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**PROCEEDINGS OF THE IRE**

Volume 47, 1959

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# PROCEEDINGS OF THE IRE

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Instrumentation Conference and Exhibit, Nov 9-11, 1959, Atlanta, Ga.: Oct 24A  
Interdisciplinary Conference on Self-Organizing Systems, Office of Naval Research-Armour Research Foundation, May 5-6, 1959, Chicago, Ill.: Jan 16A  
IRE Canadian Convention, Oct 7-9, 1959, Toronto, Ontario: Apr 16A, Sep 24A  
Magnetism and Magnetic Material Conference, Fifth, AIEE-IRE-APS-AIME-Office of Naval Research, Nov 16-19, 1959, Detroit, Mich.: Jul 14A  
Microwave Theory and Techniques National Symposium, Jun 1-3, 1959, Cambridge, Mass.: May 28A  
Mid-America Electronics Conference, Nov 3-5, 1959, Kansas City, Mo.: Jul 15A  
Midwest Industrial Radioisotopes Conference, AEC-Kansas State College, Feb 25-26, 1959, Manhattan, Kan.: Jan 16A  
Military Electronics Convention, Third National, PGMIL, Jun 29-Jul 1, 1959, Washington, D.C.: Feb 18A, Jun 20A  
Military Electronics Winter Convention, PGMIL, Feb 3-5, 1960, Los Angeles, Calif.: Nov 16A  
Nonlinear Magnetism and Magnetic Amplifiers Special Technical Conference, AIEE-PGIE, Sep 23-25, 1959, Washington, D.C.: Sep 18A  
Northeast Electronics Research and Engineering Show, Boston, Conn. and Western Mass. Sections, Nov 17-19, 1959, Boston, Mass.: Aug 18A, Nov 18A  
Nuclear Congress, Fifth, Apr 5-10, 1959, Cleveland, Ohio: Mar 18A  
Nuclear Science Sixth Annual Meeting, PGNS, Nov 19-20, 1959, Boston, Mass.: Oct 14A, Nov 20A  
PGVC Tenth National Meeting, Dec 3-4, 1959, St. Petersburg, Fla.: Nov 22A  
Plastic Engineers Conference, Jan 27-30, 1959, New York, N.Y.: Jan 15A  
Production Techniques Conference, Third National, Jun 4-5, 1959, San Mateo, Calif.: May 26A  
Quantum Electronics-Resonance Phenomena, International Conference, Office of Naval Research, Sep 14-16, 1959, Bloomingburg, N.Y.: Jun 16A  
Radar Return Symposium, Naval Ordnance Test Station, May 11-12, 1959, Albuquerque, N.M.: Apr 18A  
Radio Fall Meeting, EIA-IRE Committee on PG, Nov 9-11, 1959, Syracuse, N.Y.: Oct 26A  
Radio Frequency Interference Seminar, PGRFI-Air Force ARDC, Jun 15-16, 1959: Sep 15A  
Reliability and Quality Control in Electronics, Fifth National Symposium, IRE-EIA-ASQC-AIEE, Jan 12-14, 1959, Philadelphia, Pa.: Jan 18A

Reliability and Quality Control in Electronics, Sixth National Symposium, IRE—EIA—ASQC—AIEE, Jan 11-13, 1960, Washington, D. C.: Dec. 24A

Seventh Region Conference and Electronics Exhibit, May 6-8, 1959, Albuquerque, N.M.: Apr 30A

Solid-State Circuits Conference, Feb 12-13, 1959, Philadelphia, Pa.: Jan 22A

Southwestern IRE Conference and Electronics Show, Eleventh Annual, Apr 16-18, 1959, Dallas, Tex.: Apr 22A

Space Electronics and Telemetry National Symposium, Sep 28-30, 1959, San Francisco, Calif.: Sep 28A

Ultrasonics Engineering National Symposium, PGUE, Aug 17, 1959, Stanford, Calif.: Aug 20A

