# A Classified Bibliography on Holography and Related Fields

By JOHN N. LATTA

*This Bibliography is the fourth published in the SMPTE* Journal. *The first three* (Jour., *April 1966; August 1966; April 1967*) *comprehensively covered the literature through December 1966. This Bibliography differs from the others in that the coverage has been broadened to include topics that are related to holography.*

A contribution submitted by John N. Latta, Dept. of Electrical Engineering, University of Kansas, Lawrence, Kansas.
(This Bibliography was received on January 22, 1968.)

*An additional feature of this Bibliography is that all references are classified. There are 32 classifications, listed below. All references to articles are first listed under classification I (Holography and Related Fields) with boldface numerals following each reference to denote under which classifications that reference appears. References to books are listed under categories 2–4.*

*Each of the 32 categories is listed separately with its corresponding references. Space considerations, however, prohibit publishing all 32 classifications at once.*

*Because classifications 1–4 contain all references, they are published below. The subdivided list of references under the remaining classifications (5–32) will be published in a later issue of the* Journal. *The second group, when published, will provide a quick reference list for those interested in a particular area relating to holography.*

*The body of holographic literature is increasing rapidly. Approximately 500 references are included below, many of which were published from January through December, 1967. Holography is now finding its way into numerous applications as evidenced by some of the references. The widespread interest in this new field makes an up-to-date bibliography valuable.*

*Appreciation is expressed to the Computation Center of the University of Kansas for the use of their facilities which aided greatly in the compilation of this bibliography and to Linda Hall Library, Kansas City, Mo., without whose assistance the verification of many references would have been impossible.*



## List of Categories

1. Holography and Related Fields
2. Books — Non-Optical
3. Books — Optical
4. Books Discussing or About Holography
5. Survey Articles on Holography
6. General References in Holography
7. Theory of Holography
8. Holographic Images and Their Properties
9. Properties of the Hologram
10. Experimental Procedures and Techniques in Holography
11. Computer Generated Holograms and Spatial Filters
12. Types of Holograms
13. Color Holograms
14. Incoherent Light Holograms
15. Pulsed Light Holograms
16. Polarization Holography
17. Non-Optical Holograms
18. Holographic Displays
19. Holographic Recording Media
20. Holographic Copying
21. Holographic Interferometry
22. Holographic Microscopy
23. Integral Photography — Holography
24. Holography Applications and Equipment
25. Optical Information Theory
26. Optical Fourier Transform and Transfer Function Theory
27. Optical Information and Data Processing
28. Optical Information Storage
29. Optical Recognition
30. Optical Spatial Filtering
31. Zone Plates
32. Articles Related to Holography

## 1. Holography and Related Fields

Abramowitz, I. A. and Ballantyne, J. M., "Evaluation of hologram aberrations by ray tracing," *J. Opt. Soc. Amer. 57:* 1522–1526, Dec. 1967, **7, 22.**

Albergotti, J. C., "Instant holograms," *Amer. J. Phys., 35:* 1092–1093, Nov. 1967, **10.**

Aleksoff, C., "Gas lasers as sources for holography," *Appl. Optics, 6:* 2192–2193, Dec. 1967, **32.**

Aleksandrov, E. B., and Bonch-Bruevch, A. M., "Investigation of surface strains by the hologram technique," *Soviet Phys. Technical Phys., 12:* 258–265, Aug. 1967, **21, 24.**

Allen, J. B., and Jones, C. R., "Optical processing of flight test data," presented at IEEE conf. on laser engineering and applications, June 6–8, 1967, Washington, D.C., **24, 27.**

Altman, J. H., "Pure relief images in type 649-F plates," *Appl. Optics, 5:* 1689–1690, Oct. 1966, **19.**

Altman, J. H. and Zweig, H. J., "Effect of spread function on the storage of information on photographic emulsions," *Phot. Sci. Eng. 7:* 173–177, May-June 1963, **28.**

Anderson, D. B., "Application of coherent optical transducers to optical real-time information processing," *1966 Spring Joint Computer Conf., Proc.*, 53–60, Boston, Mass., April 26–28, 1966, **24, 26, 27, 29, 30.**

Anderson, L. K., Brojdo, S., La Macchia, J. T., and Lin, L. H., "A high-capacity, semipermanent optical memory," *IEEE Conf. on Laser Engineering and Applications*, June 6–8, 1967, Washington, D.C., **24, 28.**

Aoki, Y., "Microwave holograms and optical reconstruction," *Appl. Optics, 6:* 1943–1946, Nov. 1967, **17.**

Aoki, Y., Yoshida, N., Tsukamoto, N., and Suzuki, M., "Sound wave hologram and optical reconstruction," *Proc. IEEE, 55:* 1622–1623, Sept. 1967, **17.**

Archbold, E., Burch, J. M., and Ennos, A. E., "The application of holography to the comparison of cylinder bores," *J. Sci. Inst., 44:* 489–494, July 1967, **21, 24.**

Aroyan, G. F., "The technique of spatial filtering," *Proc. IRE, 47:* 1561–1568, Sept. 1959, **30.**

Arsac, J., "Application des théories de l'approximation à l'étude des images optiques," *Optica Acta, 3:* 55–65, June 1956, **26, 30.**

Arsenault, H. and Boivin, A., "An axial form of the sampling theorem and its application to optical diffraction," *J. Appl. Phys., 38:* 3988–3990, Sept. 1967, **25.**

Ashchevlov, Yu. V., Dymnikov, A. D., Ostrovsky, Yu. I., and Zaidel, A. N., "An interferometric holographic investigation of pulsed discharge plasma," *Phys. Letters, 25A:* 61–62, July 17, 1967, **21, 24.**

Bakhrakh, L. D. and Kurochkin, A. P., "Use of holography in reconstruction of polar diagrams of UHF antennas from field measurements in the fresnel zone," *Soviet Phys. Doklady, 11:* 1102–1104, June 1967, **24, 27.**

Bakhrakh, L. D., Sobelev, G. A. and Fridman, G. Kh., "The obtaining of holograms of three-dimensional objects," *Radiofizika, 10:* 589–590, 1967, **10.**

Baldwin, W. J., "Determination of the information storage capacity of photochromic glass with holography," *Appl. Optics, 6:* 1428, Aug. 1967, **19, 28.**

# Head-over-heels over Hazel.

## (In rapturously full color.)

No wonder. With Hazel, film lab managers and timers have complete color control, from first negative to release print. And they can inspect color adjustments as they are made, scene by scene, on closed-circuit TV, before printing.

Hazel, the world's first and only electronic Color Film Analyzer in commercial use, enables a timer to do much more than he ever could before, with almost-incredible precision and speed. Deliverable quality prints are produced the first time, with no waste.

Hazel has made such a tremendous impression on everyone associated with color film processing that, today, labs equipped with Hazel advertise the fact. Having a Hazel (or two, or three) on the premises automatically labels a lab as a leader.

If you have been hesitating while others have been stealing your 16 or 35mm full-color thunder, call us. We'll arrange to have Hazel demonstrated for you at your convenience.

Phone (212) 321-2300. Or write Special Products Dept., Hazeltine Corporation, Little Neck, N.Y. 11362. Telex 0126-166. TWX 428-0092.

Overseas, Hazeltine Color Film Analyzer information can be obtained through: Bell & Howell, Ltd.; Neutrodyne, Pty. Ltd. (Australia); and Sumitomo Shoji (Tokyo).

HAZELTINE

## Hazeltine Corporation

**New, in time for the SMPTE Spring Conference in Los Angeles: The Hazeltine all-electronic Cue Detector, compatible with existing cueing systems!**

**See it demonstrated, together with the Color Film Analyzer. Century Plaza Hotel, Booth Nos. 65 and 66, May 6-9.**

Barakat, R., "Application of the sampling theorem to optical diffraction theory," *J. Opt. Soc. Amer., 54:* 920–930, July 1964, **25.**

Barber, H. P., "Coherence-length extension of He-Ne lasers for holography," *J. Opt. Soc. Amer. 57:* 574, April 1967 (abstract only), **10.**

Barer, R., "Phase-contrast methods and birefringence," *Nature, 167:* 642–643, April 21, 1951, **22.**

Barnett, N. E., "Progress report on vibration analysis by holographic interferometry," *J. Opt. Soc. Amer., 57:* 1406, Nov. 1967 (abstract only), **21, 24.**

Bartfai, J. J., Ozarow, V., and Gaynor, J., "Red-sensitive photoplastic recording film," *Phot. Sci. Eng., 10:* 60–65, Jan.–Feb. 1966, **19.**

Becker, H. C., Meyers, P. H., and Nice, C. M., "Laser light diffraction, spatial filtering, and reconstruction of medical radiographic images — preliminary results," *1967 IEEE Region III Convention Conference Record,* 43–54, **27, 30, 32.**

Belvaux, Y., "Influence of emulsion thickness in hologram reconstruction," *Phys. Letters, 25A:* 70–71, July 31, 1967, **19.**

Belvaux, Y., "Duplication des hologrammes," *Annales de Radioelectricité, 22:* 105–108, April 1967, **20.**

Bergstein, L., "Coherent processing and ray optics," *Symposium on Modern Optics,* March 22–24, 1967, New York, N.Y., **27.**

Bernstein, K. L., "Spatial filtering with partially coherent light," *J. Opt. Soc. Amer. 54:* 571, April 1964. (abstract only), **30.**

Bertolotti, M., Gori, F., and Guattari, G., "Coherence requirements in holography," *J. Opt. Soc. Amer. 57:* 1526–1529, Dec. 1967, **7.**

Beste, D. C., and Leith, E. N., "An optical technique for simultaneous beam forming and cross correlation," *IEEE Trans. Aerospace and Electronic Sys., AES-2:* 376–384, July 1966, **32.**

Biedermann, K. and Frieser, H., "Ueber die informationskapazitaet photographischer schichten," *Optik, 23:* 75–82, Oct., 1965, **28.**

Blackmer, L. L., Kerkhove, A. P., and Baldwin, R., "Digital data recording on film by using superposed grating patterns III recording and retrieval techniques," *Photo. Sci. Eng., 10:* 263–269, Sept.–Oct. 1966, **27, 28.**

Blanc-Lapierre, A., Perrot, M. and Peri, G., "Comparaison entre la transmission de l'information en optique et en radioélectricité," *Optica Acta, 2:* 1–5, April 1955, **25.**

Blanc-Lapierre, A., "Considérations sur la théorie de la transmission de l'information et sur son application à certains domaines de la physique," *Annales De l'Institut Henri Poincaré, 8:* 245–296, 1953, **25.**

Blanc-Lapierre, A., Perrot, M., and Dumontet, P., "Sur la correction de certains défauts dus à la diffraction," *Comp. Rend. Acad. Sc., 232:* 1342–1344, April 2, 1951, **26.**

Blanc-Lapierre, A. and Perrot, M., "Diffraction et quantité d'information," *Comp. Rend. Acad. Sc., 231:* 539–541, Sept. 11, 1950, **25.**

Bolstad, J. O., "Holograms and spatial filters processed and copied in position," *Appl. Optics, 6:* 170, Jan. 1967, **10.**

Bond, R. L., Ballard, G. S. and Story, J. B., "Measurement of ray deviations in an optically inhomogeneous field," *J. Appl. Phys., 38:* 907–908, Feb. 1967, **21, 24.**

Brandt, G. B., "Hologram-moire interferometry for transparent objects," *Appl. Optics 6:* 1535–1540, Sept. 1967, **21.**

Brandt, G. B. and Rigler, A. K., "Reflection holograms of focused images," *Phys. Letters, 25A:* 68–69, July 31, 1967, **9, 12, 14.**

Brandt, G. B., "Hologram-moire interferometry," *J. Optical Soc. Amer., 57:* 563, April 1967, (abstract only), **21.**

Brooks, R. E., "Low-angle holographic interferometry using Tri-X pan film," *Appl. Optics, 6:* 1418–1419, Aug. 1967, **21.**

Brooks, R. E., "New dimension for interferometry," *Electronics, 40:* 88–93, May 15, 1967, **15, 21.**

Brouwer, W., O'Neill, E. L., and Walter, A., "The role of eikonal and matrix methods in contrast transfer functions," *Appl. Optics, 2:* 1239–1246, Dec. 1963, **26.**

Brown, W. G., "Synthetic aperture radar," *IEEE Trans. on Aerospace and Electronic Systems, AES-3:* 217–229, March 1967, **27, 32.**

Brumm, D. B., "Double images in copy holograms," *Appl. Optics, 6:* 588–589, March 1967, **20.**

Bryngdahl, O., and Lohmann, A., "Modified holographic image formation," *J. Opt. Soc. Amer. 57:* 1412, Nov. 1967 (abstract only), **12, 14.**

Bryngdahl, O., "Polarizing holography," *J. Opt. Soc. Amer. 57:* 545–546, April 1967, **16.**

Bryngdahl, O., and Lohmann, A. W., "Reconstruction of ancient holograms," *J. Opt. Soc. Amer. 57:* 574, April 1967. (abstract only), **10.**

Burch, J. J., "A computer algorithm for the synthesis of spatial filters," *Proc. IEEE, 55:* 599–601, April 1967, **11.**

Burch, J. M., and Ennos, A. E., "Interferometry with reconstructed wavefronts," *J. Opt. Soc. Amer. 56:* 541, April 1966 (abstract only), **21.**

Burckhardt, C. B., "Information reduction in holograms for visual display," *J. Opt. Soc. Amer. 57:* 1412, Nov. 1967 (abstract only), **18.**

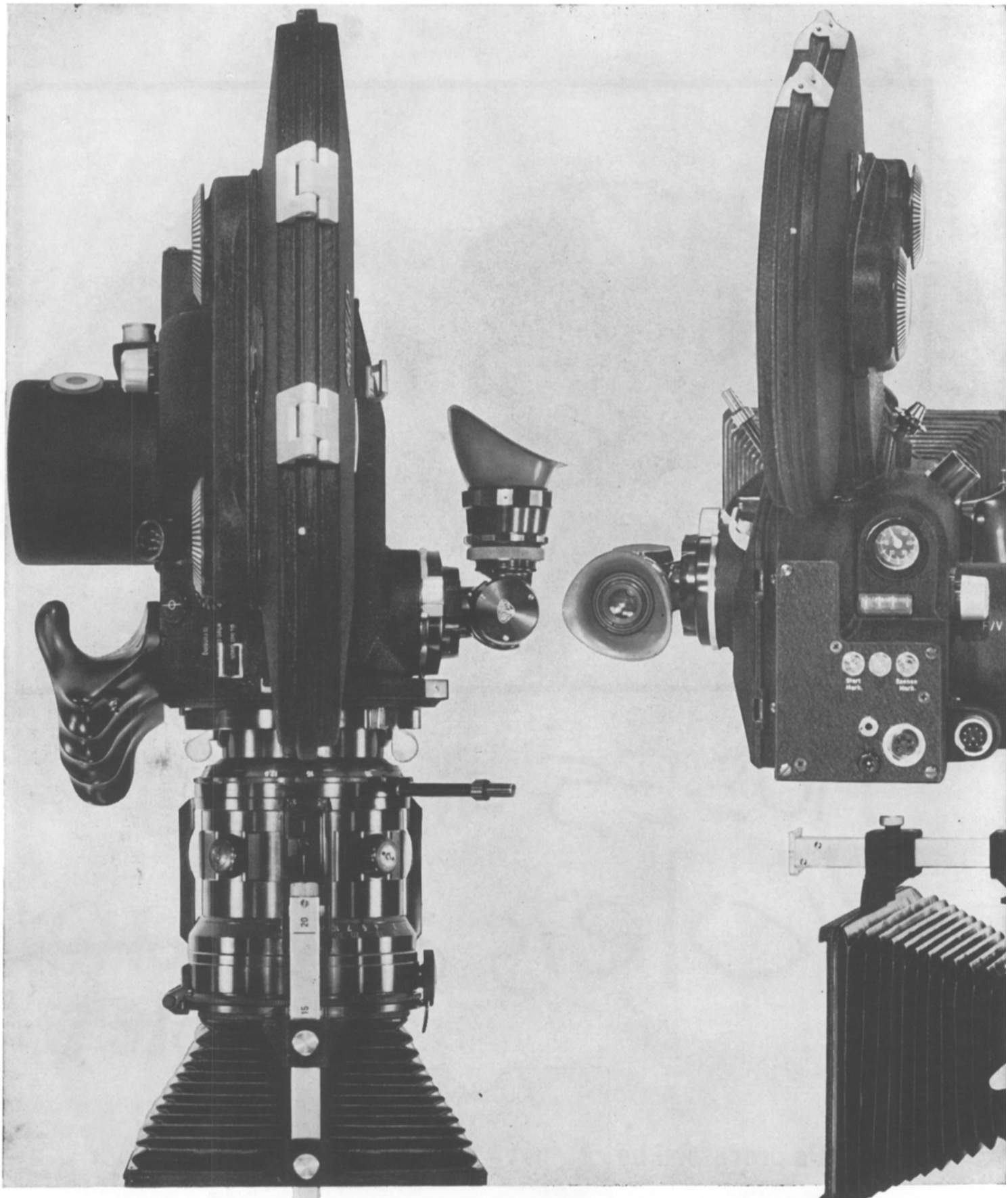
Burckhardt, C. B., "Considerations on character recognition by means of optical spatial filtering," *J. Opt. Soc. Amer. 56:* 1449, Oct. 1966 (abstract only), **29, 30.**

