ABSTRACTS OF PAPERS FROM OTHER JOURNALS

ANIMATION

New approaches in animated film, John Halas, *Brit. Kinemat. Sound and TV, 52:* 154, June 1970.

From the very beginning in the history of cinematography many advanced technical innovations and visual experiments have been coming from the animated film. Most of us may be familiar with the experimental and avant garde work of Norman McLaren, Len Lye and Alexander Alexeieff but so far their activities have been confined mainly to experimental films and to using such novel techniques as scratching on the emulsion filmstock or painting directly on film. In the 1930's Walt Disney pioneered in the development of color photography and later on was the first to use stereophonic sound and a projection system of 360°.

Animation equipment of the future, Peter Neilson, *Brit. Kinemat. Sound and TV, 52:* 166–167, June 1970.

I am taking for granted that those who are interested in the future of animation will be acquainted with the specification of existing equipment; therefore, the following article will really only be concerned with improvements. For instance, for a number of years the very best film registration has been, and remains, the fixed pilot pin method as used in the Oxberry 5442-00 camera. As I do not know how to improve on this please accept that the camera mentioned will have a fixed pilot pin gate.

To meet future requirements the animation stand will be fully automated and have many new concepts applied to its design. Also, on account of the continued increase of re-photographing color transparencies, all measurement will be in thousandths of an inch instead of hundredths.

CAMERAS

Distribution of image brightness of objectives for amateur cameras (in Russian), V. B. Leonova, *Trudy Mosk. Vyssh. Tekh. Uchil im N. F. Baumana,* 68–74, No. 135, 1970; *Ref. Zh. Fotokinotekhnika,* Abstract No. 6.46.87, 1970.

A calculation has been made of the diffractional distribution of brightness in the images of different points of a subject for the UF-28 and "Biryuz" objectives. The work is claimed to be the first attempt at the development of a computational method for the evaluation of objectives on the basis of the distribution of light in the image. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika.*)

CINEMATOGRAPHY

The compatibility of cinematographic systems (in Russian), E. M. Goldovskii, *Tekh. Kino i Televideniya, 14:* 52–54, Apr. 1970.

The different systems of cinematography available in the Soviet Union (i.e. differing in film size, screen format, etc.) are discussed from the point of view of the possibility of the use in one system of films originally made in another. — S.C.G.

Composite cinematography, Vic Margutti, *Brit. Kinemat. Sound and TV, 52:* 26–31, Feb. 1970.

To produce a composite scene, one naturally first thinks of filming the foreground scene against a black backing, and