USRI Fall Meeting, USRI—PGAP—PGCT—PGIT—PGMTT, Oct 19-21, 1959, San Diego, Calif.: Sep 16A

WESCON, Aug. 18-21, 1959, San Francisco, Calif.: Aug 22A

Western Joint Computer Conference, IRE—AIEE—ACM, Mar 3-5, 1959, San Francisco, Calif.: Jan 14A

### Front Covers

Antenna Testing in a Simulated Upper Atmosphere: August

Bio-Medical Electronics: November

Computer Program for Character Recognition: October

Devices for Guiding both Microwaves and Sound Waves: July

Electronic Scanning of Infrared Waves: December

Government Research: May

Infrared Physics and Technology: September

IRE National Convention: March

Magnetic Elements for Performing Digital Logic: January

Masers in Radio Astronomy: June

Nature of the Ionosphere—An IGY Objective: February

A New Computing Tool—Multi-Phase Subharmonics: April

### Frontispieces

Barclay, A. P. H.: Sep 1414

Berkner, Lloyd V.: Nov 1814

Chaffee, E. Leon: Mar 370

Hamburger, Ferdinand, Jr.: Jun 1046

Harp, Charles E.: Aug 1302

Kilian, James R., Jr.: May 630

Oliver, Bernard M.: Apr 514

Olson, Harry F.: Oct 1702

Sinclair, D. B.: Feb 130

Teal, Gordon K.: Dec 2056

Waynick, Arthur H.: Jul 1190

Weber, Ernst: Jan 2

### IRE People

Aden, A. L.: Jan 42A

Albersheim, W. J.: Apr 42A

Alexander, W. G.: Nov 152A

Anderson, A. G.: Dec 80A

Anderson, E. I.: Jul 34A

Anderson, R. W.: Apr 42A

Anderson, T. N.: Jun 48A

Anthony, R. L.: May 46A

Auerbach, I. L.: Oct 54A

Auld, J. S.: Jul 56A

Ayer, W. E.: Jun 48A

Bagley, G. D.: Oct 54A

Baker, W. R. G.: Nov 72A

Barasch, H. P.: Mar 40A

Beagles, R.: Sep 48A

Beckers, A. E.: Jun 48A

Bedford, A. V.: Apr 62A

Bein, W.: Mar 40A

Benjamin, J. N.: Jan 60A

Beranek, L. L.: May 46A

Bethel, C. D.; Jr.: Dec 56A

Birochak, E.: Jun 50A

Bolljahn, J. T.: Jun 50A

Boyd, H. R.: May 46A

Brafman, H. E.: Mar 40A

Bramhall, F. B.: Jun 52A

Brenner, A.: Mar 42A

Breuer, M. A.: Oct 54A

Brewer, A. F.: Sep 48A

Brown, G. H.: May 48A

Brown, G. S.: Jul 34A

Bumpus, W. W.: Jan 40A

Burke, H. E.: May 57A

Burnap, R. S.: Oct 54A

Burrows, C. R.: May 57A

Busignies, H.: Jul 34A

Cadden, W. J.: Sep 48A

Cameron, E. G.: Sep 48A

Cantwell, R. J.: Jul 34A

Carlson, A. E.: Jul 36A

Carr, R. W.: Oct 56A

Caruthers, R. S.: May 58A

Casper, S.: Mar 42A

Castriota, L. J.: Aug 36A

Chaber, R.: Oct 58A

Chait, H. N.: Aug 36A

Chipp, R. D.: Jul 36A

Christensen, J. W.: Nov 72A

