

# BELL LABORATORIES RECORD

*I N D E X*

---

Volume 36  
January 1958 to December 1958

# Bell Laboratories Record

---

*Editor*

GEORGE E. SCHINDLER, JR.

*Associate Editor*

W. W. MINES

*Assistant Editors*

A. G. TRESSLER

J. J. GRUESEN

*Production Editor*

CONRAD POLOGE

*Circulation Manager*

THEODORE N. POPE

BELL TELEPHONE LABORATORIES, INCORPORATED  
463 West Street, New York 14, N. Y.

---

## LIST OF ISSUES IN VOLUME 36

No. 1	January . . . . .	Pages 1- 40
" 2	February . . . . .	41- 80
" 3	March . . . . .	81-116
" 4	April . . . . .	117-152
" 5	May . . . . .	153-188
" 6	June . . . . .	189-236
" 7	July . . . . .	237-276
" 8	August . . . . .	277-316
" 9	September . . . . .	317-356
" 10	October . . . . .	357-396
" 11	November . . . . .	397-436
" 12	December . . . . .	437-476

## Index to Authors, Subjects and Titles, Volume 36

### A

- ACM *See* Association for Computing Machinery  
AMA *See* AUTOMATIC MESSAGE ACCOUNTING  
ANI *See* Automatic Number Identification  
AN/TRC-24 RADIO SET *See* Radio Sets  
AN/TSQ-7 DATA TRANSMISSION SET *See* Data Transmission Sets  
AN/TSQ-8 DATA TRANSMISSION SET *See* Data Transmission Sets  
AI DIGITAL DATA SIGNALING SYSTEM *See* Digital Data Signaling Systems  
ASM *See* American Society for Metals  
ASQC *See* American Society for Quality Control  
AT&T *See* American Telephone and Telegraph Company  
Aamodt, N. O.  
    *Measuring Vibration on Telephone Poles* 429  
ACCOUNTING *See* Automatic Message Accounting; Centralized Automatic Message Accounting; Local Automatic Message Accounting  
Adams, Comfort A. 266  
Affel, H. A. 171, *illus* 350  
    biographical material 350  
    retirement 350  
AIR FORCE *See* United States Air Force  
ALASKA  
    White Alice Network 184-85, 278-83  
Alexander, A. A. 384  
*All-Numerical Dialing—Would Users Like It?* (J. E. Karlin) 284-88  
ALLOY JUNCTION TRANSISTORS *See* Transistors: junction  
Almquist, M. L.  
    I.R.E. Fellow 12  
ALUMINUM, soldering 157-60  
ALUMINUM OXIDE  
    aluminum, soldering 157-60  
AMERICAN AUTOMATIC CONTROL COUNCIL  
    Lozier, J. C., Vice Chairman 310  
AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS  
    Cioffi, P. P., honored 115  
    Lamme Gold Medal  
    Black, H. S. 266, 298  
    New York section  
        Laboratories members active 431  
        Rea, W. T. Chairman 310  
AMERICAN MANAGEMENT ASSOCIATION  
    Kappel, F. R., talk, excerpts 252  
AMERICAN SOCIETY FOR METALS  
    Savour award  
        Pfann, W. G. 467  
AMERICAN SOCIETY FOR QUALITY CONTROL  
    Fisher, C. E., President 266  
AMERICAN TELEPHONE AND TELEGRAPH COMPANY  
    Annual Meeting, 1958 182-83  
    gains, 1957 131-32  
    operating companies, *see* Operating Companies  
AMERICAN VACUUM SOCIETY  
    Meissner, C. R., Director 469
- AMPLIFIERS  
    183A  
        headset, operators' 381-83  
    magnetic  
        applications 16-20, 294-97  
        bistate operation 294-97  
        principles 16-20  
    microwave diode 250-51  
    *See also* Electron Tubes; Maser  
Andrews, F. T. *illus* 232  
ANGLES  
    measurement, by vernier resolver 35  
*Antenna Filters for a Military Radio System* (M. D. Brill, R. M. Jensen) 142-45  
ANIMONY  
    crystal *illus* frontcover August  
*Applications in Telephone Switching* (Transistor Issue) (A. E. Ritchie) 212-15  
ARCS  
    contact, relay 122-26  
Arnold, C. G. *illus* 342  
Arnold, W. O. 431  
Asbell, W. E. *illus* 71  
Aschner, J. F. 467  
ASSOCIATION FOR COMPUTING MACHINERY  
    Hamming, R. W., President 352  
ASTRONOMY *See* Radio Astronomy  
ATTENUATION  
    ultrasonic, in superconductors 253-56  
AUDIO ENGINEERING SOCIETY  
    Dudley, Homer, Commendation 149  
    J. H. Potts Award  
    Fletcher, H. S. 425  
*Automatic Line-Switching for L3 Carrier* (E. C. Thompson) 340-43  
*Automatic Machine for Temperature Cycling* (T. C. Ewouds) 72-73  
AUTOMATIC MESSAGE ACCOUNTING  
    10 years of 453-57  
    assembler-computer  
        computing in 25-29  
    centralized, *see* Centralized Automatic Message Accounting  
    crossbar systems, No. 5  
        translator 415-19  
    local, *see* Local Automatic Message Accounting  
    timer 409  
AUTOMATIC NUMBER IDENTIFICATION 153-56  
*Automatically Recording Tube-Life Data* (A. T. Ross) 176-78  
AUTOMATION, printed circuits 121  
AWARDS AND PRIZES  
    A.I.E.E. 115  
    Audio Engineering Society Commendation  
        Dudley, Homer 149  
    Browder J. Thompson Memorial Prize 12  
    Buckley Award 149  
    John Fritz Medal 351  
    J. H. Potts award 425

