

Index

Numbers

1-by-3 call, 143
3-by-2 call, 150
10-10 International Club, 50

A

A index, 393
abbreviations, 144
AC power, 320
access control, 161–163
 Digital Coded Squelch (DCS), 162–163
 tone access, 162
accidents, 194–195
acquisition of signal (AOS), 403
adapters, 365
ADIF (Amateur Data Interchange Format), 331
Advanced class license, 71
AE7Q website, 102
airbags, 346
Airmail, 204
alarm systems, 379
ALE (Automatic Link Establishment), 219
all-band radios, 270
all-mode radios, 270, 277
aluminum foil, 357
AM (amplitude modulation), 26, 125
Amateur Data Interchange Format (ADIF), 331
Amateur Extra class license, 70–71
Amateur Radio Direction Finding (ARDF), 256
Amateur Radio Emergency Data Network (AREDN),
 18, 172, 206–207
Amateur Radio Emergency Service, 48
 overview, 187
 volunteering for, 188–189
Amateur Radio Guide to Digital Mobile Radio
 (Burningham), 178
Amateur Radio Service, 8, 31
amateur television (ATV), 261
American Radio Relay League, 9, 15, 46–49
 benefits of, 47–49
 equipment insurance program, 269
 National and Division conventions, 59
 Radiogram, 200
 searching for call signs, 99
American Red Cross, 14
Ampere-hours, 402
amplifiers
 HF, 280–281
 VHF/UHF, 277–278
amplitude modulation (AM), 26, 125
AMSAT, 53–54, 257
analog mode, 116
Antenna Towers for Radio Amateurs (Daso), 293
antennas, 10, 282–298
 accessories
 dummy load, 301
 SWR meters, 300–301
 tuners, 24, 299–300
 beam, 24, 283–284
 exchanging information about, 147
 feed line and connectors, 289–292
 HF, 285–289
 vertical antennas, 288–289
 wire antennas, 286–288
 jargon, 388–390
 masts and tripods, 294
 mobile, 347–349
 overview, 22
 patterns, 400–401
 portable, 353–354
 radio waves and, 28
 rotators, 296–298
 switches, 24
 towers, 295–296
 trees and, 293–294
 VHF/UHF, 284–285
AOR digital voice, 127–128, 170

- AOS (acquisition of signal), 403
- Apache Labs, 273
- Apple, 324–325
- APRS, 220–223
- APRS (Automatic Packet Reporting System), 11
- arcing, 380
- ARDF (Amateur Radio Direction Finding), 256
- ARDOP, 219–220
- Arduino, 22, 325
- AREDN (Amateur Radio Emergency Data Network), 18, 172, 206–207
- ARES. *See* Amateur Radio Emergency Service
- ARRL. *See* American Radio Relay League
- ARRL Handbook for Radio Communications, 49
- The ARRL Operating Manual, 134
- The ARRL Repeater Directory, 123
- attenuating, 281, 398
- ATV (amateur television), 261
- audio codec, 280
- audio equipment, 379
- audio FSK, 327
- audio generators, 367
- aurora, 33, 225
- auto repeater feature, 123
- Automatic Link Establishment (ALE), 219
- Automatic Packet Reporting System (APRS), 11
- Automatic Repeat Request, 219
- automotive-blade-type fuses, 365
- autopatch, 163, 195
- auto-tuner, 390
- auxiliary stations, 163
- awards, 15, 245–247
 - applying for, 246–247
 - finding, 245–246
 - on HF bands, 234–235
 - logging contacts for, 246–247
 - QSLs, 339
 - on VHF and UHF bands, 226–227
- azimuthal pattern, 400
- azimuthal-equidistant map, 228, 333–334

B

- backbones, 206
- background check, 189
- Bakelite headphones (cans), 22
- balanced tuner, 390
- baluns, 300, 389
- band maps, 243
- band plans, 110
- bandpass filter (BPF), 399
- band-pass filters, 357
- band-reject filters, 281
- bands, 30–31, 109–110
- band-stop, 399
- bandswitch, 112
- bandwidth, 281, 398–399
- batteries
 - characteristics of, 402
 - chargers, 381
- battery management system (BMS), 346
- baud setting, 375
- Baudot code, 216
- beacons
 - networks, 119–120
 - Reverse Beacon Network, 234
 - stations, 118–119
- beam antennas, 24, 283–284
- bicycle mobile station, 343
- binary FSK, 216
- blogs, 37–38, 330
- BMS (battery management system), 346
- boat stations, 344
- boating nets, 18
- bonding, 319–322
 - AC and DC power, 320
 - lightning, 320–321
 - RF management, 321–322
- booms, 283
- BPF (bandpass filter), 399
- brag tapes, 183–184
- breaking in, 144–145
- bricks, 277
- broadcasting, 27
- brushes, 366
- Buddipole designs, 354
- building, 383–384
 - basic station, 23–26
 - from kits, 383–384

- permits for, 296
- from scratch, 384
- bureau system, QSL, 338
- Burningham, John, 178

C

- cables, 22
- Cabrillo format, 242, 388
- call directory, 190
- call district, 74
- call letters, 16
- call sign, 16
 - receiving new, 74–75
 - searching on webistes, 99
 - ULS database, 98–99
 - vanity call signs, 101–103
 - applying for, 103
 - available, finding, 102–103
- calling frequency, 109
- cans (Bakelite headphones), 22
- antennas, 301
- capacitance, 396
- capacitors, 368
- Caribbean Emergency and Weather Net, 198
- carriers, 125
- casual contacts, 139
- CB (Citizens Band), 27
- CEPT, 9
- CERT (Community Emergency Response Teams), 80, 188
- Certificate of Successful Completion of Examination (CSCE), 91, 95–96
- certificates (wallpaper), 245
- channel spacing, 124, 157, 159
- channels, 112
- character spacing, 248
- characteristic impedance, 290
- charge profile, 402
- charity events, 198–199
- chassis punch, 367–368
- cheat sheet, for this book, 4
- checking in and out, 200
- chewing the rag, 17

- China, 9
- CHIRP software, 166, 276
- Circuit-building Do-It-Yourself For Dummies (Silver), 359
- Citizens Band (CB), 27
- Civil Aviation Band channels, 167
- class, license, 69–71
- clean signals, 244
- cloning radio configurations, 167, 276
- closed repeaters, 163–164
- clothing, 191
- clubs, 12, 41–46, 82
 - finding, 42–44
 - getting involved, 45–46
 - participating in meetings, 44
- CME (Coronal Mass Ejection), 393
- coaxial cables, 22, 289–290, 362–366
- code plug, 276
- codec, 127
- Cold War, 9
- COM port, 25–26, 166, 327
- commercial mobile radio, 27
- community, 12–14, 35–61
 - American Radio Relay League (ARRL), 46–49
 - hobby benefits, 48–49
 - personal benefits, 47–48
 - public benefits, 49
 - clubs and online groups, 12
 - community events, 14
 - conventions
 - finding, 59–61
 - overview, 13–14
 - emergency teams, 14
 - hamfests
 - finding and preparing for, 57–59
 - overview, 13–14
 - mentors, 36–37
 - online communities, 37–41
 - email reflectors, 39–40
 - online training and instruction, 40–41
 - social media and blogs, 37–38
 - videos, podcasts, and webinars, 38–39
 - web portals, 41

community (*continued*)