Clark, L. P.: Dec 80A

Clavier, A. G.: May 58A

Coggins, D. I.: Nov 76A

Coleman, J. B.: May 60A

Combellick, T. A.: Jun 58A

Coombs, W. C.: Nov 76A

Cooper, A. E.: Nov 68A

Cooperstein, M.: Jan 42A

Countryman, G. L.: Oct 58A

Cushing, T. D.: Apr 42A

Davis, C. B.: Jan 70A

Davis, L.: May 46A

Davis, R. E.: Oct 56A

Davison, B.: Oct 60A

Dean, N. J.: Dec 62A

Deichert, R. W.: Oct 62A

DeVore, L. T.: Mar 42A

Dewire, G. M.: Feb 32A

Dicker, P. E.: Dec 62A

DiMattia, A. L.: Dec 72A

Dinsmoor, T. E.: Nov 68A

Doane, H. J.: Aug 36A

Doll, E. B.: Mar 63A

Donaldson, W. L.: Jul 38A

Dudley, B.: Apr 42A

Dunlap, W. C.: Nov 68A

Edgerton, H. E.: May 63A

Emurian, A. D.: Aug 36A

Enderle, T. L.: Jun 54A

Estes, J. R.: Oct 58A

Evans, B. O.: May 69A

Farnell, G. W.: Jun 54A

Fenmer, M. E.: Dec 52A

Ferguson, S. A.: Jul 42A

Fink, D. G.: Apr 42A

Fischman, M.: Jan 70A

Fisk, J. B.: Mar 46A, Aug 40A

Fontaine, A.P.: May 63A

Foss, F. A.: Nov 68A

Freeman, H.: Jan 52A

Fuller, T. D.: Jan 42A

Gaffney, F. J.: May 64A

Gage, G. H.: Jun 56A

Galloway, R. E.: Jun 56A

Garnson, E. R.: Dec 68A

Gerharz, R.: Jun 58A

Gillings, J. W.: Jan 40A

Gimpel, D. J.: Jul 42A

Ginzton, E. L.: Nov 80A

Golden, N. J.: Jul 44A

Goldman, E. H.: Jul 40A

Goldsmith, T. T.: Aug 44A

Goldstein, S. H.: Apr 47A

Goodwin, P. S.: Jun 58A

Green, E. I.: Mar 46A

Groce, D. C.: Nov 80A

Gronner, A. D.: Mar 64A

Guarrera, J. J.: Dec 50A

Gunther, F. A.: Sep 48A

Guy, R. F.: Sep 50A

Gwyn, C. B.: Aug 44A

Hall, J. M.: Jun 60A

Hall, N. I.: Mar 56A

Hannell, F. D.: Feb 32A

Hansell, C. W.: Apr 62A

Hanson, O. B.: May 64A

Harris, D. B.: Jul 44A

Hauser, A. A.: Dec 64A

Hautzik, R. M.: Sep 54A

Havens, B. L.: Jun 60A

Havstad, H.: Apr 54A

Hayes, M. H.: Jun 63A

Headrick, L. L.: Nov 80A

Heins, J. L.: Dec 66A

Hennies, S. R.: May 74A

Herold, E. W.: Nov 84A

Hess, R. C.: Feb 30A

Hilliard, W. P.: Jul 46A

Hines, J. E.: Nov 88A

Hoagland, A. S.: Dec 66A

Hoagland, K. A.: May 64A

Hobbs, M.: Mar 56A

Hodgson, R. W.: May 66A

Holmes, E. A., III: May 69A

Houghton, A., Jr.: Apr 44A

Howard, J. H.: Aug 48A

Howitt, G.: Jul 38A

Hutter, R. G. E.: Jan 42A

Ilyland, L. A.: Mar 56A

Jackson, K. R.: Oct 60A

Johnson, H.: Apr 62A

Jolliffe, C. B.: Jan 63A

Jordan, J. P.: Oct 60A

Kebby, M. H.: Apr 47A

Keim, D. V.: Aug 48A

Kell, R. D.: Apr 62A

Kelly, M. J.: Mar 46A

