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**1970
International
Conference on
Communications**



**Institute of
Electrical and
Electronics
Engineers, Inc.**



JUNE 8, 9 and 10

A MESSAGE FROM THE CHAIRMAN EXECUTIVE COMMITTEE ICC-70

The Theme "Communications in the Development of Nations" has served as your Executive Committees guide in arranging the overall program for ICC-70. An outstanding Technical Program featuring some 60 foreign and 190 domestic technical papers are to be presented in 47 sessions. One of the sessions, a panel discussion session titled "Communications for the Community of Man," featuring some outstanding international leaders in communications and higher education, will explore the human environment for communications engineers. For the Luncheon and Dinner we also have outstanding speakers who will be:

Dinner:

Dr. Charles Süsskind, Professor of Engineering Science, The University of California College of Engineering

Luncheon:

Dr. Heinrich Haymerle, Ambassador of Austria, Chairman, United Nations Council for Peaceful Uses of Outer Space

The planning for the convention has been directed to provide for a completely balanced convention. One that features not only the top technical advances described in the technical papers, but also featuring the display of actual hardware that is the result of these technical engineering achievements. An extensive exhibit area will display the latest products of the telecommunication manufacturers from the United States and foreign countries.

In planning your schedule at the convention, be sure to include time to spend talking to the representatives of the manufacturers that are displaying these latest developments. You will find this just as valuable as attending the technical sessions.

All in all your committee feels it has put together a convention that will meet the requirements of all technical personnel in the telecommunication industry. ICC is now the communications channel for the communication industry. This assembly will continue to grow each year to further enhance its value to all of the individual communication engineers as well as the industry as a whole.

All of us on the Executive Committee are eagerly looking forward to welcoming you and your families to San Francisco this coming June. If there is anything we can do to help make your stay more exciting, more interesting and more profitable, please let us know.

Sincerely yours,

WALT NOLLER

*Chairman Executive Committee
ICC-70*

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Antennas and Propagation
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 Circuit Theory
 Communication Technology
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REGISTRATION

Registration will be in the Main Lobby of the Hilton
 Hotel during the following hours:

| | | |
|-----------|---------|----------------|
| Sunday | June 7 | 12 Noon - 8 PM |
| Monday | June 8 | 8 AM - 5 PM |
| Tuesday | June 9 | 8 AM - 5 PM |
| Wednesday | June 10 | 8 AM - Noon |

All those attending the technical sessions must register and receive badges. Your conference fee includes registration, admission to all technical sessions, conference material and a copy of the conference record. For those who register by mail, your badges, tickets for the luncheon and dinner, and general registration material will be waiting for you outside the exhibit area in the main lobby of the Hilton Hotel.

REGISTRATION FEES

| <i>Before</i> | <i>Technical</i> | | |
|---------------------|------------------|-----------------|---------------|
| <i>May 21, 1970</i> | <i>Sessions</i> | <i>Luncheon</i> | <i>Dinner</i> |
| IEEE members | \$18.00 | \$6.75 | \$13.00 |
| Non-Members | 23.00 | 6.75 | 13.00 |
| Students | 2.00 | 6.75 | 13.00 |
| <i>And after</i> | | | |
| <i>May 22, 1970</i> | | | |
| IEEE Members | \$20.00 | \$6.75 | \$13.00 |
| Non-Members | 25.00 | 6.75 | 13.00 |
| Students | 2.00 | 6.75 | 13.00 |

Advance registration is urged to minimize delay and to insure hotel accommodations. Cut-off date for advance registration refund is June 5, 1970. Mail registration and remittances to:

JOHN J. SCHEMBRI
 P.O. Box 77591
 San Francisco, California 94107

Make all checks payable to:
 "ICC - 70"

Extra registration forms and programs may be obtained by writing to the above address.

HOTEL RESERVATIONS

The San Francisco Hilton is known widely by discriminating travelers and has reserved rooms appropriate to the expected attendance. The hotel is located right in the business/shopping area and is only a few minutes on foot from principal stores, theaters, and other downtown hotels. Because of the popularity of the hotel and the number of visitors to the city, particularly in June, advance registration is imperative and a hotel registration card is enclosed. All reservations for rooms should be made with the hotel, preferably on the card. Should you reserve by letter or phone, please identify with ICC-70.

TELEPHONE MESSAGE CENTER

Should you wish to maintain contact with home or office during the conference; the telephone number is: Area Code 415 771-7170

This service is being provided through the courtesy of the Pacific Telephone Company and will be in operation during the following hours:

| | | |
|-----------|---------|----------------|
| Monday | June 8 | 8:30 AM - 5 PM |
| Tuesday | June 9 | 8:30 AM - 5 PM |
| Wednesday | June 10 | 8:30 AM - 5 PM |

Please check the telephone message center frequently for your calls.

EXHIBITS

The Hilton Plaza will be used as a display area for exhibits. The exhibition area will be open from 10:00 AM to 5:00 PM on Monday, from 10:00 AM to 5:00 PM on Tuesday, and from 10:00 AM to 4:00 PM on Wednesday. Admission to the exhibit area is included in your conference registration.

CONFERENCE RECORD

A Conference Record containing all papers will be furnished each registered conferee (except students). Additional copies may be purchased during the conference for \$10.00 per copy or after the conference from IEEE Headquarters.

INTERNATIONAL PARTICIPANTS'

An International Participant's lounge will be located in the Teakwood A Room. It will be open daily during the conference.

CONFERENCE DINNER AND SOCIAL HOUR

On Tuesday evening we will hold the conference dinner in the Continental Ballroom. Dinner beginning at 7:30 will be preceded by a no-host social hour beginning at 6 p.m. Cost of the dinner is shown in the table of fees. Don't miss this excellent opportunity to meet new friends and renew old acquaintances. The featured speaker will be Charles Süsskind, Professor of Engineering Science at the University of California in Berkeley. Dr. Süsskind has made extensive contributions to microwave engineering, electron optics, biomedical electronics and, through his avocation, to the history of technology. In addition, there will be an awards presentation.

CONFERENCE LUNCHEON

On Wednesday, June 10th, you are invited to attend the conference luncheon in the Hilton's Imperial Ballroom. Cost of the luncheon is shown in the table of fees. The featured speaker will be Dr. Heinrich Haymerle. Dr. Haymerle is chairman of the United Nations Council for Peaceful Use of Outer Space. He is deeply committed to worldwide collaboration and participates in many important international events. Dr. Haymerle, a career diplomat, has a message of great interest to the technical community.

SOCIAL ACTIVITIES

Most of the San Francisco attractions are best enjoyed in small groups free to choose between the many points of interest, so no organized activity is offered. There will, however, be information available on sightseeing, nightspots, and other interesting activities.

LADIES ACTIVITIES

A program of variety and interest is being arranged at nominal cost. This will include a tour of San Francisco and the famed Ghirardelli Square on Monday, June 8, (please reserve space on Advance Registration Card). Also a behind the scenes tour of some of San Francisco's stores has been arranged for Tuesday, June 9. The Ladies Hospitality Headquarters will be established convenient to the registration area. Directions for these activities will be contained in a special Ladies Program to be distributed at the registration desk. Ladies should bring some medium weight clothes since weather is usually mild through the day. Evenings are cool, however, and a wrap will be needed.

TECHNICAL PROGRAM

All conference sessions will be held on the ballroom floor of the Hilton Hotel according to the following schedule:

Monday, June 8, 9:00 a.m. to 12:00 noon

Session 1: ELECTROACOUSTIC TRANSDUCERS

Organizer: G-Audio and Electroacoustics,
G. M. Sessler

Chairman: G. M. Sessler, Bell Telephone Labs.

- 1.1: Use of Solid-State Acoustic Transducers in Communications
W.P. Mason, Columbia University
- 1.2: Flexural Mode Piezoelectric Transducers
C.P. Germano, Piezoelectric Div., Gould, Inc.
- 1.3: Electret Transducers Applied to the Telephone
C. W. Reedyk, Northern Electric Co., Ltd.,
Ottawa, Ont., Can.
- 1.4: Directional Transducers
G. M. Sessler and J. E. West, Bell Telephone Labs.
- 1.5: Thickness Mode Piezoelectric Transducers for Ultrasonic Delay Lines
T. R. Meeker, Bell Telephone Labs.

