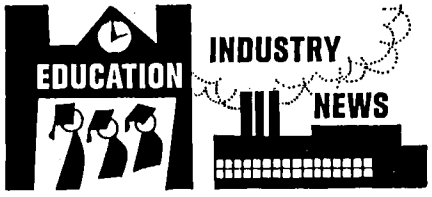

A course — Color: Motion-Picture and Television — is being conducted at the University of Southern California through the cooperation of Society and USC's Department of Cinema. Classes start February 8 and will meet every Wednesday thereafter through May 10. The announcement of the newly established course noted that the recent marked increase in color television programing has placed a serious load on every segment of the television and motion-picture industries, including production, laboratories and suppliers of raw material and equipments. The announcement emphasized that problems of standardization are especially difficult as they relate to programs originating from live, tape and film sources. The course is planned to cover many of these problems as well as to acquaint students with the present state-of-the-art and to indicate trends that appear to be developing.

An Engineering Institute entitled Modern Photographic Techniques for Industry will be held February 23–24 at the University of Wisconsin through the cooperation of the Society and the University's Extension Department of Engineering. Concurrent sessions on high-speed photographic instrumentation and industrial photographic production techniques will be held. For instrumental applications, an accuracy and dimension control workshop will be followed by detailed presentations on schlieren lens and shadowgraph, photographic materials, data reduction technique and holography. The production session will feature leading national figures who will demonstrate and discuss important aspects of still and motion-picture production, including equipment, lighting techniques, materials and procedures of production. Information on the Production Session is available from: Mr. Rolf G. Schuenzel, Extension Engineering, 432 North Lake St., University of Wisconsin, Madison, Wis. 53706. Inquiries about the Instrumentation Session should be directed to Mr. John T. Quigley at the same address.

Technika Kino i Televidenia celebrated its 10th anniversary January 17 in Moscow. Since January 1957, when the first issue appeared, *Technika Kino i Televidenia* has acquired a world-wide circulation and recognition of its quality is implicit in the number of papers translated and reprinted in various scientific and technical journals, including the *Journal of the SMPTE.*

Dedicated to the development of motion-picture and television, in recent years papers have appeared on such subjects as the use of motion pictures and television in science, engineering and space technology and communications theory. Other subjects covered have included film production, filmstock manufacturing and processing, projection, equipment for TV centers and motion-picture studios, color television and historical surveys.

During the 10 years it has been in existence, the aim of *Technika Kino i Televidenia* has been to promote the development of advanced motion-picture and television techniques; to improve the quality of products; and to contribute to the development of creative initiative, inventiveness and production experience exchange.

The Society of Photographic Scientists and Engineers (SPSE) will hold its annual meeting May 15–19 at the Sherman House in Chicago. The program will be primarily concerned with significant scientific technological and engineering advances in the field of general photographic science and engineering. Ten half-day sessions are planned. Topics are Photographic Theory; Color; Aerospace; Non-Silver Halide Physical and Chemical Processes; Silver Halide Chemistry; Sensitization; Radiation; Silver Halide Processing; Optics and General Photographic Science. Session chairman for each of the topics named in the order above are: Paul Gilman, Paul W. Vittum, Jerome Goldhammer, M. L. Sugarman, Miss M. Levy, William West, (a chairman for the Radiation session has not yet been appointed), Hutson Howell, Arthur Cox and James LuValle.

The program will also include tutorial sessions on Graphic Arts and on Progress in Photographic Science. It is expected that Frank Preusil will conduct the Graphic Arts session. Al Derr will conduct the Progress in Photographic Science session.

Programing in FORTRAN IV, a computer programing course, is now available on a series of 16mm kinescope films distributed for sale and rental by the University of California Extension Media Center, 2223 Fulton St., Berkeley, Calif. 94720. The course consists of 14 half-hour lectures and is designed to teach students how to program in FORTRAN IV, a computer language widely used for scientific and engineering problems. The lectures provide an introduction to computers and to the elements of FORTRAN, and they include discussions of such topics as writing a FORTRAN program, input-output capabilities, flow charting, manipulating alphabetic information, looping procedures, subscripted variables, one-dimensional and higher-dimensional arrays, functions, subroutines, logical variables and functions, and segmenting programs. The lectures are given by Walter T. Mara, Supervisor of Teacher Education at the University of California, Davis.