Kent, L.: Mar 42A

Kimes, R. A.: Sep 54A

Kinnard, K. F.: Jun 64A

Kluender, E. C.: Mar 58A

Kneen, W.: Oct 66A

Korman, N.: Jan 63A

Krahe, L. R.: Oct 66A

Kreck, J. A.: Jan 70A

Kroemer, H.: Aug 48A

Kruse, C.: Aug 50A

Kuhin, H. G.: Dec 72A

Kukel, J.: Nov 90A

Lack, F. R.: Oct 64A, Dec 50A

Langford, R. C.: Nov 90A

Lee, R. W.: Jul 46A

Leifer, M.: Aug 50A

Leone, W. C.: Jul 46A

Leverenz, H. W.: Apr 50A

Leverton, W. F.: May 46A, Nov 94A

Lewis, D. L.: Jan 42A

Lewis, T. B.: Jul 48A

Linden, B. R.: Aug 58A

Lindenblad, N. E.: Apr 62A

Linville, T. M.: Nov 94A

Lloyd, C. G.: Apr 52A

Lolman, I. H.: May 69A

MacKay, J. B.: Nov 102A

Magid, M.: Dec 64A

Malter, L.: Oct 70A

Manke, A. G.: Feb 32A

Mariotti, P.: May 70A

Marshall, L. C.: Oct 70A

Marshall, R. L.: Jun 84A

Marx, F. L.: Oct 76A

Mautner, L.: Jun 92A

Mayer, A. B.: Aug 54A

Mayer, F.: Jul 48A

McDonald, J. J.: May 57A, Dec 66A

McIlwain, K.: Oct 69A

McKay, K. G.: Oct 69A

McRae, J. W.: Jul 48A

Merrigan, C. F.: Jan 64A

Mettler, R. F.: Jan 64A

Metz, H. I.: Jul 50A

Mirman, I.: Aug 78A

Mohr, M. E.: Oct 76A

Montgomery, G. F.: Jan 70A

Montlor, J. A.: Feb 30A

Moseley, F. L.: Jul 34A

Mueller, A. A.: Feb 30A

Mueller, G. E.: Mar 60A

Myers, B. R.: Aug 54A

Nadler, M.: May 70A

Nash, A.: Jun 70A

Nash, C. C.: Jul 50A

Nergaard, L. S.: Apr 62A

Noble, D. S.: Jul 52A

Norman, R. O.: Mar 58A

North, D. O.: Apr 62A

Norton, K. A.: Nov 104A

Oliner, A. A.: Dec 50A

Orth, R. T.: Jul 52A

Parisier, M.: Apr 52A

Pelta, E. R.: Jun 78A

Perzley, W.: Dec 80A

Petruszelli, R. T.: Oct 62A

Piller, S. E.: Oct 74A

Pittman, P. F.: Dec 70A

Plouffe, R. L.: Apr 54A

Porro, E. D.: Aug 54A

Preisman, A.: Jun 78A, Corr. Aug 36A

Preston, L. S., Feb 30A

Proctor, D. R.: Feb 30A

Pugsley, D. W.: Sep 56A

Rajchman, J. A.: Apr 62A

Ramberg, E. G.: Apr 62A

Ratynski, M. V.: Nov 122A

Renne, H. S.: Jun 84A

Ridinger, H. J., Jr.: Oct 74A

Riedel, J. C.: Apr 56A

Robinson, J. G.: Oct 78A

Rochester, N.: Sep 60A

Romig, H. G.: Jan 40A

Rose, A.: Apr 62A

Rubel, J. H.: Aug 58A

Rutherford, R. E.: Jun 72A

Salzer, J. M.: Sep 62A

Samuelson, R. E.: Sep 66A  
 Sanders, E. R.: Sep 64A  
 Schmidt, C. J.: Nov 118A  
 Schneider, S.: Jan 40A  
 Schneiderman, S.: Aug 58A  
 Schubert, E.: Nov 112A  
 Seitz, S.: Jul 54A  
 Selbmann, R. W.: Jan 63A  
 Shank, R. J.: Mar 56A  
 Shapiro, I.: Jul 54A  