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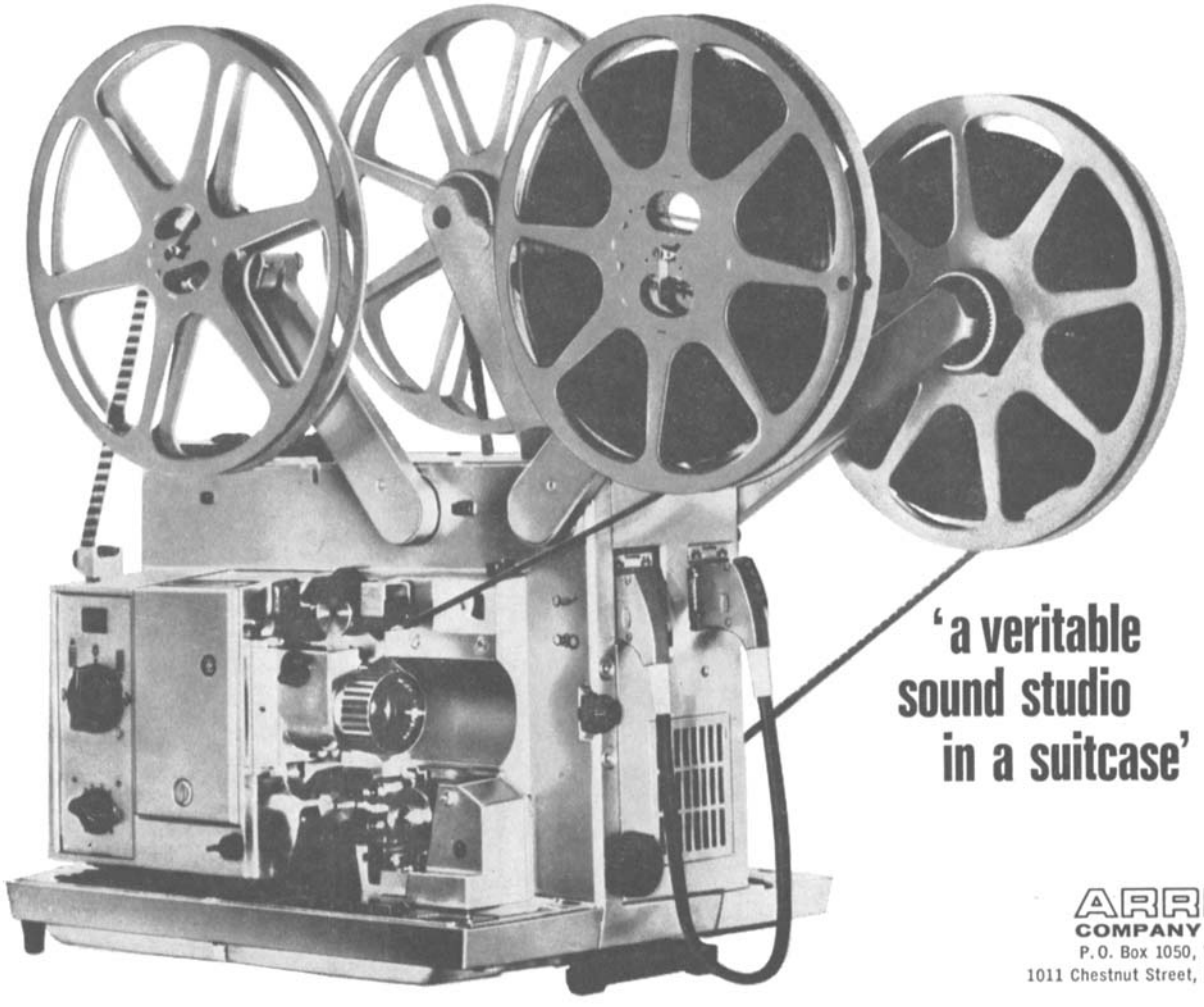

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then superimposing it on the film of the background scene. This does not work, of course, for on the composite film the background scene shows through the foreground scene. A number of techniques, developed with the object of overcoming this difficulty, are discussed.

EXPOSURE DETERMINATION

Methods for increasing the illumination of the working area of a photo-receiver in devices for exposure measurement (in Russian), E. M. Aparin, 130–143, No. 135, 1970: *Ref. Zh., Fotokinotekhnika,* Abstract No. 6.46.14, 1970.

Methods are discussed for increasing the illumination of the working area of the photo-receiver in the case when it is placed behind the camera objective. They make use of systems which concentrate the light energy passing through the camera lens. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika.*)

HIGH-SPEED PHOTOGRAPHY

Multiple spark photography, J. S. McVeagh, *Jour. Phot. Sci., 18:* 23–29, Jan./Feb. 1970.

This paper describes some of the history and techniques of spark photography and how it can be used to take a series of pictures. The multiple spark facility at R.A.R.D.E. Fort Halstead is described and some of the pictures taken with it discussed.

Application of high-speed photography to the photoelastic analysis of structural stability problems, R. C. Tennyson, *SPIE Journal, 8:* 167–174, June-July 1970.

This paper contains the results of several investigations conducted by the author with photoelastic circular cylindrical shells under axial compression. The onset of instability and the subsequent buckling process have been analyzed using high-speed photography to record change in the photoelastic isoclinic patterns. Both qualitative and quantitative results are presented concerning the inception of buckling which have never been achieved by other means. The application of high-speed photography to the photoelastic analysis of some structural stability problems is demonstrated and results compared with reflected light techniques and mechanical measurements.

High speed photography for plasma physics research, Eugene B. Turner, *SPIE Journal, 8:* 157–162, June-July 1970.

For short duration plasmas, such as high-current theta and zeta pinches, it is necessary to use very short exposures to photograph the plasmas. These plasmas are very luminous, so there is sufficient light for submicrosecond exposures. Several types of cameras were used. These include Kerr cell, image converter, framing and streak cameras. The Kerr cell camera takes only one picture, while the framing camera can take 25 pictures at the rate of 4×10^6 per second. Advantages and problems with each type of camera will be discussed.

