ABSTRACTS OF PAPERS OF THE SPRING CONVENTION AT ATLANTIC CITY, N. J.

APRIL 22–25, 1940

The Papers Committee submits for the consideration of the membership the following abstracts of papers to be presented at the Spring Convention. It is hoped that the publication of these abstracts will encourage attendance at the meeting and facilitate discussion. The papers presented at Conventions constitute the bulk of the material published in the Journal. The abstracts may therefore be used as convenient reference until the papers are published.

The Control of Sound in Theaters and Preview Rooms; C. C. Potwin, *Electrical Research Products, Inc.*, New York, N. Y.

Acoustical science can now be applied to better advantage than ever before in the planning of modern motion picture theaters. A broader understanding of the purposes and principles of acoustical design and treatment is needed, however, to make this application universal. The Society is in a position to do much toward fulfilling this need.

Greater attention should be given to the design and development of the basic theater structure. The shaping of surfaces for the control of sound reflections is effective and can be kept within a desirable architectural limit. Furthermore, such shaping can be made to function successfully if the basic design is developed to control reverberation.

The all too prevalent idea that "the more acoustical material used, the better the results" should be discouraged. Acoustical materials can be used more efficiently if they are distributed asymmetrically with due regard to the geometry of the reflecting surfaces. In general, they should not be concentrated in large compact areas on single surfaces. This principle of treatment and its effect upon the acoustical characteristics of theaters is discussed.

Instrumental measurements of the effect of surface parallelism upon the frequency reverberation characteristic of a rectangular room are shown. The results are of particular interest with respect to the acoustical treatment of preview rooms.

Current Practices in Blooping Sound-Film; W. H. Offenhauser, Jr., *Bernot-Maurer Corp.*, New York, N. Y.

A review of our dimensional standards fails to indicate any attempt in the past to standardize sound-track bloops. While it is true that there is relatively little difficulty due to bloops at the present time, this condition appears to be due to the fact that each producing organization has more or less independently arrived at some rule-of-thumb solution to its particular problem rather than a result of any directed effort on the part of the industry as a whole.

The volume of film affected is already very large and all indications seem to point to a substantial increase in the future. With this increase in prospect, it appears that an analysis of the subject is justified in order that standardization may be accomplished when, as, and if desirable.

The criteria at the present time are almost entirely empirical; the common tests are (*1*) peak volume indicator and (*2*) listening. This has resulted in a wide variety of bloops in use; a reduction in the number of sizes and types seems desirable in the interest of simplification. For single-track negative bloop punches this is especially important.

In actual use, the length of the bloop punch varies from as small as 0.330 inch in one case to as large as 0.965 inch in another. A length of 0.500 inch may be considered to represent "average" practice. There is almost complete agreement on the following characteristics of bloop punches: (*1*) The punch should be sharp. (*2*) In the case of the triangle or trapezium types, there should be rounded corners at the base of the triangle.

There is no similar agreement in the use of bloops for sound positives; in the case of release prints, this matter is not especially pressing since release negatives are usually re-recorded and have few if any splices.

An Investigation of the Influence of the Negative and Positive Materials on Ground Noise; O. Sandvik and W. K. Grimwood, *Kodak Research Laboratories*, Rochester, N. Y.

This paper deals with the effect of the negative sound-track upon the ground-noise of the print. Data are presented showing the influence of negative density and negative gamma on print ground noise for fine, medium, and course-grain negative emulsions.

The Effects of Ultraviolet Light upon Variable-Density Recording; J. G. Frayne and V. Pagliarulo, *Electrical Research Products, Inc.*, Hollywood, Calif.

The effect of using ultraviolet filters upon the gamma of negative and positive development is discussed. The effect of ultraviolet light upon image quality is discussed, and a mathematical analysis is given explaining the existence of spurious side-images found in white-light recording on clear-base variable-density negatives. Low-end frequency rise, attributed to existence of these side-images, is eliminated by recording with ultraviolet. Reduction in wave-shape distortion as

well as improvement in high-frequency response attributed more to use of ultraviolet in printing than in recording. Practically no gain in signal-to-noise ratio is found by using ultraviolet in either recording or printing.

