observatory, Columbus, and monitored at the 330 mi distant WWV station near Washington, D.C., is shown in a graph as a function of time before and after near approach of Sputnik III on 14 nights, Jan.-Feb. 1959 (50 passes). The larger peaks are shown to coincide with the satellite's passage through the northern horns of the outer Van Allen belt and auroral zone. Apparent presence of high electron density (cloud) between the satellite and the Columbus station may well be responsible for the signal blocking there, while the WWV reflections are increased. The situation is plotted on a map as observed on the night Aug. 9-10, 1959. Plausible explanations for interhemispheric effects are also given. --W. N.

D-415 Kraus, J. D. and Higgy, R. C. (Radio Obs., Dept. of Elec. Engr., Ohio State Univ., Columbus, Ohio), The relation of the satellite ionization phenomenon to the radiation belts. Institute of Radio Engineers, N. Y., Proceedings, 48(12): 2027-2028, Dec. 1960. 3 figs., 5 refs. DLC--A telemetering equipment located at the Ohio State Univ. Radio Obs., has been used during March and April 1960 to monitor the Explorer VII transmitter (19.991 Mc) and its counting rates of the Antom 112 and 302 Geiger counters. The observations revealed that many of the strongest enhancements of signals from WWV (located near Washington, D.C.) occurred very close to the time when the counting rates of the Geiger counter aboard Explorer VII were at peak values. These events were also accompanied by a partial or complete fadeout of the signal from the satellite. The signal "drop-outs" suggest the existence of ionization patches or clouds between the satellite and Columbus. These clouds attenuate the signal from the satellite transmitter and at the same time act as reflecting or back scattering regions for the WWV signals. A typical observation of these effects is discussed as observed on March 30, 1960. It is also noted that this ionization may be induced by the satellite in the most tense part of the radiation belt, due to encounters between the satellite and the regions of high particle density and/or energy. (Met. Abst. 13A-104.)--N. N.

D-416 Krishnamurthi, M.; Sivarama Sastry, G. and Seshagiri Rao, T. (all, Physical Laboratories, Osmania Univ., Hyderabad), Abnormal ionospheric behaviour at 10 metres wavelength. Current Science, Bangalore, 27(9):332-333, Sept. 1958. fig., table, ref. DLC--The radiation intensity of 10 m cosmic radio waves fell to zero on Jan. 28, Feb. 21, and March 2, 1958 at the Physical Laboratories, Osmania Univ., Hyderabad, India (17°26' N, 78°27' E). The gradual fall of intensity occurred about sunrise time, and the rise of intensity toward end of the phenomenon was uniformly rapid in the three cases, but differed in duration of minimum noise level.

Small scale irregularity in the upper ionospheric layers is offered as a plausible cause of this disturbance which is knowingly unrelated to any solar flare. (Met. Abst. 11E-82.)--W. N.

D-417 Krishnan, T. and Mullaly, R. F. (both, Radiophysics Lab., CSIRO, Sydney), Decimeter radio bursts concurrent with solar Type IV radiation. Nature, London, 192(4797):58-59, Oct. 7, 1961. fig., 2 refs. DWB, DLC--Observations of 1.420 Mc/s solar radio bursts have been made using a Christiansen crossed grating interferometer. Eight occasions characterized by intense type IV activity have been chosen for detailed analysis. The meter wave length sources were located in the high corona, the 1.420 Mc/s sources remained at rest in the chromosphere or lower corona not more than 50,000 km above the H α flares. The low frequency sources, on two occasions, showed large scale movements while the decimeter source was stationary. It was concluded that the decimeter burst and the meter wavelength type IV source must be different. --R. B.

D-418 Krivsky, L. (Astrophys. Obs., Ondrejov), Ausserung der chromosphärischen Eruptionen in den atmosphärischen Störungen. (Manifestation of chromospheric eruptions in atmospheric disturbances.) Bulletin of the Astronomical Institutes of Czechoslovakia, Prague, 4(6):196, 1953. tables. DLC--Correlations between chromospheric eruptions of importance 1, 2 and 3, and sferics on 11 km wavelength were statistically analyzed for the period July 1951-Sept. 1952. General results of the analysis are tabulated and briefly commented on. (Met. Abst. 8.1-390.)--G. T.

D-419 Kuiper, Gerard Peter (ed.), The sun. Chicago, Univ. of Chicago Press, 1953. 745 p. numerous figs., (incl. photos), tables, eqs. Bibliogs. at end of most chapters or sections. DWB--This is Vol. 1 of a series of four volumes on The solar system. The second volume is The earth as a planet, the third Planets and comets. The present volume contains the following chapters: I. Introduction, by Leo Goldberg (historical solar constants, solar physics, solar terrestrial relationships, solar atmosphere); II. The sun as a star, by Bengt Strömgren; III. The photosphere, by M. Minnaert; IV. The identification of solar lines, by Charlotte E. Moore; V. The chromosphere and the corona, by H. C. van de Hulst; VI. Solar activity, by K. O. Kiepenheuer; VII. Solar radio emission, by J. L. Pawsey and S. F. Smerd; VIII. Solar electrodynamics, by T. G. Cowling; IX. Empirical problems and equipment, by C. W. Allen, P. C. Kunan, R. R. McMath, J. W. Evans, W. O. Roberts, R. Tousey, J. G. Wild, H. W. Dodson, A. Ehmert, J. A. Simpson and others. The entire range of subjects in the field of astrophysics is included: for instance, measurement of solar constant, the zodiacal light, ionosphere during eclipses, rocket observations of UV; extreme UV and X-rays, radio frequency radiation from sun, solar flares, 200 cm/sec radiation, cosmic rays from sun, Alfven's theory of magnetic field in sunspots, corpuscular streams, auroras; and of course, historical and bibliographic material; tables of constants, etc. (Met. Abst. 11A-63.) --M. R.

D-420 Kundu, Mukul Ranjan, Etude des sources solaires persistantes sur ondes centimetriques. (Study of the persistent solar sources on centimetric waves.) Academie des Sciences, Paris, Comptes Rendus, 246(19):2740-2743, May 12, 1958. 3 figs., 4 refs. DLC--The author uses an interferometer with two antennas, the effective inter fringe of which increases in accordance with the horary angle of the observed heavenly body. This apparatus, which operates on 3.2 cm wavelength, has been used to study the passably stable emission sources located in the solar atmosphere. Measurements of brilliancy distribution of the persistent solar sources on centimetric waves indicate that certain sources are intense and narrow (diameter about 1'5), others are less brilliant and more extended. It is discovered that the appearance of the narrow sources is connected with the periods of eruptive activity of the sun. (Met. Abst. unpub.)--A. V.

D-421 Kundu, Mukul Ranjan, Sur les dimensions des sources des sursauts de rayonnement solaire sur les ondes centimetriques. (The sizes of the solar radiation jumps sources on centimetric waves.) Academie des Sciences, Paris, Comptes Rendus, 246(20):2852-2855, May 19, 1958. fig., 7 refs. DLC--Measurements of the sizes of jumps sources made with an interferometer have made it possible to specify the classification of jumps, to follow up their evolution in size and to value their equivalent temperature. The equivalent temperature of some jumps observed on centimetric waves may reach several tens of millions of degrees; it is thus highly probable that they are not of thermic origin, a conclusion which is in agreement with the observations of jumps, made in the field of metric waves. (Met. Abst. unpub.)--A. V.

D-422 Kundu, M. R. and Denisse, J. F., Solar radiation on decimeter waves as an index for ionospheric studies. Journal of Atmospheric and Terrestrial Physics, London, 13(1/2):176-178, Dec. 1958. 2 figs., 5 refs. DLC--The probability of obtaining an index of solar activity useful for ionospheric studies for shorter periods than a month by the intensity of solar radiation on decimeter waves is indicated. The presented correlation diagrams of monthly and of 5 day mean values illustrate that the 10.7 cm solar flare radiation density F should be adopted in the place of the Wolf number R for most ionospheric studies. (Met. Abst. unpub.)--O.T.

D-423 Kundu, M. R., Structures et proprietes des sources d'activite solaire sur ondes centimetriques. (Structures and properties of solar activity sources on centimeter waves.) Annales d'Astrophysique, Paris, 22(1):1-100, Jan./Feb. 1959. numerous figs., tables, eqs., 41 refs. French, English and Russian summaries p. 1. DWB, DLC--A two-antenna interferometer has been constructed for the study of localized sources on the sun (persistent sources and bursts) on centimeter waves (3. 23 cm). The two antennas are in equatorial mounting and are placed on an E-W base line at a distance of 60 m from each other. The variation of the resolving power due to the diurnal motion is utilized to measure the dimensions and distribution of brightness of these sources. Observations with this instrument have brought new evidence on several properties of these sources: evolution, apparent diameter, polarization, etc., which clarify considerably their classification and give new clues to their interpretations and their association with the corresponding phenomena observed in optics and on decimeter and meter waves. We have also been able to show an extremely close relationship between the ionization of the E layer of the ionosphere and 10-7 cm solar radiation. (Met. Abst. 11D-76.) --Author's abstract.

D-424 Kundu, M. R. and Haddock, F. T. (both, Univ. of Mich. Obs., Ann Arbor), A relation between solar radio emission and polar cap absorption of cosmic noise. Nature, London, 186(4725):610-613, May 21, 1960. 3 figs., 3 tables, 7 refs. DWB--A statistical study of the nature of centimeter and meter wave solar radio outbursts associated with polar cap absorption and a general conclusion for the prediction of proton events is presented. An analysis of 31 events of polar cap absorption, illustrated by tables and diagrams, shows a close correlation between the presence on the sun of the sources of broad band centimeter wave outbursts or Type IV events, and the probability that these "active regions" play some part in the storage or trapping of the protons responsible for absorption events in the polar regions. (Met. Abst. 11L-102.)--O.T.

D-425 Kuperov, L. P., Nabliudeniia za signalami tret'ego sovetskogo iskusstvennogo sputnika Zemli na myse Cheliuskina. (Observations of the signals of the third Soviet artificial earth satellite on Cape Chelyuskin.) Iskusstvennye Sputniki Zemli, Moscow, No. 5:66-70, 1960. fig., table. DLC --Oscillograph recordings of the Sputnik III's radio signals were made by members of the Arctic and Antarctic Scientific Research Institute during the period May 16 to June 6, 1958. The 20.005 Kc receiver described, was turned on a few minutes before the satellite appeared and remained on until the signals faded out (10-15 min). The satellite transmitted signals varied with the ionospheric conditions. Tabulated results according to visible and non-visible satellite position above and below F2 are presented and isoline plottings are shown on a northern hemisphere map. (Met. Abst. unpub.)--N.P.S.

D-426 Kurnosova, L.V.; Razorenov, L.A. and Fradkin, M.I., Kosmicheskoe izluchenie Solntsa. (Cosmic radiation from the sun.) Priroda, Moscow, No. 1:94-96, Jan. 1961. 2 figs., 2 refs. DLC--The second cosmic rocket of the U.S.S.R. contained two Cherenkov counters. These recorded on Sept. 12, 1959, 11:27 o'clock, world time, an increase of 11.8 times in the number of nuclei with the atomic number 15. This increase lasted 17 min. At the same time the total number of nuclei with $Z \geqslant 2$ and $Z \geqslant 5$ rose only 1.3 ± 0.1 and 1.5 ± 0.3 times; the rise in the number of the latter was almost entirely due to nuclei with $Z \geqslant 15$. During the time corresponding to this short period increase in the intensity of nuclear components there were recorded two chromospheric flares of class I, which began at 11:36 o'clock and 11:39 o'clock, with heliographic coordinates of 21°N, 38°E and 19°N and 33°E, respectively; the latter was near a small sunspot. Since the number of weak chromosphere flares is considerable there is a high probability that the observed increase coincided accidentally with such flares. A more likely relationship to the increased intensity of nuclear components is attributable to the burst of radiowave radiation which occurred on Sept. 12, 1959, at 11:29 o'clock; the intensity was 810 MHz and lasted less than 0.3 min. The probability of accidental coincidence of this burst with the increased intensity of nuclear components is less than 1%. Two more cases of increased intensity of nuclei streams with $Z \geqslant 15$ were recorded on Sept. 12, 1959 at 12:37 o'clock and 15:23 o'clock; the former lasted 13 min and the latter 25 min. The probability that this phenomenon was associated with statistical fluctuations was 3×10^{-3}. Both variations occurred during chromospheric flares which were in the vicinity of a large group of sunspots. No special features of radio radiation were observed with these phenomena. The characteristic short period increase in streams of nuclei of cosmic rays indicates that there occur solar processes in which the nuclei are accelerated up to energies exceeding 1.5×10^9 εv/nucleon, since largely more heavy nuclei are accelerated. --I.L.D.

D-427 Kurnosova, L.V., Nekotorye rezul'taty issledovanii pri pomoshchi iskusstvennykh sputnikov Zemli. (Some results of investigation with the 3rd artificial earth satellite.) Priroda, Moscow, No. 6:85-86, June 1958. fig. DLC. Transl. into English by E.R. Hope issued as Canada. Defence Research Board, Translation T-304-R, Sept. 1958. 2 p. typescript. DWB--Satellite data on the intensity of cosmic radiation showed that up to 700 km the intensity increased up to 40% in comparison with that observed at 200 km. The intensity above 200 km increases because of two reasons, namely: with increasing height the "screening" action of the earth decreases, and since cosmic rays are propagated in space isotropically a recording device in space records considerably more than one near the earth; also the higher the elevation the more particles can penetrate the magnetic field of the earth, which exerts a deflecting action upon cosmic particles and this effect is more intense the closer they are to the earth. The line of equal intensity of cosmic rays does not coincide with the geomagnetic parallels. During the flight of the earth satellite the halogen counters recorded short period, abrupt variations in the intensity of the cosmic rays, while such variations were not observed at the surface of the earth. (Met. Abst. 12.5-118.)--I.L.D.

D-428 Laffineur, M., Correlation entre certains phenomenes geophysiques et le rayonnement solaire sur 55 cm. (Correlation between certain geophysical phenomena and solar radiation at 55 cm.) International Council of Scientific Unions, Brussels, Commission for the Study of Solar and Terrestrial Relationships, Rome, Sept. 1952, Report No. 8:19-20, pub. 1953. fig., table. DWB--Disturbances on 55 cm occur as "points" or as bursts but not as storm noise. Radio electric phenomena accompanying chromospheric eruptions are tabulated under intense and weak points and intense and weak bursts (of 1-90 minutes). (Met. Abst. 5.8-266.)--C.E.P.B.

D-429 Laffineur, M., La radio-astronomie se developpe. (The development of radio astronomy.) L'Astronomie, Paris, p. 179-191, May 1953. figs., photos, foot-refs. DWB--Advances made in radio astronomy during 1952 are outlined and discussed, including mention of conferences in Australia, Rome and Paris. Solar radio radiation from a calm sun, a disturbed sun, intense eruptions, eclipses, etc., are discussed and the equipment used in various places for measuring these radiations illustrated. Emissions from stars, galaxies and interstellar space are also discussed. Finally, interferometry and ionospheric radio astronomy are treated. Mitra and others showed how the ion density in the ionosphere could be calculated by measuring the decrease in galactic noise. At Meudon, France, continuous records of galactic radiation at decameter wavelengths have been made. (Met. Abst. unpub.)--M. R.

D-430 Laffineur, M. and Whitehead, J. D., The measurement of cosmic radio emission for ionospheric studies. Journal of Atmospheric and Terrestrial Physics, 9(5/6):347-349, Nov. 1956. 2 figs., ref. DWB--A technique is described, in use at Meudon Observatory near Paris, for recording automatically cosmic noise from the Cassiopeia source on 24 Mc/s - 24.1 Mc/s, in spite of severe local interference. Some records are shown. (Met. Abst. 8.4-124.)--C. E. P. B.

D-431 Laffineur, M., Radio-astronomie. (Radio astronomy.) L'Astronomie, Paris, 72(5):209-214, May 1958. 2 figs. DLC--Radio astronomy, science of observation of matter in the dilute state, makes a great contribution to the enlightenment of our knowledge of the Universe. In order to encourage students to take interest in this new science, the author summarizes succinctly some important points, particularly: the visual sky and the radioelectric sky, the nature of the observed radiation, the intensity of the received radiation. He illustrates his article with the telemetry of our Galaxy. The end of the article deals with galactic hydrogen and its emission on 21 cm, the Doppler-Fizeau effect and radio sources. (Met. Abst. 11.5-159.)--A. V.

D-432 Laffineur, M., La radioastronomie. (Radio astronomy.) Revue Generale des Sciences Pures et Appliquees, Paris, 66(3/4):79-86, March/April 1959. DLC--After a short review of K. JANSKY's experiments, the difference between optical astronomy and radio astronomy is pointed out as well as the advantages and disadvantages of each of these sciences. This article constitutes a synthesis of the contributions made in recent years by radio astronomy to our knowledge of the Universe. Author considers particularly the following subjects: solar emission, telemetry of our galaxy, galactic hydrogen and its emission on 21 cm, Doppler-Fizeau effect and radio sources. (Met. Abst. 11.5-160.)--A. V.

D-433 Landmark, B.; Lied, F.; Orhaug, T. and Skribeland, S., Ionospheric observations during the solar eclipse of June 30, 1954. Geofysiske Publikasjoner, Oslo, 19(8), 1956. 39 p. 22 figs., 2+ tables, 3 refs., eqs. DLC--This monograph consists of 3 parts: Pt. I, by LANDMARK, LIED and SKRIBELAND, discusses and presents data on h'f observations obtained during the eclipse of June 30, 1954 at the 3 NDRE stations. It is shown that the F2 layer observations at time of total eclipse can only be explained by a definite solar control over the ionizing agency. Recombination coefficients have been worked out for the E, F1 and F2 layers. Pt. II, by LIED and ORHAUG, on F1 layer ionospheric absorption during the eclipse is based on observations at Kjeller and Tromöya, especially those made with variable frequency equipment, gave a basis for a solar "model". Pt. III, by LIED, on "an ionospheric layer during a solar eclipse" shows electron density profiles and other characteristics of an eclipse ionospheric layer. (Met. Abst. 11F-71.)--M.R.

D-434 Lange-Hesse, Gunther, Variation der brauchbaren Tagesfrequenzen im Kurzwellenweitverkehr als Wirkung solarer Partikelstrahlung. (Variation of the diurnal useful frequencies used in shortwave long distance communication as an effect of solar corpuscular radiation.) Archiv der Elektrischen Übertragung, Stuttgart, 14(3):115-120, March 1960. 4 figs., 12 refs. German and English summaries p. 115. DLC--The observational data of the ionospheric station Lindau/Harz ($\Phi \approx 52^\circ$) and the geomagnetic observatory Wingst ($\Phi \approx 54^\circ$) is analyzed in order to find the statistical relation between the degree of geomagnetic activity as a measure for the intensity of the incident solar particle radiation and the relative deviations of the factor M 3000 and the MUF 3000 from their median values (M 3000 conversion factor from vertical to oblique incidence critical frequency for 3000 km distance, MUF 3000 maximal usable frequency for 3000 km distance). The observational data are arranged only according to the degree of geomagnetic activity, then following average behavior of M 3000 and MUF 3000 is determined for the different degrees of geomagnetic activity. In the statistical relationship there is a distinct dependence on the sunspot cycle and the seasons. The practical significance of these results is discussed in detail with respect to the prediction of disturbances in short wave propagation conditions. The investigations are also a contribution to the study programmes No. 93 (VI) and No. 150 (VI) again proposed at the last CCIR-Planary Assembly (Los Angeles 1959). (Met. Abst. 11.12-130.)--Author's abstract.

D-435 Lauter, Ernst August (Met. Obs., Kühlungsborn, Germany), Measurements on medium and low frequencies and of atmospheric noise during the solar eclipse of June 30, 1954. (In: Solar eclipses and the ionosphere: a symposium... ed. by W. J. G. Beynon and G. M. Brown. London, Pergamon, 1956. p. 124-125.) DWB (523.7 S684)--Eclipse effects on the intensity of sky-waves received on various frequencies at distances varying from 180 to 700 km are described. The dependence of the duration of the effect (delayed start and premature ending relative to the eclipse) on frequency and distance can be interpreted in terms of a simple D region of double structure. Atmospheric noise measurements on 8 to 69 kc/s indicate an increase up to the eclipse maximum (depending on frequency and distance) and a steep decrease afterwards. (Met. Abst. 9A-122.)--Author's abstract.

D-436 Lauter, E. A.; Bartels, G.; Sprenger, K. and Skeib, G., Der Intensitätsanstieg der kosmischen Strahlung am 23.2 1956 und gleichzeitige Effekte in der tiefen Ionosphäre. (The increase of intensity of cosmic radiation on Feb. 23, 1956 and simultaneous effects in the lower ionosphere.) Zeitschrift für Meteorologie, 10(5):129-131, May 1956. fig., 3 refs. DLC--The increase of cosmic radiation shown by observations at Kühlingsborn began at 0342 GMT and by 4-5 h exceeded 65%, the limit of the electrometer; it probably reached 150%. It powerfully affected long wave transmission (35-40 kHz) in the nocturnal D region. Disturbances on 40-5 kHz at Kühlingsborn and Potsdam are shown graphically. On 185 kHz there was a sudden increase of absorption at 0348 GMT which continued to midday, also found on 245 and 1178 kHz. Next day there was an intensity rise of 6.2 % at 12-13 h. (Met. Abst. 8.1-181.)--C.E.P.B.

D-437 Lauter, E. A. and Triska, P., Zur Deutung der plötzlichen Feldanomalien im Langwellenbereich bei Sonneneruptionseffekten. (Interpretation of sudden field anomalies in long wave communication due to solar eruption effects.) Zeitschrift für Meteorologie, Berlin, 13(7/8):190-192, July/Aug. 1959. 3 figs., 2 refs. DWB, DLC--The basic characteristics of the phenomenon are described as due to phase alterations between surface and space waves caused by sinking of the reflection level as shown by simultaneous measurements at the observatory Kühlungsborn and at the Geophys. Inst., Czechoslovak Acad. of Sci. at Prague, of transmissions from Brasow, at a distance of 1360 km. The analysis of the apparent height alterations on the basis of an equation of geometric-optical extensions between surface and space waves proved the existence of a solar eruption effect in the lower ionosphere as well as the variations of the apparent reflection level. These and some other results of the analysis are illustrated by diagrams of recordings of electric field strength height variations of the apparent reflection level; of the analysis of the apparent reflection level associated with stronger solar eruption effects; and of the distribution of characteristic parameters of solar eruption effects. (Met. Abst. 11.10-47.)--O.T.

D-438 Lawrence, Lovell, Jr., "Astro"--an artificial celestial navigation system. Franklin Institute, Phila., Journal of the Franklin Institute Monographs, No. 2:89-99, June 1956. table, 7 refs., 7 figs. DWB--This paper treats the peaceful use of "Astro", an Artificial Satellite Time and Radio Orbit" to be established over the earth for celestial navigation purposes. Every effort has been made to create a simple, yet reliable, system that may be feasible in the near future. To accomplish this, however, a very high degree of accuracy must be maintained in the electronic components. Methods for observing this high velocity body by other than optical means will be necessary, and accurate time signals must be generated. The selection of 105 min polar orbits versus 24 hr orbits will be discussed, and some consideration will be given to the design of the Astro Satellite--including methods for propagating electromagnetic wave signals of one hundred megacycles--together with a review of a nuclear power source for supplying the necessary electrical energy. Reference will be made to the standard celestial navigation techniques, using circles of equal altitude obtained from an electronic sextant. To establish a fix, an arrangement will be explained for obtaining lines of position by interpreting observed Doppler frequency deviation versus position distance from the satellite. A graph of this Doppler shift, and a Mercator position plotting sheet will be used to describe a typical aircraft flight. (Met. Abst. 8.11-71.)--Author's abstract.

D-439 Lawrence, L., Jr., Navigation by satellites. Missiles and Rockets, Wash., D.C., 1(1):48-52, Oct. 1956. 8 figs. DLC--Detailed review of a system for ship navigation by earth satellite fixes. (Met. Abst. 9.10-120.)--M.R.

D-440 Lawrence, Robert S. (Nat'l. Bureau of Standards, Boulder, Colo.), An investigation of the perturbations imposed upon radio waves penetrating the ionosphere. Institute of Radio Engineers, N.Y., Proceedings, 46(1):315-320, Jan. 1958. 4 figs., 38 refs. DLC--A new method has been devised to measure continuously the phase deviations introduced by the ionosphere into the signals from discrete sources. Sample recordings of measurements at frequencies of 53, 108, and 470 Mc are given. An experiment combining this phase measuring technique and standard ionospheric soundings at the point of penetration of the line of sight is in progress and is expected to shed light upon the height of origin of ionospheric scintillations. (Met. Abst. 11E-84.)--Author's abstract.

D-441 Lawrence, R.S. and Jespersen, James L., A preliminary analysis of amplitude scintillations of radio stars observed at Boulder, Colorado. U.S. National Bureau of Standards, Technical Note, No. 20, July 1959. 19 p. 9 figs., table, 20 refs., 17 eqs. DWB (M(055) U585te)--Variations in the apparent flux from the radio source Cygnus-A are recorded at 53 and 108 mc/s using a two element phase sweeping interferometer located at Boulder. An ionospheric sounder operating at Ellsworth, Nebraska, provides simultaneous vertical incidence measurements of the ionosphere along the path. Amplitude scintillations observed at Boulder over a six month period are compared with the ionograms taken at Ellsworth. Positive correlation is found between amplitude scintillations and spread F, while a small negative correlation is found with sporadic E. The present result appears to be significant but a full year's data are being accumulated to disclose seasonal or diurnal effects. Detailed analysis of the scintillations indicates that the probability distribution of the amplitude can be represented by the Rice probability distribution function. The scintillation rate for 108 Mc/s seems to be more rapid than for 53 Mc/s. (Met. Abst. 11F-74.)--Authors' abstract.

D-442 Lawrence, R.S., Ionospheric scintillation of radio waves of extraterrestrial origin. (In: Menzel, Donald H., ed., The Radio Noise Spectrum. Cambridge, Mass., Harvard Univ. Press, 1960. p. 43-47. 2 figs., 3 refs.) DWB--A brief report of work in progress at Boulder, Colorado. Phase scintillations are measured by means of a phase tracking and phase sweeping interferometer. This instrument can be used in its phase tracking mode to provide a continuous record of phase scintillations, or it can be used with phase sweeping to provide a record from which amplitude and phase information can be extracted independently. At this time, it is not certain whether the diffraction responsible for any particular scintillation record occurs at a height of 100 or 400 km or at intermediate heights. The present experiment at Boulder is an attempt to clarify this question. Each day, soon after the rise of Cygnus A above the northeast horizon ionospheric pulse soundings are made with a sweep frequency vertical incidence sounder 300 km away in Nebraska. The sounder is so placed as to observe the very portion of the ionosphere which causes the scintillations recorded at Boulder. Comparison between these two methods of observing the ionosphere has verified the previously reported relation between scintillations and spread F, and strongly suggests an inverse relation between scintillation and sporadic E. If further investigation corroborates this relation, we will have definite knowledge that some of the scintillation activity arises at the 100 km height of the E region. Some amplitude and phase scintillation records are shown. (Met. Abst. unpub.)--E.Z.S.

D-443 Lawrence, R.S. and Little, C.G. (both, Boulder, Colo.), On the analysis of polarization-rotation recordings of satellite signals. (In: International Scientific Radio Union, IGY Committee, Some ionospheric results obtained during the IGY. Amsterdam, Elsevier, 1961. p. 391-399. 7 figs., 4 refs., 3 eqs. DLC--A method is presented which permits accurate estimates of the total electron content below the satellite height from observations at 20 Mc and rejects simplifying assumptions of ionospheric rotation of the polarization plane of a satellite radio signal. The derived analyses permit the study of ionospheric tilts and have revealed large scale irregularities in the ionospheric electron content. The deviation in sub-satellite content of these irregularities is of the order of 2% of the running mean values; the lateral extent of irregularities is of several hundred kilometers. The effect of such irregularities upon ionospheric refraction and satellite Doppler curves are discussed. (Met. Abst. unpub.)--S.N.

D-444 Leadabrand, Ray L. (Stanford Res. Inst., Menlo Pk., Calif.), Radar Astronomy Symposium report. Journal of Geophysical Research, Wash., D.C., 65(4):1103-1118, April 1960. 12 figs., 14 refs. DLC--The purpose of the Symposium held in San Diego, Oct. 1959, by the U.S. National Committee of the International Scientific Radio Union, was to call attention to the potential usefulness of radar in the exploration of the solar system and to report on past work. The following topics were included: radar studies of the moon; planets; exosphere and the interplanetary medium -- Sun, meteors and auroras. The members of the panel made a progress report in each field and indicated the potentialities for future research. The radar approach to astronomical studies in the solar system is fundamentally complementary to passive visual and radio astronomy. (Met. Abst. 11.12-75.)--E.Z.S.

D-445 Leadabrand, R.L.; Dyce, R.B.; Fredriksen, A. et al. (all, Stanford Res. Inst., Menlo Park, Calif.), Radio frequency scattering from the surface of the moon. Institute of Radio Engineers, N.Y., Proceedings, 48(5):932-933, May 1960. 3 figs., table, 7 refs. DLC--The moon, observed with two high powered 4000 Mc radars, one located at College, Alaska, and the other at Fraserburgh, Scotland, was found to behave as a smooth reflector as well as a diffuse scatterer. The image of the moon, as it would appear to the observer, utilizing the range increment and the Doppler shift increment, is reproduced as a number of concentric rings. --W. N.

D-446 Lebedeva, P. N.; Neishild, V. G. and Panovkin, B. N., Radioastronomiia. Annotirovannii bibliograficheskii ukazatel otechestvennoi i inostrannoi literaturi, 1932-1958 gg. (Radio astronomy. Annotated bibliographical index of native and foreign literature, 1932-1958.) Academy of Sciences of the U.S.S.R. Section: Network of special libraries. Library of the N.P. Lebedeve Physical Institute. 216 p. --The material is grouped under the following sections: (1) Methods of radioastronomy. (2) Solar, lunar and planetary radio emanation. (3) Galaxy and metagalaxy radio emanation. (4) Concealed sources of radio emanation. (5) Monochromatic emanation of the galaxy. (6) Study of the earth's atmosphere through radioastronomic methods. (7) Reviews. (unchecked.)--W. N.

D-447 Lee, Robert H., Solar flare detection for I. G. Y. Electronics, 30(3):162-165, March 1957. 6 figs., 2 refs. --Two receivers detect changes in D layer as indicated by increased atmospheric signal at 27 Kc/s and decreased cosmic noise signal at 18 Mc/s. --CSIRO Abstract.

D-448 Lehigh University. Institute of Research, Absorption of microwaves in gases. Contract AF 19(1222)-2, Progress Report, Nos. 9 and 10, Sept. 30, 1951. 10+ p. 2 tables, 8 figs., foot-refs. DWB--Very detailed description of the instrumentation used in the dynamic method developed to record the semi-log plot of the Volt-Ampere characteristics of a probe. The method explained greatly facilitates investigation of electron temperatures; for which density tables are presented. (Met. Abst. unpub.)--W. N.

D-449 Lehnert, Bo Peter (ed.), Electromagnetic phenomena in cosmical physics. Cambridge, Univ. Press, 1958. 544 p. bibliogs. Price: 50 sh. (International Astronomical Union, Symposium, No. 6, held in Stockholm, Aug. 1956. (Pertinent articles abstracted separately.) DLC (QB461.L43)-- A collection of 56 articles on magneto hydrodynamics (theory, experiments and observed behavior of ionized gas in a magnetic field), solar electrodynamics, stellar magnetism, solar and interplanetary magnetic fields, electromagnetic state in interplanetary space (magnetic storms and cosmic ray behavior), high current discharges and radio astronomy, etc., read at the 6th International Astronomical Union Symposium held in Stockholm, Aug. 27, 1956, under the general chairmanship of H. ALFVEN. Articles include discussions. (Met. Abst. 11.5-27.)--M.R.

D-450 Leighton, Hope I. (Nat'l. Bur. of Stands., Boulder, Colo.), Field strength variations recorded on a VHF ionospheric scatter circuit during the solar event of Feb. 23, 1956. Journal of Geophysical Research, Wash., D.C., 62(3): 483-484, Sept. 1957. fig. DLC--Field strength anomalies of the SID type from 0300 to 1000 h Feb. 23, 1956 on 49.8 Mc (Cedar Rapids to Sterling) are shown graphically. Time coincided closely with flares seen at Tokyo and Kodaikanal and cosmic ray outbursts reported from all over the world. Rise in signal strength coincided with onset of flare, maximum anomaly with maximum intensity of cosmic ray enhancement, and return to normal signal strength with end of SID as reported from Okinawa and Japan, but continued after end of solar flare. (Met. Abst. 11E-85.)--M.R.

D-451 Lejay, Pierre, Methodes modernes de recherches sur la haute atmosphere. (Modern methods of research on the upper atmosphere.) Conference at the Palais de la Decouverte, Jan. 16, 1954. Paris, 1954. 25 p. 5 figs. (Conferences du Palais de la Decouverte, Ser. A, No. 192.) DLC--Spectroscopic rocket (direct measurement) and radio echo methods of upper atmospheric research are described, and results in terms of temperature (to 150 km), density, winds, ionization, chemical composition, oscillations and radio propagation conditions discussed in this pamphlet. (Met. Abst. 12E-68.)--M.R.

D-452 Lepineux, M., Discrimination des eruptions chromospheriques associees aux perturbations geomagnetiques durant le maximum solaire actuel. (Discrimination of chromosphere eruptions associated with geomagnetic disturbances during the present solar maximum.) Academie des Sciences, Paris, Comptes Rendus, 247(1):109-111, July 7, 1958. 2 tables, 5 refs. DLC--The author considers the period of the well-defined solar maximum from April 15, 1957, to March 31, 1958. He splits up the important chromosphere eruptions into two categories. On the one hand, those which are accompanied by a well marked and rather long lasting increase of the radioelectric noise range on frequencies near 200 Mc/s. These eruptions generally occur during a pre-falling of the cosmic rays. Such eruptions determine, 20 to 70 hrs afterwards, a disturbance of the terrestrial magnetism, if they happen sufficiently close to the center of the apparent disc. On the other hand, those which are not accompanied by this long increase of the radioelectric noise on 200 Mc/s, whatever their position and importance, are not associated with geomagnetic disturbances. (Met. Abst. 10.8-105.)--A.V.

D-453 Leslie, Patricia R.R. and Elsmore, B. (Mullard Radio Astronomy Obs., Cambridge), Radio emission from the Perseus cluster. The Observatory, London, 81(920):14-16, Feb. 1961. 2 figs., table, 10 refs. --It has been suggested by J.B.BALDWIN and B.ELSMORE (Nature, 173, 818 (1954)) that 75% of the radio emission from the Perseus cluster originates in NGC 1275, and the remainder from an extended source associated with the cluster. Observations show that there are two components of small angular size. The positions and flux densities, together with angular diameter, as well as the optical data for NGC 1275 and the cluster, are shown in a table. The position and angular diameter of the strongest component are in agreement with optical measurements of NGC 1275, while the position of the extended source is close to that of the center of the cluster, but neither its brightness, nor its integrated flux density agree with the figures computed on the supposition that the emission arises from a component member of the cluster. The extended feature may be associated with the presence of two sources of small angular size and might arise in the manner proposed by I.S.SHKLOVSKY (see ref. D-750, 1955) (5th Conference on Cosmology, Moscow, p. 395 (1955)) from the interaction of the gaseous contents of two interacting galaxies. (Met. Abst. 9A-46.)--S.N.

D-454 Lied, F., Ionospheric absorption observed on Feb. 23, 1956 at Kjeller and Tromsö. Journal of Atmospheric and Terrestrial Physics, 10(1):48, Jan. 1957. fig., DWB--Records at Kjeller shown during intense solar eruption of Feb. 23, 1956. Absorption increased gradually from 0400 GMT but echoes were not lost. At Tromsö echoes were lost. (Met. Abst. 8.6-185.)--C.E.P.B.

D-455 Lied, F. (Norwegian Defence Res. Estab.), Quantitative measurements of absorption in the auroral zone. (In: Polar Atmosphere Symposium, Oslo, July 2-8, 1956, Proceedings, Pt. 2, Ionospheric Section. N.Y., Pergamon Press, 1958. p. 135-146. 14 figs., 11 refs.) Also issued in Journal of Atmospheric and Terrestrial Physics, London, Special Supplement, Pt. 2, 1957, pub. 1958? p. 135-146. DLC--In the study of "normal" auroral absorption as well as the disturbances, we need the application of different techniques with overlapping sensitivity since the observational phase in connection with ionospheric absorption is not terminated. The statistical distribution in time and space of the more catastrophic blackouts, a little of the real nature and cause of the general and excessive high absorption due to some ionizing mechanism, and the techniques for locating where in the ionosphere the excessive absorption takes place, as well as the magnitude of the extra ionization, have been covered in this paper. Techniques include the CW oblique measuring, the pulse amplitude, the

Galactic, the cross modulation techniques, all of which must be used contemporaneously and forced to overlap as in the ionospheric recordings made in Canada, Alaska and Norway. (Met. Abst. 10.9-316.)--N. N.

D-456 Lilley, A.E., The absorption of radio waves in space. Scientific American, 197(1):48-55, July 1957. 9 figs. DWB, DLC--Mostly about radio astronomical problems associated with nonterrestrial absorption of hydrogen emissions. Radio astronomers work mainly with hydrogen lines (21 cm), since 93% of all atoms in the universe are hydrogen. (Met. Abst. 9A-156.)--M. R.

D-457 Lincoln, J. Virginia, SID type phenomena and solar flares. U. S. National Bureau of Standards, NBS Report, 5065, April 26, 1957. 5 p. 4 figs. DWB--Not only SID's but gradual ionospheric disturbances (SWF) are associated with solar flares in 79% of the cases and with GWF in 85% of the cases (based on 69 selected dates). Sample records are presented and analyzed. (Met. Abst. 9.8-157.)--M. R.

D-458 Lindquist, Rune, Ionospheric effects of solar flares: preliminary reports Nos. 2 and 3. Göteborg, Sweden, Chalmers Tekniska Högskola, Handlingar, No. 95, 1950. 11 p. diagrs., tables. Reports from the Research Laboratory of Electronics, No. 13. DWB--Results of fadeout recordings made at the Ionospheric and Radio wave Propagation Observatories at Gothenburg, Sweden from July 1948-June 1949 are presented in tables and graphs. (Met. Abst. 7.10-306.)--M. R.

D-459 Lindquist, R. (Ionospheric Res. Lab., Pa. St. Coll.), An investigation of the ionizing effect in the E layer near sunrise. Journal of Geophysical Research, 57(4):439-458, Dec. 1952. 9 figs., 31 eqs. MH-BH. Also: Pennsylvania. State College. Ionospheric Research Laboratory, Contract AF 19(122)-44, Scientific Report, No. 34, March 20, 1952. 59 p. 18 figs., 41 tables, 20 refs., 38 eqs. DWB--This paper discusses the pre-sunrise decrease in height of the reflection point noted in 150 kc/sec vertical incidence group height recordings. It is shown that the local time of this decrease has a pronounced seasonal variation. The total number of particles along the sun ray to the reflection point where the height decrease begins has been computed. This number is almost constant throughout the year, yielding a value of about 3.3×10^{20} atmospheric particles. By considering the composition of the upper atmosphere, it is shown that the only constituent which might possibly be subject to the pre-sunrise ionization is O_2. The corresponding solar radiation should have $\lambda > 910$ Å, The value for the absorption coefficient of O_2 obtained from these considerations is $K_{O_2} = (3.3 \pm 2.1) \times 10^{-19}$ cm^2. It is shown that the pre-sunrise ionization is not due to a pure screening effect. (Met. Abst. 4.9-255.)--Author's abstract.

D-460 Little, C. Gordon, A diffraction theory of the scintillation of stars on optical and radio wavelengths. Royal Astronomical Society, Monthly Notices, 3(3):289-302, 1951. 3 figs., 2 tables, 20 refs., eqs. DWB--Author makes 3 objections to refraction theory of scintillation and then sets out theory of Fresnel diffraction in a nonhomogeneous disturbing layer. This corresponds with that of BOOKER, RATCLIFFE and SCHINN for radio waves. The path change requires density gradients of 0.003% in 5 cm (i.e. a temperature gradient of 0.002°C/cm for refraction theory) in a disturbing layer 0.2 km thick. The effect varies with wavelength and gives color changes. Theory is applied to local fluctuations of radio wave lengths from stars, caused by irregularities of about 5 km in F2 layer travelling at about 1000 km/hr. (Met. Abst. 3.9-227.)--C.E.P.B.

D-461 Little, C.G. and Maxwell, A. (both, Jodrell Bank Exp. Sta., Manchester Univ.), Fluctuations in the intensity of radio waves from galactic sources. Philosophical Magazine, A, 42:267-278, 1951: 5 figs., 2 tables, 9 refs. DLC--Describes experiments conducted (May 1949-Dec. 1950) with the purpose of investigating (1) the correlation between fluctuations and local ionospheric phenomena; (2) changes in amplitude and period of fluctuations with elevation of source; and (3) to determine the linear dimensions of ionospheric irregularities responsible for the fluctuations. The observations of Cygnus and Cassiopeia, taken over a wide range of angles of elevation, are discussed along with the spaced receiver observations over 0.1, 4, and 11 km base lines enabling determination of the scale of radio energy diffraction pattern across the ground. --W.N.

D-462 Little, C.G., The origin of the fluctuations in galactic radio noise. Ph. D. Thesis, Univ. of Manchester, 1952. (unchecked)

D-463 Little, C.G. and Maxwell, A., Scintillation of radio stars during aurorae and magnetic storms. Journal of Atmospheric and Terrestrial Physics, London, 2(6):356-360, 1952. 3 figs., 6 refs. DWB--Scintillations of radio stars on 3.7 m during auroras of Sept. 25 and Oct. 28, 1951, averaged 4 or more per minute compared with 1-2 in normal conditions. On Oct. 28 a 10% decrease of signal intensity at maximum aurora occurred. Scintillation rate also has high + correlation with geomagnetic K index. Records of receivers 3 km apart show that changes of fluctuation rate are due to changes in speed of passage of quasi-stable disturbances, which may be about 120 km across. During aurora, average wind speed in upper ionosphere was about 400 m/sec; changes in scintillation rate are due to changes in this velocity. (Met. Abst. 5C-207.)--C.E.P.B.

D-464 Little, C.G., High latitude ionospheric observations using extraterrestrial radio waves. Institute of Radio Engineers, N.Y., Proceedings, 42(11):1700-1701, Nov. 1954. 4 figs., 4 refs. Ibid: URSI Information Bulletin, No. 94:36-41, Nov.-Dec. 1955.--Describes method and discusses the results of observations of ionospheric effects on extraterrestrial incoming radio waves at College, Alaska, during March 16-May 1954. Absorption at 65 Mc/s was stronger around midday, was correlated with polar blackouts and found to be linked to the variability of earth's magnetic field. Findings indicative of nonuniform lateral distribution of ionization are considered.--W.N.

D-465 Little, C.G.; Rayton, W.M. and Roof, R.B., Ionospheric effects at VHF and UHF. Alaska Univ. Geophysical Institute, Contract AF 39(635)-2887, Technical Report No. 1, Oct. 1955. 104 p. 8 sections, numerous refs. DWB--The report consists of sections summarizing knowledge of radar reflections from aurora, absorption, radio noise of auroral origin, refraction of radio waves by the ionosphere, the scintillation of radio stars, radar echoes from moon, and radar echoes from meteors Each of these is in turn divided into subtopics and particular emphasis is given to references to original papers and concerned agencies. (Met. Abst. unpub.)--E.Z.S.

D-466 Little, C.G.; Rayton, W.M. and Roof, R.G., Review of ionospheric effects at VHF and UHF. Institute of Radio Engineers, N.Y., Proceedings, 44(8):992-1018, Aug. 1956. 2 tables, 182 refs., 3+ eqs. DLC--This paper summarizes the present day knowledge of ionospheric effects at VHF and UHF, with the exception of forward scattering of VHF radio waves by the ionosphere. The seven effects covered in the paper are: Radar echoes from aurora, radar echoes from meteors, the Faraday effect and radar echoes from the moon, radio noise of auroral origin, absorption of radio waves by the ionosphere, refraction of radio waves by the ionosphere, and the scintillation of the radio stars. Each ionospheric effect has in turn been divided into separate subtopics, and the main results are given in these sub-sections, with particular emphasis upon providing references to the original papers. In this way the reader wishing to know the answer to a specific problem will speedily be able to find a summary of the main published results in the field, and also be able to learn which papers deal with the particular topic of interest. (Met. Abst. 8H-81.)--Authors' abstract.

D-467 Little, C. G., Radio astronomy as a tool for studying the ionosphere at VHF. Conference on Arctic Radio Wave Propagation, Alaska Univ., Jan. 1956, Papers, Issued May 1956. p. 2-7. (Unchecked)

D-468 Little, C. G.; Merritt, Robert P.; Rumi, G. C.; Stiltner, Ernest and Cognard, Rene, Radio properties of the auroral ionosphere. Alaska. Univ. Geophysical Institute, Contract AF 30(635)-2887, Quarterly Progress Reports, No. 1-5, 7, 8, June 1, 1956-May 31, 1958. 1 piece (53 p.) 16 figs., 13 tables, 10 refs., numerous eqs. DWB (M94.6 A323ra)--This report describes the results of more than twelve months operation of the 223 Mc and 456 Mc phase switch interferometers. The magnitude of the 223 Mc amplitude and angular scintillations effects have been determined at an auroral latitude using two extraterrestrial radio sources. These magnitudes are discussed in terms probability distributions, mean values, and diurnal, azimuthal, elevations, and source effects. a) The probability of occurrence of each of the five main levels of 223 Mc scintillation activity is given; b) Typical amplitude probability distributions and mean values of tractional deviation in power are given for each of these indexes; c) Representative values of mean angular scintillation, and probability distribution for angular scintillation are given for each main 223 Mc scintillation index; d) The diurnal variation for both sources shows a maximum of scintillation activity at about magnetic midnight ($\sim$0140 AST), with a ratio of about 1.8 to 1 between maximum and minimum. It is suggested that the activity is controlled in part by magnetic time; e) An azimuthal dependence has been found for the Cygnus source, which scintillates most strongly when seen toward magnetic north (some 30 degrees east of true north). It is suggested that the activity is controlled in part by the magnetic latitude at which the ionosphere is traversed; f) Both sources show very little variation of scintillation activity with zenith angle. (Cygnus covers the range 24 degrees zenith distance to 75 degrees, Cassiopeia 6 degrees to 57 degrees.) This lack of zenith angle dependence is attributed to the elongation of the irregularities along the earth's magnetic lines of force; g) The scintillation activities of the two sources are different. These differences are attributed to the larger subtension of the Cassiopeia source; h) A recent paper on the theory of radio star scintillations is modified to take into account an elongation of the ionospheric irregularities along the magnetic field lines. Note that the occurrence of radio star fades, as observed on phase switch and phase sweep interferometers, has already been reported and described in Quarterly Progress Report No. 6. (Met. Abst. 11E-89.)--Authors' abstract.

D-469 Little, C. G. and Leinbach, H., Some measurements of high latitude ionospheric absorption using extraterrestrial radio waves. Institute of Radio Engineers, N. Y., Proceedings, 46(1):334-348, Jan. 1958. 21 figs., 2 tables, eqs. DLC. Separated pages issued as Alaska. Univ. Geophysical Institute, Contributions, Ser. B, No. 22, 1958. DWB--Outline of the ionospheric absorption theory is given along with description of instrumentation and methods of measurement. With the objectives of checking the geographical extent of the absorbing "clouds." diurnal variation, height of absorbing region, correlation between magnetic activity and absorption, and correlation between aurora and absorption, three different experiments with 30 Mc extraterrestrial waves were conducted: 1) with rotating antenna, March 1955 at College, Alaska; 2) with two antennas, summer 1956; and 3) over a distance of 800 km between College and Barrow, Alaska, spring 1957. The results discussed are presented in graphs and tables. Findings were: Absorption was greatest in northern quadrant and extended well over 100 km, and at least 800 Km during disturbances. All absorption occurs below E region at about 60 Km. Pulsating and flaming auroras alone are intimately associated with major absorption, suggesting quite a different physical mechanism from other auroras. (Met. Abst. 11E-90) --W. N.

D-470 Little, C. G. and Leinbach, H., The riometer — a device for the continuous measurement of ionospheric absorption. Institute of Radio Engineers, N. Y., Proceedings, 47(2):315-320, Feb. 1959. 4 figs., 6 refs. DLC--A sensitive, self-balancing, noise measuring equipment, known as the riometer, is described. This instrument has been designed for routine measurement of ionospheric absorption during the IGY, using the cosmic noise method. Application of this technique in the auroral zone has resulted in quantitative measurements of ionospheric absorption, even during polar blackouts. The riometer has the advantages over a simple total power cosmic noise receiving system of 1) linear response to changes of input noise power, 2) high accuracy in the presence of narrow band RF interference, and 3) good long term stability. (Met. Abst. 11E-91.)--Authors' abstract.

D-471 Little, C. G. and Lawrence, Robert S., The use of polarization fading of satellite signals to study the electron content and irregularities in the ionosphere. U. S. National Bureau of Standards, Journal of Research, Sec. D, 64(4):335-346, July/Aug. 1960. 11 figs., 15 refs., 4 eqs. DWB, DLC--A procedure is described for using the Faraday rotation fading of a satellite radio signal to measure the ionospheric electron content per unit column up to the height of the satellite. At frequencies as low as 20 Mc the rotation of the plane of polarization cannot be assumed to be proportional to ρNB cos θ d along the line of sight. The simplifying assumptions implied by this expression are avoided, and full account is taken of ionospheric refraction, using the collision-free form of the Appleton-Hartree equation. Results based on observations of 1958 Delta 2 are presented. The subsatellite electron contents have been derived throughout the satellite passes for heights both above and below the F peak, the latter compare well with values derived from simultaneous ionograms. The method also permits the study of large scale irregularities in electron content. Such irregularities, having lateral dimensions of a few hundred kilometers and fractional deviations in subsatellite electron content of about 0.01, have been detected. Our observations suggest that satellite polarization studies offer important advantages over other methods of investigating these irregularities. (Met. Abst. 11.11-54 --Authors' abstract.

D-472 Liszka, Ludwik (Kiruna Geophys. Obs., Sweden), A type of variation of the signal strength from 1958 δ2 (Sputnik 3). Nature, London, 183(4672):1383-1384, May 16, 1959. 3 figs., ref. DWB--The results of some 200 passings of Sputnik 3, as observed at Kiruna Geophysical Observatory (67.8°N, 20.4°E), Sweden, by means of the 20.005 Mc/s radio signals, seemed to fall into pattern linked to definite points of the satellite's orbit. Hence, the purpose of this paper is to test the hypothesis whether the satellite produced heavily ionized tracks of relatively long existence. The initial study is by calculating the mean weight w of 85 night passages for which the results are plotted. The study is to be continued. (Met. Abst. unpub.)--W. N.

D-473 Liszka, L. (Kiruna Geophys. Obs., Sweden), Dropout phenomenon observed in the satellite 1958 δ 2 transmissions. Journal of Geophysical Research, Wash., D.C., 66(5):1573-1577, May 1961. 6 figs., 5 refs. DLC--During the period between March 1959 and April 1960, when the amplitude of 1958 δ 2 transmissions were measured at Kiruna Geophysical Observatory, sudden decreases of observed signal strength, usually to the noise level, were occasionally recorded. Synchronous amplitude measurements at several European stations showed that the phenomena coincided exactly. The fall in amplitude was invariably accompanied by a rapid decrease of observed frequency by up to 50 cps/s. At the termination of dropout, the frequency returned to the regular Doppler curve, and the subsequent rate of change was usually lower than at the onset. Similar dropout effects were observed on transmission of Explorer VII at 19.9904 Mc/s. The author rejects two explanations of this dropout and proposes that the data from Kiruna supports the hypothesis that the phenomenon is an effect of radiation on the satellite transmitter. The radiation probably from secondary γ rays produced by high energy electrons in the upper atmosphere or in the satellite itself, is manifested during period of giant magnetic pulsations when the satellite passes through sufficiently dense regions of the lower horn of the outer Van Allen belt. (Met. Abst. unpub.)--From author's text.

D-474 Lodge, Sir Oliver Joseph, Signalling across space without wires. Being a description of the work of Hertz and his successors, with additional remarks concerning the application to telegraphy, and later developments. 3rd. ed. London, The Electrician Printing and Publishing Co., 1900. 133 p. 67 figs. --The first 42 pages contain notes and material used in the lecture which author delivered before the Royal Institution of Great Britain, June 1, 1884. Several original, as well as control experiments conducted by the author are included. Of historic interest is the first vague attempt to measure radio wave emission from the galaxy. Seen in relation to its time, the lecture was a source of inspiration to contemporary research workers. For example, "telegraphic application based upon information given in the preceding lecture was made in 1895 by Professor Popoff...". --W. N.

D-475 Lovell, A.C.B. and Clegg, J.A., Radio astronomy. London, Chapman and Hall, 1952. 238 p. 120 figs., 7 tables, refs. Frontiers of Science Series. Also transl. into Russian by B.M. Chikhachev as Radioastronomiia. Moscow, Izdat. Inostrannoi Literatury, 1953. 240 p. 120 figs., 7 tables, numerous foot-refs., eqs. Refs. at end of most chapters. DLC--After introductory chapters on astronomy and the transmission and reception of electromagnetic waves, this popular book takes up the study of meteors by radio echo, its results and significance, radio waves from the sun, sunspots and solar flares, radio waves from the galaxy, twinkling of radio stars, the aurora, radio investigation of the moon and the planets, and afterglow. The translation includes critical comments; references are given in original form but with Russian references added or substituted in several chapters; illustrations are well reproduced. (Met. Abst. 9A-20.)--C.E.P.B., M.R.

D-476 Lovell, A.C.B., Report on Jodrell Bank to the Royal Astronomical Society Council for 1951. Royal Astronomical Society, Monthly Notice, 112( ):302-305. --A brief report summarizing the work being carried out at Jodrell Bank. Discusses radio frequency emissions from extra-galactic nebulae; from the galaxy; scintillations of radio stars; solar radio frequency emissions; the velocity distributions of sporadic meteors; the daytime meteor streams; the night-time meteor streams; the continuous meteor survey; meteor heights; scattering of radio waves from meteor trails; behavior of meteor trails after formation; radio echoes from the Aurora Borealis and from the moon. --L. A. Manning.

D-477 Lovell, A.C.B., Radio astronomy and the fringe of the atmosphere. Royal Meteorological Society, Quarterly Journal, 82(351):1-14, Jan. 1956. 13 figs., 54 refs. DWB--This Symons Memorial Lecture summarizes 6 branches of radio astronomy. Scintillation of radio stars is due to elongated ionized clouds in the F region about 400 km moving with an average speed of 100 m/s in 50-60°N to 360 m/s in the auroral zone. The apparent predominance of E-W and W-E motion may be due to the shape of the clouds. Drifts of radar reflections from ionized meteor trails at 70-120 km have given much information about semidiurnal and annual variation of winds. Scale heights, pressures and diffusion coefficients in the 100 km region can also be determined by radio echo meteor techniques. Sec. 6 describes the investigation of auroras by radio echoes, including determination of drift velocities (which are probably not due to winds). Finally, the bearing of moon echoes on the total electron content of the ionosphere is mentioned. (Met. Abst. 12E-96.)--C.E.P.B.

D-478 Lovell, A.C.B. (Jodrell Bank Experimental Station), Radio astronomical measurements from earth satellites. Royal Society of London, Proceedings, Ser. A, 253(1275):494-500, Dec. 29, 1959. 3 figs., 16 refs. DWB, DLC--It may be thought that radio astronomical measurements made on the earth are not subject to the influence of the atmosphere and ionosphere to any great extent and that consequently there is no demand for measurements from earth satellites or other space stations. Unfortunately, this is not the case and certain measurements from outside the earth's atmosphere are very much desired. The radio spectrum so far explored extends from a low frequency limit in the 10 to 20 Mc/s band, to an upper limit in the millimeter waveband. In the millimeter band the limitation to the extension of the spectrum arises from absorption bands in the atmosphere, whereas at low frequencies the extension is limited by absorption and disturbances in the ionosphere. In this paper some examples are given of the need to overcome these obstacles. (Met. Abst. 11.12-39.)--Author's abstract.

D-479 Lovell, A.C.B. (Jodrell Bank Experimental Station, Univ. of Manchester), The exploration of outer space. Observatory, London, 80(915):64-72, April 1960. DLC (QB1 O2)--A review is given of what is known about the Van Allen radiation belts. It is suggested that similar radiation belts may surround the other planets of the solar system. No such belts have been found near the moon but this is not unexpected. The outer radiation belt is obviously linked with the major geophysical effect observed on the earth and seems to act as a reservoir of charged particles with the sun as a source and the earth as a sink. Radio observations of the sun show the sun to be of varying size according to the wave length used. It seems probable that there is a constant outward streaming of particulate material from the sun. This gives rise to what is termed the solar wind which appears to envelop the planets. More detailed studies of the moon and planets are projected using both satellite and radiotelescope techniques. An account is given of the results which it is hoped to achieve. The article concludes with a description of what is known about general cosmology and the possibilities of radio astronomy. (Met. Abst. 12.4-159.)--R.B.

D-480 Low, Ward C. and Knight, Raymond M., Rocket reception of radio pulses over long distances. Boston University. Upper Atmosphere Research Laboratory, Contract AF 19(122)-36, Investigation of the ionosphere utilizing sounding rockets, Final Report, June 30, 1953. 65 p. tables, numerous figs. MH-BH--This is the final report on Contract AF 19(122)-36 between the Dept. of Defense and the Trustees of Boston Univ. It also marks the conclusion of the project usually termed the "Oblique Incidence Ionosphere Experiment," here called briefly the "Ionosphere Experiment." The principal goal of this project has been to obtain general information concerning characteristics of long distance radio pulse reception in high altitude rockets, more specifically, whether significant deviations from results of simple propagation theory result from the receiving stations being in, or very near, the E layer. To the limited extent to which the recovered data have been examined no such anomalies have been recognized. A description of the equipment employed on this experiment in three high altitude missiles: V-2 No. 51, and AFCRC Aerobee Rounds No. 20 and No. 24 is presented. A display of data obtained during the flights of those missiles is given, with a discussion of the methods of measurement used. (Met. Abst. 5.7-41.)--Authors' abstract.

D-481 Ludwig, George H. and Whelpley, William A. (both, State Univ. of Iowa), Corpuscular radiation experiment of satellite 1959 Iota (Explorer VII). Journal of Geophysical Research, Wash., D.C., 65(4):1119-1124, April 1960. 6 figs., 5 tables. DLC--Satellite 1959 Iota (Explorer VII) carries an apparatus prepared by the Dept. of Physics and Astronomy of the State Univ. of Iowa for comprehensive spatial and temporal monitoring of total cosmic ray intensity, geomagnetically trapped corpuscular radiation, and solar protons. In view of the successful operation of the equipment during the first 2 months of flight and the expectation of its continued operation until

Oct. 1960, we have considered it desirable and worth while to invite international participation in the recording and interpretation of the radiation observations. A full description of the apparatus is given, including detector calibrations, telemetry code, samples of actual recordings, and other pertinent information. (Met. Abst. 11.12-594.)--Authors' abstract.

D-482 Lugeon, Jean, L'eclipse de soleil du 31 aout 1932 et le sondage par les parasites atmospheriques. (Solar eclipse of Aug. 31, 1932, and soundings by means of atmospheric parasites.) Academie des Sciences, Paris, Comptes Rendus, 195:817-819, Nov. 7, 1932. 3 figs. DLC--By comparing records from sferics recorders installed by the author during the Polar Year at Jabłonna (near Warsaw), at Tromsö, Norway and on Bear Island during the eclipse of Aug. 31, 1932, it is established in both a positive and a negative manner that the grazing rays of the sun just striking the ionosphere mark the time of ending or beginning of strong sferics reception from sources thousands of miles distant. The sources in this case were from the U.S.A. and they were clearly received during eclipse only at Jabłonna which lay in right geometric path for the eclipse influence to be felt, but not at the Norwegian or Bear Island stations. The eclipse effect is similar to sunset effect. (Met. Abst. 4K-91.)--M.R.

D-483 MacArthur, J. W. (Marlboro College, Marlboro, Vermont), Theory of the origin of the very low frequency radio emissions from the earth's exosphere. Physical Review Letters, N.Y., 2(12):491-492, June 15, 1959. 2 refs., 7 eqs. DWB, DLC--A Doppler and proton-gyro concept is shown to be complementary rather than exclusive to (Gallet's) traveling wave tube mechanism, hence work in progress may explain all types of dawn chorus by this combination process. (Met. Abst. 11.9-108.)--W.N.

D-484 McCoy, D.O., An all-weather radio sextant. Navigation, Los Angeles, 4(8):309-319, Dec. 1955. DWB, DLC--The automatic sun tracking sextant (of which three types are described and illustrated along with modus operandi outlined in simple diagram) is mainly characterized by its immunity to weather for accurate performance. Data obtained at 1.9 cm and 8.7 mm wave lengths are discussed briefly since more complete results are to be published from the experiments at Feather Ridge Observatory. Results from such experiments (1952 cases) at 8.7 mm wave length is given in a curve showing only 0.017° probable error of integral distribution for altitudes above 30°. Lunar tracking has been done experimentally, with better results than were obtained from radio stars strong enough for tracking with the radio sextant. (Met. Abst. 9B-124)--W.N.

D-485 McIntosh, Douglas Haig, Geomagnetic solar flare effects at Lerwick and Eskdalemuir, and relationship with allied ionospheric effects. Journal of Atmospheric and Terrestrial Physics, 1(5/6):315-342, 1951. 3 figs., 22 tables, 19 refs. DWB--The geomagnetic effects of solar flares (the crochets) over the period 1936-1949 are tabulated and identified. An equinoctial maximum of occurrence is observed. Midday is the hour of greatest frequency. The relationships between geomagnetic effects and flares, fade outs, sudden enhancements of sferics, etc., are examined. A general discussion of the phenomena is given. (Met. Abst. 4.3-105.)--A.A.

D-486 McKerrow, C.A., Sudden decrease in low frequency atmospheric noise during the cosmic radiation storm of Feb. 23. Nature, London, 177(4522):1223-1224, June 30, 1956. fig. DWB--At Churchill, Manitoba, a sudden decrease of 100 kc/s noise occurred at 0345 G.m.t. Other observations are compared and it is concluded that "for this solar flare there appeared to be a sudden increase in the D region absorption on the darkened half of the hemisphere which cannot be attributed to ultraviolet radiation. It also appears that this condition may occur only at high latitudes situated near the auroral zone (Met. Abst. 7.10-175.)--C.E.P.B.

D-487 McLean, D.J. (School of Physics, Univ. Sydney), Solar radio emission of spectral type IV and its association with geomagnetic storms. Australian Journal of Physics, Melbourne, 12(4):404-417, Dec. 1959. 5 figs., 2 tables, 14 refs. DLC--A new type of solar radio event, the type IV storm, first described by BOISCHOT, has been identified on Dapto radio spectographic records. It has been shown to be distinguishable from type I storms by 1) its smooth spectrum, 2) its close association with type II bursts, and 3) its remarkably close association with geomagnetic storms. In common with some type I storms, all type IV storms are found to be associated with very large solar flares. It appears possible to explain the production of type IV emission and the occurrence of the related phenomena in terms of a single cloud of gas which moves through the Sun's corona. (Met. Abst. 11.10-201.)--Author's abstract.

D-488 Magnuson, G.D. and Medved, D.B. (both, Physics Section of Convair, San Diego, Calif.), Sputtering as a possible mechanism for increase of ionization in the vicinity of low altitude satellites. Planetary and Space Science, 5(2):115-121, June 1961. 3 figs., 2 tables, 4 refs., 17 eqs. DLC--It is suggested that for altitudes below 200 km there may be sufficient sputtering produced by ion, atomic, and molecular impact on the vehicle surface to lead to some increase in ionization above ambient at distances of one mean path or less from the vehicle. The sputtering process injects into the environment atoms of metallic elements whose ionization potentials are 1/2 to 1/3 those of the ambient species. Collision energies in the center of mass system vary from ionization thresholds (E_i) to 2 to 3 times E_i. The resulting ionization in the surroundings may then be calculated if values for β, the probability of any collision leading to ionization is known. On the basis of the crude model presented, β should be greater than, or equal to, 10^{-6} for this mechanism to be of interest. (Met. Abst. unpub.)--Authors' abstract.

D-489 Malik, Chester; Aarons, Jules and Poeverlein, Hermann (all, A.F. Cambridge Res. Center, Bedford, Mass.), Backscatter experiments during the total eclipse of Oct. 2, 1959. Journal of Geophysical Research, Wash., D.C., 65(10):3241-3247, Oct. 1960. 5 figs., 7 refs. DLC--Backscatter records taken at 19.39 Mc/s with a rotating antenna were investigated in order to determine how the returns were affected by the total eclipse of Oct. 2, 1959. At the frequency chosen, ground backscatter via F layer reflection sets in before sunrise at the location of observation. On normal days before and after the eclipse, it appears first in the east and southeast and then, 2 or 3 hours later, in the west. On the eclipse day, the signal from the east was delayed several hours and appeared after the return from the west had been received. Graphical representations of details of the backscatter records show not only the eclipse effect but also the effect of ionospheric disturbances on days before and after the eclipse. These disturbances make it nearly impossible to formulate a standard of average behavior that may be quantitatively compared with the eclipse day. The long duration of the eclipse effect indicates its complicated nature which probably involves dynamic properties of the F2 layer. (Met. Abst. 11L-315.)--Authors' abstract.

D-490 Malinge, Anne-Marie (Observatoire de Meudon), Relation entre les orages radioelectriques solaires et les eruptions chromospheriques. (Relationship between solar radio noise storms and solar flares.) Annales d'Astrophysique, Paris, 23(4):574-584, July/Aug. 1960. 5 figs., 8 refs. French, English and Russian summaries p. 574. DWB, DLC--Comparisom of the position of radio noise storms observed at 169 MHz with solar flares following or preceding the beginning of the noise storms shows a definite relation between the two phenomena. A notable effect of refraction is shown to exist in the corona. (Met. Abst. 11L-99.)--Author's abstract.

D-491 Malurkar, S.L., The solar flare effect at Alibag on June 13, 1951. Annali di Geofisica, 7(2):215-219, April 1954. fig., 3 tables. DLC--A detailed study of the quick-run magnetograms of the solar flare of June 13, 1951. Alibag was favorably situated. Corresponding to different flares on that day the profile of the solar flare effect has two stage maximum. The time of the onset of the radio fadeout in relation to the flare has been pointed out. In the vertical force effect corresponding to the onset and end of radio fadeout there has been a temporary no-variation-with -time stage or a sort of inflexion. The diurnal range of ozone at Tromsø also was abnormally large within the next 24 hours. (Met. Abst. 9B-96.) --Author's abstract.

D-492 Mandel'shtam, S.L. and Efremov, A.I., Issledovaniia korotkovolnovogo ultrafioletovogo izlucheniia solntsa. (Investigation of short wave ultraviolet solar radiation.) Uspekhi Fizicheskikh Nauk, Moscow, 63(1):163-180, Sept. 1957. 13 figs., 5 tables, 24 refs. DLC. Transl. available LC or SLA. mi $2.70 phot. $4.80. --The present paper sets out briefly the results of experimental and theoretical work on the study of the short wave emission from the sun published since an earlier review (Ibid., 1952). Experiments are also described which, it is suggested, could be profitably carried out with the aid of an artificial earth satellite. (Met. Abst. 11J-103.) --Physics Abstracts.

D-493 Marini, J.W. (Electromagnetic Res. Corp., Wash., D.C.), Radiation and admittance of a slotted sphere antenna surrounded by a plasma sheath. Planetary and Space Science, N.Y., 6:116-122, June 1961. 2 figs., 3 refs., 16 eqs. DWB--On the simplified assumptions that the frequency is low and the sheath strongly ionized, expressions for the input impedance of the slot, the radiation pattern and the power loss are obtained. Criterion for thickness of the insulating layer that conduction losses in the sheath be small is established. Input admittance and external efficiency of the antenna are determined. --W.N.