AWARDS AND PRIZES *continued*

- Lamme Gold Medal 266, 298
- Reserve Officers Association 309
- Saveur Award 467
- Stuart Ballantine Medal 424
- Wire Association Medal 351

**B**

BMEWS *See* Ballistic Missile Early Warning System

BSTJ *See* Bell System Technical Journal

Baird, J. A. *illus* 234

biographical material 234

*Military Applications* (Transistor Issue) 221-25

Baker, W. O. 423

Mellon Institute trustee 309

BALLISTIC MISSILE EARLY WARNING SYSTEM 130

Ballman, A. A. 351

BANKS AND BANKING

television signature verification 41-46

Barrett, Walter J. *illus* 36, 265, 298

BARRIER GRID STORE 359-63

BASIC RESEARCH 111-12

Basseches, H. 426

BATTERIES *See* Solar Batteries

Baurenfiend, F. *illus* 457

Baxter, Frank *illus* 76, 388

*Beam Focusing in Microwave Amplifiers* (P. P. Cioffi) 172-75

Beck, A. C. I.R.E. Fellow 12

Becker, E. J. *illus* 291

Becker, F. K. *illus* 45, 46

biographical material 46

*Experimental Signature-Verification System* 41-46

Behler, B. *illus* frontcover April

Bell, James F., resignation 390

BELL LABORATORIES GRADUATE FELLOWSHIPS

awards, 1958-1959 171

BELL LABORATORIES RECORD

editorial board, *see* inside frontcover

editorial staff, *see* inside frontcover

BELL SOLAR BATTERY *See* Solar Batteries

BELL SYSTEM

earnings 93-94

growth, 1957 75

present and future 91-94

BELL SYSTEM REPAIR SPECIFICATIONS 162-65

BELL SYSTEM SCIENCE SERIES

1958-1959 plans 310

awards 310

*Gateways to the Mind* 388

*Unchained Goddess* 76-77

BELL SYSTEM TECHNICAL JOURNAL

contents

November, 1957 37

January, 1958 79

March, 1958 151

May, 1958 267

July, 1958 394

September, 1958 431

November, 1958 468

BELL TELEPHONE LABORATORIES 92

*Fortune* magazine articles 468

(in) *Telephone Almanac* 469

transistor anniversary report 304-06

Benner, C. F. *illus* 165

Bennett, A. F. *illus* 85

Berry, R. W. 426

Bertelo, M. *illus* 155

Biggs, B. S.

Sandia Corporation 74

BILLING *See* Automatic Message Accounting; Centralized

Automatic Message Accounting; Local Automatic Mes-

sage Accounting

Biondi, F. J. 469; *illus* 316

biographical material 316

*Cleaning Electron Device Parts* 288-93

Bishop, G. S. *illus* 436

biographical material 436

*New AMA Translator for No. 5 Crossbar* 415-19

Biskeborn, M.C. 265

Bittmann, C. A. 467

Black, H. S. *illus* 298

Lamme Gold Medal, award 266, 298

Bloembergen, Nicolaas

Buckley award 149

Bode, H. W. 425; *illus* 422

biographical material 422

Vice President, BTL 422

Bolenius, William C.