Burckhardt, C. B., "Storage capacity of an optically formed spatial filter for character recognition," *Appl. Optics, 6:* 1359–1366, Aug. 1966, **19, 29, 30.**

Camus, J., Girard, F., and Clark, R., "Fresnel zone plate generation," *Appl. Optics, 6:* 1433, Aug. 1967, **31.**

Canut-Amoros, M., "Quantitative analysis of Fraunhofer patterns of ordered and disordered structures of disk-like atoms, *J. Opt. Soc. Amer., 56:* 1449, Oct. 1966 (abstract only), **32.**

Carpenter, R. L., and Clifford, K. I., "Simple inexpensive hologram viewer," *J. Optical Soc. Amer., 57:* 276, Feb. 1967, **10, 14.**



**ARRIFLEX® 16BL** ...most dependable, most capable, professional

Casler, D. H., and Pruett, H. D., "Simultaneous exposure–development of holograms on 649-F film," *Appl. Phys. Letters, 10:* 341–342, June 15, 1967, **10.**

Cathey, W. T., Jr., "Use of sampling theory in holography," *J. Opt. Soc. Amer., 56:* 1449, Oct. 1966 (abstract only), **7, 18.**

Caulfield, H. J., Harris, J. L., and Hemstreet, H. W., Jr., "Local reference beam generation in holography," *Proc. IEEE, 55:* 1758, Oct. 1967, **10.**

Caulfield, H. J., and Harris, J. L., "Light pipe holography," *Appl. Optics, 6:* 1272, July 1967, **10.**

Caulfield, H. J., and Beyen, W. J., "Birefringent beam splitting for holography," *Review Sci. Instr., 38:* 977–978, July 1967, **10.**

Chambers, R. P., and Stevens, B. A., "Bibliography on holograms — III," *Jour. SMPTE, 76:* 392–395, April 1967, **6.**

Chambers, R. P., and Courtney-Pratt, J. S., "Bibliography on holograms — II," *Jour. SMPTE, 75:* 759–773, 776, 780, 782, 784, 786, 788, 790, 792, 794–796, 798, 800, 802–809, Aug. 1966, **6.**

Chambers, R. P., and Courtney-Pratt, J. S., "Bibliography on holograms," *Jour. SMPTE, 75:* 373–378, 380, 382, 386, 388, 390, 392, 394, 396, 398, 400, 402, 404, 406, 408–410, 412–414, 416–418, 420–430, 432, 434–435, April 1966, **6.**

Champagne, E. B., "A study of aberrations in holography," *J. Opt. Soc. Amer., 57:* 560, April 1967 (abstract only), **7, 8.**

Champagne, E. B., "Nonparaxial imaging, magnification, and aberration properties in holography," *J. Opt. Soc. Amer., 57:* 51–55, Jan. 1967, **7, 8.**

Champagne, E. B., "Transform relations in coherent systems," *Appl. Optics, 5:* 1088, June 1966, **26.**

Chau, H. H. M., and Mullaney, G. J., "Holographic moire patterns, their application to flow visualization in aerodynamics," *Appl. Optics, 6:* 1428–1430, Aug. 1967, **21.**

Chau, H. H. M., and Mullaney, G. J., "An example of the application of pulsed light holography to aerodynamics," *Appl. Optics, 6:* 981, May 1967, **15, 24.**

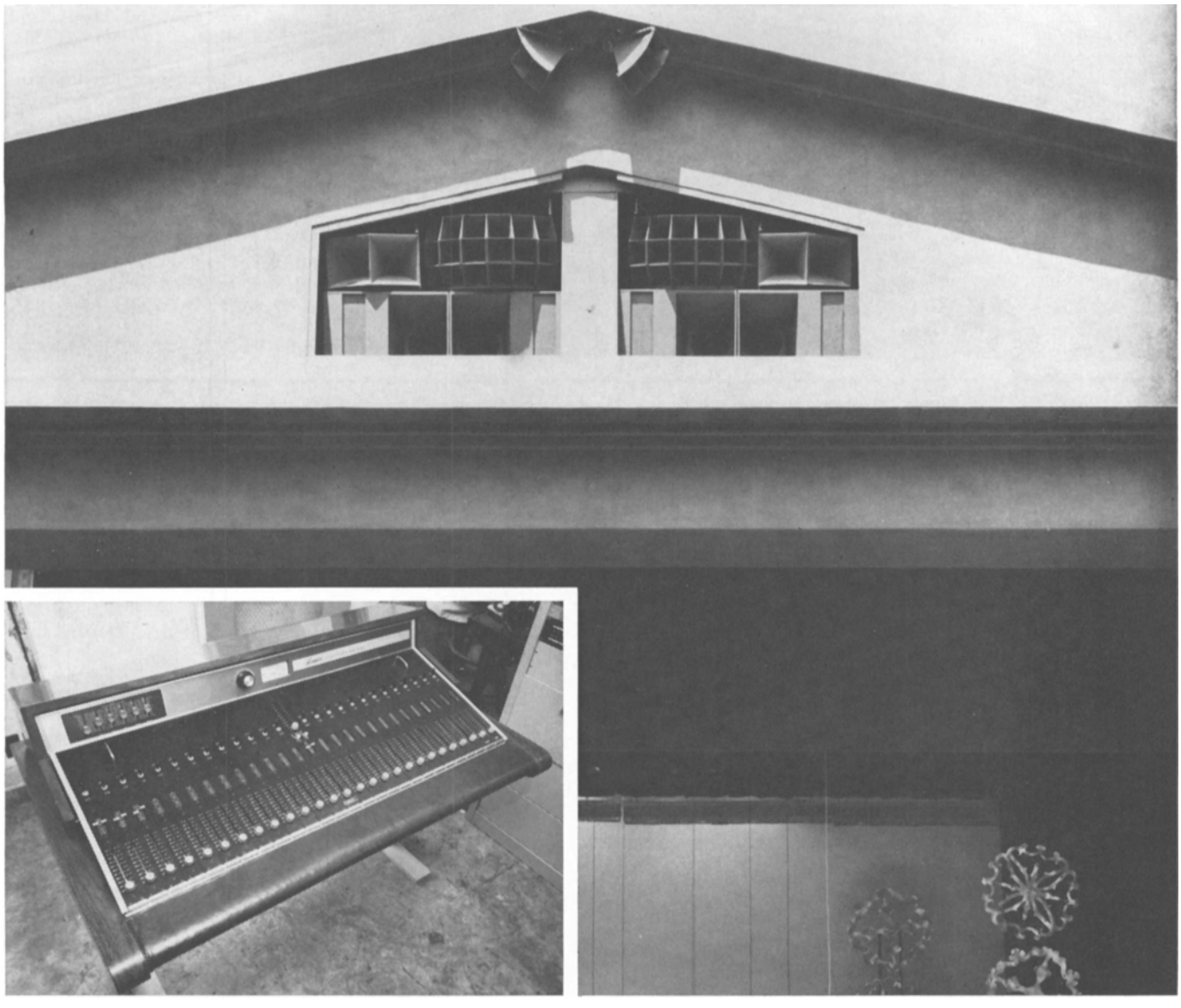
Cheatham, T. P., Jr., and Kohlenberg, A., "Optical filters — their equivalence to and difference from electrical networks," *1954 IRE Natl. Conv. Record, Part 4,* 6–12, **26.**

Cheatham, T. P., Jr., and Kohlenberg, A., "Analysis and synthesis of optical processes," *Boston Univ. Phys. Res. Labs., Tech. Note 84, Part 1,* March 1952, **26.**

Chutjian, A., and Collier, R. J., "Recording and reconstructing three dimensional images of computer-generated subjects by Lippmann integral photography," *J. Opt. Soc. Amer., 57:* 1405, Nov. 1967 (abstract only), **11, 23.**

Cindrich, I., "Image scanning by rotation of a hologram," *Appl. Optics, 6:* 1531–1534, Sept. 1967, **8, 24.**

Clifford, K. I., and Waldman, G. S., "Comments on 'Zone plate theory based on holography,'" *Appl. Optics, 6:* 1415,



Altec's new modular custom console (9200A) contains 27 strip modules, providing unequaled versatility in sound system control. The Greek Theatre console shown here uses 27 straight-line mixers.

**Altec Sound Contractor:** Hannon Engineering, Inc., Los Angeles, California

# The Greek Theatre has a word for it: ALTEC

Of prime importance to the world-famous Greek Theatre in Griffith Park, Los Angeles, is the quality of the sound produced by the theatre's speech and music reinforcement system. The fact that the audience is entirely out-of-doors creates unique acoustical problems. Until recently, these problems had never been satisfactorily solved, even though the Greek Theatre has been in operation for over 15 seasons.

But the non-profit Greek Theatre Association, which operates the theatre, found that one word provided the ideal answer: Altec.

An Altec Sound Contractor designed a complete system which is generally recognized as one of the finest outdoor sound systems in use.

From the custom-built 9200A Control Console, which utilizes a wide range of components, to the microphones, amplifiers and 35 speaker units, the entire system is Altec, including two "Voice of the Theatre"® speaker systems. And it's great.

It should be. Altec has meant leadership in professional sound since the introduction of electro-acoustics. Next time you have a sound problem, think of Altec.

Altec sound systems are installed and maintained by factory-trained authorized Altec Sound Contractors. You'll find one listed in the "Yellow Pages" under "Sound Systems." Please give him a call to discuss your sound project, present or pending. Or write for free "Voice of the Theatre" brochure.

ALTEC LANSING

*A Division of LTV Ling Altec Inc.*
1515 S. Manchester Ave., Anaheim, Calif. 92803

**Visit Altec Lansing at Booths 9, 10 & 11 at the Audio Engineering Society Convention in Los Angeles, Calif., April 29-May 2**

Aug. 1967 (See Horman, M. H. and Chau, H. H. M., *Appl. Optics, 6:* 317–322, Feb. 1967), **31.**

Cochran, G., "Techniques for the production and use of very large and very small holograms," *Opt. Spectra, 1:* 35, Jan. 1967, **10.**

Collier, R. J., "The illusory world of holography," *IEEE Conf. on Laser Engineering and Applications*, June 6–8, 1967, Washington, D.C., **24.**

Collier, R. J., and Pennington, K. S., "Multicolor imaging from holograms formed on two-dimensional media," *Appl. Optics, 6:* 1091–1095, June 1967, **10, 19.**

Collier, R. J., "An up-to-date look at holography," *Bell Labs. Record, 45:* 102–109, April 1967, **5, 24.**

Collier, R. J. and Pennington, K. S., "Techniques for recording color holograms on two-dimensional media," *J. Opt. Soc. Amer. 56:* 1449, Oct. 1966 (abstract only), **13, 19.**

Considine, P. S. and Miller, C. S., "Instrument for electro-optical data processing," *J. Optical Soc. Amer., 57:* 1406, Nov. 1967. (abstract only), **27.**

Consoli, T., Proca, G., and Slamp, L., "Holographie," *Bull. D'Informations Scientifiques et Techniques*, 99–107, June 1967, **6.**

Cooley, J. W., and Tukey, J. W., "An algorithm for machine calculation of complex Fourier series," *Mathematics of Computation, 19:* 297–301, April 1965, **11.**

Cosslett, V. E., "Present trends in electron microscopy," *Electron Phys.*, 291–303, NBS Circular 527 (See N.B.S. *Electron Phys.*), **17, 22.**

Cowley, J. M., and Moodie, A. F., "Fourier images IV — the phase grating," *Proc. Physical Soc., 76:* 378–384, Sept. 1, 1960, **26.**

Cowley, J. M., and Moodie, A. F., "Fourier images I — the point source," *Proc. Physical Soc., 70:* 486–496, May 1, 1957, **26.**

Cowley, J. M., and Moodie, A. F., "Fourier images II — the out-of-focus patterns," *Proc. Physical Soc., 70:* 497–504, May 1, 1957, **26.**

Cowley, J. M., and Moodie, A. F., "Fourier images III — finite sources," *Proc. Physical Soc., 70:* 505–513, May 1, 1957, **26.**

Croce, P., "Etude d'une méthode de filtrage des images optiques," *Revue Optique, 35:* 642–656, Dec. 1956, **26, 30.**

Croce, P., "Etude d'une méthode de filtrage des images optiques," *Revue Optique, 35:* 567–589, Nov. 1956, **26, 30.**

Cutrona, L. J., "Some considerations in holography," *Progress in Radio Science, 1963–1966 Part II*, 2242–2276, 1967, **7, 8, 14.**

Cutrona, L. J., Leith, E. N., Porcello, L. J., and Vivian, W. E., "On the application of coherent optical processing techniques to synthetic aperture radar," *Proc. IEEE, 54:* 1026–1032, Aug. 1966, **27, 32.**

Cutrona, L. J., "The role of coherent optical systems in data processing," *Proc., 1966 Spring Joint Computer Conf.*, 25–41, Boston, Mass., April 26–28, 1966, **26, 27.**

**The revolutionary blending of the Gordon Instant Dailies television system with conventional motion picture cameras proved to be exactly the tool Blake Edwards needed in filming The Mirisch Corporation-Blake Edwards Production of "The Party."**

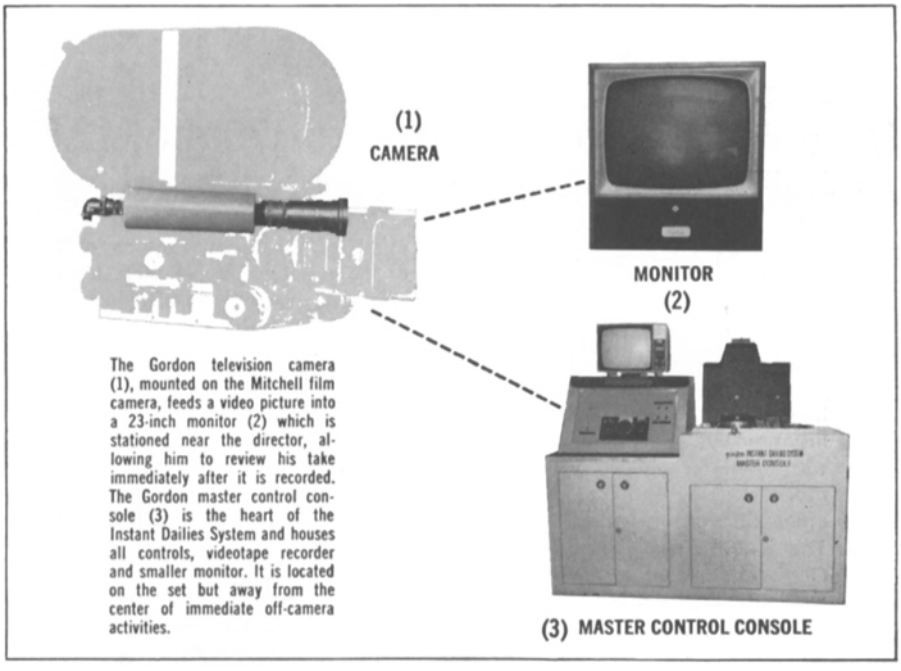
Consider the situation. Edwards had a script which was crammed with fast-paced comedic action in which precise timing was essential to the success of any given scene. By utilizing the Gordon Instant Dailies System, the talented producer-director was able to film his scenes in the normal manner and then replay them by way of videotape recording within seconds after they were photographed. There was no wait for the usual overnight rushes. As Edwards pointed out, the Gordon Instant Dailies System provides the director with the same editorial perspective available in the projection room but with the noteworthy advantage of immediate correction, while actors and sets are still in position.

# GORDON INSTANT DAILIES SYSTEM goes to "THE PARTY"

There are many advantages inherent in the system, all of which eliminate costly retakes and hold production time to a minimum. Just ask script supervisors, set decorators, lighting directors and almost any other production technician who is vitally concerned with day-to-day filming problems.

Gordon Enterprises is proud to have been an integral part of the production of "The Party," and we are equally proud of our Gordon engineers who have worked so diligently to nurture the elaborate Instant Dailies System to its present efficiency.

There are innumerable applications of the Gordon Instant Dailies System, all of them effecting savings in time and cost which can be as high as fifty per cent. For more information on how the Gordon Instant Dailies System can be applied to your particular production, just call or write Gordon Enterprises, 5362 North Cahuenga Boulevard, North Hollywood, California 91601, phone (area code 213) 985-5500.




The Gordon television camera (1), mounted on the Mitchell film camera, feeds a video picture into a 23-inch monitor (2) which is stationed near the director, allowing him to review his take immediately after it is recorded. The Gordon master control console (3) is the heart of the Instant Dailies System and houses all controls, videotape recorder and smaller monitor. It is located on the set but away from the center of immediate off-camera activities.