D-494 Marmo, F.F.; Aschenbrand, L.M. and Pressman, J. (all, Geophys. Res. Directorate. A.F., Cambridge Res. Center L.G. Hanscom Field, Bedford, Mass.), Artificial electron clouds. I. Summary report on the creation of artificial electron clouds in the upper atmosphere. Planetary and Space Science, 1(3):227-237, Aug. 1959. 3 figs., 4 tables, 3 refs. DLC--This is the first paper of a series dealing with the experimental results of artificial electron clouds as produced at 70 and 130 km altitude for the study of the upper atmosphere. A method of correlating optical and radio-radar data is included in this general survey of methods and techniques. Tabulated results from the first experiments, which began March 1956 at Holloman Air Force Base, New Mexico, are presented. Other locations for experiments are in Texas, Colorado, Utah and Arizona. --W. N.

D-495 Marner, Gene R., Atmospheric attenuation of microwave radiation. Institute of Radio Engineers, Professional Group on Antennas and Propagation, Transactions, Vol. AP, 3(1): 68-71, 1955. DLC--A combined radio telescope - radio sextant was used to measure atmospheric attenuation at a wavelength of 8.7 mm. --CSIRO Abstract.

D-496 Marner, G. R. (Collins Radio Co.), Automatic radio-celestial navigation. Institute of Navigation, London, Journal, 12(3/4):249-259, July/Oct. 1959. 6 figs. (incl. photos), table, 13 refs., 5 eqs. DWB, DLC--Describes the features of the radio sextant and indicates the possibility of its use for automatic navigation. Two radio sextants are described and shown in photographs: 1) the experimental sextant completed in 1952 (Collins Radio Co.) presently in use aboard the U.S.S. "Arneb"; and 2) a radio sextant (MARNER and WILLIS, 1959) capable of tracking both the sun and moon with high precision. In the light of experiments with these instruments the entire problem of radio-celestial navigation is examined in minute detail. It is found that the use of the discrete sources of radio radiation does not appear practical with a small antenna due to the low flux density at microwave wavelengths and to competing atmospheric emission effects. However, the automatic radio sextant has demonstrated its capability for precise solar and lunar tracking in both clear and foul weather with an antenna of modest size. (Met. Abst. 11.9-107.)--I. S.

D-497 Marshall, Alan C. and Houston, Robert E., Instrumentation for the automatic Doppler tracking of earth satellite radio signals. New Hampshire Univ., Contract AF 19(604)-4145, Scientific Report, No. 1, July 1961. 38 p. 9 figs., ref. --Detailed description in text and block diagrams is given of a simple but reliable instrumentation used effectively since 1958 for automatic tracking of the Doppler shift of passing satellites. Greatly extended usefulness of this prototype instrument is feasible with slight modifications. A few records of observations taken are included. (Met. Abst. unpub.)--W. N.

D-498 Martyn, D. F. (Indust. Res. Organ., Camden, N.S.W.), Sporadic E region ionization, 'Spread F', and the twinkling of radio stars. Nature, London, 183(4672):1382-1383, May 16, 1959. fig., 6 refs., 2 eqs. DWB--

An explanation of these phenomena is given. It is shown how the kinematically unstable surface ionization of the upward drifting F region and the simultaneous down-drift (or rather lag) of small irregularities become capable of producing the pronounced scattering responsible for scintillation and 'spread F'. In the E region a cyclindrical perturbation with travel through the medium as a wave which is almost certain to be accountable for the equatorial sporadic E region ionization. It is the kinematic instability in the ionization gradient of a medium drifting across a magnetic field which basically governs the above phenomena. (Met. Abst. 11. 9-121.)--W. N.

D-499 Massachusetts Institute of Technology. Lincoln Laboratory, Collection of Soviet papers on earth satellites. Issued Oct. 31, 1957; reissued Jan. 13, 1958. 182 p. figs., tables, refs., eqs. DWB (629.1388 M414co)--Contents: Vakhnin, V., Artificial earth satellites (from Radio, No. 6:14-17, June 1957). Kazantsev, A. N., Observation of radio signals from an artificial earth satellite and their scientific value, p. 6-15 (from Radio, No. 6:17-19, June 1957). Makhailov, A. A., Observation of the artificial satellite, p. 16 (from Astronomicheskii Tsirkuliar, No. 180:1, May 18, 1957). The following papers were all originally printed in Uspekhi Fizicheskikh Nauk, Moscow, Vol. 63, No. 1, Sept. 1957. Danilin, B. S. et al., Problem of the measurement of pressure and density of the upper layers of the atmosphere with the aid of an artificial earth satellite, p. 17-48. Ginzburg, V. L., Use of artificial earth satellites for the purpose of proving general relativity theory, p. 49-54. Mikhnevich, V. V., Measurement of pressure in the upper atmosphere, p. 55-65. Vernov. S. N. et al., Investigation of the composition of primary cosmic rays, p. 66-88. Vavilov, V. S. et al., Silicon solar batteries as electric power sources for artificial earth satellites, p. 104-112. Iatsunskii, I. M., The effect of geophysical factors on satellite motion, p. 113-130. Okhotsimskii, D. E. et al., Determining the lifetime of an artificial earth satellite and an investigation of secular perturbations of its orbit, p. 131-152. Poloskov, S. M. and Nazarova, T. N., Investigation of solid components of interplanetary matter by means of rockets and artificial earth satellites, p. 153-170. Taratynova, G. P., Motion of an artificial satellite in the noncentral gravitational field of the earth in the presence of atmospheric resistance. (Met. Abst. 10. 10-4.)

D-500 Massey, H.S.W., The nature of the upper atmosphere. Endeavour, London, 13(50):81-85, April 1954. 4 figs., 6 refs. DLC--General but semitechnical treatment of structure and composition of the high atmosphere, the ionosphere, aurora and airglow according to latest results of rocket and radio research. (Met. Abst. 12E-70.)--M.R.

D-501 Massey, H.S.W., Rockets and satellites in scientific research. Endeavour, London, 17(66):85-89, April 1958. 2 refs., 4 eqs. DLC--Usefulness of rockets in obtaining ionospheric and high atmospheric composition, temperature, density, ionization and radiation data; limitations in time aloft which are overcome by use of satellites, a history of sounding rockets, their instrumentation and future prospects, the orbits and some of the results of the first U.S. and Soviet satellites are reviewed for general information. The results of ejection of sodium vapor and of NO at high altitudes (40-60 mi) are also discussed. The fluorescence from the sodium vapor cloud persisted for 20 min, even at points 300 mi away from the launching site. (Met. Abst. 10.6-85.)--M.R.

D-502 Massey, H.S.W. and Boyd, R.L.F., The upper atmosphere. London, Hutchinson and Co., 1958. 333 p. 12 figs., 21 plates, 6 tables, 20 refs., 33 eqs. Price: 63 sh. DLC (QC879.M3). Review by D.R. Bates in Nature, 182(4650): 1629, Dec. 13, 1959.--This is the latest and most systematic book summarizing the current knowledge of the upper atmosphere (from 10 mi to several hundred mi above the surface) as gained by study of geomagnetic fields, radio wave propagation, spectra, radiations; by means of balloons, rockets, explosive waves, radio, spectroscopes, magnetometers, meteor photographs and spectra, cosmic ray counters or chambers, artificial satellites and other direct and indirect methods. Upper air temperature, composition, density; ionization, cosmic radiation (UV, visible, cosmic ray and radio frequency), magnetic fields and electric currents, auroral and airglow phenomena, ozone changes, twilight flashes and glows, atmospheric tides, solar corpuscular streams and other elements observed are tabulated. (Met. Abst. 10.8-6.)--M.R.

D-503 Massey, H.S.W. and Boyd, R.L.F., Scientific observations of the artificial earth satellites and their analysis. Nature, London, 181(4602):78-80, Jan. 11, 1958. eqs. DWB--The launching of the Soviet earth satellites took other governments by surprise. They were launched when tracking instruments in other parts of the world were inadequate and unsatisfactory. A list of the British stations engaged in the tracking is given. The shortcomings and the achievements of the first two satellites are included here. The potentialities of radar method, the clear need for accurate orbit data, the computational procedures at the Smithsonian Institution and the need to use the Faraday effect for determining ionospheric density are also discussed. (Met. Abst. 10.6-84.)--N. N.

D-504 Massey, H. S. W. (Dept. of Physics, Univ. College, London), Scientific applications of rockets and satellites. (In: Symposium on High Altitude and Satellite Rockets, Cranfield, England, July 1957, (Proceedings). N. Y., Philosophical Library, 1959. p. 7-14). DWB (629.1388 S989hi)--Some of the more important aspects of high altitude research by way of rocket and satellite borne instruments are considered here. The topics include: studies of the solar spectrum before reaching the earth's atmosphere, ionospheric refractive index, electron concentration, the positive and negative ions, the dynamo currents responsible for the quiet magnetic variations, the soft x-radiation, airglow, production of ionized and metallic clouds in relation to distribution of winds and temperature as well as the basic properties of the atmosphere. The instrumentation comprises spectrographs with photographic recordings, photoelectric telemetering, photon counters, ion analyzers, magnetometers, photometers, etc. (Met. Abst. 11I-166.)--W. N.

D-505 Massey, H. S. W. (Chairman, British National Committee on Space Research), Space research. Contemporary Physics, London, 1(2):81-95, Dec. 1959.--Space research is defined as the scientific study of the earth and the universe generally which may be carried out using instruments conveyed by the use of rocket motors to regions inaccessible in any other way. This is a review paper of such research. The technical problems involve: 1. the rocket motor; 2. a guidance mechanism; 3. precise tracking techniques; 4. the development of suitable measuring instruments; 5. power supply for instruments; 6. relaying observation back to earth. Investigations which may be carried out include: 1. study of the high atmosphere; 2. meteorological studies; 3. gravitational and magnetic studies; 4. astronomical observations; 5. particle radiations in interplanetary space; 6. study of the nature of any matter in interplanetary space; 7. study of the moon and planets in situ; 8. investigation of the nature of gravitation. (Met. Abst. 12.4-53.)--R. B.

D-506 Matsushita, Sadami (Geophys. Inst., Kyoto Univ.), Semidiurnal lunar variations in the sporadic E. Journal of Geomagnetism and Geoelectricity, Kyoto, 4(1):39-40, April 1952. 2 figs., 6 refs. DLC--An analysis of the critical frequency of the sporadic E (fE_s) during summer solstice at Kokubunji, Japan, lat. 139°29.3'E, long. 35°42.2'N, for 1949-51 shows the semidiurnal lunar variations in E_s. Harmonic analysis of these variations (shown in graph) gives an accurate picture of the significant variations. It shows that on the average the lunar semidiurnal variation reaches its maximum amplitude of 35 Mc/s or 13% about 8 hrs after the lunar culminations. The diurnal variations are usually of smaller amplitude than the semidiurnal. It was not possible to study the variation in the Dec. solstice and the equinoxes because of the small number of occurrences of E_s. The amplitude of the E_s tide is greater than that in the E or F2. (Met. Abst. 9.5-137.)--M. R.

D-507 Matsushita, S., Sequential E_s and lunar effects on the equatorial E_s. Journal of Geomagnetism and Geoelectricity, Kyoto, Japan, 7(3):91-95, Sept. 1955. 4 figs., 10 refs. DLC--Sequential Es is a type of sporadic E layer ionization which shows apparent vertical movement. Distribution of this phenomenon in space and time is analyzed from world wide ionospheric data. Lunar effects on Es and sequential Es are shown. (Met. Abst. 11D-95.)--G. T.

D-508 Matsushita, S., Lunar effects on the equatorial Es. Journal of Atmospheric and Terrestrial Physics, 10(3):163-165, March 1957. 3 figs., 7 refs. DWB--Equatorial Es at Huancayo occasionally disappears suddenly near noon or early afternoon. Local time of disappearance is earlier near full and new moon, i. e., during first half of periods of westward lunar electric current. (Met. Abst. 8.7-158.)--C. E. P. B.

D-509 Matthews, Whitney and Ludwig, George H., Satellite telemetry. American Geophysical Union, Transactions, 39(1): 187-192, Feb. 1958. 2 figs., table. DWB, DLC--Telemetering systems of the U. S. nonrecoverable satellites are designed for direct observations in space, to record observations made by the satellite's instruments, to encode such observations for transmittal to ground stations and to accomplish the actual transmission. In this U. S. -IGY program accuracy and reliability are the watch words and the embodiment of the transmission system is wrapped up in two packages, viz: the Lyman-alpha and the cosmic ray packages, which are internationally studied by a chain of stations in the U. S., as well as at strategic points over seas under a volunteer telemetering recording system. (Met. Abst. 12.5-59.)--N. N.

D-510 Maxwell, Alan and Little, C. G., A radio astronomical investigation of winds in the upper atmosphere. Nature, London, 169(4305):746-747, May 3, 1952. 3 figs., 3 refs. DWB--Measurements of irregularities in radiation (80 Mc/s) from radio stars at 3 stations give winds in F layer at night. Histograms of direction and speed show, May-June, 60° N, nearly all toward W-WNW, mean speed 250 km/hr; Sept.-Oct., 53°N, toward W-WSW, 430 km/hr. Rapid changes of speed observed. (Met. Abst. 3.10-200.)--C.E.P.B.

D-511 Maxwell, A. and Dagg, M., A radio astronomical investigation of drift movements in the upper atmosphere. Philosophical Magazine, London, 45(365):551-569, June 1954. 7 figs., 6 tables, refs. DWB--Records of fading of 3.7 m emissions from Cygnus and Cassiopeia at night on three receivers near Jodrell Bank showed irregularities in the diffracting screen at about 400 km height indicating steady translation. Average speed was 210 m/s, but ranged from 0 - 1000. Direction was nearly constant across magnetic lines of force, from W 19 h to midnight, changing rapidly to E or ESE 1 - 4 h. Movements are similar over a wide area, but in the F region in the auroral zone the average drift is 360 m/s and the direction less constant, from W - SW 9 - 21 h, equally from SW or from E - SE 21 h - 6 h. A documented table of other evidence of F region motion is given for comparison. (Met. Abst. 6D-250.)--C.E.P.B.

D-512 Maxwell, A. (Harvard Astronomy Sta., Ft. Davis, Texas), Radio emissions from the sun. National Electronics Conference, Chicago, Oct. 1957, Proceedings, Vol. 13:374-376, pub. 1957. 2 figs., 3 refs. DWB (621.38 N277pr)--A brief description of experiments at Ft. Davis, Texas (Harvard Radio Astronomy Station) for recording radio frequency radiation from sun at 100 - 580 Mc/s. Four distinct types of bursts are noted: (1) long series of short bursts lasting hours or days (usually below 250 Mc/s), coming from solar corona or active sunspot regions; (2) continuum radiation over a wide band, sometimes after great bursts; (3) slow drift bursts, intense at first and drifting toward lower frequencies, lasting 10 min and accompanied by visual flares; (4) fast drift bursts of a few seconds. Over 9000 fast drift solar radio bursts were recorded in 14 months, associated with minor solar flares. (Met. Abst. 11.8-77.)--M.R.

D-513 Maxwell, A.; Swarup, G. and Thompson, A.R., The radio spectrum of solar activity. Institute of Radio Engineers, N.Y., Proceedings, 46(1):142-149, Jan. 1958. 8 figs., 2 tables, 9 refs., eqs. DLC--Observations of the solar spectrum have been made at the Harvard Radio Astronomy Station, Ft. Davis, Texas, daily from sunrise to sunset since Sept. 1956. The equipment comprises three separate receivers covering the total range 100 - 580 Mc, and these are attached to a 28 ft diameter paraboloid antenna. The outputs of the receivers are displayed on intensity modulated, high resolution cathode ray tubes, and these are photographed by a continuous motion camera. Over all, the system is approximately ten times more sensitive than any sweep frequency equipments used previously for solar observations. Examples of the records showing the four main types of radiation from active areas on the sun are given, and brief comments are made on the existing theories to account for them. (Met. Abst. unpub.)--Authors' abstract.

D-514 Maxwell, A.; Howard, W.E., III and Garmire, G. (all, Radio Astron. St. of Harvard Coll. Observ., Ft. Davis, Texas), Some statistics of solar radio bursts at sunspot maximum. Journal of Geophysical Research, Wash., D.C., 65(11):3581-3588, Nov. 1960. fig., 7 tables, 8 refs., eq. DWB, DLC--This paper discusses the occurrence and intensity of solar radio bursts at four frequencies in the band 100 to 600 Mc/s. The observations cover 4010 hrs during a 12 month period at sunspot maximum; the results refer essentially to bursts of intensity greater than 10^{-21} mks unit and duration greater than 0.3 sec. The statistical information is interpreted in terms of the spectral characteristics of the bursts. The experimental data were taken at Ft. Davis, Tex., and the analysis shows that at 125 Mc/s burst radiation was recorded for 560 hrs, of which 380 hrs were of low intensity. At 200 Mc/s the burst radiation covered 350 hrs, of which 240 hrs were of low intensity. For these two frequencies the bursts occurred mainly in the form of noise storms (spectral type I). At 425 and 550 Mc/s the total times of the solar bursts were much less, being respectively 21 and 23 hrs; for the most part, however, this radiation was of high intensity and appeared in the form of continuum radiation (spectral type IV) over a wide frequency range. (Met. Abst. 11L-93.)--Authors' abstract.

D-515 Mayer, C.H.; McCullough, T.P. and Sloanaker, R.M. (all, Radio Astronomy Branch, U.S. Naval Res. Lab., Wash., D.C.), Measurements of planetary radiation at centimeter wavelengths. Institute of Radio Engineers, N.Y., Proceedings, 46(1):260-266, Jan. 1958. 5 figs., table, 11 refs., 3 eqs. DLC--Radiation from the planets, Venus, Mars, and Jupiter, has been measured at wavelength of 3.15 cm using the Naval Research Lab. 50 ft reflector and a narrow band radiometer. The apparent blackbody temperatures for Mars and Jupiter derived from the radio measurements agree reasonably well with the results of infrared radiometric measurements. For the case of Venus, the apparent blackbody temperature derived from the 3.15 cm measurements is about a factor or two higher than the value derived from the infrared measurements. A measurement of the radiation from Venus at 9.4 cm wavelength was made using the same antenna. The apparent blackbody temperature derived from this measurement agreed well with the value derived from the 3..15 cm measurement, but the accuracy of the 9.4 cm result was low because of the small flux density of radiation and the small number of observations. (Met. Abst. 11.6-143)--Author's abstract.

D-516 Mayer, H.F. (Cornell U., Sch. of Elec. Engr.), Radio noise considerations. Cornell Univ. School of Electrical Engineering Contract W19-122 ac-41, Solar Noise Technical Report, No. 1, Aug. 1949. 52 p. figs., eqs. DWB--Three reports, based on the author's lectures, are presented. The purpose is to lay the groundwork for designing and building suitable radiometers for solar noise observations. The first report is entitled "Investigations of noise statistics." in which is considered white noise as a function of frequency and time. The second report, "Limitations by noise in solar noise measurements." treats six factors upon which the minimum detectable signal depends. The third report: "Law of rectification, noise fluctuations and signal sensitivity" treats three factors with direct bearing upon the subjects under discussion. (Met. Abst. 9A-9.)--W. N.

D-517 Mechtly, E.A. and Bowhill, S.A. (both, Ionos. Res. Lab., Penn. State Univ.), Measured noise intensities on 512 Kc/s frequency. Journal of Geophysical Research, Wash., D.C., 65(10):3501, Oct. 1960. DLC--A rocket launched from the Air Force Missile Center, Cape Canaveral, Florida, May 1959, carried a pair of magnetic dipole antennas, turned to 512 kc/s, each being connected to a receiver. The signal level at each receiver was telemetered to ground level and recorded. The range of height covered was from ground level to over 400 km, following a somewhat oblique trajectory. The values of noise intensities observed were found to depend critically on the height region in the ionosphere. Below the ionosphere the measured intensities were 6.8×10^{-17} Watt m^{-2} $(c/s)^{-1}$ for antenna A and 1.2×10^{-13} Watt m^{-2} $(c/s)^{-1}$ for antenna B. In the ionosphere, between 90 and 400 km height, the intensities for both antennas remained essentially at the lower limit of measurability, about 10^{-18} Watt m^{-2} $(c/s)^{-1}$. Above 400 km height, the intensities on both antennas fluctuated widely, but in a similar manner, between the lower limit of measurability and an upper limit corresponding to an equivalent free space intensity of about 3×10^{-15} Watt m^{-2} $(c/s)^{-1}$ (Met. Abst. unpub.)--E. Z. S.

D-518 Medd, W.J. and Covington, A.E. (both, Nat'l. Res. Council, Ottawa, Canada), Discussion of 10.7 cm solar radio flux measurements and an estimation of the accuracy of observations. Institute of Radio Engineers, N.Y., Proceedings, 46(1):112-118, Jan. 1958. 5 figs., 2 tables, 12 refs., 11 eqs. DLC--The accuracy of the daily 10.7 cm solar flux measurements taken at the Nat'l. Research Council, Ottawa, has been investigated. The various system parameters are examined and an auxiliary experiment, using a horn antenna, is described. These studies lead to a revision of the early values of the solar flux and require the use of conversion factors to some of the published data. It has been estimated that the relative error between observations separated by intervals of months may be ± 10% during 1947 through 1949, and ± 3% during subsequent years. The systematic error in 1952-1953 was estimated at 7%. (Met. Abst. 11.6-147.)--Authors' abstract.

D-519 Medved, D.B. (Convair. Physics Section, San Diego, Calif.), Secondary electron emission and the satellite ionization phenomenon. Institute of Radio Engineers, N.Y., Proceedings, 40(6):1077-1078, June 1961. fig., 10 refs., 4 eqs. DLC--Outlines a model for ionization buildup based on secondary electron emission from the surface of a satellite between 90 and 250 km and at > 1000 km. The plane parallel analysis and the equations developed are shown to be valid for a cylindrical or spherical satellite. Variation of sheet thickness and electron density as a function of altitude are plotted. --W.N.

D-520 Meinel, A.B. (Kitt Peak Nat'l. Obs., Tucson, Ariz.), Astronomical observations from space vehicles. Astronomical Society of the Pacific, San Francisco, Publications, 71(422):369-380, Oct. 1959. DLC--An interesting discussion of the scope and possibilities of astronomical observations from space vehicles. The requirements that a space telescope must meet and the design problems are discussed. The discussion is divided into two parts. The first part consists of astrophysical considerations. Eight general areas of fruitful research and discovery in space astronomy are enumerated. In the second section ten principal problem areas relative to engineering considerations for a space telescope are considered. (Met. Abst. 11L-29.)--I.S.

D-521 Menzel, Donald Howard, Our sun. Philadelphia, Blakiston, 1950. 326 p. 178 figs., 6 tables, refs. DWB--A beautifully illustrated and handy textbook or reference work based on years of research and survey literature in respect to the physical-chemical conditions of the sun and their effects on terrestrial atmospheric, magnetic and other geophysical phenomena. The results of basic research done during the war (1939-1945) have, fortunately, been included. Discussions of interest to meteorologists include among others, those on auroras, the production of ozone by UV radiation, long range forecasting based on solar influences, the sun's corona, cycles, climatic changes, solar heating, effect of eclipses, magnetic storms, sunspots, solar faculae, solar spectroscopy, radio communication, ionospheric physics and last, and definitely least, the poorly established relations between the sunspot cycle and human behavior (economic and biological factors) which the author maintains should be viewed with suspicion. (Met. Abst. 3.10-279.)--M.R.

D-522 Menzel, D.H.; Warwick, James W. and Larence, Robert S., A dynamic spectrum analyzer for Sacramento Peak. Harvard Univ. Harvard College Obs. Solar Dept., Contract AF 19(604)-146, Scientific Report, No. 20, Jan. 6, 1955. 12 p. 8 figs. DWB--Analysis of optical observations of flares and associated chromospheric activity emphasized the importance of building at Sacramento Peak a dynamic radio spectrum analyzer similar to that now in use at the Commonwealth Scientific and Industrial Research Organization near Sydney, Australia. Dynamic spectra of the radio region, taken simultaneously with observations of associated optical activity, would provide a powerful tool for study of many solar-terrestrial effects. In particular, such an instrument promises to be of special value in studies of magnetic and ionospheric storms, solar cosmic ray sources, sudden ionospheric disturbances and the aurora borealis. Sec. II of this report discusses the observations that support this conclusion. Sec. III of the report analyzes the requirements for a dynamic spectrum analyzer, with special reference to its planned use in conjunction with optical observations, and establishes general specifications for such equipment. The requirements imposed by the optical records have been coordinated with the limitations of electronics, so that the proposed design is consistent with the present day techniques of radio engineering. (Met. Abst. 7.4-288.)--Authors' abstract.

D-523 Menzel, D.H. and Krook, Max, On the origin of solar radio noise. Harvard Univ. Obs. Solar Dept., Contract AF 19(604)-1394, Scientific Report No. 2, 1956. 4 p. DWB--This paper discusses, in a general way, the problem of energy transport when gas-kinetic processes dominate. Coupling exists between the material and radiation fields, with the result that certain frequencies are amplified because the fundamental equations are non-linear. The effects of density gradient, temperature gradient, etc., are important because a disturbance of small amplitude in a region of high density may grow to large amplitude as it moves out through the solar atmosphere. The presence of magnetic fields further complicates the situation, making possible the distinction between longitudinal and transverse oscillations. The paper discusses the modes of oscillation, the coupling of the different modes, the setting-up of shock waves, and the possible conversion of mechanical energy into the form of radio frequency emission. (Met. Abst. 9A-124.)--Authors' abstract.

D-524 Menzel, D.H. (ed.), The radio noise spectrum. Cambridge, Mass., Harvard Univ. Press, 1960. Price: $7.50. 183 p. figs., tables, refs., eqs. Contents (these articles abstracted separately): Allen, E.W., Man-made radio noise, p. 1-6. Peterson, Allen M., The aurora and radio wave propagation, p. 7-42. Lawrence, Robert S., Ionospheric scintillation of radio waves of extraterrestrial origin, p. 43-47. Eshleman, Von R., Meteor scatter, p. 49-78. Hawkins, Gerald S., Electromagnetic emission from meteors, p. 79-92. Helliwell, R. A., Whistler-mode propagation, p. 93-100. Maxwell, A.; Swarup, G. and Thompson, A. R., Radio spectrum of solar activity, p. 101-110. Aarons, Jules, Natural background noise at very low frequencies, p. 111-122. Gold, Thomas and Menzel, Donald H., Solar whistlers, p. 123-128. Burke, B. F., Noise of planetary origin, p. 129-140. Bracewell, R. N., Correcting noise maps for beamwidth, p. 141-150. Menzel, Donald H., Study on cosmic radio noise sources, p. 151-176. Gold, Thomas, Interstellar hydrogen, p. 177-179. DWB (621.38411 M551ra), DLC--The individual chapters of this book consist of papers presented by the respective authors at the Conference on Radio Noise held at Harvard College Observatory, April 22, 1958. The studies deal with problems of radio noise, its source, whether man made or natural, over the known range of frequencies as well as the origins and significance of certain characteristic noise radiations. Following the presentation of each paper discussions were held and pertinent parts of the discussion are appended to the papers. (Met. Abst. 12.6-1.)--E. Z. S.

D-525 Merrill, Harrison J. (Signal Corps Engr. Labs., Ft. Monmouth, N. J.), Satellite tracking by electronic instrumentation. (In: Van Allen, James A. (ed.), Scientific uses of earth satellites. Ann Arbor, Univ. of Michigan Press, 1956. p. 29-38. 2 figs., 3 tables, 4 refs.) DWB, DLC--Certain characteristics which warrant consideration in the passive detection and tracking of the satellite emphasize the usefulness of optical techniques. In planning for the use of existing equipment, it becomes apparent that there are essential differences between satellite tracking and astronomical observations or missile tracking. The problems associated with the satellite are due principally to the diminished contrast against the sun illuminated sky and to the tracking acceleration component and the concomitant instrumentation jitter. Improvements in the optical compatibilities of the tracking and location instrumentation can be developed if combinations of electronic techniques are utilized which have characteristics more suitable than photographic film or the eye. These improvements are associated with superior time constants, background elimination, utilization of the optimum spectral region, and the superior characteristics of the electronics in the servo tracking loop. (Met. Abst. 9.3-82.)--Author's abstract.

D-526 Merson, R.H. (Royal Aircraft Estab., Farnborough, Hants, Eng.), Techniques of analyzing terrestrial radio and optical observations of earth satellites, Astronautica Acta, Vienna, 5(1):26-39, 1959. 8 figs., 2 tables, 5 refs., eq. English, German and French summaries p. 26. DWB. Also issued in International Astronautical Congress, Amsterdam, Aug. 1958, Proceedings of the 9th Congress, Vol. 2:828-841, issued 1959. 8 figs., 2 tables, 5 refs., eqs. English, German and French summaries. DLC (TL787.144)--After a brief description of the R.A.E. satellite prediction service and a short section on Doppler measurements and their analysis, this paper goes on to describe the main features of radio interferometer and kinetheodolite observations of satellite orbits made by the staff of the Royal Aircraft Establishment. The development of a method of analyzing the observations on a digital computer is given in broad outline, together with estimates of the accuracy with which a satellite's position can be determined. A table of orbital elements of the second Russian satellite is included and a comparison is made between the theoretical and observed values of the rate of rotation of the orbital plane. These differ by 0.7% and indicate the possibility of improving the accepted values for the coefficients in the formula for the earth's gravitational potential field. (Met. Abst. 11.9-148.)--Author's abstract.

D-527 Metzger, P.G. and Strassl, H. (both, Bonn Univ. Obs., Dept. of Radioastron., Germany), The thermal radiation of the moon at 1420 Mc/s. Planetary and Space Science, 1(3): 213-226, Aug. 1959. 4 figs., 2 tables, 20 refs., 17 eqs. DLC--Measurements of the thermal radiation of the moon were made with the continuum receiver of the 25 m radio telescope at Bonn Univ. The observations and their reductions, covering three lunations (April 30 to July 22, 1958) are described in detail. It was found that, within the working accuracy of $\pm$ 2% relatively, the radiation temperature of the moon at 1420 Mc/s shows no variation with the phase of the moon. This may be explained by the fact that the observed radiation has its origin at some depth underneath the moon's surface where the periodic variations of heating from the sun have become insignificant. The mean value of the radiation temperature at 1420 Mc/s is found to be 250.2° with an estimated absolute uncertainty of about $\pm$ 12%.--Authors' abstract.

D-528 Michigan. Univ. Engineering Research Institute, Atmospheric phenomena at high altitudes, May 1 to July 31, 1957. Contract DA-26-039 SC-64659, Quarterly Report, Oct. 1957. 38 p. 10 figs. (incl. photos), 9 tables, forms, 4 refs. DWB (M10.5 M624ad)--Two grenade Aerobee rockets were flown successfully at Ft. Churchill in July. Data reduction and analysis of records on SM1:01 has continued. Theoretical studies have continued on the subjects of the explosion produced modulation of DOVAP records, finite amplitude of propagation effects, the effect of variation in velocity of propagation of electromagnetic radiation on the DOVAP system, the possibility of measuring ambient pressure at very high altitudes, and the dynamics of rarefied gases. (Met. Abst. 9. 7-151.)--Authors' abstract.

D-529 Mickelwait, Aubrey B.; Tompkins, Edwin H., Jr. and Park, Robert A., Interplanetary navigation. Scientific American, N.Y., 202(3):64-73, March 1960. 16 figs. DWB, DLC--A discussion of the practical prospect of interplanetary flight in the light of recent satellite launchings. The next step in space flight will be for the rockets to bring the payload close to – or even land them upon – another planet. This requires difficult compromises among the conflicting demands of payload, radio communication, guidance and available power. This paper presents a systematic and extensively illustrated discussion of these problems of interplanetary navigation. (Met. Abst. 11. 12-479.)--I. S.

D-530 Millman, George H. (General Elec. Co., Syracuse, N.Y.), Analysis of tropospheric, ionospheric and extraterrestrial effects on VHF and UHF propagation. General Electric Co. Electronics Div., Technical Information Series, R56EMH31, Oct. 6, 1956. 138 p. 68 figs., tables, 50 refs., numerous eqs. Photostat copy. DWB (M94.7 M655an)--Effects of the atmosphere and extraterrestrial noise sources on the propagation of VHF and UHF radio waves are discussed. Relationships are derived for calculating refraction effects, time delays, Doppler errors, polarization changes and attenuation of radio waves traversing the atmosphere. These conclusions were reached. Refraction and time delay effects in the troposphere are independent of frequency and are a direct function of relative humidity in the air. In the ionosphere refraction and time delay errors, polarization shift and attenuation are inversely proportional to the square of frequency. The Doppler frequency error in the troposphere is directly proportional to frequency while in the ionosphere is inversely proportional to frequency. The theoretical total radiation from the quiet sun, in the radio frequency spectrum, is directly proportional to frequency raised to about the 0.755 power. The total flux density emanating from radio stars, Cassiopea and Cygnus, is inversely proportional to the frequency raised to the 0.81 power. (Met. Abst. 11E-99.)--Author's abstract.

D-531 Millman, G. H., Atmospheric effects on VHF and UHF propagation. Institute of Radio Engineers, Proceedings, 46(8): 1492-1501, Aug. 1958. 16 figs., 4 refs., 53 eqs. DLC, DWB --This report discusses the effects of the troposphere and ionosphere on the propagation of VHF and UHF radio waves. In order to accurately calculate the refraction effects, time delays, Doppler errors, polarization changes and the attenuation experienced by radio waves traversing the entire atmosphere, the author has derived some mathematical relationships. Tropospheric refractive index profiles and ionospheric electron density models representative of average atmospheric conditions are also presented in this paper. (Met. Abst. 11E-100.) --N. N.

D-532 Mimno, Harry Rowe, The physics of the ionosphere. Reviews of Modern Physics, 9(1):1-43, Jan. 1937. 16 figs., 309 refs., 24 eqs. DLC--This important paper opens with a brief historical survey followed by a simple analysis of the more prominent features that distinguish the components of the radio spectrum. A more detailed discussion includes following topics, among others: thunderstorms and barometric effects, local ionospheric clouds, scattering and interaction of radio waves, etc. It is concluded that the complex physical system requires study by statistical methods. The classical magneto-ionic theory, or rather the anomalies, is considered. The molecular atomic ionization and recombination processes await a generally accepted theory explaining the stratification of the ionosphere. (Met. Abst. 6D-12.)--W. N.

D-533 Miner, Richard Y. (Arma Div., Amc. Bosch Arma Corp., Garden City, N. Y.), Experimental observation of space vehicles. Navigation, Los Angeles, 6(4):252-263, 1959. 9 figs., 7 refs. DWB, DLC--The purpose of this article is to stimulate the interest in visual and radio observations of rockets and satellites. The observational requirements of both methods are itemized and the application of instruments and other devices are described. Procedures of forecasting and subsequent conversion to apparent position and time are explained including the use of and the plotting on charts and coordinate system grids, etc. (Met. Abst. 11.9-147.)--W. N.

D-534 Minnis, C. M. (Radio Research Station, Slough), The F2 layer during eclipses of 1952, 1954, and 1955. (In: Solar eclipses and the ionosphere: a symposium... ed. by W. J. G. Beynon and G. M. Brown. London, Pergamon, 1956. p. 81-84. 2 figs., table, 8 refs.) DWB--It is desirable that the electron density as a function of height in the F2 layer should, where possible, be computed, because the changes in foF2 alone during an eclipse can give a misleading impression of the response of the layer to the drop in incident radiation intensity.

At Khartoum in 1952, foF2 remained almost constant for two hours during the eclipse, although there were marked changes in electron density at constant height at all levels. Assuming that these changes can be accounted for by an attachment process, values of the attachment coefficient have been derived which are similar to those obtained by SAVITT at Bocayuvo. The great height of the layer at Khartoum has allowed values to be computed for heights up to 400 km. The small difference between foF1 and foF2 at Inverness and Slough in 1954 has made it difficult to deduce the shape and true height of the F2 layer. After allowing for the retardation due to the F1 layer, it is concluded that the observed fall in foF2 was not accompanied by any appreciable change in the height or thickness of the F2 layer. The attachment coefficient determined for the peak of the F2 layer was considerably smaller than the values obtained at Bocayuvo and Khartoum for the same height. (Met. Abst. 9.3-278.)--Author's abstract.

D-535 Minnis, C. M. (D. S. I. R. Radio Research Station, Slough), The interpretation of changes in the E and F1 layers during solar eclipses. Journal of Atmospheric and Terrestrial Physics, N. Y., 12(4):272-282, 1958. 5 figs., 2 tables, 22 refs., 4 eqs. DLC--Recent eclipse measurements have been explained in terms of the response of a Chapman layer to the obscuration of a solar disk on which localized sources of ionizing radiation are superposed on a uniformly bright background. This interpretation is supported by several features of the results obtained during a series of eclipses. An alternative interpretation postulates a complex layer containing two different species of ion but assumes only a uniformly bright solar disk. This hypothesis has been examined but calculations based on it result in expected changes in the layer, during an eclipse, which are not in accord with certain characteristics of the experimental data. A suggestion has been made that the layer tilts which occur during an eclipse may give rise to errors in the interpretation of the data. Experimental results are quoted which suggest that such errors probably are not important. (Met. Abst. 10.4-300.)--Author's abstract.

D-536 Minnis, C. M. (Dept. of Sci. and Indus. Res., Radio Res. Station, Slough), Solar activity and the ionosphere. Nature, London, 181(4608):543-544, Feb. 22, 1958. ref. DWB, DLC--Sunspot cycles are not associated with any appreciable change in the amount of visible light and heat radiation emitted by the sun; but they increase the intensity of the ultraviolet and X-radiation which is responsible for the existence of the E layer of the ionosphere. As compared with 1954, the intensity of ultraviolet and X-radiation had increased threefold in 1957. Similar estimates of the intensity of the F2 layer confirm the conclusions reached using the E layer results. The large changes in the intensity of the ionizing radiation associated with the sunspot cycle produce corresponding variations in the structure and electron density of the layers of the atmosphere and influence the propagation of radio waves. During Oct. 1957, radio stations in the U.S. could be received in England on frequencies of 37.5 Mc/sec in the early afternoon. Even near sunspot in 1954, instances were not uncommon in which European radio stations, operating in the very high frequency band, interferred with television and other radio signals in southern England. An examination of the twenty sunspot cycles which have occurred since 1749, shows that the present one and its predecessor must be regarded as having maxima which are well above the average. (Met. Abst. 10.1-337.)--I.L.D.

D-537 Minnis, C.M. and Bazzard, G.H. (both, D.S.I.R. Radio Res. Station, Slough), Some indices of solar activity based on ionospheric and radio noise measurements, Journal of Atmospheric and Terrestrial Physics, N.Y., 14(3/4):213-228, June 1959. 5 figs., 4 tables (in appendix), 10 refs., 17 + 4 eqs. DWB, DLC--The critical frequencies of the E and F2 layers of the ionosphere are closely controlled by the level of solar activity but, at any fixed point on the earth's surface, they also vary with season owing to the annual change in the solar zenith angle. A critical frequency can only be used to provide an index of solar activity if such seasonal variations can be eliminated or reduced to very small proportions. Methods of achieving this are described and monthly mean values of an E and an F2 layer index are tabulated for the period 1938-1957. The correlation of these indices with each other and with the solar noise flux at λ 10.7 cm is high. Some possible practical applications of such indices are discussed briefly. (Met. Abst. 11F-88.)--Authors' abstract.

D-538 Minnis, C.M. and Bazzard, G.H. (both, DSIR Radio Res. Station, Slough), A monthly ionospheric index of solar activity based on F2 layer ionization at eleven stations. Journal of Atmospheric and Terrestrial Physics, London, 18(4):297-305, Aug. 1960. fig., 5 tables, 6 refs., 3 eqs. DLC--A monthly index has been constructed for the period 1938 to date, using monthly mean or median noon values of foF2 at eleven widely distributed stations. The correlation between foF2 at noon and this index is significantly greater than that between foF2 and either the 3 month weighted mean sunspot number or the monthly mean solar radio noise flux at 2800 Mc/s. Numerical estimates have been made of the errors incurred in forecasting noon and midnight foF2 several months ahead using these three indices as guides to the trend of solar activity. (Met. Abst. 11.12-403.)--Authors' abstract.

D-539 Minnis, C. M. (Radio Res. Station, Slough, Bucks), An estimate of the peak sunspot number in 1968. Nature, London, 186(4723):462, May 7, 1960. 4 refs. DWB--The operating conditions of high frequency radio communication links are profoundly modified by changes in solar activity. It is of importance, therefore, to estimate the probable limits within which the forthcoming peak sunspot number will lie. From the study of the length of sequences of uninterrupted increases and decreases it is possible to estimate the probability of occurrences. The probability of a fourth increase higher in 1968 than in 1958 is approximately 0.3. The range of values can be estimated from the frequency distribution of the observed peaks as from the differences between successive peaks. It was found that the 1968 peak will be in the range 110-160. (Met. Abst. 11L-253.)--E. K.

D-540 Minnis, C. M. and Bazzard, G. H. (both, DSIR Radio Res. Station, Slough), A world-wide semi-annual cycle in the E layer of the ionosphere. Journal of Atmospheric and Terrestrial Physics, London, 18(4):306-308, Aug. 1960. fig., 4 refs. DLC--A study of the E layer character figure for eight stations in the north and south hemispheres has disclosed an unexpected semi-annual cycle, the variations in which have the same sign in both hemispheres. The amplitude of the cycle is about ± 15% near the maximum of the solar cycle but vanishes at the minimum. Its origin has not yet been discovered but several possibilities are discussed. (Met. Abst. 11.12-382.)--Authors' abstract.

D-541 Mitra, A.P. and Jones, R.E. (both, Penna. State College, Ionosphere Research Lab.), Determination of the location of the ionospheric current system responsible for geomagnetic effects of solar flares. Journal of Atmospheric and Terrestrial Physics, London, 4(4/5):141-147, 1953. 2 figs., 2 tables, 23 refs., 2 eqs. DWB--A new method for locating the ionospheric current system associated with solar flares is presented. The method depends on the time of maximum intensity of a geomagnetic flare effect and the enhancement of electron density at the relevant level. It is found that the flare current system is located either at 100-130 km (if one assumes that the flare effect is essentially one of enhancement of the Sq current) or at 60 km (if it is an independent system). (Met. Abst. 11D-100.)--Authors' abstract.

D-542 Mitra, A.P., Ionospheric effects of solar flares, Pt. 1, Evaluation of experimental data. Penn. State Univ. Ionosphere Res. Lab., Contract AF 19(604)-3875, Scientific Report No. 112, Oct. 15, 1958. 57 p. 23 figs., 7 tables, 26 refs., 42 eqs. (Pt. 2, in Sci. Report, No. 113) DWB--

This is the first of a series of reports dealing with the ionospheric effects of solar flares. The present work describes the various radio and magnetic data and deals with initial methods of analysis. These include long and short radio wave absorption, change in phase height and, to a lesser extent, group height measurements. Magnetic crochets are also treated from the viewpoint of the current systems by which they are produced. (Met. Abst. 11D-101.)--Author's abstract.

D-543 Mitra, A.P. (Div. of Radiophysics, C.S.I.R.O., Australia), Study of the ionosphere by extraterrestrial radio waves. Indian Journal of Physics, Calcutta, 26(10):495-511, Oct. 1952. 3 tables, 7 figs., refs. p. 510-511. DLC--The paper presents a comprehensive review of a novel method of studying the ionosphere in which the radio frequency radiations from extraterrestrial sources may be utilized. Four different types of measurements of such waves are discussed for this purpose, namely: 1) ionospheric refraction, 2) ionospheric attenuation, 3) twinkling of "radio stars" and 4) effects of sudden ionospheric disturbances (SID's). The available experimental results are compared with ionospheric theory and further lines of investigation which might profitably be followed are indicated. (Met. Abst. 5.5-90.)--Author's abstract.

D-544 Mitra, A.P., The lunar semi-diurnal oscillation in the ionospheric absorption of 150 kc/s radio waves. Journal of Atmospheric and Terrestrial Physics, 7(1/2):99-100, Aug. 1955. 2 figs., 3 refs. DWB--Harmonic dials are presented for lunar semidiurnal oscillations in Pennsylvania for day (D region) and night (E region). Day oscillation is only about 0.1 km, maximum 4 hrs after lunar transit. Night oscillation is 0.20 $(2t' + 80^{\circ})$ km. (Met. Abst. 7.1-186.)--C.E.P.B.

D-545 Mitra, A.P. (Commonwealth Sci. and Industr. Res. Org., Div. of Radiophysics, Australia) and Shain, C.A. (Univ. of Calcutta, Inst. of Radiophys. and Electronics, India), The measurement of ionospheric absorption using observations of 18.3 Mc/s cosmic radio noise. Journal of Atmospheric and Terrestrial Physics, London, 4(4/5):204-218, 1953. 12 figs., 3 tables, 18 refs. DWB--A new technique permits measurement of the total attenuation suffered by 18.3 Mc/s cosmic radio noise passing completely through the ionosphere. It is shown that the total absorption may be divided into two components, one due to absorption mainly in the D region and the other in the F2 region. The observations of D region absorption confirm the diurnal and seasonal variations observed by other workers. F2 absorption depends on the critical frequency but not on the height of the region and there is evidence of increased absorption at night which may be caused by irregularities in the upper F region. The observational results are compared with those obtained by other workers and suggestions are made for the use of the method, particularly in the exploration of the upper F2 region. (Met. Abst. 11E-101.)--Authors' abstract.

D-546 Mitra, S. K., The story of radio electronics. Journal of Scientific and Industrial Research, Sec. A, New Delhi, 14(1):3-13, Jan. 1955. 6 footnotes (incl. 3 foot-refs.). DWB--This presidential address to the 42nd Session of the Indian Science Congress, Baroda, Jan. 4, 1955, opens with a brief summary of radio electronics from fundamental research to practical applications in radio climatology, radio astronomy and defense. Next part takes up India's position in radio research, facilities and future. It ends with an appeal to the younger generation to take advantage of study facilities in the nationally important field of radio electronics. (Met. Abst. 7.7-67.)--W. N.

D-547 Mitra, S. K. (Prof. of Physics, Calcutta Univ.), The upper atmosphere. 2nd ed. Calcutta, The Asiatic Society, (preface 1952.) 713 p. figs., tables, bibliog. p. 644-668, eqs. DLC, MH-BH--The first edition of this valuable work, published in 1947, contained 616 pages. About 100 pages of new material have been added, including the results of the latest research in almost every field covered by the 13 chapters. These additions include work on escape of atmospheric gases (Chap. I), atmospheric tides (Chap. II), radar studies of meteors (Chap. III), variations in ozone content with latitude and air masses (Chap. IV), dissociation of N_2 (Chap. V), ionospheric sounding by radio waves, estimation of recombination coefficients, tides and traveling disturbances in the ionosphere (Chap. VI), Sq and L = variations near the geomagnetic equator (Chap. VII), up-to-date bands and lines in auroral spectrum (Chap. VIII), new theories of magnetic storms and aurora by ALFVEN and MARTYN (extension of Chapman-Ferraro theory) (Chap. IX), Russian work on zodiacal light and afterglow or airglow, height measurements of luminescent layers, hydrogen and sodium in the upper atmosphere, etc. (Chap. X), revised model of temperature distribution in upper atmosphere (GERSON) (Chap. XI), a new chapter on rocket exploration of upper atmosphere (V-2 and aerobee flights) (Chap. XII), and new unsolved problems of the upper atmosphere (Chap. XIII). Brief discussion of winds at high levels from indirect methods (Chap. XIII). No attempt at listing all of the important subjects covered in this work would do justice to its comprehensiveness. The amount of carefully prepared illustrative material (charts, graphs, tables, schematic diagrams, etc.) both borrowed and original, is amazing. In most cases the sources are carefully cited and a class bibliography of nearly 1000 references is a further aid in locating source material on all fields of upper air research by physical methods. (Met. Abst. 4.8-15.)--M. R.

D-548 Mitra, S. N. (All-India Radio, New Delhi), Partial solar eclipse of Feb. 25, 1952, and its effect on the ionosphere. Journal of Scientific and Industrial Research, Sec. A, 12(7): 319-328, July 1953. 6 figs., table, 7 refs. DWB--Ionospheric observations taken by the All-India Radio from Feb. 20 to March 1, 1952, at Delhi, Bombay, Madras, Tiruchirapalli and Nagpur, India, are reported. The observations comprised (1) vertical incidence ionospheric measurements; (2) relative field intensity observations; (3) observations of fading and back scatter on pulsed transmissions at Delhi; (4) observations on pulsed transmissions emitted from England; and (5) photographing the sun's disk at regular intervals. Graphs giving the measured values are presented and discussed. (Met. Abst. 6.1-52.)--G.T.

D-549 Miyazaki, Yukio and Takeuchi, Hajime (Inst. of Physical and Chemical Research, Tokyo), Altitude dependence and time variation of the radiation intensity observed by U.S. Satellite 1958 α. Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan, 12(4):448-458, 1958. 6 figs., table, 6 refs. DWB, DLC--Telemetering signals from the U.S. Satellite 1958 α passing near Japan were analyzed (cosmic rays). The results are as follows: 1) As the altitude increased from 340 km to 1200 km, the counting rate of a single G-M counter mounted in the satellite showed a gradual rise and above 1200 km a steep rise. The altitude curve also showed appreciable day-to-day variation which masked the latitude dependence of the intensity between 12° to 24° geomagnetic latitude. 2) The altitude curve seemed to show a comparatively wide hump at about 350 to 800 km. 3) Dividing the data into a certain narrow range of latitude and altitude, the counting rate increased gradually day by day from Feb. 1 to Feb. 10, 1958. Finally, it reached a value factor 2 greater than the earlier one. While in this period, the planetary magnetic index K_p was also increasing but its fine variation did not always correspond to that of the counting rate. The variation of the radiation intensity at higher altitude seemed to have an appreciably longer time constant than that of the geomagnetic fluctuation. 4) On Feb. 11, the enhancement of the radiation intensity was observed at an altitude of about 1000 km. The time of onset was inferred to be between 0640 and 0842 UT. The neutron intensity of cosmic rays observed at sea level or at mountain altitude showed an increase in the neighborhood of 0700 UT. (Met. Abst. 12.5-119.)--Authors' abstract.

D-550 Möller, F., Atmospheric water vapor measurements at 6-7 microns from a satellite. Planetary and Space Science, 5(3): 202-206, July 1961. fig., 5 tables, 4 refs., 3 eqs. DLC--A theoretical estimate of the changes of radiation expected under a variety of atmospheric structures is presented and discussed. Temperature measurements, by means of satellites, are non-conclusive since water vapor changes with temperature, but are valid for the non-temperature radiation of carbon dioxide. --W. N.

D-551 Moody, Alton B., Navigation using signals from high altitude satellites. Institute of Radio Engineers, N.Y., Proceedings, 48(4):500-506, April 1960. 3 figs. (incl. photo). DLC--If electronics can be satisfactorily applied to celestial navigation, a system having universal coverage without weather limitations might be produced. Radio stars are not a promising possibility, but the sun and moon are being tracked by the U.S. Navy Radio Sextant, AN/SRN-4, to provide limited coverage. Universal coverage might be achieved by the addition of artificial earth satellites. Satellites in orbits a few hundred miles from the earth might be used in some form of piloting system, but orbit prediction problems, limited coverage by individual satellites, and computer complexities are serious obstacles to be overcome by such a system. A different approach would be to place three or four satellites in orbits at an optimum distance somewhere between 1000 and 12,000 miles from earth to serve as artificial celestial bodies in a system that would be natural evolution from traditional celestial navigation methods. A stabilized directional antenna, operating with a receiver capable of accepting signals from both the satellites and the sun, would provide angle measurement data both for fixing the position of the craft and also for establishing a north reference. The degree of sophistication of the user equipment would differ with requirements. (Met. Abst. 11.12-590.)--Author's abstract.

D-552 Mook, Conrad P. (Diamond Ordnance Fuze Labs., Wash., D.C.) and Johnson, David S. (U.S.W.B.), Proposed weather radar and beacon system for use with meteorological earth satellites. Reprint from 1959 Conference Proceedings, 3rd National Convention on Military Electronics, Institute of Radio Engineers, Professional Group on Military Electronics. (1959). p. 206-209. 2 figs., 4 refs., 2 eqs. DWB (M08.77 M817pro)--Resolution, wave length selection, receiver sensitivity, power and antenna requirements are some of the factors that must be taken into consideration in designing a meteorological satellite radar system. These five factors are discussed in terms of application to rainfall return. It is concluded that a satellite mounted radar is much preferred to other satellite weather surveillance systems. It provides three dimensional synoptic coverage of world wide rainfall patterns on a round-the-clock basis. Other surface weather elements such as pressure and wind can also be read from remote automatic beacon type weather stations. (Met. Abst. 11J-110.)--N. N.

D-553 Moorcroft, D. R. (Radio Physics Lab., Defence Res. Board, Ottawa), Radio tracking of earth satellites. American Journal of Physics, N. Y., 27(2):73-86, Feb. 1959. 17 figs., 24 refs., 71 eqs. DWB--The characteristics of artificial earth satellite orbits are summarized and related to an observer on the surface of the earth. Equations and analytical approaches are developed for determining the orbit of a transmitting satellite using information from equipment for measuring the Doppler shift of the transmitted signal. These are extended to include observations with an array of interferometers (several different arrangements are considered). (Met. Abst. 11.9-149.)--Author's abstract.

D-554 Morgan, M. G. and Johnson, W. C. (both, Hanover, N. H.), Preliminary results from the U. S. I. G. Y. "Whistlers-East" program. (In: International Scientific Radio Union. IGY Committee, Some Ionospheric results obtained during the IGY. Amsterdam, Elevier, 1961. p. 386-387). DWB, DLC--Preliminary experimental data received from 13 stations situated in a meridional chain along 70°W and stretching from the Arctic to the Antarctic, showed that the whistlers echo back and forth between the hemispheres. Properties of the whistlers were described. The associated ionospherics showed a 13-day period of activity and exhibited different characteristics with latitude, as well as a preference to certain hours of the day. (Met. Abst. unpub.)--S. N.

D-555 Mullard Radio Astronomy Obs., Cambridge, England, Radio observations of the Russian earth satellite. Nature, London, 180(4592):879-883, Nov. 2, 1957. 9 figs., 2 refs. DWB--Interferometer observations of track on 20, 40 and 80 Mc/s are described and an approximate orbit derived. Variations in intensity of received signal were due to various causes. Presence of a transmitter at varying zenith angles and various heights offers new methods of ionosphere investigation and preliminary results have been obtained. Estimates of density of atmosphere, etc., were also made. (Met. Abst. 9.2-99.)--C. E. P. B.

D-556 Muller, C. A. (Radio Obs., Dwingeloo, Netherlands), 21 cm hydrogen line absorption in the spectra of discrete sources. (In: Paris Symposium on Radio Astronomy, July-Aug. 1958, (Proceedings), pub. Stanford Univ. Press, 1959. p. 360-365. 5 figs., table, 6 refs.) DLC--

A short survey of the results obtained with the Dwingeloo 25 meter radio telescope (beamwidth $0^{\circ}56$) and the 21 cm receiver on hydrogen line absorption effects in the spectra for a number of strong point sources. The emission profile and absorption profile are discussed. The individual sources considered are: Cassiopeia A, Taurus A, Cygnus A, Orion A, Virgo A, and also Sagittarius A. A table lists the absorption components in four bright sources. (Met. Abst. unpub.)--E. Z. S.

D-557 Müller, Hans-Gerhard, Messmethoden in der Radioastronomie. (Measurement methods in radio astronomy.) Zeitschrift für Instrumentenkunde, Brunswick, 68(6):117-124, June 1960. 16 figs., 6 refs. DWB--Today radio astronomy is an independent branch of science. Although the aims are essentially similar to those in optical astronomy, different techniques are required in the radio range. The fundamental problems and measuring procedures are dealt with in this review. (Met. Abst. 11.12-40.)--Author's abstract.

D-558 Müller, Rolf; Augustin, Otto; Menzel, Willi and others, Solare und terrestrische Beobachtungen während des Mögel-Dellinger-Effektes (SID) am 19. November 1949. (Solar and terrestrial observations during the Mögel-Dellinger effect (SID) on Nov. 19, 1949.) Journal of Atmospheric and Terrestrial Physics, 1(1):37-48, 1950. 9 figs., table, 18 refs. MH-BH--A bright chromosphere eruption began Nov. 19, 1949 at 10 h 34 min. Cosmic radiation shown by ionizing effect or counter coincidences at several stations increased by 10-20% in 10-20 min, confirming earlier observations. Echo soundings on 1-16 MHz gave no reflection from E layer and none from F at lower frequencies. Echoes on 1800 KHz failed at 10:30 and field strength of transmission on 6078.9 KHz from 400 km fell nearly to zero at 10.50. Geomagnetism showed no special disturbance so that slow corpuscles from the eruption failed to reach the earth. (Met. Abst. 2.9-66.) --C. E. P. B.

D-559 Munro, G. H. (Radio Res. Board Lab., Univ. of Sydney), Diurnal lapse of signals from Sputnik III. Nature, 183(4674): 1549, May 30, 1959. ref. DLC. (Comment by) B. G. Pressey. Ibid, 184(4682), Suppl. No. 5:261, July 25, 1959. DLC--Munro reports observations made at Blaxland, near Sydney, Australia of radio signals from Satellite 1958 δ 2. These were started shortly after the satellite started orbiting in May 1958. No definite failure of signal was observed until early March 1959; since that time, however, there have been definite lapses of modulation. These lapses occur when the satellite is not illuminated by the sun. Even in the absence of pulse modulation, a weak background signal can be detected on close transits. PRESSEY reports observations made at Slough, England, and at Singapore, which confirm the absence of pulse signals during darkness, but show no evidence of the background signal observed in Australia. (Met. Abst. 11.12-566.)--G.T.

D-560 Munro, G.H. (Radio Res. Lab., Electrical Eng. Dept., Univ. of Sydney), Ionospheric information from satellite signals. Nature, London, 187(4742):1017-1018, Sept. 17, 1960. 2 figs., 3 refs. DLC--Observations of fading rates of signals from satellites have been analyzed for various observing sites and fading rate profiles have been built up. These are converted to ionization profiles by comparison with corresponding ionosonde recordings. Results derived from various satellites for a two year period are illustrated diagrammatically. The difference between the summer and winter distributions is marked. The main purpose of this paper is to report the remarkable result in Sept. 1958 when the rate increased practically from summer to winter values within two days when the satellite was at a height of 400 km. These results are also illustrated diagrammatically. (Met. Abst. 11.12-374.)--R.B.

D-561 Munro, G.H. and White, R.B. (both, Radio Res. Lab., c/o Elec. Eng. Dept., Univ. of Sydney), Observations in Australia of radio transmission from the first artificial earth satellite. Nature, London, 181(4602):104, Jan. 11, 1958. 2 figs. DWB--The Radio Research Board in Australia has had a choice of 20 and 40 Mc/s for radio transmissions from the first Soviet satellite which has provided a new approach to the study of the ionosphere. In order to record the intensity variations of the signals from these satellites the Overseas Telecommunication Commission provided a low noise site and good receiving facilities at Bringelly, near Sydney. This material tells how the observational procedures were carried out. (Met. Abst. 10.9-104.)--N.N.

D-562 Munro, G.H. and Heisler, L.H. (both, Radio Res. Bd., Sydney Univ.), Recording radio signals from earth satellites. Nature, London, 183(4664):809-810, March 21, 1959. fig., ref. DWB--A simple and very satisfactory Doppler frequency shift system developed at the radio laboratory at the Univ. of Sydney is described and discussed. The total Doppler shift of 20,005 Mc/s is 1000 cycles. One of the many good features of the recording system is the accuracy by which the slope of the Doppler shift curve $\partial F/\partial t$ is derived at the point of closest approach. Dependency of rate of change of $\partial F/\partial t$ on h (height) and V (velocity) of the satellite enables V/h curves to be derived (by a Siliac computer) for the overhead case and one other transit, intersection of which establishes the satellite's velocity and height. Facsimile record of signals from Sputnik III is given and the analysis of recordings since the end of August is now in process. (Met. Abst. 11.12-565.)--W. N.

D-563 Murcray, W. B. and Pope, J. H. (both, Geophysical Inst., Univ. of Alaska, College, Alaska), Doppler shifted cyclotron frequency radiation from protons in the exosphere. Physical Review Letters, N.Y., 4(1):5-6, Jan. 1960. 2 figs., 2 refs. DLC--This paper investigates in detail a suggestion by T. W. MacARTHUR, in a recent publication, (see ref. D-483) that the phenomenon known as "Dawn chorus" may be due to Doppler shifted radiation from protons which are rotating about the lines of force of the earth's magnetic field with the cyclotron frequency: $V_c = 1.54 \times 10^3 \mathcal{B}$, where $\mathcal{B}$ is the field strength in gauss. Theoretical chorus dispersion curve and audio spectrogram of chorus illustrate the discussion. (Met. Abst. 11.12-319.)--I. S.

D-564 Murcray, W. B. and Pope, J. H. (both, Geophysical Inst. Univ. of Alaska), Energy fluxes from the cyclotron radiation model of VLF radio emission. Institute of Radio Engineers, N.Y., Proceedings, 49(4):811-812, April 1961. 5 foot-refs.--This brief discussion on the mechanism of "Dawn chorus" involves the works by Santirocco and other workers. Santirocco's recent calculations of the energy radiated by gyrating protons in the earth's magnetic field are interesting but not convincing; neither is the travelling wave amplification hypothesis. (Met. Abst. unpub.)--W. N.

D-565 Murray, W. A. S. and Hargreaves, J. K., Lunar radio echoes and the Faraday effect in the ionosphere. Nature, London, 173(4411):944-945, May 15, 1954. 2 figs., 2 refs., eq. DLC--Observations on 120 Mc/s at Jodrell Bank show that long period (about 60 min) fading of echoes from the moon is due to rotation of polarization. This is attributed to change of mean electron density in the ionosphere. (Met. Abst. 6.8-172.)--C. E. P. B.

D-566 Nagoya, (Japan) Univ. Research Institute of Atmospherics, Data on solar radio emission with some notes. Nagoya. Univ. Research Institute of Atmospherics, Proceedings, 4:90-129, Dec. 1956. 3 figs., mostly tables. DWB--Observations made at 3750 Mc/s and 9400 Mc/s with radiometers first put into operation in Nov. 1955 and used since May 1956 for routine observations 6 hrs a day. Attenuation due to thin clouds proved negligible, but that due to nimbus was as much as 40%. Results are given in extensive tables, curves, and scatter diagrams. Bursts prominent at 9400 Mc/s were seen on Dec. 20, 1956. The daily flux density at the 2 frequencies has a correlation coefficient of + 0.95 and the 5 component at 9044 Mc is 0.8 of that at 3750 Mc/s. Observations with an 8 element interferometer have been made 5 hrs a day since Nov. 1956. A burst sometimes occurs in a region where no intense radiation is usually observed. (Met. Abst. 9A-125.)--M. R.

D-567 Nagoya, Japan. Univ. Research Institute of Atmospherics, IGY data on atmospherics, whistlers and solar radio emissions, Vol. 2-3, Jan. 1-June 30 and July 1-Dec. 31, 1958. Issued Feb. and June 1959. About 250 p. each. Entirely tables. "Compiled by the Research Institute of Atmospherics, Nagoya Univ." --The contents are as follows: 1. reports of atmospherics and whistlers, sferics network during IGY and operating schedule; 2. atmospheric average intensity, integrated intensity of atmospheric radio noise, monthly average and sudden enhancement of atmospherics; 3. intensity of atmospheric radio noise, hourly value: db(luv/m= 0 db), (median intensity during 10 min from 50 min to 00 min in each hour); 4. atmospheric noise recording (WMO, Recommendation 40, 1957-CAe), whole year of 1958 between lat 34°50'N and long. 137°22'E; 5. monthly return for narrow sector bearing (the same as above); 6. atmospheric radio noise data by statistical method, noise field intensity and cumulative amplitude probability distribution in percent and diurnal variation of noise intensity; 7. sferics fixes and wave forms of atmospherics (only in December for three different stations); 8. whistler data, 8 classified designators by whistler, magnitude of the dispersions (185 p.) and 9 solar radio emissions, intensity and polarization at frequencies of 9400, 3750, 2000 and 1000 Mc/s, flux density. (Met. Abst. 12.7-28.)--K. C.

D-568 Naismith, R. (Dept. of Scientific and Industrial Research, Slough), Solar activity and radio communication. Nature, London, 181(4614):954-956, April 5, 1958. 3 figs. DWB--The period 1957-1958, one of highest solar activity within the past 200 yrs was chosen for the International Geophysical Year as most appropriate for observations of radio communication. The major events of the program of the Radio Research Board are reported here. Sunspot number for Dec. 1957 was 244. The monthly median value of foF2 at noon at Slough during December was 15.2 Mc/s the longest in 26 yrs. The maximum frequency available for the longest distance radio communication at the latitude of Slough is close to 50 Mc/s at noon for half the days in the month. This can be applied in the planning of radio communication in the temperate regions. (Met. Abst. 11E-106.)--N. N.

D-569 Narasinga Rao, K.V.; Verdeyen, J.T. and Goldstein, L. (all, Dept. of Elec. Eng., Univ. Illinois), Interaction of microwaves in gaseous plasmas immersed in magnetic fields. Institute of Radio Engineers, N.Y., Proceedings, 49(12): 1877-1889, Dec. 1961. 18 figs., 20 refs., 29 eqs. DLC-- The phenomenon of radio frequency electromagnetic wave interaction in gaseous plasmas is reviewed. The application of microwave interaction to the study of plasmas immersed in magnetic fields is discussed. Attention is focused on the effects produced in such plasmas when one of the simultaneously propagating microwaves is in electron cyclotron resonance. It is demonstrated that for relatively modest amplitudes of the resonating wave, the kinetic energy of the electrons increases considerably, which in turn, affects (1) the electron collision frequency, and (2) the magnetic field control of the plasma confinement. (Met. Abst. unpub.)--Authors' abstract.

D-570 National Research Council. United States National Committee on International Scientific Radio Union (ISRU), Report on the 12th General Assembly, Aug. 22-Sept. 5, 1957, Boulder, Colo. National Research Council, Publication, No. 581, 1958. 195 p. figs., Mimeo. DWB (621.384 N277 re), DLC (TK5700.I834). This report on General Assembly also issued in Institute of Radio Engineers, Proceedings, 46(7):1350-1383, July 1958.-- The 7 reports cover: 1) Radio measurements and standards by Ernst Weber; 2) Tropospheric propagation by John B. Smyth; 3) Ionospheric propagation by L. S. Manning; 4) Radio noise of terrestrial origin (sferics and whistlers) by Harold E. Dinger; 5) Radio astronomy by F. T. Haddock; 6) Radio waves and circuits by E. C. Jordan; 7) Radio electronics by W. G. Shepherd. The 12th General Assembly of I.R.S.I. at Boulder was attended by over 500 radio scientists from 26 countries. The reports provide an excellent summary of work going on all over the world in each field. The agenda for the 7 sessions is given on p. 1350-51 by FREDERIC H. DICKSON, and U.R.S.I. and its officers and chairman are discussed on p. 1351-2 by H. W. WELLS. The address of welcome by DETLEV W. BRONK, President of the National Academy of Sciences, appears on p. 1352-4. The extensive report on the Academy of Science contains notes on attendance, program, detailed transactions of the assembly, symposia and business sessions, documents, discussions, resolutions, etc. (Met. Abst. 11.1-22.)--M.R.

D-571 National Research Council, Wash., D.C. U.S. National Committee on the International Scientific Radio Union (URSI), Symposium of the Exosphere and Upper F Region, May 4, 1960, National Bureau of Standards, Wash., D.C. Journal of Geophysical Research, Wash., D.C., 65(9):2563-2636, Sept. 1960. (Summaries of papers, or full manuscript in case of papers to be published in near future.) DWB--A report of the proceedings of the Symposium is presented. The contributions fall into the following four categories: general feature of the exosphere and upper F region; electron densities in and above the F region as revealed by magnetoionic refractive effects imposed on radio emissions from rockets and artificial satellites; integrated electron content derived from refractive effects; electron-ion densities and temperatures derived from incoherent backscatter. Papers from these four groups with the corresponding discussions are summarized in a fifth section. (Met. Abst. 12.6-3.)--O.T.