 Shaw, G.: May 57A  
 Sheingold, L. S.: Sep 64A  
 Shower, E. G.: Jul 56A  
 Siff, R. G.: Feb 36A  
 Single, C. H.: Apr 58A  
 Sioles, G. W.: Jun 110A, Dec 70A  
 Sittner, W. R.: May 73A  
 Smith, D. B.: Apr 42A  
 Smith, J. S.: Feb 32A  
 Smith, L. D.: Oct 78A  
 Spencer, C. L.: Jan 70A  
 Sprague, R. C.: Aug 54A  
 Stearns, H. M.: Dec 52A  
 Steele, E. L.: Aug 62A  
 Stehn, J. W.: Dec 76A  
 Stoddart, H. F.: Dec 80A  
 Stokes, I.: Nov 110A  
 Stratton, J. A.: Feb 32A, Aug 62A  
 Stuart, D. M.: Nov 122A  
 Struun, P. D.: Jun 48A  
 Sullivan, A. H.: Jan 48A  
 Sullivan, M. V.: Jul 56A  
 Swanson, B. E.: Jan 60A  
 Swanson, E. C.: Jun 110A  
 Talmo, R. E.: Dec 70A  
 Tate, R.: Sep 72A  
 Taylor, A. H.: Nov 130A  
 Taylor, H. M.: May 78A  
 Taylor, R. L.: Aug 62A  
 Teasdale, R. D.: Apr 56A, Jul 58A  
 Thomas, J. E.: Aug 66A  
 Thomason, T. H.: Mar 64A  
 Tittle, H. C.: Aug 66A  
 Town, G. R.: Apr 54A  
 Townes, C. H.: Oct 80A  
 Trotter, H.: Aug 72A  
 Tucker, J. A.: Dec 80A  
 Tull, W. J.: Jul 46A  
 Twersky, V.: Apr 58A  
 Urrico, F. X.: Aug 74A  
 Vaccaro, F. E.: Aug 74A  
 Vadasz, A. J.: Mar 60A  
 Villard, O. G.: Dec 50A  
 Vogel, O. F.: Oct 82A  
 Vogelman, J. H.: Aug 78A  
 Wait, J. R.: Oct 82A, Nov 134A  
 Walter, C. A.: May 74A  
 Wanner, L. R.: Aug 74A  
 Warriner, R. R.: Jun 88A  
 Watt, A. D.: Oct 84A  
 Waynick, A.: Nov 134A  
 Weber, E.: Aug 82A  
 Webster, W. M.: Aug 90A  
 Weeton, W. E.: Sep 72A  
 Weiss, M. T.: Aug 94A  
 Weiss, R. A.: May 78A  
 Welles, S. B.: Apr 60A  
 Wellner, F. R.: Dec 68A  
 West, J. L.: Oct 90A  
 Westman, H. P.: Dec 76A  
 Wheeler, H. A.: Nov 152A  
 Whitford, R. K.: Oct 90A  
 Whitney, M. G.: Jul 58A  
 Williams, H. M.: Jun 63A  
 Williams, J. B.: Dec 80A  
 Wilson, D. G.: Nov 136A  
 Winkler, S.: Jul 58A  
 Wolff, H. P.: Sep 72A  
 Wolff, I.: Apr 60A, Oct 86A  
 Worthen, K. J.: Jun 88A, Aug 96A  
 Wulfe, R. F.: Oct 88A  
 Yeh, L. P.: Sep 76A  
 York, R.: Oct 90A  
 Yoshida, M.: Aug 96A  
 Young, G. G.: Dec 52A  
 Young, H. A.: May 74A  
 Ziegler, H. K.: Dec 72A

### Miscellaneous

Aeronautical Communications Symposium, 1958, Meets in Utica: Feb 18A  
 Amateur Radio SSB Dinner and Hamfest: Feb 15A, Mar 15A  
 Brewer Receives PGRQC Award: Apr 14A  
 Brown, G. S. Honored by AIEE: Nov 16A  
 Buxton and Felix Receive NEC Award: Dec 15A  
 Dean Receives PGBTR Award: Jul 15A