Photographic Tone Reproduction, Theory and Practice; Loyd A. Jones, *Kodak Research Laboratories*, Rochester, N. Y.

For many years, in fact ever since the early beginnings of photography, many workers in the field have dealt with various phases, both theoretical and practical, of the photographic tone reproduction problem. The word "tone" as used in this connection refers to the brightness and brightness differences existing in the original and in the photographic reproduction thereof. Hurter and Driffield, who were pioneers in the field of photographic sensitometry, gave some consideration to this problem, and since that time many contributions to the literature of the subject have been made by various contributors. The present paper aims to summarize the work which has been done in this field and to give an account of the present status.

Some of the most recent work done in these laboratories in correlating theoretical and practical aspects of tone reproduction will be discussed in some detail. This work has centered largely upon two subjects: the application of tone reproduction theory to the development of a suitable criterion for expressing the effective camera speeds of negative materials used extensively in the field of amateur photography; and the evaluation of the relative photographic quality of positives in terms of the amount of exposure given in making the negatives from which these positives were made.

As a result of these studies, direct practical evidence has been obtained which verifies quite satisfactorily the theoretical conclusions previously reached to the effect that the gradient characteristics of both negative and positive sensitometric curves are of utmost importance in the determination of effective camera speeds and photographic positive quality as evaluated directly in terms of perceptual factors.

Tone Reproduction in Television; I. G. Maloff, *RCA Manufacturing Co., Inc.*, Camden, N. J.

The purpose of television is to produce moving pictures of original scenes in homes, auditoriums, and theaters. From the standpoint of the requirements of pictorial tone reproduction, television is closely related to motion pictures. However, the technic of tone reproduction in television is vastly different from that in motion pictures. The degree of perfection of pictorial tone reproduction of present-day television is, in some respects, not as high as that obtainable with 35-mm motion pictures. On the other hand, the medium of television is the electrical signal, which is a great deal more flexible than photographic emulsions and permits effects unobtainable with the latter.

The paper treats pictorial tone reproduction in television in detail. Means of obtaining desired range, contrast, perspective, and intensity, with adequate resolution, adequate illusion of motion and freedom from flicker, are discussed. Limitations and flexibility of pictorial tone reproduction in television are described in comparison with older methods of pictorial reproduction, and typical

tone reproduction characteristics of the complete television system as well as its essential components are given.

Direct 16-Mm Production; Lloyd Thompson, *The Calvin Company*, Kansas City, Mo.

There are so many reasons why 16-mm film can and should be used that the industrial and educational user is using more and more of it. The production of 16-mm sound pictures by the direct method has been making progress. Today there are a number of companies using direct black-and-white and color sound productions in the 16-mm size. Many who are trying to use the method do not understand the proper technic or do not use the best commercial facilities available, which make the process slow in being generally accepted.

Certain advantages and economies are effected by using the direct 16-mm production method which make it desirable for the non-user of sound-films to use this medium for the first time, and for others to use the film more effectively. Complete commercial 16-mm production and laboratory facilities are now available that equal those of the best 35-mm industrial producers. The problem of making wipes, fades, dissolves, and other tricks in the laboratory has been solved for direct 16-mm production. Re-recording facilities for blending sound from several sources are available, making it possible to achieve truly professional results by the direct method. A few examples of direct 16-mm productions are given.

Commercial Motion Picture Production with 16-Mm Equipment; John A. Maurer, *The Berndt-Maurer Corp.*, New York, N. Y.

Production of commercial sound motion pictures directly in the 16-mm size has increased rapidly during the past few years. Particularly in the production of those types of industrial films which are photographed in the field or factory rather than in the studio, the well known advantages of relative simplicity, portability, and freedom from fire risk in 16-mm equipment lead to economies that have frequently been decisive in making possible new applications of films.

This paper surveys broadly the equipment, films, and services that are available for 16-mm production, and presents a critical evaluation of the methods that are in use.