D-572 National Research Council, Wash., D.C. U.S. National Committee on the International Scientific Radio Union, Report of U.S. Commission 3 on Ionospheric Radio Propagation, to the 13th General Assembly of the ISRU, London, Sept. 5-15, 1960. U.S. National Bureau of Standards, Journal of Research, Sec. D, 64(6):629-636, Nov./Dec. 1960. Bibliog. p. 634-636. DWB, DLC--This review of U.S. activities and progress in the field of ionospheric radio propagation between Jan. 1957 and Dec. 1959, is arranged as follows: Structure of the upper atmosphere; ionizing radiations; electron densities; satellite beacon studies; ionospheric processes; ionospheric disturbances; sporadic E and spread F; studies of the lower ionosphere; radar studies of auroral ionization; refraction in the ionosphere; ionospheric propagation studies; ionospheric scatter transmissions and radio reflection from meteor ionization; ionospheric propagation research with communication systems applications. An excellent bibliography of current material, arranged alphabetically by authors, is included. (Met. Abst. 12.8-112.)--W.N.

D-573 National Research Council, Wash., D.C. U.S. National Committee on the International Scientific Radio Union, Report of U.S. Commission 4 on Radio Noise of Terrestrial Origin, to the 13th General Assembly of the ISRU, London, Sept. 5-15, 1960. U.S. National Bureau of Standards, Journal of Research, Sec. D, 64(6):637-654, Nov./Dec. 1960. Bibliog: p. 652-654. DWB, DLC--This critical review of U.S. research activities 1957-1960 includes a bibliography of current material and the following papers: Radio frequency radiation from lightning discharges; properties of atmospheric noise at various receiving locations; summary of research on whistlers and related phenomena; a summary of VLF and ELF propagation research; hydromagnetic waves and ELF oscillation in the ionosphere and the exosphere. (Met. Abst. 12.8-114.)--W. N.

D-574 National Research Council. U. S. National Committee on the International Scientific Radio Union, Report of U. S. Commission 5 on Radio Astronomy, to the 13th General Assembly of the ISRU, London, Sept. 5-15, 1960. U. S. National Bureau of Standards, Journal of Research, Sec. D, 64(6):655-669, Nov./Dec. 1960. Bibliog. p. 667-669. "Review of developments occurring within the U. S. in the field of radio astronomy." DWB, DLC--Highlights of developments and activities (1957-1960) in radio astronomy in the U. S. are evaluated separately for each of the following research centers: Univ. of Alabama; Sagamore Hill Radio Astronomy Observatory; U. S. Army Signal Research and Development Lab.; California Inst. of Tech., Owens Valley Radio Obs.; Carnegie Inst. of Washington, Dept. of Terr. Magnetism; Cornell Univ.; Collins Radio Co.; Univ. of Colorado High Altitude Obs.; Harvard Univ. Radio Astronomy Station; Hayden Planetarium; Univ. of Illinois; U.S. Naval Res. Lab., Radio Astronomy Branch; National Aeronautics and Space Admin.; NBS Boulder Lab.; Nat'l. Radio Astronomy Obs.; Ohio State Univ.; Rensselaer Polytech. Inst.; Stanford Univ.; Yale Univ. and Univ. of Michigan. The report is complemented by the current references to each of the several topics considered. (Met. Abst. 11L-75.) --W. N.

D-575 National Research Council, Wash., D. C. U. S. National Committee of the International Scientific Radio Union, Report on the 13th General Assembly, Sept. 5-15, 1960, London, England. National Research Council, Wash., D. C., Publication 880, 1961. 595 p. figs., tables, refs., eqs. Price: $5.00 from National Research Council, Wash., D. C. Contents: Presidential Address. Address of President-elect, Smith-Rose; Program of general Assembly. Actions of General Assembly. List of delegates. Reports of the seven Commissions, Radio Standards and methods of measurements. II. Tropospheric radio propagation. III. Ionospheric radio propagation. IV. Radio noise of terrestrial origin. V. Radio Astronomy. VI. Radio waves and circuits. VII. Radio electronics. The following articles arranged here alphabetically by authors, were classified respectively in the report under the above subject headings: Bailey, Dana K., Ionospheric "forward" scattering, p. 281-286. Berkner, Lloyd V., Science in space, p. 27-37. Bolton, J. G., The discrete sources of cosmic radio emission, p. 407-436. Briggs, B. H., Ionospheric drifts, p. 298-317. Crawford, Arthur B., Experimental results from investigations on wave propagation through the troposphere, p. 95-107.

Haddock, Fred T., Radio sources at 3 and 1.8 cm wavelengths, p. 462-472. Hey, J.S., Radio astronomical observations of planets, comets and meteors, p. 510-519. Hines, C.O., Theoretical survey of motions in the ionosphere, p. 320-328. Little, C. Gordon, Radio properties of aurorae, p. 261-270. Mayer, Cornell H.; McCullough, T.P. and Sloanaker, R.M., Radio Source polarization measurements at 11 cm, p. 457-462. Owren, Leif, High latitude radio aurora observed at College, Alaska, p. 272-275. Palmer, H.P., The angular diameters of radio sources, p. 437-440. Ryle, M., Studies of galactic sources at 178 Mc, p. 441. Schmerling, Erwein R., Some results of an I.G.Y. true height survey, p. 193-194. Seddon, J. Carl, Summary of rocket and satellite observations related to the ionosphere, p. 233-249. Sloanaker, R.M. and Nichols, J.H., Measurements of bright celestial sources at a wavelength of 10.2 cm, p. 453-457. Smith, Ernest K., Jr., Morphology of sporadic E, p. 218-228. Smith, F.G., Application of low noise receivers to radio, p. 486-496. Storey, L.R.O., "Whistler theory" -- Survey paper, p. 351-373. Thomas, J.O., Electron density distribution in the ionosphere, p. 188-192. Watkins, C.D., Auroral radio-echo observations at Jodrell Bank, p. 270-272. Westerhout, G., Galactic radiation and its physical interpretation, p. 473-483. Wrigley, F.; Craig, K.J. and Yaple, B.S., Parametric amplifiers in radar astronomy, p. 496-502. (Met. Abst. unpub.)--W.N.

D-576 Nelson, J.H., Planetary position effect on short wave signal quality. Electrical Engineering, 71(5):421-424, May 1952. figs., table, 4 refs. DLC--Correlation over seven years established author's hypothesis that certain planetary positions affect short wave signals. Possibly (particularly in the case of multicycles) the influence of solar planets on the sun will cause temporary changes in the sun's characteristic radiation which is registered by the ionosphere, apparently sensitive to these changes. Based on solar observation, planetary indications and a day-to-day signal analysis, the 24 hr forecasting system developed by the RCA Communication Inc., averaged close to 85% throughout 1950 and 1951. (Met. Abst. 6.3-344.)--W.N.

D-577 Nesmeianov, A.N., Vselennaia raskryvaet svoi tainy: issledovanie kosmicheskogo prostranstva s pomoshch'iu raket i sputnikov. (The universe reveals its secrets: investigations of cosmic space by means of rockets and satellites.) Pravda, Moscow, 48(196, i.e. 14, 955):3-4, July 15, 1959. photo, 8 figs. "Report issued by A. N. Nesmeianov, pres. of the Akad. Nauk. March 1959". DLC (Slavic R.R.)--A substantial and official report of the "informative" type giving details of progress in cosmic ray, radio propagation, ionosphere, micrometeorite, magnetic, interplanetary gases, belt of high radiation, upper atmosphere, composition, density, ionization (electron and positive ion concentration), and biological research in space and, finally, basic concepts for cosmic flights, as gained from the 3 Soviet "Sputniks" and later space probe flights. A number of graphs showing quantitative results in the above fields are included. (Met. Abst. 10.10-90.) --M. R.

D-578 Netherlands. Meteorologisch Instituut, Het Internationaal Geophysisch Jaar, 1957-1958. (International Geophysical Year, 1957/1958.) Its Verspreide Opstellen, No. 4, 1957. 79 p. figs., photos. Contents: Vening Meinesz, F. A.: Algemene inleiding (Introduction), p. 7-16; Bleeker, W.: Het budget van de dampkring, (Atmospheric budget), p. 17-23; Groen, P.: Het onderzoek van de wereldzee, (Oceanographic research), p. 25-31; Veldkamp, J.: De hoogste luchtlagen, (The upper layers of the atmosphere), p. 33-41; Minnaert, M. G. J.: De waarneming van de zon, (Solar observations), p. 43-48; Jongen, H. F.: De kosmische straling, (Cosmic rays), p. 49-55; DeVoogt, A. H.: Het radioverkeer in het International Geophysisch Jaar, (Radio propagation), p. 57-63; Roelofs, R.: Aarde, maan en sterren, (The earth, moon and stars), p. 65-70; Oort, J. H.: Kunstmatige satellieten, (Artificial satellites), p. 71-79. DWB--This attractive brochure consists of 9 articles on different phases of the IGY, with frequent reference to participation by the Netherlands. The preface is by C. J. WARNERS, director of the KNMI (Netherlands Meteorological Service). The illustrations vividly depict various IGY activities. (Met. Abst. 9.9-44.)--M. R.

D-579 Netherlands. Telecommunications Services, The Hague. Ionosphere and Radio Astronomy Section, A remarkable solar radio event. Nature, London, 181(4608):542-543, Feb. 22, 1958. fig., ref. DWB, DLC--A discussion of a large increase in solar radio noises observed on Nov. 4, 1957, on a frequency of 200 Mc/sec at the receiving station "Nera" of the Netherlands Telecommunications Services. The increase started suddenly at 0848 U. T. and lasted for more than 5 hrs; at its greatest intensity it amounted to some 900 times the noise level of the quiet sun. The smoothed intensity level showed considerable fluctuations with periods of the order of a few minutes. There was no report of the occurrence of a solar flare near the onset of the radio event; nor was a sudden ionospheric disturbance observed. It was also observed at 169 Mc/sec at Humain (Belgium) and Nancy (France) but was entirely absent on the decimeter-centimeter wavelength range and on a wavelength near 6 meters. "The radiation was 100% left-handed circularly polarized. The position of its source, as determined at 1125 U. T. with a two-element interferometer, was about 0.1 solar radius east of the center of the solar disk." The unusual character of this great radio phenomenon was particularly evident from records obtained with a negligible time constant. Such records are reproduced. Their analysis reveals short period fluctuations of intensity, with a period of 0.2-0.3 sec of a type hitherto unobserved. Part of this variability showed an oscillatory type of intensity fluctuation; in other parts decreases in intensity and short dips of a fading character predominated. During the later stages of the radio event dips and oscillations of the order of 0.1 mm occurred. No ionospheric oscillations of radio sources of any importance were observed at Jodrell Bank on Nov. 4. Hence, the very short period of intensity fluctuations must also be attributed to solar conditions. This peculiar type of variability is revealed only by a recording instrument with a time constant no greater than a very small fraction of a second. The occurrence of fluctuations in intensity characterizing this solar radio event suggests that in special circumstances, solar coronal gas may produce scintillation effects possibly analogous to ionospheric scintillations but more analogous in character. (Met. Abst. unpub.)--I. L. D.

D-580 Newell, Homer E., Jr. (Naval Res. Lab., Wash., D.C.), International Geophysical Year earth satellite program. Franklin Institute, Phila., Journal of the Franklin Institute Monographs, No. 2:2-13, June 1956. DWB--Details of Project Vanguard, including instrumentation of vehicle by Navy Research Lab., and the 11 ton launching vehicle being constructed by Glenn L. Martin Co.; orbit, 3 stage performance, optical and radio observing program, computational centers and geophysical or astrophysical problems which may be solved by the earth satellite program are discussed in this article. (Met. Abst. 9.4-45.)--M. R.

D-581 Newell, H.E., Jr. (National Aeronautics and Space Admin.), The United States programme in space research. Royal Society of London, Proceedings, Ser. A, 253(1275):538-541, Dec. 29, 1959. DWB--The National Aeronautics and Space Administration (NASA), created by the National Aeronautics and Space Act in 1958, plans to continue the use of sounding rockets and satellites in exploring the earth's atmosphere and the space beyond. Some of the areas of major scientific interest include: atmosphere, ionosphere, high energy particles, fields (gravitational, magnetic, electric), photons, astronomy and controlled experiments. (Met. Abst. 11.12-457.)--E. K.

D-582 Newton, H. W. and Piggott, W. R., Observational aspects of solar corpuscular radiation. International Council of Scientific Unions, Brussels, Eighth Report of the Commission for the Study of Solar and Terrestrial Relationships. Paris, 1954. p. 101-111. fig., tables, 86 refs. DWB--Observations of flares and magnetic storms during the declining phase of the last sunspot cycle are listed. The solar phenomena, especially radio noise, accompanying the emission of corpuscular streams, the direct detection of such streams and their effects on the ionosphere, aurora, geomagnetism, etc., are discussed. (Met. Abst. 9I-45.)--C.E.P.B.

D-583 Newton, H. W., Face of the sun. London, Harmondsworth: Penguin Books, 1958. 208 p. 37 figs., 15 refs. Price: 2 sh 6 d. DLC (QB521.N4). Review by C. W. Allen in Science Progress, London, 47(186):344-345, April 1959. Review by H. C. Shellard in Weather, London, 14(7):238, July 1959.--A thorough, popular science monograph on all aspects of solar surface phenomena and their important effects on the terrestrial atmosphere: magnetic storms, the aurora, radio propagation (ionosphere) and weather, rainfall and tree rings, from an historical, as well as a modern (e.g., IGY program) viewpoint. The photosphere, chromosphere, corona, sunspots, solar rotation, spectroscopy, cycles of 11 yrs, Zurich numbers and Greenwich areas, characteristics of sunspots, magnetic field theories, giant sunspots (1859, 1892, 1921, 1926, 1946, 1947), the 25 biggest sunspots, flares and prominences, geomagnetic records and disturbances, radio waves and cosmic rays from the sun, aurora, weather "cycles," solar constant, cosmology, and stars outside our system are considered. Numerous plates and drawings and a good subject index are included. It is odd that the 5 greatest (of 25) sunspots in 70 years (1874-1954) occurred in 6 years (1946-1951). (Met. Abst. 10.11-30.)--M.R.

D-584 Nicolet, Marcel, Les observations scientifiques a l'aide des satellites artificiels. (Scientific observations by means of artificial satellites.) Belgium. Institut Royal Meteorologique, Contributions, No. 46, 1959. 7 p. DLC. Reprinted from Societe Royale Belge des Ingenieurs et des Industriels, (Publication?), No. 12:527-533, 1958.--The author describes accurately the data gathered at the present time by observation of the three artificial satellites launched, and indicates what results may be expected. The assumptions advanced regarding composition of the atmosphere seem to be confirmed through the observations of satellites. These are the only conclusions that can be drawn up to now. The other data which may be expected to be obtained are indicated as well as the methods used for this purpose. There are two problems for which the use of satellites is very useful: 1) the analysis of the energy spectrum of cosmic radiation with regard to latitude in the course of one cycle of solar activity through an orbit crossing the poles; 2) the distribution of the lines of force of the earth's magnetic field, at great distance, could be investigated through examining the change in intensity. Advantage of artificial satellites over rockets is enormous. In spite of the large number of rockets fired, these could only supply observations for a total of 24 hrs, and in this total there are only 10 min of observation at an altitude higher than 200 km. The great difficulty with satellites is their return to earth. (Met. Abst. 10.10-93.)--A.V.

D-585 Nicolet, M., Nouvelles de l'espace. (Space news.) Ciel et Terre, Brussels, 75(3/4):91-107, March/April 1959. 4 figs. DLC--Account of the results obtained by means of artificial satellites during the International Geophysical Year as concerns high atmosphere. First of all, author discusses dissociation and recombination of oxygen and nitrogen molecules in upper atmosphere, where motions of charged particles are bound to the earth's magnetic field. A table shows the main peculiarities of the satellites launched up to March 1959. Diminution of satellite's orbit, owing to decrease of speed caused by atmospheric density, is discussed. The proportion of change in satellite's orbit shows that the irregularities in density of air result principally from fluctuations in solar radiation. Data relating to the changes in density within thermosphere and influence of the rise of temperature upon the increase in density are given. Densities observed and their fluctuations show that the thermal gradient at 150 km is $> 10^{o}$ per km and may reach values such as 30^{o} and 40^{o} per km. Results obtained by means of satellites and whistlers show that ionization decreases very slowly with altitude beyond the maximum, in the range of 10^{6} electrons per cm^{3}, of the F2 region. They show that there is no propagation about the equator and that the phenomenon follows the lines of force going from one hemisphere to the other. Comments on the artificial geomagnetic and radio electric effects caused through thermonuclear explosions, and more particularly on the artificial creation of temporary radiation zones at altitudes of 10,000 km or so are included. (Met. Abst. 11.4-150.)--A.V.

D-586 Nicolet, M. (Royal Met. Inst., Brussels) and Aikin, A.C. (Penn. State Univ.), The formation of the D region of the ionosphere. Journal of Geophysical Research, Wash., D.C., 65(5):1469-1483, May 1960. 4 figs., 6 tables, 52 refs., 36 eqs. DLC. Also issued as Pennsylvania. State Univ. Ionosphere Research Lab., Contract AF 19(604)-4563, Scientific Report No. 125, Nov. 1, 1959. 40 p. 4 figs., 47 refs., 30 eqs. DWB (M10.535.P415i)--

Radiations of solar origin penetrating below 85 km in the terrestrial atmosphere are: (1) X-rays of $\tau < 10$ Å; (2) Lyman-alpha and (3) Wavelengths greater than 1800 Å. These radiations can ionize: (1) molecular nitrogen and oxygen; (2) nitric oxide and (3) metallic ions such as sodium and calcium. Molecular oxygen and nitrogen are also ionized by cosmic rays. The negative ion to electron ratio is important below 70 km and affects the electron distribution below that altitude. Normal ionization conditions are explained by cosmic rays and Lyman-alpha. Solar flare conditions are explained by x-rays. Above 85 km, the behavior of the ionization is related to the E layer. (Met. Abst. 11F-97.)--Author's abstract.

D-587 Nisbet, John S., Electron densities in the upper ionosphere from rocket measurements. Pennsylvania. State Univ. Ionosphere Research Lab., Contract AF 19(604)-4563, Scientific Report No. 126, Dec. 10, 1959. 163 p. 51 figs., 10 tables, 77 refs. numerous eqs. DWB (M10. 535. P415i)--An investigation of electron densities in the upper F region of the ionosphere by new techniques employing long range rockets is described. Investigations were confined to propagation measurements between the missiles and ground stations, and to methods not requiring radio links with the missile in addition to those already incorporated for telemetry and tracking purposes. The types of rockets used for the tests were determined by the requirement that suitable transmitters were carried, and that the maximum rocket altitude allowed sufficient penetration of the F region. In practice, this limited the vehicles to those with satellite launch missions, and to intermediate range ballistic missiles. Since such vehicles have considerable horizontal velocity components, it was necessary to develop suitable methods of analysis. A matrix method is described for analyzing oblique dispersion measurements to provide vertical electron density height profiles. In this method, account is taken of horizontal gradients, refraction, and the varying ray path zenith angles in the ionosphere. Two methods of measuring ionospheric dispersion were employed and compared: Faraday rotation, and a method using the difference between the apparent positions of the missile obtained by two tracking systems operating on different frequencies. Faraday rotation measurements at two receiving stations and on two frequencies were compared, to check the horizontal gradient program and the polarization of the rocket antenna. Results are given for seven experiments of electron densities and electron contents above the maximum ionization level of the F region. These are compared with results of other investigations and some conclusions are drawn about the structure of the layer and its diurnal variation. (Met. Abst. 11F-98.)--Author's abstract.

D-588 Nordö, Jack, Solaktiviteten og dens innflytelse på atmosfaeren. (Solar activity and its influence upon the atmosphere.) Naturen, Bergen, 78(6):175-192, 1954. 10 figs. DWB--Various theories on the formation and activities of sunspots, particularly in relation to radio communication and weather, are reviewed. Solar flares are explained as hydrogen explosions giving rise to considerable ultraviolet radiation. No significant influence of flares on air pressure was found (during the 17 yr period) in Norway, but a weak increase in summer and decrease in winter was noticed in Oslo during the eruptions. (Met. Abst. 6.2-323.)--W. N.

D-589 Obayashi, Tatsuzo (Radio Res. Lab.), A possibility of the long distance HF propagation along the exospheric field aligned ionizations. Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere and Space Research in Japan, 13(3):177-186, 1959. 9 figs., 7 refs., 10 eqs. DWB, DLC--Transequatorial very long range echoes of the order of 7000 km detected by the HF backscatter sounder at Hiraiso are interpreted as the ground backscatter propagation launched on the path along the exospheric field aligned ionizations. Ray path calculation on this longitudinal mode of propagation between the geomagnetically conjugate points along its field line is made for various geomagnetic latitudes. The expected echo distance agrees well with that obtained by the experiments. It is also found that the average exospheric electron density deduced from the observed echo spreads is about $10^4 \sim 10^5$ electrons per cm^3. A possible use of this propagation mode of backscatter as a tool of exospheric sounding is suggested. (Met. Abst. 11.12-435.)--Author's abstract.

D-590 Obayashi, T. (Radio Res. Lab.), Entry of high energy particles into the polar ionosphere. Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere and Space Research in Japan, 13(3):201-219, 1959. 14 figs., 23 refs., 37 eqs. DWB, DLC--An explanation is given for two types of enhanced ionizations in the polar ionosphere associated with geomagnetic storms, viz., the polar cap blackouts and the auroral zone blackouts. The former appears several hours after major type IV radio outbursts, yet, well before the onset of geomagnetic storms, while the latter is closely related to geomagnetic disturbances and auroral displays. It is shown that the polar cap blackouts are caused by the invasion of energetic protons of $10 \sim 100$ MeV produced in the solar corona by an agitated plasma bearing magnetic fields, and that these particles precipitate into polar ionosphere following nearly the Störmer orbits. For the auroral zone blackouts, an improved version of Störmer's theory is applied, in which interesting behavior of a charged particle in the distorted geomagnetic field is revealed. The remarkable equatorward shifting of the auroral zone and world wide increases of cosmic ray intensity during the main phase of geomagnetic storms are explained consistently by the decrease of geomagnetic cut-off for incoming particles owing to the contraction of the geomagnetic cavity. (Met. Abst. 11.12-428.)--Author's abstract.

D-591 Obayashi, T., Very low frequency spectra of atmospherics propagated through the ionosphere. Nature, London, 184 (4679):34-36, July 4, 1959. 3 figs., 7 refs. DWB--A more complete experimental proof of the mode theory in very low frequency ionospheric propagation and on the characteristics of the atmospherics is given. Descriptive and experimental facts are presented from the observations of atmospherics at Ibaragiken, Japan. Typical records are examined. Among the facts that lend support to the mode theory is the relation between the sudden enhancement of atmospherics and the sudden ionospheric disturbances. (Met. Abst. 11E-109.)--W. N.

D-592 Obayashi, T. and Hakura, Yukio (both, Radio Res. Labs., Kokubunji, Tokyo), Enhanced ionization in the polar ionosphere associated with geomagnetic storms. Journal of Atmospheric and Terrestrial Physics, London, 18(2/3):101-122, June 1960. 11 figs., 21 refs., 15 eqs. DLC--New evidence indicating the existence of energetic solar particles associated with solar flares has been found from the analysis of worldwide data of f_{min} in the ionograms. An outstanding enhancement of ionization in the lower ionosphere occurs in the polar region with a delay of several hours after a large solar flare accompanied with major radio bursts of type IV. Radio blackouts due to enhanced ionizations develop, spreading inside the whole polar cap without inducing any marked geomagnetic activity. With the onset of a geomagnetic storm, however, the blackout region spreads from the polar cap up to the so-called auroral zone. As the D_{st} field of geomagnetic storm develops, it comes down to considerably low latitudes forming a spiral shaped ionization pattern. The radio blackouts, which precede the onset of geomagnetic storms, may be termed the polar cap blackouts because they are confined within the geomagnetic latitude of about 60-65°, while those related to geomagnetic storms and auroral displays are the auroral zone blackouts. It is shown that the polar cap blackouts are caused by the invasion of energetic particles of the order of 10-100 MeV, generated in an agitated solar coronal plasma bearing magnetic fields, and that those particles precipitate in the polar ionosphere following nearly the Störmer orbits. For the auroral zone blackouts, an improved version of the Störmer theory is applied, in which an interesting behavior of a charged particle in the distorted geomagnetic field is revealed. The remarkable equatorward shifting of the auroral zone and some peculiar increases of cosmic ray intensity during the main phase of magnetic storms are explained consistently by the decrease of geomagnetic cut-off for incoming particles owing to the contraction of the geomagnetic cavity. (Met. Abst. 11.12-425.)--Authors' abstract.

D-593 Obayashi, T. and Hakura, Y. (both, Radio Res. Lab., Kokubunji, Tokyo), Polar ionospheric disturbances and solar corpuscular emissions. Planetary and Space Science, N.Y., 5(1):59-69, Jan. 1961. 4 figs., 3 tables, 24 refs., 10 eqs. DWB--It has been found that the study of polar radio blackouts due to abnormal ionization in the lower ionosphere yields considerable evidence indicating the existence of energetic solar particle associated with solar flares. Polar radio blackouts are classified into two characteristic types, one is the polar cap blackout and the other is the auroral zone blackout. It is shown that the polar cap blackout appears with some hours delay after a major solar radio outburst of type IV, and the blackout is confined within the geomagnetic latitude of 60-65°. The estimated energies of particles causing this are about 10-100 MeV. The auroral zone blackout then follows, being accompanied with geomagnetic storms and aurorae, and it may be caused by the so-called auroral particles of 1 MeV or less. The energy spectrum of solar particles associated with solar flares is revealed from the present result together with all information from various observations related to solar and terrestrial disturbances. It is concluded that solar particles have a conspicuous superthermal non-Maxwellian tail extending from a few keV up to relativistic energy range, through the bulk of corpuscular clouds consists of rather low energy particles and hence, likely to be in the Maxwellian distribution. Some discussions on the nature of solar corpuscular clouds and their effect upon the terrestrial ionosphere are also given. --Authors abstract.

D-594 Ordway, F.I., III (General Astronautics Corp., 11 W. 42nd St., N.Y. 36), Instrumentation of artificial satellites. Astronautica Acta, Vienna, 4(1):90-110, 1958. 21 figs., 53 refs. DWB--This investigation is mainly on the different instruments installed in rockets and in earth satellites. Some four new instrument packages have been developed, laboratory tested and approved. A description of each of these is included, plus some descriptive work on meteoric erosion experiments, cosmic ray observations, the investigation of the radiation balance of the earth, the measurement of interplanetary matter and the satellite environmental measurements of pressure, temperature, meteoric incidence and skin erosion. (Met. Abst. 10.6-92.) --N.N.

D-595 Osborne, C. B., Magnetic and radio disturbance. North Atlantic Ocean. Marine Observer, 22(156):66-68, 1952. DWB--June 17, 1951, magnetic compass varied several degrees from gyro compass, during passage of a large sunspot. No radio signals could be received. Reports on disturbances from Admiralty Compass Obs., Overseas Telecommunications Dept. of G. P. O. and Central Forecasting Office, Dunstable, are included. (Met. Abst. 6D-130.)--C. E. P. B.

D-596 Ovenden, Michael W., The astronomical uses of small artificial satellites. Science Progress, London, 44(175):472-479, July 1956. refs. DWB--The artificial satellite project is discussed. Satellites could give data of density of atmosphere at heights of 100-300 mi, improve geodetic and gravity data, measure electric current-density in the ionosphere especially during solar flares, and give data of primary cosmic radiation and the solar spectrum. The power problem may be solved by solar batteries; other technical problems are discussed. (Met. Abst. 7. 10-46.)--C. E. P. B.

D-597 Owren, Leif (Carnegie Inst., Wash., D. C.), Observations of radio emission from the sun at 200 Mc/sec and their relation to solar disk features. Cornell Univ. School of Electrical Engineering, Contract N6onr-264(06), Radio Astronomy Report, No. 15, May 1, 1954. 219 p. 32 figs. (incl. photos). 5 p. refs. appended. DWB--A voluminous report giving results of solar radio frequency radiation observations at 200 Mc/sec, from April 1950-Dec. 1952, with a radiometer and radio interferometer at McMath-Hulburt and at Cornell Univ. Observatories. Measurement of random noise, actual radiometer observations, and radio interferometer observations in relation to solar features comprise the first 3 chapters (Pt. I). Pt. II consists of two chapters covering radio emissions associated with solar flares, and enhanced emission associated with active solar regions. Pt. III covers relationships between radio emissions from sun and solar disk features, and the origin of major bursts and fading in enhanced radiation. The appendix describes the D. T. M. solar radio interferometer. (Met. Abst. 7. 5-148.)--M. R.

D-598 Paetzold, H. K. and Zschorner, H. (both, Max-Planck-Inst. fur Stratospharenphysik, Weissenau), Radiobeobachtungen auf 20 MHz der ersten russischen Erdsatelliten. (Radio observations at 20 Mc/s of the first Russian satellite.) Telefunken-Zeitung, Berlin, 31(120):99-104, June 1958. 8 figs., 5 refs. French summary p. 99; English summary p. 104. DWB (629. 1388 P126ra)--Analysis of the Doppler effects of the 20 Mc/s radio signals from the Sputniks I and II yielded the horizontal structure of the ionosphere discussed here. The radio observations were conducted at the Institute of Stratospheric Physics, Weissenau, Germany and the optical observations at the Telefunken Triangulation Laboratory, Ulm. The 2-3 min fadings discussed in terms of the Cotton-Mouton effect and the Faraday effect indicate extension of ionospheric irregularities to 1000-2000 km. The existence of focusing elements, also horizontally orientated over 100-200 km is plausible. A form of "guidance" due to ionospheric refraction, rather than scattering, may enhance the 6000 km wave path. Excellent graphs and reproductions of the original film recordings are given. (Met. Abst. 11E-114.)--W. N.

D-599 Paetzold, H. K., Die ersten kunstlichen Erdsatelliten. (Das Internationale Geophysikalische Jahr, XIII). (The first artificial earth satellites (The International Geophysical Year, Pt. 13).) Die Umschau, Frankfurt a. M., No. 1:3-7, 1958. 7 figs. DWB, DLC--Details of the first two Soviet satellites, their trajectories, tracking and variations are discussed, along with the first preliminary scientific results. It appears that atmospheric density at 200-250 km is about double the value assumed in the past. Radio signals are being received from satellites far below the horizon which would indicate that radio waves are channeled along the ionosphere for some time before penetrating into the lower atmosphere. (Met. Abst. 10. 7-92.)--G. T.

D-600 Paetzold, H. K. (Max-Planck-Inst. für Aeronomie, Inst. für Stratosphären-Physik Weissenau, and Technische Hochschule München), Einige Ergebnisse aus den Beobachtungen der ersten russischen Erdsatelliten. (Some results of the observations of the first Russian artificial satellites.) Raketentechnik und Raumfahrtforschung, Stuttgart, 2:50-54, April 1958. 7 figs., table, 4 refs., 8 eqs. DLC. Also his: Weitere Beobachtungen der russischen Erdsatelliten. (Further observations of the Russian earth satellites.) Ibid., 3(2):45-49, April/June 1959. 6 figs., table, 14 refs. DLC, DWB (629.1388 P126ei)--The orbits of the satellites 1957 α_1 and α_2 and β and 1958 α are tabulated and briefly discussed. The succeeding theoretical discussion of the state of the upper atmosphere is based on visual and radio signal observations at different locations in Germany. Some of the results are that (1) the density of air at very great heights is by far higher than assumed. (2) The surface at immediate right angle to direction of movement rather than any aerodynamic effects of the shape of a satellite is what should be considered in quantitative evaluation. (3) The impact of colliding air molecules with a satellite is assumed to be "elastic" (i. e., the former stick before thermally evaporated). Ionospheric radio relationships are also touched upon. The results are presented graphically. Further observations and measurements, especially with Sputnik III, have been made since the first report on measurements with the first

Russian earth satellite one year ago. The radio signals of this satellite have been received through 9 months. The results described concern mainly the propagation of electromagnetic waves in the ionosphere and the structure of the upper atmosphere. (Met. Abst. 11J-127.)

D-601 Paetzold, H.K. (Max-Planck-Inst. of Aeronomy, Inst. für Stratosphären-Physik, Weissenau and T.H. München), Observations of the Russian satellites and the structure of the outer terrestrial atmosphere. Planetary and Space Science, N.Y., 1(2):115-124, April 1959. 8 figs., table, 24 refs., 9 eqs. DWB--The launching of the artificial earth satellites gave the opportunity to gain some direct information about the outer region of the earth's atmosphere. Our radio observations were mostly made on 20 MHz with a new direction finder developed by the firm Telefunken in Ulm. This instrument uses three pairs of adcock antennas. The direction of the wave front and the amplitude of the received signals can be measured at the front of a television tube. A movie camera registers the pictures with a time resolution of 0.1 sec. The accuracy of the measured azimuths is about 0.5°. For 1957 α, 1957β and 1958 δ, optical observations of the German Moonwatch groups were used. Further orbit data were obtained from the Moonwatch Headquarters, Cambridge, Mass., the Air Force Cambridge Research Center, Bedford, Mass., and the Vanguard Computing Center, Washington. (Met. Abst. 11J-131.)--Author's abstract.

D-602 Paetzold, H.K. and Zschorner, H., Über Dichteschwankungen der höchsten Atmosphäre nach Satellitenmessungen. (Density variations of the highest atmosphere according to satellite measurements.) 4 p. 3 figs. Reproduction of typescript (1959). DWB (629.1388 P126ub)--Observations of satellites Explorer V, Sputnik III, and Vanguard I at the Telefunken Co. (20 Mc) and elsewhere show that the density of the air during the day is 20% higher than at night at 225 km, with extreme values in the evening and the morning, respectively, and the density also decreases from the high latitudes to the equator. Relation of density to solar activity, magnetic storms, solar UV, etc., are also considered but not established, and data presented graphically to illustrate. (Met. Abst. 11J-130.)--M.R.

D-603 Paetzold, H.K., Die oberste Erdatmosphäre nach Satelliten-Messungen. (The upper atmosphere seen from satellite observations.) Die Naturwissenschaften, Berlin, 46(13):416-422, July 15, 1959. 7 figs., 3 tables, 46 refs. DLC--With the aid of artificial earth satellites, it is possible to study the ionosphere situated above the F2 peak level. In particular, the frequencies used in the Russian satellites (20 and 40 Mc/s) gave interesting results according to which the electron density seems to decrease slowly above the F2 layer. Fading observed in the reception of these radio signals indicates the presence of heterogeneities in the ionization, particularly in the polar zones. For the explanation of a kind of periodic fading, it is necessary to consider the rotation of the satellite and of the antennas and also the influence of the geomagnetic field. Temperature and density values of the upper atmosphere can be deduced from the observation of the deceleration of artificial satellites. The temperature at 1000 km is in the range of 2000°K, a value suitable to explain the escape of helium. Oscillations of the value of the deceleration are associated with local variations of density and temperature. The discovery of the Van Allen radiation belts, where particles are trapped in the geomagnetic field, is due to the cosmic ray equipment of earth satellites. The "Argus" experiment (explosion of A bombs at an altitude of 500 km) showed the possibility of creating temporary radiation belts observed between the two natural belts by satellites then in orbit. (Met. Abst. 11. 2-80.)--A. V.

D-604 Paetzold, H. K. (Max-Planck-Institut fur Aeronomie, Instut für Stratosphären-Physik, Weissenau and T. H. München), Die höchste Atmosphäre und der Weltenraum. (The highest atmosphere and the cosmos.) Umschau, Frankfurt a. M., 59(1):3-6, Jan. 1, 1959. 5 figs., table. DLC--The audibility of the Sputnik radio signals of 20 MHz and 40 MHz indicated that the radio waves were refracted in the ionosphere; this is possible only when the electron density does not fall below a value of 1.10^6 electrons/cm^3 in the maximum of the ionosphere at a height of 300 km. At greater altitudes the electron density diminishes much more gradually than the atmospheric density. The relative ionization gradually increases with altitude from 0.05% at 300 km to 7% at 1000 km. From the Faraday frequency perceptible in the satellite signals it was possible to compute an electron density of 5.10^5 electrons/cm^3 at 500 km. The temporary and irregular fading indicates the existence of ionospheric inhomogeneities. Duration of fading of several minutes to several seconds indicated horizontal variations of electron density extending from 2000 km to 100 km. The satellite became inaudible over higher latitudes at relative close distance while from the south it was audible at great distances; this indicates the influence of the polar ionosphere which is more disturbed by incursion of corpuscle clouds than in lower latitudes. The shorter life of the satellites as a result of deceleration indicates that atmospheric densities above 200 km are higher than hitherto expected. These higher densities signify higher temperatures in the upper atmosphere. At 200, 350 and 1000 km the temperatures were 800, 2000 and 2500°K, respectively. The composition of the atmosphere comprises a density of 100 nitrogen molecules/cm^3 and 1×10^6 oxygen atoms/cm^3, and 0.1% atomic hydrogen at about 80 km. At 1000 km there are still 10^5 H-atoms/cm^3 and at 3000 km 1000 H-atoms/cm^3 may be present. At the high temperatures of the exosphere H-atoms are no longer stable but evaporate into the cosmos. Atmosphere density is greater by day than at night; variations in density amounting to a factor of 10 result from a warming up of the high atmosphere. The frequency of meteorites impinging upon the satellite was 1 meteorite/100 m^2 sec for meteorites 4 μ in diameter; with increasing size the frequency diminished by a factor of 10. The cosmic radiation was extraordinarily high; at 1000 km it was 1000 times greater than the normal cosmic radiation. The radiation particles were protons. The maximum of radiation is apparently at 10,000 km and above this height it diminishes. The origin of the radiation belt is discussed. (Met. Abst. 11J-129.)--I.L.D.

D-605 Paetzold, H.K., Erforschung und Zustand der höchsten Atmosphäre oberhalb der Ionosphäre. (Exploration and state of the highest atmosphere above the ionosphere.) Reprint from Physikertagung München, p. 63-82. Date not given. 13 figs., 5 tables, 24 refs. --The earth's atmosphere is bounded by the earth's surface and by the interplanetary space with its very slight mass density. The atmosphere is classified according to its thermal state above the tropopause. A maximum is reached in the mesosphere (280°K) at 45 to 50 km, but the expected second maximum at 300-400 km is very probably not reached because in this height the free path lengths of the molecules and atoms are no longer small in comparison to the extension of the atmosphere. The altitude at which this occurs is termed the critical height, which delimits the exosphere from the thermosphere. The author summarizes present knowledge on the electron density and temperature in interplanetary space, the composition of the atmosphere and temperature distribution at the critical height, temperature, density, energy balance, disappearance of gases in the inner exosphere, and H-atoms in the outer exosphere and the use of whistlers as a probe of the exosphere. (Met. Abst. 11.8-179.) --I.L.D.

D-606 Palmer, C.E., Solar radio noise and high level zonal wind shear over the central Pacific Ocean. Journal of Meteorology, 13(3):315-316, June 1956. fig., 3 refs. DWB--A running plot of zonal wind shear at 30,000 ft between Wake Island and Eniwetok Atoll shows that cyclonic shear reaches a maximum 8 days after a solar flare and anticyclonic shear 8 days after a quiet day. The index of solar activity is solar radio noise. (Met. Abst. 7.10-210.)--C.E.P.B.

D-607 Papaleksi, H. D., Measurements of earth-moon distance by means of electromagnetic waves. Elektrickestvo, (5):9-15, 1946. --The problem of pulse-echo method of time measurement as applied in radar is analyzed thoroughly. The surface of the moon is assumed to be of semireflecting nature. Lambert's law is applied, and pulse forms after reflection from the moon are calculated, based on three phases, the 1st phase being contact of the leading edge of the pulse with the moon, and 2nd phase contact of the trailing edge with the moon, the 3rd phase penetration of the centre of the moon. The importance of beam angle, and the "illuminated" area are discussed. Minimum power for reliable reception is calculated for different frequencies, including light and zenith angle, and shown to be practicable with power gains attained by modern aerial arrays and pulse transmitters. The possibility of the use of light waves (spark discharge) and the reception of the reflected light signal by means of photocells is quantitatively discussed, and a refinement proposed; the sending of pulses with distinct spectral lines which should improve the signal/noise ratio of reception. The feasibility of the experiment during a moon eclipse (to exclude reflected sunlight) is stressed.

D-608 Paris Symposium on Radio Astronomy, July 30-Aug. 6, 1958, (Proceedings) of Conference, July 30-Aug. 6, 1958. Ed. by Ronald N. Bracewell. Stanford, California, Stanford Univ. Press, 1959. 612 p. figs., tables, refs., eqs. Price: $15.00. (International Astronomical Union, Symposium, No. 9 and International Scientific Radio Union, Symposium No. 1). DLC (QB475.P26)--Some of the 107 papers in the Proceedings are included in the present bibliography under the individual authors. (All will be abstracted in Meteorological and Geoastrophysical Abstracts). However, for the reader's convenience, all of the 107 papers are listed below in alphabetical order by the authors names, indexed individually under the corporate reference No. D-608. Adgie, R.L.: An attempt to detect the 327 Mc/s line of galactic deuterium, p. 352-354. Alekseev, U. and Vitkevich, V.V.: On the polarization of radio emission at 1.5 m wavelength, p. 259-262. Alsop, L.E.; Giordmaine, J.A.; Mayer, C.H. and Townes, C.H.: Observations of discrete sources at 3 cm wavelength using a maser, p. 69-74. Archer, S.; Baldwin, J.R.; Edge, D.O. et al.: Studies of radio sources at 159 Mc/s, p. 487-491. Athay, R.G.: A model of the chromosphere from radio and optical data, p. 98-104. Avignon, Yvette; Boischot, A. and Simon, P.: Observation interferometrique a 169 Mc/s des centres R, sources des orages de bruit, (Interferometric observation at 169 Mc/s from R centers, source of noise storms), p. 240-244. Baldwin, J.E. and Shakeshaft, J.R.: Radio emission from the direction of the super galaxy, p. 347-351. Baldwin, J.E.: Galactic background surveys and the galactic halo, p. 460-464. Basinski, Jane; Bok, B.J. and

Gottlieb, K.: Optical identification of southern radio sources, p. 514-522. Blaauw, Z.: The large scale structure of galaxies: concluding lecture, p. 466-468. Blum, E.J. and Boischot, A.: Eclipse de la nebuleuse du Crabe par la couronne solaire, (Eclipse of the Crab nebula by the solar corona), p. 282-285. Boischot, A. and Simon, P.: La composante leatement variable du rayonnement solaire sur 169 Mc/s, (Variable slow component of the sun's radiation on 169 Mc/s), p. 140-142. Boischot, A.: Les emissions de type IV, (Type IV emissions), p. 186-187. Boischot, A. and Fokker, A.D.: The 1957 Nov. 4 event, p. 263-267. Boischot, A.: Resultats preliminaires de l'observation des radiosources a l'aide de l'interferometre de Nancay, (Preliminary results of the observation of radio sources using the Nancay interferometer), p. 492-495. Brown, R. Hanbury: The distribution and identification of the sources, p. 471-474. Burbidge, E. Margaret and Burbidge, G.R.: The radio source in the Cygnus loop and IC443, p. 323-327. Burbidge, G.R.: The theoretical explanation of radio emission, p. 541-551. Burke, B.F.; Ecklund, E.T.; Firor, J.W. et al.: Atomic hydrogen survey near the galactic plane, p. 374-389. Christiansen, W.N. and Mathewson, D.S.: The origin of the slowly varying component, p. 108-117. Cohen, M.H. and Fokkes, A.D.: Some remarks on the polarization of 200 Mc/s polar radio emission, p. 252-258. Covington, A.E.: Solar emission at 10 cm wavelength, p. 159-165. Davies, R.D.: Substructure within galactic spiral arms as derived from studies at 21 cm, p. 355-359. de Groot, T.: Spectra of short lived transients in solar noise at 400 Mc/s, p. 245-247. de Jager, C.: The structure of the chromosphere and the low corona, p. 89-97. Denisse, J.F.: Les sources d'emissions radioelectriques du soleil, (The sources of radioelectric emissions of the sun), p. 81-88. Denisse, J.F.: Relation entre les emissions de rayons cosmiques solaires et certains sursauts radioelectriques, (Relation between solar cosmic ray emissions and certain radioelectric bursts), p. 237-239. Dewhirst, D.W.: The optical identification of radio sources, p. 507-513. Drake, F.D.: The nature of the radio source Cygnus X, p. 339-346. Drake, F.D.: Neutral hydrogen in galactic clusters, p. 366-369. Elgaroy, O.: Frequency drift and flat structure of 200 Mc/s solar bursts, p. 248-250. Elsmore, B.: Radio observations of the lunar atmosphere, p. 47-49. Elsmore, B.: The accurate positions of 17 intense radio sources, p. 337-338. Erickson, W.C.; Helfer, H.L. and Tatel, H.E.: A survey of neutral hydrogen at high galactic latitudes, p. 390-397. Evans, J.V.; Evans, S. and Thomson, J.H.: Rapid fading of moon echoes at 100 Mc/s, p. 8-12. Firor, J.: The quiet sun at 88 cm wavelength, p. 107. Firor, J.: Solar radio bright spots at 88 cm wavelength, p. 136-139. Fleischer, R.: Variations in 18 Mc/s solar and cosmic noise, p. 208-209. Gelfreich, G.; Korol'kov, D.; Rishkov, N. and Soboleva, N.S.: On the regions over sunspots as

studied by polarization observations on centimeter wavelengths, p. 125-128. Gelfreich, G.B.; Ikhsanova, V.N.; Kaldanovskii, N.L. et al.: Bursts of microwave radio emission associated with solar flare, p. 218-221. Gibson, J.E. and McEwan, R.J.: Observations of Venus at 8.6 mm wavelength, p. 50-52. Ginzburg, V.L.: On the mechanisms of sporadic solar radio emission, p. 574-582. Ginzburg, V.L.: Radio astronomy and the origin of cosmic rays, p. 589-594. Giovanelli, R.G. and Roberts, J.A.: Optical observations of solar disturbances causing type II radio bursts, p. 201-202. Giovanelli, R.G.: Flare puffs as a cause of type III radio bursts, p. 214. Gold, T.: Cosmic rays and radio waves as manifestations of a hot universe, p. 583-588. Gutmann, Monique and Steinberg, J.L.: Resultats preliminaires obtenus avec l'Interferometre a 8 antennes sur 3 cm de longueur d'onde, (Preliminary results with an 8 antennae interferometer on 3 cm wavelength), p. 123-124. Haddock, F.T.: Some characteristics of dynamic spectra of solar bursts, p. 188-193. Hartz, T.R.: Radio noise measurements on the passage of solar particles through the corona, p. 554-561. Hazard, C. and Walsh, D.: A comparison of an interferometer and total power survey of discrete sources of radio frequency radiation, p. 477-486. Hewish, A.: The scattering of radio waves in the solar corona, p. 268-273. Hey, J.S. and Hughes, V.A.: Radar observations of the moon at 10 cm wavelength, p. 13-18. Hey, J.S.: The first discovery of point sources, p. 295-296. Hogbom, J.A.: The instantaneous position and diameter of short duration bursts of solar radio emission, p. 251. Hoyle, F.: The relation of radio astronomy to cosmology, p. 529-532. Hoyle, F.: Mechanisms of solar and cosmic emission: concluding lecture, p. 598-601. Ikhsanova, V.: Solar observations with the large Pulkovo radio telescope at 3.2 cm wavelength. p. 171-173. Jennison, R.C.: The structure of the Cassiopeia A and Cygnus A radio sources measured at 127 Mc/s and 3000 Mc/s, p. 309-314. Khalkin, S.E. and Kaidanovskii, N.L.: A new radio telescope of high resolving power, p. 166-170. Kundu, M.R.: Etude interferometrique des sources d'activite solaire sur 3 cm de longueur d'onde, (Interferometric study of sources of solar activity on 3 cm wavelength), p. 222-236. Kuz'min, A.D. and Udal'tsov, V.A.: Polarization of 10 cm radiation of the Crab nebula, p. 305-308. Link, Frantisek: Sur les ionospheres planetaires, (Planetary ionospheres), p. 58-60. Link, Frantisek: Manifestations possibles de la couronne de Chapman dans la radio astronomie, (Possible manifestations of the Chapman corona in radio astronomy), p. 274. Lovell, A.C.B.: Moon and planets: concluding lecture, p. 75-78. McClain, E.F. and Sloanaker, R.M.: Preliminary observations at 10 cm wavelength using the NRL 84 ft radio télescope, p. 61-68. McVittie, G.C.: Remarks on cosmology, p. 533-535. Mills, B.Y.: Galactic structure at meter wavelengths, p. 431-446. Mills, B.Y.: A survey of radio

sources at 3. 5 m wavelength, p. 498-506. Minkowski, R.: Optical observations of nonthermal galactic radio sources, p. 315-322. Minkowski, R.: Discrete sources and the universe: concluding lecture, p. 536-538. Minnaert, M. G. J.: The sun: concluding lecture, p. 286-292. Molchanov, A. P.; Chen, Fan-Yun; Wang, Shou-Kuang et al.: Preliminary results of radio astronomical observations of annular solar eclipse, April 19, 1958, p. 174-175. Muller, C. A.: 21 cm hydrogen line absorption in the spectra of discrete sources, p. 360-365. Muller, C. A.: Hydrogen line observations on the coma cluster, p. 465. Newkirk, G., Jr.: A model of the electron corona with reference to radio observations, p. 149-158. Oort, J. H.: A summary and assessment of current 21-cm results concerning spiral and disk structures in our galaxy, p. 409-415. Panovkin, B. N.: A model of the inner corona based on radio data, p. 105-106. Pawsey, J. L.: Radio evidence on the large scale structure of our own and external galaxies, p. 405-408. Roberts, J. A.: Some aspects of type II bursts, p. 194-200. Rougoor, G. W. and Oort, J. H.: Neutral hydrogen in the central part of the galactic system, p. 416-422. Ryle, M.: The problem of confusion in surveys of sources, p. 475-47[illegible]. Ryle, M.: The nature of the radio sources, p. 523-528. Sanamian, V. A. and Tovmasian, H. M.: On increase of the sensitivity and directivity of radio interferometers, p. 496-497. Schatzman, E.: On the possibility of observing radio emission from flare stars, p. 552-553. Senior, T. B. A. and Siegel, K. M.: Radar reflection characteristics of the moon, p. 29-46. Shain, C. A.: Observations of extragalactic radio emission, p. 328-336. Shain, C. A.: Absorption of 19. 7 Mc/s in H II regions, p. 451-459. Smith, F. G.: Radio astronomy and the solar system, p. 3-7. Smith, Harlan J. and Douglas, J. N.: Observations of planetary nonthermal radiation, p. 53-55. Takakura, T.: Synchrotron radiation and solar radio outbursts at microwave frequencies, p. 562-570. Tanaka, H. and Kakinuma, T.: Polarization of bursts of solar radio emission at microwave frequencies, p. 215-217. Thompson, A. R.: The correlation of solar radio bursts with magnetic activity and cosmic rays, p. 210-213. Tunmer, Harriet: The origin of the belt of galactic radio waves, p. 571-573. van de Hulst, H. C.: Galactic and extragalactic radio sources: concluding lecture, p. 398-401. Van Woerden, H.: The distribution of neutral hydrogen in the Orion region, p. 370-373. Vauquois, B.: Etude statistique de la composante lentement variable d'apres les observations entre 10, 000 et 600 Mc/s, (Statistical study of the variable slow component according to observations between 10, 000 and 600 Mc/s), p. 143-148. Vitkevich, V. V.; Kuz'min, A. D.; Salomonovich, A. E. and Udal't-sov, V. A.: Radio picture of the sun at 3. 2 cm wavelength, p. 129-135. Vitkevich, V. V.: New data on the solar supercorona, p. 275-281. Volders, Louise and van de Hulst, H. C.:

Neutral hydrogen in extragalactic systems, p. 423-430. Waldmeier, M.: A comparison between radioheliograms and optical observations of the solar corona, p. 118-122. Wallis, G.: The determination of the energy distribution of relativistic electrons by the frequency distribution of their "synchrotron radiation", p. 595-597. Warwick, Constance and Warwick, J. W.: Flare associated bursts at 18 Mc/s, p. 203-207. Westerhout, G.: 75 cm and 22 cm continuum surveys, p. 447-450. Whitfield, G. R. and Hogbom, J.: Radio observations of the comet Arend-Roland, p. 56-57. Whitfield, G. R.: The spectra of radio sources, p. 297-304. Wild, J. P.; Sheridan, K. V. and Trent, G. H.: The transverse motions of the sources of solar radio bursts, p. 176-186. Yaplee, B. S.; Roman, Nancy G.; Craig, K. J. and Scanlon, T. F.: A lunar radar study at 10 cm wavelength, p. 19-28. --W. N.

D-609 Patterson, T. N. L. (Queen's Univ. of Belfast, Ireland), Whistler dispersions for a model of the ionic distribution in the exosphere. Planetary and Space Science, N. Y., 8(2):71-76, Nov. 1961. 2 figs., 3 tables, 3 refs., 16 eqs. DWB--Calculations are presented of the dispersions of whistling atmospherics for a model of the ion distributions in the exosphere. Exospheric temperatures of 1000°K, 1250°K, 1500°K and 2000°K are considered at latitudes 30°, 35°, 40°, and 45° and corresponding to various transition levels at which n(500 km O^+) equals n(500 km H^+). Comparison is made with two observed whistlers. (Met. Abst. unpub.)--Author's abstract.

D-610 Pawsey, J. L.; McCready, L. L. and Gardner, F. F., Ionospheric thermal radiation at radio frequencies. Pt. 1. Journal of Atmospheric and Terrestrial Physics, 1(5/6):261-277, 1951. 9 figs., 2 tables, 6 refs. Also: Gardner, F. F., ... Pt. 2. Further observations. Ibid., 5(5/6):298-315, 1954. 11 figs., 2 tables, 10 refs., eq. DWB--Part 1 - Minimizing man made radio noises and atmospherics - the thermal radiation from the ionosphere has been identified and measured. The electron temperature at 70-80 km was found to be 240-290°K. Pt. 2 - Radio noise on 2 Mc/s at Urisiono (30°S 144°E) a very quiet site in Australia, is attributed almost entirely to ionospheric thermal radiation. Temperatures (200-250°K) show no diurnal variation but vary greatly from day to day especially in summer, and increase by up to °40 K on SID days. Polarization measurements in Sept. 1951 showed that the extraordinary component was absorbed at a lower level 20°K warmer than ordinary component, indicating that temperature decreases with height. Mes-surements fit temperature height model given by rockets but about 40°K warmer, giving minimum of 217°K at 80 km. Some observations of noise of tropospheric origin are described. (Met. Abst. 12E-72.)--A. A. and C. E. P. B.

D-611 Pawsey, J. L., A catalogue of reliably known discrete sources of cosmic radio waves. Astrophysical Journal, Chicago, 121 (1):1-5, Jan. 1955. 3 tables, 21 refs. DWB--As a part of the work of Commission 40 of the International Astronomical Union, a list of reliably known discrete sources of cosmic radio waves has been prepared by a committee consisting of J. G. BOLTON, R. HANBURY BROWN, F. G. SMITH and B. Y. MILLS. In this paper this list is published, with a short description of the catalogue by the president of the commission, J. L. PAWSEY. (Met. Abst. 9A-86.)--Author's abstract.

D-612 Pawsey, J. L. and Bracewell, R. N., Radio astronomy. Oxford, Clarendon Press, 1955. 361 p. 150 figs., 23 tables, 23 plates. Bibliog. at end of each ch. Price: 55 sh. (International Monographs on Radio) DLC (QB475.P3). Review by P. ten Bruggencate in Die Naturwissenschaften, Berlin, 44(17): 476, Sept. 1, 1957.--This substantial textbook covers the history of radioastronomy, techniques for observation of extraterrestrial radio waves, theory of radio waves in ionized gases, solar physics, solar radio waves, astrophysics, cosmic radio waves, thermal radio waves from moon, extraterrestrial radio echoes, meteors, and effects of terrestrial atmosphere on extraterrestrial radio waves. The work is well indexed, excellently illustrated and contains good referencing lists at the end of each chapter. The last chapter discusses effects of the lower and upper atmosphere and ionosphere on absorption and twinkling of radio stars. (Met. Abst. 9A-87.)--M. R.

D-613 Pawsey, J. L., The question of radio emission by the ionosphere. Journal of Atmospheric and Terrestrial Physics, London, 15(1/2):51-53, Sept. 1959. 10 refs. DLC--The importance of non-thermal emission of radio waves of the ionosphere as a probable source of "radio noise from the aurora" in ionospheric and astronomical studies is examined. The thermal emission from the D region does not preclude occasional bursts nor intense emission from the E layer. Intense noise from all over the sky reported on meter wavelengths, and other similar reports, until reliably reproduced, present clues rather than evidence. Brief increases of noise level on a frequency of 33 Mc/s coinciding with meteors might originate from a source other than the meteor. GALLET's report giving reasons for supposing the "dawn chorus" is generated in the outer reaches of the ionosphere, is worthy of further examination. (Met. Abst. 11.12-323.)--O. T.

D-614 Pecker, Jean-Claude, Activite solaire et magnetisme terrestre. (Solar activity and earth's magnetism.) L'Astronomie, Paris, 72(12):485-498, Dec. 1958. 10 figs., 5 refs. DWB--The unsteady part of the earth's magnetic field is principally due to the electromagnetic activity of the very high atmosphere which is the most sensitive to solar influences. The first part concerns the sun: description of the outer layers of the sun, commentaries on solar activity, research and study of solar influences on terrestrial phenomena. The second part deals with variations of the earth's magnetism: methods of study, influences on the geomagnetic indexes, association of solar phenomena with recurrent geomagnetic activity and theory of the geomagnetism of corpuscular origin. The study of geomagnetism can supply valuable data about ionosphere and propagation of radioelectric waves. Another application of the study of geomagnetism is to meteorology, for solar influence on the terrestrial atmosphere appears to be evident. (Met. Abst. 11.2-164.)--A.V.

D-615 Penico, A.J., Propagation of electromagnetic waves in a plasma with inhomogeneous electron density. Planetary and Space Science, N.Y., 6:222, June 1961. Abstract only. The paper was presented at the Plasma Sheath Symposium, Boston, Mass., Dec. 7-9, 1959.--A theoretical study was performed to determine the propagation characteristics of an electromagnetic wave in the presence of an isotropic, dissipative plasma whose electron density varies in the direction of propagation of the wave. In the analysis, various functional forms giving the electron density as a function of the position within the plasma were inserted into the wave equation for the medium, and exact solutions were obtained for the equation. The above mentioned solutions will be discussed from two points of view. First, their qualitative behavior for all, or nearly all, of the values of the parameters will be discussed. Second, curves will be shown indicating the specific behavior of the solutions for limited ranges of radio frequency, electron-neutral particle collision frequency, initial and final electron density and rate of variation of the electron density. Criteria will be discussed for treating the electron density as "slowly varying" or "rapidly varying." In particular, some "quarter wavelength" and "half wavelength" criteria of the medium will be exhibited. These criteria will be discussed in relation to the problems of reflection and absorption of the waves.

D-616 Perlman, S.; Kelly, L.C.; Russel, W.J. and Stuart, W.D., Concerning optimum frequencies for space vehicle communication. Institute of Radio Engineers. Professional Group of Communications Systems, New York, Transactions, Vol. CS-7(3):167-173, Sept. 1959. 9 figs., 11 refs., 7 eqs. DLC--This is a condensed form of the U.S. Army Signal Radio Propagation Agency's report entitled "Tentative evaluation of the transmission factors for space vehicle communication." Equipment factors, propagation factors, auroral effects, absorption, polarization, radio star scintillation and noise are discussed. A 12 db improvement in receiver sensitivity represents these choices: (1) Four-time increase of space communication; (2) 1/16 transmission power for same distance of communication; (3) Less directive antenna with up to 12 db less gain, or a combination of any two or three factors. --W. N.

D-617 Peterson, A. M. et al. (all, Stanford Research Inst., Menlo Park, Calif.), Radio and radar tracking of the Russian earth satellite. Institute of Radio Engineers, N. Y., Proceedings, 45(11):1553-1555, Nov. 1957. 5 figs., table. DLC--Brief account of techniques employed and results obtained at the Stanford Research Institute. Experimental measurements with hastily assembled equipment — now improved — appear to yield valuable scientific data on the upper atmosphere. (Met. Abst. 9.8-51.)--W. N.

D-618 Peterson, L. E. and Winckler, J. R. (both, School of Physics, Univ. Minn., Minneapolis), Gamma-ray burst from a solar flare. Journal of Geophysical Research, Wash., D. C., 64(7): 697-707, July 1959. 7 figs., 3 tables, 16 refs. DLC--A burst of high energy radiation coincident with a solar flare has been detected during a balloon flight at 10 gm/cm^2 atmosphere depth and 30° geomagnetic latitude over Cuba. The flare occurred at 1305 UT on March 20, 1958 and was associated with solar radio bursts on 1,500 and 10,000 Mc/s. Terrestrial effects included a SID, earth current disturbance, and a magnetic crotchet. The 18 sec burst was detected with an integrating ionization chamber and a single Geiger counter. From these two instruments and their ratio, it is inferred that the radiation is due to a gamma ray flux of about 2×10^{-5} ergs/sec cm^2 peaked in the 200 to 500 Kv region. This radiation can be interpreted as bremsstrahlung produced in the solar photosphere from electrons of 0.5 to 1 Mev energy. These same electrons, spiraling in a 1000 gauss field in the flare region, can produce the observed radio burst by betatron radiation. The high energy electrons represent about 1% of the flare energy. Only about 0.01% of the emitted betatron radiation escaped from the flare region toward the earth. (Met. Abst. 11.9-72.)--Authors abstract.

D-619 Petri, Winfried (Schliersee Obs.), Auf der Schwelle des Weltraums: bericht über die ersten Wochen der kunstlichen Erdsatelliten (Sputniki) 1957 α_1, α_2 und β. (At the threshold of outer space: Report on the first week of artificial earth satellites (Sputniks) 1957 α_1, α_2 and β.) Naturwissenschaftliche Rundschau, Stuttgart, 11(1):1-7, Jan. 1958. 7 figs., 5 tables, eqs. DWB, DLC--The author summarizes Soviet studies on experimental rockets appearing in the Soviet literature prior to the launching of Sputnik I and II, including description of the structure of the rockets, indication of satellite launching and various information on the instrumentation for obtaining data on outer space and on the duration of the recording and transmission time. This is followed by a discussion of the celestial mechanics of satellites close to the earth, the influence of gravity upon the satellite path, the effect of precession upon the rotation of the plane of the path, the rotation of the opsidal lines, the braking action of atmospheric density upon the path, etc.; the visual observation methods employed to track the satellite, namely: "moonwatch"; various problems in determining the time of revolution of the satellite by visual means; reception of signals from the satellite radio by "Minitrack"; the radio interferometer technique; evaluation of the radio signals and lunar echoes from the Sputnik. Diagrams showing the motion of Sputnik within 24 hrs, a comparison of the paths of the first two satellites, and graphs showing the variation of atmospheric pressure with altitude according to Soviet data, U.S. data and the standard atmosphere, satellite path at 530 km, variation of reception frequency as a function of time, and variation in the revolution period of satellite α_2 and numerical data on the first two satellites. (Met. Abst. 11J-133.) --I.L.D.

D-620 Petri, W. (Schliersee/Obb.) and Faust, H. (Offenbach), Neue Satelliten-Ergebnisse. (New satellite findings.) Naturwissenschaftliche Rundschau, Stuttgart, 11(12):460-461, Dec. 1958. fig. DWB, DLC--There are four brief notes entitled: (1) Density variation of the upper atmosphere. G. HERGNHAHN discovered that the orbital period of Sputnik 2 and Sputnik 3 decreased (up to 40%) rather than increased. The discovery was made while analyzing the Doppler effects of the satellite borne radios. The phenomenon may be due to a drop of 25 km of the atmosphere, or less plausible, less air friction due to self orientation of the cone shaped satellite exposing least resistance surface. (2) Micrometeorites. The 10 kg Vanguard, fired May 27, 1958, reached about 3000 km altitude and was hit by 17 micrometeorites during ten minutes. Assuming that these figures are representative, the earth is bombarded at least five times heavier than was believed. (3) Contour of the earth. U.S. 1958 Alpha and Beta 2 satellite observations show that the earth is not as flat as assumed. The difference is 200 m in favor of the polar diameter vs. the equatorial. The observations of U.S.S.R. satellite, 1957 Beta, made by the English Air Force Research Establishment at Farnborough, found the earth oblateness to be 1/298.1 rather than 1/297.1. (4) State of the upper atmospheric layers on bases of satellite measurements. PAETZOLD's remarkable results showing a very active dynamic of the upper atmosphere were arrived at with the aid of Sputnik 1 and Sputnik 3. Electron density, ionization, air density and temperatures are briefly discussed. The density of air at 225 km altitude above the equator is only half of the density of the air above the pole. The density and temperature decline from the pole toward the equator is associated with strong E-W winds. (Met. Abst. 11J-134.)--W. N.

D-621 Petri, W., Unbekannte Höhenstrahlung höher Intensität. (Unknown high altitude radiation of great intensity.) Naturwissenschaftliche Rundschau, Stuttgart, 11(7):274, July 1958. DWB, DLC--According to J. van Allen the satellite "Explorer" recorded at 1500 km an increase in ionospheric radiation that was more than a thousandfold that recorded at an altitude of 400 km. It corresponded to an equivalent of 0.06 Röntgen per hour, and it was so strong that the geiger counter could not operate. It is possible that this is a hard X-ray radiation which is produced by the action of the solar particles upon the residual atmosphere or upon the body of the satellite. If this radiation is the result of an interaction between the particles with extensions of the earth's atmosphere it may disappear at a distance of 2-3 earth radii.--I. L. D.

D-622 Pettengill, Gordon, H. (Lincoln Lab., M.I.T., Lexington, Mass.), Measurements of lunar reflectivity using the Millstone Radar. Institute of Radic Engineers, N.Y., Proceedings, 48(5):933-934, May 1960. 3 figs., table, 7 refs. DLC --Successful results of lunar mapping conducted at Lincoln Laboratory, M.I.T., with a new method for mapping radar echo sources from remote rotating targets, are discussed briefly. The method renders accurate frequency data without sacrifice in range solution. Thus, a precision of approximately 0.02 in 10^5 of the observed Doppler frequency during low libration periods is feasible. Lunar range frequency contours and processed results of a run near maximum libration are given along with tabulated radar parameters. --W. N.

D-623 Pfeiffer, John, The changing universe: the story of the new astronomy. New York, Random House, 1956. 243 p. numerous illus. DLC. Review by F. G. Smith in Nature, London, 181(4614):980, April 5, 1958. Review by A. J. M. Wanders in Hemel en Dampkring, The Hague, 56(11):217-218, Nov. 1958. --The exciting story of radio astronomy from the accidental discovery which led to its birth in New Jersey in 1931-33 (by KARL JANSKY) and development during 1938-44 (by GROTE REBER) in Illinois, and its post war development in England and Australia up to the building of the huge radio telescopes and even larger ones proposed in the last few years. Radio waves from Orion, the Galaxy, the solar system, the sun, constellations from beyond the Milky Way, Belts of Galaxies, source of energy, hydrogen sources, obscuring dust, birth of stars, spiral arms, meteor flares, the moon, atmospheric absorption and transmission, twinkling radio stars, relation of radio stars to atomic power, are described in a lively manner by a thoroughgoing science reporter in this book. (Met. Abst. 11.7-20.)--M. R.