*SERVING THE WORLD*

**alan gordon enterprises inc.**

**5362 NORTH CAHUENGA BOULEVARD, NORTH HOLLYWOOD, CALIFORNIA 91601**
**Telephone (Area Code 213) 985-5500**

**RENTAL DIVISION**—1430 NORTH CAHUENGA BOULEVARD HOLLYWOOD, CALIFORNIA 90028 • Area Code (213) 466-3561

**Visit Our Booths 20-21-22 at SMPTE Convention, Century Plaza Hotel, Los Angeles, May 5–10**

Cutrona, L. J., "The use of lasers in signal processing for radar and communications," *Proc., 8th annual electron and laser beam symp.*, 39–85, Ann Arbor, Mich., April 6–8, 1966, **26, 27.**

Cutrona, L. J., Leith, E. N., and Porcello, L. J., "Coherent optical data processing," *1959 IRE WESCON Conv. Record, Part 4*, 141–153, (and *IRE Trans. Automatic Control, AC-4:* 137–149, Nov. 1959), **27.**

Cutrona, L. J., Leith, E. N., and Porcello, L. J., "Filtering operations using coherent optics," *Proc. Nat'l. Electronics Conf., 15:* 262–275, Chicago, Ill., Oct. 12–14, 1959, **27, 30.**

Cutrona, L. J., Leith, E. N., and Porcello, L. J., "Data processing by optical techniques," *Proc., 3rd. Nat'l. Conv. on Military Electronics*, 23–26, Washington, D.C., June 29, 30–July 1, 1959, **27.**

Daveney, A. J., and Baron, S., "An integral transform for analytical manipulation of holograms," *Symposium on Modern Optics*, March 22–24, 1967, New York, N.Y., **7, 11.**

De, M., and Lohmann, A. W., "Signal detection by correlation of Fresnel diffraction patterns," *Appl. Optics, 6:* 2171–2175, Dec. 1967, **29.**

De, M., and Sevigny, L., "Three-beam holographic interferometry," *Appl. Optics, 6:* 1665–1671, Oct. 1967, **21.**

De, M., and Lohmann, A. W., "Signal detection by correlation of Fresnel diffraction patterns," *Symposium on Modern Optics*, March 22–24, 1967, New York, N.Y., **29.**

De, M., and Sevigny, L., "Three-beam holography," *Appl. Phys. Letters, 10:* 78–79, Feb. 1, 1967, **10, 21.**

De, M., and Sevigny, L., "Polarization holography," *J. Opt. Soc. Amer., 57:* 110–111, Jan. 1967, **16.**

De, M., "Phase contrast microscopy in partially coherent light," *J. Opt. Soc. Amer., 56:* 541, April 1966 (abstract only), **22.**

De, M., "The influence of astigmatism on the response function of an optical system," *Proc. Royal Soc. London, Series A, 233:* 91–104, Dec. 6, 1955, **26.**

De Bitetto, D. J., "White-light viewing of surface holograms by simple dispersion compensation," *Appl. Phys. Letters, 9:* 417–418, Dec. 15, 1966, **14.**

Deschamps, G. A., "Authors reply, 'Comment on nonoptical holography'," *Proc. IEEE, 55:* 2051, Nov. 1967 (see Deschamps, G. A., *Proc. IEEE, 55:* 570–571, April 1967), **17.**

Deschamps, G. A., "Some remarks on radio frequency holography," *Proc. IEEE, 55:* 570–571, April 1967 (see Maginness, M. G., Deschamps, G. A., *Proc. IEEE*, 2050–2051, Nov. 1967), **17.**

Devaney, A. J., and Grauling, C. R., "A technique for obtaining a nonpseudoscopic real image from holograms," *Appl. Phys. Letters, 11:* 289–291, Nov. 1, 1967, **8, 10.**

De Velis, J. B., Raso, D. J., and Reynolds, G. O., "Effect of source size on the resolution in Fourier-transform holography," *J. Opt. Soc. Amer., 57:* 843–844, June 1967, **9, 12.**

De Velis, J. B., and Reynolds, G. O., "Three dimensional hologram reconstruction and image speckle," *J. Soc.*

*Photo-Optical Instrumentation Engs., 5:* 188–190, June-July 1967, **7, 9.**

De Velis, J. B., Reynolds, G. O. and Zuckerman, J. L., "Differentiation and integration of optical signals," *J. Opt. Soc. Amer., 57:* 571, April 1967 (abstract only), **27.**

De Velis, J. B., and Thompson, B. J., "Importance of photographic grain in optical processing," *J. Opt. Soc. Amer., 56:* 1440, Oct. 1966 (abstract only), **19.**

Diamond, F. I., "Magnification and resolution in wavefront reconstruction," *J. Opt. Soc. Amer., 57:* 503–508, April 1967, **7, 12, 22.**

Dick, D. E., and Wertz, H. J., "Analog and digital computation of Fourier series and integrals," *IEEE Trans. Electronic Computers, EC-16,* 8–13, Feb. 1967, **11, 32.**

Dickinson, A., and Dye, M. S., "Principles and practice in holography," *Wireless World, 73:* 56–61, Feb. 1967, **6.**

Dickinson, A., "Holography and character recognition," *Marconi Review, 30:* 40–48, 1st Quarter 1967, **29.**

Duffieux, P. M., "Dirichlet's theorem and coherent image construction," *Appl. Opt., 6:* 323–329, Feb. 1967, **26.**

Duffieux, P. M., "La cohérence partielle et les fonctions de transmission," *Revue Optique, 32:* 129–141, March 1953, **26.**

Dumontet, P., "Sur la correspondance objet-image en optique, *Optica Acta, 2:* 53–63, July 1955, **26.**

Dyes, W. A., "Experimental demonstration of the space-bandwidth theorem," *J. Opt. Soc. Amer., 57:* 1419, Nov. 1967 (abstract only), **25.**

Eaglesfield, C. C., "Holograms — could they be used in printing?" *Graphic Technology,* 7–11, Jan. 1967, **29.**

Eaglesfield, C. C., "Holograms — what uses have they?" *Discovery, 27:* 23–26, June 1966, **5.**

Elias, P., "Optics and communication theory," *J. Opt. Soc. Amer., 43:* 229–232, April 1953, **26.**

Elias, P., Grey, D. S., and Robinson, D. Z., "Fourier treatment of optical processes," *J. Opt. Soc. Amer., 42:* 127–134, Feb. 1952, **26.**

El-Sum, H. M. A., "Uses for holograms," *Science and Technology,* 50–56, 58–59, Nov. 1967, **5.**

Ennos, A. E., "Holography and its applications," *Contemporary Phys., 8:* 153–170, March 1967, **5, 24.**

Ennos, A. E., "Hologram interferometry," *Perspective (London), 8:* 276–286, 1966, **21.**

Erdos, P., "Holographic information storage and retrieval," *IBM Tech. Disclosure Bulletin, 9:* 291, Aug. 1966, **28.**

Etsell, D. G., and Reynolds, G. O., "On the equivalence of time and ensemble averaging in optics," *J. Opt. Soc. Amer., 57:* 571, April 1967 (abstract only), **27.**

Falconer, D. G., "A theory of thick-emulsion diffraction," *J. Opt. Soc. Amer., 57:* 573, April 1967 (abstract only), **28.**

Falconer, D. G., "Optical processing of bubble chamber photographs," *Appl. Optics, 5:* 1365–1369, Sept. 1966, **27, 30.**

Fellgett, P., "Concerning photographic grain, signal-to-noise ratio, and information," *J. Opt. Soc. Amer., 43:* 271–282, April 1953, **19.**

Fellgett, P. B., and Linfoot, E. H., "On the assessment of optical images,"

Take your old fiber cases, metal reels and cans and put them in a museum along with hand-cranked cameras and directors' megaphones.

We've got a better way to ship and store films. Plio-Magic reels and cases. Plio-Magic is a very light, very durable material. It won't rust, chip, crimp, bend or discolor. It's tough.

Our cases provide all the protection your films need. So you don't need cans. You'll have up to 65% less weight per shipment.

We did away with sloppy belts and straps. We designed a positive locking system right into our cases. A twist of the nylon lock opens and closes the case. Which just about closes our case, except for mentioning that our reels are stronger than ever, with a case-hardened steel insert at the hub. And our cases come in lots of colors.

Shouldn't your reels and cases be as modern as your films?

*Reels:* 16mm in 400, 600, 800, 1200, 1600, 2000 foot sizes. 8mm from 600 to 1600 foot capacity.

*Cases:* 1, 2, 3 and 4 reel sizes for 1600 foot reels. 1 and 2 reel sizes for 1200 and 2000 foot reels. 1 reel size for 400, 600 and 800 foot reels.

**For money-saving PRC data kit, write Dept. SM-48, Plastic Reel Corporation of America, 640 South Commercial Ave., Carlstadt, N. J. 07072.**

1915 Akeley "pancake" camera from F&B/Ceco.

# Museum pieces.

PLASTIC REEL CORPORATION OF AMERICA

Manufacturers of PLIO-MAGIC

Film Reels, Cans, Shipping Cases, Reel Paks, Tape Reels, Processing Rollers, Cores and Bushings.
640 SOUTH COMMERCIAL AVE., CARLSTADT, N. J. 07072, (201) 933-9125 • Direct N.Y.C. Phone No: (212) 524-5055
West Coast: 905 North Cole Ave., Hollywood, Calif. 90038, (213) 467-3107

*Phil. Trans Royal Soc. London, Series A, 247:* 369–407, Feb. 17, 1955, **25, 26.**

Fernandez-Moran, H., "High-resolution electron microscopy with superconducting lenses at liquid helium temperatures," *Proc. Nat. Acad. Sci., 56:* 801–808, Sept. 1966, **22.**

Fischer, R., and Rockey, M. A., "A heuristic model of creativity," *Experientia, 23:* 150–151, 1967, **24.**

Fleisher, H., Pengelly, P., Reynolds, J., Schools, R., and Sincerbox, G., "An optica ly accessed memory using the Lippmann process for information storage," *Optical and Electro-Optical Information Processing*, 1–30 (see Tippett, J. T., et. al., MIT Press, Cambridge, Mass., 1965), **27, 28.**

Foley, R. and Wendt, F., "Making a high efficiency antihalation backing for photographic plates which eliminates interference bands produced by coherent light," *Appl. Optics, 6:* 977–978, May 1967, **19.**

Francon, M., Lowenthal, S., May, M., and Prat, R., "Application of the techniques of holography to the transfer function," *Comp. Rend. Acad. Sc., Series B, 263:* 237–240, July 18, 1967, **9, 26.**

Friesem, A. A., and Zelenka, J. S., "Effects of film nonlinearities in holography," *Appl. Optics, 6:* 1755–1759, Oct. 1967, **19.**

Friesem, A. A., Kozma, A. and Adams, G. F., "Recording parameters of spatially modulated coherent wavefronts," *Appl. Optics, 6:* 851–856, May 1967, **19.**

Friesem, A. A., and Fedorowicz, R. J., "Multicolor wavefront reconstruction," *Appl. Optics, 6:* 529–536, March 1967, **13.**

Friesem, A. A., Kozma, A., and Adams, G. F., "Investigation of hologram recording parameters," *J. Opt. Soc. Amer., 56:* 1449–1450, Oct. 1966 (abstract only), **10.**

Friesem, A. A., and Fedorowicz, R. J., "Recent advances in multicolor wavefront reconstruction," *Appl. Optics, 5:* 1085–1086, June 1966, **13.**

Fritzler, D., and Marom, E., "Erratum — pulsed hologram formation of diffusely reflecting objects," *Appl. Phys. Letters, 11:* 212, Sept. 15, 1967. (see Fritzler, D., and Marom, E., *Appl. Phys. Letters, 11:* 16–17, July 1, 1967), **15.**

Fritzler, D., and Marom, E., "Pulsed hologram formation of diffusely reflecting objects," *Appl. Phys. Letters, 11:* 16–17, July 1, 1967, **15.**

Gabor, D., "Holograms as optical elements," *J. Opt. Soc. Amer., 57:* 562, April 1967 (abstract only), **9.**

Gabor, D., "Character recognition," *Scientia, 102:* 48–55, 1967, **29.**

Gabor, D., "The transformation of information in optics," *Optica Acta, 13:* 299–310, Oct. 1966, **6.**

Gabor, D , "Wavefront reconstruction or holography," *Proc. 8th Annual Electron and Laser Beam Symposium*, 1–19, Ann Arbor, Mich., April 6–8, 1966, **6.**

Gabor, D., "Holography and communications," *Proc. Symposium on Generalized Networks*, 1–12, Polytechnic Institute of Brooklyn, Brooklyn, N.Y., 1966, **5.**

Gabor, D., "Light and information," *Prog. in Optics, 2:* 109–153, (Wolf, E. Ed., John Wiley, New York, N.Y., 1963), **25.**

# The only complete line of Integrated Circuit Audio Equalizer-Amplifier Modules available...

The Electrodyne **Modular series** employs the latest integrated circuit differential amplifier design techniques and has been developed for **maximum quality, function integration** and **reliability**. Any of Electrodyne's 6 Input Modules offer the folowing, used with any of 8 Switching Modules, our LA-602 Program Amplifier and our ACN-1P or ACN-2P Combining Network they provide all the electronics and channel switching necessary for a **basic** Audio-Control Console.

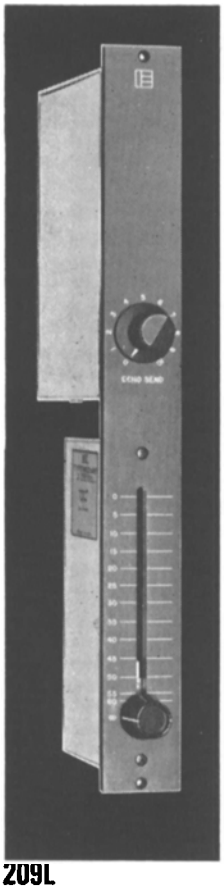
All Electrodyne Input Modules share these features. Each are completely **interchangeable** and wire to the same plug. All provide isolated echo send output with independent level control. All draw less than 40MA at 24VDC and are available without input attenuators.

The 309L, 509L and 709L incorporate a low noise microphone preamplifier, an input switch for selection of line or microphone input, —10db and —20db to accommodate various microphone output levels.

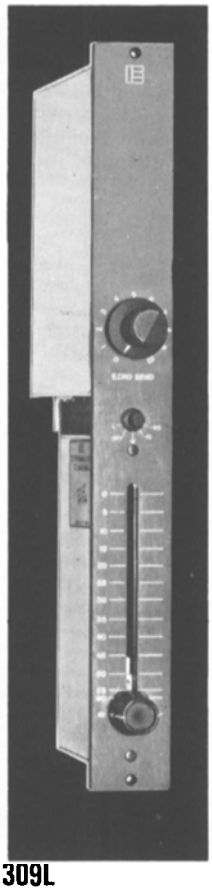
Low frequency equalization point of the 409L and 509L is 100Hz and the high frequency point is 10kHz. Low frequency equalization points of the 609L and 709L are selectable at 40 or 100Hz and the high frequency points are selectable at 1.5, 3, 5, or 10kHz.

The 609L and 709L have a coaxially mounted switch which selects echo send output from before the attenuator or after the program amplifier.

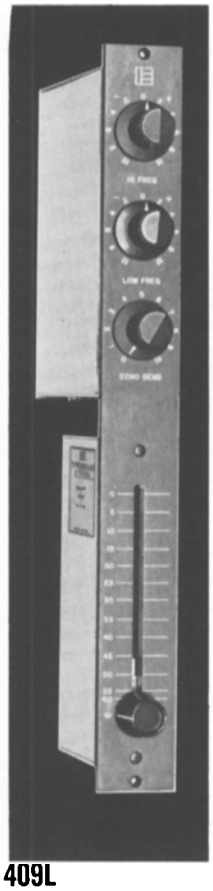
These all silicon, solid state integrated circuit amplifiers have been proven in high-reliability military and computer systems, and records of **tens of millions of hours without failure** are not uncommon. These amplifiers operate well below their maximum output capacity. Substantial amounts of feedback around each amplifier provide extremely low distortion, while insuring the highest circuit stability. Units are virtually insensitive to wide variations in power supplies, ambient temperatures, capacitive and inductive loads. All plug contacts on the printed circuit board are nickle-rhodium for added dependability while all switching contacts used have a proven reliability of over **one million** operations.