Special high speed photographic systems, William C. Griffin, *SPIE Journal, 8:* 163–166, June-July 1970.

This paper describes the design and operation of two photographic systems developed for use in recording data on small objects traveling at high speeds. The first system, developed primarily for measuring pitch and yaw, uses a single first surface mirror; the second, which records five images for 360° viewing of objects in flight, uses dual first-surface mirrors. Also described are two high-intensity lighting systems. One for use in obtaining photographic data during very short exposure times; the other for use with synchroballistic techniques.

A method of measuring velocity and triggering apparatus for a system of photographing "luminous" models in ballistics research (in Russian), V. N. Gadion, *Zh. Nauch. i Prikl. Fotogr. i Kinematogr, 15:* 246–249, July-Aug. 1970.

A method is described for the measurement of the flight velocity of a model in the range 2300-5000 m/s, based on its "self-luminance." In order to eliminate ambiguity in the measurement a system of collimation is used. This has given stable operation of the triggering apparatus of the photographic system. Streamline spectra are given for a model in air at U_∞ = 3970 m/s and P_∞ = 133.3 mbar and U_∞ = 4920 m/s and P_∞ = 133.3 mbar. — S.C.G. (Translated from *Zh. Nauch. i Prikl. Fotogr. Kinematogr.*)

A raster camera with high light-gathering power for high-speed cinematography (in

Russian), S. M. Provornov, O. F. Grebennikov, V. P. Gusev, and S. M. Pertsev, *Zh. Nauch. i Prikl. Fotogr. i Kinematogr, 15:* 269–271, No. 4. July-Aug. 1970

A brief description is given of a raster camera with a lens of high aperture. It is capable of operation at rates of 500,000 to 2 million frames/s. on a plate with dimensions 180 × 130 mm. — S.C.G. (Translated from *Zh. Nauch. i Prikl. Fotogr. i Kinematogr.*)

HOLOGRAPHY

Wavefront-reconstruction mechanism in blazed holograms, Dorian Kermisch, *Jour. Optical Soc. Am., 60:* 782–786, June 1970.

Wavefront reconstruction from blazed holograms is analyzed theoretically. Blazed holograms strongly distort a wavefront whose amplitude is not constant.

Characteristic functions for time-average holography, Alan D. Wilson, *Jour. Optical Soc. Am., 60:* 1068–1071, Aug. 1970.

This paper presents an analysis of the fringes obtained by time-average holographic interferometry of a generalized time-dependent optical phase function. The generalized optical phase function considered is the sum of a series of sinusoidal functions of time having arbitrary amplitudes, frequencies, and relative phases. Characteristic functions are determined for various optical phase functions of interest in time-average holography. In general, the characteristic functions are sums of products of Bessel functions (zero order and higher orders) and exponential phase factors. Rationally and irrationally related frequencies are included in this analysis. An example of vibrating string is considered, to illustrate the application of the results of this paper to objects vibrating at a multitude of frequencies.

Particle-size measurement using forward-scatter holography, Daniel J. Stigliani, Jr., Raj Mittra and Richard G. Semonin, *Jour. Optical Soc. Am., 60:* 1059–1067, Aug. 1970.

This study is an experimental and theoretical investigation of the application of forward-scatter Fresnel holography to water droplets. The theoretical holograms were constructed on a digital computer by determining the irradiance of the interference pattern formed by the light scattered from a droplet and a reference source, at discrete points on a hologram. The forward-scattered light is evaluated by assuming that the droplet is an opaque disk and utilizing the Rayleigh-Sommerfield theory of diffraction. The reconstructed wave front is evaluated by performing the Fresnel transform on the hologram matrix. The corresponding experimental holograms were made with a helium-neon continuous-wave laser and using glass beads from 80 to 250 μm in diameter as models of the water droplets. The half-radiance width of the reconstructed wavefront radiance distribution is shown theoretically to increase linearly as the distance of the object from the hologram is decreased. Also, the half-radiance width increases logarithmically with hologram area. The theoretical and experimental radiance distributions in the plane of reconstruction were compared. Proper alignment of the hologram during reconstruction is necessary for the reconstruction of the original radiance distribution. Size can be measured by noting edge enhancement (radiance peak at the edge of the droplet) in the reconstructed image. A relationship between the diameter of the peak and the actual droplet diameter is determined for sphere diameters from 20 to 250 μm and object distances from 10 to 20 cm. Experimental accuracy to within 4% is achieved with this technique.