D-624 Pfister, Wolfgang (Ionospheric Physics Lab., Geophysics Res. Directorate, A.F. Cambridge Res. Center), Study of fine structure and irregularities of the ionosphere with rockets and satellites. (In: Van Allen, James A. (ed.), Scientific uses of earth satellites. Ann Arbor, Univ. of Michigan Press, 1956. p. 283-291. 2 figs.) DWB, DLC--Almost all experiments using the ionosphere as a propagation medium reveal the presence of irregular or blobby structure in the electron distribution, and, consequently, a variety of methods is in use to determine something about the blobby structure, either by propagation through the ionosphere as in the radioastronomic technique or by reflection within the layers. Only limited information is available from rocket experiments, but due to the fact that a rocket or satellite travels in the midst of the ionosphere, experiments using transmissions between the vehicle and the ground will be able to add a new and very valuable type of information. Up to now, the contribution of the irregularities has been looked at more as a nasty by-product which must be smoothed out in the data analysis. However, from the data available, an analysis in terms of irregular structure appears to be quite promising. Based on experience with known techniques, a set of experiments for a satellite is being proposed. It is a combination of the pulse delay experiment similar to the Air Force electron density rocket experiment with a kind of drift type experiment measuring the signal amplitude fluctuations at three closely spaced receivers. The real advantage of the fine structure experiment with satellites or rockets will be that the changing aspect allows us to gain a three-dimensional picture of the configuration of the blob, while so far we are used to looking only at the two dimensional diffraction pattern at the ground. (Met. Abst. 9.3-83.)--Author's abstract.

D-625 Pfister, W. and Keneshea, T. J., Ionospheric effects on positioning of vehicles at high altitudes. U. S. Air Force. Cambridge Research Center. Air Force Surveys in Geophysics, No. 83, March 1956. 27 + p. numerous figs., table, 7 refs., numerous eqs. DWB, DLC--When a radio wave penetrates the ionospheric region, the presence of free electrons there causes it to deviate from its straight line path. The predictable part of this effect has been computed in terms of error in the initial angle of propagation and the error in the range of points in the ionized region. The results are contained in a series of graphs. The maximum error for a frequency of 1000 Mc/s is of the order of 0.1 mil and 45 meters, respectively; these values being inversely proportional to the frequency. The unpredictable part of the effects of the ionosphere is randomly varying and unknown in its details, especially the dependence on frequency. From known facts of the ionospheric irregularities and from theoretical considerations a justifiable estimate of the effects can be obtained. This estimate is based on the angular spread and other quantities derived from ionospheric drift measurements and on an experimentally confirmed frequency dependence law. (Met. Abst. 11E-115.)--Authors' abstract.

D-626 Pfister, W. and Ulwick, J.C. (both, A.F. Cambridge Res. Center, Bedford, Mass.), The analysis of rocket experiments in terms of electron density distributions. Journal of Geophysical Research, Wash., D.C., 63(2):315-333, June 1958. 14 figs., table, 10 refs. DLC--Rocket ionosphere experiments give the relative delay of a pulsed signal as a function of rocket position. These data are used in an analysis to obtain the electron density distribution with respect to height. This analysis, which takes into account the effects of the earth's magnetic field and the obliquity of the ray paths, is for the smooth, horizontally stratified ionosphere. The actual ionosphere, however, has an irregular or "blobby" structure evident in our delay records. The data then must be smoothed over a height interval corresponding roughly to the size of the blobs. The delay data from U.S.A.F. Aerobee No. 38, which was launched at 1210 hrs MST on June 26, 1953, at Holloman Air Development Center, New Mexico, are analyzed for rocket ascent and descent for two frequencies, 4.05 and 4.87 Mc. The electron density distribution from rocket descent data for both frequencies are in good agreement and show peaks at 106, 111, 117, and 128 km. For rocket ascent, an intense irregularity apparently was present around 98 km, with a minimum horizontal extension of 3.5 km and a maximum intensity of about 6×10^4 electrons/cm^3. The P'-f record taken at launch time compares very well with the electron density distribution from rocket descent. (Met. Abst. 10.3-205.)--Authors' abstract.

D-627 Pick-Gutmann, Monique, Sur la structure des types IV: les orages continuum. (The structure of type IV jumps: the continuum storms.) Academie des Sciences, Paris, Comptes Rendus, 250(12):2127-2129, March 21, 1960. 2 figs., 7 refs. DWB, DLC--One distinguishes two phases in the evolution of the type IV jumps. In the first phase, the duration of which seldom exceeds a quarter of an hour, the continuous radiation always occurs on centimeter or decimeter waves. In the second phase, the continuum occurs essentially on meter waves;

this emission may last from some tens of minutes to 1 or 2 days in exceptional cases. This second phase resembles radioelectric storms by both its duration and its spectrum. The 24 hr continuums present a set of characteristics which seem to define a class of distinct phenomena called by the author continuum storms. These are always preceded by a very important chromospheric eruption and by a very intense first phase. It is difficult to specify whether the continuum storm is to be considered as a transformation of the first phase of the type IV jump or as an independent phenomenon linked also with the chromospheric eruption. (Met. Abst. 11. 12-56.)--A. V.

D-628 Piddington, J. H. and Minnett, H. C., Solar radio frequency emission from localized regions at very high temperatures. Australian Journal of Scientific Research, Ser. A, Physical Sciences, 4(2):131-157, June 1951. 11 figs., 5 tables, refs., 6 eqs. MH-BH--Solar radio frequency radiation is analyzed into three components: a basic steady component B, a slowly varying component S, and various forms of more or less rapid fluctuations called the X component. The spectra of all three components are drawn between 600 and 24,000 Mc/s, and suggested extensions to lower frequencies are discussed. The properties of the S component are described in some detail; these include correlation with sunspot data, polarization, and the location of the sources of origin. Evidence is presented in favor of generation by thermal processes. It is suggested that the S component is due to thermal emission from localized regions at temperatures of about 10^7°K, often in the vicinity of sunspots. The radiation from a model hot region is examined in detail and the emission spectrum and polarization characteristics are derived. The results are found to compare reasonably with observation. Thermonic emission of electrons and protons would probably occur from the hot regions. These particles would travel to the earth with average velocities of a few hundred kilometers per sec and may be identical with the slow corpuscular radiation whose presence is deduced from terrestrial magnetic data. (Met. Abst. 4. 9-109.)--Authors' abstract.

D-629 Piddington, J. H. and Minnett, H. C., Observations of galactic radiation at frequencies of 1210 and 3000 Mc/s. Australian Journal of Scientific Research, Ser. A, Physical Sciences, 4(4):459-475, Dec. 1951. 6 figs., table, refs. MH-BH--Measurements are described of galactic radiation of 1210 and 3000 Mc/s. The results provide extensions of previous radio emission spectra by more than 1½ octaves. The intensity of radiation from near the galactic center was measured and an estimate made of the direction of the maximum of such radiation. A new "discrete source" of peculiar spectrum was discovered very close to the center of the Galaxy. Evidence suggests that the power output of this and some other sources in the radio spectrum may exceed the total output of the sun. Radiation was also observed from the direction of the Crab Nebula, from the known "radio source" in Centaurus, and from the moon. Two nebulae (M 31 and NGC 7293) were investigated with negative results. The spectra of two sources are given between the limits 18.3 and 1200 Mc/s. (Met. Abst. 4.9-114.)--Authors' abstract.

D-630 Piddington, J.H., Thermal theories of the high intensity components of solar radio frequency radiation. Physical Society of London, Proceedings, Ser. B, 66(2):97-104, Feb. 1, 1953. 18 refs. DLC--Thermal brightness of solar radio frequency radiation reaches 10^{10} - 10^{11} °K in "noise storms" and outbursts, often with maximum near 100 Mc/s. Thermal theories of origin are discussed and rejected. It is considered that high intensity components of solar and galactic radiation must be due, at least in part, to ordered non-thermal motion of electrons. (Met. Abst. 4.9-108.)--C.E.P.B.

D-631 Piggott, W.R., D.S.I.R. ionospheric absorption measuring equipment. Wireless Engineer, London, 32(6):164-169, June 1955. 4 figs., 4 refs. DLC--The principles of ionospheric absorption apparatus, first designed by Sir E. APPLETON in 1935, are described with wiring diagrams. It employs a very stable linear r-f pulse. (Met. Abst. 11E-118.)--C.E.P.B.

D-632 Piggott, W.R. (Radio Res. Station, Slough), Absorption measurements during an eclipse. (In: Solar eclipses and the ionosphere: a symposium... ed. by W.J.G. Beynon and G.M. Brown. London, Pergamon, 1956. p. 106-115. 6 figs., table, 12 refs., 7 eqs.) DWB--The measurement and interpretation of the changes in intensity of radio waves reflected from the ionosphere during an eclipse present many difficulties. Some methods of overcoming these are discussed and applied to observations made at Ibadan, Nigeria, during the eclipse of Feb. 25, 1952. It is found that the eclipse perturbation of the absorbing region implies a distribution of ionizing radiation over the sun's disk closely similar to those found for the E and F1 layers during the same eclipse. (Met. Abst. 9.6-265.)--Author's abstract.

D-633 Pisareva, V.V. (Gor'kii St. Univ.), Fluctuations in the intensity of radio emissions scattered by coronal irregularities. Soviet Astronomy AJ, N.Y., 3(3):419-424, Dec. 1959. fig., 12 refs., 10 eqs. DLC. Transl. of O kolebaniiakh intensivnosti radioizlucheniia, rasseiannogo na koronal'nykh neodnorodnostiiakh, Astronomicheskii Zhurnal, Moscow, 36(3): 427-433, May/June 1959. DLC--

Simultaneous observations of solar radio emissions made at two points separated in longitude (Gor'kii and Irkutsk) at a frequency of 260 Mc, are described. The experiment was carried out in order to detect fluctuations in intensity of diffractive origin. The observations failed to reveal any fluctuations at a precision of up to 2% of the mean level of solar radio emissions. The circumstance may be associated with the fact that radio emission sources on the sun are of too large angular dimensions. It is shown that observations made with an antenna having an effective area of the order of 200 m^2, and an equipment with a fluctuation threshold of 2^o sensitivity, with a time constant of 1 sec, might have led to the detection of such fluctuations even for wide angle sources. The variation in the distribution is considered for an angle of radiation passing through a layer containing irregularities, as a function of the distance of the observer to the layer. The results obtained are applied to the scattering of radio emission from Tauri A on coronal irregularities. It is shown that at great distances from the center of the sun, the apparent increase in the size of the source is not to be explained by scattering on coronal rays. It must be assumed that there also exist irregularities of finer scale in the corona. (Met. Abst. 11L-88.)--Author's abstract.

D-634 Poeverlein, H., Peculiar wave propagation characteristics of a plasma with constant magnetic field. Planetary and Space Science, N.Y., 6:222-223, June 1961. Abstract only. The paper was presented at the Plasma Sheath Symposium, Boston, Mass., Dec. 7-9, 1959.--A wave propagation theory based on a study of the conductivity of a plasma shows that with a sufficiently strong constant magnetic field the refractive indices arc in the order of one and independent of the electron concentration. The conductivity of a plasma with constant magnetic field is an asymmetric tensor. There is no system of three principal directions for which the current density components would be proportional to the electric field strength components. This simple proportionality is, however, found in a coordinate system whose coordinates are a vector in the direction of the magnetic field and two vectors rotating in either sense around the magnetic field direction. The longitudinal conductivity, that is, the conductivity in the magnetic field direction, is predominant. The transverse conductivities now will be assumed being suppressed by the magnetic field. The propagation characteristics then become independent of the electron concentration. The two magnetoionic modes in this case have refractive indices of or near 1, their attenuation is negligible, and one of them is perfectly guided along the magnetic field lines. This peculiar type of propagation requires a magnetic field of sufficient intensity, but no influence of ion motions or pressure gradients in the plasma.

D-635 Poincelot, Paul, Reflexion d'une onde electromagnetique plane sur un milieu ionise. (Reflection of a plane electromagnetic wave from an ionized medium.) Academie des Sciences, Paris, Comptes Rendus, 241(2):186-188, July 11, 1955. 2 refs., 15 eqs. Also his: Reflexion d'une onde electromagnetique plane sur un gaz ionise suivant une certaine loi. (Reflection of a plane electromagnetic wave from an ionized gas according to a given law.) Ibid., 241(3): 290-292, July 18, 1955. 14 eqs. Also his: Reflexion d'une onde electromagnetique plane sur un gas ionise. (Reflection of a plane electromagnetic wave from an ionized gas.) Ibid., 241(9):649-651, Aug. 29, 1955. ref., eqs. DLC--Reflection of plane electromagnetic waves is treated mathematically, considering pulse frequency and structure of the reflecting ionized medium (electronic density, height, etc.). The analysis involves Hankel functions and their asymptotic developments. (Met. Abst. 8.8-195.)--G.T.

D-636 Pope, Joseph H., An investigation of whistlers and chorus at high latitudes. Alaska. Univ. Geophysical Institute, Contract AF 19(604)-1859, Scientific Report, No. 4, April 1959. 38 p. 18 figs., table, 10 refs. --The whistlers and chorus received at College, Alaska, during the period from Dec. 1955 through March 1958, are studied particularly with respect to temporal variations. The diurnal curves for whistler activity show maxima after midnight local time while the seasonal variation peaks during the winter. It appears that these variations in whistler activity are in part explainable in terms of very low frequency propagation conditions. The diurnal variation of chorus shows a maximum at about 1400 hrs local time. By the use of data from lower latitude stations a dependence of this time of diurnal maximum on the geomagnetic latitude of the station is shown. The coefficients of correlation for chorus activity versus magnetic activity were determined on a monthly basis. A seasonal variation in these correlations is indicated which appears to be unique for the geomagnetic latitude of College. A preliminary statistical study of one of the more easily measured characteristics of chorus is discussed. The characteristic chosen is the mid-frequency in an element of chorus. A diurnal variation in this parameter is indicated. (Met. Abst. 11.12-330.) --Author's abstract.

D-637 Pope, J.H. (Geophys. Inst. College, Alaska), Effect of latitude on the diurnal maximum of 'dawn chorus'. Nature, London, 185(4706):87-88, Jan. 9, 1960. 2 figs., table, 6 refs. DWB--ALLCOCK and POPE have shown diurnal maxima as a function of geomagnetic latitude. The observations from a large number of stations with a time resolution of 1 hr during IGY makes it desirable to reconsider the latitude effect.

Our results indicate that it is desirable to consider the use of the eccentric dipole field in connection with theories of chorus. Also, the paths of whistler propagation may be affected by the eccentric field rather than the centered field, which may be an important consideration from the point of view of conjugate point experiments and electron density computations. (Met. Abst. 11.12-331.)--E. Z. S.

D-638 Pope, J.H. and Campbell, W.H. (both, Univ. Alaska), Observations of unique VLF emission. Journal of Geophysical Research, Wash., D.C., 65(8):2543-2544, Aug. 1960. 3 figs., 3 refs. DLC--Describes an unusual natural electromagnetic disturbance in the VLF range received at a low noise site (64°43'N, 148°30'W) near College, Alaska. Sonagrams are shown. As the sound reminded the observers of ocean breakers the name surf is suggested. Surf phenomenon is difficult to understand in terms of the present state of knowledge and cannot be explained by the whistler echo type of propagation. Surface exhibits systematic behavior and is distinctive. (Met. Abst. 11.12-333.)--E. Z. S.

D-639 Porter, Richard W. (General Electric), Rocket and satellite programs. American Museum of Natural History, N.Y. Hayden Planetarium, Contributions, Ser. 1, No. 1:10-17, 1958. DWB (551 A512co)--Details of the U.S. rocket and satellite plans for IGY which include study of atmospheric pressure, temperature, density and winds, aurora and airglow, ionosphere, meteorology, geodesy, radio and the launching and tracking stations, etc., are discussed at some length. (Met. Abst. 11.2-81.)--M. R.

D-640 Powell, C.F. (Univ. of Bristol), Experiments on cosmic radiation by means of artificial satellites. Royal Society of London, Proceedings, Ser. A, 253(1275):482-487, Dec. 29, 1959. DWB, DLC--The paper presents some problems of the cosmic ray radiation research to which an adequate satellite program would make a valuable contribution. The satellite could provide means for 1) the observation of nucleon-mucleon collisions in the region of extremely high energies, 2) investigation of the origin of cosmic rays, and 3) detection of X-ray radiation. (Met. Abst. 11.12-205.) --E. K.

D-641 Pravda, Moscow, Soviet artificial earth satellites: some results of the scientific investigations carried out by the two first Soviet sputniks. Transl. of original Russian in Pravda, April 27, 1958. 12 p. Reproduction of typescript. DWB (629.1388 S729)--From the successful launching of sputniks by the U.S.S.R. during 1957, scientists have been better able to study the upper atmosphere and cosmic space.

Results of ionospheric and cosmic rays investigations have been obtained from the data transmitted from these sputniks. This paper discusses also the results of the medico-biological investigation of Sputnik II. The major part of the report is the analysis of the results of these satellites. (Met. Abst. 11. 2-35.)--N. N.

D-642 Prew, Henry E., Space exploration: the new challenge to the electronics industry. Journal of Astronautics, 4(1):9-11, Spring 1957. 4 figs., eqs. DLC--A lecture delivered at the 3rd annual meeting of the American Astronautical Society, New York, N.Y., Dec. 6-7, 1956. Concept of the research vehicle is a rocket with a two way radio link, performance and parameters of which are discussed. The radio system should operate up to Mars (50 million miles). The radar beacon data link, with earth based 500 Mc radars and 2 KW output would suffice for moon orbit; 6 Megawatt for Mars orbit. Earth transmitters would require 200 KW and 600 Megawatt power output, respectively. --W. N.

D-643 Priester, W., Himmelskarte der 200 MHz-Strahlung. (Sky chart of 200 MHz radiation.) Umschau, Frankfurt a. M., 56(16):485-487, Aug. 15, 1956. 4 figs., 6 refs. DLC--Radio radiation can penetrate the dust clouds which obscure part of the Milky Way, and so give a complete picture. Isophotes are given on 200 MHz of the whole heavens, combining those obtained by F. DROGE and W. PRIESTER at Kiel and by C. W. ALLEN and C. S. GUM at Canberra. This gives radiation temperatures ranging from <120 to $>1200^{\circ}$K. Most of the cosmic radiation originates in our own Galaxy. The maximum is in a turbulent ionized gas cloud in colliding star systems in Cygnus A. (Met. Abst. 9A-129.)--C. E. P. B.

D-644 Priester, W.; Bennewitz, Hans-Gerhard and Lengrusser, Peter, Radiobeobachtungen des ersten kunstlichen Erdsatelliten. (Radio observations of the first artificial satellite.) Arbeitsgemeinschaft für Forschung des Landes Nordrhein-Westfalen, Wissenschaftliche Abhandlungen, Vol. 1, issued Cologne (Westdeutscher Verlag), 1958. 38 p. 21 figs., 4 tables, 5 refs., 29 eqs. DLC (QC802. B64P7). Review by S. F. Singer, Physics Today, 11(7), July 1958. --Trajectory data and their time variations due to precession and to friction in the earth's atmosphere were calculated from measurements of Doppler effect and recordings of signal field strength at 20 and 40 MHz. The trajectory data are presented. For the precession of the trajectory, the authors obtained $2.96 \pm 0.20\ ^{\circ}/d$ in good agreement with the theoretical value of D. G. KING-HELE and D. M. C. GILMORE. For atmospheric limits at 215 km (over the mean globe (R = 6371 km) at 42°N lat.), a value of $4.7 \cdot 10^{-13}$ g cm^{-3} was obtained. This value is five times as large as the density obtained for that altitude from American rocket experiments in 1952/53. (Met. Abst. 11J-137.)--Transl. of authors' abstract (G.T.).

D-645 Priester, W., Radiobeobachtungen des ersten kunstlichen Erdsatelliten. (Radio observations of the first artificial satellite.) Die Sterne, Leipzig, 34(3/4):64-69, 1958. 4 figs. DLC--The 20,005 and 40,002 MHz signals of the first satellite have been observed and registered at many places; at the laboratory of the Bonn University, the impulses of the satellite were received on Oct. 5, 1957 at 05 h 22 U.T. and registered on Oct. 6, 1957 (figure gives the registered curves). The observations were developed to fix the satellite orbit and also to determine the variations of the orbits elements. Observations made: 1) recording of the 20,005 MHz field value; 2) recording of the 40,002 MHz field value; 3) measurement of Doppler effect. From the first registrations and using Soviet information giving a declivity of 65° for the orbit, a first approximation of the evolution of the orbit is calculated. A figure gives a diagram for the determination of the height of the satellite and another figure shows the decrease of air density with height. (Met. Abst. 11J-138.)--A.V.

D-646 Priester, W., Sonnenaktivität und Abbremsung der Erdsatelliten. (Solar activity and deceleration of earth satellites.) Die Naturwissenschaften, Berlin, 46(6):197-198, March 1959. fig., 6 refs. DLC--The object of the author is to stress the remarkable correlation between the irregular fluctuation in the rotation time of satellite 1957 Beta (Sputnik 2) and the variation in radio radiation in the 20 cm band during Dec. 1957 and Jan. 1958. The article mentions a statement of JACCHIA, BRIGGS and NONWEILER. (Met. Abst. 11.12-554.)--A.V.

D-647 Primich, R.I. (Def. Telecom. Estab., Ottawa), Microwave techniques for hypersonic ballistic ranges. Planetary and Space Science, N.Y., 6:186-195, June 1961. 17 figs., 11 refs., eqs. DWB--Describes two simple techniques and the instrumentation developed and used to measure the properties of plasma generated by hypersonic projectiles. The Defence Research Telecommunication Establishment (DRTE) at Ottawa, and the Canadian Armament Research and Development Establishment (CARDE) at Quebec City, are engaged in a joint program of research into plasmas. --W.N.

D-648 Rabben, H.H. (Fraunhofer Inst., Freiburg i.Br.), Solare Bursts der Type III und ihre Beziehungen zu den Eruptionen. (Solar bursts Type III and their relation to eruptions.) Zeitschrift für Astrophysik, Berlin, 49(2):95-110, 1960. 5 figs., 6 tables, 14 refs., several eqs. English summary p. 95. DLC--136 burst events of Type III have been recorded with the Freiburg radio spectrograph in a period of 200 hrs. Their relation to 372 flares observed in the same period is studied. By the use of records obtained at other observatories, the spectral range was extended down to microwaves. About 20% of the flares coincided with Type III bursts, 88 of the remaining 96 burst events occurred within the lifetime of flares extended by ± 5 min. It was found that: a) the greater the flare importance the greater the number of bursts per event. b) Great burst events obviously occur near the onset of a flare, while the occurrence of smaller events is independent of the flare's phase. c) Burst intensity and frequency drift/sec increase with the total spectral range of the burst. d) The center limb decrease of the number of bursts exceeds that of flares and in addition shows a strong east-west asymmetry. e) The contribution of bursts of medium intensity and frequency drift/sec increases strongly with central meridian distance. f) The radio efficiency of flares increases with importance. g) Burst producing flares prefer certain centers of activity. (Met. Abst. 11L-100.)--Author's abstract.

D-649 Radhakrishnan, V. and Roberts, J.A. (both, Radio Obs., Calif. Inst. of Technology), Polarization and angular extent of the 960 Mc/sec radiation from Jupiter. Physical Review Letters, N.Y., 4(10):493-494, May 15, 1960. table, 7 refs. DLC--If the emission of intense 10 cm radiation from Jupiter has its origin in a "Van Allen belt" surrounding Jupiter, the angular extent of the source of the radiation is likely to be several times the diameter of the planet. Some degree of polarization of the radiation would be expected. These predictions are being tested with a variable spacing interferometer, and some results are reported. The source is strongly linearly polarized, the radiation with the electric vector parallel to the equatorial plane of the planet being approximately 1.7 times as intense as in the orthogonal polarization. The radiation comes from a region several times the diameter of the disk and is more strongly polarized in the outer parts. (Met. Abst. 11.12-66.)--E.Z.S.

D-650 Radhakrishnan, V. (Calif. Inst. of Tech. Radio Obs., Owens Valley), Self-absorption in the 21 cm radiation from galactic neutral hydrogen. Astronomical Society of the Pacific, San Francisco, Publications, 72(427):296-302, Aug. 1960. 3 figs., 7 refs., 2 eqs. DLC--The existence of clouds of neutral hydrogen at temperatures of galactic H 1 regions causes the occurrence of self absorption in the 21 cm radiation. This is substantiated by the observation reported in this paper in which self absorption due to hydrogen was detected at a temperature no greater than 60°K. The observations were made on two nights with a frequency switched radiometer in conjunction with a 90 ft equatorially mounted paraboloid. Samples of different types of 21 cm records related to these observations are discussed and graphically illustrated. (Met. Abst. 11L-114.) --I. S.

D-651 Radio Astronomy Symposium, Jodrell Bank, Aug. 1955, (Abstracts in English of a selection of papers, delivered at this Symposium.) Each abstract repaged. figs., tables, refs., eqs. Photostats of typescript. DWB (621.384 I61p)--This collection of photostats prepared from working papers of the Jodrell Bank symposium on radio astronomy contains eleven papers submitted by the Russian delegation (also one from Czechoslovakia and one from Japan). All abstracts are in English; they are either complete texts or extensive summaries including numerous data and mathematical deductions. The subjects discussed are methods used by Soviet scientists for identifying and analyzing solar, planetary and galactic radio radiation and results achieved in interpreting the mechanisms producing such radiation. As a whole, the collection conveys a good idea of the present state of Soviet research in the field of radio astronomy. The length of the papers (or summaries) varies between 2 and 12 typewritten pages. The titles are as follows: Abstract No. 3, Link, F.: Possible proofs of the lunar atmosphere. No. 32, Getmantsev, G. G.; Stankevich, K. S. and Troitskii, V. S.; Detection of monochromatic radio-emission of deuterium from the center of the Galaxy on wave-lengths of 91.6 cm. No. 33, Ginzburg, V. L.: The nature of cosmic radio emission and the origin of cosmic rays. No. 34, Troitskii, V. S. and Khaikin, S. E.: Radio emission from the moon and the nature of its surface. No. 35, Shklovskii, I. S.: Optical emission from the Crab nebula in the continuous spectrum. No. 36, Shklovskii, I. S.: Some problems of the metagalactic radio emission. No. 37, Vitkevich, V. V.: Results of observations of the scattering of radio waves on the electronic inhomogeneities of the solar corona. No. 38, Vitkevich, V. V.: Disturbed radio emission from the sun as a sum of small monochromatic peaks. No. 52, Hatanaka, Takeo: Polarization of solar radio bursts. No. 61, Chikachev, B. M.: A survey of Soviet observations of the radio emission from the sun during solar eclipses. No. 62, Shain, C. A.; Pickelner, S. B. and Ikhsanov, R. N.: The measurement of the polarization of the Crab nebula. No. 63, Vitkevich, V. V.: Burst of solar radio emission on Sept. 26, 1952. No. 64, Shklovskii, I. S.: On the nature of the emission from the galaxy NGC 4486. (Met. Abst. 11.1-66.)--G. T.

D-652 Ramanathan, K. R.; Bhonsle, R. V.; Kotadia, K. M. and Rastogi, R. G., The great solar flare of Feb. 23, 1956 and associated ionospheric effects at Ahmedabad. Indian Academy of Science, Proceedings, Sec. A, 43(5):306-308, May 1956.--25 Mc/s cosmic noise fadeout and ionospheric soundings at the time of a great solar flare.--CSIRO Abstract.

D-653 Ramanathan, K. R. and Bhonsle, R. V. (both, Physical Res. Lab., Ahmedabad, India), Cosmic radio noise absorption on 25 Mc/s and F scatter. Journal of Geophysical Research, Wash., D.C., 64(10):1635-1637, Oct. 1959. fig, 4 refs. DLC --An evaluation of the mean diurnal and seasonal variations of the attenuation of cosmic radio noise in the atmosphere is attempted. The features examined are: minimum attenuation occurs before sunrise; daytime maximum near afternoon; a second maximum usually between 20 and 22 hrs, "in the winter equinoctial and months." D region absorption and F region absorption in the ionosphere were separately estimated. D region absorption depends directly on solar zenith distance. The deviate F region attenuation was evidently connected with F scatter. This view is strongly supported by observations of BATEMAN and others in the Philippines-Okinawa area during IGY. The frequency of evening enhancements reached a peak during each equinoctial period, operating at 36.4 Mc/s. The peak at autumn could be observed during operations at 49.84 Mc/s only. BATEMAN and his co-authors suggested that the enhanced signal was propagated via the F region, and was enhanced when there was low latitude spread F. The authors of the present paper believe that ion clouds in the F region can increase the scattered VHF signal strength from a ground transmitter, and attenuate at the same time the noise signals from extraterrestrial noise sources. The decrease of cosmic noise absorption on 25 Mc/s at Ahmedabad, on days with magnetic storms, correlates with the absence of F scatter on magnetically disturbed days in low latitudes. The diagrams show the monthly mean hourly values of total attenuation; D absorption and an F2 attenuation of cosmic radio noise on 25 Mc/s at Ahmedabad. (Met. Abst. 11.12-68.)--O. T.

D-654 Ramanathan, K. R.; Bhonsle, R. V. and Degaonkar, S. S. (all, Physical Res. Lab., Ahmedabad, India), Effect of electron-ion collisions in the F region of the ionosphere on the absorption of cosmic radio noise at 25 Mc/s at Ahmedabad: changes in absorption associated with magnetic storms. Journal of Geophysical Research, Wash., D. C., 66(9):2763-2771, Sept. 1961. 6 figs., table, 18 refs., 4 eqs. DLC--Measurements of cosmic radio noise at 25 Mc/s, being made at the Physical Research Lab., Ahmedabad, since March 1957, have shown much larger values of absorption than those observed by SHAIN and MITRA in Australia. Thic fact, together with the empirically known dependence of the absorption on the critical frequency of the F region, and the effect of magnetic storms on the absorption found from the Ahmedabad observations have led us to examine the different possible parameters that may affect cosmic noise absorption. It is found that electron-ion collisions in the F region, both below and above the level of maximum electron density, contribute in a substantial way to the absorption of cosmic radio noise. The values of hourly absorption due to collisions of electrons with neutral particles and with ions have been calculated for a period of 6 days in Aug.-Sept. 1957, when there were three magnetic storms. The results obtained show a depletion of electrons above F maximum on the day following the commencement of the magnetic storm and a refilling on later days. The results are discussed in relation to findings from satellite observations about particle fluxes in the Van Allen belts during magnetic storms. (Met. Abst. 13A-136.)--Authors' abstract.

D-655 Rand, S. (Convair, San Diego, Calif.), Wake of a satellite traversing the ionosphere. Physics of Fluids, N. Y., 3(2):265-273, March/April 1960. 6 figs., 2 refs., 65 eqs. DWB--The particle treatment is applied to a study of the structure of the wake behind a charged body moving supersonically through a low density plasma. For the case of a body whose dimensions are considerably smaller than a Debye length, a solution is obtained which is very similar in structure to the solution obtained by using the linearized fluid dynamics equation. For the case of a disk whose radial dimensions are much larger than a Debye length, two conical regions are found in the wake. At the surface of each of these cones, over thicknesses of the order of a Debye length, the ion and electron densities are increased over their ambient values. Formulae for the electrohydrodynamic drag on a wire, and on a large disk are obtained. (Met. Abst. 11.12-535.)--Author's abstract.

D-656 Rand, S. (Convair, San Diego, Calif.), Damping of the satellite wake in the ionosphere. Physics of Fluids, N. Y., 3(4): 588-599, July/Aug. 1960. 3 figs., table, 10 refs., 79 eqs. DWB--Landau damping of the ion plasma oscillations which constitute the wake of a line charge moving supersonically through a low density plasma is studied. Maxwellian distribution functions in the ambient plasma for both electrons and ions have been assumed. It is found that the damping is critical to the question of whether the electrohydrodynamic wake produced by a satellite in the ionosphere is observable, unless the electron temperature is at least an order of magnitude greater than the ion temperature. (Met. Abst. 11.12-536.)--Author's abstract.

D-657 Rao, B. Ramachandra and Murty, D. Satyanarayana (both, Ionospheric Res. Lab., Andhra Univ., Visakhapatnam), A new continuous wave radio method for the study of ionospheric drifts. Journal of Scientific and Industrial Research, Sec. A, New Delhi, 17(12), Special Supplement, Dec. 1958. p. 63-67. 2 figs., 2 tables, 3 refs. DWB, DLC--A simplified method is described, involving transmission from a distant sender received by three simple vertical aerials at the corners of a right angled triangle, signal strength being recorded side by side on a photographic paper. Sectional view is given. Comparison with other methods show that this method yields consistently reliable results. Another advantage is that choice of proper frequencies enables drift measurements at different ionospheric locations from the very same receiving center. (Met. Abst. 11F-108.)--W. N.

D-658 Rao, B. R. and Ramana, K. V. V. (both, Ionospheric Res. Lab. Andhra Univ., Visakhapatnam), Diurnal variation of ionospheric absorption on 5.65 Mc/s at Waltair during the IGY. Journal of Scientific and Industrial Research, Sec. A, New Delhi, 17(12), Special Supplement, Dec. 1958. p. 56-58. table, 9 refs., 6 eqs. DWB, DLC--The equations used to obtain the ionospheric absorption by calculating comparatively the amplitude of the echo received with the amplitude if the ionosphere were a perfect reflector are given. Procedure and equipment used during the period March-Aug. 1958, are described. Tabulated n values (cos x-index) vary from 0.88 to 1.75, average 1.25 as against the theoretical 1.5. (Met. Abst. 11E-125.)--W. N.

D-659 Rao, B. R. and Bhagiratha Rao, E. (both, Ionospheric Res. Lab. Andhra Univ., Visakhapatnam), Effect of enhanced solar activity on the F2 region drifts at Waltair. Journal of Scientific and Industrial Research, New Delhi, Sec. A, 17(12), Special Supplement, Dec. 1958. p. 59-62. fig., table, 7 refs. DWB, DLC--

This is the first systematic investigation of a problem of this nature. The spaced receiver method used was modified by using a triple beam oscillograph for recording the fading patterns, frequency 6.0 Mc/s. SWI as obtained June 1957-June 1958 represented by 21 days are analyzed, first plotted separately, then mean curves were drawn. Daily variation of NS and EW curves shows the NS variation to be considerably affected on SWI days when prominent solar flares were reported, otherwise not. (Met. Abst. 11F-106.)--W. N.

D-660 Rastogi, R. G.; Sheriff, R. M. and Nanda, N. G. (all, Physical Res. Lab., Ahmedabad), Some measurements of the signal strengths of radio waves reflected from the ionosphere during the solar eclipses of June 30, 1954 and June 20, 1955. (In: Solar eclipses and the ionosphere: a symposium...ed. by W. J. G. Beynon and G. M. Brown. London, Pergamon, 1956. p. 137-142. 7 figs., ref.) DWB--The signal strengths of radio waves from B. B. C. transmissions on 15-07 Mc/s were measured at Ahmedabad during the 1954 eclipse, with control observations on a few preceding and succeeding days. The signals, which could have been either by two-hop or three-hop reflections, showed well marked increases in intensity during the eclipse. The increase of signal strength is considered to be due to a decrease of attenuation in the F1 layer. Similar measurements were carried out for the 1955 eclipse at Trivandrum, on the radio transmission from Colombo on 4.87 Mc/s directed skyward, and at Ahmedabad 7.19 Mc/s. Here again the signals showed well marked increases of strength during the eclipse. In both cases the signal intensity returned to its normal value well before the end of the eclipse. The reflections observed at Trivandrum could have been from F1, if there was an F1 layer. Near the geomagnetic equator, however, F1 is not usually observable at this hour of the day. Probably the reflection took place from F2, with decrease of attenuation mainly in F1. The reflections observed at Ahmadabad should have been from E, and the decrease of attenuation during the eclipse should have taken place below E. (Met. Abst. 9.4-257.)--Authors' abstract.

D-661 Rastogi, R. G. and Sethuraman (both, Physical Res. Lab., Ahmedabad), Field strength measurements of radio waves during the partial solar eclipse of Dec. 14, 1955 at Ahmedabad. Journal of Scientific and Industrial Research, Sec. A, New Delhi, 15(7):303-305, July 1956. 2 figs., 3 tables, 2 refs. DWB, DLC--The results of field strength measurements made at Ahmedabad during the partial solar eclipse of Dec. 14, 1955, on radio transmissions from Bombay on 7.24 and 9.55 Mc/s are described. The 7.24 Mc/s waves are reflected from the E layer, while the 9.55 Mc/s waves penetrate E and are reflected from the F2 layer on normal days. During the eclipse, the field strength of the 7.24 Mc/s transmission decreased below the value for normal days, while the 9.55 Mc/s waves showed increased field strength. The changes are explained in terms of the vertical incidence frequencies of the waves and the critical frequencies of the ionospheric layers at Ahmedabad. (Met. Abst. 8.9-328.)--Authors' abstract.

D-662 Rastogi, R. G. (Nat. Res. Coun. Postdoctorate Fellow), Magnetic control on the variations of the critical frequency of the F2 layer of the ionosphere. Canadian Journal of Physics, Ottawa, 37(7):874-879, July 1959. 3 figs., 16 refs. DWB, DLC --The paper discusses the comparative influence of the true magnetic and smooth geomagnetic latitudes on the diurnal and latitudinal variations of the critical frequency of the F2 layer (foF2) at low latitudes. The diurnal variations of foF2 are shown to differ considerably at stations having the same geomagnetic latitude, but the discrepancies disappear when the true magnetic latitude is taken into consideration. The latitudinal variation of noon values of foF2 is also shown to present discrepancies for low latitude stations in the geomagnetic latitudes plot, but on true magnetic latitude plots the points fall regularly along a smooth curve. (Met. Abst. 11F-114.)--Author's abstract.

D-663 Ratcliffe, J. A., Radio astronomy. Nature, London, 169 (4296):348-350, March 1, 1952. 2 figs. DWB--A general account of radiation of radio frequencies from the stars and the sun. The solar intensity corresponds to a temperature in corona of about 1,000,000° K. (Met. Abst. 4.9-110.)--C.E.P.B.

D-664 Ratcliffe, J. A., Microscopic mechanism for the absorption of radio waves in the ionosphere. (In: Beer, Arthur (ed.), Vistas in astronomy. pub. London, 1955-1956. Vol. 2:791-798. 5 figs., 2 refs., 30 eqs.) DWB, DLC--The paper deals with the absorption which occurs when a radio wave passes through a medium containing free electrons which make collisions with heavy particles. It is shown that the absorption can be accounted for in terms of the impulses which the electrons radiate at each collision under the influence of the imposed wave. Although these impulses are randomly timed they correspond to a coherent wave of the required amplitude and phase. (Met. Abst. 11E-128.)--Author's abstract.

D-665 Ratcliffe, J. A. (Cavendish Lab., Cambridge Univ.), Information by radio from the satellites. Institution of Electrical Engineers, London, Journal, 4(47):603-608, Nov. 1958. 7 figs., table, 2 refs. DLC--This article is a condensed form of a lecture dealing with some exploratory results of ionospheric research as obtained by way of radio signals from orbiting satellites, especially Sputnik I. The propagation characteristics of the 20 and 40 Mc/s radio waves used permit deductions to be drawn with regard to orbital features, ionospheric electron content, density and distribution, influence of earth's magnetic field, etc. Results deduced from the Doppler effect and the Faraday effect are discussed and shown in graphs. (Met. Abst. 11E-127.)--W. N.

D-666 Ratcliffe, J. A. et al., Transition from the ionosphere to interplanetary space. Geophysical discussion of the Royal Astronomical Society, Feb. 21, 1958. Geophysical Journal, London, 1(3):263-266, Sept. 1958. DWB, DLC--Under chairmanship of J. A. RATCLIFFE, a discussion was held at the Royal Astronomical Society headquarters. SYDNEY CHAPMAN spoke on his static theory of heating of the outer atmosphere by the solar corona. D. E. BLACKWELL discussed optical observations of the zodiacal light. J. V. EVANS, of Jodrell Bank Observatory, spoke on radio echoes from the moon. K. WEEKES, of Cavendish Laboratory, Cambridge University, reported on ionospheric deduction based on satellite observations and J. A. RATCLIFFE summarized work on whistlers and radio frequency atmospherics at Stanford and Boulder, Colo. A.HEWISH discussed observations of radio stars (made at Cambridge) observed through the solar corona. (Met. Abst. 11.7-41.)--M. R.

D-667 Ratcliffe, J. A. (Univ. of Cambridge), The magneto-ionic theory and its applications to the ionosphere. London, Cambridge Univ. Press, 1959. 206 p. figs., tables, eqs., bibliog. p. 193-201. Price 40 sh. DLC (QC661.R33). Review in Royal Meteorological Society, Quarterly Journal, 85(365): 320, July 1959. Review by A. Scibor-Rylski in Science Progress, London, 47(188):776-777, Oct. 1959. Review by G. H. Munro in Australian Journal of Science, Sydney, 22(4):176, Oct. 1959. --Account of the theories of radio wave propagation through the earth's ionosphere and through the ionized envelopes of radio stars, being concerned with the propagation of electromagnetic waves through a partially ionized gas in the presence of a magnetic field. The author is not content to follow a simple mathematical approach but searches for physical reasons for the behavior of the waves. Two approaches have been adopted: a macroscopic one in which the properties of the medium are averaged out and a microscopic one based on the motion of individual electrons. Ch. I treats the derivation of the equations, the microscopic approach, the physical reason for the characteristic waves and their dispersion, the absorption on the "Macroscopic" theory and the microscopic picture of absorption. In Pt. II, the results are summarized in graphical form and simple rules demonstrated for computing curves of refractive index and absorption index as functions of electron density. Pt. III treats application of the theory to the earth's ionosphere and mentions a wide range of phenomena capable of explanation in terms of the magneto-ionic theory of a homogeneous medium. Finally, the author discusses a number of relevant miscellaneous topics, including the relationship between the anisotropic behavior of the atmosphere and that of transparent crystals. A complete bibliography and an alphabetical index of subjects are included in this excellent work. (Met. Abst. 11.1-17.)--A.V.

D-668 Ratcliffe, J.A. (ed.), Physics of the upper atmosphere. N.Y., Academic Press, 1960. 586 p. figs., tables, refs., eqs. Review by M.G. Morgan in Institute of Radio Engineers, N.Y., Proceedings, 48(12):2045, Dec. 1960. Review by E.V. Appleton in Journal of Atmospheric and Terrestrial Physics, London, 19(3/4):295, Dec. 1960. Contents: Chapman, Sydney, The earth's outermost atmosphere, p. 1-16. Nicolet, Marcel, The properties and constitution of the upper atmosphere, p. 17-71. Newell, Homer E., Jr., The upper atmosphere studied by rockets and satellites, p. 73-132. Friedman, Herbert, The sun's ionizing radiations, p. 133-218. Bates, D.R., The airglow, p. 219-267. Bates, D.R., General character of auroras, p. 269-296. Bates, D.R., The auroral spectrum and its interpretation, p. 297-253. Booker, Henry G., Radar studies of the aurora, p. 355-375. Ratcliffe, J.A. and Weekes, K., The ionosphere, p. 377-470. Vestine, E.H., The upper atmosphere and geomagnetism, p. 471-512. Greenhow, J.S. and Lovell, A.C.B., The upper atmosphere and meteors, p. 513-549. Chapman, Sydney, Newell, Homer E., Jr. et al. Advances during the International Geophysical Year, 1957/1958, by authors of various of preceding articles, p. 551-563. DWB (M10.5 R233ph)--This excellently edited collection of articles, reviewing current knowledge of the atmosphere above 60 km, consists of the 12 above cited chapters written by well-known authorities on the physics and chemistry of the upper atmosphere. It includes knowledge of the aurora, airglow, ionosphere, meteors, and geomagnetism gained from direct and indirect methods — rockets and satellites, etc., mainly before IGY but with supplementary information obtained during 1857/1958 and even 1959. Recent advances in knowledge of the Van Allen Belts, radar studies of the aurora and solar ionizing radiations are treated in the final chapter written by various authors on the results of IGY. The articles as a whole contain a great deal of theoretical, as well as experimental, results. An extensive author index, including references to authors referred to in the bibliographies, and a subject index are provided. (Met. Abst. 12.4-1.)--M.R.

D-669 Rawer, Karl, Die Ionosphäre: ihre Bedeutung für Geophysik und Radioverkehr. (The ionosphere: its importance in geophysics and radio communication.) Groningen, P. Noordhoff, 1953. 179 p. 67 figs., 143 refs., 68 eqs. DLC--A complete text on the use of radio in ionospheric research. Ch. I takes up methods of observation by echoes, spectroscopic methods for aurora and airglow, magnetic, meteor and luminous night clouds, and soundings; Ch. II gives results of observations by echo methods, magnetic data, composition, pressure, density and temperature. Ch. III discusses theories of ionospheric stratification (origin and disappearance of ionization and explanation of different layers. Ch. IV takes up normal and irregular changes of the ionosphere (D, E, F2, F, E2, G and Es and influence of magnetic storms, eclipses, polar summer and night, commencements). Ch. V discusses influence of ionosphere on propagation of radio waves and forecasting propagation. (Met. Abst. 11B-118.)--M. R.

D-670 Rawer, K. (Ionospheric Stat., of S.P.I.M., France), Some remarks concerning ionospheric absorption work. Journal of Geophysical Research, Wash., D.C., 60(4):534-535, Dec. 1955. fig. DLC--Monthly mean absorption decrements in E layer, as well as daily values, do not support assumption of a horizontally stratified plane ionosphere whose total absorption is characterized by an effective reflection coefficient. Focusing effects arising from curvature in the reflecting layer produce an apparent reflection coefficient greater than 1. Effect is only important in vicinity of focusing areas. Night F2 observations showed negative absorption decrement in 30% of cases. Even in daytime, 2 or 3 daily observations show important focusing. These areas are illustrated as being in the form of inverted ripples. (Met. Abst. 11E-129.)--M. R.

D-671 Rawer, K. (Service de Prevision Ionospherique Militar, Frieburg), Absorption measurements for the eclipse of June 30, 1954. (In: Solar eclipses and the ionosphere: a symposium.. ed. by W. J. G. Beynon and G. M. Brown, London, Pergamon, 1956. p. 102-105. 6 figs., 5 refs.) DWB--Results are presented of field strength and virtual height measurements made at Freiburg on frequencies of 2.9 and 1.95 Mc/s during the partial eclipse of June 30, 1954. The different behaviors observed on the two frequencies are explained in terms of the relative contributions of deviative and non-deviative absorptions. It is found possible to isolate these two types. Some observations on 1.95 Mc/s at oblique incidence are also described. (Met. Abst. 9.6-266.)--Author's abstract.

D-672 Rawer, K. (Ionosphären Institut, Breisach/Rh., Germany) and Suchy, K. (Physikalisches Inst. d. Univ. Marburg/Lahn, Germany), Whistlers excited by sound waves. Institute of Radio Engineers, N.Y., Proceedings, 49(5):968-969, May 1961. fig., 4 refs. DLC--This brief discussion is in favor of Lippmann's view, since only strong waves, for example such as from nuclear explosions, can produce observable transversal electromagnetic waves. This mechanism is summed up in the conclusion drawn regarding excitation of whistlers by sound waves in a plasma (here below 300 km). (Met. Abst. unpub.)--W. N.

D-673 Reber, Grote, Cosmic static. Institute of Radio Engineers, N.Y., Proceedings, 28(2):68-70, Feb. 1940. 6 figs., 14 refs., 7 eqs. DLC--An attempt to account for the static from space, particularly from the Milky Way, by means of brief quantitative calculations using Kramer's formula corrected for stimulated radiation. --W. N.

D-674 Reber, G., Cosmic static. Astrophysical Journal, 100(3): 279-287, Nov. 1944. 5 figs., 3 foot-refs., 2 eqs. DLC--Cosmic static is a disturbance in nature which manifests itself as electromagnetic energy in the radio spectrum arriving from the sky. The results of a survey at a frequency of 160 Mc/s show the center of disturbance to be in the constellation Sagittarius. Minor maxima appear in Cygnus, Cassiopeiae, Canis Major, and Puppis. The lowest minimum is in Perseus. Radiation of measurable intensity is found coming from the sun. (Met. Abst. 9A-3.)--Author's abstract.

D-675 Reber, G., Motion in the solar atmosphere as deduced from radio measurements. Science, 113(2934):312-314, March 23, 1951. table, 10 refs. DLC--Disturbances in the variably ionized solar atmosphere generate radio waves of a transient nature, having different frequencies at different levels. These radio frequencies are used to analyze the source of the motions within the solar atmosphere and their velocities during a sudden ionospheric disturbance. (Met. Abst. 2.7-67.)--I.L.D.

D-676 Reber, G., Fine structure of solar radio transients. Nature, London, 175(4446):132, Jan. 15, 1955. 6 refs. DWB--High speed recordings on 480-51 Mc/s showed solar bursts to be made up of numerous small transients (pips), the structure and duration of which are described. There is a fundamental relation between their mode of generation, source in the solar atmosphere, and duration. (Met. Abst. 9A-90.)--C.E.P.B.

D-677 Reber, G., Radio astronomy in Hawaii. Nature, London, 175(4445):78-79, Jan. 8, 1955. DWB--Observations of cosmic static at 10,020 ft on summit of Haleakala, Maui, are described. Sources in Cassiopeia and Cygnus show interference patterns at 100 Mc/s and considerable asymmetry. (Met. Abst. 9A-91.)--C.E.P.B.

D-678 Reber, G. (Research Corp., N.Y.C.) and Ellis, G.R. (Commonwealth Obs., Hobart, Tasmania, Australia), Cosmic radio frequency radiation near one megacycle. Journal of Geophysical Research, Wash., D.C., 61(1):1-10, March 1956. 9 figs., 4 refs. DLC--Observations were made of cosmic radio frequency radiation on frequencies of 2130 kc/sec, 1435 kc/sec, 900 kc/sec, and 520 kc/sec. Using fast photographic recording with a cathode-ray indicator, a method of recording was found which effectively reduced interference from atmospherics. The maximum intensity of the cosmic radiation at 2130 kc/sec was approximately 10^{-19} watt per square meter per cycle per sec (W.M.$^{-2}$c/s^{-1}) per steradian, with an estimated error of 50%. At the other frequencies, the results were more uncertain, although the intensities were of the same order of magnitude, with perhaps lower intensities at lower frequencies. The ionospheric effects associated with observations near the critical frequency are discussed. (Met. Abst. 9A-132.)--Based on authors' abstract.

D-679 Reber, G., Early radio astronomy. Institute of Radio Engineers, N.Y., Proceedings, 46(1):15-23, Jan. 1958. 23 refs. DLC--A history is given of radio astronomy experiments conducted by the author from 1936 through 1947. A description of the parabolic reflector and equipment design along with reasons for the choice of successive operating frequencies of 3300, 910, 160, and 480 Mc/s. The results are reviewed in light of more recent knowledge. Published articles covering the scientific details will be found in the (23) foot-notes. (Met. Abst. unpub.)--Author's abstract.

D-680 Reber, G. (National Radio Astronomy Obs., Green Bank, W.Va.), Cosmic static at kilometer wavelengths. Canada. Defence Research Telecommunications Establishment, Publication No. 1025, March 1960. p. 243-248. 4 figs., ref. DWB (M21 S989pro)--The theory of propagation of ionospheric Y mode (extraordinary longitudinal) has been improved. Now the theory is in better agreement with galactic observations of cosmic static at 520 kc. The intensity per unit bandwidth of cosmic static is still rising at 520 kc compared to 2130 kc. Further experiments are discussed. (Met. Abst. unpub.)--Author's abstract.

D-681 Reid, George C. and Leinbach, Harold (both, Geophysical Inst., Univ. of Alaska), Low energy cosmic ray events associated with solar flares. Journal of Geophysical Research, Wash., D.C., 64(11):1801-1805, Nov. 1959. table, 22 refs. DLC--As a result of the IGY riometer program, it has been found that the measurement of ionospheric absorption in arctic regions is a sensitive method of detecting low energy cosmic rays associated with solar flares. The normal morphology of these events is described, and details are given of the 24 such events that have been detected in the period from May 1957 through June 1959. Two features have been noted: an apparent asymmetry in the distribution of cosmic ray producing flares across the solar disk; a pronounced degree of uniformity in the distribution of the radio wave absorption over the terrestrial polar cap. These features are discussed, and tentative explanations are suggested. (Met. Abst. 11.8-88.) --Authors' abstract.

D-682 Reid, G.C. and Collins, C. (both, Defence Res. Board, Ottawa, Canada), Observations of abnormal VHF radio wave absorption at medium high latitudes. Journal of Atmospheric and Terrestrial Physics, London, 14(1/2):63-81, April 1959. 7 figs., table, 23 refs., eq. DLC--A study of cosmic noise absorption at a frequency of 30 Mc/s at Ottawa and Churchill has revealed the existence of two apparently distinct types of abnormal absorption event. One of these is predominantly a night time phenomenon and is closely associated with auroral and geomagnetic disturbance. It is suggested that this absorption may be caused by an increase in electron collisional frequency at E region heights rather than by a large increase in electron density at lower levels. The second type of absorption is confined to the auroral zone and is predominantly a daytime phenomenon, recurring for several days after a large solar flare. Evidence is presented to show that this absorption is due to an increase in ionization at very low levels in the ionosphere. The cosmic noise measurements are supported by evidence from a number of VHF forward scatter circuits in Canada, and this is used to obtain information about the geographical extent and frequency of occurrence of these abnormal absorption events. (Met. Abst. 11E-133.)--Authors' abstract.

D-683 Reid, G.C. and Stiltner, E., Design and use of a phase-sweep interferometer for the study of radio star scintillations in the auroral zone. Alaska, Univ. Geophysical Institute, Contract AF 30(635)-2887, Supplement to Final Report (Phase I), Feb. 1, 1960. 15 p. 13 figs., 3 refs., 5 eqs. DWB (M94.6 A323ra)--The usefulness of the phase sweep technique in interferometers designed to record radio star signals is discussed. Interferometers of this type have been built for use at frequencies of 223 and 456 Mcs, and their electronic design is explained in some detail. The report also includes a discussion of the automatic data processing system which has been designed to operate in conjunction with the interferometers in the analysis of the amplitude scintillation of radio stars. (Met. Abst. unpub.)--Authors' abstract.

D-684 Reid, G.C. (Defence Res. Telecommunications Estab., Shirley Bay, Ottawa, Canada), A study of the enhanced ionization produced by solar protons during a polar cap absorption event. Journal of Geophysical Research, Wash., D.C., 66 (12):4071-4085, Dec. 1961. 17 figs., table, 27 refs., 22 eqs. DLC--Polar cap absorption of radio waves has been shown to be caused by an influx of fast particles emitted by the Sun at the time of certain solar flares. The steady-state daytime and night-time electron density profiles produced in the lower ionosphere by such a particle flux are calculated, on the assumptions that the particles are protons and that their differential energy spectrum is of the form $n(E)\,dE = KE^{-5}\,dE$, with a sharp cutoff at the low energy end. The shapes of the profiles are shown to be almost independent of the proton spectrum and low energy cutoff, provided the latter is higher than about 10 Mev. The radio wave absorption this ionization would produce is calculated for frequencies of 30 Mc/s and 60 Mc/s. Conditions during the twilight transition period are also examined, assuming that O_2^- is the only negative ion present. The photodetachment coefficient of O_2^- is calculated as a function of solar zenith angle, and corresponding electron density profiles deduced. By comparing the absorption these profiles would produce with the observed variation of cosmic noise absorption during twilight, it is shown that the presence of O_2^- alone is insufficient to account for the observations. (Met. Abst. unpub.)--Author's abstract.

D-685 Richey, Frances and Wehner, R.S., Use of radar as an ionospheric probe. Plesset, E.H.; Assoc., Inc., Los Angeles, Contract AF 19(604)-6187, Scientific Report No. 1, Oct. 11, 1960. 25 p. 2 figs., 14 refs., eqs. DWB--The analytical results discussed here show the feasibility of radar measurements of electron density and of collision frequency as a function of space and time, and under a variety of ionospheric disturbances. Cross modulation, discussed in some detail, is a technique applicable for extreme electron densities or collision frequencies; its expected usability at lower frequencies is to be checked. --W. N.

D-686 Ringnes, Truls S., Astronomiske begivenheter i 1953. (Astronomical events in 1953.) Naturen, 78(14):418-429, 1954. 10 figs. DLC--The 11 progressive events which HARLOW SHAPLEY (Harvard Observatory) considers significant are summarized and discussed briefly: (1) establishment of the National Astronomical Observatory in the U.S.; (2) construction of the world's largest radio telescope at Jodrell Bank, Eng. (3) electronic enlarger as developed by A. LALLEMAND and M. DUCHESNE (France) and (4) the hypersensitive photometer as developed by W. A. BAUM; (5) Radio astronomic research into the Magellanic Cloud by F. J. KERR and J. V. HINDMAN (Radio-physics Lab., Sydney, Australia). This research shows a turbulent movement around a joint center of gravity at a relative speed of 45 km/sec. The cloud masses of the large and the small clouds contain 10% and 3% water vapor, respectively. The other subjects are: (6) revision of the extra galactic scale of distance; (7) asteroidal light curves; (8) F corona and the zodiacal light; (9) relativistic gas dynamics; (10) Lyman-alpha line in the solar spectrum and (11) new method for determining the electron density in the solar corona as a function of dispersion of radio waves from irregular structure in the uppermost regions. (Met. Abst. 9B-100.)--W. N.

D-687 Rix, H. D., Radio propagation and ionized gases: a survey. Pennsylvania. State Univ. Ionosphere Research Lab., Contract Da-36-061-ORD-577, Scientific Report, No. 123, Pt. A, Sept. 1, 1959. 50 p. 2 + 3 figs., 4 + 11 + 49 refs., 22 eqs. DWB (M10. 535 P415i)--This report surveys electromagnetic wave propagation effects relating to the problem of radio interference encountered during powered flight of large missiles. An expression for the absorption of a radio signal traversing a plasma is developed from the approximate theory of plasma conductivity. Results of more accurate treatments of conductivity theory are introduced by way of comparison. Equations showing the effect of a magnetic field on the signal are also given. Properties of several types of plasma—flames, gaseous discharges and shock waves—are described in terms of methods of measuring electron density, mechanisms of ionization and means of controlling free electron concentration. Specific propagation effects treated include high frequency antenna breakdown and ionospheric effects. A guide to the relevant literature of these various subjects is provided. (Met. Abst. 11.12-482.)--Author's abstract.

D-688 Roberts, C. A. (Douglas Aircraft Co.), Radio frequency radiation from hypersonic plasmas with impressed oscillating electric fields. Planetary and Space Science, N. Y., 6:221-222, June 1961. Abstract only. The paper was presented at the Plasma Sheath Symposium, Boston, Mass., Dec. 7-9, 1959. --

The total (integrated frequency distribution) radiated power from a plasma with an impressed electric field (E cos ωt) is calculated taking into account only the semi-classical Bremsstrahlung due to electron ion encounters. The calculation is made by using the impulse approximation with the lower limit on the impact parameter taken as the de Broglie wavelength of the electron. The electron velocities are then averaged by using the appropriate non-equilibrium velocity distribution. Results are given for various conditions that might be encountered in hypersonic plasmas. The radiation frequency spectrum of the plasma in the radio frequency range for a zero field is then examined by a Fourier analysis of the acceleration using the impulse approximation. In order to determine the validity of the approximation, a comparison is made between the zero field radiation spectrum from an ionized gas calculated by using the impulse approximation with a cutoff at the de Broglie wavelength and the spectrum from the exact (dipole approximation) calculation for low (radio) frequencies. Possible effects on electronic and detection equipment are briefly considered.

D-689 Roberts, C. R.; Kirchner, P. H. and Bray, D. W., Radio reflections from satellite produced ionization. Institute of Radio Engineers, N. Y., Proceedings, 47(6):1156-1157, June 1959. DLC--Using different frequencies, several disturbances of signals from orbitting satellites were observed. Signal characteristics and some speculations as to the causes are given. --W. N.

D-690 Roberts, J. A. (Div. of Radiophysics, C. S. I. R. O. Univ. Grounds, Chippendale, N. S. W.), Evidence of echoes in the solar corona from a new type of radio burst. Australian Journal of Physics, Melbourne, 11(2):215-234, June 1958. 11 figs., 2 plates, 11 refs., eqs. DLC--A new spectral type of solar radio burst is described. The bursts contain two elements, the second being a repetition of the first after a delay of 1½ - 2 sec. In each element the frequency increases with time at a rate of 2-8 Mc/s per sec. The bursts are of very short duration and are confined to the longer meter wavelengths. Occasionally they occur within, and evidently form part of the structure of a burst of spectral type III. It is suggested that the second elements of the bursts are echoes of the first, reflected from lower levels of the solar corona. If the burst radiation is assumed to occur at the second harmonic of the coronal plasma frequency, the delay between the elements can be quantitatively explained providing the coronal density gradient is 1-5 times steeper than in the Baumbach-Allen model. Two alternative explanations of the rising frequency characteristic are considered. Either the exciting disturbances travel in through the corona at speeds between 2 and 5 $\times 10^4$ km sec^{-1}, or the outward travelling disturbances responsible for type III bursts encounter "hills" of electron density in the corona. (Met. Abst. unpub.)--Author's abstract.

D-691 Roberts, J. A. and Stanley, G. F. (both, Calif. Inst. of Tech. Radio Obs., Owens Valley), Radio emission from Jupiter at a wavelength of 31 centimeters. Astronomical Society of the Pacific, San Francisco, Publications, 71(423):485-496, Dec. 1959. 4 figs., 22 refs., 3 eqs. DLC--This is a report of a series of observations at a wavelength of 31 cm and a discussion of their implications. The observations were made with a 90 ft equatorially mounted radio telescope between April 15 and June 17, 1959. The observed intensities are graphically represented. The paper does not arrive at any definite conclusion with respect to the origin of the high intensity decimeter radiation from Jupiter. (Met. Abst. 11L-104.)--I. S.

D-692 Roberts, J. A. (Div. of Radiophysics, C. S. I. R. O., Univ. Grounds, Chippendale, N. S. W.), Solar radio bursts of spectral type II. Australian Journal of Physics, Melbourne, 12(4): 327-356, Dec. 1959. 16 figs., 3 tables, 31 refs. DLC--The characteristics of bursts of spectral type II are studied in a sample of 65 bursts. Approximately half the bursts show harmonic structure and about half are compound type III-type II events. Band splitting, the doubling of both the fundamental and second harmonic bands, is also relatively common. A rather less common feature is the appearance of herring-bone structure in which the slowly drifting band of the type II burst appears to be a source from which rapidly drifting elements diverge toward lower and higher frequencies. Statistics are given of the rate of occurrence of the bursts, their frequency range, the rate of frequency drift, and the harmonic ratio. Many of the type II bursts occurred near or after the maximum of a chromospheric flare. However, only about 3% of flares (of Class I or greater) are accompanied by type II bursts, although the figure rises to 30% for Class 3 flares. There is a greater tendency for the geomagnetic field to be disturbed in the few days following a type II burst than there is after large flares which are not accompanied by type II bursts, or after large radio bursts of spectral type III. Statistically the greatest disturbance occurs after about two days, implying a mean speed of travel of about 1000 km/sec. (Met. Abst. 11.12-57.)--Author's abstract.

D-693 Roberts, Walter Orr (High Altitude Obs., Boulder, Colo.), Solar-terrestrial relationships: weather and communications. Smithsonian Contributions to Astrophysics, Wash., D. C., 1(1):99-101, 1956. DLC--Several aspects of solar influence are discussed and, in particular, the measured and the probable influences upon world-wide weather patterns and ionospheric radio communication. It is suggested that the future practical stakes in short and long range weather forecasting may well surpass the expected gains within radio communication forecasting. (Met. Abst. 9.9-296.)--W. N.

D-694 Rochelle, R. W., Signal-to-noise considerations for a space telemetry system. Institute of Radio Engineers, N. Y., Proceedings, 48(4):691-693, April 1960. 2 figs. (incl. photo), 2 refs., 3 eqs. DLC--A signal-to-noise comparison is given between the pulse frequency channels and the pulse width channels for the FM/PDM-AM telemetry system. It is shown that the pulse frequency channels have either a higher signal-to-noise ratio or greater information rate capability than the pulse width channels. (Met. Abst. 11.12-488.)--Author's abstract.

D-695 Rosen, A.; Coleman, P. J., Jr. and Sonett, C. P. (all, Space Technology Lab., Los Angeles, Calif.), Ionizing radiation detected by Pioneer II. Planetary and Space Science, N. Y., 1(4):343-346, Sept. 1959. 2 figs., 3 refs., eqs. DWB, DLC --The total ionizing component of cosmic radiation was measured up to an altitude of 1550 km. An upper bound to the ratio of average-to-minimum specific ionization was determined by comparing the ionization with the count rate observations from the Explorer IV satellite. This result implied that protons are the predominant species which gave rise to the observed ionization. (Met. Abst. 11.12-206.)--Authors' abstract.

D-696 Ross, W. J., Ionospheric investigation from satellite radio observations Pt. 1, Doppler effect recording instrumentation. Pennsylvania. State Univ. Ionosphere Research Lab., Contract AF 19(604)-4563, Scientific Report No. 120, June 30, 1959. 81 p. 24 figs., eqs., 14 refs. DWB (M10.535 P415i)--A brief survey is made of the main features of satellite transmitters and of the ionospheric propagation effects produced in the radio waves from them. From these considerations, the desirable properties of the transmitter are summarized and the necessary properties of the receiving apparatus are inferred. Detailed descriptions of the various units of the receiving instrumentation are then given, followed by the presentation of a sample record analyzed to yield electron content of the ionosphere. (Met. Abst. 11F-117.)--Author's abstract.

D-697 Ross, W. J. (Pennsylvania State Univ.), The determination of ionospheric electron content from satellite Doppler measurements, Pt. 1, Method of analysis. Journal of Geophysical Research, Wash., D.C., 65(9):2601-2606, Sept. 1960. 5 refs., 10 eqs. Pt. 2, Experimental results, Ibid. p. 2607-2615. 9 figs., 6 refs. DLC--A procedure for determining the ionospheric electron content up to the height of an active satellite from Doppler data is developed. The equations derived from first order theory are discussed and corrected separately for earth curvature, large refraction, off zenith orbit, vertical satellite motion, horizontal ionospheric variations, and the effects of the earth's magnetic field. The methods were developed initially for use with the harmonic radiations from satellite 1958 δ_2 at frequencies of approximately 20 and 40 Mc/s, but may be adapted to other harmonic frequency ranges. In Pt. 2, the preliminary results of the analysis of daytime Doppler frequency records from satellite 1958 δ_2 for the period Sept. 1958 to Dec. 1959 are presented in the form of ionospheric electron content derived using the methods of part 1. Strong seasonal effects are found, the content being lower and the equivalent slab thickness greater in summer than in winter. Magnetic control of the summer ionosphere content is indicated, although the equivalent slab thickness is almost constant. The values of content obtained agree fairly well with the results of independent polarization rotation studies. (Met. Abstract. 11. 12-375.)--Author's abstract.

D-698 Rosseland, Svein and Tandberg-Hanssen, Einar, On some solar disturbances on Aug. 18 and Sept. 24, 1956. Astrophysica Norvegica, Oslo, 5(11):279-287, March 1957. 9 figs. (incl. photos), 2 tables, 3 refs. DWB--The correlation between solar radio bursts and high speed features on the sun has been studied in some detail in two cases observed at Harestua in 1956: (1) during the development of two dark surges on Aug. 18 and (2) during the activation of the limb prominence on Sept. 24. The motion of the prominence material has been analyzed relative to the position of the limiting isodiaphanous surface for the frequency in question, i. e., 200 Mc/s. It is pointed out that the time correlation between the occurrence of the radio bursts and the penetration of prominence material through the isodiaphanous surface is close enough to support the view that the excess radio noise is generated in the moving prominence material. (Met. Abst. 10. 1-243.)--Authors' abstract.

D-699 Rothwell, Pamela and McLlwain, Carl (both, State Univ. of Iowa), Satellite observations of solar cosmic rays. Nature, London, 184(4681):138-140, July 18, 1959. 3 figs., table, 11 refs. DWB--On Aug. 16-17, 23-24, 26-27, 1958, increases in the intensity of charged particles outside the Van Allen radiation zones were detected by Explorer IV satellite 1958 epsilon, at high magnetic latitudes and rather low satellite altitudes (270-650 km). These increases are associated with the large solar flares which are measured from balloons and with riometers during the period. (Met. Abst. 11.5-169.) --N. N.