The University of Iowa's Television-Radio-Film Division is the recipient of extensive personal collections of books, papers, photographs, drawings, recordings and production records presented by producer David Swift of the Mirisch Corp. and writer Robert Blees of Paramount Studios. Acquisition of the collections was arranged by Raymond Fielding, Associate Professor of Film, who has reported that the collections contain a wide variety of materials, all of them valuable for research into the history of motion pictures.

The Swift collection includes many paintings by and for art directors, costume sketches, advertising layouts, posters, scripts, production photographs, architects' drawings, and production records for many well-known feature films and television series. The Swift collection also contains three 5 by 6-ft models for the film *How to Succeed in Business Without Really Trying.*

The Blees collection contains books, scripts, recordings, production records and hundreds of production photographs from some of the great films of the last 30 years, such as *Sunset Boulevard, Maltese Falcon, Treasure of Sierra Madre,* Olivier's *Hamlet* and many others.

Both collections are housed in the Library of the University of Iowa in Iowa City.

The 1967 National DAVI Convention will be held April 2–6 in Atlantic City, N.J. The five-day program will include workshops, special interest discussion groups and field trips as well as presentation of papers. Following the convention a seminar will be held in Puerto Rico April 6–9 cosponsored by the Puerto Rico Dept. of Education and the University of Puerto Rico. Program themes will be Media in Puerto Rico; Broadcast and Instruction; and Plant Facilities. Further information about the Atlantic City convention and the seminar is available from: Richard G. Nibeck, Consultant, Department of Audio-visual Instruction, NEA, 1201 Sixteenth St., N.W., Washington, D.C. 20036.

The Society for Information Display (SID) will hold its Eighth National Symposium and Exhibit May 24–26 at the Jack Tar Hotel in San Francisco. SID is an interdisciplinary organization with the purpose of bringing together professionals working in the fields of information display systems, display devices and components, information processing and human factors and human engineering. Further information is available from Ralph A. Seitle, Publicity Chairman, Program Committee, SID 8th National Symposium, 35 Skywood Way, Woodside, Calif. 94062.

The New York Audio Society met December 16 at the headquarters at 319 E. 79 St., New York, N.Y. 10021. Guest speakers were René Norrele and Dr. Osamu Mabuchi, both of Sony Corp. of America, who gave a technical presentation on the subject of video tape.

The International Broadcasters Society (IBS), P.O. Box 128, Bussum (NH), The Netherlands has launched a global membership campaign. IBS has been in existence since the summer of 1964. Among other interests IBS devotes much of its time to the education of future broadcasters and to educational uses of radio and television. News about IBS is contained in *Broadcasters Bulletin,* a monthly publication sent to its members. Reviews of current technical and reference books appear in *Broadcasters Bulletin* and books are frequently offered to IBS members at substantial discounts.

A class in Agfacolor printing and processing was held January 5 under the auspices of Acalanes Adult Education Center, Lafayette, Calif. The class was conducted by Egon A. Dittman, owner of Egon

GREAT ADVANCES IN FILM HISTORY—I

T. A. EDISON.

No. 493,426. APPARATUS FOR EXHIBITING PHOTOGRAPHS OF MOVING OBJECTS. Patented Mar. 14, 1893.