- radio clubs, 41–46
 - finding, 42–44
 - getting involved, 45–46
 - participating in meetings, 44
- specialty clubs, 50–56
 - On the Air, 50
 - AMSAT, 53–54
 - competitive clubs, 51–52
 - Handiham, 52–53
 - QRP clubs, 56
 - Tucson Amateur Packet Radio (TAPR), 54–55
 - Young Ladies' Radio League (YLRL), 55
 - Youngsters On the Air, 51
- Community Emergency Response Teams (CERT), 80, 188
- competitive clubs, 51–52
- The Complete DXer (Locher), 227
- The Complete Guide to Wiring, 317
- components for repairs and building, 368–369
- computers, 22, 114, 323–339
 - digital modes, 301
 - ergonomics with, 309–310
 - hardware considerations, 328–329
 - keeping logs, 329–334
 - computer, 330–331
 - paper, 329–330
 - submitting for contests, 333
- platforms, 323–325
 - Android and iOS, 324–325
 - Linux, 324
 - Macintosh, 324
 - microcontrollers, 325
 - Windows, 324
- QSLs, 335–339
 - applying for awards, 339
 - bureau system, 338
 - direct, 337
 - electronic, 336–337
 - QSL cards, 335–336
 - using managers, 337–338
- radio control, 327–328
- software-defined radio (SDR), 326–327
- WSJT-X and fldigi, 327

- conductance, 396
- confirmation tone, 161
- connectors, 289–292, 362–366, 392
- constant amplitude, 210
- contacts, 16–18. *See also* QSOs
 - awards, 246–247
 - logging, 241–242
 - making code, 251
 - maps, 120–121
 - nets (networks), 17–18
 - radiosport, 238–240
 - ragchews, 17
- Contest University, 40
- contests, 15–16, 51–52, 141–142, 235–245
 - being polite, 244–245
 - calling CQ, 242–243
 - choosing, 237–238
 - jargon, 388
 - logging contacts, 241–242
 - making contest contacts, 238–240
 - searching and pouncing (S&P), 243
 - submitting logs for, 333
- Continuous Tone Coded Squelch System (CTCSS), 162
- continuous tuning, 113–114
- continuous wave, 23, 247–251
 - from computers, 328
 - contacts on, 181–184
 - copying, 249–250
 - making code contacts, 251
 - methods for learning, 248–249
 - receiving, 131–132
 - sending, 250
 - starting contact, 143–144
- control box, 297
- control heads, 342, 345
- control links, 157
- conventions, 13–14
 - exam sessions at, 87
 - finding, 59–61
 - volunteering at, 45
- copying code, 249–250
- cordless telephones, 379
- corona discharge, 380

- Coronal Mass Ejection (CME), 393
- counterpoise wires, 375
- countersink, 368
- CQ, 150–152
 - calling
 - in radiosport, 242–243
 - for ragchews, 141, 155
 - parts of, 150–151
 - tips, 151–152
- CQ Communications, 53
- crank-up towers, 295–296
- credit check, 189
- crimpers, 361
- cross-polarization, 283
- crystal filters, 281
- CSCE (Certificate of Successful Completion of Examination), 91, 95–96
- CTCSS (Continuous Tone Coded Squelch System), 162
- CubeSats, 19, 53–54, 258
- currents, 28, 395
- CW. *See* continuous wave
- CW Ops group, 248
- cycles, 29

D

- data interface, 25
- data modes, 128–131
- dawn enhancement, 229
- daytime, 118, 119, 228–229
- DC power, 320
- DCS (Digital Coded Squelch), 162–163
- dead spot, 164
- decibels (dB), 291, 397–398
- demodulation, 26
- desks, 311–312
- Diamond K400 mounts, 348
- digipeating, 220
- Digital Coded Squelch (DCS), 162–163
- digital message networks, 203–207
 - AREDN, 206–207
 - NBEMS, 207
 - Winlink, 204–205

- Digital Mobile Radio (DMR), 128, 172, 176–178, 276
- digital modes, 25, 210–223
 - APRS, 220–223
 - ARDOP, 219–220
 - connecting computer, 301, 327
 - contacts on, 181–184
 - FT8 and FT4, 213–215
 - HF radios, 279–280
 - MFSK modes, 218–219
 - packet radio, 220
 - PSK31 and PSK63, 216
 - radioteletype (RTTY), 216–218
 - receiving, 128–131
 - starting contact, 143–144
 - terminology, 211–212
 - VARA, 219–220
 - WSJT modes, 212–213
- digital multimeter (DMM), 361
- digital repeater networks, 18, 172–176
 - D-STAR system, 175
 - Voice over Internet Protocol (VoIP) systems, 173–174
 - WIREX system, 176
- digital satellites, 258
- digital signal processing (DSP), 11, 210, 272
- digital voice, 116, 127–128, 169–178
 - Digital Mobile Radio (DMR) system, 176–178
 - digital repeater networks, 172–176
 - D-STAR system, 175
 - Voice over Internet Protocol (VoIP) systems, 173–174
 - WIREX system, 176
 - HF digital voice, 170
 - VHF/UHF digital voice, 170–172
- digitizing radio, 12
- dipole antennas, 24, 286–287
- direct burial, 389
- direct QSLing, 337
- direct sampling, 272
- directed nets, 199
- directional antennas, 282
- directional wattmeters, 300, 402

- direction-finding, 256
- disasters
 - operating in, 193–197
 - distress calls, 195–197
 - reporting accidents, 194–195
 - preparing for, 189–193
- discipline, radio, 202–203, 407
- Discord, 38
- discriminators, 123
- distress calls, 195–197
 - making, 195–196
 - responding to, 196–197
- distributions, 324
- DMM (digital multimeter), 361
- DMR (Digital Mobile Radio), 128, 172, 176–178, 276
- DominoEX mode, 218
- Doppler (shift), 403
- downlink, 257
- drones, 12
- DSP (digital signal processing), 11, 210, 272
- D-STAR, 128, 171, 173, 175
- dual-band radios, 112
- dual-ellipse display, 217
- dummy load, 301
- dupe list, 241
- duplex, 26, 116, 155
- DXcoffee.com website, 41
- DXing, 52, 223–235
 - defined, 15
 - on HF bands, 227–235
 - contacting station, 231
 - earning awards, 234–235
 - navigating pileups, 231–232
 - receiving signals, 227–230
 - using spotting networks, 233–234
 - working split, 233
 - license for, 70
 - pursuing contacts, 141–142
 - on VHF and UHF bands, 223–227
 - earning awards, 226–227
 - propagation, 224–226
- DXLab Suite, 121
- DXMAPS, 120
- DXpeditions, 15, 337