D-700 Rotman, W. and Meltz, G. (U. S. Air Force, Cambridge Research Laboratories), Experimental investigation of plasma sheath properties of a re-entry vehicle. Planetary and Space Science, N. Y., 6:224, June 1961. Abstract only. The paper was presented at the Plasma Sheath Symposium, Boston, Mass., Dec. 7-9, 1959. --The effects of the plasma sheath, which surrounds a re-entry vehicle, upon the transmission and reception of radio signals will be investigated by means of an instrumented nonablative nose cone to be flown in a re-entry trajectory from Cape Canaveral in the latter part of 1960. The flight profile is such that an altitude of 100 miles and a maximum velocity of 18,000 ft/sec will be reached in a shallow (10-20 degrees) re-entry path. The instrumentation consists of five microwave transmitters, in the L, S, C and X-band frequency ranges, and S and C band receivers. The S and C band units also serve as the radar beacons while telemetry data is transmitted on the X band frequencies. Parameters to be measured include signal attenuation and coherence, pulse deterioration, and plasma noise generation as a function of altitude and velocity. These results will be compared with estimated values from modified isentropic calculations and, also with results from the University of California's hypersonic wind tunnel tests. Subsequent to the flight test detailed nonequilibrium real gas calculations will be programmed to provide an exact theoretical comparison. The radiation patterns of the antennas on the nose cone will be changed in shape by the plasma sheath. This effect is being simulated experimentally by the use of a lossy artificial dielectric which has the same propagation characteristics as the plasma. The realization of an index of refraction of less than unity was achieved in this artificial dielectric by the use of a cubic lattice of closely spaced wires. The loss can be introduced either by loading the wires with lossy elements or by embedding the lattice in a lossy medium. These same techniques can also be used to simulate plasmas in radar reflection and diffraction problems.

D-701 Rudkjøbing, Mogens (Ole Roemer Observ., Univ. of Aarhus), The continuous absorption coefficient of ionized hydrogen at radio wavelengths. Annales d'Astrophysique, Paris, 22(2): 118-122, March/April 1959. 2 tables, 10 refs., 21 eqs. French, English and Russian summaries p. 118. DLC--A general expression for the hydrogen free-free absorption coefficient derived wave mechanically, is shown to agree asymptotically with a formula based on KRAMER's classical results in the limit of long wave lengths and for physical conditions such as those in the solar corona or in dense nebulae. (Met. Abst. 11. 6-148.)--Author's abstract.

D-702 Ryan, W. D. (Queen's Univ., North Ireland) and Harrower, G. A. (Queen's Univ., Kingston, Ontario), An apparent solar periodicity in radio star scintillation. Canadian Journal of Physics, Ottawa, 38(6):883, June 1960. fig., 2 refs. DWB, DLC--The radio sources Cassiopeia A, Cygnus A, Taurus A, and Virgo A were observed at upper culmination from the Radio Observatory of Queen's University, Kingston, Ontario, from the beginning of December 1957 to the end of November 1958. An autocorrelation function was calculated for the scintillation index for Cygnus A. The results of the calculation indicate that solar activity contributes directly to the ionospheric processes responsible for the scintillation of radio stars, at least at locations in or near the auroral zone. (Met. Abst. 11. 12-35.)--I. S.

D-703 Rybner, Jőrgen and Ungstrup, Emil, L'influence de la zone d'aurores boreales sur les liaisons radioelectriques. (Effect of the auroral zone on radio communication.) Annales des Telecommunications, Paris, 12(5):172-173, May 1957. fig., 3 refs. DLC--Studies of high frequency propagation between Denmark and western Greenland are reported. Considering all possible modes of propagation, it is found that the unusually weak field intensities observed may be attributed to D layer absorption in the auroral zone. (Met. Abst. 9. 5-278.) --G. T.

D-704 Rydbeck, Olof E., Chalmers solar eclipse ionospheric expedition 1945 (with experimental results and theoretical investigations of the eclipse effects). Gőteborg, Sweden. Chalmers Tekniska Hőgskola, Handlingar, No. 53, 1946. 42 p. 23 figs., tables, 17 refs., 53 eqs. DLC--Automatic and semiautomatic multi frequency equipment was used. The results discussed show that frequent disturbance of the upper atmosphere and abnormal low layer absorption were quite common; abnormal E layer reflections appeared almost daily. Ionizing radiation cannot be neglected. Positive proof for the theory that ultraviolet light from the sun is the primary ionizing force of the E and F1 layers was found. The F2 eclipse effect is more complex than assumed and a geomagnetic control of the eclipse effect is suggested. Simple formulas for calculation of E and F minimum solar eclipse electron densities were obtained. --W. N.

D-705 Ryle, Martin and Hewish, A., The effects of the terrestrial ionosphere on the radio waves from discrete sources in the galaxy. Royal Astronomical Society, Monthly Notices, 110 (4):381-394, 1950. 3 figs., 14 refs. Summary in its Geophysical Supplement, 6(2):138, Oct. 1950. DWB--Observations of the discrete sources of radio waves in the galaxy have shown the existence of irregular refraction processes in the terrestrial ionosphere. These irregularities cause rapid fluctuations in the intensity of the radiation at the ground, while observations with aerials of high resolving power have shown, in addition, that the apparent position of a source may vary irregularly by 2-3 minutes of arc. The incidence of these irregularities shows a marked diurnal variation having a maximum at about 01 h 00 m local time. It does not seem possible to account for the irregularities in the ionosphere in terms of solar emissions and an alternative mechanism is proposed, based on interception of interstellar matter moving under the gravitational attraction of the sun. Further experiments may provide information of interest in theories of the accretion of matter by the sun. (Met. Abst. 5.11-221.)--Authors' abstract.

D-706 Ryle, M. (Cavendish Lab., Cambridge, England), Radio astronomy. Reports on Progress in Physics, 13:184-246, 1950. 18 figs., refs. DLC. Translated from Russian in Uspekhi Fizicheskikh Nauk, Moscow, 46(4):508-588, April 1952. 18 figs., bibliog. p. 586-588. DLC--Experimental methods are described; then the results of observations of galactic and solar radiation are presented. Theories covering these observations are put forward, the aim being a connected treatment. Particular emphasis is placed on the experimental and theoretical work, carried out since the war, at the Cavendish Laboratory. (Met. Abst. 9A-158.)--Physics Abstracts, No. 23, 1951.

D-707 Ryle, M. and Ratcliffe, J. A., Radio astronomy. Endeavour, 11(43):117-125, July 1952. 10 figs. DLC--An analytical study of the radiation from radio stars (outer space) which is characterized by the similarity to irregular e. m. f. (radio noise). No relation between bright radio stars and visible stars is found. The radio emission from an average radio star is found to be at least 10^{18} times as great as that from the undisturbed sun. A theory of solar radiation is discussed. A model chromosphere is presented and a map showing location of radio stars in the Northern Hemisphere is given. (Met. Abst. 9A-21.)--W. N.

D-708 Ryle, M. (Cavendish Laboratory, Cambridge), Radio investigations of the structure of the solar corona. (In: Solar eclipses and the ionosphere: a symposium... ed. by W. J. G. Beynon and G. M. Brown. London, Pergamon, 1956. p. 246-252. 4 figs.) DWB--Observations of the solar emission at meter wavelengths may be used to derive information on the distribution of electron density and temperature in the undisturbed solar corona. It is necessary to determine at each of several wavelengths not only the total intensity but also the distribution of "radio brightness" across the solar disk. These measurements have been made by observations of the variation of intensity during an eclipse, and more extensively by using interferometric methods to provide a sufficiently high resolving power. Using the results of such observations preliminary models of the solar corona have been derived. An entirely different method of observation has been used to study the outermost layers of the solar envelope. In this method, observations are made of a radio star at different angular distances from the sun. The results show that as this angle decreases the apparent singular size of the radio star increases, due to scattering by irregularities in the electron density. It has been possible to detect this effect out to distance of 20 R_o, and important deductions about the electron density in this region can be made. (Met. Abst. 9B-156.)--Author's abstract.

D-709 Ryle, M. (Cavendish Laboratory), Die Entdeckung von Radiosternen. (Discovery of radio stars.) Naturwissenschaftliche Rundschau, Stuttgart, 14(4):133-136, April 1961. 6 figs. DWB, DLC--Radio stars were first discovered by J. S. Herg in 1948 with the aid of a 5 m radar; directed toward gaseous clouds in constellation Cygnus. By means of an interferometric radio telescope, whose operation is described with the aid of a diagram, it was shown that the radiation source in Cygnus had a surface brightness several thousand times greater than the brightness of the galactic system. By means of precise observations made by F. G. Smith in Australia (1950) it was possible to determine exact positions with an accuracy of 1 x 1/4 arc minutes, and by means of the 200 inch Palmar telescope Boade and Minkawaki (1951) established the fact that the radio source in the constellation Cassiopeia was the remains of a super nova. The radio source in Cygnus was an extragalactic cloud about 500, 000, 000 light years away. A comparison of observations of neighboring galactic systems with those at varying distances, such as those provided by radar observations of extragalactic systems, enables a determination of the state of the cosmos at different times. From sufficient observations of radio stars it would be possible to determine whether the universe originated some 10 billion years ago or whether it is a permanently invariable universe.

Out of 500 accurately recorded positions of radio stars only 27 could be perceived optically. Eight of these are within our own galactic system and are remainders of super novae. Eleven belong to neighboring galaxies, a few of which possess a million fold emission capacity; some of these are double sources and may be instances of collision of two galaxies. Most of the radio stars belong to powerful and distant extragalactic sources. --I. L. D.

D-710 Sadler, D. H., The place of astronomy in navigation. Institute of Navigation, London, Journal, 9(1):1-10, Jan. 1956. 5 figs. DWB--Recent applications of astronomy to navigation include the Pfund sky compass, which uses the polarization of light by the atmosphere to indicate the position of the sun when obscured by clouds or below the horizon, and radio-astronomy. Waves from about 1 cm to 30 m are received from the sun. Radio sextants of practicable size using wavelengths of 1. 9 cm and 8. 7 mm are illustrated. Lunar tracking has been accomplished experimentally. Vertical reference is possible by 3 Geiger counters receiving cosmic rays. These projects will be aided by the International Geophysical Year. (Met. Abst. 7. 7-21.)--C. E. P. B.

D-711 Saha, A. K.; Ray, S.; Datta, S. et al., Ionospheric observations during the solar eclipse of June 20, 1955. Science and Culture, Calcutta, 21(8):475-477, Feb. 1956. 4 figs., 2 refs. DLC--Ionospheric records made at the Ionosphere Field Station at Haringhata (22. 9°N, 88. 5°E; Geomagnetic latitude 12. 5°N, 28 miles NE of Calcutta) where the eclipse of June 20, 1955 was 0. 67 total and the duration 2½ hours, are discussed with respect to E, Sporadic E, F1 and F2 layer variations. E region ionization dropped to 35% of average of control days (1 month on either side of eclipse), about 30 min before eclipse maximum. Maximum drop could not be recorded because of Es ionization. No change in fEs values could be detected. F1 layer showed a drop to 20% of control day, 8 minutes after maximum observation at ground. F2 ionization was higher than average before eclipse, started to drop 1½ hours before eclipse, dropped by ca. 31% 20 minutes after eclipse maximum at ground, and took 3½ hours to recover. Theory involves solar particles 1500-2000 km/sec. (Met. Abst. 8. 5-183.)--M. R.

D-712 Sarada, K. A. (Nat. Physical Lab., New Delhi, India), Sudden cosmic noise absorption associated with the solar event of March 23, 1958. Journal of Atmospheric and Terrestrial Physics, London, 13(1/2):192-194, Dec. 1958. 3 figs., table, 2 refs., 3 eqs. DLC--A large absorption effect (SCA) was observed in the records of cosmic radio noise at 30 Mc/s obtained at the National Physical Laboratory, New Delhi, on

March 23, 1958. Unusual features of this effect were: indication of an excess absorption some thirty-five times the normal value and a residual radiation attributable to the thermal radiation of the lower ionosphere. It is possible that a substantial portion of attenuation was caused by processes other than collisional absorption. (Met. Abst. 12.6-161.) --O.T.

D-713 Scheffler, H. (Potsdam), Zur Berücksichtigung der Mehrfachstreuung in der Theorie der Szintillation optischer und radiofrequenter Strahlung. (Consideration of multiple scattering in the scintillation theory of optical and radio frequency radiation.) Astronomische Nachrichten, Berlin, 284(1): 21-23, July 1957. 12 refs., 7 eqs. DLC--Connections between recent theories of ELLISON, OBUKHOV, KELLER, FEJER and the author on the scattering of electromagnetic waves in a medium with statistically distributed refractive index variations are discussed in regard to the consideration of multiple scattering. (Met. Abst. 12.1-105.)--Transl. of author's abstract.

D-714 Schiffmacher, E. R., Investigation of solar radio frequency at USAF Upper Air Research Observatory, Sunspot, New Mexico. Cornell Univ. School of Electrical Engineering, Contract AF 19(604)-73, Final report; Research Report EE 299, July 1, 1956. 24 p. photo.--Radio Observatory at Sacramento Peak, New Mexico, and antennas for 3 wavelengths of radiation are shown in photograph. Work from 1948-1955 under 2 contracts are reviewed and summaries given for 12 reports or papers issued under these contracts. Optical effects observed in vicinity were compared with enhanced radio frequency radiations from sun. Radio astronomy technical reports and bibliographies prepared at Ithica, N.Y., in connection with theoretical work and analysis of observations, are also summarized. It was found that 200 Mc/sec was the most useful frequency for solar radio observations. (Met. Abst. 9A-133.)--M.R.

D-715 Schilling, G.F. and Fergusson, E.S. (both, Astrophysical Obs., Smithsonian Inst.), Soviet orbit predictions and orbital information for U.S.S.R. satellites 1957 Alpha one, Alpha two and Beta. Smithsonian Institution. Astrophysical Observatory, IGY Project No. 30.10, Special Report, No. 5, Dec. 4, 1957. 51 p. mostly tables. 4 refs. Also issued in "edited form" as Smithsonian Contributions to Astrophysics, Wash, D.C., 2(10):219-244, 1958. DWB, DLC--The Soviet predictions on positions and times of passage overhead of U.S.S.R. satellites (1957): Alpha one (carrier rocket), Alpha 2 (Sputnik) launched Oct. 4, 1957, and Beta, the instrumented rocket launched Nov. 3, 1957, as issued from Oct. 23, 1957 to

Dec. 6, 1957 in Soviet newspapers and radio broadcasts. Other technical information released during this period is appended and results tabulated. (Met. Abst. 10.5-112.)--M. R.

D-716 Schindelhauer, F., Über die Richtung atmosphärischer Störungen. (Direction of sferics.) Jahrbuch der Drahtlosen Telegraphie und Telephonie, 22(4):163-167, Oct. 1923. fig., ref., eqs. DLC--Observations conducted at the Potsdam Observatory in March 1922 by means of a rotary frame operating within 21,000 m wavelength, showed that the NS direction of sferics was remarkably constant and independent of the weather conditions. The diurnal variation observed indicated solar relation. Direction during night hours showed no distinct trend. The maximum intensity was at 18 h with minimum at 8 h. (Met. Abst. 4K-27.)--W. N.

D-717 Schmelovsky, Karl Heinz; Klinker, Ludwig and Knuth, Robert (all, Obs. for Ionosphere Research, Kühlungsborn), Über die Elektronenkonzentration in der ausseren Ionosphäre nach Untersuchungen des Faraday-Fadings am Satelliten 1958 δ_2. (Electron concentration in the upper atmosphere from investigations of the Faraday-fading of 1958 δ_2 satellite.) Beiträge zur Geophysik, Leipzig, 68(6):321-341, 1959. 10 figs., table, 10 refs., 13 eqs. German and English summaries p. 321. DWB, DLC--Methods for evaluating the Faraday fading of satellite signals are derived from the APPLETON-HARTREE formula. Reliable values for the total electron number can only be obtained by an iterative approximation based on a sufficient number of observations. A height-electron-density distribution for the region between the F2 layer and 1200 km is determined from 135 observations during the summer 1958. Between 500 to 900 km there is a decrease in electron density with exp $(-aH)$; $a = 2.5 \times 10^{-3}$ km^{-1}. The total electron content up to 1200 km is 3.6×10^{17} m^{-2}; about 70% of this amount belong to the region above F2 layer maximum. About 2/3 of the diurnal variation in total electron number is produced below the F2 layer maximum. During magnetic and ionospheric disturbances there is a decrease of total electron number. (Met. Abst. 11.12-376.)--Authors' abstract

D-718 Schmidt, H., Planetarische Radiostrahlung. (Radio emission from planets.) Die Sterne, Leipzig, 36(3/4):81-83, March/April 1960. DLC--In agreement with the 101st session of the American Astronomical Society a symposium was organized in December 1958 at Gainesville. The author shows the observations made in the field of radio astronomy by K.L. FRANKLIN, B. BWIKE, H. TATEL, T. D. CARR and others. From the results of various research works the conclusion was reached that besides the sun, only Jupiter may be considered as a radio source; Venus, Saturn and the comets need a more developed research. The author gives some results of measurements: (Venus) by MEYER—3.15 cm and 3.4 cm wave; (Jupiter) by MACCLAIN and SLOANAKER —10.3 cm. Observations of Saturn in 1958 have been without results. (Met. Abst. 11.12-63.)--A. V.

D-719 Schwentek, Heinrich, Bestimmung eines Kennwertes für die Absorption der Ionosphäre aus einer automatische-statistischen Analyse von Feldstärkeregistrierungen. (Determination of an ionospheric absorption coefficient by means of automatic-statistical analysis of field strength recordings.) Archiv der Elektrischen Übertragung, Stuttgart, 12(7):301-308, July 1958. 11 figs., 15 refs., 14 eqs. DLC--A simple method is described by which the nondeviative absorption of the ionosphere can be determined continuously by field strength measurements at oblique incidence. The conditions of a suitable transmission path are discussed. An analysis of the field strength frequency distribution measured by a statistical counter renders possible the separation of the main transmission paths from each other. Thus absorption values for hourly intervals can be determined immediately. For this purpose the absorption values are reduced to vertical incidence. Furthermore the state of the ionosphere may be derived from the distributions. Thus the mean reflection coefficient of the Es layer at night as well as its frequency are immediately obtained. For the delayed diurnal variation of absorption dependent on the sun's zenith angle a simple formula is suggested. (Met. Abst. 11E-138.)--Author's abstract.

D-720 Scott, James C. W. (Radio Phy. Lab., Def. Res. Bd., Ottawa), The solar control of the E and F 1 layers at high latitudes. Journal of Geophysical Research, 57(3):369-386, Sept. 1952. 19 figs., 3 refs. DWB--The monthly mean critical frequencies of the E and F1 layers at high latitudes are shown to vary diurnally with solar angle according to a modified Chapman law. The seasonal, latitude, and solar cycle dependence of the E layer sensitivity to solar angle and the sub-solar frequency are measured. In the auroral zone, the sensibility of the E layer to solar angle is shown to be very low, but to the north of the zone it is found to have the theoretical Chapman value. (Met. Abst. 6D-136.)--Author's abstract.

D-721 Seddon, J. Carl (U.S. Naval Res. Lab., Wash., D.C.), Propagation measurements in the ionosphere with the aid of rockets. Journal of Geophysical Research, Wash., D.C., 58(3): 323-335, Sept. 1953. 10 figs., 7 refs., 11 eqs. DWB--Daytime measurements of electron density, ion density, electron collision frequency, and earth's magnetic field in the ionosphere were made during V-2 rocket flights at the White Sands Proving Ground, New Mexico. Two CW harmonically related frequencies were radiated from the rocket to two ground stations to obtain measurements of the ordinary and extraordinary indices of refraction in the region around the rocket. The results for one flight show an ion layer with a maximum of 5 X 10^8 ions/cc and a small electron layer with a maximum of 7500 el/cc just below the E1 layer. On a September day the F1 layer remained dense up to the E2 layer, while on a January day the density apparently decreased above the F1 layer maximum to much lower values. It is shown that the Lorentz polarization term should not be used in the E layer at 4 Mc. (Met. Abst. 6.1-62.)--Author's abstract.

D-722 Seddon, J.C. (Naval Res. Lab., Wash., 25, D.C.), Propagation measurements in the ionosphere with the aid of rockets. (In: Boyd, R.L.F.; Seaton, M.J. and Massey, H.S.W.(eds.), Rocket exploration of the upper atmosphere. London, Pergamon, 1954. p. 214-222. 10 figs., 5 refs.) DWB--The upper atmosphere has been measured by the Naval Research Laboratory since 1946. Earlier methods used for measuring electron densities and the basic experiments performed are discussed. In 1949 it was observed that the electron density did not drop much above the E1 layer maximum. This caused the vertical heights of reflection to be far greater than the actual height of the reflection. A method of determining the harmonic frequency system is described and is considered the best means of probing the secrets of the ionosphere when used with high altitude vehicles such as the V-2 rockets. (Met. Abst. 11E-141.)--N.N.

D-723 Seddon, J.C., Rocket investigations of the ionosphere by radio propagation method. U.S. Naval Research Laboratory, Upper Atmosphere Research Report, No. 22; NRL Report 4304, March 1, 1954. 37 p. figs., tables, 9 refs., eqs. DWB--Daytime measurements of electron density, ion density, electron collision frequency, mean molecular cross section, and earth's magnetic field during V-2 rocket flights at the White Sands Proving Ground, New Mexico, were obtained on March 7, 1947, Jan. 22, 1948, and Sept. 29, 1949. In each case a 4.274 Mc signal and its 6th harmonic were radiated from the rocket to receiving stations on the ground to obtain measurements of the ordinary and extraordinary indices of refraction of the region around the rocket. The results of one flight show an ion layer with a maximum of 5 X 10^8 ions/cc and a small electron layer with a maximum of 7500 el/cc just below the E1 layer. On a September day the E1 layer remained dense up to the E2 layer, while on a January day the density apparently decreased above the E1 layer maximum to much lower values. It is shown that the Lorentz polarization term should not be used in E layer computations at 4 Mc. A detailed explanation of the data analysis methods is included in the appendixes. Extensive calculations using the general Appleton-Hartree formula have been made at 4.274 Mc and some of the results are shown for various collision frequencies, using the value of the magnetic field at 100 km above the White Sands Proving Ground, New Mexico. (Met. Abst. 6D-265.)--Author's abstract.

D-724 Seddon, J.C. (Rocket Sonde Branch, U.S. Naval Res. Lab.), High electron density gradients in the ionosphere as observed with rockets. AGARDograph, Paris, No. 34:171-181, Sept. 1958. 5 figs., 2 tables, 7 refs. DWB (629.1323 N864a)--Many daytime measurements of electron density profiles with rockets have been made during the condition known as "sporadic E". In all cases, it was found to be a high electron density gradient region covering in general a radius in excess of 50 km. Gradients as large as 10^6 el/cc per km have been observed. Various characteristics of sporadic E, such as horizontal variability, thickness, and maximum electron densities are briefly discussed. Evidence of many other large electron density gradients between 66 and 200 km is presented. One such gradient is always found to be present near the mesopause. The others are variable in occurrence and altitude, except for a strong tendency for E region gradients to occur at particular altitudes separated by about one scale height. One night flight at Fort Churchill, Manitoba, Canada is discussed where two sporadic E regions existed. One of these, at 98 km, had a characteristic never before observed, of the large gradient being on top side. Evidence is presented that shows that a spread F condition existed above 190 km and that it probably consisted of many irregular, turbulent high gradient regions. (Met. Abst. 11D-128.)--Author's abstract.

D-725 Seddon, J.C. and Jackson, J.E., Rocket studies of the Arctic ionosphere. American Geophysical Union, Transactions, 40(1):63-65, March 1959. DWB--Three rocket flights furnished strong evidence that a polar blackout is due to an abnormal number of free electrons in the D region of the ionosphere, and that moving electric charges play an important role in this phenomenon. The polar blackout seems to involve little change in the E and F regions of the daytime ionosphere. The daytime electron density in this region of the ionosphere is similar to that in lower latitudes. The electron collision frequency with neutral particles may be 1/3 or 1/4 that previously estimated. Radio wave absorption in the Arctic ionosphere varies from extremely high to extremely low values. (Met. Abst. 11.12-362.)--E.Z.S.

D-726 Seddon, J. C. (Nat'l. Aeronautics and Space Admin.), Rocket observations of high electron density gradients in the ionosphere. American Geophysical Union, Transactions, 41(1):113-118, March 1960. 4 figs., 2 tables. DWB, DLC--A discussion of high electron density gradients and their significance in terms of ionospheric conditions. For the purpose the U.S. Naval Research Laboratory launched a number of rockets at White Sands, New Mexico and Fort Churchill, Canada. In all ionospheric regions penetrated by the rockets, high electron density gradients were found. In the D region a high gradient was almost always present near the mesopause. In the E region a slightly above high gradients were associated with sporadic E at various levels. They appeared related to the distribution of spread F in the F region. (Met. Abst. 11.12-363.)--I. S.

D-727 Seddon, J. C. (Goddard Space Flight Center), Summary of rocket and satellite observations related to the ionosphere. U. S. National Aeronautics and Space Administration, Technical Note D-667, Jan. 1961. 22 p. 5 figs., 114 refs., 5 eqs. Also issued as: National Research Council, Wash., D. C., Publication No. 880:233-249, 1961. DWB, DLC--New knowledge relating to the earth's ionosphere in the past 3 yrs by rocket and satellite methods is reviewed. Measurements of electron densities up to and above the F2 maximum, columnar electron densities, electron density gradients, sporadic E, and spread F are discussed. Other parameters important to the formation of the ionosphere are also briefly discussed. An extensive bibliography on these subjects are given. --NASA Abst. TN D-667.

D-728 Seddon, J. C. and Jackson, J. E. (both, U. S. A.), Summary of progress made in ionospheric research using rockets and satellites during the IGY. (In: International Scientific Radio Union. IGY Committee, Some ionospheric results obtained during the IGY. Amsterdam, Elsevier, 1961. p. 388-390.) DWB, DLC--An unusual large number of free electrons in the D region responsible for polar blackouts by absorbing radio waves in the broadcast range was recorded by Aerobee-Hi rockets. This exceptionally high ionization of the D region provided unique conditions for the measurements of the electron collision frequencies with neutral particles. Rocket results at sunspot maximum indicated an electron density gradient of 10^4 electrons/cc/km in the E and F2 regions. The Russian rocket and satellite data showed high electron density at 1000 km and their data projected to higher altitudes concur with whistler measurements in U. S. (Met. Abst. unpub.)--S. N.

D-729 Sen Gupta, Prabhat K. and Mitra, S. N., Corpuscular eclipse in the F2 layer and its association with solar flares and M regions. Nature, London, 173(4409):814-816, May 1, 1954. fig., 20 refs. DWB--Eclipse of a solar corpuscular stream about 2 hrs before optical eclipse shows that fast corpuscles have velocities about 1600 km/s, but fade outs are rarely connected with solar flares. M storms may be due to corpuscles taking 1-3 days to reach earth according to intensity. S. N. MITRA found two corpuscular eclipses 2½ and 5 hrs before optical eclipse of Feb. 25, 1952, indicating speeds of 1300 and 640 km/s. Magnetic and ionospheric disturbances on Feb. 23-25 are attributed to corpuscular streams associated with M regions. (Met. Abst. 5.8-99.)--C. E. P. B.

D-730 Sedra, R. N. and Hazzaa, I. B. (both, Faculty of Science, Cairo Univ., Giza, Egypt), Effect of radiation from solar flares on the ionosphere and the earth's magnetic field. Physical Review, N. Y., 99(4):1070-1072, Aug. 15, 1955. 3 figs., table, 5 refs., 5 eqs. Also: Agy, Vaughn, Ionospheric effects produced by solar flare radiation. Ibid., 102(3):917, May 1, 1957. 3 refs. DLC--Variation in the earth's magnetic field and the corresponding variations in the ionic density of the F1 layer due to solar flares are recorded. The value of the intensity of ultraviolet radiation before it enters the atmosphere is obtained. The constant relating the ionic density and the accompanying magnetic variation is also estimated. AGY pointed out that UV radiation from solar flares does not produce changes in ion density of E and F1 layers but rather at < 100 km. Other deficiencies are noted. (Met. Abst. 8.10-132.)--Authors' abstract, M. R.

D-731 Seeger, Charles L. (Cornell Univ.), Observations of the variable 205 Mc radiation of Cygnus A. Cornell Univ. School of Electrical Engineering, Contract N6onr-264, T. O. 6, NR 077-321, Radio Astronomy Report, No. 8, Oct. 1, 1950. 33 p. 5 tables, 10 figs., 8 refs. DWB--The first evidence of any large variation in the 205 Mc galactic radio frequency from the Cygnus region, was obtained on the night of Oct. 18, 1949. Results for some 200 nightly observations of two to ten hours duration, contradict the results as obtained by BOLTON and STANLEY insofar as the variation of intensity of radiation is concerned. The chief cause of variation in the flux of the incoming radiation from outer space seems to be traceable to scattering by random inhomogeneities in the earth's atmosphere (ionosphere). (Met. Abst. 9A-12.)--W. N.

D-732 Seeger, C. L.; Stumpers, F. L. H. M. and Hurck, N. van, A 75 cm receiver for radio astronomy and some observational results. Philips Technical Review, Eindhoven, Netherlands, 21(11):317-333, Sept. 27, 1960. 18 figs., 16 refs., 5 eqs. DLC (TK1. P5)--Description of a simple, stable, and sensitive receiver for the frequency range from 200 to 500 Mc/s (150 to 60 cm) possessing a very low noise factor which makes possible accurate observations of the very weak radio waves received from estraterrestrial sources. The receiver operates on the superheterodyne principle, with an intermediate frequency of 50 Mc/s. Various radio astronomical observations are described that have been made with this receiver, particularly in conjunction with the 25 m parabolic reflector of the radio observatory at Dwingeloo. The isophot chart of the sky drawn from the observations made with this radio telescope, and reproduced in this article, provides the most detailed information at present available on the structure of our Galaxy, measured at 400 Mc/s. The article is well issultrated. --E. Z. S.

D-733 Sen, Hari K. (U. S. Nat'l. Bureau of Standards, Wash., D. C.), Space charge wave amplification in a shock front and the fine structure of solar radio noise. Australian Journal of Physics, Melbourne, 7(1):30-35, March 1954. 2 figs., 11 refs., 6 eqs. DWB--The Mott-Smith (1951) interpolation method gives a non-Maxwellian velocity distribution for the particles in a shock front. The dispersion equation corresponding to the non-Maxwellian distribution is derived by VLASOV's (1945) formula. The roots of the dispersion equation indicate frequency bandwidths of space charge wave amplification that decrease with the shock strength. It is suggested, in agreement with DENISSE and ROCARD (1951), that the storm bursts of narrow bandwidth originating in shock fronts constitute the elementary fine structure components of solar radio noise bursts. (Met. Abst. 9A-63.)--Author's abstract.

D-734 Sen, S. N., Total solar eclipse of Feb. 1952. Science and Culture, Calcutta, 18(1):22-25, July 1952. 4 figs., map. DWB--Brief report on observation of the solar eclipse in Feb. 1952 conducted at Khartoum, Sudan, by about 60 scientists belonging to 17 separate expeditions from Europe and the U. S. Results obtained in solar radio noise and chromospheric temperature measurement, in studying the corona and in geodetical observation are summed up. Photographs showing equipment used by U. S. scientists are reproduced from various American journals. Achievements of French amateur astronomers are mentioned. (Met. Abst. 4. 5-250.)--G. T.

D-735 Sengupta, Dipak L. (Univ. Michigan), Electrical conductivity of a partially ionized gas. Institute of Radio Engineers, N. Y., Proceedings, 49(12):1872-1876, Dec. 1961. 8 refs., 39 eqs. DLC--The electrical conductivity of a low density and partially ionized gas where both electron-neutral particle and Coulomb type collisions play important roles is discussed. The effects of inelastic collisions and a steady magnetic field are not considered. We assume that the ionized gas is perturbed by a weak electric field, and obtain the velocity distribution function for the electrons by solving the Boltzmann equation; the collision between neutral and charged particles is accounted for by the hard sphere model for the particles, while the collision between the charge particles is taken care of by the Fokker-Planck terms. Explicit expressions for ac and dc conductivity are given for various cases. To the extent that the assumptions made for the collision models are valid, the expressions for conductivity given here are quite general and can be used for any degree of ionization. (Met. Abst. unpub.)--Author's abstract.

D-736 Senior, T. B. A. and Siegel, K. M. (both, Univ. of Michigan, Ann Arbor, Mich.), Radar reflection characteristics of the moon. (In: Paris Symposium on Radio Astronomy, July-Aug. 1958, (Proceedings), pub. Stanford Univ. Press, 1959. p. 29-46. 3 figs., 13 refs., 9 eqs. DLC--This paper presents a theory based on the concept of a "quasi-smooth" scattering mechanism. The theory was developed from a study of many sets of experimental data and it is thought that the pulse shape and power returns can be satisfactorily explained on this basis, as can their polarization dependence. Some of the results explained can be applied to the design of communication systems that employ scattering from the moon. The moon can be used as a parasitic antenna to provide communication between widely separated points on the earth's surface. This aspect is briefly discussed and reasons for advocating the use of the 3 cm band for this purpose are given. The relevant parameters of such a system is presented. --E. Z. S.

D-737 Senior, T. B. A. and Siegel, K. M. (Univ. Michigan), A theory of radar scattering by the moon. U. S. National Bureau of Standards, Journal of Research, Sec. D, (Radio Propagation), 64(3): 217-229, May/June 1960. 5 figs., table, 25 refs., 17 eqs. DLC, DWB--A theory is described in which the moon is regarded as a "quasi-smooth" scatterer at radar frequencies. A scattered pulse is then composed of a number of individual returns each of which is provided by a single scattering area. In this manner it is possible to account for all major features of the pulse, and the evidence in favor of the theory is presented. From a study of the measured power received at different frequencies, it is shown that the scattering area nearest to the earth is the source of a specular return, and it is then possible to obtain information about the material of which the area is composed. The electromagnetic constants are derived and their significance discussed. (Met. Abst. unpub.)--Authors' abstract.

D-738 Setty, C. S. G. K. (Dept. Physics, Cent. Coll., Bangalore), Eclipse effects on the F1 layer observed at Cambridge on June 30, 1954. Journal of Atmospheric and Terrestrial Physics, London, 19(2):95-101, Oct. 1960. 2 figs., 2 tables, 4 refs., 4 eqs. DLC--A study is made of the solar eclipse effects on the F1 layer, observed at Cambridge on June 30, 1954, using the critical frequency data following the method developed by C. M. MINNIS. The h'(F) records were made during the period June 26 to July 5, 1954 using a panoramic ionosphere recorder. Only a lower limit can be set for X the recombination coefficient in the F1 layer and a value of 8×10^{-9} is not unsuitable. The major part of the radiation causing the F1 layer ionization is almost uniformly distributed over the entire visible disc of the sun, except for some west limb brightening to explain a discontinuity in the eclipse variation of the critical frequency, a source of radiation 10% of the whole will have to be assumed to lie beyond the visible disc of the sun. (Met. Abst. 12.4-108.)--Author's abstract.

D-739 Shain, C. A., Galactic radiation at 18.3 Mc/s. Australian Journal of Scientific Research, Ser. A, Physical Sciences, 4(3):258-267, Sept. 1951. 7 figs., 15 refs., 2 eqs. MH-BH --Observations are described of galactic radiation at a frequency of 18.3 Mc/s over a zone of the sky centered on declination -34°. The results, expressed as equivalent temperatures, are compared with the distribution of intensity at 100 Mc/s. It is found that the temperatures are consistently much higher at 18.3 Mc/s than at 100 Mc/s but the observed ratio of maximum to minimum at 18.3 Mc/s is less than would have been obtained at 100 Mc/s using an aerial with the same directional diagram. The observations are consistent with the hypothesis that contours of equal equivalent temperature over the sky are of similar shape on the two frequencies. Peaks in the intensity distribution are observed which appear to be due to discrete sources. The observations give information concerning the attenuation of radiation passing through the ionosphere. It is found that F region absorption is higher near the critical frequency than expected, and that E region absorption is lower than expected. It is found that the collision frequency at the height of maximum ionization of the E region is not greater than 10^4 sec^{-1}, and is probably less. For the equipment used, the limit of sensitivity for the reception of radio signals was generally set by galactic noise. (Met. Abst. 4.9-112.)--Author's abstract.

D-740 Shain, C. A. and Higgins, C. S., Observations of the general background and discrete sources of 18.3 Mc/s cosmic noise. Australian Journal of Physics, 7(1):130-149, March 1954. 11 figs., 2 tables, 12 refs. DLC--A survey of a broad strip of the sky, centered on Dec. $-32°$, has been made at a frequency of 18.3 Mc/s using an aerial with an overall beam width to a half power of 17°. Previous results concerning the background distribution of brightness have been confirmed and 37 discrete sources have been detected. The distribution of these sources shows some galactic concentration; it becomes homogeneous if sources within 18° of the galactic plane are excluded. From observations of source scintillations, it is concluded that some of the discrete sources have angular sizes of the order of 1°. No correlation was found between the occurrence of scintillations and published ionospheric data, but the observations are consistent with an origin of the scintillations in irregularities, of dimensions about 4 km, at a height of about 500 km. (Met. Abst. 9A-65.)--Authors' abstract.

D-741 Shain, C. A. and Mitra, A. P., Effects of solar flares on the absorption of 18.3 Mc/s cosmic noise. Journal of Atmospheric and Terrestrial Physics, 5(5-6):316-328, Nov. 1954. 7 figs., 3 tables, 10 refs. DWB--Observations of abnormal ionospheric absorption in New South Wales showed sudden increases coinciding with SID's and solar flares. "An increase of 1 db in absorption on 18.3 Mc/s radiation passing once through the ionosphere is probably associated with a sudden phase anomaly of size about 200° at 16 kc/s. Such a relationship is incompatible with a D region of the simple Chapman type or one of the 'exhaustion region' type. About 30 hrs after certain solar flares of Class 3 the absorption of cosmic noise increased, the increase lasting for periods of the order of 10 hrs. Magnetic storms did not follow until some time later, and at the time of the abnormally high attenuation there were no outstanding peculiarities in magnetic records. It is uncertain whether the excess attenuation occurs within the ionosphere or well away from the earth." (Met. Abst. 9A-64.)--From authors' abstract.

D-742 Shain, C. A., Location on Jupiter of a source of radio noise. Nature, London, 176(4487):836-837, Oct. 29, 1955. 2 figs., 2 refs. DWB--Radio noise on 18.3 Mc/s on Jupiter is traced to a disturbance at the boundary between the South Temperate Zone and the South Temperate Belt, possibly originating in electrical discharges. (Met. Abst. 9A-92.)--C. E. P. B.

D-743 Shain, C. A., Changes in the absorption of cosmic noise observed during two ionospheric disturbances. Journal of Atmospheric and Terrestrial Physics, 7(6):347-348, Dec. 1955. fig., 3 refs. DWB--Observed total absorption at Hornsby (34°S, 151°E) compares with foF2 at Brisbane and Canberra on Aug. 19-21 and Nov. 23-25, 1950. (Met. Abst. 11E-145.)--C. E. P. B.

D-744 Shain, C. A. (Div. of Radiophysics, C. S. I. R. O., Univ. Grounds, Sydney), 18. 3 Mc/s radiation from Jupiter. Australian Journal of Physics, Melbourne, 9(1):61-73, March 1956. 7 figs., 7 refs. DLC--BURKE and FRANKLIN's discovery of radio emission from Jupiter has been confirmed. Examination of old records has shown that in 1950-51 the radiation came in groups of bursts of very high intensity. Bursts have duration of the order of a minute or less; groups of an hour. Because of the remarkably close relation between active periods and the period of rotation of Jupiter, it is inferred that the source at the time was very localized. Its identification with a visual disturbance in the South Temperate Belt is very probable. It is pointed out that occultation by Jupiter's satellites may help to locate the sources of radiation, both in position and in height relative to the visible surface, and that Jupiter radiation should be a valuable tool for studying the outer regions of the solar corona. (Met. Abst. 9A-172.)--Author's abstract.

D-745 Shain, C. A. and Higgins, C. S. (both, Div. of Radiophysics, C. S. I. R. O., Univ. Grounds, Chippendale, N. S. W.), Location of the sources of 19 Mc/s solar bursts. Australian Journal of Physics, Melbourne, 12(4):357-368, Dec. 1959. 5 figs., 3 tables, 11 refs. DLC--By using large aerials in a new way, it has been possible to locate, with considerable accuracy, the sources of 19 Mc/s bursts. The positions of these sources have been correlated with the positions of optically active regions associated with them, and the radial distances of the radio sources from the center of the Sun have been deduced. In 1950-1951, 18. 3 Mc/s bursts came from sources at a radial distance estimated as 3. 4 R_o; more reliable data in 1957 indicated that the sources of 19. 7 Mc/s bursts were at a radial distance of 2. 9 R_o. It is thought that these measurements give the distances of the fundamental plasma levels in coronal streamers. (Met. Abst. 11. 12-58.)--Authors' abstract.

D-746 Shibata, Hisashi, On the "minimum loss operation time" for short wave communication. Japan. Radio Research Laboratories, Tokyo, Review, 4(15):112-117, April 1958. 2 figs., 32 eqs. In Japanese; English summary p. 112. DLC--At the present stage of the "radio propagation prediction service" we have usually the median MUF and the median LUF. These values are worthy of consideration in an attempt to foresee the ionospheric conditions and are of cardinal importance from the theoretical point of view. Nevertheless, in the case of communication in practice these are not accepted as values very suitable for the purpose of determining the operation time. In this paper a method of defining the optimum operation time will be shown, the probability of communication being taken into consideration. The "minimum loss operation time" defined here is only one of the concepts based on wider considerations which will be shown in Appendix. In Appendix we show some applications of the criteria used very often in the statistical theory and in the communication theory for the problem of the radio disturbance warning service.

747 Shkarofsky, I. P. (RCA Victor Co., Ltd., Montreal, Can.), Generalized Appleton-Hartree equation for any degree of ionization and application to the ionosphere. Institute of Radio Engineers, N. Y., Proceedings, 49(12):1857-1871, Dec. 1961. 12 figs., table, 35 refs., 68 eqs. DLC--A generalized Appleton-Hartree equation is derived, applicable to any variation of electron collision frequency with electron speed and any degree of ionization. Regions of the parameters were simplification occurs are given. Results are shown for the ionosphere (60 to 320 km) and compared with experimental data. Good agreement is obtained for the D layer. Experimental data for the E layer can also be explained by assuming an electron temperature several times the gas temperature. This is consistent with rocket data and a measurement by Sputnik III. It is shown that the classic Appleton-Hartree equation should be applicable with no corrections necessary for the F2 layer, provided the collision frequency is averaged appropriately. (Met. Abst. unpub.)--Author's abstract.

748 Shkarofsky, I. P.; Johnston, T. W. and Bachynski, M. P. (RCA. Montreal, Canada), Relaxation phenomena in shock fronts. (A review). Planetary and Space Science, N. Y., 6: 221, June 1961. Abstract only. The paper was presented at the Plasma Sheath Symposium, Boston, Mass., Dec. 7-9, 1959. --For aerodynamic phenomena occurring at temperatures in excess of $1000^{\circ}K$, a great number of collisions between the constituent particles of a gas are required in order that thermal equilibrium be established. Under these conditions, relaxation times can be associated with the distribution of the internal energy of the gas into the various energy states. This paper reviews the phenomena occurring in a shock front from the start of the shock to the point of thermal equilibrium

behind the shock. Chemical reactions at high velocities, temperature variations across a shock front, mechanisms of energy transfer and effects of air flow rate on relaxation are considered. A comparison of a plasma set up by a hot gas and one created by a gas discharge is given. The distribution of energy into translational, rotational and electronic states, as well as dissociation and ionization, are discussed in detail. Some regard is given to relaxation rates, collision processes, ionization onset point and radiative relaxation.

D-749 Shklovskii, I. S., Radioastronomíia. (Radioastronomy.) Moscow, Gos. Izdat. Tekhniko-Teoreticheskoi Lit., 1953. 214 p. 96 figs. (incl. photos), foot-refs. DLC--A popular edition (10,000 copies published) giving the latest in the basic physics of radio propagation theory, including details as to its penetration through the earth's atmosphere-ionosphere; methods of radioastronomical investigation (radiotelescopes of various types illustrated); radio radiation from the sun (observations made from ship "Griboedov" during eclipse of May 20, 1947 in Bahia, Brazil), and from solar eruptions, from the moon, the galaxies (62.5, 150, 163, 185 and 300 cm); hydrogen radiation of 21 cm, radio stars, cosmic rays and radio waves from galaxies, radiogalaxies and, finally, radiolocation astronomy. (Met. Abst. 7.6-5.)--M. R.

D-750 Shklovskii, I. S., Radioastronomiia. (Radio astronomy.) Moscow, Gosud. Izdatvo. Tekhniko-Teoreticheskoi Lit., 1955. 294 p. 128 figs. (incl. photos), foot-refs. DLC (QB574.545 1955)--This revised and enlarged edition of the 1953 text contains chapters on techniques in radio astronomy, radio radiation from a quiet and from a disturbed sun, from the moon, from the galaxy, hydrogen (21 cm) radiation, radio stars and their discovery, cosmic rays and relation to galactic radio radiation, radio nebulae, radio galaxies and relation to the metagalaxies, and radiolocation in astronomy. Many illustrations of equipment and results of photography and recording of radiation from galaxies by optical and radio means in the U.S.S.R. are included for popular, as well as scientific use (25,000 copies published). Chapters on radio nebulae and location of discrete sources have been considerably enlarged and brought up to date. (Met. Abst. 11.6-141.)--M. R.

D-751 Shklovskii, I. S., Kosmicheskoe radioizluchenie. (Cosmic radio frequency radiation.) Moscow, Gosud. Izdatvo. Tekhniko-Teoreticheskoi Lit., 1956. 492 p. 167 figs. (incl. photos), 25 tables, 220 refs., eqs. DLC (QB475.S42) (3000 copies). Transl. into English by Richard B. Rodman and Carlos M. Varsavsky with title, Cosmic radio waves, issued Cambridge, Mass., Harvard Univ. Press, 1960. 444 p. 205 figs., 27 tables, bibliog. p. 414-428, eqs. DLC--

A standard monograph or textbook on radio astronomy for scientists and technicians, covering in 27 chapters (grouped in 6 sections) the following aspects: History of radio astronomy since JANSKY's discovery 25 yrs ago, antennas and equipment, basic results of observations of cosmic radio radiation, nature of Galactic radio radiation, monochromatic radiation from the Galaxy (21 cm), radio astronomy and problems of the origin of cosmic rays, and finally, radio radiation from the metagalaxy and its contribution to cosmology. The book emphasizes radiation from outside the solar system. (Met. Abst. 11.6-140.)--M.R.

D-752 Shklovskii, I.S. (Inst. for Atmos. Physics, Acad, of Sci. of the U.S.S.R., Moscow), Elementary processes in the upper atmosphere and their manifestation in emissions. Annales de Geophysique, Paris, 14(4):414-424, Oct./Dec. 1958. 17 refs., 5 eqs. DLC--This article is subdivided into three chapters, a) New type of fluorescence in the upper layers of the terrestrial atmosphere; b) Some remarks on the excitation of H emission in aurorae; c) Interplanetary gas and some geophysical problems. Of the great variety of elementary processes in the upper atmosphere, leading to the emission of various lines and bands observed in the spectra of the night airglow and aurorae, only the principal ones are discussed. Among their number is a new type of fluorescence in the upper atmosphere and also the problem of interaction of solar corpuscules with the atoms and molecules of the terrestrial atmosphere. (Met. Abst. 10.8-187.)--A.V.

D-753 Shklovskii, I.S., O vozmozhnom vekovom izmenenii potoka i intensivnosti radioizlucheniia ot nekotorykh diskretnykh istochnikov. (Secular variation of the flux and intensity of radio emission from discrete sources.) Astronomicheskii Zhurnal, Moscow, 37(2):256-264, March/April 1960. table, 13 refs., 16 eqs. Russian and English summaries p. 256. DLC. Transl. into English in Soviet Astronomy AJ, N.Y., 4(2):243-249, Sept./Oct. 1960. DLC--The dependence of the flux and brightness on radius is obtained for expanding nebulae — the remnants of supernova outbursts — on the basis of the synchrotron mechanism of radio emission, and also some simple theoretical considerations. It is shown that this dependence has the form: $F_v \propto r^{-\beta}$, $I_v \propto r^{-(\beta+2)}$ where β, in particular, depends on the exponent of the spectrum of the source. For different sources, β varies within the limits 3.2 (Crab Nebula) to 7 (remnants of the outburst of the 1604 supernova). The conclusion is reached that the flux of radio emission from Cassiopeia A should decrease annually by about 2%. The present day technique of radio astronomical observations permits the effect deduced by theory to be detected. The fact that galactic sources have a smaller spectrum exponent than the extragalactic sources is explained. The intensity of emission from remnants of outbursts at different stages of evolution is considered. At comparatively early stages, the emission should be exceedingly large. It is concluded that the possibility of observations of radio emission from supernovae of 1885 and 1895 in M 31 and NGC 5253 is not excluded. (Met. Abst. 11L-111.)--Author's abstract.

D-754 Shternfel'd, A. A., Artificial satellites. 2d rev. and extended edition. Moscow, State Publishing House for Technical and Theoretical Literature, 1958. Transl. of the original Russian (Iskusstvennye Sputniki, pub. 1958) prepared by Technical Documents Liaison Office, Wright-Patterson Air Force Base, Ohio. Distributed by U. S. Dept of Commerce, Office of Technical Services, Wash., D.C. 424 p. 58 figs., 32 plates, 51 tables, 6 refs. Price: $6.00. DWB (629.1388 S561isE, 1958). First Russian ed. with title Iskusstvennye sputniki zemli, issued Moscow, 1956. Second ed. is greatly revised owing to launching of 2 Soviet sputniks in Oct. and Nov. 1957.--Laws of motion, rocket launcher, launching, construction of satellite, human problems, conditions as observed aboard a satellite, observation and communication from satellite, descent to earth, artificial moon, planet and solar satellites, use of satellites as observatories or stations in space, interplanetary flight and law are treated in separate chapters. Chapter on artificial satellites of other bodies of the solar system is new and accounted for omitting "earth" from title as in 1st edition. The work contains many tables of data and diagrams giving quantitative knowledge of mechanics and theory, as well as actual data from U. S. and U. S. S. R. sources. (Met. Abst. 10.7-19.)--M. R.

D-755 Siglin, Pierce W. and Senn, George, Courier communication satellite. Institution of Electrical Engineers, Journal, 7(80): 504-508, Aug. 1961. 6 figs., table. DLC--The Courier communication satellite experiment was undertaken to demonstrate the feasibility and operational capabilities of a delayed repeater satellite transmission system and to provide a basis for estimating the usefulness and capacity of long range multi-station store and forward message handling capability utilizing a satellite vehicle. This article discusses the exchange of messages between ground stations through the Courier satellite, gives a typical operating sequence and describes the satellite.--Authors' abstract.

D-756 Simaljak, J. and Milerova, A., Niektore pozorovania pocas zatmenia slnka v Bratislave dna 30. juna 1954. (A few observations during the solar eclipse of June 30, 1954 in Bratislava.) Meteorologicke Zpravy, Prague, 7(5):132-134, 1954. 4 figs., photo. Russian and German summaries p. 132. DLC --Values of total light intensity, yellow, red and ultraviolet light intensity, temperature, cosmic radiation and radio reception during the solar eclipse of June 30, 1954, are graphically presented. All values show a marked decrease during the eclipse, except tropospheric radio reception which definitely improved, possibly as a result of a decrease in ionization intensity. (Met. Abst. 8.1-357.)--G.T.

D-757 Simon, Paul, Les eruptions chromospheriques associees aux sursauts radioelectriques de type IV: effets ionospheriques et geomagnetiques. (The chromospheric flares associated with the radio-electric outbursts of type IV: ionospheric and geomagnetic effects.) Annales d'Astrophysique, Paris, 23(1): 102-110, Jan./Feb. 1960. 5 figs., 13 refs. French, English and Russian summaries. DLC--The chromospheric flares associated with the radio-electric outburst of type IV are intimately related to the ionospheric disturbances with sudden commencement, the most important of these flares giving rise to particularly severe geomagnetic perturbations. (Met. Abst. unpub.) --Author's abstract.

D-758 Singer, S.F. (Dept. of Physics, Univ. of Maryland), Research in the upper atmosphere with high altitude sounding rockets. (In: Beer, Arthur, (ed.), Vistas in astronomy. pub. London, 1955-1956. Vol. 2:878-912. 23 figs., 3 tables, bibliog. p. 910-912.) DLC, DWB (520.82 B415v)--High altitude rockets have been used to investigate extraterrestrial radiations and the properties of the atmosphere. This article surveys the outstanding results achieved in these studies, including: direct measurements of the solar ultraviolet and X radiation; composition and energy spectrum of the primary cosmic rays; the incidence of micrometeorites; the dependence on altitude up to 220 km of atmospheric pressure, density, temperature, and composition; the distribution of ozone with height; evidence on the intensity and origin of the day airglow; the electron and ion density distribution in the ionospheric layers up to 350 km; variation of the earth's magnetic field with altitude; evidence on the location of ionospheric current sheets and conclusions about the conductivity of the ionosphere; high-altitude photography and its applications. Characteristics are given of high altitude sounding rockets used in the U.S.: V-2, Aerobee, Viking and Deacon. Suggestions are made for overcoming some of their inherent limitations to allow expansion of possibilities of high altitude studies. Arguments are presented for the usefulness of instrumented artificial satellite rockets for astrophysical research. (Met. Abst. 10.6-91.) --Author's abstract.

D-759 Singer, S. F., The artificial earth satellite. Discovery, 17(4):140-145, April 1956. 7 figs. DLC--A description and plan of MOUSE are given, with an account of its 90 min orbit and the path swept out. Knowledge to be gained about radiation and corpuscles outside nearly all the atmosphere is discussed; this will be especially important in study of cosmic rays. (Met. Abst. 8.6-64.)--C. E. P. B.

D-760 Singer, S. F. (Univ. of Maryland, College Park), The artificial earth satellite: past, present and future. (1956?) 9 p. Mimeo. DWB--A brief article outlining the problem of satellite launching and its uses in astronomy, meteorology, (storm tracking, albedo), study of sun, weather control, etc., and details of plans for satellites during IGY. (Met. Abst. 9.8-55.)--M. R.

D-761 Singer, S. F., Satellite instrumentation: results for the IGY. Franklin Institute, Phila., Journal... Monograph, No. 6:51-70, Dec. 1958. 12 figs., 3 refs. DWB (629.1388 F832te)--The discussion deals with 1) knowledge gained by the behavior of uninstrumented satellites; 2) measurements of various kinds obtainable by satellite-borne instruments; and 3) a comparison between the Russian and U. S. instrumentation of satellites. Author's suggestion of a gyroscopic principle for a detector pointed at the sun or at the earth by means of a spin axis seems feasible. Likewise the use of solar batteries for storage of information gathered on tapes as a part of the telemetering system which transmits to an earth receiver whenever a radar beacon hits the receiver. The meteorological gain, particularly as derived from albedo measurements of the earth is inestimable. WEXLER's (U. S. Weather Bureau) concept (depicted here) of the North American continent as seen from 4000 mi altitude is quite illustrative in this respect. The electrical charge (if any) of a satellite and how it changes is a problem for which instrumentation is considered. (Met. Abst. 11J-156.)--W. N.

D-762 Sinton, William M. (Johns Hopkins Univ.), Observations of solar and lunar radiation at 1.5 millimeters. Optical Society of America, Journal, 45(11):975-979, Nov. 1955. 7 figs., table, 7 refs. DWB, DLC--Observations of the radiation from the sun and the moon in a wide wavelength band centered approximately at 1.5 mm are reported. These waves were detected with a Golay detector using a searchlight mirror for a telescope. Measurements of atmospheric extinction are reported and compared with calculations of water vapor absorption which have been made by J. H. VAN VLECK. It is found that the measured extinction is greater than the calculated. Observations of the radiation emitted by the moon at different phases are reported. The transmittances of some materials to the 1.5 mm waves from the sun are included. (Met. Abst. 8.3-182.)--Author's abstract.

D-763 Sisco, W. B. and Fiskin, J. M., Shock wave ionization and its effect in space communication. Douglas Aircraft Co., Long Beach, Paper No. 656, June 1958. (Unchecked).

D-764 Sivaramakrishnan, M. V., Some geomagnetic disturbances at Alibag Observatory (India) and allied radio and solar effects (1937-1946). Indian Journal of Meteorology and Geophysics, 1(3):207-219, July 1950. 8 figs., table, 16 refs. MH-BH--The phenomena of solar flare and radio fade-out and the ionospheric disturbances associated with four magnetic storms recorded at Alibag Obs. are described in detail, and time of travel of solar corpuscles from sun to earth is considered. A test of intense solar flares with radio fade-out and sudden pulses in Alibag magnetic traces as counterpart and the associated magnetic storms the next day for the period 1937-1946 is given. The magnetograms of the individual magnetic storms are compared, the characteristics of the magnetic storms are discussed, the causes of the observed phenomena are indicated and criteria for predicting the occurrence of great magnetic storms are given. (Met. Abst. 2.2-173.)--I. L. D.

D-765 Skeib, G., Der Einfluss der Sonnenfinsternis auf die Ausbreitung atmosphärischer Störungen im Bereich von 5 kHz bis 30 kHz. (Effect of solar eclipse upon the propagation of atmospheric disturbances in the region of 5 kHz to 30 kHz.) Germany. Deutsche Demokratische Republik. Meteorologischer und Hydrologischer Dienst, Veröffentlichungen, No. 16:24-27, 1955. 2 figs. DWB, DLC--Effect of eclipse noticed in positive deviation of the number of atmospherics on 30 kHz with a lag of 15 min and a very sharply pronounced 100% deviation in the 5 kHz field strength of atmospherics. The latter is difficult to explain, since an opposite effect was expected. No effect was observed in the number of atmospherics on 10 kHz. (Met. Abst. 8.1-391.)--A. A.

D-766 Skilling, William Thompson (San Diego State College, ret'd) and Richardson, Robert S. (Mt. Wilson and Palomar Obs.), Brief text in astronomy. New York, Henry Holt, 1954. 327 p. figs., tables, photos, charts, bibliog, p. 289-290. DLC --This elementary but up-to-date text on astronomy contains many sections which touch on meteorology or climatology. The atmosphere (composition, refraction, twinkling and geomagnetism) is discussed on p. 34-37; meteorites, zodiacal light, counterglow on p. 45-50; time and seasons, p. 59-75; moon's temperature and atmosphere, p. 99-103; eclipses, p. 113-120; the solar atmosphere, solar and terrestrial relations, radio astronomy, p. 126-153; planetary atmospheres, albedo, surface temperature, etc., p. 154-186; and meteors, p. 197-204. The text is well illustrated and has a good index and glossary of astronomical terms. (Met. Abst. 6.11-8.)--M.R.

D-767 Skuridin, G.A. and Kurnosova, L.V., Nauchnye issledovaniia pri pomoshchi iskusstvennykh sputnikov Zemli. (Scientific investigations by means of artificial earth satellites.) Priroda, Moscow, 46(12):7-14, Dec. 1957. 6 figs. DLC--The successful launching on Nov. 3, 1957 of the second Soviet earth satellite, the information on its movement and the recordings of instruments mounted in it, make it possible to obtain very important data on atmospheric conditions at heights up to 1700 km, to measure the full intensity of cosmic rays at such heights and to register the ultraviolet and X-radiations of the sun. The authors examine some of the scientific problems whose solutions seem to have become possible with the aid of earth satellites. These are investigations of: the short wave portions of the solar spectrum, the structure of the atmosphere, the corpuscular radiation of the sun, the solid component of interplanetary substance, and geomagnetic measurements. (Met. Abst. 10.4-75.)--A.M.P.

D-768 Slee, O.B. (Div. of Radiophysics, C.S.I.R.O., Univ. Grounds, Sydney), Apparent intensity variations of the radio source Hydra-A. Australian Journal of Physics, Melbourne, 8(4):498-507, Dec. 1955. 5 figs., 2 tables, 7 refs. DLC--This paper describes the results of a detailed study of the flux density of the discrete radio source, Hydra-A. Over a period of 12 months, approximately 200 measurements of the Hydra-A intensity was compared with a similar number of observations on other strong sources. It was concluded that the observed flux density of Hydra-A is much more variable than that of these other sources, although no periodic changes have yet been detected. Possible mechanisms for the observed intensity changes are discussed. (Met. Abst. 9A-93.)--Author's abstract.

D-769 Slonim, Iu. M., Moshchnye khromosfernye vspyshki 10 i 14 iiulia 1959 g. (Intense chromospheric flares of July 10 and 14, 1959.) Astronomicheskii Zhurnal, Moscow, 37(2): 347-349, March/April 1960. 2 figs., table, ref. Russian and English summaries p. 347-348. Transl. into English in Soviet Astronomy AJ, N.Y., 4(2):327-330, 1960. DLC--Results are given of observations of two intense chromospheric flares, which appeared on July 10 and 14 above a large, irregular sunspot. A similarity in the structure of the flares is noted. Their development is evidence of eddy, or pseudoeddy, motions and of a systematic movement of the principal emission node in a western direction. The ionospheric effects due to these flares are described. (Met. Abst. 11L-269.)--Author's abstract.

D-770 Smith, Alex G.; Carr, T.D. and Perkins, W.H. (all, Florida Univ., Gainesville), Anomalous night-time reception of a major solar radio burst. Nature, London, 183(4661):597-598, Feb. 28, 1959. fig., 3 refs. DWB--The University of Florida Radio Observatory had Jupiter under observation on five different receiving arrays the morning hours of March 8, 1958, when at 0235 U.T. a single very intense burst of noise rising slowly and decreasing more slowly over a 2 min period was simultaneously observed on all five channels. Characteristics of a solar burst rather than a Jupiter pulse were identified at sunlit observation sites elsewhere. Hence, the major solar burst was propagated somehow far into the earth's dark hemisphere. Position of the celestial bodies concerned is shown in a diagram. (Met. Abst. 11.8-78.)--W.N.

D-771 Smith, A.G., Extraterrestrial noise as a factor in space communications. Institute of Radio Engineers, N.Y., Proceedings, 48(4):593-599, April 1960. 4 figs., 2 tables, 22 refs. DLC--Present-day refinements in communication systems make it appear that extraterrestrial noise sources may establish a fundamental limitation on long-range communications. The various cosmic and solar system radio sources are considered with respect to their intensities, spectral distributions, and temporal characteristics. The most severe forms of interference occur in the long wave length regions of the radio frequency spectrum, so that the future of space communications probably lies in the perfecting of low-noise microwave systems. (Met. Abst. 11.10-50.)--Author's abstract.

D-772 Smith, A.G.; Carr, T.D.; Bollhagen, H.; Chatterton, N. and Six, F., Ionospheric modification of the radio emission from Jupiter. Nature, London, 187(4737):568-570, Aug. 13, 1960. DLC--

The experiment of Gardner and Shain has been repeated at 18 Mc using two identical receivers separated by 7040 km. Some correlation is found between records at the two sites but there is also evidence of serious distortion caused by terrestrial effects. --IRE Abst. 3472

D-773 Smith, F. Graham; Little, C. G. and Lovell, A. C. B., Origin of the fluctuations in the intensity of radio waves from galactic sources. Nature, London, 165(4194):422-425, March 18, 1950. 6 figs., 2 tables, 8 refs. DLC--Smith reports on the experimental observations at Cambridge using 6.7 m wavelength receivers spaced up to 170 km. Two types of fluctuations indicate two separate mechanisms; one related to variation of emission from sources, the other to diffraction in a more or less local region. Little and Lovell report on measurements of radiation from Cygnus and Cassiopeia as conducted between May 1 and Oct. 31, 1949, in cooperation with Smith, using 3.7 m wavelength at both Jodrell Bank and Cambridge, 210 km distant. Results show radiation to be either steady at both sites, or fluctuating at both sites, on a given night. No correlation between disturbances when fluctuations occurred at both sites, and if on one side only, the significant exceptions were about 10%. --W. N.

D-774 Smith, F. G., Ionospheric refraction of 81.5 Mc/s radio waves from radio stars. Journal of Atmospheric and Terrestrial Physics, 2(6):350-355, 1952. 3 figs., 8 refs. DWB--Apparent regular movements of 4 radio stars are ascribed to "wedge refraction," i. e., to E-W gradients of the total electron content of the ionosphere. (Met. Abst. 4.6-90.)--C. E. P. B.

D-775 Smith, F. G. (Mullard Radio Astron. Obs., Univ. of Cambridge), The possibility of observing features of galactic radio emission from a satellite-borne radio telescope. Royal Astronomical Society, London, Monthly Notices, 122(6):527-534, 1961. 6 figs., 6 refs., eqs. DLC--It has already been proposed to extend measurements of the spectrum of radio emission from the galaxy to frequencies of about 1 Mc/s by means of a satellite-borne receiver. If the satellite is in the upper ionosphere, where the refractive index is increasing with height, a focusing effect will occur which may allow individual features of emission to be observed. It is shown that a beamwidth of the order of 20° may be achieved under favorable circumstances; the most important limitation is the frequency bandwidth necessary in a sufficiently sensitive receiver, which inevitably means that dispersion in the refractive index effectively blurs out any narrower beam or any interference effects inside the beam. The experimental conditions needed for the realization of this degree of focusing in a satellite or a rocket flight are discussed. It appears that the frequency of a satellite-borne receiver should sweep over a range of about 3 to 5 Mc/s, with a bandwidth of 10 kc/s. The satellite orbit should be nearly circular, at a height of about 400-500 km. (Met. Abst. unpub.)--Author's abstract.

D-776 Smith, Harlan J. and Douglas, J. N. (both, Yale Univ., New Haven), Observations of planetary nonthermal radiation. (In: Paris Symposium on Radio Astronomy, July-Aug. 1958, (Proceedings), pub. Stanford Univ. Press, 1959. p. 53-55. 3 figs., ref.) DLC (QB475.P26)--Observations of Jupiter and Saturn at 23.0 Mc/s were made and are analyzed. Results indicate that Saturn is a doubtful though possible source of radiation; that Jupiter in the last two years has shown burst occurrence probabilities roughly in the ratio 1:0.8-0.1 for frequencies 18, 21 and 23 Mc/s; and that there is good correlation between the longer pulse elements of storms over 0.8 Mc/s frequency separation around 23 Mc/s and between sites separated by tens of miles.--A. J. M. and authors' conclusions.

D-777 Smith, R.L. and Helliwell, R.A. (both, Stanford Univ.), Electron densities to 5 earth radii deduced from nose whistlers. (Summary only.) Journal of Geophysical Research, Wash., D.C., 65(9):2583, Sept. 1960. fig. DLC--Whistlers appear to propagate in columns of enhanced ionization aligned with the earth's magnetic field. From nose whistlers a value of 100 electrons/cm^3 is calculated at 5 earth radii. (Met. Abst. 11.12-328.)--Authors' abstract.

D-778 Smith, R.L.; Helliwell, R.A. and Yabroff, I.W., A theory of trapping of whistlers in field aligned columns of enhanced ionization. Journal of Geophysical Research, Wash., D.C., 65(3):815-823, March 1960. 8 figs., table, 15 refs., 11 eqs. DLC--A ray theory of whistler propagation in ducts is developed for the purpose of explaining discrete whistler components. By use of refractive index surfaces and a Snell's law construction, it is shown that the only feature of the electron distribution affecting the trapping conditions is the ratio of the electron density in the column to that of the background. In most practical cases the electron density in the column required for trapping must be greater than the background level. Under certain conditions, however, the density in the column must be less than the background level. Using the theory, it is found that the enhancement required for trapping increases markedly toward the equator, providing a possible explanation for reduced whistler occurrence at the lower latitudes. (Met. Abst. 11. 12-326.)--Authors' abstract.

D-779 Smith-Rose, R. L., International research in radio astronomy. Nature, London, 176(4493):1110-1111, Dec. 10, 1955. 3 refs. DWB--Summary of special reports 3-5 of the International Scientific Radio Union: 3) Discrete sources of extraterrestrial radio noise; 4) Distribution of brightness on the solar disk; 5) Interstellar hydrogen. (Met. Abst. 8. 1-112.) --C. E. P. B.