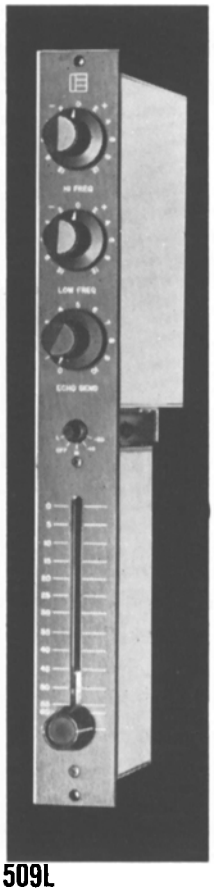
**209L**
**Line Level Input**



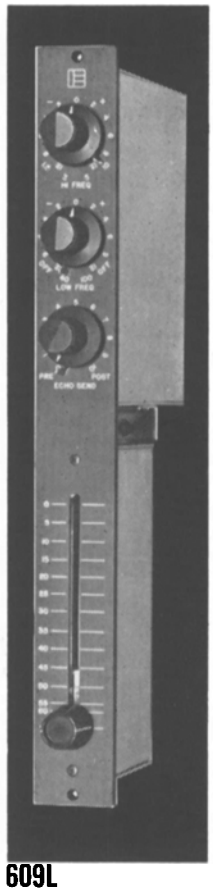
**309L**
**Line level or microphone input.**



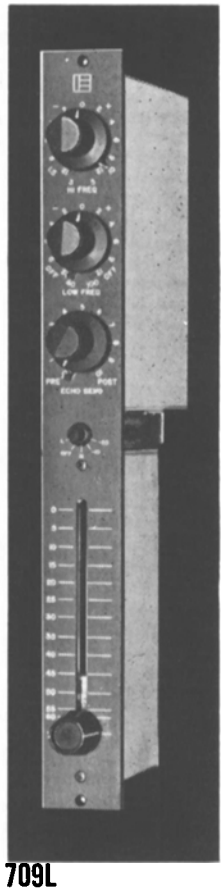
**409L**
**Line level or 2 frequency equalization.**



**509L**
**Line level or microphone input, 2 frequency equalization.**



**609L**
**Line level input, 6 frequency equalization.**



**709L**
**Line level or microphone input, 6 frequency equalization.**

## The finest too, because they're Electrodyne, "The World Leader"

ELECTRODYNE CORPORATION
7315 Greenbush Avenue ■ North Hollywood ■ Calif. 91605
Phone: (213) 875-1900 ■ Cable Address: "ELECTRODYNE"

Gamo, H., "An aspect of information theory in optics," *1960 IRE Internat'l. Conv Record, Part 4,* 189–203, **25.**

Gaskill, J. D., "Imaging through a randomly inhomogeneous medium by wavefront-reconstruction," *J. Opt. Soc. Amer , 57:* 1419, Nov. 1967 (abstract only), **8.**

Gebhardt, F. G., "Use of different bandwidth criteria for evaluating optical-system information capacity," *J. Opt. Soc. Amer., 57:* 571, April 1967 (abstract only), **27.**

Gerritsen, H. J., "Nonlinear effects in image formation," *Appl. Phys. Letters, 10:* 239–241, May 1, 1967, **19, 22.**

Gerritsen, H. J., "Image processing with nonlinear optics," *Symposium on Modern Optics,* March 22–24, 1967, New York, N.Y., **8, 22, 32.**

Givens, M. P., "Introduction to holography," *Amer. J. Phys., 35:* 1056–1064, Nov. 1967, **6.**

Goldman, S., "Sideband interpretation of optical information and the diffraction pattern of unsymmetrical pupil function," *J. Opt. Soc. Amer., 52:* 1131–1142, Oct. 1962, **25, 26.**

Goodman, J. W., and Lawrence, R. W., "Digital image formation from electronically detected holograms," *Appl. Phys. Letters, 11:* 77–79, Aug. 1, 1967, **11.**

Goodman, J. W., "Temporal filtering properties of holograms," *Appl. Optics, 6:* 857–859, May 1967, **9.**

Goodman, J. W., "Film-Grain noise in wavefront-reconstruction imaging," *J. Opt. Soc. Amer., 57.* 493–502, April 1967, **19.**

Goodman, J. W., "Effects of film nonlinearities on wavefront-reconstruction images of diffuse objects," *J Opt. Soc. Amer , 57:* 560, April 1967 (abstract only), **19.**

Goodman, J. W., "Film-grain noise in holography," *Symposium on Modern Optics,* March 22–24, 1967 New York, N.Y., **19.**

Goodman, J. W., "Applications of holography," *J. Opt. Soc. Amer., 56:* 1413–1414, Oct. 1966 (abstract only), **6, 24.**

Greguss, P., "Techniques and information content of sonoholograms," *J. Photo. Sci., 14:* 329–332, Nov.-Dec. 1966, **17.**

Greguss P., "Pictures by sound," *Perspective (London), 8:* 287–302, 1966, **17.**

Haines, K. A , and Brumm, D. B., "Data reduction of holographic information," *J. Opt. Soc. Amer , 57:* 1412–1413, Nov. 1967 (abstract only), **18.**

Haines, K. A., and Brumm, P. B., "A technique for bandwidth reduction in holographic systems," *Proc. IEEE, 55:* 1512–1513, Aug. 1967, **18.**

Harger, R., "On processing optical images propagated through the atmosphere," *IEEE Trans. Aerospace and Electronic Sys., AES-3:* 819–828, Sept. 1967, **32.**

Hercher, M., and Ruff, B., "High-intensity reciprocity failure in Kodak 649-F plates at 6943A," *J. Opt. Soc. Amer , 57:* 103–105, Jan. 1967, **19.**

Hertel, J., "Zur holographie in verketteten strahlengangen," *Optik, 25:* 217–219, April 1967.

Hildebrand, B. P., Haines, K. A., and Larkin, R , "Holography as a tool in the testing of large aperture optics," *Appl. Optics, 6:* 1267–1269, July 1967, **24.**

# NEW ELECTRONIC FLASH LIGHTING SYSTEM WITH PULSE SAMPLING TECHNIQUES!

## SERIAL SAMPLING • RANDOM SAMPLING • MULTIPLE IMAGES

**This revolutionary system introduces the pulse sampling technique for high speed photo and video instrumentation. Provides capability of photographing and analyzing every degree of a rotating (360°) turbine blade. It improves present time resolution factors 30:1. At 100 F.P.S. the resolution is equivalent to 3,000 F.P.S. with conventional techniques. Compatible with all still, motion picture and video recorders, it provides continuous duty operation for long term analysis.**

• High-Speed, High-Power Electronic Stroboscope (70 Peak Mega-Lumens Per Shot Per Head) Providing Rep Rates of 1 to 10,000 P.P.S. with Strobe Timing Accuracy of ± .25% • All Types of Synchronization: Magnetic, Photo Tube, Microphone, etc. • Lampheads: Reflector Fresnell Spot-Flood Lights • Automatic Photo Exposure Meter with Digital Read-Out • 20,000 Watt Second Light Intensity Permits Photographing Extremely Large Areas with Color Film ASA 32—300,000 Cubic Feet Area May Be Fully Illuminated

For further information contact Mr. Richard Sequerra, President

**UNILUX** INC.

48-20 70TH STREET, WOODSIDE, NEW YORK, N. Y. 11377 (212) 651-2258

Hildebrand, B. P., and Haines, K. A., "Multiple-wavelength and multiple-source holography applied to contour generation," *J. Opt. Soc. Amer., 57:* 155–162, Feb. 1967, **21.**

Hirsch, D. M., Lesem, L. B., and Jordon, J. A., Jr., "Applications of computer-generated holograms," *J. Opt. Soc. Amer., 57:* 1406, Nov. 1967 (abstract only), **11.**

Hoffmann, A. S., Doidge, J. G. and Mooney, D. G., "Inverted reference-beam hologram," *J. Opt. Soc. Amer., 55:* 1559, Nov. 1965, **10.**

Holmes, W. S., Babcock, T. R., Richmond, G. E., Pownall, L. A., and Vorie, G. C., "Optical-electronic spatial filtering for pattern recognition," *Optical and Electro-optical Information Processing,* 199–207. (see Tippett, J. T., et al., MIT Press, Cambridge, Mass., 1965), **29, 30.**

Hopkins, H. H., "The frequency response of optical systems," *Proc. Phys. Soc., Sec. B, 69:* 562–576, May 1, 1956, **26.**

Hopkins, H. H., "The frequency response of a defocused optical system," *Proc. Royal Soc., Series A, 231:* 91–103, July 19, 1955, **26.**

Hopkins, H. H., "On the diffraction theory of optical images," *Proc. Royal Soc., Series A, 217:* 408–432, May 7, 1953, **26.**

Horman, M. H., "Efficiencies of zone plates and phase zone plates," *Appl. Optics, 6:* 2011–2013, Nov. 1967, **31.**

Horman, M. H., "Reply to 'Comments on zone plate theory based on holography,'" *Appl. Optics, 6:* 1415–1418, Aug. 1967 (see Horman, M. H., and Chau, H. H. M., *Appl. Optics, 6:* 317–322, Feb. 1967), **31.**

Horman, M. H., and Chau, H. H. M., "Zone plate theory based on holography," *Appl. Optics, 6:* 317–322, Feb. 1967 (see Clifford, K. I., and Waldman, G. S., Horman, M. H., *Appl. Optics, 6:* 1415–1418, Aug. 1967), **31.**

Horvath, V. V., Holeman, J. M. and Lemmond, C. Q., "Holographic technique recognizes fingerprints," *Laser Focus, 3:* 18–23, June 1967, **24.**

Horwitz, L. P., and Shelton, G. L., Jr., "Pattern recognition using autocorrelation," *Proc. IRE, 49:* 175–185, Jan. 1961, **29, 30.**

Huang, T. S., "The use of digital computer in optical image processing," *IEEE Conf. on Laser Engineering and Applications,* June 6–8, 1967, Washington, D.C., **26, 27.**

Huang, T. S., and Stamm, P. L., "Effect of multipath on hologram television systems," *M.I.T. Research Laboratory of Electronics, Quarterly Progress Report No. 84,* 304–307, Jan. 15, 1967, **18.**

Ingalls, A. L., "Optical simulation of microwave antennas," *IEEE Trans. Antennas Propagation, AP-14:* 2–6, Jan. 1966, **32.**

Inglestam, E., "Linear and non-linear links in optical image transfer," *Communication and Information Theory Aspects of Modern Optics,* 5–30. (see O'Neill, E. L., G. E. Co., Syracuse, N.Y., 1962), **26.**

Jackson, P. L., "Correlation function spatial filtering with incoherent light," *Appl. Optics, 6:* 1272–1273, July 1967, **30.**

Jackson, P. L., "Diffractive processing of geophysical data," *Appl. Optics, 4:* 419–427, April 1965, **27, 30.**

Jahoda, F. C., Jeffries, R. A., and Sawyer, G. A., "Fractional-fringe holographic plasma interferometry," *Appl. Optics, 6:* 1407–1410, Aug. 1967, **21, 24.**

Jeong, T. H., "Cylindrical holography and some proposed applications," *J. Opt. Soc. Amer., 57:* 1396–1398, Nov. 1967, **10, 23.**

Jones, R. C., "Information capacity of photographic films," *J. Opt. Soc. Amer., 51:* 1159–1161, Nov. 1961, **28.**

Jones, R. C., "Information capacity of photographic films," *Communication and Information Theory Aspects of Modern* (see O'Neill, E. L., G. E. Co., Syracuse, N.Y., 1962), **28.**

Kakichashvili, Sh. D., Mumladze, V. V., and Ramishvili, N. M., "New method of obtaining high-resolution holograms," *JETP Letters, 5:* 305–307, May 15, 1967, **10.**

Kaspar, F. G., and Lamberts, R. L., "A study of photographic characteristics affecting the relative luminance of the reconstructed image of a hologram," *J. Opt. Soc. Amer., 56:* 1414–1415, Oct. 1966 (abstract only), **19.**

Kelly, D. H., "Image-processing experiments," *J. Op. Soc. Amer., 51:* 1095–1101, Oct. 1961, **30.**

Kelly, D. H., "Systems analysis of the photographic process II, transfer function measurements," *J. Opt. Soc. Amer., 51:* 319–330, March 1961, **26.**

Kelly, D. H., "Systems analysis of the photographic process I, a three stage model," *J. Opt. Soc. Amer., 50:* 269–276, March 1960, **26.**

Kiemle, H., "Nichtpseudoskopische, reelle bilder von beliebigen hologrammen," *Phys. Letters, 25A:* 412–414, Sept. 25, 1967, **8,10.**

Klimenko, I. S., Matinyan, E. G., and Rukman, G. I., "Reconstruction, in white light, of interference-pattern images produced by holograms obtained by double exposure," *JETP Letters, 6:* 57–58, Aug. 1, 1967, **10, 14.**

Klimenko, I. S., and Rukman, G. I., "On the regeneration of a wave front by means of hologram transmitted with TV-system," *Zhur. Technicheskoi Fiziki, 37:* 1532–1534, Aug. 1967, **18.**

Klimenko, I. S., and Rukman, G. I., "Gabor wavefront reconstruction by a means of a laser," *Optics and Spectroscopy, 21:* 409–410, Dec. 1966, **10.**

Kliukin, L. M., Pomerantsev, N. M., and Fabrikov, V. A., "Application of magnetic films in holography," *Akademiia Nauk SSSR, Izvesii Seriia Fizicheskaia, 31:* 386–391, March 1967, **19.**

Knight, G. R., "Effects of film nonlinearities in wavefront-reconstruction imaging," *J. Opt. Soc. Amer., 57:* 1413, Nov. 1967 (abstract only), **19.**

Knox, C., Sayano, R. R., Seo, E. T., and Silverman, H. P., "Holographic interferometry in electrochemical studies," *J. Phys. Chem. 71:* 3102–3104, Aug. 1967, **21, 24.**

Kock, W. E., "Use of lens arrays in holograms," *Proc. IEEE, 55:* 1103–1104, June 1967, **18, 23.**

Kock, W. E., Rosen, L., and Stroke,

**Troubled** by out-of-focus pictures?

**Troubled** by emulsion pile-up in your camera gate?

**Troubled** by distracting camera noise when shooting subjects who should not be distracted from what they are doing?

**Troubled** by cameras that are always in need of repair and adjustment?

**If so,** switch to Auricon, the only 16mm Camera that guarantees you protection against all these troubles, because it is so well designed! The Auricon is a superb picture-taking Camera, yet silent in operation, so that at small extra cost for the Sound Equipment, it can even record Optical or Filmagnetic sound in addition to shooting your professional pictures.

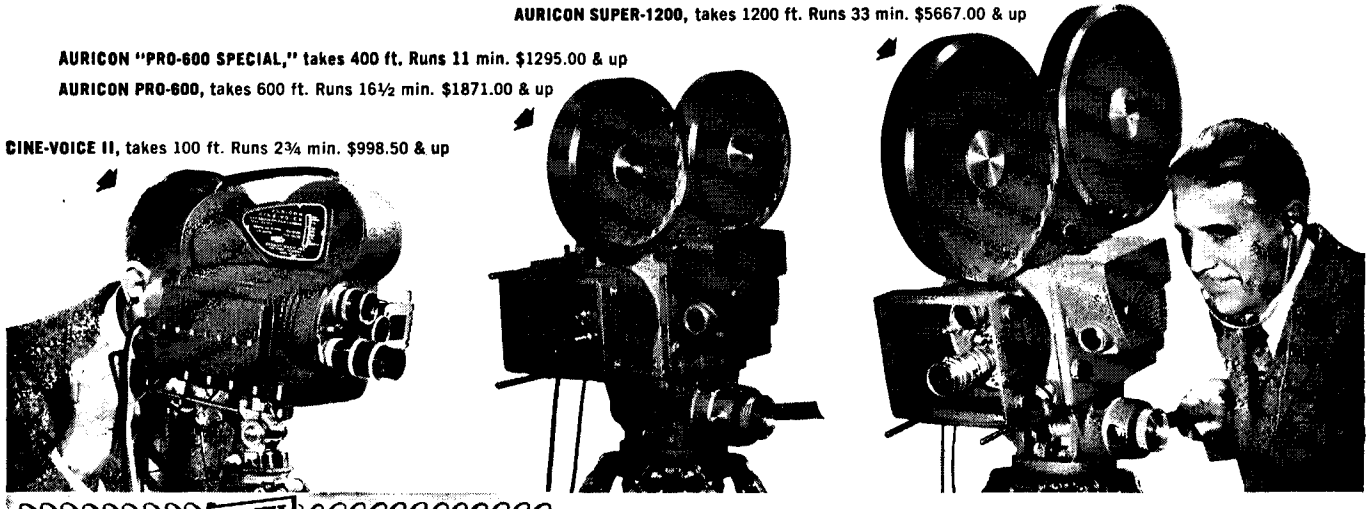
BACH Auricon ®

**AURICON SUPER-1200,** takes 1200 ft. Runs 33 min. $5667.00 & up

**AURICON "PRO-600 SPECIAL,"** takes 400 ft. Runs 11 min. $1295.00 & up

**AURICON PRO-600,** takes 600 ft. Runs 16½ min. $1871.00 & up

**CINE-VOICE II,** takes 100 ft. Runs 2¾ min. $998.50 & up



**GUARANTEE**
All Auricon Equipment is sold with a 30-day money back Guarantee and a 1 year Service Warranty. You must be satisfied!