Copies of 16-mm films are being produced at the present time by reversal duplication from reversal originals, by making prints from reversal originals by means of an intermediate negative on fine-grain stock, by the direct negative-positive procedure, and by Kodachrome duplication. Prints produced by each of these processes will be demonstrated.

Professional 16-Mm Recording Equipment; D. Canady, *Canady Sound Appliance Co.*, Cleveland, Ohio.

Details and description of 16-mm sound recording equipment for professional use is given, including:

(*1*) A 16-mm recorder employing a high-quality optical system and glow-lamp.

(*2*) Sound-track optical-reduction printer, permitting 16-mm variable-density sound-track being made from either 35-mm variable-density or variable-area recorded track.

(*3*) Noise-reduction equipment, for use in connection with glow-lamps or the new high-pressure quartz mercury lamp.

Sixteen-Mm Equipment and Practice in Commercial Film Production; J. F. Clemenger and F. C. Wood, Jr., *Sound Master, Inc.*, New York, N. Y.

Today's commercial film is designed to accomplish a specific purpose and is therefore particularly directed to a specific audience. Prior to the introduction of the 16-mm sound projector, commercial sound-films could for the most part be shown only to theatrical entertainment audiences.

The immediate acceptance and rapid growth in use of 16-mm sound projection equipment for the first time made it possible for the commercial film producer to select the audience most useful to him.

At first practically all commercial 16-mm sound-films were made on 35-mm equipment and subsequently optically reduced to obtain 16-mm prints. It soon became obvious that it would be desirable to produce these films in the same medium in which they were to be shown. Among the advantages to be gained by such procedure were the absence of fire risk and consequent freedom from legal restrictions, the compactness and portability of equipment, lower raw-stock and print costs, and greater flexibility.

The RCA Portable Television Pick-Up Equipment; G. L. Beers, *RCA Manufacturing Co.*, Camden, N. J.; O. H. Schade, *RCA Radiotron Corp.*, Harrison, N. J.; and R. E. Shelby, *National Broadcasting Co.*, New York, N. Y.

Spot news, athletic events, parades, *etc.*, form an important source of television program material. Portable pick-up equipment suitable for televising such events has recently been developed. The equipment includes a small Iconoscope camera, camera auxiliary, camera control and synchronizing generator units, and a 325-megacycle relay transmitter and receiver. Most of the units are about the size of a large suitcase and weigh between 40 and 70 pounds. Each of the units is described and some of the practical applications of the equipment are indicated.

Quality in Television Pictures; P. C. Goldmark and J. N. Dyer, *Television Engineering Department, Columbia Broadcasting System, Inc.*, New York, N. Y.

Present television standards specify certain factors that determine the appearance of a television picture only to a limited extent. Other factors, however, such as contrast, gradation, brilliance, and the shape of the scanning spot are fully as important and are discussed in the paper.

A photographic method of producing artificial pictures that permits varying several of these factors will be explained. Pictures will be shown that were obtained by this method and approach ideal quality within a given set of standards.

A New Method of Synchronization for Television Systems; T. T. Goldsmith, R. L. Campbell, and S. W. Stanton, *Allen B. DuMont Laboratories, Inc.*, Passaic, N. J.

Line and frame scanning frequencies in an all-electronic television system need not be frozen to a standard giving limited definition performance if the synchronizing system is arranged to allow flexible operation. Automatic operation of re-

ceiver synchronizing circuits at variable line and frame frequencies is made possible with the aid of a new type of synchronizing wave-form. Synchronizing standards which permit both flexible and automatic operation are discussed. Transmitter synchronizing apparatus for flexible synchronizing standards, receiver circuits for both non-automatic and automatic synchronous operation are also discussed, and a "transition" type receiver for operation on both old and new type of synchronizing signals is briefly described.

Advancement in Projection Practice; F. H. Richardson, *Quigley Publishing Co.*, New York, N. Y.

This paper briefly reviews projection practice from the beginning, pointing out the extremely poor conditions confronting projectionists in early days. By means of some twenty stereopticon slides the early projection equipments are illustrated and contrasted with those in use today. The work of some of the outstanding pioneers who had to do with early invention and improvements in projection equipments is described.