D-780 Sørensen, E. V., Magneto-ionic Faraday rotation of the radio signals on 40 Mc/s from Satellite 1957 (Sputnik I). (Abstract of article issued by Danish Academy of Technical Sciences, Microwave Laboratory, Copenhagen, as its Report P 1765, June 24, 1959). --Some of the fadings of the 40 Mc/s signals from Sputnik I during morning transits are assumed to originate in Faraday rotation in the ionosphere. This has been investigated for the transit of Oct. 12, 1957, 5. 30 GMT, for which the orbit was known with reasonable accuracy. The fading records show an increasing fading rate during the last part of the transit. This is contrary to the simple theory based on the assumptions of a flat earth and a homogeneous ionosphere, from which a constant fading rate should be expected. The main reason why simple theory did not apply in this case, is that the satellite travels through the twilight zone from night towards day, i. e., from low to high ionization. The Faraday rotation is calculated by means of data for the orbit, magnetic field maps and predictions of the ionosphere conditions. The result is in good agreement with the observation when a high ionization between the altitude of maximum ionization and the satellite is assumed. The effect of refraction is estimated by means of the perturbation theory. It increases the Faraday rotation from 0 to 19% during the transit. It is concluded that it is difficult to obtain detailed information on the state of the ionosphere by means of such fading records, especially when the frequency is so low that the refraction becomes significant. (Met. Abst. 11F-140.)--Author's abstract.

D-781 Soifer, Raphael (M. I. T., Cambridge, Mass.), Satellite supported communication at 21 megacycles. Institute of Radio Engineers, N. Y., Proceedings, 49(9):1455-1456, Sept. 1961. table, 3 refs. DLC--

Coordinated control experiments (Nov. 1959) with WWV signals, were conducted by a group of advanced radio amateurs over the path New York, N.Y. and Bethesda, Md. The tests were conducted when the ionosphere did not support normal communication, hence, no audible background levels, and when satellites were expected and not. Tabulated three interval scheme results of burst frequency are discussed briefly. The main object was to achieve a two way communication which was met with success. Improvement of range and effectiveness are in process. --W. N.

D-782 Solar eclipses and the ionosphere: a symposium held under the auspices of the International Council of Scientific Unions Mixed Commission on the Ionosphere, in London, Aug. 1955. Editors, W. J. G. Beynon and G. M. Brown, London, Pergamon, 1956. 330 p. figs., tables, eqs. refs. at end of each ch. Literature on solar eclipses and the ionosphere (including) chronological catalogue of eclipses, p. 308-320 (225 refs.). Issued as Vol. 6 of the Special Supplements to the Journal of Atmospheric and Terrestrial Physics. DWB. Review by R. M. Goody in Weather, 12(6):198, June 1957. Review by R. L. Smith-Rose in Nature, London, 179(4562):711, April 6, 1957. Also: Beynon, W. J. G., Solar eclipses and the ionosphere. Nature, London, 176(4490):947-948, Nov. 1955.

D-783 Somayajulu, Y. V. and Narayana Rao, N. (both, Madras Inst. of Technology, Chromepet, Madras), Observations on galactic radiation at 30 Mc/s. Journal of Scientific and Industrial Research, Sec. A, New Delhi, 17(12); Special Supplement, Dec. 1958. p. 54-56. 2 figs., 8 refs. DWB, DLC --A Philips BX 925 A receiver, bandwidth 2.6 kc/s was used in the observations outside Madras since Oct. 1957, discussed briefly accompanied by plot of diurnal variation of the cosmic noise intensity, which rapidly increases after sunset, decreases after sunrise. (Met. Abst. 12.1-134.) --W. N.

D-784 Southworth, George C. (Bell Telephone Labs.), Early history of radio astronomy. Scientific Monthly, Wash., D.C., 82(2):55-67, Feb. 1956. 12 figs. (incl. photos), 10 refs. and notes. DWB, DLC--The author relates the history of the discovery of radio waves from the Milky Way by JANSKY in 1931 and of radio waves from the sun in 1942 by the author and other investigators. The historical account is based in part upon the author's memory of events in which he participated personally, and upon the notes of various investigators. The existing knowledge of the radio spectrum, the work on long wave static measurements carried out in the Bell Telephone Laboratories by FRIES, the beginning of short wave static measurements by JANSKY (diagrams of the circuit used by JANSKY during his discovery of radio waves from the Milky Way is shown), the steps toward the discovery of radio waves emanating from the Milky Way, and GROTE REBER's studies of extraterrestrial noise, and SOUTHWORTH's own work leading to the discovery of radio waves from the sun are reviewed. Photographs of apparatus used, samples of records obtained are presented. (Met. Abst. 9A-134.)--I. L. D.

D-785 Spitz, Armand and Gaynor, Frank, Dictionary of astronomy and astronautics. N. Y., Philosophical Library, 1959. 439 p. --Short, terse definitions of over 2000 terms in astronomy, astronautics and upper atmospheric physics, are included in this up-to-date glossary. Some of the terms are defined at greater length and a great deal of astronomical data about the sun, moon, planets and their orbits and satellites, constellations plus some excellent photographs of the moon, Saturn, sunspots, etc., are included. Most of the constellations, recent artificial satellite programs, and some astrological terms are defined. (Met. Abst. 10.8-78.)--M. R.

D-786 Sprenger, K. and Lauter, E. A., Beobachtungen der tiefen Ionosphäre während der Sonnenfinsternis am 30. 6. 1954. (Observations of the low ionosphere during the solar eclipse of June 30, 1954.) Beiträge zur Geophysik, Stuttgart, 64(4): 284-312, 1955. 17 figs., 14 refs. DWB--At Kühlingsborn on 185-1223 kHz the expected increase of the reflection coefficient of the low ionosphere did not appear until some time after the first contact, and normal values returned considerably before the end of the eclipse. The observed effect (40 db) and retardation of the maximum (4 min) agreed with calculation from a single layer model of the D region, but the time contraction is only reconciliable with a multiple structure. Observations of the level of disturbance in the long wave region (8-70 kHz) show first a positive phase due to a decrease of low ionosphere damping, followed by a long negative phase after the maximum obscuration, apparently due to meteorological effects of the eclipse. (Met. Abst. 7. 1-189.)--C. E. P. B.

D-787 Stanley, G. J. and Price, R., An investigation of monochromatic radio emission of deuterium from the galaxy. Nature, London, 177(4522):1221-1222, June 30, 1956. 3 figs., 4 refs. DWB--Observations at Sydney, Australia, of radiation from the center of the galaxy on a frequency of 327. 555-327. 369 Mc/s showed that temperature of critical source is 800°K and abundance of deuterium is less than 10^{-3} that of hydrogen. (Met. Abst. 9A-135.)--C. E. P. B.

D-788 Staras, H. (RCA Labs., Princeton, N. J.), The propagation of wide band signals through the ionosphere. Institute of Radio Engineers, N. Y., Proceedings, 49(7):1211, July 1961. 2 refs., 7 eqs. DLC--The differential group delay across the frequency band is discussed in relation to wide band satellite techniques. The estimated delays given are restricted to a reasonably regular ionosphere (no flare distuptions). Quantitative values depend on satellite tests designed for this purpose. (Met. Abst. unpub.)--W. N.

D-789 Sternberg, Sidney (RCA Astro-Electronic Products Div., Princeton, N. J.) and Stroud, William G. (NASA Goddard Space Flight Center, Beltsville, Md.), Tiros I: meteorological satellite. Astronautics, N. Y., 5(6):32-34, 84-86, June 1960. figs., photos. DLC--The first two weeks operation of Tiros I proved the feasibility of using television camera equipped satellites for viewing the earth cloud cover and returning pictures of large clouded areas back to earth. Some of the representative cloud pictures, the launching of the weather satellite, a cutaway view of major components and the relative camera coverage areas are shown. The Tiros I exceeded expectations and its success predicts a brilliant future for such observation satellites and world-wide meteorology. (Met. Abst. 11J-166.)--E. K.

D-790 Stetson, Harlan T., The sun and the atmosphere. Smithsonian Institution, Annual Report, 1938:149-174. 7 figs., 3 plates. DLC--A popular account of radiations from the sun and their effects on the earth's atmosphere, frequency of auroras, geomagnetism, radio reception, temperatures and weather, especially relations to the sunspot cycle. The theory of sunspots is discussed. (Met. Abst. 8A-20.)

D-791 Stoffregen, W. (Ionosphere Observatory, Upsala), Solar eclipse of June 30, 1954: preliminary report. (In: Solar eclipses and the ionosphere: a symposium... ed. by W. J. G. Beynon and G. M. Brown. London, Pergamon, 1956. p. 57-64. 11 figs., 2 tables). DWB--Ionospheric measurements at two stations in Sweden during the eclipse of June 30, 1954 are summarized. The behavior of the Es layer was similar to that of the E and F layers during the eclipse, but some hours before the eclipse the Es ionization was high. Field strength measurements for long and medium waves indicated a short, sharp increase near the eclipse maximum. The noise level of atmospherics was also greater during eclipse. (Met. Abst. 9.6-267.)--Author's abstract.

D-792 Storey, L. R. O., A method to detect the presence of ionized hydrogen in the outer atmosphere. Canadian Journal of Physics, 34(11):1153-1163, Nov. 1956. 4 figs., table, 12 refs., eqs. DWB, DLC--The method proposed for the detection of ionized hydrogen in the outer atmosphere relies on the influence of the positive ions on the propagation of whistlers. If ionized hydrogen is the chief constituent of the atmosphere at great heights above the earth, then the relation between frequency and time in a whistler should depart at low audio frequencies from the form observed at higher frequencies. The departure is likely to be most marked in whistlers occurring at low magnetic latitudes. At magnetic latitude 45° the effect of the hydrogen ions should be detectable at frequencies below about 2 kc/sec. (Met. Abst. 8.6-189.)--Author's abstract.

D-793 Storey, L. R. O., A method for interpreting the dispersion curves of whistlers. Canadian Journal of Physics, Ottawa, 35(9):1107-1122, Sept. 1957. 5 figs., table, 10 refs., 30 eqs. DWB, DLC--This paper considers how the dispersion curves of whistlers may be interpreted to provide information on the distribution of electron density with height in the outer atmosphere. The simpler inverse problem, that of computing the dispersion curve for a given distribution, is considered first. On the assumption of longitudinal propagation in a dipole magnetic field, the dispersion curve is derived in the form of an equation relating the product $tf^{1/2}$ to the frequency f. The equation can be represented by a power series in f, which is useful for estimating departures from the elementary $f^{-1/2}$ - t relationship at frequencies where these departures are small. The coefficient of f^n in this series is termed the "dispersion constant of order n." The main problem is now treated, regarding the above equation as an integral equation determining the distribution of electron density along the path. This integral equation is solved in series, making use of the same power series in f. The dispersion constant of order n is shown to be proportional to the n th moment of the distribution, suitably expressed and weighed. From the values of the moments, it is possible to deduce both the initial geomagnetic latitude of the path and the distribution of electron density along it. When the observed dispersion curve is incomplete, so that only the dispersion constants of lower order can be measured, the method yields an approximation to the distribution. (Met. Abst. 9.7-279.) --Author's abstract.

D-794 Storey, L. R. O., A method for measuring local electron density from an artificial satellite. U. S. National Bureau of Standards, Journal of Research, Sec. D, 63(3):325-340, Nov./Dec. 1959. 11 figs., table, 14 refs., 51 eqs. DWB, DLC--A method is proposed for measuring the electron density at known points in the outer ionosphere, by the use of VLF receiving equipment in an artificial satellite, in conjunction with a VLF transmitter on the ground. The transmitter would radiate continuous waves, which would be propagated through the ionosphere in the "whistler" mode. The basis of the method is a measurement of the local wave admittance of the medium, by comparison of the signals received on an electric dipole and on a loop. A further proposal is made for an integrated VLF satellite experiment, in which several different types of observations would be made simultaneously. (Met. Abst. 11F-141.)--Author's abstract.

D-795 Storey, Owen (Defence Res. Board, Ottawa), Protons outside the earth's atmosphere. Annales de Geophysique, Paris, 14(2):144-153, April/June 1958. 4 figs., 6 refs., 4 eqs. French and English summaries p. 144. DLC--The evidence is surveyed for the belief that hydrogen is the main ionizing constituent of the earth's atmosphere at great heights. If this view is correct, it should be possible to detect the protons by making precise measurements of the dispersion curves of whistling atmospherics observed at low latitudes. (Met. Abst. 10.2-155.)--Author's abstract.

D-796 Stranz, Dietrich, Ergebnis einer Fade-out-Statistik. (Results of fade out statistics.) Archiv der elektrischen Übertragung, 4:217-218, (1950). 7 refs. Reprint available. MH-BH--Distribution of spots about central meridian of sun on days with total fading and without fading at Göteborg compared for Aug.-Dec. 1948. This showed a significant rarity of spots near central meridian on days without fading. (Met. Abst. 2.8-173.)--C. E. P. B.

D-797 Stratton, F. J. M. (Caius College, Cambridge), Radio astronomy. Pakistan Journal of Science, Lahore, 6(3):137-141, July 1954. DWB--The science of radio astronomy was born on Feb. 26, 1942, in England when all radar sets reported unidentified noise, later found to come from the sun. The science could not be developed until after the war when radar sets became surplus and were used for nonmilitary research such as detecting meteors or charged particles in the train of a meteor. Also, disturbances on the sun or in the chromosphere can be mapped; eclipses do not completely block radiations; structure of Milky Way can be determined. Radio stars were first detected in 1932 by JANSKY; now it is found they are not points (stars) but areas (discrete sources). By observing radio stars from 3 points the structure or disturbances in ionosphere can be determined. New 250 ft radio telescope at Manchester, England, will enable us to see farther into space than ever before. Finally, hydrogen line (21 cm) is visible. (Met. Abst. 9A-66.)--M. R.

D-798 Strong, C. L., How a group of amateurs detected flares on the sun with long wave radio receivers. Scientific American, N. Y., 203(3):231-244, Sept. 1960. 8 figs. DWB, DLC--David Warshaw of Brooklyn, N. Y., designed an inexpensive radio receiver expressly for the purpose of monitoring flare activity. Despite several delays the first SEA appeared on his record on Oct. 4. Walter A. Feibelman of Pittsburgh, Pa., built a station after Warshaw's design, and Val Isham of Powell, Ohio, assisted by G. H. Pieterson, also put a station into operation. The records submitted by these stations compared favorably with those of professional observatories. Thereafter the Bureau of Standards assigned four Brown recorders to the project for a period of a year. Additional observers included Ralph Buckstaff, Walter Scott, Franklin Loehde of Alberta, and Robert Evans of Victoria, B. C. and C. H. Hossfield of New Jersey. Subsequently a number of others joined the group. An explanation is given of what is shown by the SEA recordings. A detailed sunrise pattern was distinguished. This correlated satisfactorily with those made by the official observatories and they obtain some SEA's that are missed by the official stations, and vice versa. Walter Orr Roberts of the Bureau of Standards noted that this program is making an important contribution to the observing effort. (Met. Abst. unpub.)--E. S.

D-799 Stroud, W. G. and Nordberg, W. (Signal Corps. Eng. Labs., Ft. Monmouth, N. J.), Meteorological measurements from a satellite vehicle. (In: Van Allen, James A. (ed.), Scientific uses of earth satellites. Ann Arbor, Univ. of Michigan Press, 1956. p. 119-132. 9 figs., 3 tables, 12 refs.) DWB --Among the meteorological observations which could be made from an earth satellite are albedo measurements with a photodetector. The satellite must be capable of giving orientation information. The theory, variations with latitude, time of day and season, and for various types of surfaces (snow, rock, vegetation, sea, clouds), for various wavelengths, cloud thickness, etc., methods and instruments, orientation and telemetering problems and operational requirements are discussed and illustrated with graphs, charts and diagrams. (Met. Abst. 11J-168.)--M. R.

D-800 Struve, O.; Emberson, R.M. and Findlay, J.W. (all, Nat'l. Radio Astronomy Obs., Green Bank, W. Virginia), The 140 ft radio telescope of the National Radio Astronomy Observatory. Astronomical Society of the Pacific, San Francisco, Publications, 72(429):439-458, Dec. 1960. fig., foot-ref. DLC--The 140 ft telescope is intended to be of the family of precision instruments in the U.S. It will be used as a research tool for measuring accurate positions of small radio sources and maps of larger sources, for determining radiative fluxes of many sources at different frequencies, for studying variable sources, as well as refraction and scintillation of radiowaves. The performance specifications of the telescope require operation at wavelengths at least of 3 cm and suitability for photometric and positional program. The operation of drive and control should be consistent with the required accuracy. The above performance requirements were translated into structural and mechanical specifications, described in detail. Dimensions of the telescope are presented in a table. (Met. Abst. unpub.)--S. N.

D-801 Suzuki, Shigemasa (Tokyo Astron. Obs.), Multiphase radio interferometers for locating the sources of the solar radio emission. Astronomical Society of Japan, Tokyo, Publications, 11(4):195-215, 1959. 16 figs., 8 refs., numerous eqs. DLC--Multiphase radio interferometers, developed for the purpose of minimizing the ambiguity and simplifying the reduction procedure in locating the sources of the solar radio emission, are discussed. By simple eye estimation, the relative position can be deduced with an accuracy of 0.01 R. (Met. Abst. 11L-83.)--Author's abstract.

D-802 Svensson, S.I.; Hellgren, G. and Perers, O., The Swedish Radioscientific Solar Eclipse Expedition to Italy, 1952: preliminary report. Göteborg, Sweden. Chalmers Tekniska Högskola, Handlingar, No. 181(its subseries Electrical Engineering Series, Vol. 7, No. 6), 1956. 30 p. 20 figs., 15 refs., eq. DWB, DLC. Also issued as: Acta Polytechnica, Stockholm, No. 212, 1957.--Pt. I of the report accounts for the ionospheric part of the expedition. It gives general information of the sweep-recording equipment. Further, it presents the E, F1 and F2 observations made. The experimental reduction in critical frequency is found to be greater than theoretically predicted. The discrepancy is discussed. Pt. II accounts for the solar noise measurements on 2 m wavelength. General information about equipment and antenna system is given. Total intensity and the amount of circular polarization of the solar radiation were measured. A short discussion of the observational results is given. (Met. Abst. 11.7-127.)--Authors' abstract.

D-803 Swarup, G. (Stanford Univ., Calif.); Stone, P. H. and Maxwell, Alan (both, Harvard College Obs., Ft. Davis, Texas), The association of solar radio bursts with flares and prominences. Astrophysical Journal, Chicago, 131(3): 725-738, May 1960. 7 figs., 4 tables, 26 refs. DWB, DLC --Solar radio bursts in the frequency range 100-580 Mc/s have been correlated with solar optical phenomena over a 2 yr period covering the present sunspot maximum. It is found that 60% of fast drift (Type III) radio bursts are coincident in time with solar flares. This figure is in accord with that obtained by previous investigators, but statistical studies show that only half this number of bursts are truly associated with flares; the remainder are associated by chance. The truly associated bursts usually occur between the start and the maximum of a flare. Intense bursts are more highly associated with flares than are weak bursts. In the reverse correlation — that of flares with radio bursts — it is found that 25% of all solar flares are apparently associated with fast drift bursts, the probability of association increasing if the flare is of greater area or height, on the east side of the disk, or accompanied by a surge or spray. Almost all slow drift bursts (Type II) and continuum (Type IV) events are associated with flares, often of large area and intensity, but there is no well defined association between noise storm bursts (Type I) and flares. Only a small proportion of ejective solar prominences are accompanied by radio bursts; this may result from the unfavorable geometry for radio propagation from the limb. Concerning the physical association of the flares and solar bursts, it is suggested that both phenomena result from an unidentified primary origin. The transfer of energy to coronal radio levels probably takes place at 10^5 km/sec in the case of the fast-drift bursts and at about 10^3 km/sec for the slow drift bursts. (Met. Abst. 11L-94.)--Authors' abstract.

D-804 Swerling, P. and Crain, C. M., A possible transponding system for an artificial asteroid. Rand Corporation, Santa Monica, Calif., Project Rand Research Memorandum, RM-2172, May 14, 1958. 35 p. figs., 3 tables, 5 refs., 34 eqs. DWB (507.2 R186r)--The measurement of transmission path length to an artificial asteroid by radio frequency transponding techniques has been suggested as a means of increasing the precision with which the dimensions of the solar system are known. This report describes the design of a possible pulsed transponding system by which the transmission path length could be measured with an accuracy limited essentially by the accuracy with which the velocity of light is known, i. e. about one part in 10^6. Typical values of range and radial velocity with respect to the earth of the proposed artificial asteroid are assumed. All assumed components are presently available. A weight and volume breakdown of a possible design is given, which indicates that the necessary asteroid-borne transponding equipment, with associated power sources, could be accommodated in a 15 lb package occupying about 900 cu in. (Met. Abst. 12. 4-63.)--Authors' abstract.

D-805 Swerling, P., First order error propagation in a stagewise smoothing procedure for satellite observations. Journal of the Astronautical Sciences, N. Y., 6(3):46-52, Autumn 1959. 72 eqs. DWB--A practical method of smoothing satellite data by evaluating a finite number of parameters, or elements, is presented. (Met. Abst. 11. 12-569.)--Author's abstract.

D-806 Symposium on Ballistic Missiles and Space Technology, 4th, 1959. Proceedings of the 4th AFBMD/STL Symposium (on) Advances (in) Ballistic Missile and Space Technology. Co-sponsors, Air Force Ballistic Missile Div. and the Space Technology Laboratories, Inc. (Proceedings issued in) Planetary and Space Science, N. Y., Vol. 7, July 1961. 462 p. figs., photos, tables, refs.--The entire volume, which is devoted to the proceedings of the symposium, contains 45 papers listed under the following subject headings: Instrumentation and control (4 papers); Space guidance (8); Trajectories (7); Computers (2); Reliability (4); Space communication (3); Man in space (10); Space experiments (7). Abstract of all papers will appear in Meteorological and Geoastrophysical Abstracts; some within the scope of the present bibliography are included here. --W. N.

D-807 Symposium on Physical Processes in the Sun-Earth Environment, July 20-21, 1959. Proceedings. Comp. by C. Collins. Canada. Defence Research Telecommunications Establishment, Publication No. 1025, March 1960. 392 p. figs., tables, refs., eqs. DLC--Contains a total of 33 papers; 9 on sun-earth atmospheres, 10 on geomagnetically trapped particles, 7 on wave interaction and 7 on auroral and magnetic disturbances. Abstracts of all papers will appear in Meteorological and Geoastrophysical Abstracts.--W. N.

D-808 Symposium on the Plasma Sheath: Its effects on communication and detection, Dec. 1959, Boston, Mass. Electromagnetic effects of re-entry: selected papers from the Symposium. Ed. by Walter Rotman and Gerald Meltz. Pub. in Planetary and Space Science, N. Y., Vol. 6, 1961. 226 p. figs., tables, refs., eqs. "Symposium under auspices of the Electromagnetic

Radiation Lab. of the U.S. Air Force Cambridge Research Lab." The Volume is divided into 4 major sections: A. Thermodynamic and electrical properties of stock-ionized flow fields (7 papers). B. Interaction of microwaves and ionized air (5 papers). C. Voltage breakdown of antennas (3 papers). D. Experimental techniques for exploring the interaction of microwave energy with ionized flow field (5 papers). The term plasma sheath, in contrast to Langmuir's original meaning, is here used to define the envelope of ionized gas produced about a body entering the atmosphere from outside at hypersonic velocities. Some of the papers dealing with propagation of radio waves in the presence of the plasma sheath and its consequent wake are included in the present bibliography. All abstracts will be published in Meteorological and Geoastrophysical Abstracts. --W. N.

D-809 Syrovatskii, S.I. (Acad. Sci., U.S.S.R.), The distribution of relativistic electrons in the galaxy and the spectrum of synchrotron radio emission. Soviet Astronomy AJ, N.Y., 3(1):22-38, Jan./Feb. 1959. 2 figs., 10 refs., 91 eqs. DLC. Transl. of Raspredelenie reliativistskikh elektronov v Galaktike i spektr magnitotormoznogo radioizlucheniia, Astronomicheskii Zhurnal, Moscow, 36(1):17-32, Jan./Feb. 1959. DLC--The problem of the diffusion of particles is solved, taking into account the regular changes of the particle energy during this process. The spatial distribution and the energy spectrum of electrons, whose energy changes because of radiation emission in the magnetic field, was found on the assumption that the sources occupy an ellipsoidal volume and inject into interstellar space relativistic electrons with an energy spectrum $QE^{-\gamma_0}$. The case when the distribution of the sources coincides with the flat subsystem of the galaxy and $\gamma_0 = 2$ is considered in detail. The energy spectra of electrons along the line of sight in different directions and the corresponding intensities of synchrotron radiation were calculated. It is shown that the energy spectrum of electrons along the line of sight can be represented in a limited energy region by the expression $KE^{-\gamma}$, where γ varies within the limits $2 < \gamma < 3$, depending on the choice of the diffusion coefficient. The choice of the diffusion coefficient of relativistic particles in interstellar space equal to $D = 10^{29}$ cm/sec and the intensity of the sources (the coefficient in the source spectrum) $Q = 10^{38}$ ergs/sec give agreement between the theoretical and observed spectra of nonthermal radio emission of the galaxy in the frequency region $\nu > 10$ Mc. (Met. Abst. 11L-106.)--Author's abstract.

D-810 Takakura, Tatsuo (Univ. of Tokyo), Polarized bursts and noise storms of solar radio emission, Pt. 2, Storm bursts and background continuum. Astronomical Society of Japan, Tokyo, Publications, 11(2):55-70, 1959. 7 figs., table, 4 refs., 53 eqs. Pt. 3, The post-detection low frequency spectra of noise storms. Ibid., p. 71-78. 8 figs., 2 refs., 8 eqs. DLC--An attempt is made to explain the so-called background continuum of the noise storms as the superposition of many spikes which have an identical shape, occur at random and whose amplitudes are distributed according to a probability density. If two parameters, the frequency of occurrences of bursts and the range of distribution of the amplitude, change with time as they are likely to do, almost all noise storms are in fairly good agreement with the present hypothesis. In this case, so-called "storm bursts" are fluctuations about a mean level and the superposition of at least a few spikes. (Met. Abst. 11L-96.) --Author's abstract.

D-811 Takakura, T. (Tokyo Astron. Obs.), Microwave bursts of solar radio emission. Astronomical Society of Japan, Tokyo, Publications, 12(1):55-62, 1960. 5 figs., 3 refs. DLC--Wide-band compound dynamic spectra of solar radio outbursts have been studied in the frequency range from 9500 Mc to 67 Mc. The range of 9500-1000 Mc has been covered by the records at several fixed frequencies, and both the swept frequency records and fixed frequency records have been used on the frequencies below 1000 Mc. A typical outstanding outburst may be as follows. A short lived burst whose duration is several minutes begins almost simultaneously at the frequencies above 1000 Mc. The flux density of the burst is maximum at about 9000 Mc - 3000 Mc, decreases with decreasing frequency and is generally very weak on the frequencies below 1000 Mc. A few minutes later, a Type II burst begins in the meter wave region with a sharp high frequency cut-off which is usually below 350 Mc for the fundamental wave (and below 700 Mc for the second harmonic). Following the Type II burst, a broadband Type IV burst begins and lasts one hour or two. The frequencies for the maximum flux density of the Type IV bursts distribute depending on the case from 200 Mc to 10,000 Mc. Above mentioned short lived burst at the frequencies above 1000 Mc is neither an extension of the Type II burst nor the same as the Type IV burst. It is a distinctive type of burst and may be called "Microwave burst" or "M-type" burst. In comparison with the current classification of bursts at microwave frequency, short lived SD (Simple and Distinct) and CD (Complex and Distinct) bursts whose durations are less than about 10 min seem to be the "M-type" bursts, while long lived CD bursts might be Type IV bursts. (Met. Abst. 11L-97.)--Author's abstract.

D-812 Tanaka, Haruo; Kakinuma, T.; Jindo, Hidehiko and Takayanagi, Toshio, Equipment for the observation of solar noise at 3750 Mc. Nagoya. Univ. Research Inst. of Atmospherics, Proceedings, 1:71-85, Jan. 1953. 23 figs., 2 photos, 5 refs., eqs. DWB--Equipment for measuring 8 cm radio waves from the sun (solar noise) was designed by the authors in 1950 and tested by actual observations for 600 hrs in 1951, then modified and used for systematic observations from Nov. 1951 through 1952 with alterations in Aug. 1952. The method is similar to that of R.H. DICKE (1946). Details of construction of aerials, modulator, balanced frequency converter, amplifiers, synchronous rectifiers, output, power supply, signal generator and calibrations are given in text and illustrations. Theoretical calculations of output fluctuations also given. (Met. Abst. 12.1-113.)--M.R.

D-813 Tanaka, H. and Kakinuma, T., Equipment under construction for locating sources of solar noise at 4000 Mc. Nagoya. Univ. Research Inst. of Atmospherics, Proceedings, 1:89, Jan. 1953. photo. DWB--An interferometer with 5 aerials was constructed beginning in May 1952. Aerials are placed at 6 m intervals in an E-W direction. Test observations were to be performed in April 1953, by scanning the sun "stripwise as it passes through the aerial pattern." (Met. Abst. 12.1-114.)--M.R.

D-814 Tanaka, H. and Kakinuma, T., Observations of solar radio noise at 3750 Mc. Nagoya. Univ. Research Inst. of Atmospherics, Proceedings, 1:103-107, Jan. 1953. 2 figs., 2 tables. DWB--Summary of data from station near Nagoya for the Sub-Committee for Worldwide Network on Solar Radio Emission of the U.R.S.I. Test observations from April-July 1951 and daily values from Nov. 1951 to Jan. 1953 are given on graphs, and data for outstanding occurrences in tables (starting time, duration, type, maximum intensity and time, and radio fadeouts). (Met. Abst. 9A-41.)--M.R.

D-815 Tanaka, H. and Kakinuma, T., The most intense burst of solar radio emission observed on Feb. 23, 1956. Nagoya. Univ. Research Inst. of Atmospherics, Proceedings, 4:74-77, Dec. 1956. 3 figs., ref. DWB--A violent outburst of solar radio emission was observed on Feb. 23, 1956. A perfect record of the intensity was successfully obtained by

3750 and 9400 Mc/s radiometers, together with a drift curve taken by an 8 element interferometer at 4000 Mc/s. The maximum intensity was 225 and 141 times as large as that of the quiet-sun radiation for 3750 and 9400 Mc/s radio flux density, respectively. The position of the radio source at 4000 Mc/s slightly moved during the burst. The most probable E-W width of the radio source during the burst is 3 min of arc, which corresponds to the maximum effective temperature of about 5 X 10^8 ^oK. (Met. Abst. 9A-136.)--Authors' abstract.

D-816 Tanaka, H. and Kakinuma, T., Observations of solar radio emission at microwave frequencies. Nagoya Univ. Research Inst. of Atmospherics, Proceedings, 5:81-89, March 1958. 12 figs., 3 tables, 6 refs. DWB--Outline of the equipment used for radio observations at Toyokawa station which are in operation since the beginning of IGY, is described together with the method of tabulation. Percentage variation of the S component versus frequency is calculated for the first half year period of IGY, which shows a peak near 4000 Mc/s and there are many cases where the sense of polarization reverses between 3750 and 9400 Mc/s. Experiment has been made for detecting linear polarization at a frequency of 3750 $\pm$ 5 Mc/s, but we have yet no data to show the existence of linear polarization for both S component and outstanding occurrences. (Met. Abst. unpub.)--Authors' abstract.

D-817 Tandberg-Hanssen, Einar (Inst. of Theoretical Astrophysics, Oslo and Mt. Wilson and Palomar Obs.), On the correlation between radio frequency radiation from the sun and solar activity. Astrophysical Journal, Chicago, 121(2): 367-375, March 1955. 7 figs., 2 tables, 11 refs. (Also issued as Oslo. Universitet. Institutt for Teoretisk Astrofysikk, Reprint, No. 10.) DLC--An investigation is made of the correlation between radio frequency radiation from the sun and solar activity, sunspots, prominences, and geomagnetic disturbances. The difference in observed directivity and intensity of the radiation at different frequencies is explained by the reflection conditions in the sun's atmosphere. A distinction is made between radio noise active and radio noise inactive sunspots. (Met. Abst. 9A-97.) --Author's abstract.

D-818 Tandberg-Hanssen, E., On the correlation between solar flares and radio bursts. Astrophysics Norvegica, Oslo, 6(2), Oct. 1957. 25 p. 2 figs., 5 tables, 8 refs. DLC--

Some 700 cases of time coincidences between flares and – presumably randomly polarized – radio bursts on 200 Mc/s have been analyzed to study the correlation between flare importance and radio bursts. It is found that as a general rule the correlation increases greatly with the importance of the flares. Bright flares occur, however, at times when there is no indication of excess radio radiation, and strong radio bursts are not infrequently observed at times when there is no excess H_x radiation. One is led to conclude that radio bursts are not to be considered as flare induced phenomena, but that flares and radio bursts are but two manifestations of a common disturbance. (Met. Abst. unpub.)--Author's abstract.

D-819 Tandon, Jagdish Narain (Physics Dept., Univ. of Delhi), Radio astronomy. Science and Culture, Calcutta, 22(1):4-11, July 1956. 2 figs., 2 tables, 27 refs. DLC--A review of discovery by JANSKY (1931) of radio waves from space, and subsequent discoveries regarding sources of these radiations, uses of the information in astrophysics, ionospheric physics and astronomy, and other aspects of radio astronomy (meteor trail investigations, interstellar hydrogen, solar radio radiation, echoes from ionosphere, etc.). It is demonstrated how this discovery has opened a window into space that is 100 times as wide (with respect to the ℓ, m spectrum) as was possible with visible or photographic radiation. (Met. Abst. 9A-137.)--M. R.

D-820 Taubenheim, Jens (Berlin-Adlershof), Messungen der Absorption von Kurzwellen in der Ionosphäre. (Measurement of the absorption of short waves in the ionosphere.) Freiberger Forschungshefte, Ser. C, Geophysik, No. 29:1-18, Oct. 1956 (issued Berlin, Akademie Verlag). 8 figs., 22 refs., 10 eqs. DWB--A review of recent knowledge concerning absorption of short radio waves in the various ionospheric layers, methods of measurement, the relation to propagation and the relation of propagation to knowledge of the electrical properties of these layers of the upper atmosphere. Diurnal, seasonal, sunspot cycles and eclipse effects or variations are discussed and illustrated. Focussing and de-focussing are illustrated schematically. (Met. Abst. 10.11-136.)--M. R.

D-821 Taubenheim, J., Incoherency of pulse echoes and the measurement of ionospheric absorption. Journal of Atmospheric and Terrestrial Physics, London, 18(2/3):147-151, June 1960. 3 figs., 6 refs., 13 eqs. DLC--The presence of incoherently scattered energy in the h. f. pulse echoes from the ionosphere gives rise to errors in the absorption value determined from the median echo amplitude. These errors are larger for the second order than for the first order echo. The calculations are confirmed by experimental results. (Met. Abst. 11.12-440.)--Author's abstract.

D-822 Taylor, Eloise W., Absorption of radio waves reflected at vertical incidence as a function of the sun's zenith angle. U. S. National Bureau of Standards, Journal of Research, 41(12):575-579, Dec. 1948. 2 figs., 3 tables, 2 eqs. DWB --The diurnal variation of ionospheric absorption is related to the sun's zenith angle. The absorption values for this study were obtained from the continuous automatic field intensity recordings made at the Central Radio Propagation Laboratory on two frequencies. Because of proximity of the receiving station to the transmitting station, reflections are obtained at nearly normal incidence. An analysis of data covering a period of 3 yrs indicates that little error is introduced by assuming a linear dependence of absorption upon the cosine of the sun's zenith angle. (Met. Abst. 10.11-137.)--Author's abstract.

D-823 Taylor, Paul B. and Engler, Nicholas A., Charts of corrections to radar observations for refraction by terrestrial atmospheres. Dayton, Ohio. Univ. Research Institute. Contract AF 33(616)-5438, Research Report 427-71, Feb. 1960. 139 p. 4 figs., 100 charts, 4 tables, 15 refs., numerous eqs. (U.S. Wright Air Development Center, WADC Technical Report 59-619). DWB (M(051) U589ch)--There are presented in chart form corrections for atmospheric refraction to observations of range and angular altitude of targets observed by electromagnetic radiation at either visual or radar wavelengths. These corrections have been computed for 16 type atmospheres above a spherical earth. In these atmospheres the index of refraction attenuates exponentially with height. The type atmospheres cover a range of base indices and exponential attenuation rates. Tabulations of the computations upon which the charts are based are available upon application to the Project Engineer. These tabulations list $\lambda - 1$, $n - 1$ and $\sin \beta$ in addition to the quantities used directly in plotting. The original charts were prepared on paper having five divisions to the half centimeter. Copies of these original charts are also available. The charts appearing in this report are reduced copies of vellum tracings of the original charts, the tracings having two divisions to the centimeter.--Authors' abstract.

D-824 Taylor, William C. (Lockheed Missiles and Space Div.), Analysis and prediction of radio signal interference effects due to ionized layer around a re-entry vehicle. Planetary and Space Science, N. Y., 7:286-300, July 1961. 12 figs., 21 refs., 11 eqs. DWB, DLC--Effect of thermal ionization upon radio signals from a re-entering space vehicle are discussed in terms of determination and particle density, plasma wave interaction and plasma properties, and collision frequency. Conclusions are drawn for radio signals at 200 and at 10,000 Mc/s. It is shown that the plasma effects can be controlled by increased frequency during re-entry. --W. N.

D-825 Taylor, W. C. (Lockheed Aircraft Corp. Missiles and Space Div., Sunnyvale, Calif.), Analysis of radio signal interference effects due to ionized layer around a re-entry vehicle. Planetary and Space Science, N. Y., 6:1-9, June 1961. 7 figs., ref., 4 eqs. DWB--Transmission problems at 200 Mc/s during re-entry are discussed. Methods of predictions and calculations under given conditions are shown to agree satisfactorily with practical tests. --W. N.

D-826 Theissing, H. H. and Caplan, P. J., Atmospheric attenuation of solar millimeter wave radiation. Journal of Applied Physics, 27(5):538-543, May 1956. --Measurements of water vapor absorption at around 1 mm compared with van Vleck-Weisskopf theoretical equation. --CSIRO Abstract.

D-827 Theissing, H. H. and Caplan, P. J., Measurement of solar millimeter spectrum. Optical Society of America, Journal, 46(11):971-978, Nov. 1956. --Used a thermal detector, and filters of woven copper wire mesh. The observed spectrum agreed with a Raleigh-Jeans curve, allowing for van Vleck's atmospheric attenuation data. --CSIRO Abstract.

D-828 Thomas, J. A. (Univ. of Queensland, Brisbane) and Hibberd, F. H. (Univ. of New England, Australia), Satellite Doppler measurements and the ionosphere. Journal of Atmospheric and Terrestrial Physics, London, 13(3/4):376-379, Feb. 1959. fig., 2 refs., 3 eqs. DLC--An outline of the method of an analysis of the effect of the ionosphere on the simultaneous Doppler frequency shifts of the 20 and 40 Mc/s signals from Sputnik I is presented. (Met. Abst. 11.12-377.)--O. T.

D-829 Thomas, J. O. and Robbins, A. R. (both, Cavendish Lab., Cambridge), Movements in the F2 layer of the ionosphere during some solar eclipses. (In: Solar eclipses and the ionosphere: a symposium... ed. by W. J. G. Beynon and G. M. Brown. London, Pergamon, 1956. p. 94-101. 4 figs., table, 10 refs., 3 eqs. DWB--Five different sets of ionosphere soundings made during eclipses have been analyzed in an attempt to see whether vertical transport of electrons plays an important part in the F2 layer during an eclipse. The assumption was made that the rates of production and loss of electrons were those tentatively suggested by RATCLIFFE et al. (1956). It has been found that the five sets of observations lead to fairly similar conclusions. Vertical movements of importance seem to have occurred during the eclipses. Their possible causes are considered. (Met. Abst. 9.6-269.)--Authors' abstract.

D-830 Thompson, A. R. and Maxwell, A., Solar radio bursts and low energy cosmic rays. Nature, London, 185(4706):89-90, Jan. 9, 1960. fig., table, 10 refs. DWB, DLC--This paper considers the radio spectral observations of the sun, and from this elucidates the origin of the solar protons of energies 30-300 MeV and their relation to solar radio bursts, flares, and terrestrial disturbances. The data consists of a continuous record of solar radio bursts obtained from sunrise to sunset for the past three years at the Harvard Radio Astronomy Station, Ft. Davis, Texas, with sweep frequency receivers covering the range 25-580 Mc/s. (Met. Abst. 11.12-60.)--I. S.

D-831 Tischer, F. J., Propagation-Doppler effect in space communications. Institute of Radio Engineers, Proceedings, 48(4):570-574, April 1960. 3 figs., 4 refs., 51 eqs. DLC --A Doppler equation, derived by field theory, is presented in this investigation of the effect of a nonhomogeneous medium in the flight direction. Subsequently, the derived relations are used to consider typical deviations from the regular Doppler shift due to the influence of the propagation phenomena. --From author's text.

D-832 Trexler, James H., Lunar radio echoes. Institute of Radio Engineers, N. Y., Proceedings, 46(1):286-292, Jan. 1958. 13 figs., 21 refs. DLC--High power radars at the Naval Research Laboratory have been used to study the reflecting properties of the earth's moon. Experimental work over the last six years at frequencies in the 30 to 3000 Mc band has revealed a lunar surface phenomenon which produces a "highlight." Measurements made at 198 Mc have shown that more than 50% of the echo energy is reflected in the first 50 microsecond after the leading edge of a short incident pulse contacts the moon. This fortunate situation permits many interesting astronomical observations and suggests the use of wide band communication signals in a circuit using the moon as a passive relay. Many types of modulation have been successfully passed over the lunar circuit, including amplitude modulation by voice. (Met. Abst. unpub.)--Author's abstract.

D-833 Triskova, Ludmila (Prague), Ionisation durch Erdsatelliten. (Ionization by earth satellites.) Beiträge zur Geophysik, Leipzig, 68(4):246-249, 1959. 6 refs., 5 eqs. German and English summaries p. 246. DWB, DLC--It was experimentally found that frequencies higher than the MUF are reflected by the space ionized by an artificial earth satellite. The process of ionization is investigated. Especially ionization by molecules accelerated by collision with the satellite is considered and this process appears probable. (Met. Abst. 11D-144.)--Author's abstract.

D-834 Twiss, R.Q. (C.S.I.R.O., Univ. Grounds, Chippendale, N.S.W.), Radiation transfer and the possibility of negative absorption in radio astronomy. Australian Journal of Physics, Melbourne, 11(4):564-579, Dec. 1958. 20 refs., 55 eqs. DLC--Stimulated transitions are relatively enormously more probable at radio than at optical frequencies and it is this which makes it possible for negative absorption to arise at radio wavelengths when the medium will behave like an amplifier to the incident radiation. A necessary condition for the existence of this phenomenon is that the kinetic energy distribution $F(\eta)$ of the radiating electrons be markedly non-thermal with an appreciable excess of high energy electrons such that $\partial F/\partial\eta$ is positive over a finite range of the kinetic energy η. However, this condition is not sufficient, since it is shown that an electron gas in which free-free transitions provide the dominant radiation process can never exhibit negative absorption whatever the form of $F(\eta)$, and it is further necessary that the stimulated transition probability should have a maximum at some finite value of the kinetic energy, the most favorable case occurring when this maximum is a sharp one at the value of η at which $\partial F/\partial\eta$ has a positive maximum. These conditions can both be met in principle for the cases in which the dominant radiation process is due (a) to Cerenkov effect, (b) to gyro radiation by non-relativistic electrons, (c) to synchrotron type radiation by highly relativistic electrons, and it is shown that negative absorption can arise in all these cases; the relevance of these results to radio astronomy is discussed briefly. (Met. Abst. 12.6-165.) --Author's abstract.

D-835 Tyas, J.P.I.; Franklin, C.A. and Molozzi, A.R., Measurement of cosmic noise at low frequencies above the ionosphere. Nature, London, 184(4689):785-786, Sept. 12, 1959. 9 refs. DWB--The paper reports a 2-15 Mc/s swept frequency ionosphere sounder, being designed at present under the auspices of the Canadian Defence Research Bd., in cooperation with the National Aeronautics and Space Administration, to be launched as an Earth satellite. The practicability of this device for measurement of cosmic noise is discussed. (Met. Abst. 11.12-44.)--I.S.

D-836 U.S. Dept. of the Army. Army Library, Guided missiles, rockets and artificial satellites (including Project Vanguard): a selected list of titles. Its Special Bibliography, No. 11, Jan. 23, 1957. 153 p. "Current companion volume to its Special Bibliography, No. 4 (Guided Missiles), April 20, 1956." DWB--Briefly- or non-annotated reference material is arranged in alphabetical order by title within major and subject groups, under Sec. VI. Missiles and Rockets (by type). Pt. E (Experimental and Specialized Vehicles) contains references to Aerobee Rockets (p. 48), ASP (Atmospheric Sounding Projectile) (p. 48), Viking (p. 52). Artificial Satellites are covered in Pt. II (IGY program, p. 130; Project Vanguard, p. 131; other satellite projects, p. 145). Scientific applications of satellites are covered on p. 151. At least 50 papers or books of interest to meteorologists will be found in this section. No author or subject index is provided. (Met. Abst. 8.8-81.) --M.R.

D-837 Utah. University, Physical properties of the upper atmosphere. Contract W19-122 ac-15, Progress Report, No. 17, May 31, 1952, and Final Report for the Contract. Pub. July 30, 1952. 50 p. 8 figs., table, refs. DWB--An administrative report outlining the activities of the project which was mainly concerned with the development of airborne and ground equipment for the study of electromagnetic waves at various altitudes by means of V-2 rockets and aerobees. The method of attack was several times modified during the development of the work. Great care was taken in the construction of an antenna adequate from both the transmission and aerodynamical points of view. The desired data about ion density transmission constants, etc., were not obtained since all the rockets misfired with the exception of one whose beacon failed shortly after landing. Circuit schemes for the developed equipment are included. (Met. Abst. 6.6-74.)--A.A.

D-838 Uyeda, Hiroyuki; Shibata, Hisashi; Mambo, Masayoshi (all, Radio Res. Labs.) and Ishida, Tadashi (Kanto Radio Regulatory Board), On the reception of radio waves from Sputnik I. Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan, 12(1): 37-39, 1958. 2 figs. DWB, DLC--A short note analyzing the satellite's orbits obtained from the data observed at the Monitoring Division, Kuiki Radio Regulatory Bureau, Ministry of Posts & Telecommunications and from the ephemeris given by the Smithsonian Astrophysical Observatory. The regions of reception analyzed on the normal propagation by F2 and Es layer reflections, and graphically represented, are divided into two regions. Region I corresponds to the region in which the satellite is in flight lower than the height of points of maximum electron density in the F2 layer, and region II corresponds to the other region in which the satellite is in flight higher than the height of points of maximum electron density in the F2 layer. An analysis of both regions is presented. (Met. Abst. 11E-160.)--I.S.

D-839 Van Allen, James A. (ed.), Scientific uses of earth satellites. Ann Arbor, Univ. of Michigan Press, 1956. 316 p. figs., tables, bibliogs. throughout. Price: $10.00. DWB--A compilation of 33 of the papers presented at the Upper Atmosphere Rocket Research Panel meeting at Ann Arbor, Mich. on Jan. 26-27, 1956. The papers are devoted to detailed, specific proposals for use of satellites in measuring temperature, density, air-drag, pressure, radiative heat transfer, visibility, hydrogen in space; UV, auroral and cosmic ray flux; geomagnetic field, ionospheric structure, meteoric drag, interplanetary dust, radio propagation, etc., as well as the performance of the satellite itself. (Met. Abst. 8.4-6.)--M.R.

D-840 Van Allen, J.A.; Ludwig, G.H.; Ray, E.C. and McIlwain, C.E., Observation of high intensity radiation by satellites 1958 Alpha and Gamma (1958). 19 p. 8 figs., table. Mimeo. "Assisted by U.S./I.G.Y. Project 32.1 of the Nat'l. Academy of Sciences and the Nat'l. Science Foundation." --A preliminary report is given of the results obtained by artificial earth satellites Explorers I and III in measurements of radiation intensities and of several geophysical effects, by means of a single Geiger Mueller tube, a scaling circuit for reducing the number of pulses to be worked with, and telemetering systems used for transmitting the scalar output to the ground receiving stations. (Met. Abst. 10.10-133.)--N.N.

D-841 Van Bladel, J. (Univ. of Wash.), Les applications du radar a l'astronomie et a la meteorologie. (Applications of radar to astronomy and meteorology.) Pref. by M.P. Lejay, Paris, Gauthier-Villars, 1955. 147 p. 55 figs., 6 tables, 196 refs. --This monograph presents a complete coverage of the manifold uses of radar in observing astronomical and meteorological objectives such as the sun, moon, planets, zodiacal light, meteorites, auroras, lightning, precipitation, snow, turbulence, thunderstorms, tornadoes and clouds. The six major sections cover: 1. General theory, design and operation of the equipment and the electromagnetic waves; 2. Diffusion by opaque spheres and echoes from heavenly bodies; 3. Diffusion from ionized trails from meteors, meteor showers, effect of upper winds, recombination, ionization variations, sporadic ionization; 4. Detection of auroras, auroral ionization and lightning; 5. Detection of precipitation, physical basis, quantitative and qualitative statics of precipitation and turbulence, upper bands; 6. Rawinsondes for obtaining upper air winds with primary and secondary radar. A very complete bibliography, including material published through 1954 is appended. Many illustrations from recent publications are included. (Met. Abst. 7.1-25.)--M.R.

D-842 Van Isacker, J., La scintillation des etoiles. (The scintillation of stars.) Belgium. Institut Royal Meteorologique, Publications, Ser. B, No. 8, 1953. 110 p. figs., tables, 17 refs., eqs. DWB--A statistical theory is developed for determining angular distribution, covariant and spectrum of starlight intensity as functions of the variation of refractive index in the atmospheric layers. This method of computation makes it possible to derive upper tropospheric temperatures from star scintillation measurements. The study includes an analysis of the observations made in Ireland by BUTLER. It is shown how the theory can be applied to scintillation of radio stars and to fading of radio waves reflected by the ionosphere. (Met. Abst. 5.11-214.)--G.T.

D-843 van Sabben, D., Relationship between radio propagation disturbance, geomagnetic activity and solar noise. Journal of Atmospheric and Terrestrial Physics, 3(4):194-199, May 1953. 3 figs. DWB--A radio propagation disturbance index I is derived and its variations in circuit New York-Amsterdam compared with variations of geomagnetic K. Close agreement is found, I having a mean lag of 7 hrs behind K. A nonrecurrent magnetic storm was generally preceded by an increased flux of radio noise, average interval 2 days. (Met. Abst. 5.1-118.)--C.E.P.B.

D-844 Vassy, E., La haute atmosphere. (The upper atmosphere.) La Meteorologie, Paris, 4th Ser., No. 35:185-194, July/ Sept. 1954. 12 figs. DWB--Review of different indirect methods for obtaining information on the high atmosphere (radio and sound propagation, meteors, ozone, twilight airglow and auroral data), and direct methods used since the war (rockets) to obtain density, temperature, chemical composition, ozone and mass spectrometer data. Measurement of electrical properties by means of (a) UHF; (b) the U.S. Naval Research Laboratory (NRL) method using two figures, 2.34 Mc and 25.6 Mc, or the sixth harmonic of the first, to determine ionization at 80-160 km; (c) the Langmuir method which determines that no electrons exist below 70 km, although + and — ions occur at 60 km; and (d) Doppler method are described. (Met. Abst. 9.9-107.) --M.R.

D-845 Vassy, E., Les satellites artificiels, leur interet pour l'etude de l'atmosphere. (Artificial satellites: their importance in the study of the atmosphere.) La Meteorologie, Paris, Ser. 4, No. 40:283-290, Oct./Dec. 1955. 3 figs., eqs. English and Spanish summaries p. 283. DWB--The writer shows that it is necessary for some types of research to have a means of rapid high-altitude exploration along a meridian. He reviews solar emission in the ultraviolet range, X-radiation, charged particles causing northern lights and variations in the earth's magnetic field, in cosmic radiation and their effects on the upper atmosphere. It is demonstrated that it is possible to make artificial satellites. Summary report of the American "MOUSE" Project. (Met. Abst. 8.4-58.)--Author's abstract.

D-846 Vassy, E., Radionavigation et teleguidage a grande distance. (Long distance radio navigation and remote control.) Annales des Telecommunications, Paris, 14(9/10):256-260, Sept./Oct. 1959. 5 figs., 5 refs., eqs. DLC--Statement of a theoretical method relating to a hyperbolic system working through phase lag, which proves that it is possible to take advantage of the ionosphere provided that the chosen frequencies correspond to a level of the curve h'f where h' is the apparent height or virtual height of the trajectory and f the exploring frequency. The author investigates two cases: that of combined direct and ionospheric waves in the case of RANA (see: L'Onde Electrique, Paris, 1955, p. 319) and that of ionospheric wave only. The choice of the frequencies permitting theoretical functioning of long distance radio navigation is determined, and the disturbing influence of the ionosphere on the phase is examined. The experimental process is described and the results obtained are stated. (Met. Abst. 11.3-107.)--A.V.

D-847 Vassy, E., L'emission radioelectrique des satellites artificiels. Applications a la connaissance de l'ionosphere. (Radio transmission from artificial satellites. Applications to the knowledge of the ionosphere.) L'Onde Electrique, Paris, 39(388/389):647-653, July/Aug. 1959. 8 figs., table. French and English summaries. DLC--The radio features of the Soviet and U.S. artificial satellites are summarized. A description is then given of investigations of the properties of the upper atmosphere based on the simple reception of a transmitted radio signal without knowledge of the code. A report is made of the methods to determine the air density of the upper atmosphere, using the Doppler-Fizeau effect, radio interferometry, the Faraday effect and refractive waves. The author comments on these various methods and shows their great utility. (Met. Abst. 11.5-166.)--A.V. and author's abstract.

D-848 Vauquois, Bernard; Coupiac, Pierre and Laffineur, Marius, Etude experimentale des orages radioelectriques solaires. (Experimental study of radioelectric solar storms.) Academie des Sciences, Paris, Comptes Rendus, 237(25):1630-1632, Dec. 21, 1953. fig., 5 refs. DLC--The results of observations of simple radioelectric storms of solar origin on 5 occasions in 1952 and 1953 at Sydney, Cambridge, Nera, and Meudon indicate that there is a dissymmetry which depends on the longitude of the sunspots and on the wavelength. (Met. Abst. 9A-42.)--M.R.

D-849 Veldkamp. J., De eerste Amerikaanse kunstmaan. (The first American artificial satellite.) Hemel en Dampkring, The Hague, 56(7/8):147-149, July/Aug. 1958. 3 figs. DWB, DLC--Description of the first U.S. satellite 1958 α sent up on Jan. 31, 1958 at Cape Canaveral. Statement of the transmitters and observation methods, followed by a commentary of the research by means of satellites. (Met. Abst. 11J-183.)--A.V.

D-850 Veldkamp, J. and van Sabben, D. (both, R. Netherlands Met. Inst., De Bilt), On the current system of solar flare effects. Journal of Atmospheric and Terrestrial Physics, London, 18(2/3):192-202, June 1960. 7 figs., 16 refs., 6 eqs. DLC--The electric current system responsible for the great solar flare effect (s.f.e.) of March 23, 1958, is compared with the currents of the normal daily variation of the geomagnetic field. Whereas the standard Sq currents are symmetric with respect to the geographic equator, the pattern of the currents of the s.f.e., as well as that of the currents of the normal daily variation at the time of the s. f. e. are controlled by the magnetic equator. The same result is found by a re-examination of selected s. f. e.s published in the IATME Bulletins nos. 12f and 12h. It is shown that the s. f. e. currents must flow in a region where the disappearance of electrons follows an attachment law. The decrease of the s. f. e. leads to a loss coefficient = 5 X $1\cdot^{-4}$ sec^{-1}, which compares with the known value for the D layer. (Met. Abst. 11.12-104.)--Authors' abstract.

D-851 Venugopal, V. R. (Kodaikanal Observ., Kodaikanal), Sunrise effect in the F region of the ionosphere over Kodaikanal. Indian Journal of Meteorology and Geophysics, Delhi, 10(3): 325-330, July 1959. fig., table, 8 refs. DWB, DLC--The sunrise effect in the F region of the ionosphere over Kodaikanal has been studied. It is found that the effect occurs about an hour after the moment of sunrise for visible rays in the layer and a few minutes before ground sunrise. This result is compared with those obtained at other places. The delay in the occurrence of the sunrise effect is believed to be due to the absorption of the solar ionizing radiation by the ionospheric layers lying to the east of the observing station. (Met. Abst. 11D-146.)--Author's abstract.

D-852 Vilbig, Friedrich (Communication Sciences Lab., Air Force Cambridge Research Center), Global communication using passive or active satellite relay stations. Advances in the Astronautical Sciences, N.Y., Vol. 5, 1959, issued 1960. p. 251-260. 9 figs., 2 refs., 12 eqs. DWB (629.1388 A512pro), DLC (QB1.A26)--The limitations of present day long distance communication links are compared with the limitations of links which might use passive or active satellite relay stations. The paper is largely concerned with orbital paths and the number and distribution of satellites required for several possible communication systems. A probability calculation showing the distribution and number of satellites required for line-of-sight interception at any earth point is also given. (Met. Abst. 11.12-490.)--Author's abstract.

D-853 Viterbi, A. J. (Jet Propulsion Lab., Calif. Inst. of Technology, Pasadena), Design techniques for space television. Advances in the Astronautical Sciences, N.Y., Vol. 5, 1959, issued 1960. p. 291-305. 7 figs., 3 refs., 40 eqs. DWB (629.1388 A512pro), DLC (QB1.A26)--The basis for establishing a television system for obtaining visual images of the planets is outlined. This entails consideration of the distances involved, signal levels and noise environment. An FM-PM communication system is described and design restrictions formulated. The problem is then illustrated by an example involving transmission of a television image from the vicinity of Venus. (Met. Abst. 11. 12-489.)--Author's abstract.

D-854 Vitkevich, V. V., Issledovanie ionosfernykh neodnorodnostei radioastronomicheskimi metodami. (Investigation of ionospheric inhomogeneities by the methods of radioastronomy.) Radiotekhnika i Elektronika, 3(4):478-486, April 1958. 2 refs. DLC--The method based on the radio emission of "radio stars" is used to study electronic inhomogeneties in the ionosphere. The size and electronic concentration of large inhomogeneties are calculated from data on irregularities in vertical ionospheric refraction. Data are supplied on the irregularities in horizontal radio refraction and also on the electronic irregularities which confuse the interference picture.--R. M.

D-855 Vitkevich, V. V.; Gorelova, M. V. and Lozinskaia, T. A. (all, Acad. Sci., U. S. S. R.), The spectrum of peaks in solar emission. Soviet Astronomy AJ, N. Y., 3(4):626-627, Jan./Feb. 1960. fig., 6 refs. DLC. Transl. of Spektr pichkov radioizlucheniia Solntsa, Astronomicheskii Zhurnal, Moscow, 36(4):641-642, July/Aug. 1959. DLC--Two types of short duration bursts of solar radio frequency emission are described: narrow band width peaks with a band width ranging to 5 Mc, and wide banded peaks with a band width of the order of 12-15 Mc. (Met. Abst. 11L-90.) --Authors' abstract.

D-856 Bogelman, Joseph H., Propagation and communications problems in space. Institute of Radio Engineers, N. Y., Proceedings, 48(4):567-569, April 1960. 3 figs., 2 tables. DLC--The problems of propagation and communications arising from landings on the Moon, Venus, or Mars are treated in terms of the characteristics required for the communication system to achieve data transfer between parties on the surface of these bodies and the communications problems arising in the transfer of information from these bodies back to the Earth. Consideration is given to Doppler shift, Faraday rotation, tracking and stabilization of antennas, and ground network requirements. The problems of communications between vehicles in space in terms of signal acquisition and antenna orientation and tracking are described. (Met. Abst. 11. 12-480.)--Author's abstract.

D-857 Voigt, H.H., Identifizierung der kosmischen Radiostrahlungsquellen mit optischen Objekten. (Identification of cosmic radio sources with optical objects.) Naturwissenschaften, 42(5):115-119, March 1, 1955. 2 figs., 10 refs. DWB--The two "windows" in the atmosphere are 3000-30,000 Å (optical) and 1 cm-20 m. Radio radiators are defined as objects which emit radio radiation far exceeding the long wave extension of thermal radiation. Types of nonradiating and radiating optical objects are listed. Extragalactic emissions from Crab nebula, Cassiopeia, Cyghus, etc., and emissions from the Milky Way are discussed. (Met. Abst. 9A-98.)--C.E.P.B.

D-858 Voigt, H.H., Radioquellen ausserhalb der Milchstrasse. (Radio sources outside the Milky Way.) Umschau, 55(24): 744-746, Dec. 15, 1955. 2 figs. DLC--So far radio emission has only been found from spiral Sc nebulas such as Andromeda, some colliding star swarms such as Cygnus A (very strong), and an elliptical nebula emitting a "plume" of unknown composition. The sources are probably turbulent gas clouds. (Met. Abst. 9A-99.)--C.E.P.B.

D-859 Voigt, H.H., Radiostrahlung und Sonnenaktivität. (Radio radiation and solar activity.) Umschau, Frankfurt a.M., 56(17):525, Sept. 1, 1956. fig. DLC--The correlation between solar activity and solar radio radiation is much closer for frequencies above 600 MHz (50 cm) than in the meter wave region. On 2800 MHz (10.7 cm), E. TANDBERG-HANSSEN found a very close relation with monthly sunspot relative numbers Jan. 1950-April 1951. He distinguishes between active and inactive spots. (Met. Abst. 8.1-227.) --C.E.P.B.

D-860 Voigt, H.H., Das "optische" und das "Radio-Fenster" in der Astronomie. (The optical and radio windows in astronomy.) Umschau, Frankfurt a.M., 56(11):323-325, June 1, 1956. 2 figs. DLC--The atmosphere is transparent to electromagnetic waves from 3000 Å to near infrared and from <1 cm to 20 m; the latter also pass through clouds. The intensities and wave lengths from sources at 1 to 10^6 Å are shown; for the sun the maximum is approximately in the visible range. Problems of stellar emission are discussed; radio waves are essentially different in origin from light rays. (Met. Abst. 8.1-223.)--C.E.P.B.

D-861 Voigt, H.H., Die 21-cm-Linie: neue Möglichkeiten und Ergebnisse in der Astronomie, 1, Beobachtungen innerhalb unserer Milchstrasse. (The 21-cm line: new possibilities and results in astronomy, Pt. 1, Observations within our Galaxy.) Umschau, 59(15):452-455, Aug. 1959. 3 figs. Pt. 2, Beobachtungen an aussergalaktischen Objekten. (Pt. 2, Observations on outer galactic objects.) Ibid., 59(16):494-496, Aug. 15, 1959. photo, table, 6 refs. DLC --In this first review paper, the author discusses the physical characteristics of the 21 cm line, the celestial mechanics of our galactic system, the systematic analysis of the 21 cm line along the galactic plane and the demonstration of the spiral structure of galactic system; detailed structure of the spiral arms including hydrogen atmosphere and clouds, interaction between interstellar hydrogen and pleiades, etc.; physics of interstellar matter; the Magellanic clouds including their radial velocities, the Andromeda cloud; cloud nebula and the red displacement. The second part of the article reports the details of observations such as the Magellanic and Andromeda clouds, the red shift, etc. (Met. Abst. 11.9-112.)--I.L.D.

D-862 Volland, Hans, Die Frequenzabhängigkeit der Sonneneruptionseffekte im Längstwellengebiet. (Frequency dependence of solar flare effects in the region of very long waves.) Archiv der Elektrischen Übertragung, Stuttgart, 13(10):443-448, Oct. 1959. 11 figs., 7 refs. German and English summaries p. 443. DLC--Measurements of field strength of the transmitters GBR (16 kc/s), GBZ (19.6 kc/s) and GIY 20 (51.95 kc/s), made in the Heinrich-Hertz Institut in Berlin-Charlottenburg during solar flares, show positive and negative field anomalies, dependent on frequency, time of day, and year. These are explained as interferences between ground wave and rays reflected from the ionosphere. It is assumed that the height of reflection decreases during a solar flare. The median height of reflection is between 69 and 76 km for 16 kc/s. It decreases down to 12 km during a solar flare. The same model can explain the change of the frequency spectrum of atmospherics during a solar flare. (Met. Abst. 11E-163.)--Author's abstract.

D-863 Von Klüber, H., Beobachtungen der Sonnenfinsternis vom 25 Februar 1952 im Sudan. (Observations of the solar eclipse of Feb. 25, 1952 in the Sudan.) Naturwissenschaften, 39(9):199-206, May 1, 1952. 9 figs., 10 refs. DWB--A brief introduction describes the physics of the sun and its relation to the ionosphere, and radio astronomy. The work of the 16 expeditions (including 4 from U.S.A.) in or near Khartoum on these is then summarized. (Met. Abst. 4.5-251.) --C.E.P.B.

D-864 Wachtler, Maximillian, Funkpeilungen des ersten kunstlichen Erdsatelliten Sputnik. (Radio bearing taken from the first artificial satellite of the earth, Sputnik.) Deutsche Hydrographische Zeitschrift, Hamburg, 10(5):169-175. 6 figs., table, 2 refs. German, English and French summaries p. 169. DWB--Information is given about the radio bearings taken from the first satellite Sputnik on Oct. 16 and 17, 1957, on a frequency of 20,005 Mc. A special feature is that the results obtained by application of the twin channel visual direction finder are pure line indications. The different series of observations show a variation of the bearings in a clockwise direction as well as in anti-clockwise direction, covering angles between circ. 4° and 171°. These bearings for a shortwave transmitter beyond the ionosphere were compared with bearings for two very distant stations on nearly identical frequencies which both show the elliptical split being characteristic of coherent waves. (Met. Abst. 12.7-73.)--Author's abstract.

D-865 Wait, James R. (Nat'l. Bureau of Standards, Boulder, Colo.), The attenuation vs. frequency characteristics VLF radio waves. Institute of Radio Engineers, N.Y., Proceedings, 45(6):768-771, June 1957. 10 figs., 7 footrefs., eqs. DLC--The theoretical dependence on frequency of the attenuation of the wave guide modes in VLF propagation is discussed in some detail. It is indicated that most of the published experimental data between 1 and 30 kc was compatible with the sharply bounded model of the ionosphere with a reflecting height of about 70 km during the day and 90 km during the night. (Met. Abst. 9.8-158.)--Author's abstract.

D-866 Wait, J.R., A survey and bibliography of recent research in the propagation of VLF radio waves. U.S. National Bureau of Standards, Technical Note, 58, May 1960. Ground wave propagation, 38 refs.; Characteristics of the lower ionosphere, 16 refs.; General theories for propagation in inhomogeneous medium, 15 refs.; Calculations of ionospheric reflection coefficients, 26 refs.; Measured ionospheric reflection coefficients (VLF), 11 refs.; Mode theory of ELF and VLF ionospheric propagation, 51 refs.; Theory of the propagation of pulses in ELF and VLF ionospheric propagation, 9 refs.; Characteristics of lightning discharge, 29 refs.; Atmospheric wave forms (VLF), 29 refs.; Atmospheric wave forms (ELF), 18 refs.; Measured amplitude characteristics of VLF fields, 18 refs.; Measured phase characteristics of VLF fields, 18 refs.; Noise (ELF), 16 refs.; Whistlers and magneto-ionic duct propagation, 26 refs.; Exosphere and Dawn Chorus, 9 refs. --

The survey is confined primarily to terrestrial propagation. Solar and exospheric phenomena generally excluded.