E

- EchoLink, 173
- effective radiated power (ERP), 398
- EFHW (end-fed half-wave) antennas, 288, 353
- eHam.net website, 41, 270
- ELAD, 273
- electric fences, 381
- electric field, 28
- electric noise, 380–381
- electrical safety, 316–317
- electrical tape, 366
- electrical units, 395–396
- electromagnetic radiation, 28
- electronic keyers, 250
- electronic noise, 382
- electronic QSLs, 336–337
- electronics
 - exam questions about, 78
 - overview, 10–12
- electrons, 28
- electrostatic discharge (ESD), 361, 368
- elements, 69, 78, 283
- elevation pattern, 400
- Elmers, 36–37, 82–83
- email, 18, 39–40, 204–205
- emergencies
 - communications, emergency, 186
 - operating in, 193–197
 - distress calls, 195–197
 - reporting accidents, 194–195
 - preparing for, 189–193
 - teams, 14
- emergency operations center (EOC), 190, 356
- end-fed half-wave (EFHW) antennas, 288, 353
- endorsements, 235
- energy density, 402
- eQSL, 336–337
- equations
 - Ohm's Law, 396
 - power equation, 397
 - standing wave ratio (SWR), 401–402

- equipment, 21–22, 359–384
 - building, 383–384
 - from kits, 383–384
 - from scratch, 384
 - components for repairs and building, 368–369
 - maintenance
 - overview, 370–371
 - tools for, 360–366
 - repair and building tools, 366–368
 - troubleshooting, 372–383
 - control problems, 376–377
 - data problems, 375–376
 - power problems, 373
 - RF interference (RFI), 377–383
 - RF problems, 374–375
- ergonomics, 308–312
- ERP (effective radiated power), 398
- ESD (electrostatic discharge), 361, 368
- ESP32, 325
- Europe, 8
- exam, licensing, 72–73, 77–83, 85–93
 - finding sessions, 88
 - mentors, 82–83
 - overview, 77–78
 - registering with ULS, 88–90
 - studying for, 78–82
 - classes, 79–80
 - online practice exams, 82
 - overview, 72
 - resources, 80–81
 - taking, 72, 90–93
 - types of, 86–87
 - volunteer examiner coordinator (VEC), 73
 - volunteer examiners (VEs), 73
- exchange, 141, 238–239, 388
- Expert Electronics, 273
- extended-coverage receiving, 275

F

- faceplates, 342, 345
- facsimile over radio, 260
- factory reset, 377
- Family Radio Service (FRS), 27, 162
- Farnsworth method, 248
- fasteners, 366
- fast-scan television, 261
- The FCC Rules and Regulations for the Amateur Radio Service, 133–134
- Federal Communications Commission (FCC), 8
 - emergency communications, 186
 - Part 15 rules, 379
 - rules, 66–67
- Federal Emergency Management Agency (FEMA), 40–41, 187
- Federal Registration Number (FRN), 89–90
- feed lines, 22, 24, 289–292, 349, 389
- fees, license, 104
- female connectors, 364
- ferrites, 382
- fiberglass masts, 294, 353
- Field Day, 15, 45, 193, 355–357
- filtering and noise, 281–282
- filters, 126, 399–400
- first aid, 318
- FISTS Club, 248
- fixed station, 99
- flashing, 322
- fldigi software, 327
- FlexRadio Systems Maestro operating console, 11, 273
- FM (frequency modulation), 26, 116, 121–124
- foam, 389
- forward power, 402
- framing, 375
- FreeDV*, 127–128, 170
- frequency, 29–30, 396
- frequency allocations, 31, 67–69
- frequency modulation (FM), 26, 116, 121–124
- FRN (Federal Registration Number), 89–90
- front-to-back ratio (F/B), 400
- front-to-side ratio (F/S), 400
- FRS (Family Radio Service), 27, 162
- FSK (frequency-shift keying), 279
- FT4, 213–215
- FT8, 213–215
- full-wavelength loop antennas, 286
- fuses, 365

G

- gain, 278, 398
- Galchutt, Steve, 352
- gateway, 220
- General class license, 70
- General Message (ICS-213) form, 200–201
- General Mobile Radio Service (GMRS), 27, 162
- generators, 192, 268, 355
- geo-foxing, 256
- geomagnetic activity, 393
- Get On the Air (GOTA), 352
- Get On the Air with HF Digital (Ford), 210
- GFCI (Ground-fault Circuit Interrupter), 357
- gigahertz (GHz), 30
- glass-cartridge fuses, 365
- GMRS (General Mobile Radio Service), 27, 162
- GNU Radio, 11
- go kits, 190–192
- Goldenberg, David, 38
- GOTA (Get On the Air), 352
- GPS technology, 11, 221–222
- GQRP Club, 56
- grandfathered license classes, 71
- grid squares, 226, 391
- ground wave propagation, 32
- Ground-fault Circuit Interrupter (GFCI), 357
- ground-independent verticals, 289
- grounding, 319–322
 - AC and DC power, 320
 - lightning, 320–321
 - RF management, 321–322
- Grounding and Bonding for the Radio Amateur (Silver), 319
- groundplane antennas, 285, 289
- groups, 149
- Groups.io, 39
- Guth, Eric, 39

H

- half-wavelength dipole antennas, 286
- Hall, Randy, 38
- Ham Nation show, 38

- ham radio, 7–34
 - building basic station, 23–26
 - communicating through contacts, 16–18
 - nets (networks), 17–18
 - ragchews, 17
 - communication technologies, 26–28
 - effects of nature on, 32–34
 - overcoming radio noise, 33–34
 - radio waves, 32–33
 - exploring around world, 8–9
 - gear, 21–22
 - radio waves, 28–32
 - frequency, 29–30
 - spectrum, 30–32
 - wavelength, 29–30
 - radiosport, 15–16
 - reasons for tuning into, 9–14
 - joining community, 12–14
 - using electronics and technology, 10–12
 - in scientific research, 18–20
- Ham Radio Deluxe, 121
- Ham Radio License Manual, 80–81
- Ham Radio Newslane podcast, 39
- Ham Radio Now TV podcast, 38
- ham radio operators. *See* hams
- Ham TV website, 261
- Hamation, 328
- Hamcation, 60
- HamCom, 60
- hamfests, 13–14
 - exam sessions at, 87
 - finding and preparing for, 57–59
 - volunteering at, 45
- hams (ham radio operators)
 - defined, 7
- jargon, 387–393
 - antenna tuners, 389–390
 - antenna varieties, 388–389
 - connector parts, 392
 - feed lines, 389
 - grid squares, 391
 - interference and noise, 391–392
 - radiosport, 388

