INDEX

Absorption-type wavemeter, 114 Active duty requirements for advancement, 3 Adapter, indicator, MX-1399/SPS-10, 301 Adjustments, facsimile equipment, 273-295 frequency-shift converter CV-172A/U, 283-286 frequency-shift keyer KY-75/SRT, 278-280 modulator, radio MD-168/UX, 280-282 receiving equipment, 282 recorder set AN/UXH-2, 289-295 recording RD-92A/UX, 286-289 transceiver TT-41B/TXC-1B, 273-278 Adjustments, teletype equipment, 254-273 communication patching panel SB-1203/UG, 270 converter-comparator groups, 256-270 AN/URA-8B, 256-265 AN/URA-17, 265-270 frequency-shift keyer KY-75/SRT, 255 transmitter teletype control unit C-1004A/ SG, 270-273 Advancement in rating, 1-8 active duty requirements, 3 Electronics Technician rating, 1 enlisted rating structure, 1 inactive duty requirements, 4 materials used in, 5 preparing for, 2 qualifications for, 2 Quals Manual, 6 Record of Practical Factors, 6 training, 7 courses, 7, 8 films, 8, 381 Air filters, maintenance of, 324 Alteration and repair, 318, 319 Alteration Record Card, NavShips 530, 37 AM-1845/UXH-2 electrical control amplifier, 291 Ammeter, use in test oscilloscopes, 135 Amplidyne, 93 Amplifier Assembly AM-518/SSA, 198 Analyzer capacitance-inductance-resistance,99 AN/APS-2 radar set, designation system for, 17 AN electronic type designation system, 17-24 equipment indicator letters, 18 set identification, 17 table of component indicators, 20-24

AN-GRC-27A, 231 radio transmitter-receiver set, 231, 232 AN/PSM-2A insulation test set, 330 AN/SGC-1A tone converter, 266 AN/SPA-8A repeater, 66 AN/SPS-8B radar set, 64 AN/SRN-6 radio set, installation of, 60 AN/SRR-11, 12, and 13 radio receiving sets, 224 - 231external adjustments, 228-230 general description of, 224-228 summary of operation, 230, 231 troubleshooting chart, 356 AN/SRT-14 troubleshooting chart, 354 AN/SRT-15 radio transmitting set, adjustments on, 210-224 antenna coupler, 219 low-level radio modulator, 213-215 power supply, 215-219 radio frequency amplifier, 211 remote control unit, 219 r-f tuner, 219 transmitter coupler, 216 Antenna assembly AS-936A/SPS-10B, 301 Antenna resistance measurements, 110 Antennas and transmission lines, 328-332 Antennas, safety precautions, 13 Antenna systems, installation of, 80-84 Antenna transfer panel, type 23406, 195 AN/UCC-1 teletype terminal equipment, installation of, 52 AN/UPM-56 radar test set, 165-169 AN/UPM-99 radar test set, 169-174 AN/UPN-12 loran receiving set, 310 AN/URA-8B converter-comparator group, 256-265 AN/URA-17 converter-comparator group, 265-270AN/URC-32 radio set, 241-253 audio and control unit block diagram, 245 CW and FSK unit, 249 frequency generator, 249 general description of, 245 operating procedure, 251 power amplifier, 250 sideband generator, 246-249 tuning procedure, 251-253 turning on equipment, 251

AN/USM-24 synchroscope, 138-145 AN/UXH-2 recorder set, 289-295 Artificial respiration, 9 Atmospheric noise, reduction of, 88 Attenuator networks, 29-32 Average power, 108 Background noise, reduction of, 88 Balanced modulator, installation of, 45 Bidirectional coupler, 109 Bleeder resistors, 12 Bolometer methods of measuring r-fenergy, 113 Bonding compound, 367, 371 removing a defective part from, 367 Bridge, ZM-11/U, 100 Brushes, use in maintenance of electronic equipment, 326, 246 Bulkhead mountings, 94 Bulletins, technical, 33 Bureau of Ships Journal, NavShips 250-200, 34 Bureau of Ships Technical Manual, NavShips 250-000, 34 Cables, installation of, 74-76 Calibration chart, 115 Canvas wiper, 328 Capacitance bridge, 103 Capacitance-inductance-resistance analyzer, 99 Capacitance measurements, 102 Capacitors, safety precautions, 10 Cathode-ray tubes, safety precautions when handling, 14 Chassis holding jig, 377 Chassis wiring, standard colors used in, 29 Cleaning electronic equipment, 323 Cleaning solvents, use in maintenance of electronic equipment, 323 Collector leakage current, 126, 338 measurement of, 126 test, 338 Collector rings and commutators, 327 Combination test sets, 99 Communication equipment, installation of, 43-56 facsimile, 53-56 radio, 43-48 radio teletype terminal equipment, 48-53 Communication patching panel SB-1203/UG, 270 Commutators and collector rings, 327 Comparator CM-22A/URA-8A, 260 Compass equipment, radio, installation of, 57 Component identification, 20 Compressed air, safety precautions, 323 Conductor marking, 28