Write for your free copy of the 74-page Auricon Catalog

**BACH AURICON, Inc.**
6946 Romaine St., Hollywood 38, Calif.
HOLLYWOOD 2-0931

MANUFACTURERS OF PROFESSIONAL 16MM CAMERAS SINCE 1931

G. W., "Focused-image holography — a method for restoring the third dimension in the recording of conventional-focused photographs," *Proc. IEEE, 55:* 80–81, Jan. 1967, **8, 10.**

Kogelnik, H., "Response and efficiency of five hologram types," *Symposium on Modern Optics,* March 22–24, 1967, New York, N.Y., **9, 12, 19.**

Kogelnik, H., "Bragg diffraction in hologram gratings with multiple internal reflections," *J. Opt. Soc. Amer., 57:* 431–433, March 1967, **19.**

Komar, A. P., Stabnikov, M. V., and Turukhano, B. G., "Phase holograms of tracks on bubble and emulsion chambers and the feasibility of interpreting them," *Soviet Phys. Doklady, 12:* 590–592, Dec. 1967, **24.**

Komar, A. P., Stabnikov, M. V., and Turukhano, B. G., "Holography using a direct reference beam," *Soviet Phys. Doklady, 12:* 371-373, Oct. 1967, **10.**

Konjaev, K. V., "Interference method of two-dimensional Fourier transform with spatial incoherent illumination," *Phys. Letters, 24A:* 490–491, April 24, 1967, **26.**

Konstantinov, B. P., Zaidel, A. N., Konstantinov, V. B., and Ostrouskii, I. I., "Coherent light photography — experiment technique and resolving power," *Soviet Phys. Technical Phys. 11:* 1279–1281, March 1967, **9, 10.**

Kopylov, G. I., "Contribution to the theory of holographic image magnification," *JETP Letters, 5:* 314–315, May 15, 1967, **22.**

Kosourov, G. I., Kalinkina, I. N., and Golovei, M. P., "Reconstruction of an image from a hologram in nonmonochromatic light," *JETP Letters, 4:* 57–58, Aug. 1, 1966, **14.**

Kovasznay, L. S. G., and Arman, A., "Optical autocorrelation measurement of two-dimensional random patterns," *Rev. Sci. Inst., 28:* 793–797, Oct. 1957, **26, 30.**

Kozma, A., and Kelly, D. L., "Spatial filtering for detection of signals submerged in noise," *Appl. Optics, 4:* 387–392, April 1965, **30.**

Kreuzer, J. L., "Ultrasonic three-dimensional imaging using holographic techniques," *Symposium on Modern Optics,* March 22–24, 1967, New York, N.Y., **17.**

Lamacchia, J. T., and White, D. L., "Coded multiple-exposure holograms," *J. Opt. Soc. Amer., 57:* 1413, Nov. 1967 (abstract only), **10.**

Lamberts, R. L., and Higgins, G. C., "Digital data recording on film by using superposed grating patterns I, general theory and procedures, *Phot. Sci. Eng. 10:* 209–213, July-Aug. 1966, **27, 28.**

Lamberts, R. L., "Digital data recording on film by using superposed grating patterns II, analysis of the system," *Phot. Sci. Eng. 10:* 213–221, July-Aug. 1966, **27, 28.**

Lamberts, R. L., "Applications of communication theory to optics and photography," *Communication and Information Theory Aspects of Modern Optics,* 181–200 (see O'Neill, E. L., G. E. Co., Syracuse, N.Y., 1962), **25, 26.**

Landry, M. J., The effect of two hologram-copying parameters on the quality of copies," *Appl. Optics, 6:* 1947–1956, Nov. 1967, **20.**

Lasser, M. E , "Lasers and their application to television systems," *IEEE Trans. Broadcasting, BC-13:* 1–5, Jan. 1967, **18.**

Lehmann, M., "Photographic detection of holograms," *J. Opt. Soc. Amer., 57:* 1414, Nov. 1967 (abstract only), **10, 19.**

Lehmann, M., "Simple holographic setup," *J. Opt. Soc. Amer., 56:* 1448, Oct. 1966 (abstract only), **10.**

Lehmann, M., "Photography for optical measurements," *Wescon Tech. Papers, 9:* Part 6, Paper 13.3, 1965, **10, 19.**

Leith, E. N., and Upatnieks, J., "Holography with achromatic-fringe systems," *J. Opt. Soc. Amer., 57:* 975–980, Aug. 1967, **14.**

Leith, E. N., and Upatnieks, J., "Zone plate with aberration correction," *J. Opt. Soc. Amer., 57:* 699, May 1967, **31.**

Leith, E. N., "Some recent results in holography," *Progress in Radio Sci., 1963–1966, Part II,* 2241, 1967 (abstract only), **10.**

Leith, E. N., Cutrona, L. J., and Porcello, J., "Coherent optical techniques for radar data processing," *J. Opt. Soc. Amer., 56:* 1419, Oct. 1966 (abstract only), **27, 32.**

Leith, E. N., "Recent results in holography," *Proc. 8th Ann. Electron and Laser Beam Symposium,* 21–37, Ann Arbor, Mich., April 6–8, 1966, **9, 13, 14, 21, 28.**

Leith, E. N., and Palermo, C. J., "Some filtering operations using coherent optics," *Proc. Symposium on Generalized Networks,* 743–751, Polytechnic Institute of Brooklyn, Brooklyn, N.Y., 1966, **27, 30.**

Lerman, S. H., Minnick, W. A., Rimmer, M. P., and Shannon, R. R., "New method of computing the optical-transfer function," *J. Opt. Soc. Amer., 57:* 566, April 1967 (abstract only), **11, 26.**

Lesem, L. B., Hirsch, P. M. and Jordon, J. A., Jr., "Computer synthesis of large scale holograms," *J. Opt. Soc. Amer., 57:* 1406, Nov. 1967 (abstract only), **11.**

Lesem, L. B., Hirsch, P. M., and Jordon, J. A., Jr., "Computer generation and reconstruction of holograms," *Symposium on Modern Optics,* March 22–24, 1967, New York, N.Y., **11.**

Lin, L. H., "Increase of hologram image separation by total reflection," *Appl. Optics, 6:* 2004–2005, Nov. 1967, **10.**

Lin, L. H., "Increase of hologram image separation by total reflection," *J. Opt. Soc. Amer., 57:* 1413, Nov. 1967 (abstract only), **10.**

Lin, L. H., and Lo Bianco, C. V., "Experimental techniques in making multicolor white light reconstructed holograms," *Appl. Optics, 6:* 1255–1258, July 1967, **13, 14, 19.**

Lin, L. H., and Lo Bianco, C. V., "Experimental techniques in making multicolor white light reconstructed holograms," *J. Opt. Soc. Amer., 56:* 1414, Oct. 1966 (abstract only), **13, 14.**

Linfoot, E. H., "Quality evaluations of optical systems," *Optica Acta, 5:* 1–14, March-June 1958, **26.**

Lippmann, G., "Epreuves reversibles photographies integrales," *Comp. Rend. Acad. Sci., 146:* 446–451, March 2, 1908, **23.**

Lohmann, A. W., "Some spatial filtering experiments," *J. Opt. Soc. Amer., 57:* 1405, Nov. 1967 (abstract only), **11, 30.**

Lohmann, A. W., "Holographic production of spatial filters for code translation and image restoration," *Phys. Letters, 25A:* 570–571, Oct. 23, 1967, **30.**

Lohmann, A. W., and Paris, D. P., "Binary Fraunhofer holograms, generated by computer," *Appl. Optics, 6:* 1739–1748, Oct. 1967, **11.**

Lohmann, A. W., and Paris, D. P., "Variable Fresnel zone pattern," *Appl. Optics, 6:* 1567–1570, Sept. 1967, **11, 31.**

Lohmann, A. W., "Variable Fresnel zone pattern," *IBM Tech. Disclosure Bull., 10:* 407–412, Sept. 1967, **11, 31.**

Lohmann, A. W., "Interlace-multiplex holography," *IBM Tech. Disclosure Bull., 10:* 433, Sept. 1967, **10.**

Lohmann, A. W., Paris, D. P., and Werlich, H. W., "A computer generated spatial filter applied to code translation," *Appl. Optics, 6:* 1139–1140, June 1967, **11, 30.**

Lohmann, A. W., and Paris, D. P., "Variable Fresnel zone pattern," *Symposium on Modern Optics,* March 22–24, 1967, New York, N.Y., **11, 31.**

Lohmann, A. W., and Paris, D. P., "Computer generated spatial filters for optical data processing," *J. Opt. Soc. Amer., 56:* 1413, Oct. 1966 (abstract only), **11.**

Lohmann, A. W., and Paris, D. P., "Space-variant image formation," *J. Opt. Soc. Amer., 55:* 1007–1013, Aug. 1965, **26.**

Lohmann, A. W., and Paris, D. P., "Influence of longitudinal vibrations on image quality," *Appl. Optics, 4:* 393–397, April 1965, **26.**

Lohmann, A. W., "Methods of influencing the optical contrast transfer of image-forming devices," *Communication and Information Theory Aspects of Modern Optics,* 51–90. (see O'Neill, E. L., G.E. Co., Syracuse, N.Y., 1962), **7, 26.**

Lohmann, A. W., "Die Fresnel-Zonenplatte als Testobjekt," *Optik, 18:* 514–518, Oct./Nov. 1961, **31.**

Long, L. T., and Parks, J. A., "Inexpensive holography," *Amer. J. Phys., 35:* 773–774, Aug. 1967, **10.**

Lowenthal, S., and Belvaux, Y., "Observation of phase objects by optically processed hilbert transform," *Appl. Phys. Letters, 11:* 49–51, July 15, 1967, **26, 27.**

Lowenthal, S., and Belvaux, Y., "Reconnaissance des formes par filtrage des fréquences spatiales," *Optica Acta, 14:* 245–258, July 1967, **26, 29, 30.**

Lowenthal, S., and Werts, A., "Restitution d'hologrammes en lumière partiellement cohérente," *Compt. Rend. Acad. Sc., 264:* 971–974, March 29, 1967, **14.**

Lowenthal, S., and Belvaux, Y., "Progrès récent en optique cohérente, filtrage des fréquences spatiales, holographie," *Revue Optique, 46:* 1–46, Jan. 1967, **6, 9, 12, 20, 21, 27, 29, 30.**

Lowenthal, S., and Belvaux, Y., "Reconnaissance des formes en optique par traitement de signaux dérivés," *Comp. Rend. Acad. Sc., 262:* 413–418, Feb. 7, 1966, **30.**

Lu. S., Hemstreet, H. W., Jr., and Caulfield, H. J., "Holography of moving objects," *Phys. Letters, 25A:* 294–295, Aug. 28, 1967, **10.**

Lukosz, W., "Optical systems with resolving powers exceeding the classical limit II," *J. Opt. Soc. Amer., 57:* 932–941, July 1967, **25.**

Lukosz, W., "Optical systems with resolving powers exceeding the classical limit," *J. Opt. Soc. Amer., 56:* 1463–1472, Nov. 1966, **25.**

Lurie, M., "Holography of moving objects measurement of small displacements," *J. Opt. Soc. Amer., 57:* 573–574, April 1967 (abstract only), **10.**

Mac Anally, R. B., "Inclined reference acoustic holography," *Appl. Phys. Letters, 11:* 266–268, Oct. 15, 1967, **17.**

Mac Kay, B. M., "The structural information-capacity of optical instruments," *Information and Control, 1:* 148–152, May 1958, **25.**

Magill, P. J., and Wilson, A. D., "Holographic detection of motion of semiconductor devices," *Proc. IEEE, 55:* 2032–2033, Nov. 1967, **21, 24.**

Magill, P. J., and Young, T., "Detection of strain in evaporated films by wavefront reconstruction," *J. Vacuum Sci. and Tech., 4:* 47–48, Jan. 1967, **21, 24.**

Maginness, M. G., "Comment of non-optical holography," *Proc. IEEE, 55:* 2050–2051, Nov. (1967 see, Deschamps, G. A., *Proc. IEEE, 55:* 570–571, April 1967), **17.**

Marathay, A. S., "Optical image processing in incoherent and coherent illumination," *J. Soc. Photo-Optical Inst. Engs., 4:* 267–271, Aug.–Sept. 1966, **30, 32.**

Marchant, M., and Knight, D., "Multiple recording of holograms," *Optica Acta, 14:* 199–201, April 1967, **10, 19.**

Marechal, A., "Optical filtering by double diffraction," *Optical Processing of Information* 20–30 (see Pollock, D. K., et al., Spartan Books, New York, N.Y., 1963), **32.**

Marechal, A., "Filtering of optical images," *Communication and Information Theory Aspects of Modern Optics,* 41–50 (see O'Neill, E. L., G.E. Co., Syracuse, N.Y., 1962), **30.**

Marechal, A., and Croce, P., "Un filtre de fréquences spatiales pour l'amélioration du contraste des images optiques," *Compt. Rend. Acad. Sc., 237:* 607–609, Sept. 21, 1953, **26.**

Marechal, A., "The contrast of optical images and the influence of aberrations," *Optical Image Evaluation,* 9–22, NBS Circular 526 (see N.B.S. Optical Image Evaluation), **26.**

Marom, E., and Fritzler, D., "Holographic image formation in the presence of lenses," *J. Opt. Soc. Amer., 57:* 559, April 1967 (abstract only), **8, 9.**

Marom, E., "Color imagery by wavefront reconstruction," *J. Opt. Soc. Amer., 57:* 101–102, Jan. 1967, **13.**

Marquet, M., Bourgeon, M. H., and Saget, J. C., "Quelques applications de l'holographie," *Comp. Rend. Acad. Sc., 264:* 35–37, Jan., 1967, **24, 29.**

Marquet, M., Bourgeon, M. H., and Saget, J. C., "Interférométrie par holographie," *Revue Optique, 45:* 501–506, Nov. 1966, **21.**

Marquet, M., "Performances en holographie," *Revue Optique, 45:* 404–416, Sept. 1966, **19.**

Martienssen, W., and Spiller, S., "Holographic reconstruction without granulation," *Phys. Letters, 24A:* 126–128, Jan. 16, 1967, **10.**

Massey, G. A., "Acoustic holography in air with an electronic reference," *Proc. IEEE, 55:* 1115–1117, June 1967, **17.**

Maurer, D. W., and Francois, E. E., "Experimental properties of bragg angle phase gratings," *IEEE Conf. on Laser Engineering and Applications*, June 6–8, 1967, Washington, D.C., **28.**

Meier, R., "Optical properties of holographic images," *J. Opt. Soc. Amer., 57:* 895–900, July 1967, **8.**

Meier, R. W., "Holographic image types and their aberrations," *J. Opt. Soc. Amer., 56:* 1448, Oct. 1966 (abstract only), **7, 8, 12.**

Melroy, D. O., "Holograms with increased range coverage," *Appl. Optics, 6:* 2005, Nov. 1967, **10.**

Mermoz, H., "The optical Fourier transform and its application possibilities," *Annales des Telecommunications, 22:* 17–39, Jan.–Feb. 1967, **26, 30.**

Merzkirch, W. F., "Making flows visible," *Intern'l. Sci. and Tech.*, 46–48, 51–56, Oct. 1966, **21.**

Metherell, A. F., El-Sum, H. M. A., Dreher, J. J., and Larmore, L., "Introduction to acoustical holography," *J. Acous. Soc. Amer., 42:* 733–742, Oct. 1967, **17.**

Metherell, A. F., and El-Sum, H. M. A., "Simulated reference in a coursely sampled acoustical hologram," *Appl. Phys. Letters, 11:* 20–22, July 1, 1967, **17.**

Metherell, A. F., El-Sum, H. M. A., Dreher, J. J., and Larmore, L., "Image reconstruction from sampled acoustical holograms, *Appl. Phys. Letters, 10:* May 15, 1967, **17.**

Metherell, A. F., El-Sum, H. M. A., Dreher, J. J., and Larmore, L., "Optical reconstruction from sampled holograms made with sound waves," *Phys. Letters, 24A:* 547–548, May 8, 1967, **17.**

Meyer, A. J., and Hickling, R., "Holograms synthesized on a computer-operated cathode ray tube," *J. Opt. Soc. Amer., 57:* 1388–1389, Nov. 1967, **11.**

Meyer, A. J., "Holograms created via a computer-driven cathode ray tube," *J. Opt. Soc. Amer., 57:* 1405–1406, Nov. 1967 (abstract only), **11.**

Mikaelyan, A. L., Razumov, L. N., Sakharova, N. A., and Turkov, Yu. G., "Production of Fourier holograms with the aid of a pulsed ruby laser," *JETP Letters, 5:* 119–121, March 1, 1967, **10, 12, 15.**

Mittra, R., and Ransom, P. L., "Aspects of microwave holography," *Electronic Communicator, 2:* 11–12, July/Aug. 1967, **17.**

Mittra, R., "Diffraction theory of imaging with application to holography and other systems," *Symposium on Modern Optics*, March 22–24, 1967, New York, N.Y., **7, 8.**

Miyanoto, K., "On Gabor's expansion theorem," *J. Opt. Soc. Amer., 50:* 856–858, Sept. 1960, **26.**