Executive Vice President, A.T.&T. 390

Bömmel, H. E. *illus* 255, 276

biographical material 276

*Ultrasonic Attenuation in Superconductors* 253-56

BONDING

thermo-compression

semiconductors 127-30

BOOTHS 149, 425

Bouton, G. M. *illus* frontcover May, 160

biographical material 160

*Method for Soldering Aluminum* 157-60

Bown, Ralph 76, 388

Braga, F. J. 265

Brangaccio, D. J. *illus* 451, 475

biographical material 475

*New Broad-Band Oscilloscope Tube* 450-52

Brasher, W. K. *illus* 265

Brattain, W. H. 309

BREAKDOWN

gases 50

Bridgers, H. E. 310

Brill, M. D. *illus* 145

*Antenna Filters for a Military Radio System* 142-45

biographical material 145

*Brittleness in Polyethylene* (I. L. Hopkins) 5-8

Brooks, W. Clare

Western Electric Merrimack Valley Manager 64

Brousse, Paul R.

Vice President, Western Electric 64

Brower, J. A. *illus* 73

BRUSSELS WORLD'S FAIR, 1958

semiconductor exhibit 266

Bucklew, J. W. *illus* 369, 395

biographical material 395

*Through-Connections for Printed Wiring* 368-70

BUILDING, pole-type 329

Bullington, Kenneth 114

Busala, A. *illus* 435  
biographical material 435  
*Experimental Transistorized Telephone* 403-06  
Bush, Vannevar 266

## C

CAMA *See* Centralized Automatic Message Accounting  
CDT *See* Communications Development Training Program

### CABLES

carrier, *see* Carriers  
concentration, *see* Concentration  
Puerto Rico-U. S., *see* Puerto Rico Telephone Cable  
splicing, joints, testing 72-73  
submarine, *see* Submarine Cables  
transatlantic, *see* Transatlantic Telephone Cable

CANADA, telephone statistics 77

Cantril, Hadley 388

Caporaso, A. J. 351

Capra, Frank 388

Carbrey, R. L. *illus* 201

CARBON BLACK, in polyethylene 321-22

### CARD TRANSLATOR

transistors in 213-14

Cardona, Manuel 171

Carlson, Richard *illus* 76

### CARRIER SYSTEMS

#### L3

line-switching, automatic 340-43

#### PI

temperature 95-98

transistors 52-55, 207-08

N-type, connectors 69-71

O-type, connectors 69-71

#### ON

described 99-100

radio links 99-103

*Carrier Terminals for the Transatlantic Telephone Cable*  
(C. A. W. Grierson, W. F. Miller) 461-64