C-1004A/SG transmitter teletype control unit, 270-273 Converter-comparator group AN/URA-8B, 256 Converter-comparator group AN/URA-17, 265-270 Correspondence courses, 8 Corrosion of metal surfaces, correction of, 346 Cosmic noise, reduction of, 88 Countermeasures, electronic, 71 Counter type frequency meter, 117 Courses, training, 7 correspondence, 8 Crystal diodes, testing of, 334 Current Ship's Maintenance Project (CSMP), 36 CV-172A/U frequency-shift converter, 283-286 Data switching group OA-496/SSA, 198-200 Dbm-to-watts conversion chart, 168 Decibel, 108 Dental and medical department tools, use in servicing electronic equipment, 322 Designations, terminal, 26 Directional coupler, 108 Dummy antenna circuit, 124 Earphones and microphones, maintenance of, 339 Echo box TS-275/UP, 145-160 connecting to radar, 147 frequency calibration, 147 illustration of, 146 power output, 152 ringtime measurements, 149 spectrum analysis, 150-152 Electrical Control Amplifier AM-1845/UXH-2, 291 Electric shock, prevention of, 9, 10 Electronic counter, 524D, 118 Electronic equipment, designation system for, 17 - 24component identification, 20 equipment indicator letters, 18 set identification, 17 table of component indicators, 20-24 Electronic Equipment Failure/Replacement Report DD-787, 39 Electronic Equipment Operational Time Log, NavShips 4855, 39 Electronic equipment history card, NavShips 536.35 Electronic equipment, wiring color code for, 29 Electronics installations, 43-97 antenna systems, 80-84 cables, 74-76 communications equipment, 43-56

Electronics installations—Continued facsimile, 53-56 radio, 43-48 radio teletype terminal, 48-53 countermeasures, 71 filters, 88-92 foundation and racks, 73 grounding, 74 multicouplers, 85-88 navigational equipment, 56-64 loran, 60-64 radio compass, 57 radio direction finders, 56 sector beacons, 58 tacan, 59 power cables, 76-78 power system, 92 radar equipment, 64-71 radio teletype terminal equipment, 48-53 r-f cables, 78-80 shock mounts, 73 timing circuits, 72 transmitting antennas and transmission lines, 84 Electronics Installation Practices Manual (EIPM), NavShips 900-171, 34 Electronics Performance and Operational Report, NavShips 3878, 40 Electronics Technician rating, advancement in, 1-8 Electronics Type Designator System (AN system), 17-24 component identification, 20 equipment indicator letters, 18 set identification, 17 table of component indicators, 20-24 Electronic voltmeter, 98 Electron tubes, testing of, 332-334 **Emergency ratings**, 1 Emergency techniques, 370-373 Enlisted rating structure, 1 Equipage stock card and custody record, 40 Equipment failure and performance records, 37 Equipment nomenclature and designations, 17-32 attenuator networks, designations for, 29-32 joint electronics type designation system (AN system), 17-24 component identification, 20-24 set identification, 17-19 model letter system, 25 terminal designations, 26-29 wiring color code for electronic equipment, 29 wiring diagrams, 25

Facsimile equipment adjustments on, 273-295 installation of, 53-57 Faulty circuits, localizing of, 351 Field change, 319 Field-intensity measurements, 107 Films, training, 8, 381 Filters, 88-92 First aid training course, 9 Frequency division multiplexing, installation of, 50 Frequency measurements, 107, 114 Frequency-power meter chart, 161 troubleshooting TS-230B/AP, 160-165 Frequency-shift converter-comparator group AN/URA-8B, block diagram of, 259 Frequency-Shift Converter CV-89A/URA-8A, 261 Frequency-Shift Converter CV-172A/U, 283-286 Frequency-Shift Keyer KY-75/SRT, 278-280 adjustments on, 255 Gases, poisonous, safety precautions, 10 General ratings, 1 Germanium crystals, 335 Goggles, protective, 14