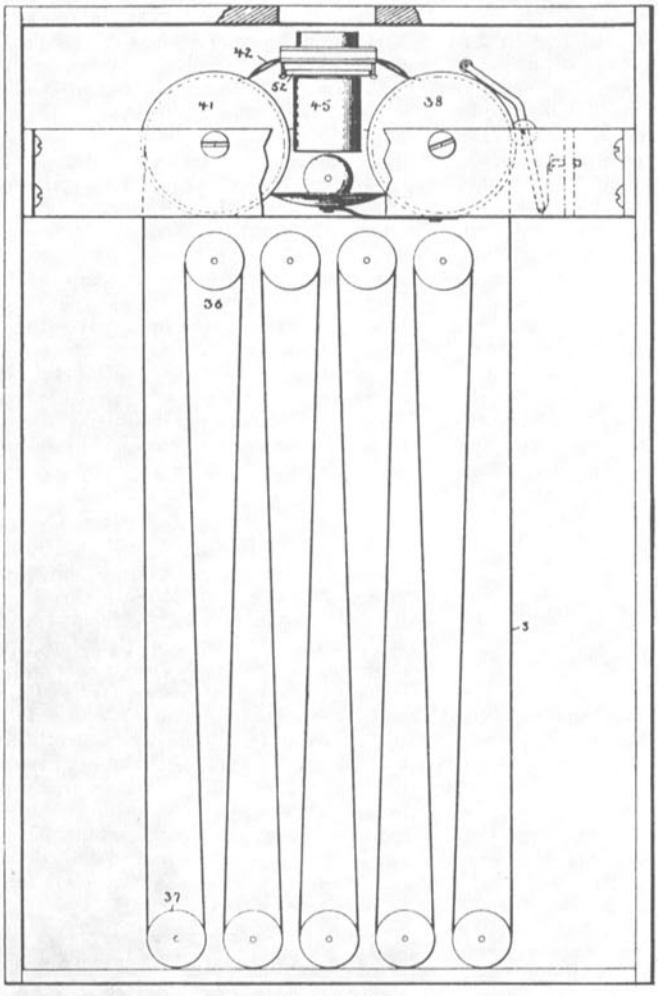

Fig. 2.

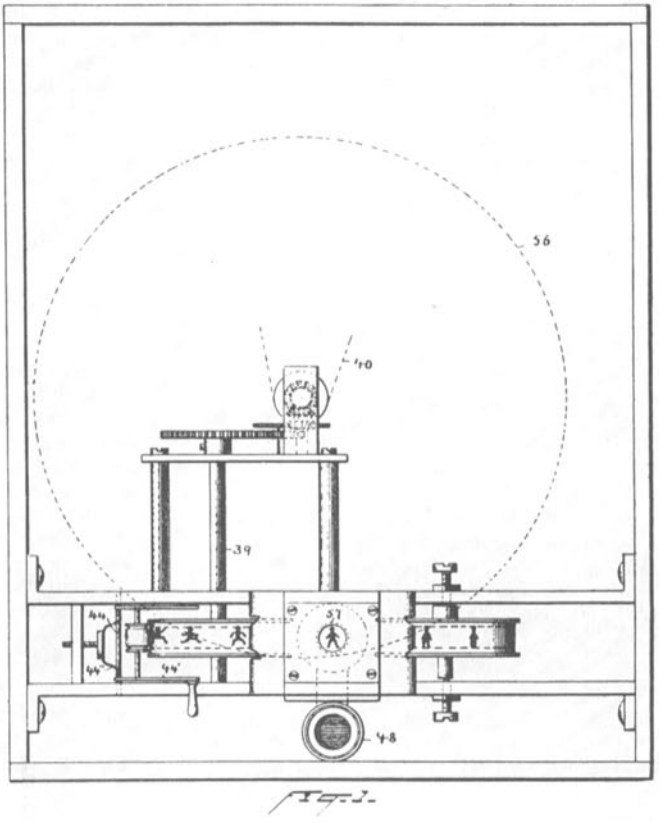

Fig. 1.

The present invention relates to apparatus for using photographs which have been taken in rapid succession of an object in motion, by means of which a single composite picture is seen by the eye, said picture giving the impression that the object photographed is in actual and natural motion.

Figure 1 is a plan view of the reproducing apparatus, the top of the inclosing case being removed. Fig. 2 is a rear view of the apparatus, the back of the case and the motor being removed and the frame being broken away to show some of the parts behind it. Fig. 3 is a sectional view showing the arrangement of reflector, light, film, &c.

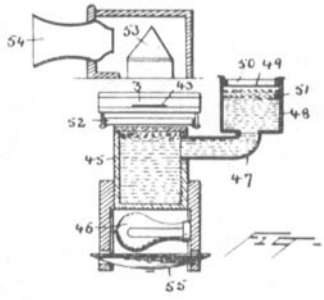

Fig. 3.

Witnesses
Norris A. Clarke.
W. F. Church

Inventor
T. A. Edison
By his Attorneys
Dyer & Seely.

These diagrams and excerpts are from reproductions of the original patent application in the Kemp R. Niver collection.

Productions-Laboratories, 854 El Pintado Rd., Danville, Calif. This is the second such class conducted by Mr. Dittman. A similar class was held last spring (*Journal*, p. 522, May 1966).