Carter, H. T. *illus* 81, 85

biographical material 85

*Versatile New Intercom System* 81-85

### CATHODE(S)

nickel, analysis 146-47

CATHODE RAY TUBE *See* Electron Tubes

### CENTRAL OFFICES

time measurement 407-10

troubles 133-34

### CENTRALIZED AUTOMATIC MESSAGE ACCOUNTING

crossbar systems, 5-type 372-75

number identification, automatic 153-56

Chaplin, N. J. 467

### CHARACTERS

handwritten

reading device 34-35

Chase, A. J. *illus* 396

biographical material 396

*Transistor Amplifier for Operators' Headsets* 381-83

### CHESTER, NEW JERSEY

outside plant tests 96

Christensen, H. *illus* 127, 130

biographical material 130

*Electrical Contact with Thermo-Compression Bonds*  
127-30

Chynoweth, A. G. *illus* 47, 51

biographical material 51

*Electrical Breakdown in p-n Junctions* 47-51

Cioffi, P. P. *illus* 172, 175

A.I.E.E. prize. 115

*Beam Focusing in Microwave Amplifiers* 172-75

biographical material 175

Clark, O. P. *illus* 324

### CLEANING

parts, electron device 288-93

sequence switches 65-68

*Cleaning Electron Device Parts* (F. J. Biondi) 288-93

Cleveland, H. M. *illus* 293

Cobb, L. J. 352

### COILS

voltage, testing 370-71

COIN TELEPHONE SET. *See* Station Sets

### COLUMBIA UNIVERSITY SCHOOL OF JOURNALISM

Kelly, M. J., advisor 266

### COMMUNICATIONS DEVELOPMENT TRAINING PROGRAM

fellowships 307

graduation 307

COMPUTERS *See* Digital Computers

*Computing in the AMA Assembler-Computer* (T. C. Rehm)  
25-29

CONCENTRATION, cable lines 56-59

*Concept of Automatic Number Identification* (A. E. Vitalo)  
153-56

CONDUCTORS *See* Superconductors

### CONNECTIONS

printed circuits 368-70

CONNECTOR, 20-contact 69-71

### CONTACTS

relay

activation 122-26

arcing 122-26

erosion 122-26

wear 122-26

*See also* Bonding

*Continental Classroom* (television show) 427

*Coordinate Data Sets for Military Use* (W. Koenig) 166-70

COPPER etching 161

Cowan, Frank A. 266

Craft, W. H. *illus* 292

Crane, E. G., Jr. *illus* 137, 140

biographical material 140

*Line Verification in No. 5 Crossbar* 137-41

Cronburg, Claude I. J., Jr. *illus* 99, 102

biographical material 102

*Radio Links for ON Carrier* 99-103

Crosland, E. S. *illus* 389

biographical material 389

Vice President, A.T.&T. 389

### CROSSBAR SYSTEMS

No. 5

automatic message accounting translator 415-19

centralized automatic message accounting 372-75

line verification 137-41

relay troubles 135

CRYSTALS *See* Antimony: crystal; Germanium: crystal

### CUPRIC CHLORIDE

copper, etching 161

## D

Dacey, G. C. 115

Dagnall, C. H., Jr. 431

Danklefs, Mrs. B. *illus* 455

DATA PROCESSING  
transistors 219-20

DATA SIGNALING SYSTEM *See* Digital Data Signaling Systems

DATA TRANSMISSION  
sets, coordinate, military use 166-70  
transistors 219

DATA TRANSMISSION SETS  
AN/TSQ-7 166-70  
*block diagrams* 168-69  
AN/TSQ-8 166-70

DATAPHONE SERVICE 148, 384-85

David, E. E., Jr. 349, 469

Davis, C. G. *illus* 210

Davis, M. G. 431

Davison, Clinton J. *illus* 113  
obituary 113

De Bella, Miss M. *illus* 457

De Dona, R. J. *illus* 137

DEAFNESS 383

DEFENSE WORK *See* Military Communications

DeGrasse, R. W. *illus* 242

DELAY LINES, torsional 185

Depp, W. A. *illus* 234  
biographical material 234  
*Station Apparatus, Power and Special Systems* (Transistor Issue) 216-20

DeWitt, J. W., Jr. *illus* 334

D'heedene, Robert N. 171

DIAL TELEPHONE, DIALING  
all-numeral 284-88  
direct distance, signaling 438-41  
nationwide  
automatic number identification 153-56  
numeral 284-88  
repertory 308  
set, *see* Station Sets  
statistics 77  
switching, *see* Switching  
traffic, *see* Traffic  
transistorized 403-06  
voice 239-40

Dietz, J. *illus* 155

Dietzold, R. L. 171

DIFFUSED BASE TRANSISTOR *See* Transistor: base: diffused

DIGITAL COMPUTERS  
*See also* Leprechaun: Tradic

DIGITAL DATA SIGNALING SYSTEMS  
A1 376-80  
*block diagram* 377  
receiver, *block diagram* 380  
transmitter, *block diagram* 378

DIGITAL DATA TRANSMISSION *See* Data Transmission

Dimond, T. L. *illus* 34

DIODES  
amplifier, microwave 250-51  
junction 390  
*See also* Junction

DIRECT DISTANCE DIALING *See* Dial Telephone

DISTRIBUTION TERMINAL *See* Terminal

Dixon, Mrs. R. *illus* 383

Dorrance, L. *illus* 318

Doucette, E. I. *illus* 150

Dudley, Homer  
Audio Engineering Society award 149

Dugan, Charles D.  
Vice President, Western Electric 64

Dusenberry, R. F. *illus* 107, 109

**E**

Early, J. M. 115; *illus* 88, 90  
biographical material 90  
*Intrinsic-Barrier Transistor—How It Works* 86-90

Eckert, R. W. *illus* 52

Elbert, E. F. *illus* 22

*Electrical Breakdown in p-n Junctions* (A. G. Chynoweth) 47-51

*Electrical Contact with Thermo-Compression Bonds* (H. Christensen) 127-30

*Electrical Protection for Transistorized Equipment* (J. W. Phelps) 247-49

ELECTRON BEAMS  
traveling-wave tubes, focusing 172-75

ELECTRON TUBE(S)  
cathode ray  
signature verification 45  
gas diode  
(as) switches 446-49  
ground strip 13  
life data  
recording, automatic 176-78  
tester, *see* Electron Tube Tester  
traveling-wave  
beam focusing 172-75  
broad-band 450-52

