ABSTRACTS

Supply and Cost of 16-Mm. Film for the Home. F. S. IRBY. *Electronics*, August, 1931, p. 48. An analysis of the various factors that contribute to the cost of 16-mm. films for sound pictures in the home. The author considers that if such films are to reach more than a very limited class market, the rental cost to the consumer should not exceed $2 for a four or five reel feature picture. The library must anticipate liquidation of the cost of the film in from twenty to twenty-five rentals, which means that the cost of the film to the library must not exceed $10 to $12 per reel. A. C. H.

Light-Valve Sound Recording. J. P. LIVADARY. *Electronics*, August, 1931, p. 54. The third and final installment in a series of articles dealing with the frequency distortion introduced by the finite width of the slit in recording. This article is concerned chiefly with a mathematical analysis of the distortion introduced in the light valve method of recording. In the conclusion, the author summarizes the results of this and the preceding articles by comparing the various methods of recording that have been studied; namely, the glow lamp method, the single ribbon light valve method, the double ribbon light valve, and the variable width method. He concludes that "from a practical standpoint, all three systems are capable of high-grade recording, and any difference such as we have shown will not become very apparent or objectionable until such time when the film grain noise is suppressed and sound recording systems are capable of commercially reproducing frequencies up to 10,000 cycles or over. Until then all three systems will be competing on practically equal terms." A. C. H.

Dynamic Loud Speaker Design. J. E. GOETH. *Electronics*, August, 1931, p. 66. A very elementary account of the magnetic circuit of dynamic loud speakers. A second installment of this article will appear in a later issue. A. C. H.

A Rapid-Record Oscillograph. A. M. CURTIS AND I. E. COLE. *Electronics*, August, 1931, p. 70. An oscillograph of the string galvanometer type that is especially designed for the study of transient phenomena. A. C. H.

Noiseless Sound-on-Film Recording. GEORGE LEWIN. *Electronics*, September, 1931, p. 102. The author discusses the theory of noiseless sound-on-film recording by the light valve. The subject will be treated from a practical standpoint in a subsequent issue. A. C. H.

Dynamic Loud Speaker Design—II. J. E. GOETH. *Electronics*, September, 1931, p. 112. The second and final installment of an article concerned primarily with the magnetic circuit of dynamic loud speakers. A. C. H.

Stage Equipment: An Outline of Modern Practice. W. L. TANN. *Theater Management*, **27**, December, 1931, p. 6. Essential stage equipment in an average sized theater presenting straight pictures or pictures and stage performances is described and illustrated. Modern advances in fire protection by asbestos curtains and steel smoke pockets are pointed out. Various mechanical contrivances for enlarging the screen to permit the showing of wide films are discussed. A

notable advance in design of stage equipment is the silence with which the intricate mechanism operates. E. P. J.

Room Noise Reduction for Improved Sound Reception. V. A. SCHLENKER. *Theater Management*, **26**, November, 1931, p. 3. Describes tests conducted to determine the effect of extraneous noises on sound reproduction. Illustrates outside noises in typical theater before and after acoustical treatment of vestibule, lobby, foyer, and exit doors. An oscillograph trace of three bands of noises recorded simultaneously in the street, lobby, and foyer of theater under discussion reveals that while high and middle frequency bands are effectively silenced by entrance doors, bands of low frequency enter the theater practically undiminished.

A chart showing the effect of various sensation levels expressed in decibels above minimum audibility of the human ear is discussed. The painful effect produced by fader manipulation to produce audibility of picture sound above room noise is indicated. E. P. J.

The Use of Rochelle Salt Crystals for Electrical Reproducers and Microphones. C. B. SAWYER. *Proc. IRE*, **19**, No. 11, November, 1931, p. 2020. A brief history of the use of piezo-activity for acoustic uses is followed by a description of a cheap method of production of Rochelle salt crystals, used in the author's experiments. The principle of opposition was used. Two Rochelle salt sections are cemented together so that upon application of an electrical field, one section tends to expand and the other section tends to contract, thus amplifying the resultant motion. The method of cutting Rochelle salt crystals for this work is explained. Brief descriptions of Rochelle salt microphones, loud speakers, and phonograph pick-ups are given. The Rochelle salt development has the following outstanding advantages.