Monday, June 8, 9:00 a.m. to 12:00 noon

Session 2: SOURCE ENCODING

Organizer: TC-Communication Theory, P. Wintz

Chairman: P. Wintz, Purdue University

- 2.1: Maximum Likelihood Quantizer Design for Digital Matched Filter Receivers
F. Bruno, Hazeltine Corp. (70-CP-206-COM)
- 2.2: Bandwidth Reduction via Movement Compensation on a Model of the Random Video Process
F. Rocca, S. Zanoletti, Istituto di Elettrotecnica Politecnico, Milano, Italy (70-CP-207-COM)
- 2.3: Differential PCM Encoding of TV Signals Using a Digital Loop
P. Kaul, COMSAT Labs. (70-CP-202-COM)
- 2.4: Image Coding Using the PEANO Map
J. F. Hayes, Bell Telephone Labs. (70-CP-205-COM)
- 2.5: Image Coding by Coding Contours
L. Wilkins, P. Wintz, Purdue Univ. (70-CP-210-COM)

Monday, June 8, 9:00 a.m. to 12:00 noon

Session 3: CUSTOMER TELEPHONE SYSTEMS I

Organizer: TC-Communication Switching,
J. H. Weber, Bell Telephone Labs

Chairman: W. B. Groth, IBM Corp.

- 3.1: IBM 2750 Voice and Data Switching System Overview
A. Romano, IBM, France (70-CP-211-COM)
- 3.2: IBM 2750 System Description
P. T. Chu, IBM, France (70-CP-212-COM)
- 3.3: IBM 2750 Programming and Simulation
D. S. Lake, IBM, France (70-CP-213-COM)
- 3.4: IBM 2750 Application and Operational Experience
J. J. de Buck, IBM, France (70-CP-214-COM)
- 3.5: IBM 2750 Switching Technology
J. Besseyre, IBM, France (70-CP-215-COM)
- 3.6: ITT TE400A Full Electronic PABX
J. Reines, ITT Telecommunications (70-CP-216-COM)

Monday, June 8, 9:00 a.m. to 12:00 noon

Session 4: WIDEBAND DATA

Organizer: TC-Data Communication Systems,
J. R. Mineo

Chairman: J. R. Mineo, Michigan Bell Telephone Co.

- 4.1: A New Wideband Partial-Response Data Set
A. M. Gerrish and W. J. Lawless, Bell Telephone Labs. (70-CP-217-COM)
- 4.2: An Automatic Equalizer for a Wideband Partial-Response Data Set
H. F. Haisch, Bell Telephone Labs. (70-CP-218-COM)
- 4.3: Adaptive Tuning Recovery in a Wideband Partial-Response Data Set
J. G. Kneuer, Bell Telephone Labs. (70-CP-219-COM)
- 4.4: Decision-Directed Digital Adaptive Equalization Technique for High-Speed Data Transmissions
A. Lender, Lenkurt Electric Co., Inc. (70-CP-219-COM)
- 4.5: Megabit Data Link Using Noncoherent Light Sources
B. G. King, Orthel, Schultz, Bell Telephone Labs. (70-CP-220-COM)

Monday, June 8, 9:00 a.m. to 12:00 noon

Session 5: MECHANIZED MICROWAVE ENGINEERING

Organizer: TC-Radio Communication, R. F. Johnson

Chairman: R. F. Johnson, Western Telecommunications, Inc.

- 5.1: **An Approach to Computer Assisted Microwave System Design**
D. Brulotte, M. Lecours, Laval Univ., Quebec, Canada (70-CP-221-COM)
- 5.2: **Programing Time Shared Computers for Microwave Radio Interference Studies**
C. H. Roggenkamp, Southern Bell Tel. & Tel. Co. (70-CP-222-COM)
- 5.3: **A Computer System for Microwave Frequency Coordination and Interference Calculations**
H. E. Turner, American Tel. & Tel. Co. (70-CP-225-COM)
- 5.4: **Computerization of Radio Engineering Functions**
J. D. Creel, South Central Bell Tel. Co. (70-CP-224-COM)
- 5.5: **Automated Design and Analysis of FDM-FM Communications Systems**
W. L. Bauer, III, M. J. Braums, Philco-Ford (70-CP-225-COM)

Monday, June 8, 9:00 a.m. to 12:00 noon

Session 6: MILLIMETER-WAVE COMMUNICATION SYSTEMS — PANEL DISCUSSION

Organizer: TC-Communication Systems Disciplines,
C. A. Strom, Jr.

Chairman: C. A. Strom, Jr. USAF, Rome Air Development Center

Overview of Millimeter-Wave Communications
C. A. Strom, Jr., RADC

- 6.1: **Millimetric Waves Communications for the DCS**
D. T. Worthington, Defense Communications Agency (70-CP-226-COM)
- 6.2: **Millimeter Wave Technology**
S. Kapuscinski, Raytheon Company (70-CP-227-COM)
- 6.3: **Millimeter Wave System for Space Communications**
L. Ippolito, Goddard Space Flight Center (70-CP-229-COM)
- 6.4: **Some Other Millimeter Wave Applications**
W. E. Coffrin, Raytheon Company (70-CP-230-COM)

Monday, June 8, 9:00 a.m. to 12:00 noon

Session 7: DIGITAL SIGNAL CONVERSION

Organizer: TC-Wire Communication, J. M. Sipress,
Bell Telephone Labs.

Chairman: T. J. Fellows, Northern Electric Co., Ltd.,
Canada

- 7.1: **Variable Nonlinear PCM Codec**
Y. Hoshiki, T. Aoki, C. Ohkawara, Nippon

T&T Public Corp., Japan; M. Kawashima,
S. Hinoshita, and Y. Minejima, FUJITSU
Labs., Japan (70-CP-231-COM)

- 7.2: **Consideration in Selection of a MU-255 Companding Characteristic**
E. J. Anderson, Bell Telephone Labs. (70-CP-232-COM)
- 7.3: **Six Decibel Digital Attenuation**
W. L. Montgomery, Bell Telephone Labs. (70-CP-233-COM)
- 7.4: **A Continuous Delta Modulator and a Numerical Converter for an Integrated Telecommunication Network**
P. A. Deschenes, M. Villeret, University de Sherbrooke, Quebec, Canada (70-CP-234-COM)
- 7.5: **A Digitally Companded Delta Mode for Speech Transmission**
J. A. Greefkes, Philips Research Labs., Eindhoven, The Netherlands (70-CP-235-COM)

Monday, June 8, 9:00 a.m. to 12:00 noon

Session 8: BANDWIDTH LIMITED COMMUNICATIONS

Organizer: TC-Communication System Disciplines,
L. S. Golding

Chairman: L. S. Golding, COMSAT Labs.

- 8.1: **Intersymbol Interference Considerations in Digital Communications**
M. Celebiler, O. Shimbo, COMSAT Labs. (70-CP-236-COM)
- 8.2: **Narrowband Medical Telemetry Over the Dial Telephone Network**
R. N. Watts, Bell Telephone Labs. (70-CP-237-COM)
- 8.3: **Minimum Bandwidth Multiplex Radio Teleprinter System**
R. D. Tottingham, Barry Research (70-CP-238-COM)
- 8.4: **Analysis of Intermodulation Distortion in an FDMA Communication System with a Bandwidth Constraint**
R. B. McClure, COMSAT Labs. (70-CP-239-COM)
- 8.5: **Factors in the Design of Multiple Voice Channel Equipment for Nominal 3 kHz Bandwidth Circuit**
C. F. Teacher, Philco-Ford (70-CP-240-COM)
- 8.6: **Analysis of Differential Systems for PCM Transmission**
B. R. N. Murthy, Bell Telephone Labs., P. A. Wintz, Purdue Univ. (70-CP-240-COM)

Monday, June 8, 2:00 p.m. to 5:00 p.m.