Greasing procedures, 324 Grounding of equipments and components, 12, 74 Gyrocompass selector switch, 202, 203

Handbooks, technical, 33 Height-finding radar system AN/SPS-8B, 64 Heterodyne type frequency meter, 115 HF multicouplers, installation of, 87 Hypodermic syringes, use in servicing electronic equipment, 322

IFF equipment, installation of, 70 Impedance triangles, 106 Inactive duty requirements for advancement, 4 Induced voltages, 13 Inductance measurements, 104, 105 Installation and maintenance manuals, 33 Insulated controls, 12 Insulation testers, 98 AN/PSM-2A test set, 330 use in testing antenna systems, 329 Interference measurements, 107 Interlock switches, 11

Jacks, telephone type, 181 Keyer Adapter KY-44A/FX, 278 Knife switches, 178 KY-44A/FX keyer adapter, 278 KY-75/SRT frequency-shift keyer, 255, 278-280 Lamp-local method of measuring resistance, 113 Lever pileup switches, 178 Lissajous figures, 135-137 Localizing faulty circuits, 351 Local oscillator, tuning of, 153 Loran, installation of, 60-64 Loran Receiving Set AN/UPN-12, 309-316 block diagram of, 312 cathode-ray tube presentations, 314 operating procedures, 315 Low-pass and high-pass filters, 93 Magnifying glass, use to locate a hairline crack, 365 Maintenance and installation manuals, 33 Maintenance procedures and techniques, 317-380 air filters, 324 alteration and repair, 318, 319 antennas and transmission lines, 328-332 beyond the capacity of ship or station forces, 319 cleaning practices, 323 corrective procedures, 348-380 earphones and microphones, 339 emergency techniques, 370-373 lubrication, 324 modular assemblies, 373 motors and motor-generators, 325-328 packaging methods, 378 Performance, Operational and Maintenance Standards for Electronic Equipment, 320 preventive maintenance procedures, 319 radiac equipment, 347 radar equipment, 345-347 radio receivers, 343-345 radio transmitters, 339-343 safety practices, 322 soldering technique, 375 testing, 332-339 crystal diodes, 334 electron tubes, 332-334 transistors, 337-339 tools, 320-322 transistorized training aids, 380 troubleshooting, 348-380 localizing faulty circuits, 351 miniature components and devices, 357 radar equipment, 357 radio equipment, 353-357 Maintenance publications, 320

Man-made noise, 88 Manual of Qualifications for Advancement in Rating, 6 Manuals, technical, 34 Mark X code, generation of, 173 MD-168/UX modulator radio, 280-282 Meters to be read in 3, 4, and 5 in part II, Maintenance Standards Book, 341 Microammeter, 98 Microphones and earphones, 339 Microwave antenna, installation of, 83 Military requirements for advancement in rating, 6 Military Standards of Graphical Symbols for Electrical and Electronic Diagrams, 25 Miniature components and devices, corrective maintenance, 357 Model letters, 25 Modulation measurements, 137 Modulation, radio equipment, 43-47 Modulator assemblies, 373-380 Modulator, radar, MD-176A/SPS-10, 298 Monitor oscilloscope patterns for convertercomparator group AN/URA-8B, 262 Motion picture films for training, 8, 381 Motor-generator sets, 93, 96 illustration of, 96 Movies, training, 8 Multicouplers, installation of, 85-88 Multimeters, 98 Navigational equipment, installation of, 56-64 loran, 60-64 radio compass, 57 radio direction finders, 56 sector beacons, 58 tacan, 59 Navy model letter system, 25 Navy training courses, 7 Needle probes, 364 Noise, filters for reduction of, 88 Operating conditions and control settings, electronic equipment, 342 Oscillators, 115 Oscilloscope, 98 Oscilloscope OS-8B/U, 128-140 block diagram of, 129 controls of, 128-130 deflection sensitivity, 131 distortion, 132 frequency ranges, 131 general information, 130 input circuit, 130 Lissajous figures, 135-137 modulation measurements, 137, 138