ELECTRON TUBE TESTER  
KS-15750 179-81

Emling, J. W. 265

ENGINEERING  
simulation in 238-41, 348-49

ENGINEERING CENTER, NEW YORK CITY 36

Erchard, M. T. *illus* 438

ETCHING, copper 161

Ewald, R. F. *illus* 409, 435  
*Measuring Time in Central Offices* 407-10

Ewouds, F. C.  
*Automatic Machine for Temperature Cycling* 72-73

EXCHANGE *See* Private Branch Exchanges

EXPENSE *See* Cost

*Experimental Electronic Switching System* (A. E. Joel, Jr.) 359-63

*Experimental Gas Diode Switch* (A. D. White) 446-49

*Experimental Signal for Centralized Calling* (R. T. Jenkins) 104-17

*Experimental Signature-Verification System* (F. K. Becker, J. R. Hefele) 41-46

*Experimental Transistorized Telephone* (A. Busala) 403-06

EXPLORER (satellite), transistors 115

*Extending CAMA with No. 5 Crossbar* (G. A. Hurst) 372-75

**F**

FARNSWORTH ELECTRONICS COMPANY 45

Faulkner, L. W. *illus* 73

FELLOWSHIPS *See* Bell Laboratories Graduate Fellowships

FERRIC CHLORIDE  
 copper, etching 161

FERROMAGNETISM  
 zirconium zinc 303

FILTERS, antenna  
 radio set, AN/TRC-24 142-45

Fischer, H. B. 265

Fisher, C. E.  
 ASQC President 266

Fisk, J. B. *illus* 264, 428  
 biographical material 264  
 U. S.-Russia nuclear talks 264  
 Williams College honorary degree 428

500 TELEPHONE SET *See* Station Sets

592-TYPE RINGER *See* Ringers

FLASH PYROLYSIS 386-87

Fletcher, Harvey S. *illus* 425  
 J. H. Potts award 425

FLUX  
 aluminum, soldering 157-60

FLYING SPOT STORE 359-63

*Fortune* (magazine) 468

4B TRANSISTOR *See* Transistor: n-p-n

4C TRANSISTOR *See* Transistor: n-p-n

4D TRANSISTOR *See* Transistor: junction

Franz, E. E. 120

Fraser, J. M. 265

Friis, Harald T. *illus* 424  
 biographical material 424  
 Stuart Ballantine Medal 424

FRITZ MEDAL 351

Fuller, M. M. *illus* 334

Fuller, Wesley *illus* 387  
 obituary 387

## G

Garbacz, G.  
*Joining Armor Wire for Transoceanic Telephone Cable*  
 414

Garn, P. D. 146-47; *illus* 161  
 copper, etching 161

GAS DIODE TUBE *See* Electron Tubes

GASES, breakdown 49-50

*Gateways to the Mind* (television program) 388

Geballe, T. H. 261

Genther, J. E. *illus* 227, 234  
 biographical material 234  
*Transistor Manufacture* 226-28

GERMANIUM  
 crystal 193  
 junction, *see* Junction  
 transistor, *see* Transistor: base: diffused

GERMANIUM RESISTANCE THERMOMETER 261

GERMANY (WEST GERMANY)  
 telephone statistics 77

Germer, L. H. *illus* 126  
 biographical material 126  
*Organic Vapor and Relay Contacts* 122-26

Gibson, J. W. *illus* 59

Gilroy, H. M. *illus* 146-47

Glarum, Sivert H. 171

Gleichmann, T. F. 265

Gnaedinger, R. J., Jr. *illus* 368, 395  
 biographical material 395  
*Precision Evaporation and Alloying* 364-67

Goldup, T. E. *illus* 265

Gorgas, J. W. *illus* 438, 475  
 biographical material 475  
*On-Hook, Off-Hook: Signaling over the Telephone Network* 438-41

Gorman, Paul A.  
 Vice President, New Jersey Bell Telephone Company 64

Gould, K. E. 171

Graham, R. E. 349

Green, C. W. *illus* 224

Grierson, C. A. W. *illus* 476  
 biographical material 476  
*Carrier Terminals for the Transatlantic Telephone Cable*  
 461-64

Griffith, R. G. 265

GROUND STRIPS  
 electron tubes  
 3A 13; *illus*  
 7A 13; *illus*

Gruenz, O. O. *illus* 241

Guettich, T. H. *illus* 476  
 biographical material 476  
*"Two-in-One" Wire-Spring Relay* 458-60

## H

Hamilton, Charlotte H. *illus* 131, 136  
 biographical material 136  
*Study of Performance in Switching Systems* 133-36