**Session 9: EXAMPLES OF
TELECOMMUNICATIONS PLANNING**

- Organizer:** International Participation Chairman,
G. Wallenstein
- Chairman:** G. Wallenstein, Lenkurt Electric Co., Inc.
- 9.1: Communications and the Development of Mexico**
E. Mendez, Undersecretary, Secretaria de Comunicaciones y Transportes, Mexico;
E. M. del Campo, C. Perez-Correa, N. Duch, Instituto de la Comunicacion, Mexico, D.F.;
F. Ruiz, Direccion General de Telecomunicaciones, S.C.T., Mexico (70-CP-241-COM)
- 9.2: Estimating Telephone Necessities in Developing Countries: A New Approach**
B. Wellenius, Universidad de Chile, Santiago, Chile (70-CP-242-COM)
- 9.3: Long Range Forecasting in Overseas Telephone Service**
P. G. Yatrakis, A.T.&T. (70-CP-242-COM)
- 9.4: Growth Trends in Telephone and Switching Development**
H. K. Ebenberger Standard Telephone und Telegraphen A.G., Vienna, Austria (70-CP-244-COM)

Monday, June 8, 2:00 p.m. to 5:00 p.m.

Session 10: CHANNEL CHARACTERIZATION

- Organizer:** TC-Communication Theory, E. Baghdady, ADCOM Teledyne Corp.
- Chairman:** R. E. Totty, Radiation, Inc.
- 10.1: Characterization of Man-Made Noise and Prediction Error Rate in VHF Digital Systems**
R. Esposito and J. F. Roche, Raytheon Company (70-CP-245-COM)
- 10.2: Burst Statistics for Digital Signaling on Frequency Selection Fading Channels**
W. E. Coffrin, Raytheon Company (70-CP-246-COM)
- 10.3: Communication over Completely Known Time-Varying Multipath Channels**
J. F. Bartram, Raytheon Company (70-CP-247-COM)
- 10.4: Analysis of Satellite Communications in a Multipath Environment**
J. J. Uhran, and J. L. Massey, Univ. of Notre Dame (70-CP-248-COM)
- 10.5: A Simple Method for the Simulation of Fading Channels**
E. O. Landeide, General Dynamics (70-CP-249-COM)

- 10.6: An Approach to Impulse Noise Due to Adjacent Channel Interference**
K. Greene, COMSAT Labs. (70-CP-250-COM)
- 10.7: Characterization of Noisy Communication Channels**
E. A. Quincy, D. J. Krause, and G. R. Proctor, Colorado State Univ. (70-CP-251-COM)

Monday, June 8, 2:00 p.m. to 5:00 p.m.

Session 11: CUSTOMER TELEPHONE SYSTEMS II

- Organizer:** TC-Communication Switching,
J. H. Weber, Bell Telephone Labs.
- Chairman:** F. K. Becker, Bell Telephone Labs.
- 11.1: Exploratory Common Control Key Telephone System—System and Functional Description**
L. P. Fabiano, Bell Telephone Labs. (70-CP-252-COM)
- 11.2: Exploratory Common Control Key Telephone System—Novel Technological Aspects**
L. C. Allen, R. L. Cerbone, T. R. King, Bell Telephone Labs. (70-CP-253-COM)
- 11.3: The Electronic Key Telephone Concentrator System**
D. J. H. Knollman, Bell Telephone Labs. (70-CP-254-COM)
- 11.4: A new Electronic PABX — Objectives and Design Considerations**
S. B. Weiner, A. A. Jorgensen, Stromberg-Carlson Corp. (70-CP-255-COM)
- 11.5: A New Electronic PABX—Trunks and Related Circuitry**
J. Adams, Stromberg-Carlson Corp. (70-CP-256-COM)
- 11.6: A New Electronic PABX—System Organization and Control**
E. O. Lee, Stromberg-Carlson Corp. (70-CP-257-COM)

Monday, June 8, 2:00 p.m. to 5:00 p.m.

Session 12: DATA INPUT AND OUTPUT DEVICES

- Organizer:** TC-Data Communication Systems,
W. Y. Lang
- Chairman:** W. Y. Lang, Consultant
- 12.1: A Highly Adaptive 9600/4800 bps Data Modem for Voice-Band Telephone Channels**
E. D. Gibson, Autonetics, No. Am. Rockwell Corp. (70-CP-435-COM)
- 12.2: Data Set 203—A New High-Speed Voiceband Modem**
L. N. Holzman, W. J. Lawless, Bell

- Telephone Labs. (70-CP-259-COM)
- 12.3: **High Speed Paper Tape Punch**
H. D. Purps, Philips Central Lab., Hamburg,
Germany (70-CP-261-COM)
- 12.4: **1200-2400 BITS/SEC Printer in Japan**
K. Ukitsu, K. Mukai, I. Nakano, Nippon
Telephone & Telegraph Public Corp.,
Tokyo, Japan (70-CP-262-COM)
- 12.5: **Informatik Terminal LO 380**
B. Cramer, Standard Elektrik Lorenz AG,
Stuttgart, Germany (70-CP-260-COM)
- 12.6: **Touch-Tone Data Input System**
R. M. Hirsch, MITE Corp. (70-CP-258-COM)

Monday, June 8, 2:00 p.m. to 5:00 p.m.

**Session 13. LINE-OF-SIGHT MICROWAVE
PROPAGATION — Panel Discussion**

Organizer: TC-Radio Communication, W. T. Barnett
Chairman: W. T. Barnett, Bell Telephone Labs.

Engineering of line-of-sight microwave systems has many facets related to propagation. The speakers will give short presentations bearing on this topic. Since the main objective of this seminar is the discussion of significant problems, ample time will be reserved for questions and comments from the audience.

- 13.1: **Explanation of Fast Atmospheric Fading on Line-of-Sight Systems**
H. Magnuski, Motorola, Inc.
(70-CP-263-COM)
- 13.2: **Observations on a Path in the Everglades**
C. B. Burnett, American Telephone &
Telegraph Co. (70-CP-264-COM)
- 13.3: **Occurrence of Multipath Fading**
W. T. Barnett, Bell Telephone Labs.
(70-CP-265-COM)
- 13.4: **Review of Space and Frequency Diversity**
A. Vigants, Bell Telephone Labs.
(70-CP-266-COM)
- 13.5: **Some Aspects of Microwave System Reliability**
R. F. White, Lenkurt Electric Co., Inc.
(70-CP-267-COM)

Monday, June 8, 2:00 p.m. to 5:00 p.m.

Session 14: LASER COMMUNICATION SYSTEMS

Organizer: TC-Communication System Disciplines,
J. L. Randall
Chairman: J. L. Randall, Marshall Space Flight
Center

- 14.1: **Optical Transmission Research**
S. Miller, Bell Telephone Labs.
(70-CP-268-COM)
- 14.2: **Optical System Design Considerations for Atmospheric Turbulence**
D. Fried, Autonetics, North American
Rockwell (70-CP-269-COM)
- 14.3: **Visible Laser Communications for Space Missions**
H. Wischnia, Perkins-Elmer Corp.
(70-CP-270-COM)
- 14.4: **Optical Communication Systems Design and Evaluation**
J. Ward, ITT Federal Labs.
(70-CP-271-COM)
- 14.5: **Theoretical Considerations in Design of Optical Communication Systems**
S. Karp, NASA (70-CP-272-COM)

Monday, June 8, 2:00 p.m. to 5:00 p.m.

**Session 15: TRANSMISSION SYSTEMS DESIGN
AND PERFORMANCE**

Organizer: TC-Wire Communication, J. M. Sipress
Chairman: J. M. Sipress, Bell Telephone Labs.

- 15.1: **An Approach to Asynchronous Time Division Communications Network Design**
J. W. Pan, Bell Telephone Labs.
(70-CP-273-COM)
- 15.2: **A Digital Mastergroup Channel for Modern Coaxial Systems**
J. F. Gunn, D. C. Weller, Bell Telephone
Labs. (70-CP-274-COM)
- 15.3: **A Consideration on a Simplified PCM Repeated Line**
T. Matsushimi, H. Fujimoto, H. Iigima, H.
Shimoyama, Nippon Electric Co., Ltd.,
Tokyo, Japan (70-CP-275-COM)
- 15.4: **Modeling and Error Structure of Interference Due to Far-End Crosstalk in Cables Carrying Digital Signals**
K. R. Swaminathan, Bell Telephone Labs.
(70-CP-276-COM)
- 15.5: **Experimental 60 MHz Coaxial Cable System Repeated Line**
K. Tanaka, S. Mano, Y. Jimbo, Nippon Tele-
graph & Telephone Public Corp, Tokyo,
Japan (70-CP-277-COM)

Monday, June 8, 2:00 p.m. to 5:00 p.m.