- repeater operating, 390
- solar and geomagnetic activity, 393
- spoken Q-signals, 387–388
- origins of, 8
- HamSCI, 19–20, 55
- Hamstick-type antennas, 347–348
- Hamstudy, 81
- HamTestOnline, 81
- Hamvention, 59
- handheld radios, 22
 - choosing, 268–269
 - FM, 276–277
- Handiham, 52–53
- hard reset, 377
- headphones, 22, 268
- Heliacx, 389
- hertz (Hz), 29
- high bands, 228
- high frequency (HF) bands, 31, 116–118, 178–184
 - adjusting for time of day, 118
 - antennas, 285–289
 - vertical antennas, 288–289
 - wire antennas, 286–288
 - contacts on CW and digital modes, 181–184
 - digital voice, 170
 - DXing on, 227–235
 - contacting station, 231
 - earning awards, 234–235
 - navigating pileups, 231–232
 - receiving signals, 227–230
 - using spotting networks, 233–234
 - working split, 233
 - mobile radios, 342–343
 - organizing activity on, 117–118
 - overview, 178–179
 - radios, 278–281
 - amplifiers, 280–281
 - digital modes, 279–280
 - ranges, 108
 - times, picking, 179–181
- high-altitude ballooning, 12, 19, 222
- high-pass filter (HPF), 399
- high-speed data, 18
- High-Speed Multimedia (HSMM), 206
- hobbies, 12
- home stations, 307–322
 - choosing, 267–268
 - designing, 307–316
 - ergonomics, 308–312
 - examples of, 312–316
 - station notebook, 308
 - grounding and bonding, 319–322
 - AC and DC power, 320
 - lightning, 320–321
 - RF management, 321–322
 - safety, 316–318
 - electrical safety, 316–317
 - first aid, 318
 - radio-wave frequency (RF) exposure, 317–318
- homebrewing, 10
- horizontal polarization, 283
- hotspots, 128, 172, 322
- HPF (high-pass filter), 399
- HSMM (High-Speed Multimedia), 206
- HSMM-MESH, 18
- Huntsville Hamfest, 60
- The Hurricane Watch Net, 14, 198
- Hz (hertz), 29

I

- iambic keyers, 250
- IARU (International Amateur Radio Union), 9, 119
- icons, used in this book, 3
- ICs, 368
- ICS (Incident Command System), 188
- ICS-213 (General Message) form, 200–201
- image communication, 259–261
 - fast-scan television, 261
 - slow-scan television (SSTV), 259–260
- impedance, 396
- impedance matcher, 389
- impulse noise, 282
- Incident Command System (ICS), 188
- incremental tuning, 112, 279
- India, 9

inductance, 396
inductors, 368
industrial equipment noise, 380
in-person exams, 86
input frequency, 157
Instagram, 38
Instructables, 38
International Amateur Radio Union (IARU), 9, 119
international licensing regulations, 8–9
International Telecommunication Union (ITU), 8, 67, 135–136
Internationale Exhibition for Radio Amateurs, 59
Internet Relay Linking Project (IRLP), 173
inverted-V antennas, 288
ionosphere, 10, 33, 118
iOS, 324–325
IR drop, 396
Islands On the Air (IOTA), 50, 352
ITU (International Telecommunication Union), 8, 67, 135–136

J

jack, 364
Jamboree On the Air (JOTA), 51, 246, 352
Japan, 8, 352

K

K index, 393
Karn, Phil, 34
Keplerian elements, 259
kerchunking, 160–161
keyboard-to-keyboard communication, 143
keyers, 23, 298–299
keys, 22, 298–299
kilohertz (kHz), 30
kits, 383–384
Koch method, 248
Kutzko, Sean, 54

L

ladder line, 389
LaFreniere, Bernie, 173

lamps, 379
lead-acid gel-cells, 354
lead-acid storage, 354
legacy ports. *See* COM port
LF (low frequency), 31
license plates, 103
licensing, 65–75, 95–104
 call sign, 101–103
 applying for vanity, 103
 available, finding, 102–103
 receiving, 74–75
 searching on webistes, 99
 ULS database, 98–99
 exam, 72–73, 77–83, 85–93
 finding sessions, 88
 mentors, 82–83
 overview, 77–78
 registering with Universal Licensing System (ULS), 88–90
 studying for, 72, 78–82
 taking, 90–93
 types of, 86–87
 volunteer examiner coordinator (VEC), 73
 volunteer examiners (VEs), 73
 FCC rules, 66–67
 frequency allocations, 67–69
 general discussion of, 8–9
 maintaining, 104
 paperwork, 95–98
 printing, 100
 for remote operation, 302
 types of, 69–71
 Amateur Extra class, 70–71
 General class, 70
 grandfathered license classes, 71
 Technician class, 70
 upgrading, 101
light, speed of, 29
lightning, 320–321
Li-ion, 354
Li-iron-phosphate (LiPO), 355
Lindquist, Rick, 36
linear amplifiers, 277
links, 157, 220

- Linux, 324
- LiPO (Li-iron-phosphate), 355
- listening for signals, 107–110, 405
 - bands, organization of, 109–110
 - on input, 124
 - where to, 108–109
- lobe, 400
- location (QTH), 147
- Logbook of the World (LoTW), 336–337
- log-periodics, 283
- logs, 22, 329–334
 - for awards, 246–247
 - computer, 330–331
 - paper, 329–330
 - radiosport, 241–242
 - for stations, 266
 - submitting for contests, 333
- LOS (loss of signal), 403
- loss, 398
- LoTW (Logbook of the World), 336–337
- low bands, 229
- low frequency (LF), 31
- lower sideband (LSB), 116, 125
- low-pass filter (LPF), 399

M

- Macintosh, 324
- mag-mount antennas, 23, 275, 284, 348
- magnetic field, 28
- magnetic loop antennas, 354
- magnifiers, 361
- maintenance
 - overview, 370–371
 - tools for, 360–366
- Maker Faires, 60
- male connectors, 364
- managers, QSL, 337–338
- maps, 333–334
- Marconi Cape Cod Radio Club, 16
- Maritime Mobile Service Net, 195
- MARS (Military Auxiliary Radio System), 187
- masts, 294
- matchbox, 390
- Maxim, Hiram Percy, 48
- maximum usable frequency (MUF), 229
- McGrath, Jeff, 129
- medium frequency (MF), 31
- meetings, club, 44
- memory channels, 112, 165, 276
- memory tuning, 112
- mentors, 36–37, 82–83
- mesh network, 206
- messaging, 18
- metal bristle brushes, 366
- meteors
 - scatter, 225
 - trails, 33
- MF (medium frequency), 31
- MFSK modes, 218–219
- microcontrollers, 325
- microphones, 22, 298–299
- microwaves, 32, 108
- Mike & Key Amateur Radio Club, 43
- Military Auxiliary Radio System (MARS), 187
- mismatch, 402
- mobile FM radios, 274–276
- mobile nets, 18
- mobile phones, 9, 27
- mobile stations, 23, 341–349
 - HF mobile radios, 342–343
 - mobile antennas, 347–349
 - mobile installations, 343–347
- model rocketry, 12
- modems, 25
- modes, 26, 109
- modulation, 26
- monitors, 309–310
- moonbounce, 212, 259
- Morse code, 23, 247–251
 - from computers, 328
 - contacts on, 181–184
 - copying, 249–250
 - making code contacts, 251
 - methods for learning, 248–249
 - receiving, 131–132
 - sending, 250
 - starting contact, 143–144

mountaintopping, 226
MUF (maximum usable frequency), 229
multimode radios, 270, 346
multi-path, 164
multipliers, 240