Coherent photography (holography) as an aid to engineering design, B. S. Hockley and J. N. Butters, *Jour. Phot. Sci., 18:* 16–22, Jan./Feb. 1970.

The paper presents information on the technique of holography applied in a routine engineering application. The extension of photography made possible by the use of coherent laser light, which enables the recording of far more surface information than was hitherto possible has brought new uses of the photographic process in quantitative measurement and metrology. To realize the full value of the new technique a simple arrangement of equipment is required which can be called upon for routine application. A rig is described which has been tailor-made for vibration testing and inspection of

aero engine components. A particular feature is that the rig can be used outside the specialized laboratory.

Time-average holographic interferometry of a circular plate vibrating simultaneously in two rationally related modes, Alan D. Wilson and Douglas H. Strope, *Jour. Optical Soc. Am., 60:* 1162–1165, Sept. 1970.

This paper presents the results of time-average holographic interferometry of a circular metal plate vibrating simultaneously in two unique modes whose frequencies are rationally related. Rational and irrational frequency ratios are presented for comparison. The rational and irrational results differ significantly, and these differences are explained by use of their respective characteristic functions.

Effect of high scanning velocities on the holographic image, B. P. Hilderbrand, *Jour. Optical Soc. Am., 60:* 1166–1168, Sept. 1970.

The principle of source and receiver scanning is well established both in microwave and acoustic imaging systems. In microwave systems, where the scan velocity is very slow compared to the velocity of propagation of the electromagnetic waves, motion of the source is inconsequential. In acoustic systems, the scan velocity can be an appreciable fraction of the sound-propagation velocity. This paper analyzes the effect on the image, when a hologram is made by scanning the source and receiver at relatively high velocities. The first-order analysis shows that the image undergoes a rotation and a distortion.

Unique properties of holographic images, D. C. Wender, *Optical Spectra, 4:* 22–25, Oct. 1970.

The very special imaging properties of holograms not only provide interesting and complex problems for the researcher but also suggest such exciting applications as the storage and retrieval of separate images in a single recording device.

Holographic recording with photopolymers, J. A. Jenney, *Jour. Optical Soc. Am., 60:* 1155–1161, Sept. 1970.

Phase holograms have been recorded using several photopolymers. These photopolymer recording systems are self-developing and require only uv-light fixing. Sensitivities as high as 0.6 mJ/cm² have been achieved with He-Ne-laser light. Reconstructions from 3000-line/mm gratings recorded on these materials have been achieved; however, the signal-to-noise ratio falls off above 1500 lines/mm. Microscopy has revealed that the hologram is recorded both on the surface and in the volume of the polymer, and that the surface modulation provides the dominant contribution to the diffraction efficiency for 25-μm thick films.

A hologram portrait of a human being (in Russian), D. I. Stasel'ko, Yu. I. Denisyuk, and A. G. Smirnov, *Zh. Nauch. i Prikl. Fot. i Kinemat., 15:* 147–148, No. 2, Mar.-Apr. 1970.

The experimental lay-out of a system for obtaining a three-dimensional portrait by holography is described, and a portrait reconstructed from a hologram is reproduced. — S.C.G.

The value of the contrast coefficient of a photographic material in making holograms (in Russian), Sh. D. Kakichashvili, N. S. Gafurova, and A. V. Borin, *Zh. Nauch. i Prikl. Fot. i Kinemat., 15:* 153–155, No. 2, Mar.-Apr. 1970.

By discussion and experiment it is shown that in choosing or specifying a photographic material for holography, γ must be taken into account as a factor compensating for insufficient speed by increasing the intensity of the reference beam. — S.C.G.

The use of holograms with optical imaging for the recording of irregularities on a Mach-Zehnder interferometer (in Russian), A. F. Belozerov and V. T. Chernykh, *Zh. Nauch. i Prikl. Fotogr. i Kinematogr., 15:* 281–283, No. 4, July-Aug. 1970.