Defects in Motion Picture Projection and Their Correction; I. Gordon, Akron, Ohio.

A statement is presented of the various kinds of damage inflicted upon screen images by oil on film. The paper enumerates the sources of this evil, the heavy loss the box-office can suffer as a result of them, the ill effect upon eyes of theater patrons, and suggests means for reducing the evil or possibly eradicating it.

A Personal Safety Factor for Projection Practice; T. P. Hover, Lima, Ohio.

The dangers inherent to the projection of nitrocellulose film are so obvious, and the accidents, when they occur, are so spectacular that practically no attention is given to other hazards in the projection room. This is to be expected in an industry where practically no knowledge concerning the equipment and its operation ever appears to the outside world. Only the joint coöperation of the manufacturer of equipment, the sound supervisor, the theater manager, the projectionists, and intelligent public safety officials can make the profession of projecting motion pictures a safe one. Some of the observations of the author, who is closely associated with safety officials in the State of Ohio, are given in the paper.

Projection Supervision, Its Problems and Its Importance; Harry Rubin, *Paramount Theaters Service Corp.*, New York, N. Y.

The importance of thorough and continuous supervision of projection and sound equipments in the theaters, some of the problems connected therewith in the construction and the maintenance of the theaters; a brief outline of a few of the many details that must be examined and precautions that must be observed in order that the motion picture entertainment may be presented under the most nearly perfect conditions, are described by a Projection Supervisor for a theater chain. Emphasis is placed upon the benefits to be derived through the close coöperation between the supervisor and the projection personnel of the individual theaters and several measures for accomplishing this result are cited.

Products of Combustion of the Carbon Arc; A. C. Downes, *National Carbon Co.*, Cleveland, Ohio.

This paper is a review of work done in the laboratories of National Carbon Company, Inc., the College of Medicine of the University of Nebraska, the School of Public Health of Harvard University, and the Department of Health of the City of Detroit on the products of combustion from carbon arcs used in the motion picture industry. Analyses of the gases coming from various lamps show that, even in the stacks, the only gas occurring in toxic concentration is nitrogen dioxide.

The biological effects of undiluted stack gas from simplified high-intensity arcs upon experimental animals were only those due to the nitrogen dioxide.

The arc-ash fume when administered by intratracheal and subcutaneous routes in rabbits was found to be relatively inert.

Determination of nitrogen dioxide concentrations in poorly ventilated projection rooms failed to show any concentration more than about one-fifth that generally considered as allowable for exposure of several hours duration, and therefore there is little or no hazard in these projection rooms.

Studies of ventilation under controlled conditions show that even with very low rates of both lamp house and room ventilation there is no danger of gases or fumes reaching concentrations which are toxic and that if sufficient ventilation is provided to produce comfortable working conditions there can not be any appreciable concentrations of nitrogen dioxide or arc-ash fumes in the booth.

Rating of Motor-Generator Equipment Used for Direct Current Supply to Projection Arc Lamps; C. C. Dash, *Hertner Electric Co.*, Cleveland, Ohio.

The ratings of electrical equipment in general are based upon the heating and upon the performance.

The projection room duty cycle with the alternate burning of two lamps and a single lamp puts a rather peculiar load upon generating equipment. This affects the temperature rating of the unit. The most important item in connection with the rating is the output characteristic. If designed for heating alone, a generator set would be unsatisfactory.

The paper considers the output characteristics desirable for use with present-day arc lamps and their effect upon the design of the unit. Motor ratings will also be discussed.

Records for the Projectionist; J. R. Prater, Palouse, Wash.

Some portions of the data necessary to good projection room records may be kept to the best advantage on blank forms. Examples are shown of such blanks adapted to (*1*) an inventory of projection room supplies and spare parts, (*2*) data on vacuum tubes, (*3*) exciter lamps, (*4*) film inspection, and (*5*) a cue sheet. Noteworthy features are discussed, and suggestions given for adapting these forms to individual projection rooms. Projectionists will find it easier to keep good records on appropriate forms than it is to get by without them.