The Council on International Nontheatrical (Film) Events (CINE) celebrates its 10th anniversary in 1967 and plans are underway for special events to commemorate its 10 years of selecting and coordinating films produced in the United States for entry in international film festivals. Of the 85,000 motion pictures released during the last nine years, some 400 CINE jurors throughout the United States reviewed 2,269. Of these, 729 were chosen to represent the United States in festivals abroad.

When CINE was first established it selected only nontheatrical motion pictures. Later it added television documentaries and in 1963, when the Motion Picture Association of America ceased selecting theatrical features and shorts, CINE added theatrical shorts to the categories of eligibility. Feature films are handled by a special Hollywood committee. In November CINE added government-sponsored films to its categories of eligible films. Approval of the sponsoring agency is required before submission to CINE. Further information is available from James Culver, CINE, 1201 Sixteenth St., N.W., Washington, D.C. 20036.

The Sixth Annual Film-Makers Festival will be held June 3–4 at Foothill College, 12345 El Monte Rd., Los Altos Hills, Calif. 94022. Purpose of the festival is to give public recognition to individual points of view of persons interested in using the film medium as their means of expression and to encourage experimentation in the visual, technical and esthetic aspects of filmmaking. The term "independent" connotes a quality of mind rather than the financial status of the filmmaker. Cash prizes will be awarded. Films must be on 16mm and films made solely for classroom instruction or commercial purposes are not eligible.

The Fourth International Experimental Film Competition will be held December 27, 1967, through January 2, 1968, at Knokke-Le Zoute in Belgium. Ten prizes totaling 600,000 belgian francs (about $12,000) will be awarded. The competition is limited to films that have not previously been shown. The term "experimental" will be interpreted as embracing all works created for cinema or television which give evidence of an effort to regenerate or extend the film as a medium of cinematographic expression. Further information is available from M. Jacques Ledoux, Curator, Royal Film Archive of Belgium, 23 Ravenstein, Brussels, Belgium.

The Watch on Health is a public service documentary film released by the U.S. Public Health Service Audiovisual Facility in Atlanta, Ga. The 13½-min film emphasizes current activities of the Public Health Service. It shows various episodes including a technique for surgery using a heart-lung machine to maintain blood flow while surgeons repair a defective heart; scientists establishing planetary quarantine for spacecraft under rigorously aseptic conditions; and operation Dead Head Medico in which the Service assigns medical officers to the U.S. Coast Guard to provide emergency medical aid for ships at sea.

The Hashemite Kingdom of Jordan has ordered television equipment for two transmitting stations and a production studio from Marconi Co., Chelmsford, Essex, England. Both stations will be on the air sometime this year and will provide the first television service in the Holy Land. One transmitting station, broadcasting in Band III, will be located in Jerusalem to give coverage of the Holy City and the surrounding area. The other will be on the outskirts of Amman and will broadcast in Band I. The Jordan Television Corp. studios will be in the city of Amman and programs will be fed to Jerusalem by a microwave link. The order includes the supply of 10-kW transmitters and associated equipment for the two transmitting stations. Four broadcast vidicon cameras, a 16mm telecine unit and electronic equipment for the control rooms will be provided for the studios, together with a film camera and suitable storage and processing equipment. Marconi engineers will supervise the installation and will train Jordanian engineers in the operation and maintenance of the equipment.

A community television network devoted solely to medical instruction has been established at Atlanta, Ga. The network links Emory University School of Medicine, Emory University Hospital, Grady Memorial Hospital, Veterans Administration Hospital, Georgia Department of Public Health, Georgia Mental Health Institute and the U.S. Public Health Service Audiovisual Facility through the 2,500-MHz TV system set aside by the FCC for instructional purposes. Eventually any properly equipped hospital or other site within a radius of about 25 mi and within visual sight of the original transmitter will be able to tie into the system. Programs presently scheduled include: Grand Rounds at Grady Hospital; Pediatric X-Ray Instruction; Psychiatric Conferences; Cardiology Tele-Lectures; X-Ray Technology Courses and special conferences in Neurology, Cancer, Obstetrics-Gynecology and Surgery.