(1) Cheapness and simplicity.
(2) Long life.
(3) Flexibility of design.
(4) Generation of high voltages in input circuits.
(5) Directly matched with output tubes in output circuits.
(6) No necessity for an exciting field. A. H. H.

Trans-Lux Rear Stage Projection. W. MAYER. *Theater Management and Theater Engineering*, **26**, No. 22, October, 1931, p. 3. A non-technical discussion of the Trans-Lux system of rear stage projection as installed in theaters. The history of the system, various problems encountered and their solutions, and a description of the present installations give a concise outline of Trans-Lux. By means of special lens and optical systems, no changes in the projector and sound head mechanisms are necessary. Standard film is used and is threaded in the projector in the standard way. The average distance between screen and projector is $13^1/_2$ feet. A. H. H.

Moving Coil Telephone Receivers and Microphones. E. C. WENTE AND A. L. THURAS. *Bell Telephone Tech. J.*, **X**, No. 4, October, 1931, p. 565. A description of a moving coil head receiver and a microphone. The mechanical construction is based on using light-weight materials for moving parts, thus giving greater response over the frequency range. Theoretical and actual response are compared. The sensitivity of the moving coil microphone was found to be about ten db. higher than that of the condenser microphone. A. H. H.

Playing Light on a Thermionic Organ. W. C. FULTON. *Motion Picture Herald*, **104**, No. 13, September 26, 1931, Section 2, p. 12. A description of a unique lighting switchboard, built for the Severance Memorial Hall in Cleveland. The major innovation in the lighting system is the switchboard, built along the lines of a console of a modern organ. Controls for 4000 lighting combinations of 110 load circuits are at the finger tips of the operator. Included are a four scene preset control, proportional control, remote control of intensity, and interconnection of circuits. The system is based on the thermionic type of lighting control. The control apparatus for each circuit requires a dimming reactor, a conventional vacuum tube, two grid glow rectifiers, and a system of control potentiometers. The lamp load current flowing in the a-c. coils of the reactor, is directly dependent on the d-c. saturation current flowing in the d-c. coil of the same unit. As the direct current increases, the iron core of the reactor becomes saturated alternating current increases. The direct current is supplied by a pair of grid glow tubes whose output is controlled by the plate current of the vacuum tube. The plate current of the vacuum tube is in turn controlled by varying the bias on its grid. All the above apparatus is placed at a remote point from the control console. The control circuit of the vacuum tube grid is brought to the console. By means of selector switches, potentiometers, *etc.*, any or all circuits in the hall may be controlled at will. Circuit diagrams and pictures clearly show the operation of this installation. A. H. H.

Audible Frequency Ranges of Music, Speech, and Noise. W. B. SNOW. *Bell Telephone Tech. J.*, **X**, October, 1931, No. 4, p. 616. A description of tests to determine the maximum frequency range necessary for perfect or nearly perfect reproduction. With the aid of experienced listeners, and using a series of filters, varying degrees of cut-off were tried. It was found that frequencies between 80 and 8000 cycles were necessary to give good quality. Although rather indefinite as to the advantages of using frequencies outside this range, it is believed that the most nearly perfect quality is obtained by reproducing the full audible frequency range. A. H. H.

The Development of the Microphone. H. A. FREDERICK. *Bell Telephone Quarterly*, July, 1931, p. 164. An interesting history of the early experiments leading up to the present design of microphones. Dr. Page in 1837, Sullivan in 1845, Bourseil in 1854, Reis in 1861, Helmholtz in 1863, and Varley in 1870, made contributions to the development of the microphone. The experiments of Dr. Alexander Graham Bell, begun in 1874, are described in more detail. In 1877, Edison patented a transmitter of the varying resistance type, using a button of solid carbon or plumbago. The granular carbon design was first used in 1885. The condenser type and the piezoelectric crystal type are of more recent design. The difficulties of developing the carbon microphone are described in detail. It is interesting to note that minute granules of carbonized anthracite coal were first used by Edison in 1886. This source of carbon is still used to a great extent at the present time. A. H. H.