D-867 Waldmeier, Max, Ein neuer Effekt chromosphärischer Eruptionen. (A new effect of chromospheric eruptions.) Naturwissenschaften, 44(16):439, Aug. 15, 1957. fig. DWB--An eruption was seen on E limb of sun, 1046-1230 world time, on April 16, 1957. There was total fading (Mögel-Dellinger effect) on 5320 m and increase on 1950 m. (Met. Abst. 8.11-279.)--C.E.P.B.

D-868 Waldmeier, M. (Zürich), Fortschritte der Radioastronomie. (Progress in radio astronomy.) Naturwissenschaftliche Rundschau, Stuttgart, 12(7):243-254, July 1959. 9 figs., 3 tables. DWB, DLC--The progress in radio astronomy, as presented at the symposium of the Astronomical Union and Radio Union held in Paris, July 30 to Aug. 6, 1958, is reported on under the subjects: moon, planets and comets, and especially on the sun. The radio emission of the calm sun, the radiation of coronal condensations, of R areas, radiation eruptions, the radio astronomical exploration of the outer corona, and solar terrestrial relations are dealt with. Technical problems are discussed under the following headings: structure of our stellar system, observations on radio sources, their optical identification, and hydrogen in galactic and extra-galactic star systems. Photographs of the 25 m radiotelescope of the Maryland Point Observatory, of the 15 m radiotelescope of the Naval Research Laboratories, Washington, and of the expanding gas mist shell in Cygnus, taken by the 25 m Schmidt Refractor at Mt. Palomar, are among the illustrations. (Met. Abst. 11.9-105.)--O.T.

D-869 Warren, E. and Muldrew, D., A method for computing ionospheric focusing of radio waves, using vertical incidence ionograms. Institute of Radio Engineers, New York, Transactions, Vol. AP-9(4):403-409, July 1961. 15 figs., 14 refs., 19 eqs. DLC--The dependence of the signal strength of radio waves upon ionospheric focusing and spatial attenuation is calculated for a spherical ionosphere in terms of parameters obtainable from the appropriate vertical incidence ionogram. The signal strength at any given distance can be presented as a function of these ionospheric parameters in the form of a contour chart from which the unabsorbed field strength can be obtained easily as a function of frequency. The geometrical optics approximation is used. The limits of the region at the skip distance for which this method fails are estimated by comparing the results of a ray and a wave type calculation. --Authors' abstract.

D-870 Warwick, Constance (Nat'l. Bur. of Standards, Boulder, Colo.) and Warwick, J. W. (High Altitude Obs., Boulder, Colo.), Flare associated bursts at 18 Mc/s. (In: Paris Symposium on Radio Astronomy, July-Aug. 1958, (Proceedings), pub. Stanford Univ. Press, 1959. p. 203-207. 4 figs., table, 9 refs. DLC--This study is limited to those bursts closely associated with an SCNA, and with a reported flare or SWF. The relation to bursts at other frequencies to associated flares and to geomagnetic disturbances were investigated. It is concluded that while flares or SCNA's with associated 18 Mc/s bursts provide a promising means of forecasting geomagnetic disturbance, they appear to offer no essential improvement over forecasts made on the basis of optical flares characteristics and radio noise bursts at higher frequencies. Despite the higher level in the solar atmosphere at which the 18 Mc/s disturbance occurs, the relation to geomagnetism does not sharpen. --E. Z. S.

D-871 Warwick, C. and Wood, M. (both, Nat'l. Bur. of Standards, Boulder, Colo.), A study of limb flares and associated events. Astrophysical Journal, Chicago, 129(3):801-811, May 1959. 6 figs., 4 tables, 14 refs. DWB, DLC--Measured heights of limb flares were used to derive a frequency distribution of flare height and to assess the importance of height in the production of flare associated events. The observed height distributions can be explained by a real distribution with maximum at zero, decreasing toward greater heights. The occurrence of SWF (short wave fadeout) depends strongly on flare height. This dependence could be explained as an effect either of absorption of the ionizing radiation in the sun's atmosphere or of a mechanism of production of ionizing radiation that depends critically on the height of the flare. Center-to-limb variation of SWF occurrence, while not conclusive, favors the former interpretation. The relation between optical flare characteristics and occurrence of associated bursts of radio noise is strongest for decimeter bursts and weaker for bursts at meter wave lengths. (Met. Abst. 11.5-100.)--Authors' abstract.

D-872 Warwick, James W., Research carried out June 15-Sept. 15, 1955, (at the High Altitude Observatory). Colorado Univ. High Altitude Observatory, Climax, Contract AF 19(604)-1491, Scientific Report, No. 1, Jan. 10, 1956. 9 p. 8 refs., 13 eqs. DWB--

Pt. IV, p. 6-8, gives the results of the author's solution of the problem of wave propagation of discrete radio noise sources in the ionosphere, assuming an accumulation of net charge in a magnetic field and with oblique incidence of the wave on a stratified region for normal incident, reflected, and transmitted waves. This solution was found to have been worked out previously by K.C. WESTFOLD in Australia (1949). Notes on the author's visit to the Jodrell Bank Radio Observatory in connection with the International Astronomy Conference at Dublin are included. (Met. Abst. 9A-140.) --M. R.

D-873 Warwick, J. W., Current (Sept. 1955) status of English and French radio astronomy research on ionospheric and atmospheric problems. Colorado. Univ. High Altitude Observatory, Climax, Contract AF 19(604)-1491, Scientific Report, No. 2, Jan. 8, 1956. 5 p. DWB--A summary of research under way at Manchester Univ., Cambridge, London, and Paris, along the lines of radio star scintillation measurements at VHF range, to determine ionospheric winds, eclipse results in June 30, 1954 and studies of scattering at 9350 Mc/s based mainly on unpublished work. (Met. Abst. 9A-139.)--M. R.

D-874 Warwick, J. W. and Zirin, H., (Comments on) Chubb, T. A.; Friedman, H.; Kreplin, R. W. and Kupperian, J. E., Jun.: Rocket observation of X-ray emission in a solar flare. Nature, London, 180(4584):500-501, Sept. 7, 1957. 8 refs. Reply by Chubb et al. Ibid., p. 501-502. DWB--On July 20, 1956, during a solar flare which gave normal Lyman Alpha and enhanced X-ray emissions from the sun, cosmic noise fell to 93% of average at 1912 U.T., becoming normal again by 1920. The origin of 3-A-X-rays is discussed; the possibility is considered that they are produced locally in the earth's atmosphere. CHUBB et al. point out that X-rays were detected only when the photon counter in the rocket could "see" the sun. The X-ray source increased electron density in the D layer by 40%. (See ref. D-126.) (Met. Abst. 9B-166.)--C. E. P. B.

D-875 Warwick, J. W. and Zirin, H., Research carried out Oct. 1-Dec. 31, 1956 (at the High Altitude Observatory). Colorado. Univ. High Altitude Observatory, Climax, Contract AF 19 (604)-1491, Scientific Report, No. 6, April 1, 1957. 6 p. 2 figs., 9 refs., 7 eqs. DWB (M10.535 C719s)--Construction of the 18 Mc/s wide angle interferometer continues through the report period. The antenna superstructures were essentially completed, in unassembled form, receiver tests on Ewen-Knight Radio Astronomy Receiver Model 1620 continued, but were not completed during the period. In view of the incomplete status of the equipment, we decided to devote time to analysis of the records from the IGY Radio Flare Detector, constructed at HAO with funds from another source. The records show the intensity of cosmic noise (at 18 Mc/s) vertically incident through the ionosphere. We are able to derive from these records the march of electron density as a function of time of day and height in the D region. Surprisingly, we also can discuss the variation of recombination coefficient within a limited height range of the D region. The electron density curves fit, more or less, those derived in different ways by other groups. On the other hand, we predict that the recombination coefficient either is constant with height (in the D region), or increases upwards. (Met. Abst. 11F-149.)--Authors' abstract.

D-876 Warwick, J. W., Radio observations of Soviet satellites, 1957 Alpha 2 and 1957 Beta 1. International Geophysical Year, 1957/1958. IGY World Data Center A (Rockets and Satellites), National Academy of Sciences, Wash., D.C., IGY Satellite Report Series, No. 5, July 30, 1958. 50 p. 26 figs., table, 47 eqs. Also issued as: Colorado. Univ. High Altitude Observatory, Boulder, Scientific Report, No. 10, DWB (629.1388 W299ra)--A report is given on the preliminary results of the analysis of U.S. 20 Mc/s radio observations of Soviet satellites 1957 α 2 and 1957 β 1, the problems involved, the cataloguing of various kinds of ionospheric fading, the interferometric effects of these satellites and the basic fading on the records. Details on the spin-fading characteristics of rotating and circularly polarized antenna systems are also discussed and analyzed in full. (Met. Abst. 11.1-109.)--N. N.

D-877 Warwick, J. W., Measures of ionospheric absorption and refraction at 18 megacycles/second. Colorado. Univ. High Altitude Observatory, Contract AF 19(604)-1491, Final Report, Dec. 15, 1958. 9 p. 2 figs., 10 refs. DWB (M10.535 C719s)--Ionospheric absorption and refraction at a frequency of 18 Mc/s has been measured by means of the techniques of radio astronomy. A description of the two experiment techniques used is given in this report. (Met. Abst. 11F-150.)--N. N.

D-878 Watts, J. M. (Nat'l. Bur. of Stand., Boulder, Colo.), Audio-frequency electromagnetic hiss recorded at Boulder in 1956. Geofisica Pura e Applicata, Rome, 37(169-173, 1957. 4 figs., 3 refs. DLC--Hissing noise is very frequently heard on receivers used for detecting whistlers during geomagnetic disturbances. This phenomenon may be associated with the "dawn chorus" or whistlers, but is distinct from either and also from sferics. The energy is concentrated in narrow band widths that fluctuate, giving a surging rather than a steady hissing effect. Relative amplitude of the hiss, compared with the geomagnetic field records, is shown graphically. The hissing begins about 8 hrs after the rapid commencement of the storm. Records show the peak energy of the hiss was near 3 kc. Variations in spectra of hiss frequency are illustrated by numerous reproduced records from March-Dec. 1956, hissing was heard on 9 out of 15 major magnetic storms recorded at Boulder, Colo., at Sunset Field Station. (Met. Abst. 10.1-134.)--M.R.

D-879 Watts, J. M. (Nat'l. Bureau of Standards, Boulder, Colo.), An observation of audio frequency electromagnetic noise during a period of solar disturbance. Journal of Geophysical Research, Wash., D.C., 62(2):199-206, June 1957. 5 figs., 6 refs. DLC--An unprecedented cosmic ray increase occurred on Feb. 23, 1956. Recording apparatus for the regular collection of examples of whistlers began operating at Boulder, Colo., on the evening of Feb. 26 – when hissing noise was being received. A narrow band receiver tuned to 15 kc showed no response to hiss on Feb. 26 but on March 3 noise was heard. Instead of being a steady hiss, the narrow band noise oscillated in amplitude, rising and falling with a period of about 2 sec. This suggested a changing spectrum in the vicinity of 15 kc. Pictures of the spectra are shown. Their essential features are: each spectrum was quite narrow. The center frequency was near 3 kc. The high frequency side of the peak in energy showed significant variation from hour to hour. The correlation of hiss amplitude with magnetic record is shown for March 3-4, 1956. The strong hiss was followed by only a small enhancement of the night airglow in the north. The hiss started 8 hrs after the initial field perturbation, but the fact that it coincided with the reversed phase may be significant. (Met. Abst. 12.7-142.)--E.Z.S.

D-880 Webster, H.C. (Physics Dept., Univ. Queensland, Brisbane), A study of "spread F" ionospheric echoes at night at Brisbane, Pt. 4, Range spreading. Australian Journal of Physics, Melbourne, 11(3):322-337, Sept. 1958. 10 figs., 8 refs., 20 eqs. DLC--In the course of investigations of satellite echoes from the F region of the ionosphere, it was noted that F and Es traces recorded at night, on h't equipment at frequencies well below vertical, are broader than anticipated and tend to change in a characteristic manner as the gain of the receiver is lowered. In this paper, a quantitative explanation of these phenomena is elaborated, based on the postulate of a "rough" ionosphere. This theory leads to a method whereby, from the swept-gain h't records, estimates of roughness index can be formed. These estimates compare satisfactorily, on a statistical basis, with estimates by other methods. The theory is extended to the case of multiple hop reflections, and to the satellite traces; general agreement with experiment is found. Evidence is presented that the ionosphere appears rougher when transmitter and receiver are adjacent than when they are widely separated, and a tentative explanation is suggested. From the roughness indices, the relative intensities of Z- and O-mode F echoes for Brisbane are computed and the rare appearance of Z traces on Brisbane records is satisfactorily explained. (Met. Abst. 11F-154.)--Author's abstract.

D-881 Weisbrod, S. (Smyth Res. Assoc., San Diego, Calif.) and Colin, L. (Griffiss AF Base, Rome, N.Y.), Refraction of very high frequency radio signals at ionospheric heights. Nature, London, 184(4680):119, July 11, 1959. fig., 2 refs. DWB--A note and a graphical representation related to the subject of refractive errors caused by the Earth's atmosphere in the elevation angle determination. It is shown that in the case of radio tracking of space vehicles, the refractive errors due to the troposphere rapidly decrease with an increase in the elevation angle, while those due to the ionosphere initially increase with the elevation angle, and then gradually fall off. (Met. Abst. 11.11-59.)--I.S.

D-882 Wells, H.W. (Carnegie Inst. of Washington, D.C.), Ionospheric effects of solar eclipse at sunrise, Sept. 1, 1951. Journal of Geophysical Research, 57(2):291-304, June 1952. 9 figs., 6 refs., 3 eqs. MH-BH--Ionospheric observations at three stations in Maryland and Virginia during annular eclipse of Sept. 1, 1951 did not show significant increases of ion production. They indicate that coronal radiation is not an important factor in production of F2 ionization. (Met. Abst. 5.1-119.)--C.E.P.B.

D-883 Wells, H.W. (Carnegie Inst. of Wash., Wash., D.C.), F - scatter at Huancayo, Peru, and relation to radio star scintillations. Journal of Geophysical Research, 59(2):273-277, June 1954. 2 figs., 6 refs. MH-BH--The scattering of radio waves by the F region of the ionosphere at an equatorial location (Huancayo, Peru) was discussed by BOOKER and WELLS (1938). Subsequent analysis reveals pronouncedly diurnal, seasonal, and annual characteristics. It is fundamentally a night time event, with greatest frequency of occurrence in the period from four hours before midnight to four hours after midnight. The scattering is most prevalent during seasons when the sun is overhead and is infrequently observed during May, June, July, and August (local winter) when the noon solar zenith angle becomes as great as 35°. The relative total annual occurrence of F region scatter for the period 1938 through 1945 shows low values during 1941-1942, followed by a rapid increase through 1946, which is not closely related to solar activity. The diurnal properties of F scatter closely correspond to reported characteristics of radio star scintillations with peak activity around midnight. However, the annual or seasonal properties are not in simple agreement. (Met. Abst. 6D-270.)--Author's abstract.

D-884 Westerhout, Gart, Het Radioastronomische Symposium in Jodrell Bank. (Radio Astronomy Symposium at Jodrell Bank.) Hemel en Dampkring, The Hague, 54(1):4-13, Jan. 1956. DWB, DLC--An account of the results of astronomic research carried out with radiotelescopes: studies on the 21 cm line, in the vicinity of Orion, heavy water in the universe and absorption of radio sources by hydrogen clouds. The supernova Cassiopeia A, the possible existence of a radio galactic system, and the limit of the universe are summarized. Photographs of radiotelescope installations, of hydrogen clouds around the Orion association, of the first radio astronomy star map, etc., are included. (Met. Abst. 8.11-39.)--I. L. D.

D-885 Westerhout, G., The radio galaxy. Scientific American, N.Y., 201(2):44-51, Aug. 1959. figs. DLC, DWB--Radio astronomical observations show the spiral structure of our galaxy, with outward surging waves of hydrogen. The spiral arms of the nebula have their origin near the center of the Milky Way in the constellation Sagittarius. Interstellar clouds of dust obscure this spiral structure from visual telescopes but not from radio telescopes. Much of the fine structure of the galaxy has been observed and mapped on 21 cm wave length at the Leiden Observatory's 82 ft radio telescope at Dwingelov. Different wave lengths show up different features on radio maps. Details of telescope and records, and explanation of thermal and nonthermal radiation are presented in this article and illustrated. Origin of new stars is also explained from new data. (Met. Abst. 11.8-74.)--M. R.

D-886 Westfall, W. D. (U.S. Navy Electronics Lab., San Diego, Calif.), Prediction of VLF diurnal phase changes and solar flare effects. Journal of Geophysical Research, Wash., D. C., 66(9):2733-2736, Sept. 1961. fig., 2 tables, 6 refs., 10 eqs. DLC--VLF diurnal phase shift data are compared with predictions resulting from the wave guide equations for the first order mode. The effects of higher order mode energies appear to exist out to 2700 km, and may at times affect measurements beyond this range. A relation is given for the prediction of diurnal phase shift for 10-20 kc radio waves. Expressions are given for relating observed VLF phase perturbations caused by both small and large solar flares to the resulting apparent decreases in ionospheric reflecting height. (Met. Abst. unpub.)--Author's abstract.

D-887 Wexler, Raymond (Allied Res. Assoc., Inc.), Satellite observations of infrared radiation. U.S. Air Force. Cambridge Research Center, GRD Research Notes, No. 36: 153-180, June 1960. 13 figs., 3 tables, 13 eqs. DWB--A discussion of the proposed meteorological satellites carrying several infrared sensing elements intended to provide information on the infrared properties of the atmosphere. From available experimental data on absorptions by atmospheric gases, atmospheric transmissions in the infrared have been determined. The actual amounts of radiation which may be expected to leave the top of the atmosphere over the U.S. on a specific occasion (March 6, 1959, 000Z) are mapped for the "window" regions, the 6.3 μ H_2O, the 15 μ, the 4.3 μ CO_2 and ozone bands. For the H_2O band, computations are made at air masses (secant of the zenith angle) for zenith angles of 0^o, 60^o and 81.5^o. (Met. Abst. 11J-194.)--I. S.

D-888 Whale, H. A. (Seagrove Radio Res. Station, New Zealand), The effects of ionospheric irregularities and the auroral zone on the bearings of short wave radio signals. Journal of Atmospheric and Terrestrial Physics, London, 13(3/4): 258-270, Feb. 1959. 8 figs., 12 refs., 5 eqs. DLC--The nature of the observed variations in the received bearing of the signals from short wave radio stations at various distances is discussed and the origins of some of the effects are suggested. The major part of the daily variation of bearing of stations up to about 15,000 km distant arises from the refraction of the ray in the F1 region when it is reflected from the F2 region. A discussion of the curving of the ray path by successive small changes of direction at each reflection point leads to the concept of an antipodal area replacing the geometrical antipodal point. The large changes in direction associated with the passage of a ray through the auroral regions suggest a method of plotting the shape of the absorbing parts of the auroral zone by observations at a place remote from this zone. A sample plot obtained by this method is presented. (Met. Abst. 12.4-357.)--Author's abstract.

D-889 Wheelon, A. D. (Space Technology Labs., Inc., Los Angeles, Calif.), Relation of turbulence theory to ionospheric scatter propagation experiments (summary only). Journal of Geophysical Research, Wash., D.C., 64(12): 2230-2231, Dec. 1959. ref., eq. DLC--The subjects discussed are: 1) statistical behavior of ionospheric scatter signals; 2) scattering of electromagnetic waves by turbulent irregularities; 3) spectrum of electron density deviations and its relation to turbulence; 4) signal level and scattering heights, and finally, 5) an explanation is given of some SID features in terms of increased attenuation. (Met. Abst. 11E-168.)--W. N.

D-890 Whipple, Fred L. and Davis, Robert J. (both, Smithsonian Astrophysical Obs., Cambridge, Mass.), Proposed stellar and interstellar survey. Astronomical Journal, New Haven, Conn., 65(5):285-290, June 1960. 6 figs., 15 refs. DLC--Previous planning for the design, construction and operation of an astronomical telescope in a satellite orbit was presented by members of the Smithsonian Astrophysical and Harvard College Observatories (R. J. DAVIS, R. E. MC CROSKY, F. L. WHIPPLE and C. A. WHITNEY, Astron. J. 64, 50, 1959). Further elaboration of these plans is presented, including possible systems for measuring bright line radiation of the interstellar medium and obtaining slitless spectra of stars, as well as a broad survey of the entire sky in three colors between 1000 and 3000 A. With the support of the National Aeronautics and Space Administration the design program is under way at the Smithsonian Astrophysical Observatory. Plans are also developing for an Aerobee rocket firing in late 1960 or early 1961 in which a TV image tube system covered by a multicolor mosaic filter can produce a preliminary shallow survey of both nebulosity and bright stars over a strip of the sky some 150° by 4°. Since the rocket will be neither precisely stabilized nor controlled at high altitudes, the exact position of the observational strip can only be approximated. Direct image photographs of stars and nebulosity, however, will be available in spectral regions from below Lyman-alpha to approximately 2000 A. The Westinghouse Electric Corporation has under-taken the development of special materials for TV image tubes sensitive to spectral regions in the far UV. The precise spectral regions in which the rocket and satellite experiments will be conducted depend upon these developments. The astrophysical significance is discussed of the proposed experiments in the regions of Lyman-alpha and above for stars and interstellar material. (Met. Abst. 11L-30.)--Authors' abstract.

D-891 Whitehead, J. D., The absorption of short radio waves in the D, E, and F regions of the ionosphere. Journal of Atmospheric and Terrestrial Physics, N. Y., 16(3/4):283-290, Nov. 1959. 6 figs., 16 refs. DWB, DLC--The published values of the noon absorption of radio waves of frequencies 2, 2·4, 4 and 4·8 Mc/s measured at Slough from 1947 to 1953 have been analyzed. From the absorptions of 2 and 2·4 Mc/s waves, it has been deduced that (a) the electronic collision frequency ν, at the height of the maximum electron density in the E region when the sun's rays are incident vertically on the ionosphere, is $(1.9 \pm 0.1) \times 10^4$ per sec; and (b) the normal absorption in the D region increases with increasing sunspot number, whereas the additional absorption which occurs on certain winter days and arises in the D region may decrease with increasing sunspot number. The 4 and 4.8 Mc/s waves were reflected from the F region at noon. The absorption in the F region is calculated from the known total absorption and the calculated absorption in the D and F regions. The collision frequency in the F region may then be found. At the height of reflection of 4 Mc/s waves (150 to 180 km) it is $(3.6 \pm 0.6) \times 10^3$ per sec, and at the height of reflection of 4.8 Mc/s waves (180 to 200 km) it is $(3.0 \pm 0.6) \times 10^3$ per sec. The significance of these results is discussed. (Met. Abst. 11F-157.)--Author's abstract.

D-892 Whitehurst, R. N.; Mitchell, F. H. and Copeland, J., Solar radiation and atmospheric attenuation measurements in the 7 to 8 mm wavelength range. American Physical Society, Bulletin, 1(5):265, June 21, 1956.--Application of Dicke radiometer constructed by the authors.--CSIRO abstract.

D-893 Whitehurst, R. N. and Mitchell, F. H. (both, Univ. of Alabama, Univ., Ala.), Solar temperature and atmospheric attenuation in the 7-8 mm wavelength range. Institute of Radio Engineers, N. Y., Proceedings, 44(12):1879-1880, Dec. 1956. fig., 6 refs. DLC--A record showing results of a transit of sun through antenna beam of a 7.5 mm radiometer lasting about 14 min indicates antenna temperature of 720°K when sun is in beam. This and other tests give sun temperature - 6000 ± 500°K, and values of vertical attenuation of 0.3 to 0.6 db for weather ranging from clear to overcast with moderate rain. Solar temperatures are in keeping with those expected, but attenuation in cloudy and rainy weather is somewhat smaller than anticipated. A Dicke type radiometer, and 18 in. paraboloidal antenna were used. (Met. Abst. 11.5-163.)--M. R.

D-894 Whitfield, G. R. and Högbom, J. (both, Mullard Radio Astronomy Obs., Cambridge, Eng.), Radio observations of the comet Arend-Roland. (In: Paris Symposium on Radio Astronomy, July-Aug. 1958, (Proceedings), pub. Stanford Univ. Press, 1959. p. 56-57. table, 2 refs.) DLC (QB475. P26)--A note on the observations made at Cambridge, England, between March 12 and May 13, 1957 of the comet Arend-Roland. The observations were made with five different instruments including two interferometers of large resolving power. The possibility of radio emission from the extended tail was investigated by observing radio stars through it. No detectable effect was observed. The upper limits of the flux density are presented in tabular form.--I. S.

D-895 Whitney, H.; Strick, H.; Aarons, J. et al. (all, A.F. Camb. Res. Lab., Bedford, Mass.), Sudden amplitude variations of Sputnik III signals. Journal of Geophysical Research, Wash., D.C., 65(12):4210-4212, Dec. 1960. 3 figs., ref. DLC--Amplitude recordings of the 20 Mc/s signals from Sputnik III (1958 Delta II) were made at the Sagamore Hill Radio Observatory in Massachusetts. An interesting feature of the recordings was the presence of "dropouts", i.e. sudden decrease of the signal either to noise level or close to noise level. Two different types of events responsible for these dropouts are postulated. One event is wide in geographical extent and the other is a localized effect which is frequency dependent. The dropout was due mainly to changing transmitter characteristics resulting in reduced power output. The cause of the changing characteristics was that the satellite had entered a region of high electron flux. In the instances in which dropout was observed at some locations or frequencies and not at others, the reduced signal was due to the intervening medium rather than to the transmitter itself. The two causes are best differentiated by taking simultaneous observations at several geographical positions.--E. Z. S.

D-896 Wild, J. P. and McCready, L. L., Observations of the spectrum of high intensity solar radiation at metre wavelengths. I. The apparatus and spectral types of solar burst observed. Australian Journal of Scientific Research, Ser. A, Physical Sciences, 3(3):387-398, Sept. 1950. 3 figs., 2 plates (one fold.), table, 7 refs., 6 eqs., append. DWB--The authors describe the apparatus and method for recording the spectrum of the high intensity radio frequency radiation emitted by the sun in the frequency range 70 - 130 Mc/s. Results indicating the different kinds of spectra in solar bursts and the relationship of these bursts to those observed by means of single frequency equipment are discussed. A special discussion on the effective area and design of the rhombic aerial, which is used to receive the radiation, is appended. (Met. Abst. 2.8-82.)--I.L.D.

D-897 Wild, J. P., Observations of the spectrum of high intensity solar radiation at metre wavelengths. II. Outbursts. Australian Journal of Scientific Research, Ser. A, Physical Sciences, 3(3):399-408, Sept. 1950. 2 figs., 2 fold. plates, 2 tables, 18 refs., eqs. DWB--The author describes observations of the spectrum of solar radio frequency radiation in the frequency range 70-130 Mc/s. The apparatus and method of recording the spectrum is described in article by WILD and MC CREADY. The correlation of outbursts and other solar radio frequency emissions with solar flares and magnetic storm is discussed. The spectra are interpreted as the result of "surge" prominences in the solar atmosphere and the factor causing the surge phenomenon corresponds to the particles that bring about terrestrial magnetic storms. (Met. Abst. 2.8-83.) --I.L.D.

D-898 Wild, J. P., Observations of the spectrum of high intensity solar radiation at mètre wavelengths. III. Isolated bursts. Australian Journal of Scientific Research, Ser. A, Physical Sciences, 3(4):541-557, Dec. 1950. 7 figs., 4 plates, tàble, 12 refs., eqs. DLC--Elaborate colored graphs show the time-intensity relationships of solar radiation "bursts" of various frequencies between 70 and 130 Mc/s in support of article which gives a thorough analysis of observations made at Sydney, Australia, during June 1949. Thirty-two isolated bursts were recorded in 264 hrs of observation and 3 types of bursts defined; energy spectra are given for 4 isolated bursts, and a good correlation shown between frequency and energy distribution. (Met. Abst. 3.9-127.)--M.R.

D-899 Wild, J.P., Observations of the spectrum of high intensity solar radiation at metre wavelengths. IV. Enhanced radiation. Australian Journal of Scientific Research, Ser. A, Physical Sciences, 4(1):36-50, March 1951. 9 figs., plate, refs. DLC--In this final paper of a series, author refers to the theoretical work by other scientists and after briefly summarizing their work gives a detailed analysis of the high intensity solar radiation at 70-130 Mc/s. The results indicate that "storm bursts" (i.e., short lived narrow band bursts) have defined properties and suggest a possible new approach to the theoretical problem of the "enhanced radiation." (Met. Abst. 5.6-133.)--W.N.

D-900 Wild, J.P. and Roberts, J.A., Regions of the ionosphere responsible for radio star scintillation. Nature, London, 178(4529):377-378, Aug. 18, 1956. fig., 3 tables, 6 refs. DWB--Observations of scintillations of radio source in Cygnus A at 15° elevation from Dapto, N.S. Wales, 1952-55, showed nighttime correlation with spread F and daytime with sporadic E. Fluctuations were greatest at midnight in midwinter and noon in mid summer. At night only there is a W-E component of motion of 80 m/s across the ground, which is attributed to the effect of the earth's rotation on stationary irregularities at 500 km. (Met. Abst. 8.2-298.)--C.E.P.B.

D-901 Wild, J.P. and Roberts, J.A., The spectrum of radio star scintillations and the nature of irregularities in the ionosphere. Journal of Atmospheric and Terrestrial Physics, 8(1/2):55-75, Feb. 1956. 17 figs., table, 15 refs. DWB--Observations were made at Sydney, Australia, on the radio source in Cygnus, of intensity at one point as a function of time and frequency (40-70 Mc/s), the phase gradient as a function of time, and the intensity at 45 Mc/s at corners of a triangle. Instrumental set-up is described and specimen records shown and discussed. The spectra suggest that most of the irregularities are due to focusing by single lenslike irregularities. The scale size of structures causing spectral patterns is above 3 km. In some cases random effects predominate, due to finer structure. Degree of fluctuation shows maxima near midnight (winter) and midday (summer). In many cases the pattern on the ground is very elongated (3 or 4 to 1). Apparent motion was mainly W - E, 80 m/s, in winter, variable in summer. (Met. Abst. 7.8-116.)--C.E.P.B.

D-902 Wild, J.P. (Div. of Radiophysics, C.S.I.R.O., Sydney) and Zirin, H. (High Altitude Obs., Univ. of Colorado, Boulder), On the association of solar radio emission and solar prominences. Australian Journal of Physics, Melbourne, 9(3):315-323, Sept. 1956. 6 figs., 6 refs. DLC--Prominence cinematograms made at Sacramento Peak and Climax in the years 1949-55 have been examined and compared with the solar radio records at 167 Mc/s. No close connection was found between limb events and radio events, but some eruptions were found to be associated with simultaneous radio bursts. Three such cases are discussed in detail. The limb passages of large sunspots in 1949-55 were studied on both cinematograms and single exposure surveys with the view of finding a criterion for radio-noisy spots. It was found that spot groups showing looped prominences and downward streaming from the corona showed a marked tendency to produce radio noise storms. This result is ascribed to the fact that the seat of such storms must lie in the corona and in the presence of strong ordered magnetic fields. (Met. Abst. 9A-141.)--Authors' abstract.

D-903 Wild, J.P. (Radiophysics Div., C.S.I.R.O., Sydney), Solar radio noise and the study of corpuscular streams from the sun. (In: Solar eclipses and the ionosphere: a symposium... ed. by W.J.G. Beynon and G.M. Brown. London, Pergamon, 1956. p. 258-260. 2 figs., 2 refs.) DWB--Observations in Australia over several years with a dynamic spectroscope covering the frequency range 40 - 240 Mc/s have shown that most sporadic bursts of radio emission from the sun fall into two distinct spectral classes, having quite discrete ranges of outward radial velocity. Both types of radio burst may occur at the time of solar flares. It is thought that the slower velocities may be associated with the outrush from the sun of geomagnetic storm particles, while the very fast range of velocities may be associated with the ejection from the sun of the agency responsible for the increase in cosmic rays sometimes observed about one hour after flares. (Met. Abst. 9A-142.)--Author's abstract.

D-904 Wild, J.P. and Sheridan, K.V., A swept frequency interferometer for the study of high intensity solar radiation at meter wavelengths. Institute of Radio Engineers, N.Y., Proceedings, 46(1):160-171, Jan. 1958. 15 figs., 16 refs., 15 eqs. DLC--The instrument described and discussed is capable of measuring the one dimensional position and angular size of a transient source on the sun's disk, determines the polarization and intensity of the received radiation as a function of frequency 40-70 Mc/s. The two antennas of the main interferometer are spaced at a 1 km east-west line. The two antennas of the polarization system are erected on a common axis maintained in the direction of the sun. Some preliminary observations have given an indication of the spectrum of source size for activity of spectral types I and III. In both cases the angular size is found to decrease from about 10 min of arc at 45 Mc to about 6 min of arc at 65 Mc. (Met. Abst. unpub.)--Authors' abstract.

D-905 Wild, J.P.; Sheridan, K.V. (both, C.S.I.R.O., Univ. Grounds) and Neylan, A.A. (Mt. Stromlo Obs., Canberra), An investigation of the speed of the solar disturbances responsible for type III radio bursts. Australian Journal of Physics, Melbourne, 12(4):369-398, Dec. 1959. 16 figs., 18 refs., 11 eqs. DLC--The paper describes an investigation aimed at finding out whether solar radio bursts of spectral type III are due to disturbances which travel out through the corona with velocities exceeding 0.1 c, as predicted by the well known hypothesis that the emissions are due to plasma oscillations. If the proposition is correct, emissions at different frequencies would be generated at different levels in the corona – the lower the frequency the higher the source. This property is tested by simultaneous directional observations at a number of frequencies between 40 and 70 Mc/s, using a swept frequency interferometer. The system and performance of the interferometer are described and errors in position finding due to ionospheric refraction are discussed. Results for type III bursts show that different frequencies are generated at different levels in the corona according to the predicted sequence; they therefore strongly support the plasma hypothesis. It is concluded that the corona is considerably denser in the regions where type III sources are generated than in the average corona as depicted by conventional models; and an origin in coronal streamers is suggested. The derived velocities of type III disturbances are found to be considerably greater than those previously deduced from spectral data alone. The range of velocities now inferred extends from 0.2 c to 0.8 c, with an average of 0.45 c. The significance of these very high velocities is discussed. For this purpose new evidence is discussed relating to the "type V" continuum emission which follows certain type III events. The combined type III-V events, which are known to correlate closely with chromospheric flares and sub-flares, are interpreted in terms of streams of relativistic electrons with energies $\gtrsim$ MeV which travel along magnetic lines of force in spiral paths. It is suggested that, in its outward passage, such a stream excites plasma oscillations in the surrounding coronal gas (yielding the type III burst), while, under favorable circumstances, the electrons themselves emit synchrotron radiation (yielding the type V burst). A possible connection between the energetic solar electrons and the corpuscular radiation surrounding the Earth is suggested. (Met. Abst. 11. 12-62.)--Authors' abstract.

D-906 Williams, W. E., Jr., Space telemetry systems. Institute of Radio Engineers, N. Y., Proceedings, 48(4):685-690, April 1960. table, 14 refs. DLC--This paper presents some of the problems which are faced in the field of space telemetry, and gives a few examples of the approaches used in attempts to solve these problems to date. The different types of information to be transmitted back to receiving stations on the earth from satellites and space probes are discussed. The telemetry systems (FM/FM, FM/AM, PCM/PM, etc.) which have been used in various experiments of this type are described, along with some typical performance figures for some past payloads. The paper is concluded with a discussion of the problems to be faced in future experiments. (Met. Abst. 11. 12-486.)--Author's abstract.

D-907 Wilson, Raymond H., Jr. (Goddard Space Flight Cent., NASA, Wash., D. C.), Geomagnetic rotational retardation of satellite 1959 $\alpha 1$ (Vanguard II). Science, Wash., D. C., 131(3395):223-225, Jan. 22, 1960. fig., 9 eqs., 9 refs. DLC--Radio observations made during the battery life of Vanguard II showed that the satellite's rotation was being retarded exponentially at a rapid rate. Precise analysis of electromagnetic couples on the conducting and magnetic parts of the satellite indicates a mean ambient geomagnetic field of 0. 158 gauss, and confirms the eddy current theory previously applied to Vanguard I. (Met. Abst. 11. 12-553.) --Author's abstract.

D-908 Wilson, D. McL. A. (Cavendish Lab., Cambridge), Electron density measurements in the upper ionosphere using the Faraday rotation of radio signals from artificial satellites. Nature, London, 186(4725):623-624, May 21, 1960. fig., 2 refs. DWB--Several observers using the Faraday rotation of radio signals assumed that the ionosphere is spherically stratified. The signals of satellites 1957 δ 2 and 1958 δ 2, observed at Cambridge, have shown that the variation of the ionosphere with latitude and longitude must be taken into account near or below the peak of the F2 layer if results consistent with vertical incidence soundings are to be obtained.

The effect of the horizontal variation of the ionosphere is shown. On this occasion the satellite was slightly above the F2 layer peak. Satellite passes above the F2 peak indicate that the electron density falls off with a scale height of approximately 230 km and the average ratio of the total electron content above the peak to that below is 3.4 to 1. (Met. Abst. 11.12-378.)--E.K.

D-909 Witunski, Michael (McDonnell Aircraft Corp., St. Louis, Mo.), The system design of orbiting astrophysical laboratories: a report. Societe Royale des Sciences de Liege, Memoires in 8^{o}, 5th Ser., 4:60-85, 1961. DLC--A review of the design and construction of the Orbiting Astrophysical Laboratory is presented. The advantages of observations outside the terrestrial atmosphere are emphasized. The apertures of telescopes of 12 in. for stellar and 3 in. for solar observations will yield results unobtainable from most powerful ground instruments. In solar research the problem consists of obtaining a complete trace of the solar spectrum from the x-ray region to 3000 A with as high a spectral resolution as can be obtained. Telescope guidance and attitude control are discussed in relation to perturbation torques. The latter depend critically on the configuration design of the orbiting satellite, on the earth's magnetic field, the sun's radiation pressure, air drag and the earth's gravitational field. The control system may be achieved by several methods; among them, by the motion of a fly wheel or by gas pressure jets. The guidance system is envisaged by setting three telescopes on three north pole stars and three telescopes on three south pole stars. Various methods for obtaining observational accuracy and the dynamic interaction of all the systems in the control loop are discussed. The reliability of various satellite parts for a year's operation was tabulated. Transmission of information from the orbiting telescope to the ground stations and the reception, processing and recording of telemetered data on the stations are outlined. --S. N.

D-910 Wong, Ming S. (AFCRC Propagation Lab., Bedford, Mass.), Refraction anomalies in airborne propagation. Institute of Radio Engineers, Proceedings, 46(9):1628-1638, Sept. 1958. 16 figs., foot-refs., 5 eqs. DLC--Propagation at 250-10,000 mc often encounters dense fadings, radio holes, antiholes or radio ducting. These anomalies are portrayed by ray tracings using a differential analyzer which solves the simplified ray equation

$$\frac{d^2h}{dx^2} = \frac{n(h, x)}{h} + \frac{1}{a}$$

Both hypothetical-prototype and complex measured refractive index profiles of the atmosphere are used for the analog computation of the ray tracings which are interpreted to explain refraction anomalies in radio wave propagation, and are compared with signal strength measurements. They involve divergence of rays, and concentration and crossing of direct rays in multipath transmission. Resulting radar angular and range errors of arrival of interfering rays at the points where they cross, corroborating radio astronomical data on angular deviation of stars. (Met. Abst. 10.5-218.) --From author's abstract.

D-911 Woodward, R. H., A tentative model of the sun. Journal of Geophysical Research, 54(4):387-396, Dec. 1949. 30 refs. DWB--A theory of the circulation of ions in the earth's electric field is used as an analogy for the solar electric field, Sunspots, chromosphere, prominences and flocculi and corona are briefly described with references to the ionosphere, solar radio noise and cosmic rays. (Met. Abst. 2.5-50.)--C. E. P. B.

D-912 Wright, R. W.; Koster, J. R. and Skinner, N. J., Spread F-layer echoes and radio star scintillation. Journal of Atmospheric and Terrestrial Physics, London, 8(4/5):240-246, May 1956. 4 figs., 10 refs. DWB--Observations of radio star scintillation at Achimota and spread F layer scatter at Ibadan, both in Gold Coast, 510 km apart, showed an average correlation of 0.46 for 165 pairs. Diurnal and seasonal variations of spread F layers are plotted. These depend to some extent on the degree of magnetic disturbance; at Ibadan in winter the scatter on disturbed days is only a quarter that on quiet days. (Met. Abst. 7.10-308.)--C. E. P. B.

D-913 Yaplee, B. S.; Bruton, R. H.; Craig, K. J. and Roman, N. G., Radar echoes from the moon at a wavelength of 10 cm. Institute of Radio Engineers, N. Y., Proceedings, 46(1):293-297, Jan. 1958. 8 figs., 14 refs. DLC--Radar contact has been made with the moon with short pulses at 2860 Mc, beginning a program of short pulse lunar radar. The principal objective of the program is to obtain more accurate moon-to-earth distances than presently are known. Other information may result from the program, such as the earth's diameter, the interplanetary electron density, and the lunar surface characteristics. To date, the program has yielded the following results: earth-moon distances have been measured over several days with consistencies of less than one-half mile; several rough reflectivity measurements have been made which indicate that the radar cross section of the moon is 975 miles at 2860 Mc with pulses of 2 μsec duration, and the fine structure of echoes may be correlated with lunar topography. (Met. Abst. unpub.)--Authors' abstract.

D-914 Yee, James S. (Boeing Co., Seattle, Wash.), Mutual coupling of two thin infinitely long slots located on a perfectly conducting plane in the presence of a uniform plasma layer. Institute of Radio Engineers, N.Y., Proceedings, 49(12): 1837-1845, Dec. 1961. 10 figs., 15 refs., 82 eqs. DLC--The investigation of antenna coupling was motivated by a study of communication with a hypersonic vehicle which upon re-entry, introduces a plasma sheath over the antennas. The model chosen for analysis consists of two infinitely long thin slots on a ground plane covered by a uniform plasma layer which is assumed to be a lossless gaseous dielectric slab having a dielectric constant less than unity but greater than zero. The coupling effects are described in terms of a mutual admittance parameter in an equivalent π network from which other admittance parameters are derivable. The problem is formulated by spatial Fourier transforms which, upon inversion, would yield the desired results. The transform integral for the case of a thick plasma layer is evaluated approximately by the method of steepest descent. The results are explained in terms of multiple reflections of rays by the sharply defined plasma-air interface. When the quantities are plotted as functions of slot separation, the perturbations show up in the form of ripples about the curve for the unbounded plasma. In a realistic situation there is no well defined boundary and the rippling may show up in a statistical manner. The coupling effect is found to be less serious in the presence of a plasma than in its absence. When the operating frequency is appreciably higher than the plasma frequency, the change in driving point admittance is small. Also, inside a thick plasma layer, no unattenuating pole waves are excited. (Met. Abst. unpub.)--Author's abstract.

D-915 Yeh, K.C. and Swenson, G.W., Jr. (both, Univ. of Illinois, Urbana, Ill.), The scintillation of radio signals from satellites. Journal of Geophysical Research, Wash., D.C., 64(12):2281-2286, Dec. 1959. 6 figs., 8 refs. DLC--

Signals from satellites 1957 α2 and 1958 α2, recorded during a 20 month period, are analyzed to determine the diurnal and seasonal variations of the incidence of scintillation. Marked diurnal effects are noted, scintillation being much more frequent at night. Night time scintillation correlates with the occurrence of ionospheric 'spread F' and apparently originates in inhomogeneities at heights of about 220 km and, in most cases, at latitudes greater than 40° N. Daytime scintillation appears to originate in smaller, inhomogeneous regions below 220 km and more widely distributed in latitude. (Met. Abst. 11F-159.)--Authors' abstract.

D-916 Yeh, L.P., Communication in space. Electronic Industry and Teletechnique, 18(3):94-99, March 1959. 9 figs., 9 tables, 16 refs. DLC--Experimental data obtained from moon echo experiments and from satellite observations are analyzed and it is concluded that a fading margin of 20 db should be allowed for in a communication system. Problems associated with radio transmission and reception in space and between satellites and the earth are examined.--IRE Abstract.

D-917 Zachary, W.W.; Wolff, E.A. and Katzin, M., Determination of ionosphere parameters by means of a satellite antenna type probe. Electromagnetic Research Corporation, Wash., D.C., Contract AF 19(604)-6656, Scientific Report No. 1, June 30, 1960. 52 p. 9 figs., 11 refs., 65 eqs.--A spherical antenna type probe for determining the parameters of the ionosphere is described. This consists of a main slot around which are disposed pairs of small orthogonal slots. By applying a driving voltage to the main slot and measuring the input impedance, as well as the voltages induced in the orthogonal slots, the ionization density, collision frequency, and vector earth's magnetic field may be determined. These are local values since the reaction of the medium on the probe is effectively limited to distances of the order of less than a wavelength. As a preliminary to the main analysis, the input admittance of a slotted plane antenna in a magneto-ionic medium is analyzed. The solution is obtained in a form suitable for numerical evaluation. Measurement systems for the determination of the quantities necessary to evaluate the parameters of the ionized medium are considered. Three systems are shown and their relative advantages and disadvantages are outlined. A suitable measurement system appears to be quite feasible of realization. (Met. Abst. 11.12-379.)--Physics Abstracts.

D-918 Zelinskaia, M. R.; Troitskii, V. S. and Fedoseev, L. I. (all, Gor'kii Univ.), Lunar radio emissions at 1.63 cm wavelength. Soviet Astronomy AJ, N. Y., 3(4):628-632, Jan./Feb. 1960. 2 figs., 13 refs., 9 eqs. DLC. Transl. of Radioizluchenie Luny na volne 1.63 cm, Astronomicheskii Zhurnal, Moscow, 36(4):643-647, July/Aug. 1959. DLC--Measurements were taken of the temperature of radio emissions from the central portion of the lunar disc, at 1.63 cm wavelength, as a function of lunar phase. The relationship displayed a sufficiently good approximation to the expression $T_C = 224 - 36^{\circ} \cos(\Omega t - 40^{\circ})$. The value of the attenuation coefficient $\kappa = 0.2\ cm^{-1}$ of the electromagnetic wave, and the value of the equivalent conductivity $\sigma = 7.9 \cdot 10^3$ CGSE of lunar rock, were derived from a comparison with the theoretical relationship. (Met. Abst. 11L-103.)--Authors' abstract.

D-919 Zevakina, R. A., Bukhtoobraznye vozmushcheniia geomagnitnogo polia i sviazannye s nimi izemeneiia v ionosfere po nabliudeniiam v Murmanske. (Bay-like disturbances of the geomagnetic field and associated changes in the ionosphere according to observations in Murmansk.) Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz., No. 2:304-310, Feb. 1959. 4 figs. (incl. photos), 4 tables, 13 refs. DLC--Bays possess a fully definite diurnal variation. In 1954-1956 positive bays were observed chiefly in the second half of the day - negative in the first. The latter are most frequently observed in summer; the former in winter. Currents producing bay-like disturbances in Murmansk alter their direction about 20.00 h. Up to 20.00 h the current flows from west to east producing positive bays but from 20.00 h it flows from east to west and produces negative bays. "The center of the currents" in most cases (86%) is in northern Murmansk. With increase in solar activity the center of currents is displaced to the south. The majority of bay shaped disturbances was accompanied by anomalous variations in the ionosphere. Most frequently (more than 50%) the bays were accompanied by an increase of the limiting frequencies of Es layer. About 25% of the bays are accompanied by complete absorption of radio waves. With increase of magnetic activity the character of ionospheric variations associated with bay shaped disturbances varies somewhat and the frequency of anomalous variations in the F2 region increases. The appearance of sporadic Es clouds with high limiting frequencies and complete absorption over Murmansk during bay shaped disturbances indicates the penetration of corpuscular currents overhead. At the same time the center of the source of bay shaped disturbance in most cases is north of Murmansk. (Met. Abst. 11.8-105.) --I. L. D.

D-920 Zhekulin, L. A., Raspredelenie elektronnoi kontsentratsii s vysotoi po dannym opytov s raketami i iskusstvennymi sputnikami Zemli i ee vliianie na rasprostranenie radiovoln. (Distribution of electron density with height according to data from rocket and artificial satellite experiments and its effect on radio wave propagation.) Iskusstvennye Sputniki Zemli, Moscow, No. 1:67-79, 1958. 5 figs., 7 refs., 27 eqs. DLC--With the aid of relevant equations, the author presents a comprehensive examination of the propagation of radio waves at high altitudes. The contents of this paper include the following, viz: distribution of the density of ionization with height; effect of the distribution of ionization, as disclosed by the most recent experiments, upon the propagation of radio waves; extinction of radio waves; and unstable processes in the reflection of an electromagnetic signal from a non-homogeneously ionized layer. The solution of the problem of the propagation of electromagnetic waves in the ionosphere with the distribution of ionization is expressed in Airy functions. A sharp variation of the ionization gradient occurs in the E layer of the ionosphere since the continuous and approximately monotonic increase of ionization with height is maintained. Hence, with increase in the frequency, the level of reflection of electromagnetic waves is displaced gradually into higher regions of the ionosphere. The critical frequency W_o is that at which the dielectric penetrability for the ionization density N_1, corresponding to the level of the sharp ionization gradient becomes zero. The effective height of the ionosphere increases sharply in the transition through W_o and the extinction of waves increases at the same time, since the intensity of the incoming signal is slight. The curves of the establishment of signals reflected from the E and F regions with distribution of ionization correspond to the most recent experimental data. (Met. Abst. 11E-172.)--I. L. D.

D-921 Zhelezniakov, V. V., Radioizluchenie Iupitera. (Radio emission from Jupiter.) Priroda, Moscow, 45(3):78-80, March 1956. 2 figs., 3 refs. DLC--On the basis of non-Russian papers dealing with radio emission from Jupiter, the author discusses the discovery of the radio emissions, the characteristics of the emission curve which resembles those obtained from thunderstorm electricity discharges at the earth's surface and suggests that thunderstorm and lightning may occur in the hydrogen atmosphere of Jupiter. (Met. Abst. 9A-143.)--I. L. D.

D-922 Ziegler, H. K. (Signal Corps Eng. Labs., Ft. Monmouth, N. J.), Components for instrumentation of satellites. (In: Van Allen, James A. (ed.), Scientific uses of earth satellites. Ann Arbor, Univ. of Michigan Press, 1956. p. 55-67. 3 figs., 6 tables.) DWB, DLC--The environmental conditions of satellite instrumentations are reviewed. Present and predictable availability of suitable chemical batteries, solar batteries, electron tubes, transistors, and frequency control devices is discussed. Special attention is given to the comparison of power sources. (Met. Abst. 9.4-46.)--Author's abstract.

D-923 Akademiebericht über die Erdsatelliten. (Academy report on the artificial satellites.) Osteuropa-Naturwissenschaft, Stuttgart, 1(2):155-156, May 1958. DWB--A statement made by A. W. TOPCHEV at the annual meeting of the Academy of Sciences of the USSR on March 26, 1958, is quoted from the newspaper Pravda of the same date. The statement refers to preliminary results of atmospheric density, ionospheric electron density, radio propagation, cosmic radiation and biological observations made by means of the first two Soviet Satellites. (Met. Abst. 11J-125.)--G. T.

D-924 Aktivität und Kurzwellenstrahlung der Sonne. (Activity and short wave radiation of the sun.) Die Umschau, 53(4): 103, Feb. 15, 1953. 2 figs. DWB--Summary of report of Radio-astronomy Observatory of Cornell Univ. and McMath Hulbert Observatory of Univ. of Michigan on correlation between solar activity and 1.5 m radiation from flares. (Met. Abst. 9A-22.)--C. E. P. B.

D-925 Beam of light may carry conversations. C. & P. Call (Chesapeake and Potomac Telephone Co.), 32(8):2, Aug. 1961. fig.--By means of the "Optical Maser," developed at Bell Telephone Laboratories, the human voice was transmitted for the very first time on a beam of coherent infrared light. This new mode of communication opens possibilities hitherto not feasible. Space communication may be one of the multiple applications of the future. --W. N.

D-926 'Bubble' on the Sun. Science and Culture, Calcutta, 21(11):664-665, May 1956. DLC--Motion picture photographs of the huge solar flare of Feb. 10, 1956 (equal to 100 million H bombs) were shown at Columbus, Ohio, to American Astronomical Society by scientists from Sacramento Peak Observatory, N. Mexico. The 20,000 mi bubble shot out 200,000 mi at 700 miles/sec, setting a record for solar flares. Most of the gas was hydrogen. Ultraviolet light from flare affected the ionosphere and radio transmission. (Met. Abst. 9.11-164.)--M. R.

D-927 Der erste Erdsatellit. (The first earth satellite.) Naturwissenschaftliche Rundschau, 10(11):424-425, Nov. 1957. 2 figs. DWB--Account of satellite launched on Oct. 4, 1957, tracks and structure of radio signals. There is a brief reference to second satellite which will record ultraviolet solar spectrum, cosmic rays, measurements of earth's surface and sun's magnetic field. (Met. Abst. 9.2-100.)--C.E.P.B.

D-928 Fourth artificial earth satellite (1958β). Nature, London, 181(4612):810, March 22, 1958. DWB--On March 17, 1958 the U.S. Navy launched another artificial earth satellite at Cape Canaveral, Fla., by means of a "Vanguard" rocket. The satellite, 1958β, consisted of an aluminum sphere 6.4 in. in diameter; mass, 3.25 lbs.; eccentric orbital revolution, 400 and 2,500 mi above the earth's surface; time, 135 min. The satellite is equipped with two radio transmitters, one powered by chemical batteries, broadcasting on a frequency of 108.00 Mc/s, the other, powered by solar batteries, operating on 108.30 Mc/s. (Met. Abst. 11J-112.)--N.N.

D-929 Ionospheric studies using earth satellites. American Geophysical Union, Transactions, 39(1):169-174, Feb. 1958. fig., table. DWB, DLC--At the USNC-IGY meeting held on Nov. 5, 1957 at the Central Radio Propagation Laboratory (CRPL) of the Nat'l. Bur. of Standards, Boulder, Colo., it was decided that a refinement of experimental techniques be undertaken. Representatives from 24 laboratories and organizations were present to give account of their observations of the Russian satellites. Ionospheric turbulence studied and the fluctuations and fading rates of ionospheric characteristics were collectively discussed. Recommendations adopted are contained in this report. (Met. Abst. 11E-68.)--N.N.

D-930 International Scientific Radio Union. Nature, London, 178(4532):528, Sept. 8, 1956. footnote refs. DWB--Review of Proceedings of the 11th General Assembly, the Hague, Aug. 23-Sept. 3, 1954 (vol. 10 in 5 parts). Pt. 3 deals with Ionosphere radio and Pt. 5 with Radio-astronomy. (Met. Abst. 9A-115.)--C.E.P.B.

D-931 Jupiter emits static (and) Short waves from stars. Science News Letter, Wash., D.C., 67(16):243, April 16, 1955. DLC--BURKE and FRANKLIN detected radio noise from Jupiter that sounded like "thunderstorm interference on a broadcast receiver." The sferics are heard at 22 Mc about one day out of three during the 6 min when the planet crosses the narrow path of their radio telescope in Seneca, Maryland. (Met. Abst. 7.5-255.)--W. N.

D-932 Long range radio communication by satellite microwave dipoles. Nature, London, 191(4795):1237-1238, Sept. 23, 1961. DLC--The West Ford Project, as proposed by the Lincoln Laboratory, Massachusetts Institute of Technology, autumn 1959, is an experiment to launch an 8 km wide, and 40 km thick belt consisting of a density of 21 dipoles per km^3, which will reflect radio waves at about 8,000 Mc/s. Investigations made by the several committees and the response from interested scientific groups are reported on, and the conclusions of the Space Science Board are given point by point. (Met. Abst. unpub.)--W. N.

D-933 Lunik II — the Russian moon rocket. Current Science, Bangalore, 28(9):359, Sept. 1959. DWB, DLC--A short note on the successful Russian launching of the Moon rocket Lunik II, which landed on the Moon almost to the minute according to schedule. The rocket was launched on the afternoon of Saturday, Sept. 12, 1959. The final stage of the rocket hit the Moon at 00 hrs, 2 min, 24 sec (Moscow time) on Monday morning, Sept. 14, 1959. Launching details and the rocket radio signalings are reported. The rocket impact on the Moon as observed from different observatories is described. (Met. Abst. 11.12-182.)--I. S.

D-934 Lunik III: the Russian third moon rocket. Current Science, Bangalore, 28(10):393, Oct. 1959. DWB, DLC--A brief note on the third Russian cosmic rocket launched on Oct. 4, 1959. The multi-stage rocket put into orbit an "automatic interplanetary station" which, after circling the moon, returned toward the earth and is now orbiting the earth. The significance of this feat for interplanetary exploration is emphasized and its launching and operation details are given. (Met. Abst. 11.12-530.)--I. S.

D-935 N. B. S. Research in radio propagation. U. S. National Bureau of Standards, Technical News Bulletin, 38(4):49-59, April 1954. photos. DLC--A brief review of the work of the Central Radio Propagation Laboratory, which has four main divisions: (a) the Ionosphere Research Laboratory, whose investigations include solar rf radiation, upper atmospheric winds, etc.; (b) the Systems Research Laboratory, which is concerned with tropospheric propagation and with research on the best use of the frequency spectrum;

(c) the Measurements Standards Laboratory, which is responsible for the standard frequency broadcasts from WWV and WWVH; (d) the propagation prediction services. (Met. Abst. 6D-256.)--I. R. E., Proceedings, No. 3018, Nov. 1954.

D-936 O zapuske kosmicheskoi rakety v storonu Luny (iz soobshchenii Tass). (Launching of a cosmic rocket toward the Moon (from TASS announcements).) Priroda, Moscow, No. 1:I-IV, Jan. 1959. DLC--On Jan. 2, 1959, the USSR launched a multistage rocket toward the Moon. The final stage of the rocket, which weighed 1,472 kg without fuel, was provided with a special container which contained instrumentation for the following investigations, viz.: determination of the Moon's magnetic field, radiation intensity and variation of intensity of cosmic rays, determination of lunar radio activity, etc. For observations on the flight of the final rocket stage it contained a radio transmitter, broadcasting on 19,997 and 19,995 mHz telegraphic messages 0.8 and 1.6 seconds long, a radio transmitter on a frequency of 19,993 mHz broadcasting scientific data, a transmitter with a frequency of 183.6 mHz used for measuring parameters of motion and broadcasting scientific data, and special apparatus for making a Na cloud. The course of the rocket and the nature of the signals transmitted for approximately 3 hr intervals from 0300 h (Moscow time) Jan. 3 to 10:00 h Jan. 5, 1959, is described. The cosmic rocket went into the periodic orbit of an artificial satellite on Jan. 7-8, 1959. (Met. Abst. 11.12-181.)--I. L. D.

D-937 Planets emit radio waves. Science News Letter, 69(24): 374, June 16, 1956. DWB, DGL--Two types of radio frequency radiation are emitted from planets (Venus and Jupiter). They are caused by 1) heat absorbed from sun's rays and re-radiated and 2) electrical storms similar to thunderstorms. The temperature of Venus was found to be $> 212^{\circ}$ although from optical methods a temperature only half that high was deduced. The latter applies only to the top of the Venus cloud layer, whereas the radio frequency waves indicate temperatures deep down in the cloud layer or perhaps at the surface of the planet. (Met. Abst. 9A-128.) --M. R.

D-938 Progress Chekhoslovatskoi astronomii v 1945-1955 g.g. (Progress of Czechoslovak astronomy from 1945-1955.) Bulletin of the Astronomical Institutes of Czechoslovakia, Prague, 6(3,4):41-64, 65-96, 1955. bibliog. at end of each section. In Russian and English. DLC--

Literature published in Czechoslovakia in the field of astronomy during the period 1945-1955 is reviewed in 8 sections (each written by different authors) with references (àmounting to a total of some 300) at the end of each section. Information of meteorological interest is contained in the following sections (papers in Russian and English): Bumba, V., Fizika solntsa, (Solar physics), p. 41-52 (106 refs.). Includes chapter on solar effects on the general circulation of the atmosphere and on the state of the upper atmosphere, with some 30 refs. Guth, V., Meteornaia astronomiia, (Meteoric astronomy), p. 65-76 (78 refs.) with chapters dealing with upper air density determination by means of meteors; meteoric ionization and meteoric dust in the atmosphere (23 pertinent refs.). Ceskoslovenska Akademie Ved. Astronomicky Ustav, Vysokie sloi atmosfery, (The upper atmosphere), p. 76-82 (42 refs.). In this paper various astronomical techniques (used in Czechoslovakia) for research on the upper atmosphere are reviewed: namely observation of the earth's shadow during lunar eclipses (ozone, meteoric dust); measurement of twilight spectra, and ionospheric soundings. Other sections are on: Celestial mechanics; Comets (with reference to LINK's paper on correlation between discovery of comets in historic times and climatic changes); Astrometry; Stellar astronomy and Radio astronomy. (Met. Abst. 7.10-38.)--G.T.

D-939 Put' v kosmos: materialy gazety "Pravda" o trekh sovetskikh iskusstvennykh sputnikakh Zemli. (Journey into space: material from "Pravda" on the three Soviet artificial earth satellites.) Moscow, Izdat. "Pravda," 1958. 319 p. figs., photos. DWB--A popular book (50,000 copies) consisting of about 70 articles, many by top scientists or academicians, on the 3 Soviet sputniks and their scientific results to date. The articles are grouped into 6 chapters: (1) the first Soviet artificial satellite, (2) comments by scientists in the U.S.S.R., (3) comments from foreign scientists, (4) the second artificial satellite, (5) some notes on the scientific results of the first sputniks, (6) the third Soviet satellite. (Met. Abst. 10.4-77.)--M.R.

D-940 Radioastronomicheskie izmereniia napravleniia i skorosti vetrov v vysokikh sloiakh atmosfery. (Radio-astronomic measurements of direction and velocity of winds in upper atmospheric layers.) Uspekhi Fizicheskikh Nauk, Moscow, 48(1):138-143, Sept. 1952. 2 figs., 9 refs. DLC--Review based mostly on foreign papers, emphasizing the use of "radio stars" in measuring fluctuations due to ionospheric disturbances. Tentative data for dimensions of disturbances, drift direction and speed and vertical velocity given. Wind roses and histograms for wind frequencies in F2 layer are presented for: a) May-June 1951 at 60°N and b) Sept.-Oct. 1951 at 53°N. Data compiled for various levels 80-250 km for U.S.A., England, Germany and Australia. (Met. Abst. 4F-115.)--A.A., M.R.

D-941 Radio signals from Mars. Science, Wash., D.C., 124(3223):620, Oct. 5, 1956. DLC--U.S. Navy announced detection of first radio waves from Mars, picked up with a 600 in. radio telescope at National Research Lab. in Washington, D.C. (where first radio signals from Venus were detected earlier in 1956). Emissions indicate an average temperature of Mars of slightly below 32°F. The 3 cm signals were picked up on 2 nights in early Sept. 1956. (Met. Abst. 9A-130.)--M.R.

D-942 Relations between the sun and the ionosphere. Nature, London, 179(4564):804-806, April 20, 1957. DWB--Account of Geophysical Discussion at R. Astron. Soc., Feb. 22, 1957. The first part was on "The great solar flare of Feb. 23, 1956", with increase of cosmic rays, radio fadeout and other phenomena even on dark side of the earth, indicating a sudden increase of ionization at 80-90 km about 0345 UT. The second part dealt with "The solar cycle variation of the sun's ionizing radiation." separating the background from a slowly varying component from local active centers. (Met. Abst. 8.7-318.)--C.E.P.B.

D-943 Research based on Sputniks I and II reported by Soviets. Science, Wash., D.C., 127(3311):1378-1381, June 13, 1958. DLC--Excerpts from the article Soviet artificial earth satellites which the Soviet Embassy, Wash., D.C. released May 19, 1958. The popular article is based on results as published in Pravda, April 27, 1958. It is stated that scientific papers are to be published in various journals. The highlights may be summed up as follows: The density of the upper layers of the atmosphere at 225-228 km appears to be 5 to 10 times greater than theoretical values before sputniks. Changes of the state of the atmosphere as dependent on latitude and time of day are assessable. The temperature at 225 km altitude was higher than shown by pre-sputnik theories and higher than solar influence may yield. Determination of electron densities are predictable from known deflection of the radio beam. Cosmic ray particle number can be determined as dependent on altitude. The increase was about 40% from 225 km - 700 km altitude. Variation of intensity which is believed to relate to the interplanetary environment near the earth may be checked by the now possible cosmic ray "sounding" of the earth's magnetic field at very great distances from the globe. Electrocardiograms, obtained from the first dog in space, revealed no morbid symptoms, the heart beat diminished frequently due to increase of the acceleration. The weightlessness in orbit was taken quite well, movements were brief and rather smooth. (Met. Abst. 11J-143.)--W. N.

D-944 Rocket flare patrol program. American Geophysical Union, Transactions, 39(1):165-167, Feb. 1958. table. DWB, DLC --Summary of the scientific results of the rocket flare patrol program, giving the dates, altitude in feet, physical appearance of the sun, data obtained and comments on particular observations. Advances in rocket launching have now led to a perfect telemetering performance on all flights because of the use of the new type of aerodynamic telemetering antenna, with uniform radiation pattern. Several scientific rocket results correlated with direct solar observations have proved real and practicable. (Met. Abst. 11.4-149.)--N. N.

D-945 Satellite communication. Institution of Electrical Engineers, Journal, 7(80):487-488, Aug. 1961. DLC--The USA satellite Echo I communication experiments in 1960 improved and expanded the busy and often disturbed frequency bands <30 Mc heretofore used, by establishing non-interference transcontinental and transoceanic radio communication between 1000 and 10,000 Mc. Some of the several technical, operational and international problems thus arisen, along with further satellite communication tests planned in 1962 on an international basis, are outlined briefly. The problems are now being examined by Study Group IV of the International Radio Consultative Committee of the International Telecommunication Union pending an interim meeting early 1962 in U.S.A. and the 10th Plenary Assembly of C.C.I.R. in 1963. --W. N.

D-946 Solar eclipses and the ionosphere: a symposium held under the auspices of the International Council of Scientific Unions Mixed Commission on the Ionosphere, in London, Aug. 1955. Editors, W. J. G. Beynon and G. M. Brown. London, Pergamon, 1956. 330 p. figs., tables, eqs., refs. at end of each ch. Literature on solar eclipses and the ionosphere (including) chronological catalogue of eclipses, p. 308-320 (225 refs.). Issued as Vol. 6 of the Special Supplements to the Journal of

Atmospheric and Terrestrial Physics. Articles abstracted separately. DWB. Review by R. M. Goody in Weather, 12(6):198, June 1957. Review by R. L. Smith-Rose in Nature, London, 179(4562):711, April 6, 1957. Also: Beynon, W. J. G., Solar eclipses and the ionosphere.

D-947 The space encyclopedia: a guide to astronomy and space research. N. Y., E. P. Dutton, 1957. 287 p. numerous figs., photos, tables. Appended: Nov. 1957 Supplement. 5 p. DWB (629.1388 S732)--A glossary of terms used in all fields of astronautics, space medicine, and associated astrophysical, geophysical and meteorological phenomena, arranged alphabetically, with many fine illustrations of equipment and results and observations. Such unrelated terms as zodiacal light, radar, solar prominences, falling sphere, galaxies, atmosphere, origin of earth, earth as seen from space, artificial earth satellite, etc., are described and illustrated. An appendix of 5 pages includes a description and illustration of the first Soviet Sputnik (Oct. 4, 1957), and the U. S. "Farside" Rocket which was shot on Oct. 21, 1957, reaching 4000 mi. (Met. Abst. 10.4-73.)--M. R.

D-948 Scientists upset theories about particles in space. The Evening Star, Wash., D. C., A-11, June 11, 1957. --Radio propagation experiments indicate that the "ghost signals" arriving about 3/4 sec later, come from space up to 6000 mi. The findings of ROBERT A. HELIWELL and his associate ERNST GEHRELS (both of Stanford Univ.) contradict current theories on magnetic storms, aurora borealis, and deepen the problems of solar activity as influencing weather. Outer space may be utilized for radio communication. (Met. Abst. 12B-150.)--W. N.