**Session 16: COMPUTER COMMUNICATION
SYSTEMS**

Organizer: TC-Communication System Disciplines,
R. W. Lucky, Bell Telephone Labs.

Chairman: B. Goldberg, U.S. Army Electronics
Command, Fort Monmouth

- 16.1: **Electronic Data Switching for Data Communication**
P. Kern, K. Gossiau, Siemens AG, Munich,
Germany (70-CP-273-COM)
- 16.2: **Comparison of Synchronous and Asynchronous Time Division Multiplexing Techniques**
J. H. Chang, IBM (70-CP-274-COM)
- 16.3: **An Adaptive Decision Feedback Equalizer**
R. R. Bowen, J. Storey, Communications
Research Centre, Ottawa, Canada, D. A.
George, Carleton University, Ottawa,
Canada (70-CP-275-COM)
- 16.4: **A Survey of Error Correcting Techniques for Data on Telephone Facilities**
H. O. Burton, Bell Telephone Labs.
(70-CP-276-COM)
- 16.5: **Two-Wire DC Baseband System for Two-Way Simultaneous Data Transmission at High Speeds**
R. Gaiser, Siemens AG, Munich, Germany
(70-CP-277-COM)
- 16.6: **Improving the Reliability of Acoustically Coupled Data Modems**
R. Meidan, Applied Digital Data Systems,
Inc. (70-CP-278-COM)

Tuesday, June 9, 9:00 a.m. to 12:00 noon

Session 17: MISSION REQUIREMENTS AND SPECIFICATIONS OF PERFORMANCE FOR 1970 DECADE HIGHWAY ELECTRIC VEHICLES — Panel Discussion

Organizer: G-Vehicular Technology, R. R. Aronson

Moderator: R. R. Aronson, Electric Fuel Propulsion, Inc.

Panel Members:

- J. F. Norberg, E. S. B., Inc.
J. Young, Edison Electric Institute
D. Freedman, Mini Cars, Inc.
B. Cozzens, Consultant to The Utility Industry
D. Dow, Consultant

Tuesday, June 9, 9:00 a.m. to 12:00 noon

Session 18: COMMUNICATION THEORY AND CODING

Organizer: G-Information Theory, W. C. Lindsey,
Univ. of Southern California

Chairman: R. A. Scholtz, Univ. of Southern
California

- 18.1: **Performance of Reed-Solomon Codes on a Symmetric Erasure Channel**
P. J. Trafton, General Telephone and
Electronic Labs., Inc.
- 18.2: **Construction of Asymptotically Optimal Rate $\frac{1}{2}$ Diffuse Codes**
S. Tong, Bell Telephone Labs.
- 18.3: **Automated Code Word Synchronization — The Noiseless Case**
R. A. Scholtz, Univ. of Southern California
- 18.4: **Rate Distortion Theory for Sources with Memory**
R. M. Gray, Stanford University
- 18.5: **Statistical Detection with Pattern Recognition and Threshold Learning**
E. A. Graham, Universite de Paris, Paris,
France
- 18.6: **Estimation of a Time-Varying Parameter Using a Dynamic Stochastic Approximation Algorithm**
D. D. Falconer, R. D. Gitlin, Bell Telephone
Labs.
- 18.7: **Threshold Determination in Sequential Detection with Fixed Error Rates**
N. E. Nahi, R. M. Gagliardi, University of
Southern California (70-CP-285-COM)

Tuesday, June 9, 9:00 a.m. to 12:00 noon

Session 19: COMPUTER AND COMMUNICATION NETWORKS

Organizer: TC-Communication System Disciplines,
L. Kleinrock

Chairman: L. Kleinrock, University of California,
Los Angeles

- 19.1: **Optimal Design of Centralized Computer Networks**
H. Frank, I. T. Frisch, W. Chou, R. Van
Slyke, Network Analysis Corp.
- 19.2: **Suboptimal Communication Network Synthesis**
R. L. Sharma, M. T. El-Bardai, Collins Radio
- 19.3: **Topology and Transmission Rate Considerations in the Design of Centralized Computer-Communication Networks**
D. R. Doll, Datamax Corp.
- 19.4: **Control of Data Processor Networks**
I. Cohen, Electronic Arrays, Inc.
- 19.5: **Vulnerability of Directed Communication Networks**
M. Malek-Zavarej, University of California,
Berkeley, I. T. Frisch, Network Analysis Corp.

Tuesday, June 9, 9:00 a.m. to 12:00 noon

Session 20: FACSIMILE

Organizer: TC-Data Communication Systems
H. G. Burkhard

Chairman: H. G. Burkhard, U.S. Army Electronics
Command, Ft. Monmouth

20.1: **Thin Film Facsimile Scanner**
J. M. Hanlet, W. H. Hell, Marquardt Corp.,
G. E. Brown, Comm/ADP Lab., Ft.
Monmouth (70-CP-286-COM)

20.2: **The New IEEE Facsimile Test Chart**
B. C. Burdick, Eastman Kodak Co.
(70-CP-287-COM)

20.3: **DACOM Facsimile Data Compression
Techniques**
D. Hochman, D. R. Weber, DACOM, Inc.
(70-CP-288-COM)

20.4: **FASTFAX—A Second Generation Facsimile
System Employing Redundancy Reduction
Techniques**
B. Rosenbeck, Litcom Div., Litton Systems,
Inc. (70-CP-289-COM)

20.5: **Automatic Phase Control (APC) of Wideband
Facsimile Transmission**
H. Koga, Nippon Electric Co., Ltd., Tokyo,
Japan (70-CP-290-COM)

Tuesday, June 9, 9:00 a.m. to 12:00 noon

Session 21: TOPICS IN ANGLE MODULATION

Organizer: TC-Radio Communication
J. C. G. Carter

Chairman: J. C. G. Carter, Westinghouse
Electric Corp.

21.1: **Threshold Analysis of the Frequency
Modulation Feed Forward (FMFF) FM
Demodulator**
J. A. Camp, Collins Radio (70-CP-291-COM)

21.2: **A 70 MHz Solid-State Frequency Modulator**
J. H. Denny, General Electric Co.
(70-CP-292-COM)

21.3: **A Comparative Analysis of FM Threshold
Extension Techniques**
G. D. Arndt, F. J. Loch, NASA
(70-CP-293-COM)

21.4: **The Eye Diagram for the Noncoherent
Binary Receiver**
W. F. McGee, Northern Electric Co.,
Canada (70-CP-294-COM)

21.5: **Spectrum Economy for Filtered and Limited
FSK Signals**
J. R. Boykin, Westinghouse Electric Corp.
(70-CP-295-COM)

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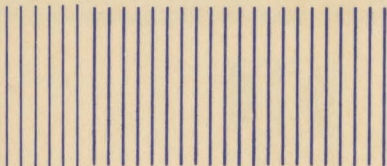
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- 21.6: An Adaptive Coherent Diversity Receiver for PSK Data Transmission Through Dispersive Media
D. M. Brady, Bell Telephone Labs.
(70-CP-296-COM)
- 21.7: A New Direct Regenerative Repeater for PCM/PSK Microwave System
M. Hata, T. Ohta, S. Ohwaku, H. Honda,
OKI Electric Industry Co., Ltd., Japan
(70-CP-297-COM)

Tuesday, June 9, 9:00 a.m. to 12:00 noon

Session 22: LASERS AND MILLIMETER WAVE COMMUNICATIONS

Organizer: TC-Space Communication
F. B. Woodworth
Chairman: F. B. Woodworth, Airborne Instruments Lab.