N

Narrow Band Emergency Message System (NBEMS), 207
narrowband FM, 122
National Contest Journal magazine, 47
National Electrical Code (NEC), 316–317
National Hurricane Center, 14
National Incident Management System (NIMS), 40, 188
National Telecommunications and Information Administration (NTIA), 69
National Weather Service (NWS), 197
natural disasters, 14
nature, 32–34
 affecting radio waves, 32–33
 overcoming radio noise, 33–34
NBEMS (Narrow Band Emergency Message System), 207
NCDXF (Northern California DX Foundation), 119
NCVEC Form 605, 96–97
NEC (National Electrical Code), 316–317
net control station (NCS), 139, 199
net manager, 199
nets (networks), 11. *See also* digital message networks
 contacts, 17–18
 defined, 26
 joining, 139–140
 participating in, 199–203
 checking in and out, 200
 exchanging information, 200–202
 radio discipline, 202–203
 tactical call signs, 202
networking, 328
Newkirk, Rod, 36
nibbling tool, 367
Nifty E-Z Guide to EchoLink Operation (LaFreniere), 173
Nifty Mini-Manuals, 165
nighttime, 118, 119, 229
NIMS (National Incident Management System), 40, 188
NOAA National Weather Service, 167
NOAA SKYWARN severe weather spotters, 14
nodes, 174, 176, 206
noise
 jargon, 391–392
 noise figure, 278
 overcoming, 33–34
 reduction, 281–282
noise blankers, 282
non-ionizing radiation, 28
nonperishable food, 191
non-resonant doublet antennas, 288
Northeast HamXposition, 60
Northern California DX Foundation (NCDXF), 119
notch filters, 281, 399
Novice license, 71
NTIA (National Telecommunications and Information Administration), 69
null, 400
NWS (National Weather Service), 197

O

obscene speech, 148
off-center-fed dipole (OCFD) antennas, 288
offset, repeater's, 157
Ohm's Law, 396
Olivia signals, 218
omnidirectional antennas, 282, 288
On The Air magazine, 47
On the Air (OTA), 50, 352
1-by-3 call, 143
online communities, 37–41
 email reflectors, 39–40
 online training and instruction, 40–41
 social media and blogs, 37–38
 videos, podcasts, and webinars, 38–39
 web portals, 41
online groups, 12
online practice exams, 82

- online resources, 134
 - abbreviations, 144
 - allocation chart, 69
 - antenna tuners, 300
 - APRS, 223
 - batteries, 402
 - beacons, 119
 - building kits, 383–384
 - cheat sheet for this book, 4
 - computer platforms, 324–325
 - contest logging software, 241
 - conventions, 60, 61
 - CubeSats, 19
 - decibel values, 398
 - digital mode software resources, 211
 - DXing, 52, 235
 - emergency communications training courses, 193
 - exam study resources, 81
 - Federal Communications Commission (FCC), 67
 - Field Day Station Locator, 15
 - GNU Radio, 11
 - HamSCI, 19
 - Handiham, 52
 - high-altitude ballooning, 19
 - The Hurricane Watch Net, 14
 - International Telecommunication Union (ITU), 8
 - logging, 331
 - Marconi Cape Cod Radio Club, 16
 - mobile stations, 342
 - National Council of VECs, 88
 - portals, 41
 - prefix assignments, 75
 - QRP and portable operating, 255
 - QRZ website, 36
 - radio programming software, 166
 - radiosport, 237, 238
 - receivers, 25
 - reflectors, 39
 - RTTY, 217
 - safety information, 318
 - SARA website, 19
 - software-defined radios (SDRs), 273, 327
 - sub-bands, 109
 - towers, 295
 - training, 40–41
 - VEC groups, 73
 - Winlink system, 18
 - WSJT-X, 34
 - WSPRnet, 19
- open repeaters, 163–164
- open-wire, 289–290, 389
- operating, 133–184
 - with computers, 323–339
 - hardware considerations, 328–329
 - keeping logs, 329–334
 - QSLs, 335–339
 - radio control, 327–328
 - software-defined radio (SDR), 326–327
 - types of, 323–325
 - WSJT-X and fldigi, 327
- contacts (QSOs), 134–152
 - breaking in, 144–145
 - calling CQ, 150–152
 - casual contacts, 139
 - exchanging information, 147–149
 - failing to make, 145–146
 - nets and talk groups, 139–140
 - parts of, 135–138
 - radiosport, 141–142
 - starting, 142–144
- digital voice systems, 169–178
 - Digital Mobile Radio (DMR) system, 176–178
 - digital repeater networks, 172–176
 - HF digital voice, 170
 - VHF/UHF digital voice, 170–172
- equipment, 359–384
 - acquiring tools and components, 360–369
 - building, 383–384
 - maintenance, 370–371
 - troubleshooting, 372–383
- exam questions about, 78
- on HF bands, 178–184
 - contacts on CW and digital modes, 181–184
 - overview, 178–179
 - times, picking, 179–181

- operating (*continued*)
 - mobile stations, 341–349
 - HF mobile radios, 342–343
 - mobile antennas, 347–349
 - mobile installations, 343–347
 - portable operating, 349–357
 - Field Day, 355–357
 - portable antennas, 353–354
 - portable power, 354–355
 - ragchews, 152–155
 - calling CQ for, 155
 - finding, 152–154
 - identifying, 154
 - repeaters, 156–169
 - features of, 163–164
 - making repeater contact, 160–161
 - maximizing signal, 164
 - overview, 156–160
 - setting up radio, 164–167
 - simplex contact, 168–169
 - using access control, 161–163
 - specialties, 209–261
 - awards, 245–247
 - digital modes, 210–223
 - DXing, 223–235
 - image communication, 259–261
 - Morse code (CW, continuous wave), 247–251
 - QRP, 251–256
 - radiosport, 235–245
 - satellites, 257–259
 - system design, 267–269
 - handheld radio operation, 268–269
 - home station, 267–268
- operating chair, 311
- oscillating radio waves, 29
- oscilloscope, 367
- OTA (On the Air), 50, 352
- output frequency, 157