Mathematical Expression of Developer Behavior; J. R. Alburger, *RCA Manufacturing Company*, Camden, N. J.

Characteristics of developing agents have been unified in a mathematical expression. The use of the analysis of developer behavior afforded by this expression has been helpful in providing a guide toward improving a developer with respect to any given characteristic.

Recording and Reproducing Square Waves; D. Canady, *Canady Sound Appliance Co.*, Cleveland, Ohio.

A brief description of electrical equipment involved in the recording and reproduction of square waves is given.

Direct-coupled amplification is used throughout as conventional amplifier circuits are unsatisfactory when dealing with steep wave-fronts. Toe recording has been found satisfactory as picture requirements are not involved.

Oscillograms and illustrations of mechanical wave-forms used in testing are shown and described. Records showing speech syllables passed through a conventional transformer-coupled system and direct-coupled amplifier are relatively striking and show the usual asymmetries encountered in a-c amplifiers when compared with direct-coupled systems.

Motion Picture Theater Developments; by M. Rettinger, *RCA Manufacturing Company*, Hollywood, Calif.

The first part of the paper is devoted to conveying basic requirements as well as recent developments in the design of motion picture theaters with balconies to provide satisfactory conditions for all the basic considerations of proper motion picture presentation.

The second part is providing similar information pertaining to theaters with balconies. Separate sections are provided for the recommended dimensional and constructional features of balcony depth, soffit, and height; of the theater ceiling, sidewalls, and rear wall; and of the space above the balcony.

Silent Variable Speed Treadmill; J. E. Robbins, *Paramount Pictures, Inc.*, Hollywood, Calif.

Treadmills are a definite necessity to the making of motion pictures for the purpose of obtaining intimate scenes of animated objects or persons working before moving backgrounds. The evolution of this type of equipment dates back to the very beginning of the industry. Due to the fact that noise was of no consequence, these earlier machines were simply and crudely constructed. The type generally used employed the ordinary conveyor-chain principle, utilizing web belts running over series of rollers. Other developments include the revolving disk type, not entirely desirable due to the variation of surface speed in relation to the distance from the center of the circle; the gravity unit motivated by the persons or animals walking or running on them, *etc., etc.* Inasmuch as these were generally operated in front of sky backings or moving panoramas, speed ranges obtainable by gear boxes or belt pulley or chain sprocket changes were adequate. With the advent of sound and a more general use of the transparency or process background the need of smoother, more flexible, silent mills was recognized. The problem was carefully considered by the engineering department of Paramount

Pictures, Inc., and the unit recently developed by them embodies all the previously mentioned requisites and to date has operated satisfactorily under the most trying conditions.

Construction details, speeds, degrees of silence, and other factors are covered in the paper.

Optimum Load Impedance for Feedback Amplifiers; B. F. Miller, *Warner Bros. First National Studios*, Burbank, Calif.

The apparent plate-resistance of vacuum-tubes employed in inverse feedback amplifier stages is shown to be a function of the degree of feedback employed. Equations for predicting the optimum value of amplifier load impedance for maximum undistorted power output are derived, and the necessity for properly building out the amplifier load circuit is demonstrated. A basic circuit, employing a combination of two feedback elements is indicated, which permits securing the maximum undistorted power output from an amplifier stage while maintaining proper impedance relationships between amplifier and load circuits without the use of building out resistors.

A Modern Studio Laboratory; G. M. Best and F. R. Gage, *Warner Bros. First National Studios*, Burbank, Calif.

A description of the new laboratory erected by Warner Bros. at Burbank, Calif, in 1938. No general release work is required of this laboratory, and the generous space provided is devoted exclusively to the developing and printing of the dailies, storage and handling of the negative, and the latest in air-conditioning and dust-removing equipment. Advantage has been taken of the recent developments in rust-resisting and acid-proof metals, especially in the construction of the developing machine tanks. The description includes the method of operation through the dailies, negative cutting, printing, chemical mixing, silver recovery, and other essential processes.

Audience Noise as a Limitation to the Permissible Volume Range of Dialog in Sound Motion Pictures; W. A. Mueller, *Warner Bros. First National Studios*, Burbank, Calif.