- 22.1: Some System Considerations in Millimeter Space Communications
J. Bonnelle, TRW (70-CP-298-COM)
- 22.2: Measurements on Earth Space Paths at 1.9 Centimeters, 1 Centimeter and 10 Micrometers Wavelengths
R. W. Wilson, Bell Telephone Labs.
(70-CP-299-COM)
- 22.3: Avalanche Diode Oscillators — A Proven Solid-State Microwave Source
D. L. Scharfetter, Bell Telephone Labs.
(70-CP-300-COM)
- 22.4: Millimeter Wave Communication Experiments for Satellite Applications
J. C. Wiltse, Martin-Marietta Corp.
(70-CP-301-COM)
- 22.5: Carbon Dioxide Laser Systems for Space Communication
J. H. McElroy, Goddard Spaceflight Center
(70-CP-302-COM)
- 22.6: The Offset Fed Spherical Reflector
D. F. DiFonzo, COMSAT Labs.
(70-CP-303-COM)
- 22.7: Optical Modulation at Gigahertz Rates
G. White, Bell Telephone Labs.
(70-CP-304-COM)

Tuesday, June 9, 9:00 a.m. to 12:00 noon

Session 23: CHARACTERISTICS AND CHARACTERIZATION OF THE TELEPHONE CHANNEL — I

Organizer: TC-Wire Communication, H. T. Uthlaut
Chairman: H. T. Uthlaut, South Central Bell Telephone Co.

- 23.1: **National Telephone Network Transmission Planning in the AT&T Company**
F. T. Andrews, Jr., and R. W. Hatch, Bell Telephone Labs. (70-CP-305-COM)
- 23.2: **Quality Control Procedures Utilized in the Bell System**
H. L. Kertz, American Telephone and Telegraph Co. (70-CP-306-COM)
- 23.3: **Systems Engineering Survey of the GT&E Subscriber Loop Plant**
C. H. Davis, W. J. Lally, General Telephone and Electronics Service Corp. (70-CP-307-COM)
- 23.4: **Transmission Analysis of GT&E Customer Loop Plant**
J. O. Norback, General Telephone and Electronics Service Corp. (70-CP-308-COM)
- 23.5: **Rural Telephone Systems: Designs and Performance**
T. J. McDonough, R. E. Hitt, W. J. Lally, Rural Electrification Admin., US Dept. Agr. (70-CP-309-COM)

Tuesday, June 9, 9:00 a.m. to 12:00 noon

Session 24: CIRCUIT THEORY

- Organizer:** G-Circuit Theory, R. W. Lucky, Bell Telephone Labs.
Chairman: D. A. Spaulding, Bell Telephone Labs.
- 24.1: **A Tunable Band-Notch Filter for RF and Audio Applications**
T. V. Saliga, Honeywell Comm. Center
- 24.2: **SSB Frequency Division Multiplexing Using TDM Digital Filters**
C. F. Kurth, Bell Telephone Labs.
- 24.3: **Optimization of Pulse Shaping Filters for Data Transmission**
R. J. Tracey, Bell Telephone Labs.
- 24.4: **A Fast Computer Routine to Design High Frequency Broadband Hybrid Integrated Amplifiers**
L. Besser, Fairchild Microwave & Opto-electronics Div.
- 24.5: **A New Integrated Oscillator for TOUCH-TONE Dialing**
D. Feldman, T. N. Rao, R. D. Biggs, R. A. Tice, Bell Telephone Labs.

Tuesday, June 9, 2:00 p.m. to 5:00 p.m.

Session 25: COMMUNICATIONS FOR THE COMMUNITIES OF MAN — Panel Discussion

- Organizer:** International Participation Chairman, G. D. Wallenstein
Chairman: G. D. Wallenstein, Lenkurt Electric Co., Inc.

Panel Members:

- F. L. Bates, University of Georgia; Head, Dept. of Sociology
C. Cherry, Imperial College of Science and Technology, London, England; Professor of Telecommunication
H. Haymerle, Ambassador of Austria to the United Nations; Chairman, U.N. Council for Peaceful Uses of Outer Space
H. E. Hoelscher, University of Pittsburgh; Dean of Engineering

This session is entirely devoted to discussion of the social environment in which the communications engineer goes about his work. No prepared papers will be read. The panel members will instead take up questions from the audience.

Tuesday, June 9, 2:00 p.m. to 5:00 p.m.

Session 26: DIGITAL SIGNAL PROCESSING

- Organizer:** TC-Communication Theory, J. Salz
Chairman: J. Salz, Bell Telephone Labs.
- 26.1: **An Adaptive Equalized Modem for Partial Response Channels**
G. K. McAuliffe, IBM (70-CP-315-COM)
- 26.2: **Application of Digital Processing of a DC PSK HF Modem**
M. Zimmerman, General Atronics Corp. (70-CP-316-COM)
- 26.3: **Adaptive Digital Filtering for PAM Data Transmission**
M. G. Taylor, Bell Telephone Labs. (70-CP-317-COM)
- 26.4: **Some Aspects of Overflow Oscillation in Digital Filters**
J. E. Mazo, Bell Telephone Labs. (70-CP-317-COM)
- 26.5: **Finite State Equalization of a Dispersive Data Channel in the Presence of Noise**
R. Pickholz, Polytechnic Institute of Brooklyn (70-CP-318-COM)
- 26.6: **Composite Signal Decomposition**
D. G. Childers, University of Florida (70-CP-319-COM)
- 26.7: **Fast Fourier Transform Speech Compression**
G. S. Robinson and R. L. Granger, COMSAT Labs. (70-CP-320-COM)

Tuesday, June 9, 2:00 p.m. to 5:00 p.m.

Session 27: NEW SWITCHING SYSTEMS

Organizer: TC-Communication Switching,
J. H. Weber, Bell Telephone Labs.

Chairman: A. E. Joel, Bell Telephone Labs.

- 27.1: **NX-IE—An Electronically Controlled Crossbar Switching System**
E. Aro, T. K. Cheney, J. McMullen, North Electric Co. (70-CP-321-COM)
- 27.2: **The NX-IE Routing Control Complex**
J. Watts, North Electric Co.
(70-CP-322-COM)
- 27.3: **The 10C Toll Telephone Switching System Central Processor**
J. B. Beierle, Bell Telephone Manufacturing Co., Antwerp, Belgium (70-CP-323-COM)
- 27.4: **A Function Sharing Design for a Large Message Switching System**
J. J. Sharp, Standard Telephones and Cables, Ltd., ITT Creed, Herts. England (70-CP-324-COM)
- 27.5: **Program Controlled Telephone Switching System Featuring Remote Control in Central Data Channels**
G. Gattner, Siemens AG, Munich, Germany (70-CP-325-COM)
- 27.6: **A Computer Controlled Electronic TELEX Exchange**
Y. Nakagome, Y. Fukata, H. Mori, Kokusai Denshin Denwa Co., Ltd., Tokyo, Japan (70-CP-326-COM)

Tuesday, June 9, 2:00 p.m. to 5:00 p.m.

Session 28: DATA TECHNIQUES

Organizer: TC-Data Communication Systems,
R. A. Gibby

Chairman: R. A. Gibby, Bell Telephone Labs.

- 28.1: **BCH Code Performance for Sampled Data**
A. Appel, P. Wintz, Purdue University (70-CP-327-COM)
- 28.2: **Design and Performance of a Statistical Multiplexer**
T. H. Gordon, Bell Telephone Labs.
(70-CP-328-COM)
- 28.3: **Selection of Optimal Transmission Rate for Statistical Multiplexors**
W. W. Chu, University of California at Los Angeles (70-CP-329-COM)
- 28.4: **Data Buffer Occupancy Statistics for Asynchronous Multiplexing of Data in Speech**
D. Sherman, Bell Telephone Labs.
(70-CP-330-COM)

- 28.5: **Joint Equalization, Carrier Acquisition, and Timing Recovery for Data Communication**
R. W. Chang, Bell Telephone Labs.
(70-CP-331-COM)

Tuesday, June 9, 2:00 p.m. to 5:00 p.m.

Session 29: INTERFERENCE AND NOISE ON RADIO SYSTEMS

Organizer: TC-Radio Communications, R. R. Clement

Chairman: R. R. Clement, General Electric Co.