Electron Devices Meeting Well Attended: Jan 16A  
 Eta Kappa Nu Honors Young Engineers: Dec 22A  
 Guy, Raymond F. Honored by Broadcast Pioneers: Jul 18A  
 Hammond, Dr. J. H. Receives Elliot Cresson Medal: Nov 16A  
 Hazeltine Forms ALRI Team: Nov 14A  
 Hazeltine "Neutrodyne" at Smithsonian: May 22A  
 Herold Speaks to Detroit Section: Feb 15A  
 Hornbeck, J. A. Speaks on Transistors: Aug 15A  
 Information Processing International Conference Honors 13 Americans: May 18A  
 IRE Members Receive Young Engineers Awards: Jan 18A  
 IRE National Convention to Feature New Topics: Feb 14A  
 Italian Award Given to Sarnoff, Engstrom and Zworykin: Dec 15A  
 Jensen Honored by IRE Standards Committee: Jun 16A  
 Kalnus Awarded Army Prize: Dec 14A  
 Kepner, Gen. Heads PGMIL Meeting: Apr 15A  
 Krasik, Sidney Award Designated by PGNS: Feb 18A  
 Lack Receives EIA Medal of Honor: Aug 16A  
 Lamb, J. J. Receives Amateur Radio Award: Dec 15A  
 MAECON 1958 Highlights: Mar 18A  
 Mathematical Journal Has New Editorial Staff: May 22A  
 NBS to Publish Radio Propagation Journal: Feb 16A  
 NEC Elects 1959 Officers: Mar 15A  
 Olson Elected to National Academy of Sciences: Jul 16A  
 Peterson, A. M. Receives Seventh Region Award: Nov 15A  
 PGEWS Holds Second Annual Symposium: Feb 16A  
 PGMIL National Convention Has Record Attendance: Sep 14A  
 Pickering, W. H. Receives PGRQC Award: Mar 14A  
 Ramo, Dr. S. To Address Eta Kappa Nu: May 18A  
 RTTY Dinner Scheduled for New York: Mar 16A  
 Sinclair Attends Hungarian Symposium: Dec 14A  
 Systematic Ionospheric Data Program of NBS: Oct 16A  
 Teachers Hear IRE Science Lecture Series: Sep 16A  
 WESCON 1959 Officers Chosen: Feb 18A  
 WESCON "New Look": Jun 14A  
 Zepler Elected New President of British IRE: Mar 16A

### Notices

ACM Conference to be Held at M.I.T.: Aug 16A  
 Aeronautical and Navigational Electronics Conference Proceedings Available: Jan 16A  
 AIEE Calls for Papers: Nov 14A  
 AIEE Elects Officers: Aug 18A  
 Air Force MARS Eastern Technical Net Announces Programs: Jan 15A, Feb 16A, Mar 16A, Apr 18A, May 18A, Jun 15A, Nov 16A, Dec 20A  
 American Automatic Control Council Calls for Papers: Feb 16A  
 Armour Foundation Plans Radio Interference Meeting: Aug 14A  
 Army MARS Technical Net Announces Programs: Jan 14A, Feb 16A, Mar 16A, Apr 16A, May 20A, Nov 15A, Dec 20A  
 ASQC Reliability Handbook Now Available: Jun 16A  
 Australian IRE Elects Officers: Aug 14A  
 Automatic Control Course at University of Michigan: Mar 16A  
 Communications Symposium Calls for Papers: May 22A  
 EIA Holds Conference on Value Engineering: Sep 15A  
 EJCC Issues Call for Papers: Jul 14A  
 Electrical Techniques in Medicine and Biology Conference Issues Call for Papers: May 18A  
 Electronic Components Conference Calls for Papers: Nov 16A  
 Extended Range and Space Communications Symposium To Publish Proceedings: Jan 18A