Colonial Williamsburg's Twin Theaters (see "The Colonial Williamsburg Theaters for a Wide-Screen Participation Film," by Arther L. Smith and Ben Schlanger, *Jour. SMPTE*, 70: 677–685, Sept. 1961) have been modernized to the extent of the installation of Century 70/35mm projectors operating with Century all-transistor sound systems to replace the horizontal Vista-Vision projectors originally installed. A specially produced film called *The Story of a Patriot* has been shown 85,000 times to more than 6 million visitors to Colonial Williamsburg during the less than 10 years since it was established. The theaters operate continuously from 10 to 12 hours each day, seven days a week. Complete inspection of each 70mm reel is made after each showing. The films receive routine cleaning and careful handling for long life and freedom from dirt and scratches. In addition to routine care of the film, the film traps, gates, rollers and sprockets are carefully inspected after each showing.

Opening of a $4 million Optics Center has been announced by Itek Corp., Lexington, Mass. The new facility covers 88,000 ft² and enables production of optical systems with diameters up to 130 in. in a controlled environment. Optical testing is performed on 14 seismic test blocks weighing up to 80 tons. Each block rests on vibration isolators to eliminate effects of internal and external ground vibrations. Sound vibrations have been virtually eliminated by locating all optical test tunnel areas in the interior of the structure. Basically buildings within buildings, each of the ten test tunnels is equipped with laminar air flow to provide precise temperature control and turbulence-free atmosphere for high-acuity optical testing. Eleven cranes ranging in size from ½ ton to 7 tons are used to move large optical elements throughout the building.

Byron Motion Pictures of Washington, D.C., will move into a new laboratory next fall, according to a recent announcement from Byron Roudabush, President. The new laboratory will be located at 65 K St. N.E., in the new light-industrial development area at North Capital and K streets. Construction costs of the building will exceed $1 million. The new building will consist of three floors and a penthouse, totaling nearly 60,000 ft². In addition to the laboratory, the building will also house offices, sound recording studios, editing rooms, vaults, machine shops, employees' cafeteria and lounge, and screening rooms, including two large preview theaters.

Mecca Film Laboratories has expanded its laboratory services to include color printing and processing, it was recently announced. To provide for the expansion, the firm has taken over the entire third floor of the Film Center Building at 630 Ninth Ave., New York, N.Y. A custom-built 16mm color processing machine is in operation and a 35mm color processing machine is being installed.

Laboratories RCA, Inc., a research subsidiary of Radio Corp. of America in existence in Japan since 1961, has established a new laboratory complex to house an expanded program of studies in physics, chemistry, communications theory, and other basic fields of electronics. The new complex is being built on a 12,000 m² site at 3-661 Zushi-Machi, Machida City, Tokyo. It is a single-story building and will have about 1,050 m² of floor space.

F&B/CECO, Inc., 315 W. 43 St., New York, N.Y. 10036, has obtained exclusive national distribution rights for the series of dichroic daylight conversion filters developed by Arthur Bodkins. The filters are used to simulate daylight by placing them in front of yellow lights, thus boosting the color temperature to the correct degree.

The Bodkins Pyrex glass filters are said to transmit 85% of available corrected light. By means of a patented process the filters function by reflection rather than by heat absorption.

F&B/CECO, Inc., has moved its manufacturing and storage operations into larger quarters in the firm's 14-story Industries Building at 315 W. 43 St., New York, N.Y. 10036. The firm has added 10,000 ft² of machine shop space to its facilities. It is also expanding its camera research and development department and its service department.

Three light modulators developed at Bell Telephone Laboratories make it possible to impress broadband communications signals onto laser beams, using modulating powers of less than 1 W. All three devices can modulate both pulsed and continuous laser light. In the lithium tantalate electro-optic modulator, pulses of visible light passing through a lithium tantalate crystal are modulated for digital transmission when an electric field is pulsed rapidly through the crystal. After passing through a polarizer, the light pulses enter the lithium tantalate crystal, which acts as a high-speed gate. Two electrodes are plated on opposite rectangular faces of the crystal. When the PCM terminal sends an electrical pulse to the electrodes it causes the plane of polarization of the light pulse then passing through the crystal to shift 90°. This change allows the light pulse to pass through the analyzer and to be detected by the photodiode. If no electrical pulse is sent from the PCM terminal, the light pulse passing through the crystal is blocked when it reaches the analyzer and does not register at the photodiode.