- 29.1: **Minimization of Envelope Delay Distortion Due to Mode Conversions in Circular Wave Guide and Horn Antenna Systems**
A. T. Schindler, Northern Electric Co., Ottawa, Canada (70-CP-332-COM)
- 29.2: **Differential Phase and Gain in FM Radio Relay Systems Caused by Feeder Line Echo Distortions**
F. H. Hartke, General Electric Co.
(70-CP-333-COM)
- 29.3: **A Comprehensive Amplitude Probability Distribution for Atmospheric Radio Noise**
L. L. Lay, L. B. Browne, Westinghouse Electric Corp. (70-CP-334-COM)
- 29.4: **Interference Rejection Characteristics of a Diversity System**
L. Lundquist, Bell Telephone Labs.
(70-CP-335-COM)
- 29.5: **Baseband Distortion in Angle Modulated Systems Due to Thermal Noise and Multiple Interference**
G. A. Wong, Bell Telephone Labs.
(70-CP-336-COM)
- 29.6: **Multipath Intermodulation Associated with Operation of FM-FDM Radio Relays in Heavily Built Areas**
D. Ongaro, SIT Siemens, Milano, Italy
(70-CP-337-COM)

Tuesday, June 9, 2:00 p.m. to 5:00 p.m.

Session 30: SATELLITE COMMUNICATION SYSTEMS PROBLEMS AND SOLUTIONS

Organizer: TC-Space Communication, L. Pollack, COMSAT Labs.

Chairman: F. J. Altman, Computer Sciences Corp.

- 30.1: **Limitations on Fence and Pit Shielding for Satellite Earth Stations**
E. Nagelberg, Bell Telephone Labs.
(70-CP-338-COM)

- 30.2: **Impulse Noise Effects Due to Adjacent Carrier Interference**
M. R. Wachs, COMSAT Labs.
(70-CP-339-COM)
- 30.3: **Design Study of a Transportable Ground Station**
K. C. O'Brien, H. J. Scagnelli, Bell Telephone Labs. (70-CP-340-COM)
- 30.4: **A Computer Controlled Frequency Shift Radiometer for Satellite Power Monitoring**
L. Gray, E. Steinbrecher, COMSAT Labs.
(70-CP-341-COM)
- 30.5: **A Pulse Counter Type Demodulator**
O. Peterson, Northern Electric Co., Ltd., Ottawa, Canada (70-CP-342-COM)
- 30.6: **Earth Station Transitions Within the Intelsat System**
J. Potts, H. Prescott, Communications Satellite Corp. (70-CP-343-COM)

Tuesday, June 9, 2:00 p.m. to 5:00 p.m.

Session 31: CHARACTERISTICS AND CHARACTERIZATION OF THE TELEPHONE CHANNEL — II

Organizer: TC-Wire Communication, J. M. Sipress, Bell Telephone Labs.

Chairman: P. J. May, Stromberg-Carlson Corp.

- 31.1: **Operating Experience of Station Carrier**
A. J. Flores, T. L. Moore, Rural Electrification Administration, US Dept. Agr.
(70-CP-344-COM)
- 31.2: **Minimum Perceptible and Minimum Understandable Telephone Speech Levels**
J. V. Buscemi, Superior Continental Corp.
(70-CP-345-COM)
- 31.3: **Phase Jitter Measurement on Voice Frequency Channels**
J. T. Boatwright, Northeast Electronics Corp.
(70-CP-346-COM)
- 31.4: **58-Type Echo Suppressor Measuring System**
R. D. Baum, Bell Telephone Labs.
(70-CP-347-COM)
- 31.5: **New Aids to the Laying and Monitoring of Submarine Links**
C. Chalhoub, Compagnie Industrielle Des Telecommunications, Paris, France
(70-CP-348-COM)

Tuesday, June 9, 2:00 p.m. to 5:00 p.m.

Session 32: VEHICULAR COMMUNICATION 1970

Organizer: G-Vehicular Technology, R. H. Moore, Communications Dept., City of San Jose, Calif.

Chairman: M. H. Jones, Sylvania Electric Products, Inc.

- 32.1: **The Development of Two-Way Radio by the Public Utilities Commission of Liberia**
J. W. Robinson, Motorola Communications International, Inc.
- 32.2: **Supervision and Control Features of a Small-Zone Radiotelephone System**
P. T. Porter, Bell Telephone Labs.
- 32.3: **A Nation-Wide Direct-Dialing Mobile Radiotelephone System**
H. Grosse, TEKADE-Felten und Guillaume GmbH, Germany
- 32.4: **A Minimal Data Probabilistic Model for Spectrum Management**
E. R. Freeman, Sachs/Freeman Associates, Inc.
- 32.5: **Digital Communications for Law Enforcement Agencies**
R. T. Adams, Sylvania Electric Products, Inc.

Wednesday, June 10, 9:00 a.m. to 12:00 noon

Session 33: COMMUNICATION CONCEPTS FOR AIRLINE OPERATIONS OF THE FUTURE — Panel Discussion

Organizer: TC-Communication System Disciplines, G. Karger

Moderator: G. Karger, Eastern Airlines, Inc.

- 33.1: **Overview of Future Airline Communication Systems (Introductory Remarks)**
G. Karger, Eastern Airlines, Inc.
(70-CP-354-COM)
- 33.2: **Airline Communications Requirements for the Seventies**
B. F. McLeod, Pan American World Airways
(70-CP-355-COM)
- 33.3: **The FAA Role in Aviation Communication Development**
R. W. Meier, Federal Aviation Administration (70-CP-356-COM)
- 33.4: **Data Link Communications for the Seventies**
L. C. Keene, ITT Navigator Systems, Inc.
(70-CP-357-COM)
- 33.5: **Airframe Requirements for Future Communications**
R. Dunn, The Boeing Company
(70-CP-358-COM)

Wednesday, June 10, 9:00 a.m. to 12:00 noon

Session 34: SYNCHRONIZATION AND MODULATION THEORY

Organizer: TC-Communication Theory
Chairman: J. Uhran, University of Notre Dame

- 34.1: **Time to Cycle Slip in First and Second Order Phase Lock Loops**
L. Schuchman, Bellcomm, Inc.
(70-CP-359-COM)
- 34.2: **Hybrid Carrier and Modulation Tracking Systems**
W. C. Lindsey, University of Southern California (70-CP-360-COM)
- 34.3: **Steady States and Transient Analysis of a Digital Bit-Synchronization Phase-Locked-Loop**
J. R. Cessna, University of Iowa
(70-CP-361-COM)
- 34.4: **A Digital Phase-Locked Loop for Synchronizing Digital Networks**
H. Goto, Nippon Electric Co., Ltd., Kawasaki, Japan (70-CP-362-COM)
- 34.5: **Diversity of Modulation and Its Applications**
N. P. Murarka, IITRI (70-CP-363-COM)
- 34.6: **Generalized Notion of Ambiguity Function**
H. P. Debart, Alcatel, Montrouge, France
(70-CP-364-COM)
- 34.7: **A Pseudo Bayes Digital Radar Receiver**
J. R. McLendon, A. P. Sage, Southern Methodist University (70-CP-365-COM)

Wednesday, June 10, 9:00 a.m. to 12:00 noon

Session 35: TRAFFIC CONSIDERATIONS IN SWITCHING SYSTEMS

Organizer: TC-Communication Switching,
J. H. Weber
Chairman: J. H. Weber, Bell Telephone Labs.