The Effect of Humidity upon the Absorption of Sound in a Room, and a Determination of the Coefficients of Absorption of Sound in Air. V. O. KNUDSEN, JR. *J. Acoustical Soc. of America*, **III**, No. 1, Part 1, July, 1931, p. 126. It is shown that the absorption of sound in air for frequencies above 2000 cycles is appreciable. This effect is great enough to affect very appreciably the calculation

of the reverberation time and absorption in a room for frequencies of 4000 cycles and above. The absorption of air becomes less as the humidity increases.

An idea of the magnitude of the effect may be obtained from the following statement. "Thus, if a tone of 4096 d.v., in the form of a plane parallel beam, were used for long range signaling there would be, at a temperature of 21° C. and a relative humidity of 44 per cent, an attenuation of 9.8 db. per second, or about 46 db. per mile. On the other hand, the attenuation would be less than 1 db. per mile for a frequency of 512 d.v." Furthermore, it appears from this data, that a reverberation chamber with perfectly reflecting walls would have a reverberation time of no more than about six seconds for a tone of 4096 d.v. if the humidity of the air in it is 44 per cent or less.

Theoretical formulas are deduced. The method used in separating the effect of the absorption in air and that at the surface of the rooms was to take comparable data in two rooms of different sizes but with the same boundary material, namely, painted and varnished concrete. This yields sufficient data to separate the effects. Even at 4096 d.v. the absorption of the painted concrete was about 0.02 and practically independent of humidity as long as condensation did not occur.

W. A. M.

A Critical Study of the Precision of Measurement of Absorption Coefficients by Reverberation Methods. P. E. SABINE, JR. *J. Acoustical Soc. of America*, III, No. 1, Part 1, July 1931, p. 139. The data presented include a comparison of absorption coefficients obtained at the Bureau of Standards and by two methods at the Riverbank Laboratories on identical samples of each of four materials. It is concluded that normal experimental errors in measuring absorption coefficients may easily be 3 or 4 per cent, that probably an error of 10 per cent in the coefficients would not appreciably affect the acoustic properties of an audience room; and the actual computation of the reverberation time in a room is a matter of approximate estimate rather than precise determination. W. A. M.

The High Intensity Arc for Motion Picture Projection. F. PATZELT. *Kinotechnik*, 13, September 20, 1931, p. 344. Measurements and graphs were made of the light distribution of an "Artisol 75" projection lamp with high intensity carbons and with ordinary carbons. The average brightness of the entire crater of ordinary carbons 14 mm. in diameter at 35 amperes and 45 volts was found to be 140 Hefner candles per sq. mm. Copper-coated high intensity carbons 11 mm. in diameter were found to have a brightness of 357 Hefner candles per sq. mm. at 75 amperes and 45 volts. The variation in the brightness of high intensity carbons with different amounts of current was also measured. It was found that carbons of small diameter require higher current densities than larger carbons to attain the same brightness. The effect of changing the relative positions of the carbons was studied, and it was found that greater brightness was attained with the axis of the negative carbon in line with the center of the positive carbon than with the axis of the negative carbon opposite the lower edge of the positive carbon. The variation of the brightness at constant current with varying length of arc was found to be small. It is stated that a 25-degree inclination of the axis of the negative carbon to the axis of the horizontal positive carbon is the most favorable. It is concluded that the difficulties in the use of high intensity carbons are compensated for by the increased illumination. M. W. S.

Safety Film. K. BRATRING. *Kinotechnik*, 13, July 20, 1931, p. 237. In its

mechanical properties, such as resistance to wear and damage, cellulose acetate motion picture film base is considered inferior to cellulose nitrate base. In view of the universal precautions against fire in the projection of professional motion picture films, it is considered that the low inflammability of cellulose acetate film is sufficient cause to justify the increased expense attendant upon its use in theaters. For schools, homes, and other places where proper safety precautions for nitrate film are not taken, cellulose acetate film should undoubtedly be used. It is thought that nitrate support constitutes no great hazard when used for amateur roll films and film packs, or for professional portrait films. For x-ray films, the introduction of cellulose acetate support is viewed with favor. M. W. S.