P

- Pacificon, 60
- packet radio, 11, 54, 204, 220
- Paalink, 204

- PACTOR, 219–220
- paddles, 23, 250, 299
- panadapters, 115, 272
- paperwork, 95–98
- parades, 198–199
- Parks On the Air (POTA), 50–51, 255, 352
- Part 15 rules, 379
- passband, 399
- Passion-Radio website, 327
- patterns, antennas, 400–401
- Perkiömäki, Jari, 332
- phone signals, 109–110
- phonetics, 135–136
- Pignology, 303, 327
- pileups, 152, 231–232
- pilot error, 376–377
- ping jockeys, 225
- platforms, 323–325
 - Android and iOS, 324–325
 - Linux, 324
 - Macintosh, 324
 - microcontrollers, 325
 - Windows, 324
- plugs, 364
- podcasts, 38–39
- portable operating, 254–255, 349–357
 - Field Day, 355–357
 - portable antennas, 353–354
 - portable power, 354–355
- portals, 41
- POTA (Parks On the Air), 50–51, 255, 352
- power
 - defined, 396
 - equation, 397
- power connectors, 363
- power supply, 24, 192, 266, 269
 - portable power, 354–355
 - troubleshooting, 373
- power-line noise, 380
- powerpole connectors, 363
- practice exams, online, 82
- preamplifiers, 278
- predicting propagation, 332

- prefixes, 16, 72
- preselectors, 281
- prices, radio, 271
- privacy codes, 162
- privileges, 109
- procedural signs, 248
- processing gain, 212
- propagation, 10, 32, 224–226, 332
- protocol errors, 375, 406
- PSK31, 128–130, 216
- PSK63, 216
- PSKreporter network, 120
- PTT (push-to-talk), 280
- public service operating, 17–18, 185–207
 - digital message networks, 203–207
 - AREDN, 206–207
 - NBEMS, 207
 - Winlink, 204–205
 - emergencies and disasters
 - operating in, 193–197
 - preparing for, 189–193
 - joining groups, 186–189
 - participating in nets, 199–203
 - checking in and out, 200
 - exchanging information, 200–202
 - radio discipline, 202–203
 - tactical call signs, 202
 - providing public service, 197–199
 - parades and charity events, 198–199
 - weather monitoring, 197–198
- public-safety radios, 27
- push-to-talk (PTT), 280
- push-up masts, 294

Q

- QEX* magazine, 47
- QRP, 251–256
 - clubs, 56
 - direction-finding, 256
 - overview, 251–254
 - portable operating, 254–255
 - radios, 279
- QRP Amateur Radio Club International (QRP ARCI), 56

- QRP Quarterly* magazine, 56
- QRZ website, 36, 41, 99
- Q-signals, 136–137, 387–388
- QSLs, 335–339
 - applying for awards, 339
 - bureau system, 338
 - cards, 335–336
 - defined, 13
 - direct, 337
 - electronic, 336–337
 - using managers, 337–338
- QSO Today* podcast, 39
- QSOs, 108, 134–152. *See also* contacts
 - breaking in, 144–145
 - calling CQ, 150–152
 - parts of, 150–151
 - tips, 151–152
 - casual contacts, 139
 - exchanging information, 147–149
 - joining groups, 149
 - repeater style, 148
 - failing to make, 145–146
 - nets and talk groups, 139–140
 - parts of, 135–138
 - Q-signals, 136–137
 - signal reports, 137–138
 - using phonetics, 135–136
 - points, 240
 - radiosport, 141–142
 - starting, 142–144
 - CW or digital mode contact, 143–144
 - repeater contacts, 142
 - SSB voice contact, 142–143
- QST* magazine, 47
- QTH (location), 147
- quarter-wave whips, 285
- Quartzfest, 343
- question pool, 72, 78

R

- radiation, 317–318
- Radio Amateur Civil Emergency Service (RACES), 187
- Radio Amateurs of Canada, 59

- radio clubs, 12, 41–46, 82. *See also* clubs
 - finding, 42–44
 - getting involved, 45–46
 - participating in meetings, 44
- radio discipline, 202–203, 407
- Radio Message Server (RMS) stations, 204
- radio programming software, 165–167
- radio shacks. *See* stations
- radio waves, 10, 28–32
 - frequency, 29–30
 - nature affecting, 32–33
 - spectrum, 30–32
 - wavelength, 29–30
- radiocontrolled (R/C) model operation, 12
- RadioQTH website, 102
- radios, 270–282
 - computers, 323–339
 - hardware considerations, 328–329
 - keeping logs, 329–334
 - QSLs, 335–339
 - radio control, 327–328
 - software-defined radio (SDR), 326–327
 - types of, 323–325
 - WSJT-X and fldigi, 327
 - ergonomic placement of, 310
 - filtering and noise, 281–282
 - for go kits, 191
 - for HF, 278–281
 - amplifiers, 280–281
 - digital modes, 279–280
 - prices, 271
 - setting up, 164–167
 - cloning radio configurations, 167
 - radio programming software, 165–167
 - software-defined radios (SDRs), 272–273
 - for VHF and UHF, 273–278
 - all-mode radios, 277
 - amplifiers, 277–278
 - handheld FM radios, 276–277
 - mobile FM radios, 274–276
 - preamplifiers, 278
- radiosport, 15–16, 51–52, 141–142, 235–245
 - being polite, 244–245
 - calling CQ, 242–243

- choosing, 237–238
- jargon, 388
- logging contacts, 241–242
- making contest contacts, 238–240
- searching and pouncing (S&P), 243
- submitting logs for, 333
- radiotelephone, 109–110
- radioteletype (RTTY), 216–218
- radio-wave frequency
 - grounding and bonding, 321–322
 - networking and, 328
 - safety, 317–318
 - troubleshooting, 374–375
- ragchews, 152–155
 - calling CQ for, 155
 - contacts, 17
 - finding, 117, 152–154
 - identifying, 154
- Rapp, Neil, 39
- Raspberry Pi, 22, 303, 324
- ratio-dB pairs, 397–398
- RBN (Reverse Beacon Network), 120, 234
- R/C (radiocontrolled) model operation, 12
- reactance, 396
- receiver incremental tuning (RIT), 112
- receiving signals, 120–121
 - digital or data modes, 128–131
 - digital voice, 127–128
 - DXing, 227–230
 - FM signals, 121–124
 - Morse code, 131–132
 - single sideband (SSB), 125–127
- receptacles, 364
- recovery communication, 186
- Red Cross, 188
- Reddit, 38
- reflected power, 402
- reflectors, 39–40
- regions of ITU, 67–68
- reliable transport, 219
- remote control stations, 12, 25, 302–304
 - accessing, 303–304
 - rules, 302–303
- remote exams, 86–87

- Remote Operating for Amateur Radio (Ford), 303
- remote receivers, 163
- RemoteRig, 327
- repair tools, 366–368
- repeater directories, 123
- Repeater MapBook Directory, 123
- repeater pair, 157
- repeater satellites, 258
- RepeaterBook website, 128
- repeaters, 22, 156–169
 - contacts, 142, 160–161
 - defined, 26
 - features of, 163–164
 - autopatch, 163
 - open and closed repeaters, 163–164
 - remote receivers, 163
 - jargon, 390
 - listening on VHF and UHF, 115
 - maximizing signal, 164
 - overview, 156–160
 - reporting accidents, 194–195
 - setting up radio, 164–167
 - cloning radio configurations, 167
 - radio programming software, 165–167
 - simplex contact, 168–169
 - using access control, 161–163
 - Digital Coded Squelch (DCS), 162–163
 - tone access, 162
- resistance, 396
- resistors, 368
- Reverse Beacon Network (RBN), 120, 234
- RF. *See* radio-wave frequency
- RF ground bus, 321, 357
- RF interference (RFI), 321
 - to other equipment, 378–380
 - to own equipment, 380–383
- RF reference plane, 322
- RFI, Ferrites, and Common Mode Chokes for Hams (Brown), 378
- RFinder app, 123
- RigPi Server, 303, 327
- RIT (receiver incremental tuning), 112
- RMS (Radio Message Server) stations, 204
- roll call, 200