A series of noise measurements were made in theaters to determine the cause of low intelligibility of dialog recordings of wide volume range. Audience noise level was found to be a serious restriction, because it averages 8 db louder than film noise level and reduces the useful volume range by that amount. Audience noise is an extremely variable factor, as measurements made in the same theater showed it to be as low as the film noise in one instance and later to rise 14 db above this value. To secure good intelligibility, the volume range of the dialog must be compressed so that the softest-spoken words never are so low in level as to be seriously masked by audience noise.

Color Theories and the Intersociety Color Council; H. P. Gage, *Corning Glass Company*, Corning, N. Y.

Thanks to intensified study of color by scientists of the National Bureau of

Standards, of the Agricultural Marketing Service of the U. S. Department of Agriculture, of the committees of the American Association of Railways, glass manufacturers, dye manufacturers, paint and ink manufacturers, the American Pharmaceutical Association, and photographic manufacturers, and the stimulation of the motion picture industry, the theories of color have been put in shape and tied together with extensive data on the color vision of many observers so that a workable engineering evaluation of colors, a scientific system of naming them, and a practical means of producing them to exact specification is now available and is ripe for presentation not only to learned societies but to the general public.

The phenomena and theory of the production of color in photographs both still and motion pictures have frequently been presented to this Society, and some phases will be rapidly reviewed in a demonstration of the spectral characteristics of color.

Colored lights are subject to spectrophotometric measurement and by means of the I.C.I. (International Commission on Illumination) data can be interpreted in terms of luminosity and the x and y coördinates (or maps defining chromaticity.

In these terms are being defined all standard Atlases of Color such as the Maertz & Paul Dictionary of Color, the Munsell Book of Color, and, it is hoped, the next standard set of colors of the Color Card Association used by all manufacturers of clothing and other things in which standardization of manufacture in spite of rapidly changing styles is an economic necessity.

The next edition of the National Formulary, sponsored by the American Pharmaceutical Association, will use this system of color names to describe the normal appearance of all drugs and chemicals.

A shorthand method of describing the spectrophotometric analysis of color filters for theater spot and floodlights in the form of a seven-digit number has been devised for commercial specification of this material.

These activities of numerous separate individuals and members of different technical societies have been coördinated and freely discussed by the delegates and individual members of the Intersociety Color Council so that all phases of the situation have been discussed.

The Intersociety Color Council is made up of 74 delegates appointed by 11 member societies, and by 67 individual members. It functions as a joint committee on color of the member societies favored with the advice of the individual members. The Council issues News Letters in mimeograph form to its members. They contain information of progress in color work, notices of important color publications, the activities of the Color Council and notices of its planned meetings. It is not intended as a competing journal but with the minutes of the meetings serves as a basis for reports by the delegates to the member societies which can be published in their Journals. The Council sponsors meetings with the member societies on the subject of color. These papers are published in the journals of the societies. Such joint meetings have been held with the Optical Society of America, the Technical Association of the Pulp & Paper Industry (T.A.P.P.I.), the American Psychological Association, and a joint technical session on color will be held at the annual convention of the Illuminating Engineering Society this fall.

The Cyclex System of Motion Picture Projection; C. S. Ashcraft, *Ashcraft Mfg. Corp.*, Long Island City, N. Y.

Cyclex is a new method of light projection, particularly adapted to the projection of motion pictures. It is based on a method of coördinating light impulses, whereby alternating current may be used for the production of an electric arc and the light therefrom projected through a rotating shutter upon a screen, with a total absence of the periodic visual beat which has heretofore characterized alternating-current projection arcs.

Simultaneously with the development of the non-pulsating alternating-current projection system, has been the development of a distinctly new type of alternating-current arc, wherein the characteristics of the arc itself have been used to the best advantage. Heretofore the method of operating alternating-current arcs has not been conducive to obtaining the highest efficiency and economy. The new *Cyclex* arc, however, has resulted in a light-source producing a far greater screen brilliancy together with a greatly reduced power input and consequent carbon consumption.