- 35.1: **An Approximation to Delay Distributions in Single-Server, Systems with Poisson Arrivals Arbitrary Service Time Distribution and Random Selection**
J. G. van Bosse, Automatic Electric Labs., Inc. (70-CP-366-COM)
- 35.2: **Algorithms for Constructing Ideal Gradings for Nonhoming Selectors (An Application of the Theory of Block Designs)**
O. A. Pedersen, Automatic Electric Labs., Inc. (70-CP-367-COM)
- 35.3: **Space Time Equivalences in Switching Networks**
M. J. Marcus, MIT (70-CP-368-COM)

- 35.4: **Performance of a Simple Multiplexer-Concentrator for Data Communication**
H. Rudin, Jr., IBM, Zurich, Switzerland
(70-CP-369-COM)
- 35.5: **Switching Networks for 10C Toll and Tandem Exchanges**
H. H. Adelaar, Bell Telephone Manufacturing Co., Antwerp, Belgium
(70-CP-369-COM)

Wednesday, June 10, 9:00 a.m. to 12:00 noon

Session 36: DATA TRANSMISSION TECHNIQUES

Organizer: TC-Data Communication Systems,
M. A. Berk
Chairman: M. A. Berk, IBM Systems & Development Division

- 36.1: **A Loop Transmission System**
E. H. Steward, IBM Corp. (70-CP-370-COM)
- 36.2: **A Pulse-Code Modulated Transmission Loop**
R. O. Hippert, IBM Corp.
- 36.3: **On the Use of Error Statistics from Data Transmission on Telephone Facilities to Estimate Performance of Forward-Error-Correction**
H. O. Burton, W. K. Pehlert, Jr., Bell Telephone Labs. (70-CP-372-COM)
- 36.4: **Frequency Modulation Using Digital Filtering Techniques**
B. R. Saltzberg, Bell Telephone Labs.
(70-CP-373-COM)
- 36.5: **An All-Digital Multichannel Narrowband FSK Data Receiver**
C. A. Buzzard, Bell Telephone Labs.
(70-CP-374-COM)
- 36.6: **A Real Time Processor for the Control of an All Digital Multiline Data Set**
G. Pasternack, Bell Telephone Labs.
(70-CP-375-COM)

Wednesday, June 10, 9:00 a.m. to 12:00 noon

Session 37: RADIO COMMUNICATIONS SYSTEMS

Organizer: TC-Radio Communication, J. C. G. Carter, Westinghouse Electric Corp.
Chairman: R. F. White, Lenkurt Electric Co., Inc.

- 37.1: **A Multiple Access Communications System Using Multi-Frequency Pulses**
E. Y. Ho, Bell Telephone Labs., F. Haber, University of Pennsylvania
(70-CP-376-COM)

- 37.2: **A Laboratory Ultra Wideband FM/IM Optical Data Relay System**
H. V. Hance, D. G. Peterson, R. B. Ward,
R. C. Ohlmann, Lockheed (70-CP-377-COM)
- 37.3: **Effect of Data Loading on Radio and Carrier Systems**
J. B. Berry, Southern Bell Telephone and
Telegraph Co. (70-CP-378-COM)
- 37.4: **Approach to a Successful High Capacity Microwave Radio System**
P. A. Nwafor, Bell Telephone Co., Ottawa,
Canada (70-CP-379-COM)
- 37.5: **An Experimental High Speed PCM/AM Optical Communication System Using a Mode Locked He-Ne Gas Laser**
T. Masuda, T. Uchida, Y. Ueno,
T. Shimamura, Nippon Electric Co., Ltd.,
Tokyo, Japan (70-CP-380-COM)
- 37.6: **Engineering Considerations Concerning Maritime Public Correspondence Telephone Communications**
V. B. Robinett, Pacific Telephone
(70-CP-381-COM)
- 37.7: **A Frequency Dplexed Service Channel for IF Heterodyne Radio Repeaters**
J. W. Knapp and K. L. Seastrand, Bell
Telephone Labs. (70-CP-382-COM)

Wednesday, June 10, 9:00 a.m. to 12:00 noon

Session 38: REGIONAL COMMUNICATIONS SATELLITE SYSTEMS AND TECHNOLOGY

Organizer: TC-Space Communication, J. Aein
Chairman: J. Aein, Institute for Defense Analyses

- 38.1: **Domestic Satellite Communication for Australia**
A. Kellock, Australian Post Office,
Communication House, Victoria, Australia
(70-CP-383-COM)
- 38.2: **Low Cost Education a T-V Receiver Terminal (With Specific Application for Brazil)**
J. Janky, R. Taggart, B. Lusignan, Stanford
University (70-CP-384-COM)
- 38.3: **Domestic Satellite Design**
R. Briskman, Communications Satellite
Corp. (70-CP-385-COM)
- 38.4: **Novel Earth Terminal Antenna**
G. Hyde, COMSAT Labs. (70-CP-386-COM)
- 38.5: **Multiple Beam Antenna for Regional Communication Satellite**
J. Cowan, Philco-Ford Corp.
(70-CP-387-COM)

Wednesday, June 10, 9:00 a.m. to 12:00 noon

Session 39: 4-WIRE MAKES SENSE IN TRANSMISSION PLANNING — Panel Discussion

Organizer: TC-Wire Communication, G. J. Mack,
Illinois Bell Telephone Co.
Moderator: D. T. Osgood, American Telephone &
Telegraph Co.

- 39.1: **Overall Network Aspects and History**
F. D. Andrews, Jr., Bell Telephone Labs.
(70-CP-388-COM)
- 39.2: **Transmission Aspects**
A. F. Culbertson, Lenkurt Electric Co., Inc.
- 39.3: **Switching Aspects**
J. G. Pearce, Stromberg-Carlson Corp.
(70-CP-390-COM)
- 39.4: **Station Aspects**
G. E. Saltus, Bell Telephone Labs.
(70-CP-391-COM)

Wednesday, June 10, 9:00 a.m. to 12:00 noon

Session 40: ANTENNAS AND PROPAGATION—

Organizer: G-Antennas and Propagation,
J. H. Provencher
Chairman: J. H. Provencher, Naval Electronics
Lab. Center

- 40.1: **A Millimeter-Wave Intersatellite Communication Antenna**
F. J. Dietrich, D. F. Ford, H.L. Hillesland,
Philco-Ford Corp.
- 40.2: **A Nine Horn Cassegrain Feed Design Using Focal Plane Matching Techniques**
J. S. Ajioka, Hughes Aircraft Co.
- 40.3: **Step-Scanned Circular Array Antenna**
J. E. Boyns, C. W. Gorham, A. D. Munger,
J. H. Provencher, J. Reindel, B. I. Small,
Naval Electronics Lab. Center
- 40.4: **Wave Polarization Effects on Ionospheric Radio Communications**
C. P. Tou, C. R. Chow, Nova Scotia
Technical College, Nova Scotia, Canada
- 40.5: **The Relationship of High Latitude Scintillations to VHF Synchronous Satellite Communications**
J. Aarons, J. Mullen, AFCRL
- 40.6: **Earth/Space Propagation at L-Band Using the ATS-5 Spacecraft**
F. J. Kissel, Westinghouse Electric Corp.

Wednesday, June 10, 2:00 p.m. to 5:00 p.m.

Session 41: THE FUTURE OF ELECTRONIC AIDS FOR HIGHWAYS — Panel Discussion

Organizer: G-Vehicular Technology, I. S. Wisepart

Chairman: I. S. Wisepart, ALL, a Division of Cutler-Hammer, Inc.

Moderator: Brig. Gen. D. G. Penterman, State of Nebraska Military Department

- 41.1: **Overview of Communications Problem**
A. Goldsmith, Office of Telecommunications, Office of the Secretary of Transportation
- 41.2: **Los Angeles Area Freeway Surveillance and Control Project**
W. E. Schaefer, State of California Division of Highways
- 41.3: **Governmental Liability Problems Arising From the Use of Electronic Aids for Highways**
K. G. Nellis, State of California Department of Public Works
- 41.4: **Automotive Electronic Aids**
C. D. Simmons, Ford Motor Co.
- 41.5: **Urban Traffic Control Needs**
- 41.6: **Nebraska's Project 20/20**
Brig. Gen. D. C. Penterman, State of Nebraska Military Department

Wednesday, June 10, 2:00 p.m. to 5:00 p.m.