Holograms with optical imaging of a body are obtained on the Mach-Zehnder interferometer. A comparison of the working zone of the irregularity under study is carried out with the aid of two optical systems set up in the receiving part of the interferometer. Each of the optical systems, simultaneously with the formation of the image of the body in the plane of the hologram, produced a signal light beam and a reference beam. In the first variant of the design the reference beam passed through the peripheral portion of the objective to give an optical image of

the body. In the second the reference beam was directed into the plane of the hologram with the aid of plane mirrors, bypassing the objective bringing together the working zone and the plane of the hologram. An appropriate choice of the optical elements makes it possible to reduce considerably the dimensions of the hologram in comparison with the dimensions of the working field of the interferometer. The use of focusing optics allows one to obtain, on reconstruction of the holograms, sharp body contours in the reconstituted image. In the quantitative estimation of an irregularity, this makes it possible to measure the size of the image with a smaller error. The interferogram of the flame of an alcohol burner, made with a band of infinite width, and a picture made by the point and knife-edge method, show that it is necessary to use a focusing optical system when transparent irregularities are being studied. — S.C.G. (Translated from *Zh. Nauch. Prikl. Fotogr. i Kinematogr.*)

LIGHTING AND LAMPS

IES guide to design of light control, Pt. IV, practical concepts of equipment design, *Illuminating Eng., 65:* 479–494, Aug. 1970.

This guide is intended to familiarize the designer and the professional with some of the factors that must be considered in the design of a luminaire. It is not intended to be a detailed text on the subject, but to provide a general guide to the many considerations that go into the design of lighting equipment. The text of this report consists of six basic parts: (1) an explanation of codes and standard practices relative to the construction and installation of luminaires; (2) a consideration of the physical and environmental characteristics of luminaires; (3) electrical and mechanical considerations that affect luminaire design; (4) thermal consideration relative to the light source, the environment and the luminaire; (5) safety considerations as they apply to all areas of luminaire design; and (6) the economic factors which may affect the design of luminaires.

Quartz-halogen lamps for motion-picture projection (in Russian), G. A. Golostenov, T. V. Derbisher, V. V. Piskunov, and V. I. Tsar'kova, *Tekh. Kino i Televideniya., 14:* 18–22, Mar. 1970.

The characteristics of quartz-iodine lamps produced in the Soviet Union for motion-picture projection are discussed. — S.C.G.

PHOTOGRAPHIC THEORY AND MATERIALS

Automatic measurement of the frequency-contrast characteristic of photographic materials: II Estimation of the errors of measurement of the system and their correction (in Russian), K. V. Vendrovskiĭ, Yu. S. Andreev, and A. I. Veĭtsman, *Zh. Nauch. i Prikl. Fotogr. i Kinematogr, 15:* 256–266, July-Aug. 1970. (Part I, Ibid., *14:* 442, 1969)

A calculation has been made of the errors of the system of determination of MTF proposed earlier. Methods are discussed for the correction of errors introduced by the non-ideal MTFs of the resolving-power meter and the microphotometer, and also by the granularity of the photographic material. MTFs have been measured for the resolving-power meter and the microphotometer under the conditions prevailing when they are used for the evaluation of the structural properties of the photographic materials. As an example, two motion-picture films of different sensitivity classes have been subjected to an experimental evaluation of the errors of measurement. — S.C.G. (Translated from *Zh. Nauch. i Prikl. Fotogr. i Kinematogr.*)

SOUND

Speech and vocoders, L. C. Kelly, *Radio and Electronic Eng., 40:* 73–82, Aug. 1970.

Speech signals are produced by relatively slow articularly movements. This suggests that the information rate of the speech signal is much less than would be expected by considering the bandwidth of the acoustic signal. Vocoders attempt to exploit the redundancy in the speech waveform by extracting and transmitting the information bearing parameters of the speech signal. At the receiver, these parameters are used to control a speech synthesizer that reproduces the original signal without any serious loss of intelligibility but with some degradation of quality. The paper describes speech pro-

duction principles, and their application to speech synthesis; the operation of various types of vocoder and the problems of pitch extraction.

The evolution of the synchronizaton devices between sound and picture in the film industry, G. S. Taylor, *Brit. Kinemat. Sound and TV, 52:* 192–195, July 1970.