Monneret, J., "Holographie dynamique," *Compt. Rend. Acad. Sc., 264:* 1306–1308, May 3, 1967, **10.**

Montgomery, W. D., "Self-imaging objects of infinite aperture," *J. Opt. Soc. Amer., 57:* 571, April 1967 (abstract only), **32.**

Montgomery, W. D., "Artificial reconstructions in incoherent holography," *J. Opt. Soc. Amer., 56:* 1415, Oct. 1966 (abstract only), **10.**

Montgomery, W. D., "The extension to probability distributions for detection spatial filters," *IEEE Trans. Information Theory, IT-10* 2–5, Jan. 1964, **30.**

Montgomery, W. D., and Broome, P. W., "Spatial filtering," *J. Opt. Soc. Am., 52:* 1259–1275, Nov. 1962, **30.**

Morris, R. E., "The physical principles of holography," *J. Phot. Sci., 14:* 291–296, Sept.–Oct. 1966, **6.**

Mueller, P. F., "Retrieval of carrier-modulated phase transparencies," *J. Opt. Soc. Amer., 57:* 1419, Nov. 1967 (abstract only), **19.**

Mullaney, G. J., and Chau, H. H. M., "Holography interferometry," *Boeing Sci. Research Lab. Review*, 15–16, July–Dec. 1966, **21.**

Mustafin, K. S., Seleznev, V. A., and Shtyrkov, E. I., "The use of holography to study the temperature distribution field of a flame," *Optics and Spectroscopy, 22:* 174–175, Feb. 1967, **21, 24.**

Myers, O. E., Jr., "Studies of transmission zone plates," *Amer. J. Phys., 19:* 359–365. Sept. 1951, **31.**

National Bureau of Standards, U.S., "Electron physics," *Proc. of the NBS Semicentennial Symposium on Electron Physics*, Washington, D.C., Nov. 5–7, 1951 (issued as NBS Circular 527, March 17, 1954.), **4.**

National Bureau of Standards, U.S., "Optical image evaluation," *Proc. of the NBS Semicentennial Symposium on Optical Image Evaluation*, Washington, D.C., Oct. 18–20, 1951 (issued as NBS Circular 526, April 29, 1954.), **3.**

Neumann, D. B., "Holography of moving scenes," *J. Opt. Soc. Amer., 57:* 1406, Nov. 1967 (abstract only), **7, 10.**

Neumann, D. B., and Rose, H. W., "Improvement of recorded holographic fringes by feedback control," *Appl. Optics, 6:* 1097–1104, June 1967, **10.**

Neumann, D. B., "Stabilization of holographic interference fringes by feedback control," *J. Opt. Soc. Amer., 56:* 1448, Oct. 1966 (abstract only), **10.**

Nisida, M., and Saito, H., "Application of an interferometric method to studies of contact problems," *Sci. Papers Inst. Phys. and Chem. Research, 59:* 112–113, Sept. 1965, **32.**

Nomarski, G., "Simple mathematical treatment of coherent and incoherent holography," *J. Opt. Soc. Amer., 57:* 562–563, April 1967 (abstract only), **26.**

O'Neill, E. L., "An introduction to quantum optics," *Dep't. of Physics, Univ. of California*, Berkeley, 1965, **32.**

O'Neill, E. L., "The question of phase in image formation," *Optica Acta, 10:* 33–40, Jan. 1963, **26.**

O'Neill, E. L., "Communication and information theory aspects of modern optics," *Symposium Proc.* of Meeting Held June 30–July 1, 1960, Syracuse, N. Y., General Electric Co., Electronics Lab., Syracuse, N.Y., Aug. 1962, **40.**

O'Neill, E. L., "Selected topics in optics and communication theory," Boston Univ. Phys. Research Labs., *Tech. Note 133*, Oct. 1957, **32.**

O'Neill, E. L., "Spatial filtering in optics," *IRE Trans. Information Theory, IT-2:* 56–65, June 1956, **30.**

O'Neill, E. L., "Transfer function for an

annular aperture," *J. Opt. Soc. Amer., 46:* 285–288, April 1956, **26.**

O'Neill, E. L., "The analysis and synthesis of linear coherent and incoherent optical systems," Boston Univ. Phys. Research Labs., *Tech. Note 122,* Sept. 1955, **32.**

Oster, G., "Holography as a moire phenomenon," *Symposium on Modern Optics,* March 22–24, 1967, New York, N.Y., **9.**

Papoulis, A., "Fresnel transforms with applications in diffraction theory," *Symposium on Modern Optics,* March 22–24, 1967, New York, N.Y., **32.**

Papoulis, A., "Two-dimensional systems with applications to modern optics," *Proc. Symposium on Generalized Networks,* 753–785, Polytechnic Institute of Brooklyn, Brooklyn, N.Y., 1966, **26.**

Paris, D. P., "Digital simulation of image-forming systems," *IBM J. Research and Dev't., 10:* No. 5, 407–411, Sept. 1966, **11, 32.**

Paris, D. P., "Computer simulation of photo-optical image-forming systems," *Phot. Sci. Eng., 10:* 69–76, March-April 1966, **11, 32.**

Parrent, G. B., Jr., and Reynolds, G. O., "Space-bandwidth theorem for holograms," *J. Opt. Soc. Amer., 56:* 1400–1401, Oct. 1966, **7, 25.**

Perrot, M., and Peri, G., "Comparaison entre la transmission de l'information en optique et en radio électricité," *Optica Acta, 2:* 1–5, April 1955, **25, 26.**

Pistolkors, A. A., "A contribution to the theory of the holographic microscope," *Akademiia Nauk SSSR, Doklady, 176:* 816–819, Oct. 1, 1967, **7, 22.**

Pistolkors, A. A., "Resolving power of a hologram," *Soviet Phys. Doklady, 12:* 79–81, July 1967, **7.**

Platonenko, V. T., "Holography (photography and wave front reconstruction)," *Uspekhi Fizicheskikh Nauk, 90:* 199–201, Sept. 1966, **12, 24.**

Plummer, W. T., "Ghost lines in spectra from an interferometric hologram," *Japanese J. Appl. Phys., 6:* 1250–1251, Oct. 1967, **9, 19.**

Pole, R. V., and Pennington, K. S., "Sampling of optical fields with a fly's eye lens," *J. Opt. Soc. Amer., 57:* 1413, Nov. 1967 (abstract only), **23.**

Pole, R. V., "Computer-generated 3-D displays," *IBM Tech. Disclosure Bull., 10:* 598–600, Oct. 1967, **11, 18, 23.**

Pole, R. V., and Thorpe, R. A., "Real-time computer-generated 3-D display," *IBM Tech. Disclosure Bull., 10:* 601–603, Oct. 1967, **11, 18.**

Pole, R. V., Wieder, H., and Barrekette, E. S., "Reactive optical information processing I, theory of information recovery and resonant mode structure," *Appl. Optics, 6:* 1571–1575, Sept. 1967, **27.**

Pole, R. V., "3-D imagery and holograms of objects illuminated in white light," *Appl. Phys. Letters, 10:* 20–22, Jan. 1, 1967, **23.**

Pole, R. V., "Spatial phase modulation and remodulation," *Communication and Information Theory Aspects of Modern Optics,* 153–180 (see O'Neill, E. L., G.E. Co., Syracuse, N.Y., 1962), **25, 26.**

Powell, R. L., and Hemmye, J. H., "Holography and hologram interferometry using photochromic recording materials," *J. Opt. Soc. Amer., 56:* 1450, Oct. 1966 (abstract only), **19, 21.**

Preston, K., Jr., "Fundamentals of holography," *Phot. Sci. Eng., 11:* 190–197, May-June 1967, **6, 31.**

Preston, K., Jr., and Kreuzer, J. L., "Ultrasonic imaging using a synthetic holographic technique," *Appl. Phys. Letters, 10:* 150–152, March 1, 1967, **17.**

Preston, K., Jr., "Computing at the speed of light," *Electronics, 38:* 72–83, Sept. 6, 1965, **27, 29.**

Pribram, K. H., "Some dimensions of remembering Steps toward a neuropsychological model of memory," *Macromolecules and Behavior,* 165–187 (Gaito, J., Ed., Appleton Century Crofts, New York, N.Y., 1966), **24.**

Ramberg, E. G., "Lasers and holograms," *RCA Engineer, 12,* 66–72, Oct.–Nov. 1966, **6.**

Raso, D. J., "Target recognition for continuous tone objects," *J. Opt. Soc. Amer., 57:* 1419, Nov. 1967 (abstract only), **29, 30.**

Rau, J. E., "Real-time complex spatial modulation," *J. Opt. Soc. Amer., 57:* 798–802, June 1967, **26, 29.**

Rau, J. E., "Real-time correlation of spatial function," *J. Opt. Soc. Amer., 57:* 562, April 1967 (abstract only), **26.**

Rau, J. E., "Detection of differences in real distributions," *J. Opt. Soc. Amer., 56:* 1490–1494, Nov. 1966, **26.**

Rau, J. E., "Comparison of coherently illuminated images," *J. Opt. Soc. Amer., 56:* 541–542, April 1966 (abstract only), **26.**

Redakci, D., "Holography by division of amplitude," *Ceskoslovensky Casopis Pro Fysiku, 17:* 379, 1967, **10.**

Reynolds, G. O., and De Velis, J. B., "Hologram coherence effects," *IEEE Trans. Antennas Propagation, AP-15:* 41–48, Jan. 1967, **7.**

Reynolds, G. O., "Magnification limitations in holography," *J. Opt. Soc. Amer., 56:* 1414, Oct. 1966 (abstract only), **8, 12.**

Rhodes, J. E., Jr., "Analysis and synthesis of optical images," *Amer. J. Phys., 21:* 337–343, May 1953, **26.**

Rogers, G. L., "Device for aligning a pinhole with a microscope objective," *J. Sci. Inst., 43:* 763–764, Oct. 1966, **10.**

Rogers, G. L., "Pictures by waves," *Perspective (London), 8:* 261–275, 1966, **5.**

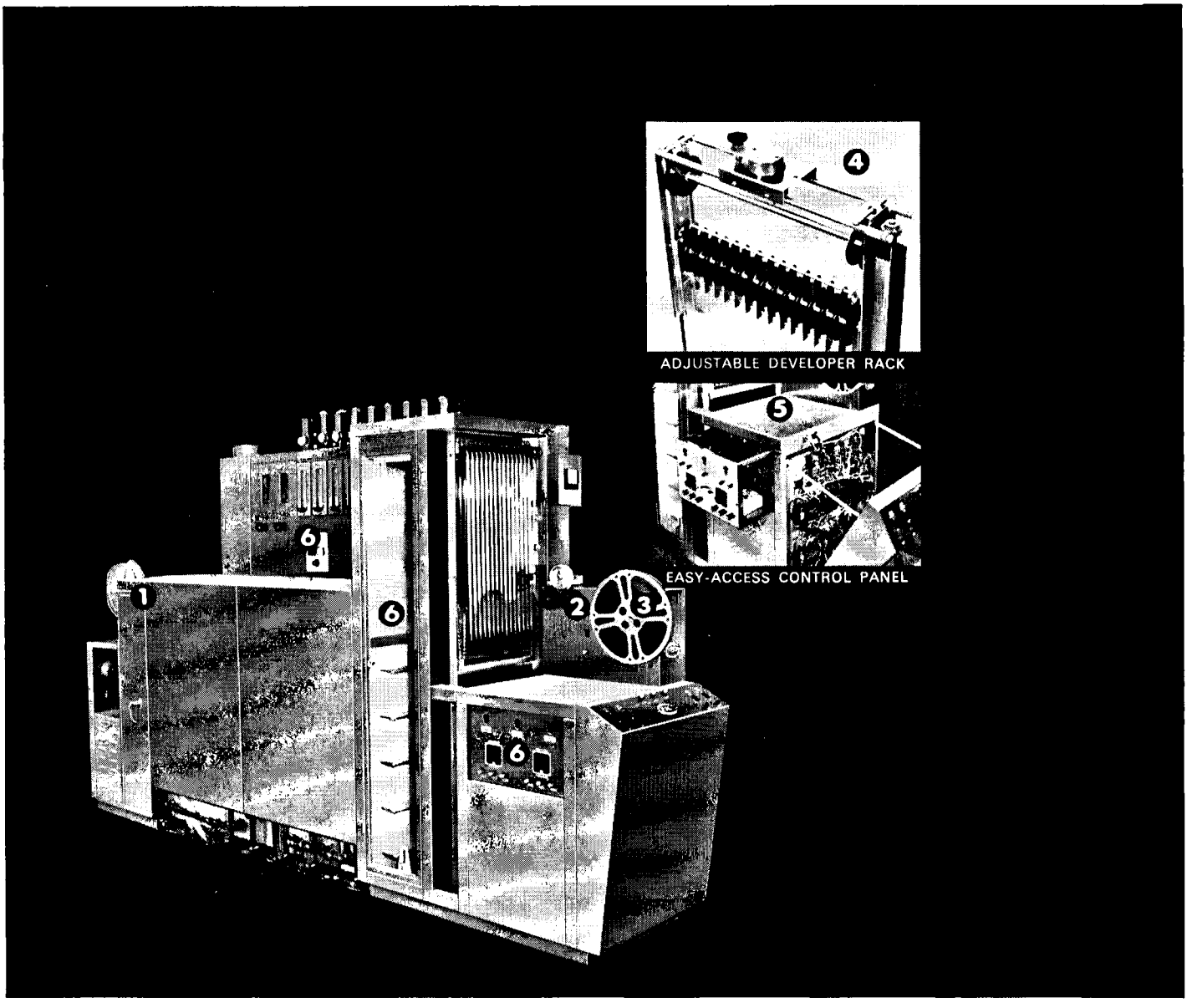
Rope, E. L., and Tricoles, G., "Microwave holograms, wavefront reconstruction, and visible images," *IEEE 1966 Intern'l. Antenna and Propagation Symposium,* Dec. 5–7, 1966 (Pub. in *Symposium Digest,* IEEE Catalog No. 3C38), **17.**

Rose, H. W., "Laser instabilities in interferometry and holography," *J. Opt. Soc. Amer., 57:* 1427, Nov. 1967 (abstract only), **32.**

Rose, H. W., "Application of fringe stabilization servo for phase compensation of scene motion and optical frequency differences," *J. Opt. Soc. Amer., 56:* 1448–1449, Oct. 1966 (abstract only), **10.**

Rose, H. W., and Champagne, E., "Diffraction-pattern photography," *Proc. 17th Nat'l. Aerospace Electronics Conf.,* 303–309, Dayton, Ohio, May 10–12, 1965, **6.**

Rosen, L., "Moire effects in computer-generated holograms," *Proc. IEEE, 55:* 1736–1737, Oct. 1967, **11, 31.**




# *The practical processor for Ektachrome*

The Pako Model 28EK Cine/Strip Processor is a small-size, low-cost unit for processing both 16mm and 35mm Ektachrome. It handles over 1600 feet per hour with consistent, high quality results.

**1.** Light-tight 2400-ft. magazine permits leader and film footage to be handled together, eliminating costly start-up time. Daylight loading and processing is in normal room illumination. Ideal for TV stations, film producers and photo processors.

**2.** Footage counter records the total footage for comparisons with chemical usage—especially important for replenishment of secondary solutions.

**3.** A unique automatic speed control on the film take-up maintains constant film tension by compensating for changing diameter of film on the take-up reel.

**4.** First developer rack is adjustable for film exposed at other-than-normal exposure indexes. Dial is calibrated in ¼ f-stops and has click stops. May be adjusted while machine is running.

**5.** Drawer-type electrical control panel simplifies inspection. And Pako's nationwide Distributor Network means that parts and factory-trained personnel are readily available.

**6.** The Pako 28EK Processor also includes an automatic replenishment system, automatic temperature control, controlled impingement drying system, and fpm tachometer—all adjustable to meet your sensitometric requirements. Yet it takes up only 30 sq. ft. of floor space. Fast installation supervised by factory trained personnel. A quality product backed by local parts and service from your Pako Distributor. Pako also has proven, quality processors for Kodachrome, Kodacolor, Anscochrome, Eastman Color, and B/W.

Contact your Pako Distributor for more information or write Pako Corporation, 6300 Olson Memorial Highway, Minneapolis, Minnesota 55440.

**PAKO CORPORATION** PAKO®

PS Processing Systems for the Photographic, Graphic Arts, Motion Picture, Medical and Industrial X-Ray Industries.