- Romanchik, Dan, 38, 81
- roof flashing, 322
- roofing filters, 281
- roof-mount tripods, 294
- Rookie Roundup, 237
- rotators, 283, 296–298
- roundtables, 140, 154
- roving, 331, 346
- RT Systems, 166, 276
- RTTY (radioteletype), 216–218
- Rules & Regulations, 78
- RV mobile station, 342–343

S

- S&P (searching and pouncing), 243, 388
- safety
 - exam questions about, 78
 - home stations, 316–318
 - electrical safety, 316–317
 - first aid, 318
 - radio-wave frequency (RF) exposure, 317–318
 - installing antennas, 293
- safety lockout, 317
- Salvation Army's Team Emergency Radio Network (SATERN), 188
- SARA (Society of Amateur Radio Astronomers), 19
- satellites, 26, 257–259
 - accessing, 258–259
 - overview, 257–258
 - tracking, 402–403
- SATERN (Salvation Army's Team Emergency Radio Network), 188
- scanners, 112
- schedule, making, 160
- School Club Roundup, 237
- science, technology, engineering, and math (STEM) students, 19
- scientific research, ham radio in, 18–20
- screwdriver antennas, 348
- SDRs (software-defined radios), 10, 11, 26, 272–273, 326–327
- SeaPac, 60
- searching and pouncing (S&P), 243, 388
- secondary batteries, 402

- selectivity, 281
- self-supporting towers, 296
- semiconductors, 368
- sending code, 250
- separation kits, 345–346
- SEQP (Solar Eclipse QSO Party), 19
- serial numbers, 141, 239, 388
- served agencies, 187
- services, 31
- sessions, 219
- shift (Doppler), 403
- shortwave, 31
- sidebands, 125
- signal reports, 137–138
- signals, 30–31, 107–132
 - listening for, 107–110
 - bands, organization of, 109–110
 - where to, 108–109
 - receiving, 121–132
 - digital or data modes, 128–131
 - digital voice, 127–128
 - FM signals, 121–124
 - Morse code, 131–132
 - single sideband (SSB), 125–127
- repeaters, maximizing, 164
- tuning in, 110–121
 - beacon networks, 119–120
 - beacon stations, 118–119
 - contact maps, 120–121
 - continuous tuning, 113–114
 - on high frequency (HF), 116–118
 - software-controlled tuning, 114–115
 - on VHF and UHF, 115–116
- signal-to-noise ratio (SNR), 234
- signatures, 380–381
- signing off, 155
- simplex, 116, 155, 168–169
- single sideband, 116
 - receiving, 125–127
 - voice contact, 142–143
- skip propagation, 227
- sky wave propagation, 33
- SKYWARN program, 197
- Slack, 38
- slide-rule dial, 113
- slow-scan television (SSTV), 127, 259–260
- SMD (surface-mount devices), 369
- SNR (signal-to-noise ratio), 234
- social media, 37–38
- Society of Amateur Radio Astronomers (SARA), 19
- soft reset, 377
- soft-bristle brushes, 366
- software, radio programming, 165–167
- software-controlled tuning, 114–115
- software-defined radios (SDRs), 10, 11, 26, 272–273, 326–327
- solar activity, 230, 393
- Solar Eclipse QSO Party (SEQP), 19
- solar flare, 393
- solar flux, 393
- solar panels, 355
- soldering iron and gun, 361
- solid-state amplifiers, 280
- solvents, 366
- SOTA (Summits On the Air), 50, 226, 254, 352
- special events
 - call sign, 103
 - stations, 16
- specialty clubs, 50–56
 - On the Air, 50
 - AMSAT, 53–54
 - competitive clubs, 51–52
 - Handiham, 52–53
 - QRP clubs, 56
 - Tucson Amateur Packet Radio (TAPR), 54–55
 - Young Ladies' Radio League (YLRL), 55
 - Youngsters On the Air (YOTA), 51
- specialty operations, 209–261
 - awards, 245–247
 - applying for, 246–247
 - finding, 245–246
 - logging contacts for, 246–247
- digital modes, 210–223
 - APRS, 220–223
 - ARDOP, 219–220
 - FT8 and FT4, 213–215

- MFSK modes, 218–219
- packet radio, 220
- PACTOR, 219–220
- PSK31 and PSK63, 216
- radioteletype (RTTY), 216–218
- terminology, 211–212
- VARA, 219–220
- WSJT modes, 212–213
- DXing, 223–235
 - on HF bands, 227–235
 - on VHF and UHF bands, 223–227
- image communication, 259–261
 - fast-scan television, 261
 - slow-scan television (SSTV), 259–260
- Morse code, 247–251
 - copying, 249–250
 - making code contacts, 251
 - methods for learning, 248–249
 - sending, 250
- QRP, 251–256
 - direction-finding, 256
 - overview, 251–254
 - portable operating, 254–255
- radiosport, 235–245
 - choosing, 237–238
 - operating in, 238–245
- satellites, 257–259
 - accessing, 258–259
 - overview, 257–258
- spectrum, radio, 30–32
- spectrum display, 114, 272
- speed of light, 29
- split cores, 382
- split-frequency operation, 233
- sporadic E, 224–225
- spotting networks, 233–234
- sprays, 366
- square-loop beams, 283
- squelch
 - overview, 122
 - tail, 160
- SSB. *See* single sideband
- SSTV (slow-scan television), 127, 259–260
- standing wave ratio (SWR), 287, 401–402
- state QSO party, 238
- station notebook, 308
- stations, 265–305
 - accessories, 298–301
 - antenna tuners, 299–300
 - digital mode interfaces, 301
 - dummy load, 301
 - mikes, keys, and keyers, 298–299
 - SWR meters, 300–301
- antennas, 282–298
 - beam, 283–284
 - feed line and connectors, 289–292
 - HF, 285–289
 - masts and tripods, 294
 - rotators, 296–298
 - towers, 295–296
 - trees and, 293–294
 - VHF/UHF, 284–285
- building basic, 23–26
- choosing, 268–269
- defined, 265–266
- radios, 270–282
 - filtering and noise, 281–282
 - for HF, 278–281
 - prices, 271
 - software-defined radios (SDRs), 272–273
 - for VHF and UHF, 273–278
- remote control, 302–304
 - accessing, 303–304
 - rules, 302–303
- system design, 266–269
 - activities, choosing, 266–267
 - operating choices, 267–269
- upgrading, 304–305
- stealth antennas, 286
- STEM (science, technology, engineering, and math)
 - students, 19
- step size, 112
- stepped drill bit, 367–368
- STM32, 325
- straight key, 23, 250
- Straight Key Century Club, 248