Most problems of synchronization of picture and sound may be divided into two groups. The first concerns all problems of synchronization of picture and sound at the time when they are being recorded. The second concerns synchronization of picture and sound during replay, mixing dubbing. In order to perform the different operations of the second group, it is necessary that the synchronization be maintained not only during normal running both forward and reverse directions but also during starting and stopping of the equipment irrespective of the number of start and stop sequences.

Sound and the cinema, John Elliott, *Brit. Kinemat. Sound and TV, 52:* 134, May 1970.

There is an almost complete lack of standards for sound reproduction in cinemas throughout the United Kingdom and Europe, which will take years to overcome. Apparently the situation in America is improving (but is nowhere near satisfactory). There does exist an Academy curve for optical tracks and this is something, but in practice no cinema installation conforms to this and their overall electroacoustic frequency response ranges from "tinny 1950 Hi-Fi" to unintelligible "mumble-phonic."

A device for the visual control of soundtracks (in Russian), V. I. Ulichev and V. M. Grishin, *Tekh. Kino i Televideniya, 14:* 25–27, June 1970.

The device described is intended for the conversion of signals on different sound carriers into visual signals, for assistance in assembling a single master track. It should also have other uses in cinematography, telegraphy and telephony. — S.C.G.

The dynamic range of disc and tape records, Daniel W. Gravereaux, Arthur J. Gust and Benjamin B. Bauer, *Jour. Audio Eng. Soc., 18:* 530–535, Oct. 1970.

The emergence of the tape cartridge and cassette as entertainment media prompts comparisons with the disc record. Factors which control the disc noise during production have been measured and are discussed and the geometric level limitation of a disc, occurring in an equalized player, is described. Both the level capability and the background noise of cartridge and cassette tape are measured and discussed. The dynamic range curves of each medium are compared by referencing to the audible background noise and examining the level capability. At present the disc record has the greater dynamic range.

Development of a new magnetic tape for music mastering, Delos A. Eilers, *Jour. Audio Eng. Soc., 18:* 540–544, Oct. 1970.

Recent improvements of professional magnetic recording systems have been complemented by improved magnetic tapes. For music mastering, certain characteristics and considerations are paramount. The development and performance of a new recording tape optimized for the music industry is described. Its features include wider dynamic range, increased durability, and a new backing.

TELEVISION

Editing tape and how it compares with editing film, John Costa, *Making Films in New York, 4:* 28–29, Oct. 1970.

This article is written for the producer of television film commercials who may not have done any post-production work in videotape. It is not a technical article but incorporates technical terms necessary to explain the workings of some complex videotape equipment. It is a step by step effort to compare the procedure for editing in videotape with that of film.

A standardized digital coding system for the film and television industry, Norman Green, *Brit. Kinemat. Sound and TV, 52:* 222–225, Aug. 1970.

It has become increasingly apparent during the last two years that digital techniques are going to be widely used by the television industry, and that the trend will continue into the film industry as well.

Thames Television decided some time ago that unless standardization was achieved at the outset, one would end up with the type of chaos that pervades the computer industry with respect to compatibility.

This paper proposes, therefore, a standard digital code structure that should be comprehensive enough to keep pace with the fast-moving developments in the industries concerned. By adopting a standard code and placing coded information along the film edge, on videotape, on paper tape, or in a magnetic store, a number of necessary — if tedious — operating functions can be mechanized; e.g., fast search and retrieval for editing and sound dubbing, the selection of VTR and film inserts for television, and programed color balance correction, all become possible.

Color EVR, Peter C. Goldmark, *IEEE Spectrum, 7:* 22–33, Sept. 1970.

In electronic video recording (EVR), the color television signals are recorded on a special 8.75-mm-wide, high-resolution photographic film, with two frames side by side. One frame contains luminance information; the other, coded chrominance information. Sound is recorded on two magnetic edge stripes. An 18-cm-diameter cartridge can play 25 minutes of color programing or twice that duration of black-and-white programing. Described in this article are the processes that, starting from an original program on video tape, produce a reproduction with excellent fidelity upon playback. A detailed explanation is provided of the mechanical, optical, and electronic arrangements, including the transcoding of the chrominance signal into a conventional color television signal.