Geophysical Research Journal Revision and Expansion: Feb 15A  
 Instrumentation Conference Solicits Papers: Jul 20A  
 Instrumentation Symposium and Research Equipment Exhibit to Feature New Equipment: Sep 16A  
 IRE Constitution Amendments Adopted: Jun 14A  
 IRE Miscellaneous Publications Available: May 24A, Oct 16A  
 IRE National Convention Calls for Papers: Aug 15A, Sep 15A  
 IRE National Convention Record, 1959: Apr 20A  
 IRE Standards Available: Dec 18A  
 Kelly Award to be Given by AIEE: Apr 18A  
 Long Island IRE Sponsors Radio Talks: Oct 14A  
 MAECON—1959 Calls for Papers: Apr 14A  
 Magnetics Conference Solicits Papers: Jan 18A  
 Microwave Tubes International Congress Calls for Papers: Dec 20A  
 Military Electronics Convention Calls for Papers: Jan 15A, Dec 16A  
 M.I.T. Announces Summer Program: Apr 16A, Jun 15A, Jul 18A  
 NAECON Proceedings Now Available: Oct 14A  
 NBS Publishes Radio Propagation Journal: Jun 15A, Sep 18A  
 NBS To Publish Four-Part Journal: Jul 16A  
 NEC Issues Calls for Papers: May 20A  
 NEREM—1959 Calls for Papers: Jul 18A  
 New York University Offers Temporary Memberships: Dec 18A  
 Nominations for 1960 IRE Officers and Delegates: Jul 15A  
 Nonlinear Magnetics and Magnetic Amplifiers Conference Announces Paper Deadline: Mar 14A  
 PGHFE To Conduct Symposium: Dec 14A  
 PGMIL Calls for Papers: Oct 15A  
 PGMITT Abstracts Deadline: Nov 14A, Dec 14A  
 PGMITT Plans Symposium and Solicits Papers: Feb 14A  
 PGVC Calls for Papers: Apr 14A  
 Public Employment Service: Nov 16A  
 RQC Calls for Papers: Jun 14A  
 Russian Acoustical Journal Translated: Jul 16A  
 Russian Journal Translations Available Through ISA: Mar 16A  
 Russian Solid-State Journal Available: Aug 16A  
 Solid-State Circuits Conference Calls for Papers: Jul 18A  
 Solid-State Conference Publishes Papers Digest: Apr 16A  
 SWIRECO Summary Available: Aug 14A  
 Telemetry National Symposium Calls for Papers: Apr 15A  
 Telemetry Symposium Proceedings Available: Jan 14A  
 Ultrasonics National Symposium Invites Contributions: Feb 15A  
 WESCON Convention Record Available: Oct 16A  
 WESCON Papers Deadline: Feb 14A, Mar 15A, Apr 15A  
 WESCON Sponsors Future Engineers Show: May 20A  
 Western Electronic Manufacturers Association Includes Eleven States: Aug 16A  
 WJCC Deadline Announced: Oct 14A

### Obituaries

Buck, Dudley A.: Aug 18A  
 Crossley, Alfred: Oct 15A  
 Eckersley, Thomas Lydwell: Jul 20A  
 Goldup, Thomas E.: Dec 22A  
 Guthrie, Frederick P.: May 24A  
 Kent, Roscoe: Dec 22A  
 Mahood, David M.: May 26A  
 Morlock, William J.: Aug 18A  
 Parker, Henry W.: May 26A  
 Phelps, Boyd: Sep 18A  
 Quarles, Donald A.: Aug 18A  
 Ridenour, Louis N., Jr.: Aug 20A  
 Tarhoux, Joseph G.: May 24A  
 Varian, Russel H.: Oct 15A  
 Wheeler, Lynde P.: Apr 18A  
 Zenneck, Jonathan: Jul 20A