D-949 The second U. K. Scout satellite. Nature, London, 190 (4777):681, May 20, 1961. DWB--The payload for the second U. K. Scout satellite has now been agreed. A project to measure the galactic noise in the frequency range 0.75-3 Mc/s and the exploration of the upper ionosphere will be carried out by Dr. F. Graham Smith, Mullard Radio Astronomy Observatory, Cavendish Laboratory, Cambridge. Two methods of measuring atmospheric ozone will be directed by Dr. R. Frith and Dr. K. H. Stewart of the Meteorological Office, Great Britain. The measurement of micrometeorite flux will be organized by Dr. R. C. Jennison of Jodrell Bank. --R. B.

D-950 Solar flare of May 20, 1959. Sky and Telescope, N.Y., 18(10):544-545, Aug. 1959. photos. DWB, DLC--An illustrated discussion of the solar flare of importance 3^+ which occurred on May 10, 1959. This flare ranks as one of the largest and brightest yet observed. It occurred in the vicinity of a spot group on the northeast quadrant on the sun, fairly near the limb. Simultaneously with the appearance of the flare, there also began a sudden enhancement of atmospherics. Two photographs, one photographed in red light of hydrogen and the other a monochromatic picture illustrate the description. The record of radio bursts obtained on May 10th at the Harvard Radio Astronomy Station in Texas is also photographically shown. Other phenomena probably induced by this gigantic flare are described. (Met. Abst. 11L-270.)--I.S.

D-951 The solar flare of Feb. 23, 1956. Discovery, 17(5):177-179, May 1956. 4 figs. DLC--Increasing area of sunspots occurred in Feb. 1955 and a large flare on Feb. 23, 0330-0510 UT at Kodaikanal. An increase of about 6% in cosmic radiation was reported. There was a complete fadeout of short wave radio. (Met. Abst. 11E-154.)--C.E.P.B.

D-952 Soviet writings on earth satellites and space travel. N.Y., Citadel Press, 1958. 253 p. 41 figs., tables. DWB, DLC--The history of Russian development of astronautics and rocketry (since 1924) leading up to the successful launching of the first Sputnik on Oct. 4, 1957, is recounted, followed by general aspects of rockets, satellites and space travel and uses thereof. A Joint Committee on Space Travel was organized in the Astronomical Council of the Akademiia Nauk in 1954 and an Astronautical Society at the Central Air Club in Moscow (also 1954). The International Astronautical Federation coordinates societies of $>$20 countries. Pt. II includes a number of articles or interviews with Soviet scientists after Sputniks I, II or III were launched, and covers many aspects of satellite observations and applications (military, communications, optical, weather (OBUKHOV), astronomical, solar, travel to moon or planets, biological problems, navigation, power, etc.). (Met. Abst. 11.1-110.) --M.R.

D-953 Space Science Board (of National Academy of Sciences - National Research Council). Science, Wash., D.C., 128(3320):350-351, Aug. 15, 1958. DLC--The 16 man Space Science Board as established by the National Academy of Sciences, National Research Council, has assumed the task "to survey in concert the scientific problems, opportunities and implications of man's advance into space" under the chairmanship of LLOYD V. BERKNER. Activities and functions of the Space Science Board will be subject for coordinations and cooperation with similar domestic and foreign civil and government bodies. The 11 Ad Hoc committees organized are: 1) Geochemistry of space and exploration of moon and planets. 2) Astronomy and radio astronomy. 3) Future vehicular development. 4) International relations field. 5) Immediate problems. 6) Space projects. 7) Ionosphere. 8) Physics of fields and particles in space. 9) Future engineering development beyond available facilities. 10) Meteorological aspects of satellite and space research. 11) Psychological and biological research. The names of the chairmen of the different committees are listed. (Met. Abst. 11J-145.)--W. N.

D-954 To study whistlers. Science News Letter, Wash., D.C., 67(1):3, Jan. 7, 1956. DWB, DLC--Whistlers, which are radio waves of audiofrequency that are born of individual lightning impulses, will receive special attention during the International Geophysical Year, 1957-1958. Whistlers are not the same as cosmic noise due to radio waves from outer space. The so-called "dawn chorus," a radio effect connected with the aurora and magnetic disturbances and caused by the bombardment of the earth by material shot from the sun, will be also listened to. It is hoped that this will settle what comes from the sun to disturb radio, TV and wire communications on the earth, particularly at the time of the greatest prevalence of sunspots. (Met. Abst. 8.3-348.) --A. M. P.

D-955 Twinkling of stellar radio waves studied. Science News Letter, 68(1):3, July 2, 1955. DLC--Preliminary studies by C. GORDON LITTLE show a marked difference between the way radio stars twinkle in England and in Alaska. Size, shape and movement of the dense regions in the ionosphere are indicated by the twinkling. (Met. Abst. 7.4-285.)--W. N.

D-956 Two major observatories join in solar studies. Science News Letter, Wash., D.C., 27(21):327, May 21, 1955. DLC--The explosive energy of the sun and its impact on all atmospheric layers will be jointly studied by the Smithsonian Institution and Harvard University. The subject has great theoretical interest for astronomers and geophysicists and is of practical value in radio communication, weather forecasting and rocket flights. Headquarters of the Astrophysical Observatory is being moved from Washington, D.C. to Cambridge, Mass., as of July 1, 1955. (Met. Abst. 7.5-21.) --W. N.

D-957 Union Radio Scientifique Internationale (U. R. S. I.). (International Scientific Radio Union.) International Union of Geodesy and Geophysics, Bulletin d'Information, 2(2):362-370, April 1953. DWB--First assembly in Sydney, Australia under Presidency of Sir EDWARD APPLETON, Aug. 11-21, 1952, attended by 300 delegates, 50 from overseas. Commissions dealing with measurements, tropospheric waves, ionospheric waves, sferics, radio astronomy, etc., met during the session. It was decided not to publish the documents presented at the meeting but to publish Special Reports of the U. R. S. I. from time to time on such subjects as ionospheric storms, meteors, wave interaction, etc. (Met. Abst. 6D-217,)--A. A.

D-958 U. S. Moon Rocket Pioneer IV. Current Science, Bangalore, 28(3):100, March 1959. DWB, DLC--The U. S. four-stage Juno II rocket was launched on March 3, 1959 from the Cape Canaveral missile test center (Florida). It carried a 13.4 lb gold plated space probe, Pioneer IV. At 22.24 hrs GMT on March 4, the space probe by-passed the moon at a distance of 37,771 miles from it. This is more than 17,000 miles further away than was planned. Data were received on the telemeter by Jodrell Bank and the Goldstone tracking stations until March 6. By then it had gone 406,020 miles from the earth and was travelling at 3899 mph. (Met. Abst. 11.12-524.)--N. N.

D-959 Allcock, G. McK. and Rodgers, M.F. (both, Dominion Physical Lab., Lower Hutt, New Zealand), Geomagnetic activity and the reception of whistlers in polar regions. Journal of Geophysical Research, Wash., D.C., 66(11): 3953-3955, Nov. 1961. fig., table, 5 refs. DWB, DLC--The negative correlation between whistler reception and geomagnetic activity at geomagnetic latitudes of 50° and 66° (Barrington, 1960) was found stronger as the auroral zone was approached and even more pronounced at the Scott Base (79°S) Antarctica. A strong diurnal variation in whistler reception was found but not significant seasonal variation in the shape of diurnal curves. --S. N.

D-960 Australia. Commonwealth Scientific and Industrial Research Organization. Div. of Radiophysics, Radio astronomy bibliography, 1954-1956. Sydney, Aug. 1957. 292 p. 1016 titles with brief summaries, arranged by subject. List of journals (with abbreviated titles) referred to, p. xiii-xxv. Author index p. 279-292. "Transcript of accumulated card entries from the CSIRO Radiophysics Abstracts, for 1954-1956. Similar publication covering 1952-1954 issued in 1954 with limited circulation. These two issues constitute a tentative bridging of the gap between existing and projected publications of Cornell Univ. Bibliography of extraterrestrial radio noise." (See ref. D-107, 108.) (Met. Abst. unpub.)

D-961 Bain, W.C. (Radio Res. Station (DSIR), Slough), What space research is revealing about the ionosphere. New Scientist, London, 12(262):493-495, Nov. 23, 1961. 6 figs. DWB--The different techniques used for measuring ionospheric characteristics by means of artificial satellites are reviewed, namely those based on 1) the Faraday effect; 2) the Doppler effect; 3) scintillation of radio signals and 4) direct measurement with various probes. Important results already achieved with these techniques include confirmation of the discovery (originally made by Moon radar) that the number of electrons above the F region is about 3 times the number below, and the discovery (as a result of Canadian rocket measurements) that electron collisional frequencies in the D and E regions are several times smaller than believed previously. Plans for "topside sounder" satellites are mentioned which are hoped to provide much more information about the ionosphere than the satellite measurements made heretofore. --G. T.

D-962 Bauer, Siegfried J. and Daniels, Fred B., Ionospheric parameters deduced from Faraday rotation of lunar radio reflections. Journal of Geophysics, Wash., D.C., 63(2): 439-442, June 1958. fig., 7 refs., eqs. DWB--Faraday rotation at 151.11 Mc/s was measured in 30° steps Jan. 8-9, 1958 from 23.30 to 05.30 CST. The lunar reflected transmissions from Belmar, N. J., were received at Urbana, Ill. The observed results: 7.7×10^{12} electrons cm^{-2} are compared with the computed results: 3.5×10^{12} electrons cm^{-2} of a parabolic layer model, using Fort Monmouth, N. J. data. There are on the average, during night, 3.4 times as many electrons above as below maximum. (Met. Abst. unpub.) --W. N.

D-963 Becker, W. (Inst. für Ionosphären-Physik, Germany), The varying electron density profile of the F region during magnetically quiet nights. Journal of Atmospheric and Terrestrial Physics, London, 22(4):275-289, Dec. 1961. 12 figs., 8 refs. DLC--Ionograms taken at Lindau and at two field stations (average distance from Lindau 125 km) on magnetically quiet nights were reduced to N(h) profiles of the F-layer. The normalized profiles showed maximum height changes of about 60 km lasting for about 2 hrs; they also showed layer height differences on comparable nights of more than 100 km . No seasonal influence on the rise and descent of these profiles in the late evening and early morning hours, respectively, could be found. The ionograms of the field station showed no local difference or temporal displacement. Generally, the electron loss rate at the F layer peak is closely related with the height of the peak and, therefore, dependent on season. Spread F echoes of high intensity are occasionally observed at Lindau even on magnetically quiet nights; they are not necessarily associated with vertical movements of the F layer. No spread F echoes were observed during vertical movements of the F layer induced by positive magnetic bay disturbances. It is not possible to determine from either observation whether vertical movements cause unstable conditions within the F layer. --Author's abstract.

D-964 Benson, Robert F. (Univ. Alaska), Effect of line of sight aurora on radio star scintillations. Journal of Geophysical Research, Wash., D.C., 65(7):1981-1985, July 1960. 4 figs., 5 refs. DLC--

Evidence is presented to show that active auroral forms that pass across the line of sight to a radio star can have a direct effect on the scintillations of the signal received on a frequency of 223 Mc. This effect is most pronounced if the level of scintillation activity is relatively low before the aurora crosses the star position. Two examples are presented: in the first, an intense auroral band between the radio source in Cassiopeia (angular diameter, 4') and the receiver disrupts the characteristic sinusoidal trace produced by the radio star signal in the output of the phase switch interferometer. This long duration fade lasted for a period of about 8 min. In the second example, the aurora is accompanied by strong angular scintillation coincident with strong absorption of 27.6 Mc galactic radio waves. In both examples the radio star was within 10° of the geomagnetic zenith. (Met. Abst. 12A-27.)--Author's abstract.

D-965 Bhargava, B. N. (Kodaikanal Obs., Kodaikanal), Observations of spread echoes from the F layer over Kodaikanal: a preliminary study. Indian Journal of Meteorology and Geophysics, New Delhi, 9(1):35-40, Jan. 1958. 5 figs., 10 refs. DWB, DLC--Occurrence of spread F echoes at Kodaikanal for a period of about one year has been analyzed and diurnal and seasonal characteristics have been found to exist in the frequency of occurrence of these echoes. It has been found that the phenomenon occurs only during nighttime, with largest frequency between 1900 and 0400 hrs local time. While the seasonal variation is characterized by equinoctial maxima as in the case of geomagnetic activity, the day-to-day variations in scattering indicate a negative correlation with the degree of magnetic activity. Thus, scattering persists for largest percentage of time during comparatively quiet periods and is often altogether absent on magnetically stormy nights. The phenomenon is discussed in relation to ionospheric irregularities and radio star scintillation. (Met. Abst. 9.10-165.)--Author's abstract.

D-966 Bolton, J. G.; Slee, O. B. and Stanley, G. J., Galactic radiation at radio frequencies, Pt. 5, The sea interferometer. Pt. 6, Low altitude scintillations of the discrete sources. Australian Journal of Physics, Melbourne, 6(4):420-451, Dec. 1953. figs., tables, refs. DLC--In Pt. 5, the factors involved in the study of discrete sources of galactic noise by the sea interferometer are discussed. Three new forms of sea interferometer which increase the effectiveness of this technique are described. Pt. 6 represents a study that has been made of the scintillations of four discrete sources at altitudes of from 0 to 10°. The observations cover the years 1947-1951 and were made at various frequencies in the range

40-300 Mc/s. It was found that the scintillation index, a measure of the amplitude of the scintillations, (1) increases with increasing wavelength, (2) decreases rapidly with increasing altitude, (3) shows seasonal and diurnal variations, the seasonal component having minima near the equinoxes and the diurnal component having minima near the equinoxes and the diurnal component near dawn and sunset. The scintillation rate, or the number of scintillations per minute (1) is different for sources of different declination, (2) is independent of wavelength. In the case of the Cygnus source, the data for which are the most extensive, the rate increases and the decline in the scintillation index with altitude is less rapid during the winter months. A strong correlation is established between the occurrence of the scintillations and sporadic E. The difference in the scintillation rates for different rates for different sources can be explained in terms of variations in the size of irregularities and the effects of the winds in the Es layer. (Met. Abst. 9A-25.) --Authors' abstract.

D-967 Braude, S. Ia., K voprosu o vybore etalonnogo diskretnogo istochnika kosmicheskogo radioizlucheniia. (On the selection of a standard discrete source of cosmic radio emission.) Astronomicheskii Zhurnal, Moscow, 38(5):898-904, Sept./Oct, 1961. 4 figs., 2 tables, 20 refs., 6 eqs. Russian and English summaries p. 898. Transl. into English in Soviet Astronomy AJ, New York, 5(5):687-691, March/April 1962. DLC--The possibility of using the discrete radio source Cygnus A as a standard is considered. The procedure and corrections, due to the proximity of the extended source Cygnus X, are given. The flux density of radio emission for the standard source in Cygnus A in the frequency range 12.5 - 10,000 Mc/s is determined. The discordancies of the data, found by different authors, for the flux density of radio emission on frequencies lower than 30 Mc/s are noted. --Author's abstract.

D-968 Briggs, B. H. (Cavendish Lab., Cambridge), Correlation of radio star scintillations with geomagnetic disturbances. Geophysical Journal, London, 5(4):306-317, Oct. 1961. 5 figs., 21 refs., 3 eqs. DWB, DLC--The correlation between the degree of scintillation of the radio source Cassiopeia A and the local magnetic K index is studied. It is shown that the correlation coefficient between these quantities depends upon the epoch of the solar cycle at which the observations are made, on the position of the source in the sky, and on the radio frequency used. For observations on 38 Mc/s made at sunspot minimum, the correlation coefficient is small but positive for all positions of the source. At sunspot maximum, the correlation coefficient is positive when the source is near upper transit and negative when it is near lower transit; the average value of the correlation coefficient for all positions of the source is approximately zero. It is shown that these results can be explained when the finite angular diameter of the radio source is taken into account. For some conditions an increase in the degree of irregularity of the ionosphere can result in a decrease in the degree of scintillation which is observed. It is suggested, therefore, that the degree of irregularity of the ionosphere always increases during magnetic disturbances in medium latitudes, and that the negative values of the correlation coefficient between scintillation index and magnetic K index which are sometimes obtained are due to a secondary effect related to the finite size of the source. The results of the present paper explain the inconclusive and conflicting results of earlier workers. --Author's abstract.

D-969 Buck, Richard F., Provide services toward instrumenting Aerobee rockets. Oklahoma. State Univ. Research Foundation, Contract AF 19(604)-2029, Final Report, July 31, 1960. 40 p. 13 figs. DWB--Contract AF 19(604)-2029 has represented a continuation of a series of support contracts between the Research Foundation Electronics Laboratory of Oklahoma State University and the Air Force Cambridge Research Center. A wide variety of support activities have been conducted throughout the period of this contract. The logical breakdown of these activities separates them into two broad classes: (1) direct support in the form of manpower and equipment for bunch missions at the firing sites, where upper air research experimentation has been conducted through the use of rocket sounding vehicles, and (2) indirect support activities, which have been concerned with activities in the Stillwater laboratory. These have provided the necessary equipment and facilities for these research instrumentation vehicles. Direct support activities for rocket borne equipment have been concerned with L band beacons, FM/FM telemetry systems, Range Safety equipment for tracking and flight termination, preparation of actual payload structures, and other miscellaneous activities related to the installation, check-out and operation of all of these forms of equipment. Further direct support activities have been concerned with the construction and operation of necessary ground receiving equipment for L band transponder beacons, SMT telemetry systems, special telemetry systems utilizing special pulse-time modulation of telemetry pulses following a normal S-band tracking beacon, FM/FM recording equipment, and blockhouse activities associated with the launch and pre-launch periods for all of the above types of equipment.

Indirect support activities have been considerably more varied in nature. In many cases investigations and circuit development programs have led to improvements of existing equipment, or construction of more modern replacement equipment, in order to provide the necessary ground installations required for support and to improve performance of the air borne components in use. Some of the equipment involved has been designed completely and constructed by this organization; in other instances commercially available equipment has been purchased and integrated into systems compatible with the rocket experimentation program. In addition to the equipment provided for continued field operation and support activity, a separate program in the Stillwater laboratory has resulted in the design and construction of a single prototype transistorized pulse-time to DC-data converter unit which is capable of transforming received pulse-time telemetry signals into suitable form for strip chart recording. The final circuit of this prototype data converter is discussed in some detail and an estimate presented of the greater improvements possible within the present state of the art, if this investigation should be continued. --Author's abstract.

D-970 Castelli, John P.; Aarons, Jules; Ferioli, Carl and Casey, Joseph (all, U.S. Air Force, Hanscom Field, Bedford, Mass.), Absorption, refraction, and scintillation measurements at 4700 Mc/s with a traveling wave tube radiometer. Planetary and Space Science, N.Y., London, 1(1):50-56, Jan. 1959. 7 figs., 2 refs. DLC--By means of radio astronomy techniques, measurements of atmospheric absorption were made at C band (4700 Mc/s), with the sun as a source of radio frequency energy. The equipment, a comparison type radiometer, used travelling wave tubes, a tuned radio frequency receiver, and an altazimuth antenna mount. The average solar temperatures recorded for the period varied from 22,000°K at zero elevation to 26,000°K at 60° of elevation. Individual readings ranged between 18,000°K and 30,000°K. The mean absorption, based on average solar temperatures at the various elevations for the period, was 0.00348 dB/km. Refractive errors were approximately the same as optical although deviations from the mean during any day were large. Atmospheric scintillation for periods ranging from 0.5 sec to 90 sec were recorded. Scintillation amplitudes ranged from 2% to 20% of antenna signal temperature at low angles. At high elevation angles, scintillations rarely reached 10% and were generally less than 1%. (Met. Abst. 13.4-387.) --Authors' abstract.

D-971 Chapman, J.H. and Molozzi, A.R. (both, Defence Research Telecommunications Establishment, Ottawa), Interpretation of cosmic noise measurements at 3.8 Mc/s from satellite 1960 1. Nature, London, 191(4787):480, July 29, 1961. 2 refs. DWB, DLC--The results of measurements of cosmic noise at 3.8 Mc/s from the satellite 1960 1 showed variations in field strength at different locations. These results have now been analyzed, on the assumptions that the variations in signal strength are due to three causes: (a) the variation of radiation resistance of the antenna due to the ionosphere surrounding the satellite; (b) the restriction in angular aperture of the satellite antenna due to the ionosphere; and (c) the variation of cosmic noise over the sky. The results indicate that these are the most important factors affecting the cosmic radio noise. --R.B.

D-972 Conway, R.G.; Shuter, W.L.H. and Wild, P.A.T. (all, Nuffield Radio Astron. Labs., Jodrell Bank), An attempt to observe radio emission from Comet Burnham 1959k. Observatory, London, 61(922):106-107, June 1961. 2 tables, 4 refs., eq.--It seems uncertain whether radio emission by a comet has yet been observed. During the recent close approach of comet Burnham (1959k) an attempt was made with the Jodrell Bank radio telescope to reach for radio radiation but none was observed. A table summarizes the observations. --S.N.

D-973 Dagg, M., Radio star ridges. Journal of Atmospheric and Terrestrial Physics, 11(2):118-127, 1957. 4 figs., 3 tables, 8 refs. DWB--A radio star "ridge" effect has been investigated which is quite different in character from the usual radio star scintillations. The occurrence of ridges correlates more closely with ionospheric inhomogeneities in the E region than in the F region. A divergent lens mechanism for the production of ridges is proposed which gives a qualitative explanation of the main features. (Met. Abst. 9A-146.) --Author's abstract.

D-974 Douglas, J.N. and Smith, H.J. (both, Yale Observatory, New Haven, Conn.), Presence and correlation of fine structure in Jovian decametric radiation. Nature, London, 192 (4804):741, Nov. 25, 1961. fig., 11 refs. DWB, DLC--Four identical crystal controlled total power receivers working at 22,200 Mc/s with 6 kc/s bandwidth were set up at Yale University's Bethany Observing Station and three other stations at distances of 15, 30 and 100 km. from Bethany. These were used during March to August 1961 to observe the radio noise storms in the Jovian non-thermal emission. Correlation between the records at the different stations varied during the period of the observations, but on six nights the correlation was essentially perfect. It is concluded that the fine structure of these emissions is characteristic either of the source at Jupiter or of the interplanetary medium. This intrinsic structure is often obliterated by local ionospheric effects. --R. B.

D-975 Elgarøy, Øystein, High resolution spectrometry of enhanced solar radio emission. Astrophysics Norvegica, Oslo, 7(5): 123-263, Sept. 1961. 94 figs., 6 tables, 95 refs., 19 eqs. DWB, DLC--A sweep frequency receiver of high resolving power is described. The sweep is repeated 50 times per sec in the frequency band from 215 to 190 Mc/s. The instrument has been used to investigate the fine structure of solar radio emissions. From a number of observations of bursts of spectral type I it is concluded that the dynamic spectra of this class of bursts take various forms. For practical reasons a subdivision of the type I class is made for use in the present paper. The frequency of occurrence of bursts in the different sub-classes is determined from some representative noise-storm records. Lifetime, band width and line profile of type I bursts are studied. Some observational evidence of echo effects is presented. Examples are shown of bursts that are split into two components with a frequency separation of about 8 Mc/s. This is likely to be the same type of splitting known from bursts of spectral type II (outbursts). Theories proposed to explain type I storms are reviewed and compared with observational results. Some interpretations of the sweep observations are proposed. Arguments are advanced in support of the view that type I bursts are generated by a sporadic emission process with energy output in a narrow frequency band, as opposed to the suggestion that the bursts are caused by variable transmission or focusing of radiation from a wide band source. Some examples are shown of solar radio emissions with peculiar structure, and possible interpretations are discussed. High resolution spectra of type III bursts recorded at the Oslo Solar Observatory are compared with wide band spectra obtained simultaneously at the Harvard Radio Astronomy Station. The agreement between the records is very good. Evidence is presented of fine structure in type III bursts. It is possible to account for the details in the type III burst spectra on the basis of current theory for this class of solar radio events. --Author's abstract.

D-976 Eshleman, V. R.; Gallagher, P. B. and Barthle, R. C. (all, Radioscience Lab., Stanford Univ.), Radar methods of measuring the cislunar electron density. Journal of Geophysical Research, Wash., D. C., 65(10):3079-3086, Oct. 1960. 16 refs., 10 eqs. DLC--The ionized medium between the earth and the moon is being studied at Stanford by means of lunar radar echoes. Of prime interest is the electron density beyond the earth's ionosphere, in regions (at distances of several to 60 earth radii) where the interplanetary gas may be dominant. Six related techniques for measuring the total integrated electron density are discussed. In practice the ionospheric part could be determined separately and subtracted from the total. These same techniques could be used to measure by radar the electron density between the earth and various planets, and to measure by one-way propagation the integrated electron density between a space probe and the earth. The moon's radar range exceeds the true range, especially at low frequencies, because of group retardation, which is a measure of integrated electron density. Density measurements based on absolute measures of radar range would require very high peak power (for pulse ranging) or very high equipment stability (for CW ranging); furthermore, the true lunar range is not known accurately. In two of the methods described here, the full average power capability of the transmitter can be used without need for high stability or precise knowledge of the lunar range. In effect, a reference is sent with the measuring quantities and only relative radar range is measured. Doppler frequency shifts and the earth's magnetic field cause only slight difficulties. However, path splitting, electron "blobs," and lunar surface irregularities possibly could affect the waves more than the electrons do. The measurements might then yield information about the lunar surface or about the temporal and spatial variations of the cislunar medium. (Met. Abst. 11L-123.) --Authors' abstract.

D-977 Fediakina, N. I., Anomal'noe pogloshchenie v mae i iiule 1959 g. po nabliudeniiam v bukhte Tiksi metodom kosmicheskogo radioizlucheniia. (Observations of abnormal absorption in May and July 1959 in Tiksi Bay with the method of cosmic radio emission.) Akademiia Nauk SSSR. Mezhduvedomstvennyi Komitet po Provedeniiu MGG, Sbornik Statei V Razdel Programmy MGG (Ionosfera), No. 5:20-27, 1960. 3 figs., table, 5 refs. English summary p. 26-27. DLC--An abnormally high absorption observed in the Polar zone during May and July of 1959 at a frequency of 32 MHz with the method of the cosmic radio emission is described. Four cases of such an absorption have been observed during the period from Oct. 1, 1958 to Sept. 1, 1959. On all occasions the absorption was preceded by a solar radio noise storm which continued for 1.5–5 hrs. Within 2–5 hrs after the commencement of the solar radio noise storm there was noted an increase of the absorption. The absorption increased for about 20 hrs and at a maximum it reached 9–11 db. The absorption decreased in the course of several days. Within 20–40 hrs after the commencement of the solar radio noise storm a magnetic storm began. During the storm the absorption decreased rather than increased. The more intensive the magnetic storm, the sooner the absorption decrease occurred. Rapid absorption changes (as much as 3.5 db per min) during the magnetic storms on the 15, 17–19 of July, 1959, were observed. A supposition is made that the abnormally high absorption is produced by corpuscular particles ejected by the Sun during the strong chromospheric flares of May 10 and July 9, 14 and 16. The velocities of these particles considerably exceed the velocities of corpuscular streams producing magnetic storms. --Author's abstract.

D-978 Fleischer, Robert (Rensselaer Poly. Inst., Troy, N.Y.), Variations in 18 Mc/s solar and cosmic noise. (In: Paris Symposium on Radio Astronomy, July-Aug. 1958, (Proceedings), pub. Stanford Univ. Press, 1959. p. 208-209. fig., 3 refs.) DLC (QB475.P26)--The apparatus for measuring changes in the received intensity of 18 Mc/s cosmic noise has been in operation at the Sampson Station of the Observatory of Rensselaer Polytechnic Institute since Feb. 1957. The purpose of the apparatus is to record sudden cosmic noise absorption (SCNA) as indirect indications of solar flares, depending on the effect on the ionosphere of the ionizing radiation from the flares. The program is related to the IGY. It is suggested that the bursts investigated are of solar origin. It was found that in addition to the bursts that are specifically associated with flares, on days of general solar disturbances, such as the Special World Intervals of the IGY, there is a general "noisiness" or variability of the 18 Mc/s record. On such days it is very difficult to say when the radiation is enhanced and when it is absorbed. This mean level may be higher or lower, or the same, as on more quiet days. Recorder tapes in pictorial form and other patrol data will be published in a series entitled "Rensselaer Observatory Publications."--E.Z.S.

D-979 Ginzburg, V.L. (Lebedev Physics Inst., Acad. Sci., USSR), O neionosfernykh kolebaniiakh intensivnosti radioizlucheniia tumannostei. (Non-ionospheric fluctuations in the intensity of radio emission from nebulae.) Akademiia Nauk SSSR, Doklady, 109(1):61-63, July 1, 1956. 6 refs., 4 eqs. DLC--

It is generally accepted that fluctuation of the intensity scintillation of discrete sources of cosmic clouds is caused solely by earth's ionosphere. Thence, the recently established fact that these excited intensity fluctuations from some source of non-ionospheric nebulae led to the assumption that this source is of stellar dimensions. Since evidence for non-ionospheric fluctuations are as yet inadequate, the author examines the conclusions that would have to be drawn should the existence of non-ionospheric scintillation of discrete sources be established definitely. It is also suggested that the source may not be stellar and the scintillation may depend upon the propagation of radio waves in interstellar or interplanetary space. (Met. Abst. 9A-112.) --I.L.D.

D-980 Gringauz, K.I. and Rudakov, V.A., Measurements of electron concentration in the ionosphere up to altitudes of 420-470 km, carried out during the International Geophysical Year by means of radio wave transmissions from the geophysical rockets of the Academy of Sciences, USSR. Planetary and Space Science, N.Y., 8(3/4):183-193, Dec. 1961. 6 figs., 18 refs., 10 eqs. DWB. Transl. by R. Matthews of original Russian, Ismereniia elektronnoi kontsentratsii v ionosfere do vysot 420-470 km, provedennye vo vremia MGG pri pomoshchi radiovoln, izluchavshikhsia s geofizicheskikh raket AN SSSR in Iskusstvennye Sputniki Zemli, No. 6:48-62, 1961. DWB--Comparison of the sections of the curves relating electron concentration to altitude above the principal ionization maximum (over 300 km), obtained from three rocket flights, indicates that the rate of electron concentration decay with altitude over the one geographical location may vary over a wide range (apparently according to time of year and day), thus contradicting the earlier concept of an ionization model only slightly dependent on time of day, season, latitude, etc. The variability in the fall-off rate of ionized particles with altitude in the upper ionosphere was confirmed by results obtained from ion traps installed on the third Soviet earth satellite. The results confirm a principal electron concentration maximum in the ionosphere at altitudes around 300 km and that the so-called E layer of the ionosphere appears only as the result of the limited possibility of a purely altitude distribution of electron concentration on the basis of the altitude-frequency characteristics obtained from ionosphere stations. An assessment of the possibilities of using the dispersion interferometer at altitudes of some thousands of kilometers indicates their unreliability, reaching impossibility at distances greater than 20,000 km. --Authors' abstract.

D-981 Hanel, R. A. and Stroud, W. G. (both, Goddard Space Flight Cen., NASA, Wash., D. C.), The Tiros II radiation experiment. Tellus, Stockholm, 13(4):486-488, Nov. 1961. 7 figs. (incl. 5 color maps), table, 4 refs. DWB, DLC--The Tiros II meteorological satellite, containing two television cameras and a family of electromagnetic radiation experiments, was placed into orbit on Nov. 23, 1960. The medium resolution radiometer is a cluster of five sensors, their optical axes inclined at 45° to the spin axis of the satellite. The spin of TIROS provides the scanning motion. Channels are sensitive to the following spectral bands: (1) 6 to 6.5; (2) 8 to 12; (3) 0.2 to 6; (4) 8 to 30; and 0.55 to 0.75 microns. --Authors' abstract.

D-982 Harrower, G. A., A consideration of radio star scintillations as caused by interstellar particles entering the ionosphere. Pt. 1, Daily and seasonal variations of the scintillation of a radio star. Canadian Journal of Physics, Ottawa, 35(5):512-521, May 1957. 6 figs., 9 refs. Pt. 2, The accretion of interstellar particles as a cause of radio star scintillations. Ibid., p. 522-535. 12 figs., 2 refs., eqs. Pt. 3, The kind, number, and apparent radiant of the incoming particles. Ibid., 35(7):792-798, July 1957. 2 figs., 7 refs. DWB, DLC--In Pt. 1, an analysis is made of measurements of the scintillations of the radio source in Cassiopeia recorded at Ottawa during 1954 at a frequency of 50 Mc/s. After removal of the effect of the altitude of the source, the data show certain daily maxima occurring at solar times dependent on the date of the year. These maxima are found to comprise five separate groupings, two being present roughly from Sept. 13 to March 30, and the other three for the remainder of the year. The obvious lack of circular symmetry suggests a cause external to the solar system, such as the infall of interstellar particles. The apparent directions of arrival of these particles are derived from the scintillation measurements. In Pt. 2, a previously reported analysis of measurements of radio star scintillation, which showed daily variations dependent on time of year, is here interpreted to be the result of the accretion of interstellar particles by the sun's gravitational field. After a brief general discussion of the accretion process, the measurements are examined in an attempt to provide an explanation on that basis. Five distinct features exhibited by the scintillation data are interpreted as resulting from particles arriving at the earth as follows: directly from interstellar space, from a collision region behind the sun (both directly and after having crossed the earth's orbit), and from the collision region by a process of accretion in the gravitational field of the earth. The velocities of certain of these particles are derived by simple applications of vector addition employing the known velocity of the earth. The collision region is calculated to be located a radial distance of 200 million miles from the sun. In Pts. 1 and 2, as the result of an analysis of measurements of the scintillations of the radio source in Cassiopeia, it was suggested that interstellar particles, captured by the gravitational field of the sun, contributed to the observed features. Arguments presented in Pt. 3 lead to the conclusion that such particles must be hydrogen atoms. The number of hydrogen atoms reaching the earth is estimated to be $6 \times 10^{16}/m^2/$ sec. Their energy averages 9 or 22 electron volts, depending on whether or not they are ionized. It is concluded that the effect of this infall on the Earth's ionosphere would be more than adequate to produce scintillations. The location of the radiant, subject to the possibility of some considerable error, is judged to be right ascension 17 hrs, declination -30°. Based on this position of the radiant, the velocity of the interstellar hydrogen atoms in the vicinity of the sun is found to have the components: tangential 28×10^4 m/sec, radial 2×10^4 m/sec, and transverse 0.2×10^4m/sec, with respect to the plane of our galaxy. (Met. Absts. 9A-152 and 9A-155) --Author's abstracts.

D-983 Haslam, C.G.T. (Nuffield Radio Astron. Labs., Jodrell Bank), An attempt to observe the occultation of a radio source by Jupiter. Observator, London, 81(922):108, June 1961. --The reason for failure in observing an occultation of a radio source by Jupiter on Oct. 23, 1960, was discussed. The source of radio emission was evaluated at a few minutes of arc. If the diameter were appreciably greater than 2'5, no occultation by Jupiter could occur. Also, a probable error in declination of the source is several times Jupiter's angular diameter. --S. N.

D-984 Hoyle, F. and Narlikar, J.V. (both, St. John's College, Cambridge), On the counting of radio sources in the steady state cosmology. Royal Astronomical Society, London, Monthly Notices, 123(2):133-166, 1961. 7 figs., 2 tables, 16 refs., 36 eqs. DLC--The problem of the number count of radio sources as a function of the incident flux is shown to depend on two crucial features: (i) the size and behavior of condensations; (ii) the dependence on age of the probability of a galaxy being a radio source. Provided the probability rises by a factor 10^2 for galaxies with ages from H^{-1} to about 2.5^{-1}, and provided the primary condensations of the steady-state theory possess initial dimensions of order 30 megaparsecs, the radio source count can rise more steeply than is the case for sources uniformly distributed in Euclidean space. Each primary condensation contains of the order of 10^5 galaxies, which in the main expand apart from each other as the universe expands. It is shown that a luminosity function can be chosen for the radio sources giving results consistent with observation, not only for the source count, but also with the data on angular diameters and with experience in the problem of optical identifications. --Authors' abstract.

D-985 Istomin, V.G., Variation in the positive ion concentration with altitude from data of mass spectrometry measurements on the third satellite. Planetary and Space Science, N.Y., 8(3/4):179-182, Dec. 1961. fig., 7 refs., eq. DWB. Transl. by R. Matthews of original Russian, Ismenenie kontsentratsii polozhitel'nykh ionov s vysotoi po dannym mass-spektrometricheskikh izmersnii na tret'em sputnike, in Iskusstvennye Sputniki Zemli, No. 6, p. 127-131, 1961. DWB--Up to altitudes of 550 km the variation in positive ion concentration is in satisfactory agreement with the variation in electron concentration, while above 650 km mass spectrometry measurements, show a wide diversity on three different days. A comparison of mean concentration measurements obtained by mass spectrometry with experimental data employing ion traps provides conformation of the O concentration as a function of altitude, and of electron concentration as a function of altitude. The agreement between the N, O, NO and O positive ion concentration against altitude and the electron concentration curve points to the fact that light ions, with mass numbers beyond the range of the instrument (hydrogen ions H, and H, and helium He) do not exist in appreciable quantities and the ionosphere up to 900 km remains oxygen-nitrogen. With the presence of light ions, it is natural to expect an increase in their relative concentrations with altitude, as is found for ions of atomic nitrogen in relation to ions of atomic oxygen and for ions of atomic oxygen in relation to still heavier ions/1, 2/. An increase in relative concentrations of ions H, H and He would thus lead to a divergence between the electron concentration and the ion concentration. --Author's abstract.

D-986 Kallmann, H.K. (Rand Corp., Santa Monica, Calif.), Variable atmospheric properties derived from rocket and satellite observations. Journal of Atmospheric and Terrestrial Physics, London, 23:330-337, Dec. 1961. 3 figs., 2 tables, 26 refs., 4 eqs. DLC--Upper air densities obtained by means of rockets and satellites in the region from 100 km to about 800 km are presented. Variations of densities from day to night become apparent around 200 ± 30 km; the effect increases with altitude. Pressures and scale heights are derived from densities, and preliminary mean values for day and night are obtained. From the variation of scale height with altitude, regions of constant temperature and of variable molecular weight have been determined. It has been found that the mean temperature at 300 ± 50 km is approximately 1400°K. Shortly after midnight, the temperature drops to about 1010°K, and stays approximately constant above 160 ± 10 km. --Author's abstract.

D-987 Komesaroff, M. M. (C. S. I. R. O., University Grounds, Chippendale, N. S. W.), Galactic radio spectrum down to 19.7 Mc/s. Australian Journal of Physics, Melbourne, 14(4):515-528, Dec. 1961. 4 figs., 3 tables, 14 refs., 13 eqs. DLC--Studies of the galactic radio spectrum have been carried out using results of a number of surveys between 19.7 and 1390 Mc/s. About 4-5° from the equator the spectrum is non-thermal and the temperature spectral index has a constant value of 2.6 ± 0.1. The form of the spectrum changes with decreasing latitude, and at the lowest frequency an intensity minimum is observed along the equator. It is shown that the observations are fully consistent with a model consisting of two components: (i) non-thermal sources of constant spectral index, (ii) ionized hydrogen of constant temperature. The results yield some information about the distribution of thermal and non-thermal emissivity in the galactic plane, and provide qualitative support for results which Westerhout has drawn from more limited spectral data. --Author's abstract.

D-988 Kuz'min, A. D., O diskretnom istochnike radioizlucheniia $\alpha = 18^h 53^m.7$; $\delta = 1°16'$. (Discrete source of radio emission $\alpha = 18^h 53^m.7$, $\delta = 1°16'$.) Astronomicheskii Zhurnal, Moscow, 38(5):905-911, Sept./Oct. 1961. 3 figs., table, 22 refs., 6 eqs. Russian and English summaries p. 905. Transl. into English in Soviet Astronomy AJ, N. Y., 5(5): 692-696, March/April 1962. DLC--Results of the study of the discrete source of radio emission $\alpha = 18^h 53^m.7$, $\delta = 1°16'$, are given. The observations were made at 9.6 cm with the 22 meter radio telescope of the Physical Institute of the USSR Academy of Sciences. The flux density of radio emission and the angular dimensions of the source are determined. The derived data are compared with those of other authors. The spectrum of the source is obtained; it is non-thermal. The spectral index 0.4 ± 0.1 is derived. Shklovsky's method is used for the determination of the distance to the source, R = 3500 pc. The radius of the source at this distance is r = 9 pc. The minimum total energy of relativistic particles and the magnetic field, within the source, is found to be 10^{50} ergs. The magnetic field strength in the source $H = 10^{-4}$ gausses. A comparison is made with the discrete radio source, identified with the nebula IC 443. The spectrum of this source is obtained. The spectral index is 0.5 ± 0.1. The similarity of the compared sources as regards to structure, spectrum, dimension, total energy and field strength is shown. On the basis of the above and also the large value of the energy, within the nebula, it is concluded that the studied source is a remnant of a type II supernova. The erroneous results obtained by Parijsky, assuming a thermal radiative mechanism, are noted. --Author's abstract.

D-989 Large, M.I.; Mathewson, D.S. and Haslam, C.G.T. (all, Nuffield Radio Astronomy Labs., Jodrell Bank), Radio survey of the galactic plane at a frequency of 408 Mc/s, Pt. 1, Discrete sources. Royal Astronomical Society, London, Monthly Notices, 123(2):113-122, 1961. 4 figs., table, 28 refs. Pt. 2, Continuum emission from the galactic disk, p. 123-132. 5 figs., 12 refs., 2 eqs. DLC--Part of the galactic plane has been surveyed at 408 Mc/s using the 250 ft radio telescope at Jodrell Bank. The results are compared with the Sydney 85 Mc/s survey and the Leiden 1390 Mc/s survey in order to group the discrete sources of radio emission according to their spectral index. Of 51 sources, 36 are found to have a spectral index consistent with the assumption that they radiate thermally, and 15, including the source at the galactic center, have a non-thermal spectral index. Most of the sources lie within $1/4^{\circ}$ of the new galactic plane, and are thought to be at distances of several kiloparsecs. Some of the thermal sources are a few degrees from the galactic plane, and probably less than one kiloparsec from the Sun. The continuum background emission from the galactic disk is discussed in a second paper. The 408 Mc/s Jodrell Bank survey of the galactic plane has been used in conjunction with the Sydney (85 Mc/s) survey and the Leiden (1390 Mc/s) survey to delineate the distribution of thermal and non-thermal radio emission from the Milky Way. The results of this analysis are presented in the form of both isophotes and profiles at constant galactic latitudes. They extend and confirm a similar analysis carried out by Westerhout. Some features of the distributions could indicate a spiral structure of the Galaxy, but it is found that there are difficulties in fitting Mill's spiral model to the parts of the Milky Way ween from the northern hemisphere. --Authors' abstract.

D-990 Leinbach, H. and Reid, G. C. (both, College, Alaska), V.H.F. radio wave absorption in northern latitudes and solar particle emissions. (In: International Scientific Radio Union. IGY Committee, Some ionospheric results obtained during the IGY. Amsterdam, Elsevier, 1961. p. 281-294. 2 figs., table, 32 refs.) DLC (QC879.I68), DWB (M10.535 I612so) --Extensive observations of the absorption of radiowaves associated with ionospheric disturbances have been obtained at high latitudes by using the cosmic noise technique. The high latitude ionospheric absorptions were divided into three types: Type I as a SID accompanying a solar flare; Type III following the flare as a strong slowly varying absorption persisting for 45 hrs. After 46 hrs the absorption shows rapid variations of Type II coinciding with auroral and magnetic activities. The characteristics of Type III are described in detail and tabulated for the period of July 3 to Sept. 22, 1957. The Type III absorption due to ionization caused by high energy protons is atmospheric in origin, the result of attachment of electrons to form negative ions during the night and photo-detachment of the same electrons during the daytime. The proton energy is evaluated to 8 Mev and the penetration into the atmosphere to a height of 67 km. The interplanetary density of the fast protons is probably very low. The state of the interplanetary medium may be revealed by the Type III absorption. (Met. Abst. 13F-133.)--S. N.

D-991 Liszka, L. (Kiurna Geophysical Obs., Sweden), Local electron densities deduced from the Faraday fading of satellite transmissions using measurements during two consecutive transits. Planetary and Space Science, N. Y., 5(3):213-219, July 1961. 5 figs., 4 refs., 30 eqs. DWB--A simplified method for analysis of the Faraday fading measurements is described. With a satellite of circular orbits, both the total electron content between observer and satellite and the direction of the magnetic field in the ionosphere can be calculated. For all other orbits the local electron density must be taken into consideration. From measurements of the Faraday fading frequency during at least two consecutive transits the total electron content and the local electron density can be calculated as a function of satellite altitude on the following assumptions: (a) during the period of time comprising two consecutive transits the relative gradients of local electron density are constant at the same altitudes; (b) the local electron density at altitudes above the F2 maximum during a period of time comprising two consecutive transits changes as does the electron density within the maximum of the F2 layer. The method has been applied to the daytime observations of the 1958 δ 2 on Sept. 12 and 29, 1959. --Author's abstract.

D-992 McLean, D. J. and Wild, J. P. (both, C. S. I. R. O., Univ. Grounds, Chippendale, N. S. W.), Systems for simultaneous image formation with radio telescopes. Australian Journal of Physics, Melbourne, 14(4):489-496, Dec. 1961. 5 figs., 3 refs., eq. DLC--The large arrays of aerials often necessary for high resolution in radio astronomy are generally used to observe a brightness distribution in an area of the sky by scanning the aerial beam, point by point, across the area. In this paper we investigate the possibility of observing the complete distribution simultaneously over a given area. Two possible analogue systems capable in principle of forming such images, are described: in one, the analogue image is formed optically, in the other with ultrasonic methods. The problems and limitations of the two systems are examined and it is concluded that further technical developments are required before practical systems with useful sensitivity and resolution can be achieved. --Authors' abstract.

D-993 Miller, Raymond J. (General Electric Co., Ithaca, N. Y.), Air and space navigation system uses cross correlation detection techniques. Electronics, N. Y., 34(50):55-59, Dec. 15, 1961. 6 figs., ref., eq. DWB, DLC--The correlation navigator is a self contained surface speed and drift angle measuring system, which, unlike Doppler systems, takes advantage of unique characteristics of radar signal returns from individual scatters. It measures altitude above any terrain, regardless of its nature or state, and renders the surface speed of aircrafts or space vehicles. The cross correlation detection technique and other features are described in some detail. (Met. Abst. unpub.)--W. N.

D-994 Millman, George H.; Sanders, Armand E. and Mather, Robert A., Radar - lunar investigations at low geomagnetic latitude. Journal of Geophysical Research, Wash., D. C., 65(9):2619-2626, Sept. 1960. 8 figs., 10 refs., 6 eqs. DLC--Radar reflections from the Moon have been studied utilizing the Trinidad, BWI, radar operating in the 400 Mc/s frequency range. The Moon has been tracked from moon rise through transit during periods of sunset. On all occasions, the rotation of the plane of polarization (Faraday effect) was observed. Absolute values of the total electron content of the ionosphere deduced from these measurements and the electron content above the height of the F layer maximum, evaluated from vertical incidence ionospheric soundings recorded at the NBS Puerto Rican station, are presented. (Met. Abst. 13F-157.)--Authors' abstract.

D-995 Mills, B.Y.; Slee, O.B. and Hill, E.R., Catalogue of radio sources between declinations -50° and -80°. Australian Journal of Physics, Melbourne, 14(4):497-507, Dec. 1961. 5 tables, 15 refs. DLC--A catalogue has been prepared of the radio sources observed between declinations -50° and -80°, using the Sydney cross type radio telescope at a wavelength of 3.5 m; a total of 219 sources is listed. This supplements the earlier catalogues for the declination ranges $+10^{\circ}$ to -20° and -20° to -50°. In addition to the positions and intensities of the sources, angular sizes of 42 of the strongest sources are given. As before, identifications with bright optical objects have been sought, and a number of possible identifications with emission nebulae and bright galaxies are listed. Because of the small area of sky covered by the present catalogue, the numbers of sources are small (compared with those in our earlier catalogues) so that the statistical analysis of their distribution has comparatively low weight. However, the analysis gives results consistent with those obtained using the earlier catalogues. Finally, the present state of the identification of sources in our catalogues is briefly reviewed.--Authors' abstract.

D-996 Mitra, A.P. and Sarada, K.A. (both, Nat'l. Physical Lab., New Delhi, India), Determination of the electron content of the outer ionosphere from measurements of cosmic radio noise absorption. Journal of Atmospheric and Terrestrial Physics, London, 23:348-357, Dec. 1961. 6 figs., 3 tables, 11 refs., 9 eqs. DLC--Simultaneous use of ionograms and observations of cosmic radio noise taken at New Delhi (at 22.4 Mc/s) have yielded approximate values of the electron content of the outer ionosphere. It has been assumed that the electron density falls out exponentially from the level of maximum ionization. The value of the exponent was determined to be about 6×10^{-3}/km.--Authors' abstract.

D-997 Molchanov, A.P., Spektr lokal'nykh istochnikov radioizlucheniia Solntsa. (The spectrum of local sources of solar radio emission.) Astronomicheskii Zhurnal, Moscow, 38(5): 849-854, Sept./Oct. 1961. 3 figs., 20 refs., 3 eqs. Russian and English summaries p. 849. Transl. into English in Soviet Astronomy AJ, N.Y., 5(5):651-654, March/April 1962. DLC--The relative spectrum of a source on the Sun, observed during a solar eclipse, has been obtained. The mean inclination of the spectra is determined from measurements of the maximum shift of the center of gravity of solar radio emission. The absolute spectrum is computed, adopting several assumptions on the dependence between the emission flux of a quiet Sun and the wave length. The magnetic field in the source is found from the inclination of the spectrum. A conclusion is made on the necessity of assuming either the presence of strong magnetic fields in the sources or the existence of a component of non-thermal emission. --Author's abstract.

D-998 Naismith, R. and Smith, P.A. (both, D.S.I.R. Radio Res. Station, Slough, Bucks), Further evidence of a long term variation in the relationship of solar activity to the ionosphere. Journal of Atmospheric and Terrestrial Physics, London, 22(4):270-274, Dec. 1961. 4 figs., table, 2 refs. DLC--Ionospheric measurements indicate that during the last 20 yrs there has been a progressive decrease in F region ionization corresponding to a given sunspot number. In a previous paper it was shown that there was a corresponding decrease in the E region. It is pointed out that this represents a progressive change in the nature of solar radiation or in the atmosphere. --Authors' abstract.

D-999 Noton, A.R.Maxwell (Elec. Eng. Dept., Univ. Nottingham), Guidance of space vehicles by radio measurements and command. British Interplanetary Society, Journal, 18(4):132-138, July/Aug. 1961. 4 figs., table, 2 refs., 13 eqs. DWB, DLC --The injection of space vehicles into orbit is dependent on guidance and control systems which are effective during the powered flight in the vicinity of the Earth. However, for most advanced lunar or interplanetary missions, the injection will not be sufficiently accurate and forms of post injection guidance will be employed. This paper is concerned with such guidance and in particular with the important radio command system which depends on ground radio tracking, computing and command. After summarizing the necessary ballistics theory, schemes of mechanization are discussed assuming the use of a small rocket (chemical propellant) mounted in the space vehicle. The computation of the mid-course correction depends on the orbit determination, based on radio tracking of the vehicle by several sites located at widely dispersed points on the surface of the Earth. The method of orbit determination is explained and finally, for lunar and interplanetary missions, some examples are given in which the overall accuracy of such guidance systems has been calculated in terms of the various sources of error, e.g., in pointing the rocket and determining the orbit from noisy radar data. --Author's abstract.

D-1000 Parĭskiĭ, Iu. N., Model' tumannosti Oriona po radionabliudeniiam. (Model of the Orion nebula from radio observations.) Astronomicheskii Zhurnal, Moscow, 38(5):798-808, Sept./Oct. 1961. 10 figs., table, 39 refs., 4 eqs. Russian and English summaries p. 798. Transl. into English in Soviet Astronomy AJ, N.Y., 5(5):611-618, March/April 1962. DLC--The coordinates and radio brightness distribution of the Orion nebula have been obtained with the Pulkovo large radio telescope. A comparison with previously measured coordinates of the radio source shows that the maximum of radio emission coincides with the position of the Orion trapezium. The kinetic temperature of the nebula is derived from the distribution of radio brightness at 8.3 cm. A method for determining the kinetic temperatures of gas nebulae of arbitrary structure is described, it being a generalization of Wade's method. The value of $T_e = 11750^\circ K$ obtained from radio data is close to that found from optical observations. The mean square electron density in the nebula differs considerably from the electron density derived from the relative intensities of the lines 3726/3729, the difference increasing with the distance from the trapezium. If this difference is interpreted as a result of the cloud structure of the nebula, the fraction of the volume occupied by dense clouds is 1/14 in the center and exceeds 1/36 at the periphery of the nebula. The mass of the nebula is found to be 116 $M_\odot$, about 6 $M_\odot$ being concentrated in its brightest part having a diameter of 3'. The emission measure obtained from radio observations is essentially smaller than that predicted from the brightness of the nebula in $H\beta$. It is possible that the "excess" emission in $H\beta$ is connected with the existence of separate very hot formations, in which excitation due to hydrogen collisions becomes essential. Such formations can exist as a result of the presence of a system of shock waves in the nebula during its expansion.--Author's abstract.

D-1001 Payne-Scott, Ruby and McCready, L.L., Ionospheric effects observed during dawn observations on solar noise. Journal of Geophysical Research, 53(4):429-432, Dec. 1948.--Near dawn measured interference pattern of direct radiation from the sun, combined with reflected energy from the sea. Both 60 and 200 Mc/s were used. Found the refractive effects about three times as great as would be produced by a symmetrical parabolic F layer with constants similar to the lower side. (Unchecked)--L.A. Manning

D-1002 Pawsey, J. L., Radio star scintillations due to ionospheric focusing. (In: Physical Society, London, Physics of the Ionosphere. London, Physical Society, 1955. p. 172-173.) DWB--A new type of scintillation of the radio star in Cygnus has been detected which cannot be attributed to scattering from a number of randomly distributed ionospheric irregularities, but appears to be due to a focusing effect of lens-like irregularities. The irregularities are elongated in directions which vary from time to time, and it is not yet possible to decide in which part of the ionosphere they exist. (Met. Abst. 13F-174.)--Physics Abstract 8423, 1955.

D-1003 Pineo, V. C. and Briscoe, H. W. (both, Lincoln Lab., Mass. Inst. of Techn.), Discussion of incoherent backscatter power measurements at 440 Mc/s. Journal of Geophysical Research, Wash., D. C., 66(11):3965-3966, Nov. 1961. 9 refs., 4 eqs. DWB, DLC--The Mill Stone Hill backscatter power measurements were improved by taking into account certain approximations. The observed scattered power was compared with GORDON's (1958) original prediction which was based on independent scattering by free electrons. More recently developed theories (FEJER, 1960; DOUGHERTY and FARLEY (1960) show that at radio wavelengths greater than the Debye length, the electrons do not behave independently of each other, and that the scattered power is approximately one half what it would be for free electrons. Hence, the scattered power measurements at 440 Mc were about 7 db less than Gordon's prediction and 4 db less than predictions based on latest theories of electron scattering. --S. N.

D-1004 Ponomarev, E. A., Nekotorye voprosy rasprostraneniia kolebanii nizkoi chastoty v viazkoi i szhimaemoi plazme vdol' magnitnogo polia. (Some problems on the propagation of low frequency oscillations in a viscous compressible plasma along the magnetic field.) Astronomicheskii Zhurnal, Moscow, 38(5):877-884, Sept./Oct. 1961. 8 refs., 47 eqs. Russian and English summaries p. 877. Transl. into English in Soviet Astronomy AJ, N. Y., 5(5):673-677, March/April 1962. DLC--The propagation of low frequency electromagnetic, transversal viscous and longitudinal oscillations in plasma along the magnetic field, is considered. Relations are obtained, which generalize the known magneto-hydrodynamic equations for the case of higher frequencies. The connection between the electric conductivity and viscosity coefficients is given. The energy exchange between different forms of waves is considered. Qualitative estimates, applicable to conditions in the solar corona, are made. --Author's abstract.

D-1005 Ratcliffe, J. A. (Cambridge, Great Britain), S. I. D. 's during the IGY. (In: International Scientific Radio Union. IGY Committee, Some ionospheric results obtained during the IGY. Amsterdam, Elsevier, 1961. p. 124-129. 4 figs., 6 refs., 3 eqs. French summary p. 129.) DLC (QC879. 168), DWB (M10. 535 I612so)--Measurements of the changes of phase and amplitude of waves reflected from the E layer on frequencies of 2. 4 and 2. 8 Mc/s and from the F layer on frequencies of 4 and 6 Mc/s and changes of amplitude of waves emitted from radio stars on frequencies of 16 and 24 Mc/s, were all carried out simultaneously during the course of a S. I. D. The results from about 50 S. I. D. 's are discussed. It is suggested that they provide reason for supposing that extra electrons are produced during an S. I. D., at all levels between about 60 km and 120 km and that the distribution changes from one S. I. D. to another. This suggestion is shown to be compatible with evidence from experiments of different kinds. (Met. Abst. 13F-187.) --Author's abstract.

D-1006 Rutherford, G.T. (Bureau of Met., Melbourne), Review of the application of satellites to meteorology. Australian Meteorological Magazine, Melbourne, No. 34:1-14, Sept. 1961. 3 figs., 11 refs. DWB--The increase in meteorological knowledge during the past half century has not been accompanied by a parallel increase in accuracy of forecasts. This has been due, not only to a continuing absence of information from certain vital areas, but also to a more fundamental and scientific difficulty of inadequate understanding of meteorological processes, necessitating reliance on empirical and largely subjective forecasting techniques. In this paper reference is made to the potential of the weather satellite, by television camera and radiation sensor, to remove the former of these limitations by extending the field of observation from the present one-quarter of the Earth's surface to the entire globe. The importance of radiation measurements by satellite sensors for extended range forecasting by heat balance considerations is also discussed together with other applications of these measurements. It is concluded that while availability of observations on a global basis from weather satellites will be a major advance, it will not prove a panacea for all meteorological ills. The additional requirement is a better understanding of meteorological processes. This is still a long term prospect but close study and interpretation of photographed cloud patterns is one avenue which promises to lead to this result and consequently to better weather prediction. --Author's abstract.

D-1007 Shain, C.A.; Komesaroff, M.M. and Higgins, C.S., High resolution galactic survey at 19.7 Mc/s. Australian Journal of Physics, Melbourne, 14(4):508-514, Dec. 1961. Graph (fold), 14 refs. DLC--An extensive strip of the Southern Milky Way has been surveyed at 19.7 Mc/s, using a Mills Cross with a pencil beam 1.4° wide. The radio contours show a number of dark areas whose positions agree with those of optically observed H II regions which at this frequency are seen in absorption. In addition, an intensity minimum along the galactic equator appears to represent the effect of absorption due to many H II regions extending to great distances in the galactic plane. --Authors' abstract.

D-1008 Swift, D.W. (AVCO Corp., Wilmington, Mass.), Effect of solar X-rays on the ionosphere. Journal of Atmospheric and Terrestrial Physics, London, 23:29-56, Dec. 1961. 15 figs., 3 tables, 20 refs., 39 eqs. DLC--Quite often a large solar flare is accompanied by a Sudden Ionospheric Disturbance (SID) in which the electron density of the D region undergoes a rapid increase in a matter of minutes. There is strong evidence that the rapid increase is caused by soft X-rays generated in the Sun's corona during a solar flare. The X-rays reach the D region where they are capable of producing ionization. Extensive computations have been carried out in order to understand the effects caused by a burst of solar X-rays in the D region. In general, the altitudes for peak production range from 95 km for 1 keV X-rays down to 60 km for 9 keV X-rays. The rate equations are set up (and solved, with the aid of an IBM 704 computer), assuming several specific energy distributions and a duration of 6 min for a solar flare. The various processes are also studied separately by solving the rate equations under simplifying assumptions. The assumption of a detailed electron negative ion balance led to results which agreed very well numerically with those obtained by machine computations. It is found that the maximum relaxation time for equilibrium between the electrons and negative ions is about 2 sec. Since recombination times are at least two orders of magnitude longer than the relaxation time for equilibrium between the electron and negative ions, a detailed electron-negative ion balance will hold at all altitudes in the D region throughout an SID. The number of free electrons decreases with increasing X-ray energy. This is because the higher energy X-rays deposit most of the ionization at the lower altitudes where the electron attachment rate is much larger than the detachment rate. Therefore, most of the ionizing radiations will then go over to the production of negative ions. Also, recent solar X-rays measurements are discussed and used for computing electron densities. Finally, the computed electron distributions are compared with data deduced from ionospheric measurements. --Author's abstract.

D-1009 U.S. Weather Bureau, Catalogue of meteorological satellite data: Tiros I television cloud photography. Its Key to Meteorological Records Documentation, No. 5.31, 1961. 147 p. mostly maps and tables. DWB--The Catalogue attempts to provide information to research personnel making use of climatological data. It consists of a complete listing of cloud photographs by Tiros I and a set of maps showing their geographical coverage. The tabulated listings give descriptive information about the pictures obtained by Tiros I. Following the listings is a series of maps which provide a rough indication of the area covered. A report by the Meteorological Satellite Laboratory describes the problems and uncertainties in specifying the satellite's attitude as a function of time. --S. N.

D-1010 Vestine, E. H., Physics of solar terrestrial space: lunar flight. Rand Corp., Santa Monica, Calif., Paper 1344, Feb. 24, 1958. 17 p. 3 figs., 14 refs. DWB (M(055) R186p)--This lecture discusses physical conditions in space near the earth, moon, and sun. In particular, it deals with density, radiation, temperature, wave propagation, magnetic fields, and the effects of these factors on space flights. --Author's abstract.

D-1011 Warwick, J. W. (High Altitude Obs., Univ. of Colorado, Boulder), Relation of Jupiter's radio emission at long wavelengths to solar activity. Science, Wash., D.C., 132 (3435):1250-1251, Oct. 28, 1960. 2 figs. DLC--Since the spring of 1960 a strong positive correlation between Jupiter's decametric emission and solar decametric continuum emission observed at Boulder has been evident. The time delay of 1 to 2 days, with solar emission preceding Jupiter's emission, suggests that fast solar corpuscles, at velocities of the order of 0.1 c, are directly involved in the planet's atmosphere or magnetic field. --Author's abstract.

D-1012 Watkins, C. D. (Nuffield Radio Astronomy Lab., Jodrell Bank, Manchester Univ.), The magnetic storm time variation of radio star scintillations and auroral radio echoes. Journal of Atmospheric and Terrestrial Physics, London, 19(3/4):289-292, Dec. 1960. 3 figs., 3 refs. DWB--An examination of the observations made at Jodrell Bank during 1955-1958 shows that about 80% of all the series of radio echoes recorded were preceded by a sudden commencement. This suggests that echo activity is mainly related to s.c. type magnetic storms. The storm time variations of echo incidence and mean scintillation rate are graphically presented. The variation of echo incidence is also plotted for the periods Jan. 1955-June 1957 and July 1957-Dec. 1958 separately and combined, and the associated features are discussed. (Met. Abst. 13B-165.)--I. S.

ANONYMOUS

D-1013 Powerful VHF radar probes sun's corona. Electronics, N. Y., 34(52):54, 56, Dec. 29, 1961. photo. DWB, DLC--Reports on a long term study of radar echoes from the sun being conducted by the Lincoln Laboratory of MIT with joint U. S. Army, Navy and Air Force support. The detailed study covers 32 radar measurements made during April 19 to July 7 near El Campo, Tex. The findings are compared with those obtained by Stanford in April 1959. Long term radar observations are stated to be capable of yielding quantitative data on the effective size and shape of the corona and other phenomena. The characteristics and capabilities of the radar transmitter operating with a 38. 25 Mc transmitting frequency is discussed. A photograph is presented of the half megawatt radar and 1, 024 dipole antenna array used in gathering data about solar phenomena. --D. B. K.

AUTHOR INDEX

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U. S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

NATIONAL BUREAU OF STANDARDS
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THE NATIONAL BUREAU OF STANDARDS

The scope of activities of the National Bureau of Standards at its major laboratories in Washington, D.C., and Boulder, Colorado, is suggested in the following listing of the divisions and sections engaged in technical work. In general, each section carries out specialized research, development, and engineering in the field indicated by its title. A brief description of the activities, and of the resultant publications, appears on the inside of the front cover.

WASHINGTON, D. C.

Electricity. Resistance and Reactance. Electrochemistry. Electrical Instruments. Magnetic Measurements. Dielectrics. High Voltage.

Metrology. Photometry and Colorimetry. Refractometry. Photographic Research. Length. Engineering Metrology. Mass and Scale. Volumetry and Densimetry.

Heat. Temperature Physics. Heat Measurements. Cryogenic Physics. Equation of State. Statistical Physics.

Radiation Physics. X-ray. Radioactivity. Radiation Theory. High Energy Radiation. Radiological Equipment. Nucleonic Instrumentation. Neutron Physics.

Analytical and Inorganic Chemistry. Pure Substances. Spectrochemistry. Solution Chemistry. Standard Reference Materials. Applied Analytical Research. Crystal Chemistry.

Mechanics. Sound. Pressure and Vacuum. Fluid Mechanics. Engineering Mechanics. Rheology. Combustion Controls.

Polymers. Macromolecules: Synthesis and Structure. Polymer Chemistry. Polymer Physics. Polymer Characterization. Polymer Evaluation and Testing. Applied Polymer Standards and Research. Dental Research.

Metallurgy. Engineering Metallurgy. Microscopy and Diffraction. Metal Reactions. Metal Physics. Electrolysis and Metal Deposition.

Inorganic Solids. Engineering Ceramics. Glass. Solid State Chemistry. Crystal Growth. Physical Properties. Crystallography.

Building Research. Structural Engineering. Fire Research. Mechanical Systems. Organic Building Materials. Codes and Safety Standards. Heat Transfer. Inorganic Building Materials. Metallic Building Materials.

Applied Mathematics. Numerical Analysis. Computation. Statistical Engineering. Mathematical Physics. Operations Research.

Data Processing Systems. Components and Techniques. Computer Technology. Measurements Automation. Engineering Applications. Systems Analysis.

Atomic Physics. Spectroscopy. Infrared Spectroscopy. Far Ultraviolet Physics. Solid State Physics. Electron Physics. Atomic Physics. Plasma Spectroscopy.

Instrumentation. Engineering Electronics. Electron Devices. Electronic Instrumentation. Mechanical Instruments. Basic Instrumentation.

Physical Chemistry. Thermochemistry. Surface Chemistry. Organic Chemistry. Molecular Spectroscopy. Elementary Processes. Mass Spectrometry. Photochemistry and Radiation Chemistry.

Office of Weights and Measures.

BOULDER, COLO.

Cryogenic Engineering Laboratory. Cryogenic Equipment. Cryogenic Processes. Properties of Materials. Cryogenic Technical Services.

CENTRAL RADIO PROPAGATION LABORATORY

Ionosphere Research and Propagation. Low Frequency and Very Low Frequency Research. Ionosphere Research. Prediction Services. Sun-Earth Relationships. Field Engineering. Radio Warning Services. Vertical Soundings Research.

Radio Propagation Engineering. Data Reduction Instrumentation. Radio Noise. Tropospheric Measurements. Tropospheric Analysis. Propagation-Terrain Effects. Radio-Meteorology. Lower Atmosphere Physics.

Radio Systems. Applied Electromagnetic Theory. High Frequency and Very High Frequency Research. Frequency Utilization. Modulation Research. Antenna Research. Radiodetermination.

Upper Atmosphere and Space Physics. Upper Atmosphere and Plasma Physics. High Latitude Ionosphere Physics. Ionosphere and Exosphere Scatter. Airglow and Aurora. Ionospheric Radio Astronomy.

RADIO STANDARDS LABORATORY

Radio Physics. Radio Broadcast Service. Radio and Microwave Materials. Atomic Frequency and Time-Interval Standards. Radio Plasma. Millimeter-Wave Research.

Circuit Standards. High Frequency Electrical Standards. High Frequency Calibration Services. High Frequency Impedance Standards. Microwave Calibration Services. Microwave Circuit Standards. Low Frequency Calibration Services.

NBS