- Straight Key Night, 251
- structured modes, 144, 219
- study guides, 80–81
- studying, 78–82
 - classes for, 79–80
 - general discussion of, 72
 - online practice exams, 82
 - resources for, 80–81
- sub-audible, 162
- sub-bands, 109
- sub-receivers, 111
- suffixes, 16, 72, 101
- Summits On the Air (SOTA), 50, 226, 254, 352
- sunspot cycle, 230
- superheterodyne receiver, 113
- surface-mount devices (SMD), 369
- swabs, 366
- SWR (standing wave ratio), 287, 401–402
- SWR bridge, 401
- SWR meters, 300–301, 367
- system design, 266–269
 - activities, choosing, 266–267
 - operating choices, 267–269
 - handheld radio operation, 268–269
 - home station, 267–268
- System Fusion, 128, 171–172

T

- tactical call signs, 202
- talk groups, 139–140
- TAPR (Tucson Amateur Packet Radio), 54–55
- Taylor, Joe, 34, 212
- TDMA (Time-Division, Multiple Access), 177
- technical specialties nets, 18
- Technician class license, 70
- technologies, 26–28
- Teensy 4.0, 325
- telemetry, 258
- telephones, cordless, 379
- teleprinters, 218
- televisions, 379
- terminal crimpers, 361
- terminal node controller (TNC), 220, 275
- Thailand, 9
- T-handled reamer, 368
- 3-by-2 call, 150
- through-hole components, 369
- tilt-over towers, 295
- Time-Division, Multiple Access (TDMA), 177
- time-out function, 161
- TNC (terminal node controller), 220, 275
- tone access, 162
- tone encoding, 160
- tone scan feature, 123, 165
- tone squelch, 162
- tools
 - components, 368–369
 - maintenance, 360–366
 - repair and building, 366–368
- top band, 230
- toroid cores, 382
- touch lamps, 379
- towers, 295–296
- TowerTalk, 296
- TPO (transmitter output power), 398
- training, 219
- transceivers, 22, 266
- transmatch, 390
- transmission lines, 289
- transmitter output power (TPO), 398
- transmitters, 28
- transponders, 257
- transverters, 277, 346
- trap dipole antennas, 288
- trees, 293–294, 353
- triangle-loop beams, 283
- tri-banders, 283
- tripods, 294
- tropospheric propagation, 33, 226
- troubleshooting
 - control problems, 376–377
 - data problems, 375–376
 - equipment, 372–383
 - power problems, 373

- RF interference (RFI), 377–383
 - to other equipment, 278–280
 - to own equipment, 380–383
- RF problems, 374–375
- TRS connector, 364
- tube amplifiers, 280
- Tucson Amateur Packet Radio (TAPR), 54–55
- tuners, antenna, 24, 299–300, 389–390
- tuning in signals, 110–121
 - beacon networks, 119–120
 - beacon stations, 118–119
 - contact maps, 120–121
 - continuous tuning, 113–114
 - on high frequency (HF), 116–118
 - adjusting for time of day, 118
 - organizing activity on, 117–118
 - software-controlled tuning, 114–115
 - on VHF and UHF, 115–116
- tuning indicators, 111, 217
- Turner, Stu, 81
- TW vertical dipoles, 354
- twin-lead line, 389
- Twitter, 37
- Two-Way Radios and Scanners For Dummies (Silver), 160

U

- ULS. *See* Universal Licensing System
- ultra high frequency (UHF) bands, 32
 - antennas, 284–285
 - digital voice, 170–172
 - DXing on, 223–227
 - earning awards, 226–227
 - propagation, 224–226
 - listening on, 115–116
 - radios, 273–278
 - all-mode radios, 277
 - amplifiers, 277–278
 - handheld FM radios, 276–277
 - mobile FM radios, 274–276
 - preamplifiers, 278
 - ranges, 108

- United States, 8
- Universal Licensing System
 - registering with, 88–90
 - searching database, 98–99
- Universal Time Coordinated (UTC), 234, 330
- Up the Tower* (Morris), 293
- up-converters, 273
- upgrading
 - license, 101
 - stations, 304–305
- uplink, 257
- upper sideband (USB), 116, 125
- USB port, 25–26
- UTC (Universal Time Coordinated), 234, 330

V

- vanity call signs, 101–103
 - applying for, 103
 - available, finding, 102–103
- VARA, 219–220
- variable frequency oscillators (VFOs), 111
- variable-frequency drive (VFD) systems, 381
- VEC (volunteer examiner coordinator), 48, 73
- vehicle ignition noise, 381
- vertical antennas, 24, 288–289
- vertical polarization, 283
- very high frequency bands, 32
 - antennas, 284–285
 - digital voice, 170–172
 - DXing on, 223–227
 - earning awards, 226–227
 - propagation, 224–226
 - listening on, 115–116
 - radios, 273–278
 - all-mode radios, 277
 - amplifiers, 277–278
 - handheld FM radios, 276–277
 - mobile FM radios, 274–276
 - preamplifiers, 278
 - ranges, 108
- VEs (volunteer examiners), 8, 72, 73
- VFD (variable-frequency drive) systems, 381

VFOs (variable frequency oscillators), 111
VHF bands. *See* very high frequency band
videos
 equipment, 379
 online, 38–39
Vimeo, 38
voice keyers, 299
Voice of America Coverage Analysis Program (VOACAP), 332
Voice over Internet Protocol (VoIP) systems, 173–174
voltage, 395
volunteer examiner coordinator (VEC), 48, 73
volunteer examiners (VEs), 8, 72, 73
volunteering, 45

W

W1AW station, 48
wallpaper (certificates), 245
WARC (World Administrative Radio Conference), 180
waterfall displays, 115, 217, 272
wattmeter, 367
wavelength, 29–30, 396
weak-signal modes, 126, 153
weather monitoring, 197–198
web portals, 41
webinars, 38–39
welded lattice towers, 295
West, Gordon, 81
whips, 284
wideband FM, 122
WiFi, 27

window line, 389
Windows operating system, 324
Winlink, 18, 204–205
Winterfest, 60
wire antennas, 286–288
wire cutters, 361
wire strippers, 361
WIRES-X system, 176
WM7D call-sign database, 102
working split, 233
World Administrative Radio Conference (WARC), 180
World Radiosport Team Championship (WRTC), 242
world time, 234
World Wide Radio Operator's Foundation, 40
WSJT modes, 212–213
WSJT-X, 34, 327
WSPRnet, 19, 120

X

Xiegu, 273

Y

Yagi antennas. *See* beam antennas
Young Ladies' Radio League (YLRL), 55
Youngsters On the Air (YOTA), 51, 352
YouTube, 38, 81

Z

zero beat, 127
zones, 388