In a second device, near-infrared light waves traveling through a gallium-doped crystal of yttrium iron garnet (YIG) are continuously modulated when the direction of the crystal's internal magnetic field is varied. Polarized infrared light is focused by a lens and enters the modulating crystal. The magnetic field within the modulator changes as the signal in the surrounding coil varies. The plane of polarization of the light fluctuates in response to the changing magnetic field. An analyzer, which is another polarizer rotated clockwise 45°, translates the fluctuating plane of polarization into an amplitude-modulated light wave. The light wave is detected by a high-speed germanium photodiode which demodulates the signal impressed on the light beam.

In a third device, varying a reverse bias to a gallium phosphide diode modulates visible or near-infrared light traveling along the plane of the p-n junction. The incoming light wave is polarized and focused on the diode p-n junction region. The two polarization components of the light wave then travel at different velocities along the plane of the p-n junction and emerge from the junction out of phase with each other. The change in velocity imparts a phase modulation to each polarization component of light. To achieve amplitude modulation, the phase-modulated components of light are passed through an output polarizer.

A proposal for a multipurpose Integrated Space/Earth Communications System has been filed with the Federal Communications Commission by American Telephone and Telegraph Co. The system is planned to meet long-range communications requirements in the United States through 1980. The Bell System proposal would intermix satellite and terrestrial facilities so that selection of a facility could be made on the basis of service and cost. An important advantage would be conservation of the frequency spectrum by utilizing higher frequencies hitherto considered infeasible for commercial use.

According to the terms of the proposal the system would be operative by 1969. By 1980 the satellite portion of the proposed system would provide for more than 80,000 equivalent two-way voice circuits, 27 TV channels and 61 protection and/or occasional TV channels. In its ultimate configuration (1980 and beyond) the proposed system would utilize high-capacity satellites of advanced design which would operate on the higher frequencies and thus reduce problems of interference with terrestrial facilities.

An experimental gallium arsenide device "no bigger than the width of an eyelash" developed at Radio Corp. of America has transmitted music of high quality across a laboratory. According to the announcement, it appears that the gallium arsenide unit derives its unusual capability from the interaction of two exotic solid state effects — the Gunn effect and the field effect. The new device is basically a semiconductor junction diode. It is a tiny, two-sided flake of gallium arsenide whose top has been treated chemically to give it an excess of electrons (n-type) and whose bottom has been similarly treated to give it a shortage of electrons (p-type). The device has three terminals rather than the conventional two terminals. It is sawn through the top to a point just above the junction and contacts are put on both sides of the resulting channel or cleft. The bottom is left untouched and has only one contact. By carefully controlling the voltages applied to the three contacts, or terminals, it is possible to generate, frequency modulate and tune the microwave output of the device.

Synthetic speech produced with the aid of a controllable computer-generated model of the vocal tract has been developed at Bell Telephone Laboratories. The model, stored in a computer, is actually a geometric description of vocal tract areas as they are shaped to produce various sounds. When synthesizing speech, a researcher can see an outline of the vocal tract displayed on an oscilloscope and, at the same time hear the sound which corresponds to the displayed shape. By flicking switches and turning knobs at a computer console, the researcher can change the shape and sound simultaneously. In order to synthesize whole words or syllables realistically, transitions are needed between basic sounds. Shapes corresponding to basic sounds are defined by the researcher at the console. The computer can then automatically interpolate sequences of transitional shapes between one basic shape and another

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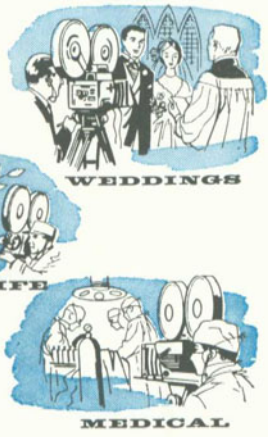

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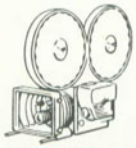

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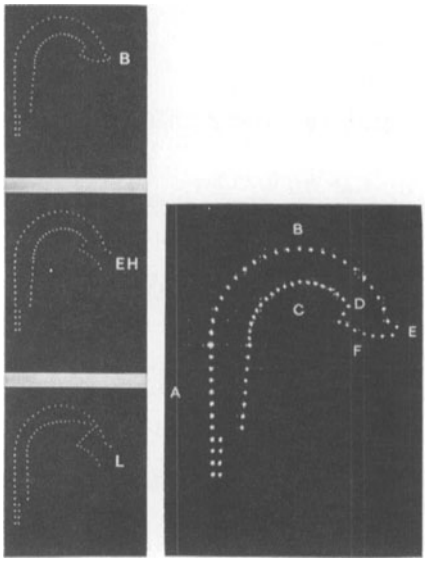
This research is for the purpose of obtaining basic information about speech sounds. Eventually the information may be useful in devising a more efficient means of encoding speech signals and transmitting them over communications lines and may also help in the development of a practical speaking machine for reading out data stored in, or generated by, computers. The data were obtained from x-rays of individuals uttering basic sounds.