The Phillips Reproducing Set. *Kinemat. Weekly*, **172,** June 4, 1931, p. 61. The sound equipment in the Phillips set is a pedestal mounted at the left-hand side of the projector; and a flexible shaft coupling driven by the motor is connected with the projector flywheel. An integral gear shift permits the use of either sound-on-film, sound-on-disk, or silent operation. The sound head of the projector employs a curved gate which is said to prevent film buckle. A high emission photoelectric cell (18 microamperes per lumen) is used at present but a gas-filled caesium cell is being investigated for future use. The speed control is ingenious, the electric control being effected by rotating make-and-break cams, one driven by the projector motor and the other by a constant-speed motor. When the contact is made on both cam switches, a resistance is short circuited. The period during which this resistance is short circuited, therefore, depends upon the relative positions of the two cams. The cams revolve at approximately 80 rpm. The fader used in the set gives a logarithmic change. The projection room amplifier consists of a single stage which supplies current to the main amplifier which may range in capacity from 20 to 200 watts with speech levels of 10 to 45 watts, respectively. L. E. M.

A Continuous Motion Picture Projector. M. HUC. *Bull. soc. franç. phot.*, **73,** June 1931, p. 128. A newly designed single oscillating mirror type of continuous projector is described. The principle involved is one in which the film passes over a cylindrical drum having an aperture through which the single frame is projected upon an oscillating mirror, which in turn reflects it into the objective of the machine. During the movement of the film over the aperture, the adjacent frame is isolated by a moving window behind the aperture, which moves with the same angular velocity as the film. When the projection phase is terminated, a shutter in front of the objective masks it during the return of the mirror and window. The light from the illuminating sources does not fall directly on the film but is interrupted and reflected by a 45-inch mirror which is fabricated of a metal capable of absorbing a large percentage of the heat rays, thus protecting the film. All gears and cams are encased in oil, where possible, thereby minimizing noise. It is claimed that a projector as described is capable of projecting a film 3000 times without injury to the film. Drawings are included. C. H. S.

Faith in the Title. F. SLIP. *Filmtechnik*, **7,** May 2, 1931, p. 6. Although titles have been replaced temporarily by the use of sound, they have a place in certain classes of films, such as teaching films. Correctly composed titles may also be of value in the presentation of certain sound films. During a study of correct methods of title composition the maximum title width of 19 mm. has been selected as desirable with the height accordingly proportional. The background

should preferably be dark and the letters light. The type must be simple, clear, and attractive. The optimum length for the title has been investigated from a consideration of (1) length of the lines, and (2) number of letters. A useful table is given showing length of the lines, number of letters, length of the title, and length of the film per line of title, assuming projection at the rate of 24 frames per second. L. E. M.

Motion Picture of the Eclipse of the Moon. F. Albrecht. *Filmtechnik*, **7**, May 2, 1931, p. 1. On April 2, 1931, the first motion picture of a total eclipse of the moon was photographed at the Trepton observatory in Germany. With the usual motion picture camera the image of the moon is far too small and even with a teleobjective of 30 cm. The image is only 3 mm. in diameter. In the successful motion picture an $f/10$ objective of 65 cm. focal length was used, mounted on an Ernemann *E* camera. The camera and lens were secured in place on the 21-meter Trepton telescope. Positive film was employed and exposures of $^1/_4$ to $^1/_2$ second were made, using a blue filter with the teleobjective operated with a 35-mm. opening. The camera shutter opening was increased to 160 degrees at the beginning of the eclipse and decreased to 90 degrees as the eclipse passed. Single frame exposures were made at intervals of 5 seconds, thus giving for the $3^1/_2$ hour time a length of film which, when projected at the rate of 24 frames per second, occupied $1^1/_2$ minutes. L. E. M.

Television Demonstration at Broadway Theater. *Film Daily*, **57**, October 23, 1931, p. 1. A television demonstration was given at the Broadway Theater, New York, for two weeks beginning on Oct. 22, 1931, a 10 by 10 foot screen being used. The receiving disk revolved 900 times per minute and a projection system projected the images on the screen. The sending station was located a short distance away in the Theater Guild Studio. G. E. M.