### Photographs

Adler, Dr. Robert, Receiving a 1958 PGBTR Award: Sep 16A



Aero-Com Symposium Banquet: Feb 18A  
 Benelux Section Officers: Dec 18A  
 Bennett, Rear Admiral Rawson, Guest Speaker  
 at the Annual PGANE Luncheon: Jun 15A  
 Brown, Dr. Gordon S.: Nov 16A  
 Brown, S. R.: Sep 16A  
 Cedar Rapids Section Banquet: Dec 20A  
 Dean, Dr. Charles E. Receives PGBTR Award:  
 Jul 15A  
 Disney, V. H., New President of NEC: Mar  
 15A  
 Electrical Techniques in Medicine and Biology  
 Conference Committee: Aug 16A  
 Electron Devices Meeting: Jan 16A  
 Hammond, Dr. J. H. Sr.: Nov 16A  
 Harnell, G. P. and Mervin J. Kelly: May 22A  
 Hazeltine, Alan, With Model of "Neutrodyne":  
 May 22A  
 Herold, E. W. Speaks to Detroit Section: Feb  
 15A  
 Hornbeck, J. A. With L. J. Giacioletto and F.  
 Caddy: Aug 15A  
 IRE-AIIE Chairmen of Student Branches:  
 Jan 16A  
 IRE Canadian Convention Executive Com-  
 mittee: Apr 16A  
 Jensen, Axel G., Honored by IRE Standards  
 Committee: Jun 16A  
 Kales, Dr. Morris L. Receiving an Applied  
 Science Award from Dr. Jacob E. Dinger:  
 Jul 16A  
 Kepner, Gen., PGMIL Convention President:  
 Apr 15A  
 Lamb, J. J. Receiving Radio Award From  
 G. L. Dosland: Dec 15A  
 MIL-E-CON Planning Committee: Nov 14A  
 Olson, Harry F., Elected to National Academy  
 of Sciences: Jul 16A  
 Peterson, Dr. Allen M., Receiving Achiev-  
 ment Award from Glenn A. Fowler: Nov  
 15A  
 LaGrone, A. H. Receives PGB Award From  
 G. E. Hagerty: Dec 14A  
 PGNS Fifth National Meeting: Feb 16A  
 PGRFI Interference Authorities: Sep 15A  
 Pickering, Dr. W. H., Named to Receive  
 PGRQC Award: Mar 14A  
 Reliability and Quality Control Symposium  
 Officials and Winners: Apr 14A  
 Rome-Utica Section and Armed Forces Com-  
 munications and Electronics Association  
 Combined Meeting: Mar 18A  
 Solid-State Circuits Conference Committee:  
 Mar 16A  
 Solid-State Microwave Electronics Informal  
 Session: May 22A  
 SWIRECO Invitation Presented to Dr. Ernst  
 Weber: Jun 16A  
 UNESCO Consultants: Jun 14A  
 Washington Section Annual Banquet Speak-  
 ers: Apr 18A

Weber, Dr. E., Mrs. Weber, W. L. Donaldson  
 and G. Pish at Southwest Research Insti-  
 tute: Aug 16A  
 WESCON Board Members with Dr. E. Weber:  
 Aug 14A

### Poles and Zeros

Atlanta is Captured, IRE Style: Jan 1  
 Constitutional Bylaws: Oct 1701, Nov 1813  
 DX and Progress: Jun 1045  
 Electronics-Oriented Engineers: Mar 369  
 Electronics is Youth: Mar 369  
 Engine in Engineering?: Jan 1  
 Engineering School Enrollment: May 629  
 Engineering Writing and Speech: Aug 1301  
 Graduate Degrees: Nov 1813  
 High School Students: Aug 1301  
 Index of IRE Publications: Sep 1413  
 International Geophysical Year: Feb 129  
 International Scene: Dec 2055  
 IRE Constitutional Changes: Feb 129  
 IRE Convention Record, Apr 513  
 IRE and IRIS: Sep 1413  
 IRE Members Speak: Jul 1189  
 IRE National Convention: Mar 369  
 Lusted, Dr. Lee, First MD Elected IRE Fel-  
 low: Apr 513  
 May Board Meeting: Jul 1189  
 Metric System: Apr 513  
 New Electronic Application: Jul 1189  
 Scientific Marriage: Nov 1813  
 Section Publications: Apr 513, May 629  
 Sections Approved: Benelux; Milan, Italy; and  
 Orlando, Fla.: Jun 1045  
 Space: Feb 129  
 Space ad Infinitum: Oct 1701  
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