Hammel, Frank J.  
 Vice President, Western Electric 64

Hamming, R. W.  
 ACM President 352  
 biographical material 352

HANDWRITING  
 numerals, reading 35  
 signatures, verification 41-46

Hansen, Virginia *illus* 398

Hanson, Kurtz M.  
 biographical material 186  
 Western Electric Director 186

HARD OF HEARING 383

Hare, W. F. J. 467

Harris, J. R. *illus* 331, 356  
 biographical material 356  
*TRADIC: The First Phase* 330-34

Haurwitz, Bernhard 76

Hartford, H. R. *illus* 451

Haury, P. T.  
*Transmission Equipment for Submarine Cable* 344-45

Hawkins, W. L. *illus* 318

Hayward, W. S., Jr. *illus* 59  
 biographical material 59  
*Traffic Studies of Line Concentration* 56-59

Hazell, N. C. *illus* 404

Heald, Henry T.  
 AT&T Board, election 74  
 biographical material 74

HEARING, hard of 383

Heberlein, A. A. *illus* 179, 181  
 biographical material 181  
*New Portable Electron Tube Tester* 179-81

SUBMARINE CABLES  
armor wire, joining 414  
USAF Missile Test Center  
transmission equipment 344-45

SUPERCONDUCTORS  
attenuation, ultrasonic 253-56

Sutton, S. M.  
*New Pole-Type Building* 329

SWEDEN, telephone statistics 77

SWITCHES  
gas diode  
446-49  
sequence, cleaning 64-68  
transistor, voltage conversion 60-64

SWITCHING  
accomplishments 324-26  
electronic 327-28  
present state of 323-28  
SAGE system 335-39

SWITCHING SYSTEMS  
crossbar, *see* Crossbar Systems  
electronic 1-4, 359-63  
storage, *see* Barrier Grid Store; Flying Spot Store  
transistors 215  
"new art" 1-4  
performance, study 133-36  
teletypewriter service 420-21  
traffic recording 107-10  
transistors in 212-15  
trouble recorder 257-60

SYBIL LABORATORY 399-402  
*Systems Planning* (Transistor Issue) (D. F. Hoth) 229-33

## T

TASI *See* Time Assignment Speech Interpolation

TD-2 RADIO RELAY SYSTEM *See* Radio Relay Systems

TH RADIO RELAY SYSTEM *See* Radio Relay Systems

Tanner, T. L. 431

Taylor, Myron C.  
A.T.&T. Board, resignation 74

TELEPHONE *See* Dial Telephone  
*Telephone Almanac* 469

TELEPHONE BOOTH *See* Booths

TELEPHONE PIONEERS OF AMERICA  
Kappel, F. R., address, *excerpts* 430

TELEPHONE SET *See* Station Sets

*Telephone Switching—An Old Field with a New Future*  
(A. E. Joel, Jr.) 1-4

*Teletypewriter Intersystem Operation* (J. A. Kreck) 420-21

TELEVISION  
applications 41  
continental classroom 427  
cost 41  
signatures, verification 41-46  
transmission, *see* Transmission

TELEWRITING, simulation 239-40

TEMPERATURE  
cable joints  
cycling, automatic 72-73  
carrier, P1 95, 98  
semiconductors 95-98

*Ten Years of AMA* (R. G. Ruwell) 453-57

TERMINAL  
distribution  
ready-access 411-13  
*illus* 413

TEST SETS  
X-4786 370-71

TEST(S), TESTING  
cable joints, temperature cycling 72-73  
coils, voltage 370-71  
electron tubes, *see* Electron Tube Tester  
line verification 137-41  
polyethylene 5-8  
set, *see* Test Sets  
Sybil Laboratory 399-402

THERMO-COMPRESSION BONDING *See* Bonding

THERMOMETER  
germanium resistance 261

Thomas, L. C. *illus* 232

Thompson, E. C. *illus* 356  
*Automatic Line-Switching for L3 Carrier* 340-43  
biographical material 356

3A GROUND STRIP *See* Ground Strips

*Three-Level Solid-State MASER* (H. E. D. Scovil) 243-46

*Through-Connections for Printed Wiring* (J. W. Buckelew, E. D. Knab) 368-70

Thurmond, C. D. *illus* 132

Thurston, R. N. *illus* 185  
delay lines 185

Tidd, W. H. *illus* 315  
biographical material 315  
*White Alice—A New Radio Voice for Alaskan Outposts* 278-83