Vocal tract areas are described in the computer program by five variables. The tongue is represented by a simple arc. Two parameters indicate the position of the tongue (up-down and forward-backward) within a larger, fixed outer arc representing the palate and pharyngeal wall. A third variable indicates the position of the tongue tip, i. e., raised as it would be when pronouncing "L," or tucked as it would be when pronouncing "Ah." Area measurement of the lower part of the pharynx, represented by straight lines connected to the bottom of the arcs depicting the tongue and the palate, is related directly to the tongue position and is not included as an independent variable. The fourth and fifth parameters are taken from the extent of opening and protrusion of the lips.



Computer-generated displays (shown above) show at the left changes in the position of the tongue, lips and pharynx on an oscilloscope as the word "Bell" is spoken; and, at the right, a geometric side view of (A) pharynx, (B) palate, (C) tongue, (D) tongue tip, (E) lips and (F) lower jaw. The lips, pharynx and tongue are positioned on the oscilloscope to synthesize basic sounds.

Frank Lewin, a sensitive and talented as well as successful composer for motion pictures and television, made use of film techniques in the video-taped ABC Stage '67 production, *The Trap of Solid Gold*, presumably the first time this technique has been used for a major production. To achieve absolute control over the sound, a kinescope was specially made. Music and effects were scored to the film and the final mixed track was transferred to the videotape master. This technique enabled the composer to make dramatic points with the precision possible only to film while retain-

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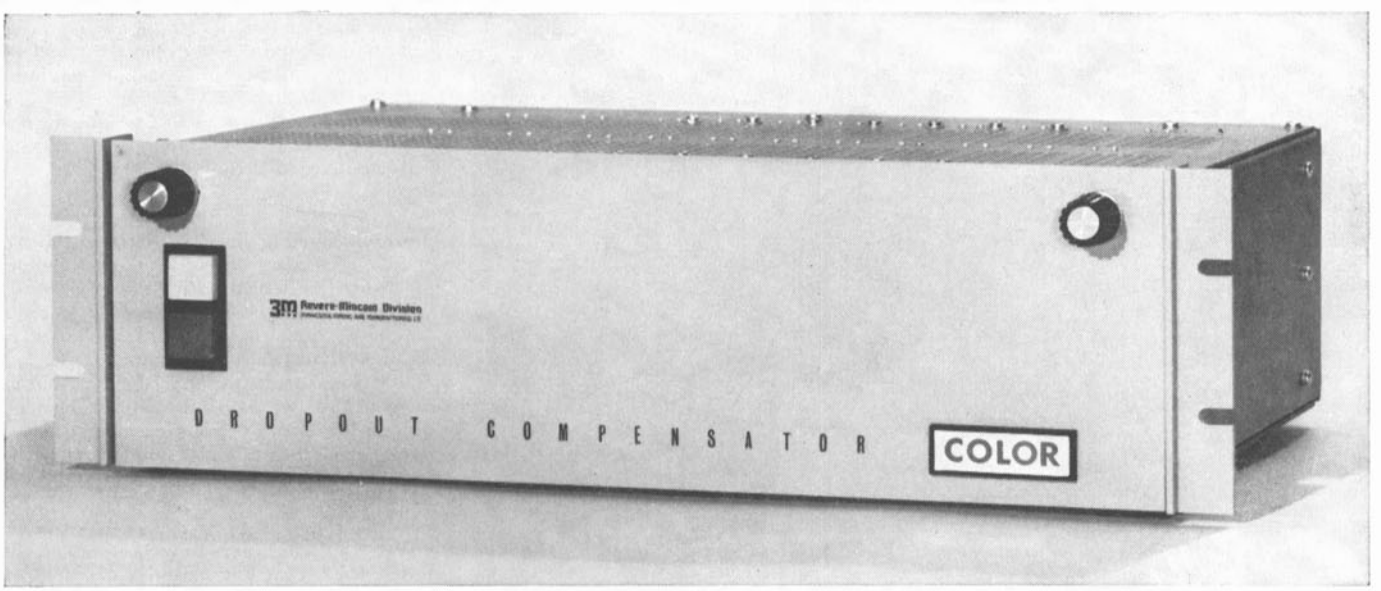

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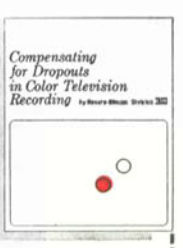

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ing the fluidity of a performance recorded on video tape.