Rosen, L., and Clark, W., "Film plane holograms without external source reference beams," *Appl. Phys. Letters, 10:* 140–142, March 1, 1967, **10.**

Rosen, L., "Focusing hologram diffraction grating," *Rev. Sci. Inst., 38:* 438–440, March 1967, **10.**

Rosen, L., "Apparent rotation of hologram virtual images," *J. Opt. Soc. Amer., 57:* 278–279, Feb. 1967, **9.**

Rosen, L., "Holograms of the aerial image of a lens," *Proc. IEEE, 55:* 79–80, Jan. 1967, **8, 10.**

Rosen, L., "The pseudoscopic inversion of holograms," *Proc. IEEE, 55:* 118, Jan. 1967, **8.**

Ross, A. H. M., "Optical spatial filtering for simultaneous delay and doppler estimates of radarlike signals," *M.I.T. Research Lab. of Electronics Quart. Prog. Report No. 84,* 307–309, Jan. 15, 1967, **30.**

Ross, R. M., "Ring hologram for 3-D display — single concept motion picture," *IBM Tech. Disclosure Bull., 9:* 390, Sept. 1966, **10.**

Rotz, F. B., and Friesem, A. A., "Errata — holograms with nonpseudoscopic real images," *Appl. Phys. Letters, 8:* 240, May 1, 1966 (see Rotz, F. B., and Friesem, A. A., *Appl. Phys. Letters, 8:* 146–148, March 15, 1966.), **8, 10.**

Rotz, F. B., and Vander Lugt, A., "Data reduction by coherent optical systems," *Proc. SPIE Seminar on Photo-Optical Data Reduction,* V-1-V-20, St. Louis, Mo., March 2–3, 1964, **27, 30.**

Rousseau, M., "Photographie en lumière monochromatique d'un objet periodique diffusant, application à la détermination du degré de cohérence spatiale d'une source," *Comp. Rend. Acad. Sc., 264:* 1569–1572, June 5, 1967, **32.**

Rudder, C. L., "Polarization filtering in holography," *Appl. Phys. Letters, 10:* 270–272, May 15, 1967, **16.**

Ruff, B., "Pulsed laser holography," *Opt. Spectra, 1:* 48–50, Jan. 1967; **15.**

Saccocio, E. J., "Application of the dynamical theory of x-ray diffraction to holography," *J. Appl. Phys., 38:* 3994–3998, Sept. 1967, **7, 9.**

Saccocio, E. J., "Applications of Lloyd's mirror to x-ray holography," *J. Opt. Soc. Amer., 57:* 966, July 1967, **17.**

Saccocio, E. J., "The Borrman effect in holography," *J. Opt. Soc. Amer., 57:* 559, April 1967 (abstract only), **9.**

Schade, O. H., "Fourier treatment of optical processes," *J. Opt. Soc. Amer., 43:* 704–705, Aug. 1953, **26.**

Schade, O. H., "A new system of measuring and specifying image definition," *Optical Image Evaluation,* 231–249, NBS Circular 526 (see *NBS Optical Image Evaluation*), **26.**

Schwar, M. J. R., Pandya, T. P., and Weinberg, F. J., "Point holograms as optical elements," *Nature, 215:* 239–241, July 15, 1967, **7.**

Sedney, R., Rowe, R., Bush, C., and Voelker, L., "Conventional flow visualization using laser light source," *AIAA Bull., 2:* 717, Dec. 1965, **32.**

Sherman, G. C., "Hologram copying by Gabor holography of transparencies," *Appl. Optics, 6:* 1749–1753, Oct. 1967, **7, 20.**

Sherman, G. C., "Reconstructed wave forms with large diffraction angles," *J. Opt. Soc. Amer., 57:* 1160–1161, Sept. 1967, **7.**

Sherman, G. C., "Diffraction theory of hologram copying," *J. Opt. Soc. Amer., 57:* 563, April 1967 (abstract only), **20.**

Shewell, J. R., "Beam ratios in holography," *J. Opt. Soc. Amer., 57:* 560, April 1967 (abstract only), **10.**

Siebert, L. D., "Front-lighted pulse laser holography," *Appl. Phys. Letters, 11:* 326–328, Nov. 1967, **15.**

Sintsov, V. N., "Application of optical quantum generators (lasers) in photography," *Zhur. Nachnoi I Prikladnoi Foto. I Kinema., 11:* 65–68, Jan.–Feb. 1966, **32.**

Smith, A. B., "Direct-view 3-D images," *Radio-Electronics, 38:* 46–49, Jan. 1967, **5.**

Smith, H. M., 'Photographic relief images," *J. Opt. Soc. Amer., 57:* 584, April 1967 (abstract only), **19.**

Smith, W. V., "Computer applications of lasers," *Proc. IEEE, 54:* 1295–1300, Oct. 1966, **27, 28.**

Smits, F. M., and Gallaher, L. E., "Design considerations for a semipermanent optical memory," *Bell Sys. Tech. J., 46:* 1267–1278, July-Aug. 1967, **27, 28.**

Snow, K., and Vandewarker, R., "Holographic interference microscope," *J. Opt. Soc. Amer., 57:* 1406, Nov. 1967 (abstract only), **21, 24.**

Soroko, L. M., "Holography and interference processing of information," *Soviet Phys. Uspekhi, 9:* 643–669, March 1967, **12, 19, 21, 24, 27, 28.**

Spitz, E., "Reconstitution holographique des objets à travers un milieu diffusant en movement," *Comp. Rend. Acad. Sc., 264:* 1449–1451, May 22, 1967, **10.**

Spitz, E., and Werts, A., "Transmission des images à travers une fibre optique," *Comp. Rend. Acad. Sc., 264:* 1015–1018, April 3, 1967, **10.**

Stabnikov, M. V., Turkhano, B. G., and Naidenkov, A. F., "Holography of media with small variation of refractive index," *Soviet Phys. Technical Phys., 12:* 709, Nov. 1967, **10.**

Steel, W. H., "Transfer function in partially coherent light," *Communication and Information Theory Aspects of Modern Optics,* 91–114 (see O'Neill, E. L., G.E. Co., Syracuse, N.Y., 1962.), **25.**

Stetson, K. A., "Holography with total internally reflected light," *Appl. Phys. Letters, 11:* 225–226, Oct. 1, 1967, **10.**

Stetson, K. A., "Holographic fog penetration," *J. Opt. Soc. Amer., 57:* 1060–1061, Aug. 1967, **10.**

Stetson, K. A., "Holographic fog penetration," *J. Opt. Soc. Amer., 57:* 573, April 1967 (abstract only), **10.**

Stigliani, D. J., Jr., Semonin, R. G., and Mittra, R., "Film resolution and holographic recordings," *Proc. IEEE, 55:* 1509–1511, Aug. 1967, **7, 19.**

Stigliani, D. J., Jr., Mittra, R., and Semonin, R. G., "Resolving power of a zone plate," *J. Opt. Soc. Amer., 57:* 610–613, May 1967, **25.**

Stroke, G. W., and Zech, R. G., "A posteriori image-correcting 'deconvolution' by holographic Fourier-transform division," *Phys. Letters, 25A:* 89–90, July 31, 1967, **12.**

Stroke, G. W., "Recent advances in holography," *Technology Rev., 69:* 16–22, May 1967, **5.**

Stroke, G. W., "Spectroscopic origins and applications of white-light reflection holography," *J. De Physique, 28:* 196–203, March 1967, **12, 14.**

Stroke, G. W., "A reformulated general theory of holography," *J. Opt. Soc. Amer., 57:* 563, April 1967 (abstract only), **12.**

Stroke, G. W., "Theoretical and experimental foundations for the attainment of high resolutions in holographic microscopy of three-dimensional objects," *J. Opt. Soc. Amer., 57:* 563, April 1967 (abstract only), **7, 10, 22.**

Stroke, G. W., "A reformulated general theory of holography," *Symposium on Modern Optics,* March 22–24, 1967, New York, N.Y., **12.**

Stroke, G. W., Funkhouser, A., Leonard, C., Indebetouw, G., and Zech, R. G., "Hand-held holography," *J. Opt. Soc. Amer., 57:* 110, Jan. 1967, **10.**

Stroke, G. W., "Spectroscopic implications of new holographic imaging methods," *Physica, 33:* 253–267, 1967, **10, 12.**

Stroke, G. W., Westervelt, F. H., and Zech, R. G., "Holographic synthesis of computer-generated holograms," *Proc. IEEE, 55:* 109–111, Jan. 1967, **10, 11.**

Stroke, G. W., "Attainment of high resolutions in image-forming x-ray microscopy with lensless Fourier-transform holograms and correlative source-effect compensation," *Proc. IV X-Ray Cong.,* Paris, Sept. 7–10, 1965, **12, 22.**

Strong, C. L., and Heumann, S. M., "The amateur scientist — How to make holograms and experiment with them or with ready-made holograms, *Scient. Amer., 216:* 122–128, Feb. 1967, **10.**

Suzuki, T., and Hioki, R., "Frequency response of photographic emulsion in holography," *Japanese J. Appl. Phys., 5:* 1257–1258, Dec. 1966, **19.**

Tanner, L. H., "The optics of laser streak interferometry," *J. Sci. Inst., 44:* 725–730, Sept. 1967, **21.**

Tanner, L. H., "The design of laser interferometers for use in fluid mechanics," *J. Sci. Inst., 43:* 878–886, Dec. 1966, **21.**

Theocaris, P. S., and Koutsabessis, A., "Slope measurement by means of moire fringes," *J. Sci. Inst., 42:* 607–610, Aug. 1965, **32.**

Thiry, H., "Some qualitative and quantitative results on spatial filtering of granularity," *Appl. Optics, 3:* 39–41, Jan. 1964, **30.**

Thompson, B. J., and Zinky, W. R., "Holography — a status report," *Research/Development, 18:* 20–25, July 1967, **24.**

Thompson, B. J., "Franhofer holography for bubble chambers," *Symposium on Modern Optics,* March 22–24, 1967, New York, N.Y., **24.**

Thompson, B. J., Ward, J. H., and Zinky, W. R., "Application of hologram techniques for particle size analysis," *Appl. Optics, 6:* 519–526, March 1967, **24.**

Thompson, B. J., and Parrent, G. B., Jr., "Holography," *Sci. Jour., 3:* 42–49, Jan. 1967, **5.**

Tippett, J. T., Berkowitz, D. A., Clapp, L. C., Koester, C. J., and Vanderburgh, A., Jr., "Optical and Electro-Optical Information Processing," M.I.T. Press, Cambridge, Mass., 1965, **3, 4.**

Toraldo Di Francia, G., "Directivity, super-gain and information," *IRE Trans. Antennas Propagation, 4:* 473–478, July 1956, **25.**

Toraldo Di Francia, G., "Capacity of an optical channel in the presence of noise," *Optica Acta, 2:* 5–8, April 1955, **25.**

Toraldo Di Francia, G., "Super-gain antennas and optical resolving power," *Nuovo Cimento, Suppl., 9:* 426–438, 1952, **25.**

Tradowsky, K., "Holography high-speed and microphotography with laser beams," *Chemie-Ingenieur-Technik, 39:* 497–504, May 24, 1967, **6, 13, 15, 22.**

Tricoles, G., and Rope, E. L., "Reconstruction of visible images from reduced-scale replicas of microwave holograms," *J. Opt. Soc. Amer., 57:* 97–99, Jan. 1967, **17.**

Tricoles, G. and Rope, E. L., "Visible and microwave holography using an inclined reference beam," *J. Opt. Soc. Amer., 56:* 1414, Oct. 1966 (abstract only), **17.**

Tsujiuchi, J., "Correction of optical images by compensation of aberrations and by spatial frequency filtering," *Progress in Optics, 2:* 133–180 (Wolf, E., Ed. John Wiley, New York, N.Y., 1963.),, **30.**

Tsujiuchi, J., "Restitution des images aberrantes par le filtrage des fréquences spatiales III, restitution de l'image prise avec un filtre à deux foyers," *Optica Acta, 8:* 161–168. April 1961, **30.**

Tsujiuchi, J., "Restitution des images aberrantes par le filtrage des fréquences spatiales II, restitution de l'image prise avec un filtre à deux foyers," *Optica Acta, 7:* 385–398, Oct. 1960, **30.**

Tsujiuchi, J., "Restitution des images aberrantes par le filtrage des fréquences spatiales," *Optica Acta, 7:* 243–261, July 1960, **30.**

Tsuruta, T., Shiotake, N., Tsujiuchi, J., and Matsuda, K., "Holographic generation of contour map of diffusely reflecting surface by using immersion method," *Japanese J. Appl. Phys., 6:* 661–662, May 1967, **21.**

Upatnieks, J., "Improvement of two-dimensional image quality in coherent optical systems," *Appl. Optics, 6:* 1905–1910, Nov. 1967, **32.**

Upatnieks, J. and Leith, E. N., "Holography with achromatic-fringe systems," *J. Opt. Soc. Amer., 57:* 563, April 1967 (abstract only), **10.**

Upatnieks, J., "Improvement of micro-image quality in holography and other coherent systems," *J. Opt. Soc. Amer., 56:* 1448, Oct. 1966 (abstract only), **10.**

Urbach, J. C., "The role of screening in thermoplastic xerography," *Phot. Sci. Eng., 10:* 287–297, Sept.–Oct. 1966, **32.**

Vander Lugt, A., "The effects of small displacements of spatial filters," *Appl. Optics, 6:* 1221–1225, July 1967, **30.**

Vander Lugt, A., and Mitchel, R. H., "Technique for measuring modulation transfer functions of recording media," *J. Opt. Soc. Amer., 57:* 372–379, March 1967, **30.**

Vander Lugt, A., "Practical considerations for the use of spatial carrier-frequency filters," *Appl. Optics, 5:* 1760–1765, Nov. 1966, **30.**


For modern European film makers, Arriflex is ***the*** camera. Thus it was natural for the German news weekly, DER SPIEGEL, to select an Arriflex (and companion!) to grace its cover for a recent feature story on "The Young German Film."

In America too, Arriflex is the overwhelming choice of modern cinematographers and has become the standard of the industry for portable motion picture cameras.

ARRIFLEX
CORPORATION OF AMERICA

Vander Lugt, A., "Operational notation for the analysis and synthesis of optical data-processing systems," *Proc. IEEE, 54:* 1055–1063, Aug. 1966, **26, 32.**

Vander Lugt, A., "The analysis and synthesis of optical information processing systems by operational notation," *Proc. Symposium on Generalized Networks,* 735–741, Polytechnic Institute of Brooklyn, Brooklyn, N.Y., 1966, **26, 27.**

Vander Lugt, A., Rotz, F. B., and Klooster, A., Jr., "Character-reading by optical spatial filtering," *Optical and Electro-Optical Information Processing,* 125–141 (see Tippett, J. T., et al., M.I.T. Press, Cambridge, Mass., 1965), **29, 30.**

Vandewarker, R., and Snow, K., "Low spatial frequency holograms of solid objects," *Appl. Phys. Letters, 10:* 35–36, Jan. 15, 1967, **10, 19, 20.**

Van Heerden, P. J., "Information retrieval from holograms," *J. Opt. Soc. Amer.,* 57: 1403, Nov. 1967 (abstract only), **7, 9.**

Van Lighten, R. F., and Lawton, K. C., "Image separation by pupil separation in multiple-exposure holography," *J. Appl. Phys., 38:* 1994–1996, March 15, 1967, **10, 19.**

Van Lighten, R. F., and Lawton, K. C., "Image separation by pupil separation in multiple-exposure holography," *J. Opt. Soc. Amer., 57:* 559, April 1967 (abstract only), **8, 28.**

Van Lighten, R. F., "A holographic microscope," *J. Opt. Soc. Amer., 57:* 564, April 1967 (abstract only), **22.**

Vienot, J. C., and Monneret, J., "Interférométrie et photoélasticimétrie holographiques," *Revue Optique, 46:* 75–79, Feb. 1967, **21.**

Vienot, J. C., and Bulabois, J., "Spectral differentiation and hologram filtering of decorrelated weak optical signals," *Optica Acta, 14:* 57–70, Jan. 1967, **26, 29, 30.**

Vienot, J. C., Bulabois, J., and Perrin, G., "Notion de degré de ressemblance de formes géométriques défini dans une opération de filtrace-correlation optique," *Comp. Rend. Acad. Sc., 263:* 1300–1303, Dec. 1963, **30.**

Vilkomerson, D. H. R., and Bostwick, D., "Some effects of emulsion shrinkage on a hologram's image space," *Appl. Optics, 6:* 1270–1272, July 1967, **9, 19.**

Walther, A., "The question of phase retrieval in optics," *Optica Acta, 10:* 41–49, Jan. 1963, **26.**

Ward, J. H., and Thompson, B. J., "In-line hologram system for bubble-chamber recording," *J. Opt. Soc. Amer., 57:* 275–276, Feb. 1967, **10, 24.**

Waters, J. P., "Holographic image synthesis utilizing theoretical methods," *Appl. Phys. Letters, 9:* 405–407, Dec. 1, 1966, **11.**

Watrasiewicz, B. M., "Character recognition by holography," *Nature, 216:* 302–304, Oct. 21, 1967, **29.**

Watrasiewicz, B. M., "Lasers and holography," *Instrument Practice, 21:* 669–673, July 1967, **6.**

Weaver, C. S., and Goodman, J. W., "A technique for optically convolving two functions," *Appl. Optics, 5:* 1248–1249, July 1966, **26.**