TIME  
measurement, in central offices 407-10

TIME ASSIGNMENT SPEECH INTERPOLATION 132

TIMERS  
1A 410; *illus*  
2A 410  
*illus* 408

Toole, W. C. *illus* 74  
biographical material 74  
Secretary, BTL 74

Tornillo, L. M. *illus* 185  
biographical material 185

Townsend, J. S. 49-50

TRADIC 309  
*illus* 331  
first phase 330-34

TRADIC: *The First Phase* (J. R. Harris) 330-34

TRAFFIC  
line concentration 56-59  
switching systems 107-10  
usage recorder, portable 107-10

*Traffic Studies of Line Concentration* (W. S. Hayward, Jr.) 56-59

TRAFFIC-USAGE RECORDER  
No. 1 108-10

TRANSATLANTIC TELEPHONE CABLE (Canada-Scotland)  
carrier terminals 461-64

TRANSATLANTIC TELEPHONE CABLE (Canada-France)  
shore operations 350

TRANSATLANTIC TELEPHONE CABLE CONFERENCE  
papers, commemorative volume 265

*Transformers for Military Communications Systems* (L. J. Steinbach, Jr., H. E. Vaiden) 299-302

TRANSISTOR(S)  
anniversary report 304-06



base, diffused  
 fabrication 364-67  
 germanium *illus* frontcover June  
 Explorer satellite 115  
 card translator 213-14  
 carrier, P1 207-08  
 circuits 198-201  
 data transmission sets 166-70  
 designs 202-06  
 invention 193  
 junction 203  
 4D 55  
 1752 52  
 1858 52  
 alloyed 60-64, 203  
 frequency response 86  
 operators' headset amplifier 381-83  
 p-n-i-p 86-90  
*diagram* 90  
 manufacture 225-28  
 military applications 221-25  
 n-p-n  
 4B 53-55  
*illus* 53  
 4C 53-55  
 numeral reading device 35  
 personal radio service 208-09  
 point-contact 202  
 frequency response 86-90  
 power supply 199  
 properties 190-91  
 protection 247-49  
 reliability 225  
 repeater, negative impedance 208  
 station sets 216-17  
 structure 86  
 switch. *see* Switches  
 switching systems 212-15  
 systems 198-201  
 technology 203-06, 229-33  
 ten years of 190-233  
 transmission applications 207-11  
 voltage regulators 442-45  
*Transistor Amplifier for Operators' Headsets* (A. J. Chase)  
 381-83  
*Transistor Designs: The First Decade* (W. J. Pietenpol)  
 202-06  
 TRANSISTOR DIGITAL COMPUTER *See* TRADIC  
*Transistor Manufacture* (J. E. Genter) 226-28  
*Transistor—Ten Years of Progress* (M. J. Kelly) 190-91  
*Transistor Voltage Regulators* (G. W. Meszaros) 442-45  
*Transistors for Rural Telephone Systems* (I. C. Savadelis)  
 52-55  
 TRANSLATOR  
 automatic message accounting  
 crossbar systems  
 5-type 415-19  
 TRANSMISSION  
 data. *see* Data Transmission  
 television 42  
 transistors in 207-11  
*Transmission Applications* (Transistor Issue) (M. B. Mc-  
 Davitt) 207-11  
*Transmission Equipment for Submarine Cable* (P. T. Haury)  
 344-45  
 TRANSMISSION LINES  
 cables. *see* Cable  
 TRANSOCEANIC CABLES *See* Cables: submarine

TRAVELING-WAVE TUBE *See* Electron Tube  
 TRICHLOROETHYLENE  
 relay, wire-spring, cleaning 33  
*Trouble Recorder* (M. Salzer) 257-60  
 Trucksess, D. E.  
 biographical material 468  
 I.R.E. Fellow 468  
 TUBES *See* Electron Tube  
 Tucker, R. S. 265  
 Tufts, Donald W. 171  
 2A TIMER *See* Timers  
 "Two-in-One" Wire-Spring Relay (T. H. Guettich) 458-60

## U

USAF *See* United States Air Force  
 Uenohara, M. *illus* 250  
 ULTRASONIC ATTENUATION *See* Attenuation  
*Ultrasonic Attenuation in Superconductors* (H. E. Bömmel,  
 W. P. Mason) 253-56  
*Unchained Goddess* (television program) 76-77  
 UNITED KINGDOM, telephone statistics 77  
 UNITED STATES, telephone statistics 77  
 UNITED STATES AIR FORCE  
 SAGE System  
 signaling, selective 335-39  
 switching 335-39  
 TRADIC 309, 330-34  
 vernier resolver 35  
 White Alice Network 184-85, 278-83  
 UNITED STATES AIR FORCE MISSILE TEST CENTER  
 submarine cable  
 transmission equipment 344-45  
 UNITED STATES ARMY ORDNANCE CORPS  
 Nike Hercules 346-47  
 UNITED STATES ARMY SIGNAL CORPS  
 data transmission sets 166-70  
 radio set, AN/TRC-24  
 antenna filters 142-45  
 UNITED STATES NAVY  
 Certificate of Merit 303