Besides composing music for television and feature films and documentaries, Mr. Lewin is also well known as a composer of concert music. One of his earliest compositions is *Innocence and Experience*, a cycle of songs on the poems by William Blake first performed in 1961. Another of his well-known compositions is *Music for the White House*, a cantata for voices and instruments first performed in 1965. Mr. Lewin is the author of "The Soundtrack in Nontheatrical Motion Pictures," a four-part paper published in the *Journal* in 1959 (Pt. I, pp. 113-118, Mar.; Pt. II, pp. 407–412, June; Pt. III, 482–485, July; and Pt. IV. pp. 485–488, July 1959).

Ed Emshwiller, well-known experimental filmmaker, produced the film sequences for the Wilford Leach comedy, *In 3 Zones*, for the Repertory Theater of Lincoln Center. *In 3 Zones* premiered at the opening of the Forum, the new theater at the Vivian Beaumont, on December 17. General Aniline and Film Corp. donated 100,000 ft of film to the Repertory Theater for Mr. Emshwiller to use in the project. Mr. Emshwiller's experimental films have been shown at important film festivals both here and abroad and he has been awarded a number of prizes. *In 3 Zones* alternates between live and filmed scenes with the same actors taking part in both.

Wentworth W. Crouch retired January 1 from the post of Co-Ordinator of Photographic Chemicals for the Professional, Commercial and Industrial Markets Div., Eastman Kodak Co. His career with Kodak began in 1934 in the Industrial Engineering Dept. of Kodak Park Works. He later transferred to the Chemical Plant and to the Powder and Solution Dept. He became Co-Ordinator of Photographic Chemicals in 1965. He is succeeded by Carl V. Nitze who has been with Kodak since 1947.

Sam C. Gale, Jr., has been appointed Vice-President of Sales of Capital Film Laboratories, 470 E St., S.W., Washington, D.C. 20024. Mr. Gale has been with the company as Sales Engineer since 1963. He was formerly a writer and director of industrial motion pictures for General Electric Co. in Burlington, Vt. In his new post he will be responsible for the firm's entire marketing, sales and promotion activities.

Walter H. Mills has been appointed Marketing Manager of Magnasync/Moviola Corp. In his new post he will be responsible for all domestic and foreign sales and promotion of Magnasync professional sound recording/reproducing equipment and the professional motion-picture editing and TV equipment of the recently acquired Moviola Manufacturing Co. The plant facilities are located at 5539 Riverton Ave., North Hollywood, Calif.

John E. Gerling has joined the Applications Engineering staff of Watkins-Johnson Co. where he will be primarily concerned with products of the firm's Space Communications Section. He was formerly Manager of the Industrial Microwave Dept. of Litton Industries Atherton Div. Previously he was Director of Marketing for Radiation-at-Stanford, a developer of high-power microwave communications and radar transmitters.

Three field engineers have been added to the staff of Visual Electronics Corp., 356 W. 40 St., New York, N.Y. 10018, to meet the requirements of an expanding Norelco Plumbicon Color Camera program, it was recently announced. Field engineers working from the Dallas, Tex., area are N. A. Bratcher and Roy Price. Howard G. McClure of Bakersfield, Calif., will serve the West Coast stations.

Larry Mallach has been appointed General Manager of the Visual/Allen Div. of Visual Electronics Corp. in Palo Alto, Calif. He will have the responsibility for all video-tape operations and will coordinate the expansion of the operating departments within the division. Visual Electronics headquarters is at 356 W. 40 St., New York, N.Y. 10018. Mr. Mallach has been in the communications and broadcast field for more than 30 years. He has held positions in various marine radio and broadcast operations and was responsible for the setting up of a network of radio stations for the fishing industry in Alaska.