Session 42: COMMUNICATION SYSTEMS

Organizer: TC-Communication Theory

Chairman: A. M. Bush, Georgia Institute of Technology

- 42.1: **Carrier Suppression in Angle Modulated Telemetry**
R. Gagliardi, University of Southern California (70-CP-404-COM)
- 42.2: **A Digital Matched Filter for Pseudonoise Sequences**
S. M. Sussman, Teledyne ADCOM (70-CP-405-COM)
- 42.3: **Construction of Maximally Reliable Communication Networks with Minimum Transmission Delay**
R. F. Wilkov, IBM (70-CP-406-COM)
- 42.4: **Application of the Z-Transform to Time-Division Multiplexing and Demultiplexing Systems**
D. E. Cottrell, ESSA, C. A. Halijak, University of Alabama (70-CP-407-COM)
- 42.5: **Optimum Signal Selection and Improved Performance of Phase and Frequency Modulated Digital Systems Using Envelope Information**

F. Bruno, L. Kurz, New York University (70-CP-408-COM)

- 42.6: **The Response of a Quasi-SSB-FB System-to-Noise**
A. J. Snider, Polytechnic Institute of Brooklyn, D. L. Schilling, City College of New York (70-CP-409-COM)

Wednesday, June 10, 2:00 p.m. to 5:00 p.m.

Session 43: SWITCHING DEVICES AND FEATURES

Organizer: TC-Communication Switching, J. H. Weberg, Bell Telephone Labs.

Chairman: J. G. Pearce, Stromberg-Carlson Corp.

- 43.1: **A Time Division Switching Network Using Asynchronous Active Energy Transfer**
J. O. Dimmick, T. G. Lewis, J. F. O'Neill, Bell Telephone Labs. (70-CP-410-COM)
- 43.2: **Solid-State Miniature Tie Trunk Circuit**
R. R. Maxon, Bell Telephone Labs. (70-CP-411-COM)
- 43.3: **New Energy Transfer System for TDM**
S. Schlichter, Siemens AG, Munich, Germany (70-CP-412-COM)
- 43.4: **A Hardware Technique for Reduction of MITR in Redundant Synchronized Digital Systems**
J. F. Hebel, The MITRE Corp. (70-CP-413-COM)
- 43.5: **Detection of and Recovery from Memory Mutilation**
J. Nowak, L. S. Tuomenoksa, Bell Telephone Labs. (70-CP-414-COM)

Wednesday, June 10, 2:00 p.m. to 5:00 p.m.

Session 44: OPEN SESSION

Wednesday, June 10, 2:00 p.m. to 5:00 p.m.

Session 45: VOICE RESPONSE FROM COMPUTERS

Organizer: G-Audio and Electroacoustics, W. D. Chapman

Chairman: W. D. Chapman, International Business Machines Corp.

- 45.1: **Prospectives in Voice Response from Computers**
W. D. Chapman, IBM Corporation
- 45.2: **Synthetic Voices for Computers**
J. L. Flanagan, L. R. Rabiner, R. W. Schafer, C. H. Coker, N. Umeda, Bell Telephone Labs.
- 45.3: **Considerations for Using Channel Vocoders As Peripherals**

C. P. Smith, Air Force Cambridge Research Laboratories

45.4: Evaluation of Voice-Response Communication Systems

Michael H. L. Hecker, Stanford Research Institute

Discussion:

F. S. Cooper, Haskins Laboratories

Wednesday, June 10, 2:00 p.m. to 5:00 p.m.

Session 46: SMALLER USER SPACE COMMUNICATION SYSTEMS

Organizer: TC-Space Communication, L. Pollack

Chairman: L. Pollack, COMSAT Labs.

46.1: Space Data Transmission Efficiency Improvement

B. P. Kerfoot, McDonnell Douglas Astronautics Co. (70-CP-419-COM)

46.2: An Integrated General Purpose Satellite Communications System Concept

J. U. Beusch, I. G. Stiglitz, MIT (70-CP-420-COM)

46.3: An Air Transportable Satellite Telecommunications Terminal

H. Salasin, General Electric Co. (70-CP-421-COM)

46.4: Multiple Channel VHF Satellite Test Results on ATS-1 and ATS-3

L. K. Harman, R. L. Baldrige, Westinghouse Electric Corp. (70-CP-422-COM)

46.5: SPADE: A PCM FDMA Demand Assignment System for Satellite Communications

A. M. Werth, COMSAT Labs. (70-CP-423-COM)

46.6: On Multiple Demand Access Satellite Systems for Speech Communications in Remote Areas

W. J. Hurd, Jet Propulsion Labs., Calif. Inst. of Tech. (70-CP-424-COM)

Wednesday, June 10, 2:00 p.m. to 5:00 p.m.

Session 47: RECENT TRANSMISSION SYSTEMS DEVELOPMENT AROUND THE WORLD

Organizer: G. D. Wallenstein, International Participation Chairman

Chairman: E. L. Peterson, Lenkurt Electric Co.

47.1: Tests on the 2700 Channel Microwave System realized in Italy

C. Rudilosso, Istituto Superiore P. T. Rome, Italy (70-CP-425-COM)

47.2: Space Diversity Receiver in 2GHz

Jinjiro Dodo, Shoichiro Iwai, Fujitsu Labs., Ltd., Kawasaki, Japan (70-CP-426-COM)

47.3: Design and Optimisation of Logarithmically Companded Delta Modulation

D. Maiwald, H. R. Schindler, IBM, Zurich Research Laboratory, Zurich Switzerland (70-CP-427-COM)

47.4: Extremely Flexible Small Capacity FDM System for Low Traffic Density Areas

M. Jagodic, B. Bastar, Iskra-Institute for Automation, LJUBLJANA (70-CP-428-COM)

47.5: A New Family of Military UHF and AM Communication Equipment

A. Milner, Electric Industries, Ltd., Tadiran, Tel-Aviv, Israel (70-CP-429-COM)

Wednesday, June 10, 2:00 p.m. to 5:00 p.m.

Session 48: ANTENNAS AND PROPAGATION—II

Organizer: G-Antennas and Propagation, J. H. Provencher

Chairman: J. H. Provencher, Naval Electronics Laboratory Center

48.1: The Measurement of Precipitation Scatter Interference and Space-Path Attenuation

F. J. Altman, Computer Sciences Corp.

48.2: The Meteor-Burst Channel for Low Data Rate Telemetry

D. N. March, Montana State University

48.3: Problems in Tuning and Loading Multiple VHF Signals

H. Hanft, Westinghouse Electric Corp.

48.4: A Layer-Structure Model for Analysis of Angle Diversity Troposcatter Systems

H. S. Merrill, Jr., Bell Telephone Labs.

48.5: Deep Space — Outer Planet Communications

A. W. Kermode, Jet Propulsion Lab., Calif. Inst. of Tech.

— NOTES —

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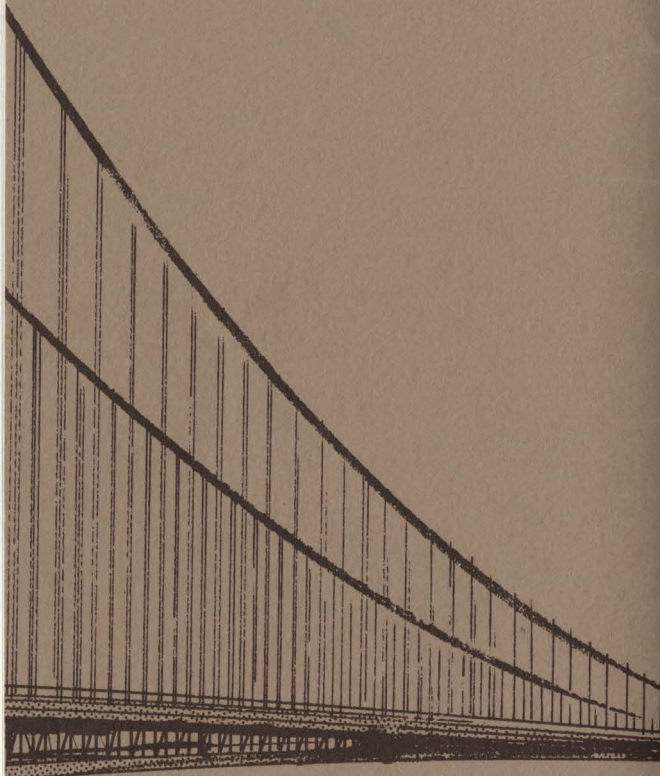
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