## V

VACUUM TUBES *See* Electron Tubes  
 Vaiden, H. E. *illus* 316  
 biographical material 316  
*Transformers for Military Communications Systems*  
 299-302  
 VANGUARD (Satellite)  
 Bell Solar batteries 181  
 transistors 181  
 VAPOR, organic  
 contact erosion 122-26  
 VARISTOR, field-effect 150  
 Vaughan, Guy W.  
 retirement 186  
 Vaughan, V. N., Jr. *illus* 148  
 Veazie, E. A. 265  
 VERNIER RESOLVER 35  
*Versatile New Intercom System* (H. T. Carter) 81-85  
 VIBRATION, telephone poles 429  
 Vincent, C. J. 431  
 VISTABOOTH 425  
 Vitalo, A. E. *illus* 154, 156  
 biographical material 156  
*Concept of Automatic Number Identification* 153-56

VOICE DIALING *See* Dial Telephone  
*Voltage Conversion with Transistor Switches* (P. L. Schmidt)  
60-64

VOLTAGE REGULATORS  
transistors as 442-45

## W

WE *See* Western Electric Company

*Wafer-Type Rectifiers for Millimeter Waves* (W. M. Sharpless) 21-24

Wahl, G. A. 352

Walker, Eric A. 307

Walker, W. H. *illus* 69, 71  
biographical material 71

*Improved Multiple-Contact Connector* 69-71

Wallace, R. L., Jr. *illus* 236  
biographical material 236

*Research in Circuits and Systems* (Transistor Issue)  
198-201

Wannier, G. H.

biographical material 29

New Hampshire University lectures 29

WAR WORK *See* Military Communications

Warner, R. M., Jr. 150 *illus*

WASHINGTON, D.C.

telephone statistics 77

Wasserman, N. *illus* 71

WAVES

millimeter

rectifiers, wafer-type 21-24

*See also* Microwaves

WAYNE STATE UNIVERSITY, DETROIT

Kelly, M. J., honorary degree 428

WESCON *See* Western Electronic Show and Convention

WEATHER

*Unchained Goddess* 76-77

Wegner, J. A. *illus* 88

Wenk, H. A. *illus* 283

WESTERN ELECTRIC COMPANY 92-93

222 Broadway building 351

BMEWS 130

Nike Hercules 346-47

progress, 1957 147

repair activities 162-65

transistor manufacture 225-28

WESTERN ELECTRONIC SHOW AND CONVENTION 348-49

Weston, Edward 266

White, A. D. *illus* 448, 475

biographical material 475

*Experimental Gas Diode Switch* 446-49

White, A. H. 423

White, H. E. 427

White, P. R. *illus* frontcover May, 160

biographical material 160

*Method for Soldering Aluminum* 157-60

WHITE ALICE NETWORK 184-85, 278-83

*White Alice—A New Radio Voice for Alaskan Outposts*  
(W. H. Tidd) 278-83

WILLIAMS COLLEGE

Fisk, J. B., honorary degree 428

Williams, E. P. *illus* 410, 435

biographical material 435

*Measuring Time in Central Offices* 407-10

Willson, F. E. *illus* 283

Wilson, Kenneth G. 171

Winslow, F. H. *illus* 355

biographical material 355

*New Protectants for Polyethylene* 319-22

WIRE ASSOCIATION

Lawson, C. C., Director 431

WIRE ASSOCIATION MEDAL 351

WIRE-SPRING RELAY *See* Relays

WIRING *See* Printed Circuits

Wolf, H. N. *illus* 419

Wolpert, F. S. *illus* 165

biographical material 165

*Repair—Philosophy and Documentation* 162-65

Wood, Mrs. E. A. *illus* 132

Wooley, M. C. 265

Wright, L. A. 265

WRITING *See* Handwriting

## X

X-4786 TEST SET *See* Test Sets

## Y

Yamamoto, Sukeyasu 171

Yeager, A. H. *illus* 31

Young, G. MacDonald *illus* 467

YUMA, ARIZONA

outside plant testing 96

## Z

Zener, Clarence 48-49

ZIRCONIUM ZINC

ferromagnetism 303

Zuk, P. 467

Zworykin, V. K. 266

# BELL LABORATORIES RECORD

---

Volume 37  
January 1959 to December 1959