The practical application of the combination necessitated the development of a radically new type of power conversion equipment, particularly adapted to the operation of the new arc. This equipment must have such characteristics that coördinated light impulses may be obtained with the maximum of electrical and mechanical efficiency, simplicity, and flexibility.

The purpose of the present paper is (*a*) to present the basic theory of the system, (*b*) explain the characteristics of the *Cyclex* arc, together with the quality of the light produced, and (*c*) describe the apparatus employed for flexible frequency conversion and method of polyphase current transformation for the arc supply.

Television Pick-Up of the Pasadena Rose Tournament Parade, January 1, 1940; H. R. Lubcke, *Don Lee Broadcasting System*, Los Angeles, Calif.

The first television pick-up of the Pasadena Rose Tournament Parade was made on New Year's Day, 1940. This was accomplished with the "suitcase" type portable television equipment and beam transmitter *W6XDU* of the Don Lee Broadcasting System.

Two television cameras were used to give long-shot and close-up views of the floats; the cameras being arranged to give instantaneous switching of scene. The distance from Pasadena to the Don Lee Building, site of the home transmitter *W6XAO*, is nine miles and the line of sight was interrupted by two hills and buildings. Since the portable transmitter operates on a wavelength of less than one meter, much effort was therefore directed toward erecting high and efficient antennas at the transmitter and receiver.

Diathermy machines, as used by the medical profession, were found to cause interference even on the beam transmitter frequency of 324 megacycles, indicating the need for proper shielding of such devices.

The sound portion of the broadcast was sent over the nationwide Mutual Network. Camera work and aural description were adequately synchronized. Although rain fell during the parade and the morning was darkly overcast, written statements of reception from *W6XAO* lookers up to 15 miles away reported clear images, enabling them to read the names on the floats and discern other items of detail.

Speed Up Your Lens System; W. C. Miller, *Paramount Pictures, Inc.*, Hollywood, Calif.

The tendency of bare glass surfaces to reflect light has always presented a serious problem in optics. New discoveries in the field of physics have resulted in methods of reducing these light reflections. One of these methods has proved practicable for general use in optical equipment. The reduction of reflections in treated systems has been so great that ghosts and flares are rarely encountered. The light no longer reflected by the glass surfaces is transmitted by the optical systems, increasing their efficiency. Camera lenses treated with the new process show an increase in speed of nearly a full stop. New applications of the process are being found almost daily.

The Theory of Three-Color Reproduction in Motion Picture Photography; J. B. Engl, New York, N. Y.

The theory of Three-Color reproduction of Hardy-Wurzburg gives the necessary conditions which have to be fulfilled in order to get a truthful reproduction of color. It is applied to the production of colored moving films. The possibilities of color corrections in film practice are discussed. Considerations of cost and of technical difficulties seem to lead to the conclusion that the most practical is the known method of color correction in the recording process by an artificial distortion of the color values of the subject.

The theory allows an approximate computation of the necessary amounts of distortions. Truthful color rendering to a certain extent can be obtained in a predetermined way. The necessity of a systematic study of artificial color distortion is emphasized.

A Precision Integrating-Sphere Densitometer; J. G. Frayne and G. R. Crane, *Electrical Research Products, Inc.*, Hollywood, Calif.

A densitometer employing an integrating sphere associated with a stable high gain amplifier is described. Densities up to 3.0 are read directly on a multiple scale logarithmic meter. Visual diffuse operation is attained by simulating average eye characteristic by inserting appropriate filters in optical path.

Filtering Factors of the Magnetic Drive; R. O. Drew and E. W. Kellogg, *RCA Manufacturing Co.*, Camden, N. J.

A laboratory model of magnetic drive film phonograph was modified so that speed fluctuations of large and measurable magnitude and of frequencies ranging from $^1/_2$ to 7 cycles could be introduced either into the sprocket rotation or the magnet rotation. The resulting speed variations at the drum were determined by means of a "wowmeter." The large ratios of flutter reduction indicated by these measurements show in part why the magnetic drive gives unsurpassed film motion.