Weaver, C. S., "Optical signal processing and applications to pattern recognition," *WESCON Tech. Papers, 9:* 1965, **27, 29.**

Weber, R. L., "The aperture problem in holographic copying," *J. Opt. Soc. Amer., 57:* 560, April 1967 (abstract only), **20.**

Wieder, H., and Pole, R. V., "Reactive optical information processing II, factors affecting the applicability and efficiency of the method," *Appl. Optics, 6:* 1761–1765, Oct. 1967, **27.**

Wildey, R. L., "Spatial filtering of astronomical photographs II, theory," *Astronomical J., 72:* 884–886, Sept. 1967, **30.**

Williams, R. E., "Partially coherent processing by optical means," *IEEE Trans. Info. Theory, IT-11:* 499–507, Oct. 1965, **27.**

Williams, R. E., "The panchromatic principle in optical filtering," *IEEE Trans. Info. Theory, IT-10:* 227–234, July 1964, **26, 30.**

Wolfe, R. and Doherty, E. T., "Holographic interferometry of the distortion of thermoelectric cooling modules," *J. Appl. Phys., 37:* 5008–5009, Dec. 1966, **21, 24.**

Wolpert, D., "The hologram and the reconstruction of wavefronts," *Bildmessung und Luftbildwesen, 34:* 31–37, March 1, 1966, **10.**

Wolter, H., "On basic analogies and principal differences between optical and electronic information," *Progress in Optics, 1:* 155–210 (Wolf, E., Ed., John Wiley, New York, N.Y., 1961.), **25, 26.**

Wuerker, R. F., Heflinger, L. O., Brooks, R. E., and Knox, C., "Q-switched ruby-laser holography," *J. Opt. Soc. Amer., 57:* 573, April 1967 (abstract only), **15.**

Yates, J. M., "Wave front image formation," *Brit. J. Photog., 113:* 328–331, 343, April 22, 1966, **5.**

Yoshihara, K., and Kitage, A., "Holographic spectra using a triangle path interferometer," *Japanese J. Applied Physics, 6:* 116, Jan. 1967, **10.**

Young, J. D., and Wolfe, J. E., "A new recording technique for acoustic holography," *Appl. Phys. Letters, 11:* 294–296, Nov. 1, 1967, **17, 19.**

Zaidel, A. N., Ostrovskaya, G. V., Ostrovskii, Yu. I., and Chelidze, T. Ya., "Time-resolved holography of laser-produced plasmas," *Soviet Phys. Technical Phys., 11:* 1650–1652, June 1967, **10, 21, 24.**

## 2. Books — Non-Optical

Arsac, J., *Fourier Transforms and the Theory of Distributions,* Englewood Cliffs, N.J., Prentice-Hall, 1966.

Bracewell, R., *The Fourier Transform and its Applications,* New York, McGraw-Hill, 1965.

Campbell, G. A., and Foster, R. M., *Fourier Integrals for Practical Applications,* Princeton, N.J., Van Nostrand, 1947.

Lighthill, M. J., *An Introduction to Fourier Analysis and Generalized Functions,* New York, Cambridge University Press, 1958.

Mees, C. E. K., and James, T. H., *The Theory of the Photographic Process,* 3rd ed., New York, Macmillan Co., 1966.

Papoulis, A., *The Fourier Integral and its Applications,* New York, McGraw-Hill, 1962.

Sneddon, I. N., *Fourier Transforms,* New York, McGraw-Hill, 1951.

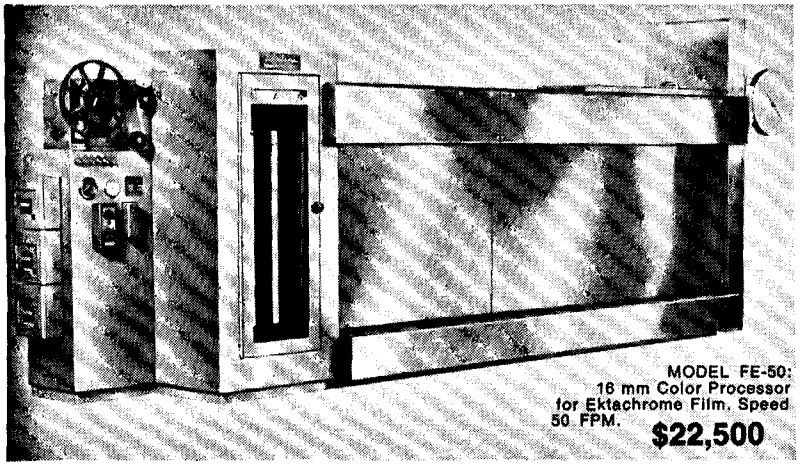
# The Money-Makers

## FILMLINE'S professional color film processors for motion picture laboratories.

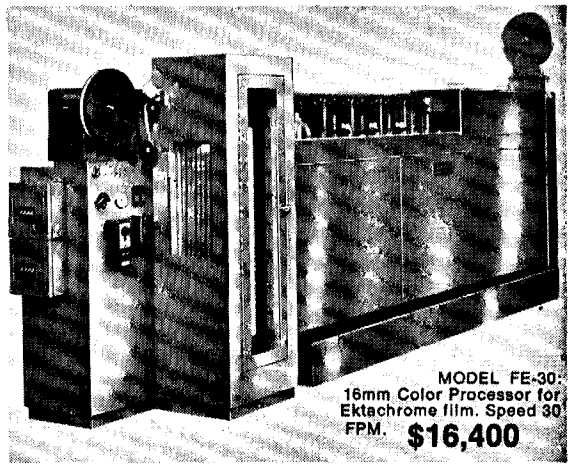
The Filmline Models FE-30 and FE-50 are fast, foolproof, troublefree and long-lasting. They turn out consistently superior work. The design is backed by Filmline's reputation as the world's leading manufacturer of film processors for the motion picture laboratory industry.

Now enjoy the benefits of professional equipment incorporating exclusive Filmline features that have paced the state-of-the-art in commercial, industrial and defense installations at a cost lower than processors offering less.

*Check the exclusive Filmline features below:*



MODEL FE-50: 16 mm Color Processor for Ektachrome Film. Speed 50 FPM. **$22,500**



MODEL FE-30: 16mm Color Processor for Ektachrome film. Speed 30 FPM. **$16,400**

- **"FILMLINE OVERDRIVE FILM TRANSPORT SYSTEM"** This marvel of engineering completely eliminates film breakage, pulled perforations, scratches and operator error. The film can be deliberately stalled in the machine without film breakage or significant change of film footage in solutions. The heart of any film processor is the drive system. No other film drive system such as sprocket drive, bottom drive or simple clutch drives with floating lower assemblies can give you the performance capability of the unique Filmline Overdrive Film Transport System.
- **"TORQUE MOTOR TAKE-UP"** gives you constant film take-up and does not impose any stress or strain on the film itself. Completely independent of the film transport system. This FILMLINE feature is usually found in professional commercial processors but is incorporated on the FE-30 and FE-50 models as standard equipment. Don't settle for less!
- **"TEMP-GUARD"** positive temperature control system. Completely transistorized circuitry insures temperature control to well within processing tolerances. Temp-Guard controls temperatures accurately and without the problems of other systems of lesser sophistication.
- **"TURBO-FLOW"** impingement dryer. Shortens dry-to-dry time, improves film results, and carefully controls humidity content of your valuable (and sometimes rare) originals. Immediate projection capability is assured because the film dries flat without the usual curl associated with other film processors.

**"ZERO DOWN TIME"** The reputation of any film processor is only as good as its reliability. The combination of the exclusive and special added Filmline features guarantees trouble-free operation with absolute minimum down-time and without continual operator adjustments. Recapture your original investment in 2 years on maintenance savings alone. Filmline's "Push the button and walk-away processing" allows inexperienced operators to turn out highest quality film.

- **"MATERIALS, CONSTRUCTION AND DESIGN"** All Filmline machines are constructed entirely of metal and tanks are type 316 stainless steel, heliarc welded to government specifications. The finest components available are used and rigid quality control standards are maintained.

Compare Filmline features to other processors costing more money. Feature-by-feature, a careful evaluation will convince you that Filmline offers you more for your investment.

## Additional Features included in price of machine (Not as extras).

Magazine load, daylight operation ■ Feed-in time delay elevator (completely accessible) ■ Take-up time delay elevator (completely accessible) ■ Red brass bleach tank, shafts, etc. Prehardener solution filter ■ Precision Filmline Venturi air squeegee prior to drybox entry ■ Air vent on prehardener ■ Solid state variable speed D.C. drive main motor ■ Bottom drains and valves on all tanks ■ Extended development time up to two additional camera stops at 50 FPM ■ Pump recirculation of all eight solutions thru spray bars ■ Temperature is sensed in the recirculation line ■ All solutions temperature controlled, no chilled water required ■ Built-in air compressor ■ Captive bottom assemblies assure you constant footage in each solution ■ Change over from standard developing to extended developing can be accomplished in a matter of seconds ■ Impingement dryer allows shorter put through time.

**Partial listing of Filmline Color Installations:** — NBC- New York, NBC- Washington, NBC- Cleveland, NBC- Chicago, CBS & ABC Networks, Eastman Kodak, Rochester.

**Laboratories:** De Luxe Labs, General Film Labs (Hollywood), Pathe-Labs, Precision Labs, Mecca Labs, Color Service Co., Capital Film Labs, Byron Film Labs, MGM, Movie Lab, Lab-TV, Technical Film Labs, Telecolor Film Labs, Guffanti Film Labs, A-One Labs, All-service Labs, NASA Cape Kennedy, Ford Motion Picture Labs.

**TV Stations:** WAPI-TV, WHP-TV, WMAL-TV, WXYZ-TV, WWL-TV, WMAR-TV, WJXT-TV, KETV-TV, WTOP-TV, WEAT-TV, WCKT-TV, WAVE-TV, WAVY-TV, KTVI-TV, WCPO-TV, KTAR-TV, WSYR-TV.

All prices F.O.B. MILFORD, CONN.

Filmline CORPORATION MILFORD, CONNECTICUT

Dept. SA-68

Send for Literature.

Time & Lease Plans Available.

**"When you buy quality Filmline Costs Less"**

Titchmarsh, E. C., *Theory of Fourier Integrals*, New York, Oxford University Press, 1937.

### 3. Books — Optical

Born, Max, and Wolf, Emil, *Principles of Optics*, 3rd Rev. Ed., New York, Pergamon Press, 1965.
Brown, F. M., Hall, H. J., and Kosar, J., *Photographic Systems for Engineers*, Washington, D.C., Society of Photographic Scientists and Engineers, 1966.
Ditchburn, R. W., *Light*, 2nd Ed., New York, John Wiley, 1963.
Duffieux, P. M., *L'Intégrale De Fourier et Ses Application à L'Optique*, Besançon, France, 1946.
Francon, M., and Saez, A., "Principles and applications of holography," *Acta Cientifica Venezolana, 18:* 36–40, 1967.
Francon, M., *Optical Interferometry*, New York, Academic Press, 1966.
Hopkins, H. H., *Wave Theory of Aberrations*, Oxford, England, 1950.
Linfoot, E. H., *Fourier Methods in Optical Image Evaluation*, New York, Focal Press, 1964.
Luneburg, R. K., *Mathematical Theory of Optics*, Berkeley, Calif., University of California Press, 1964.
Mertz, L., *Transformations in Optics*, New York, John Wiley, 1965.
National Bureau of Standards, U.S., "Optical image evaluation," *Proc. of the NBS Semicentennial Symposium on Optical Image Evaluation*, Washington, D.C., Oct. 18–20, 1951. (Issued as NBS Circular 526, April 29, 1954.)
O'Neill, E. L., *Introduction to Statistical Optics*, Reading, Mass., Addison-Wesley, 1963.
Pollock, D. K., Doester, C. T., and Tippett, J. T., *Optical Processing of Information*, New York, Spartan Books, 1963.
Tippett, J. T., Berkowitz, D. A., Clapp, L. C., Koester, C. J., and Vanderburgh, A., Jr., *Optical and Electro-Optical Information Processing*, Cambridge, Mass., M.I.T. Press, 1965.

### 4. Books Discussing or About Holography

Born, Max, and Wolf, Emil, *Principles of Optics*, 3rd Rev. Ed., New York, Pergamon Press, 1965.
Cosslett, V. E., *Practical Electron Microscopy*, New York, Academic Press, 1951.
Cosslett, V. E., and Nixon, W. C., *X-Ray Microscopy*, London, Cambridge University Press, 1960.
Cosslett, V. E., Engstrom, A., and Pattee, H. H., Jr., *X-Ray Microscopy and Microradiography*, New York, Academic Press, 1957.
De Velis, J. B., and Reynolds, G. O., *Theory and Applications of Holography*, Reading, Mass., Addison-Wesley, 1967.
Ditchburn, R. W., *Light*, 2nd Ed., New York, John Wiley, 1963.
Francon, M., *Optical Interferometry*, New York, Academic Press, 1966.
Haine, M. E., *The Electron Microscope*, New York, Interscience Publishers, 1961.
Leith, E. N., and Upatnieks, J., "Recent advances in holography," *Progress in Optics, 6:* 3–52. (Wolf, E., Ed., John Wiley, New York, 1967.)
Mertz, L., *Transformations in Optics*, New York, John Wiley, 1965.
National Bureau of Standards, U.S., "Electron physics," *Proc. of the NBS Semicentennial Symposium on Electron Physics*, Washington, D.C. Nov. 5–7, 1951 (issued as NBS Circular 527, March 17, 1954).
O'Neill, E. L., "Communication and information theory aspects of modern optics," *Symposium Proc. of meeting held June 30–July 1, 1960*, Syracuse, N.Y., General Electric Co., Electronics Lab., Syracuse, N.Y., Aug. 1962.
Stroke, G. W., *An Introduction to Coherent Optics and Holography*, New York, Academic Press, 1966.
Tippett, J. T., Berkowitz, D. A., Clapp, L. C., Koester, C. J., and Vanderburgh, A., Jr., *Optical and Electro-Optical Information Processing*, Cambridge, Mass., M.I.T. Press, 1965.

# Measurement of Noise in Video Systems

By RUDOLF FELDT

#### Introduction

Noise in video systems cannot be measured by means of a simple voltmeter because of the blanking and sync pulses which are essential elements in these systems. A wide variety of special methods and measuring equipment has been developed to measure video noise — including oscillogram scanning, and the use of an oscilloscope to measure the peak value of the noise signal. Most of these techniques have inherent weaknesses, but a recent measurement technique has been developed. This is a video noise meter which permits "objective" measurements of noise, quickly and easily.

In all communication systems, noise has a major effect on the quality of transmission. Measurement of SNR, therefore, is practiced on a large scale. In television systems, the significance of noise is perhaps even greater because of the very large bandwidth of the TV channels and because the transmitted signals are, by their very nature, pulses, i.e., similar in characteristics to the noise signals. Until recently, no completely satisfactory method was readily available for measurement of video noise.

Measurement of noise in a video system cannot be achieved by means of a simple voltmeter because of the presence of the blanking and sync pulses (vertical and horizontal), which are required for the operation of the transmission system. The amplitude of these operational signals is several orders of magnitude larger than that of the noise, and, therefore, would make any direct measurement impossible (Fig. 1a). Because of this problem, a number of methods and techniques have been developed; however, these have serious limitations.

*Noise Measuring Method According to RCA*

Noise voltage, which is contained in a line or in the full picture, is displayed on the screen of an oscilloscope. This oscillogram is scanned by means of the photocell through a horizontal slot. This scanning is accomplished by shifting the oscillogram in vertical direction by means of a dc voltage, which is the so-called "displacement voltage." The current in the photocell is a measure for the distribution frequency of the amplitudes. The displacement voltage, which is required to reduce the current in the photocell in both directions to 60.7%, corresponds to twice the rms value of the noise voltage. The accuracy of this method is quite satisfactory. The requirements for the oscilloscope are rather demanding. Major disadvantages are the complexity of the operation and the rather small measuring range, which at the best amounts to 60 dB.

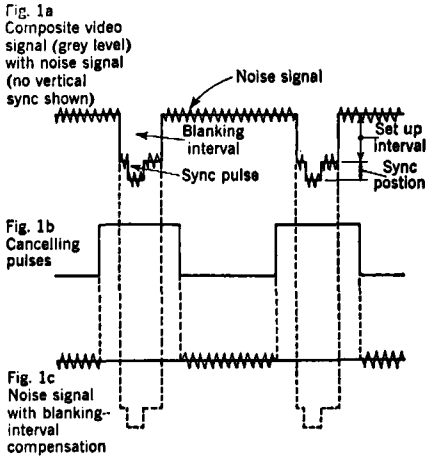



**Fig. 1**

A contribution submitted by the author, Rudolf Feldt, Rohde & Schwarz Sales Co., 111 Lexington Ave., Passaic, N.J. 07055, first on August 11, 1967, and, in a slightly expanded version, on October 12, 1967. The earlier version was presented by the author in April 1967 at the NAB Conference in Chicago and published in the *Proceedings of the 1967 NAB Engineering Conference.*