Oscilloscope OS-8B/U-Continued signal tracing, 133 stray pickup, 132 use as a measuring device, 133-135 voltage dividers, 131 Own ship's course selector switch, 202 Packaging methods in maintenance procedures. 378 Painting electronic equipment, safety precautions, 15 Pickup horn, 109 Plug-in board, protective packaging of, 378 Plugs and receptacles, grounded type, 12 Poisoning from radioactive materials, safety precautions, 14 Polar coordinate presentation of tacan data, 59 **POMSEE** program, 320 Power cables, installation of, 76-78 conversion chart, average-to-peak, 169 line filters, 93 line, safety measures, 12 measurements, 106 meter, 98 system for electronic equipment, installation of, 92 PP-1901/UXH-2 power supply, 291 Precipitation, static reduction of, 88-92 Preventive maintenance procedures, 319 Printed circuits, troubleshooting procedure for, 364-372 repairing a broken printed circuit board, 372 special techniques, 366 Professional requirements for advancement in rating, 6 Protective clothing, 14 Publications maintenance, 320 technical, 33-35 Push switches, 177 Qualifications for advancement in rating,2,388-394 Radar duty cycles, 164 Radar equipment installation of, 64-71 maintenance, 347 corrective maintenance, 357 Radar performance figure, 174-176 Radar performance measurements, 108 Radar selector switches, 202 Radar Set AN/SPS-10D, operating adjustments on, 296-309

description and function of units, 296-302 functional block diagram, 302-305 operation, 305 prechecks, 305 starting the equipment, 306-308 tuning adjustments, 308, 309 power supply, 298 Radar switchboard, diagram showing route of signals from radar to repeater, 208 Radar test sets, 99 AN/UPM-56, 165-169 AN/UPM-99, 169-174 Radiac equipment, maintenance of, 347 Radiation, safety precautions, 14 Radioactive electron tubes, safety precautions, 14 Radio compass equipment, installation of, 57 Radio facsimile FS reception, 284 Radio frequency circuits, safety precautions, 10 Radio frequency units, measurements in, 110 Radio, installation, 43-48 compass equipment, 57 direction finders, 56 Radio maintenance, 353-357 Radio receiver and transmitter remote-control transfer switchboards, 185-194 interconnections between transfer switchboards, 190 receiver transfer switchboard, 185-188 switch connections between radiophone unit and transmitter, 190-194 transmitter transfer switchboard, 188 Radio receiver band-switching circuits, 182-185 Radio receiver maintenance, 343-345 Radio receiver R-278B/GR, 233-237 Radio receiving sets AN/SRR-11, 12, and 13, 224 - 231external adjustments, 228-230 general description of, 224-228 summary of operation, 230, 231 troubleshooting chart, 356 Radio Set AN/URC-32, 241-253 audio and control unit block diagram, 245 CW and FSK unit, 249 frequency generator, 249 general description of, 245 operating procedure, 251 power amplifier, 250 sideband generator, 246-249 tuning procedure, 251-253 turning on equipment, 251 Radio teletype system, block diagram of, 254 Radio teletype terminal equipment, installation of. 48-53 **Radio transmitters**

Radio transmitters-Continued installation of, 47 maintenance of, 339-343 Radio transmitter-receiver Set AN/GRC-27A, 231, 232 Radio Transmitter T-217A/GR, 237-241 Radio transmitting Set AN/SRT-15, 210-224 antenna coupler, 219 low-level radio modulator, 213-215 low-voltage power supply, 215 power supply, 215-219 radio frequency amplifier, 211 remote control unit, 219 r-f tuner, 219 transmitter coupler, 216 Radium, safety precautions, 14 Radon, safety precautions, 14 Range calibration, 98 RD-92A/UX recorder, 286-289 Reaction-type wavemeter, 114 Receivers AN/SRR 11, 12, and 13, schematic diagrams, 29 Receivers, corrective maintenance of, 355-357 Receiver sensitivity measurements, 122 test setup for, 344 Receiver transfer switchboard, 185 Receiver-transmitter, Radar RT-272A/SPS-10D, 299 Receiving-antenna distribution systems, 194-209 diagram showing route of signals from radar to repeater, 208, 209 distribution of radar information, 198-200 gyrocompass selector switch, 202, 203 own ship's course selector switch, 202, 204 radar selector switches, 202 illustration, 205 switching-control servosystem, 200-202 system employing filter assembly, 196 system employing transfer panels, 194-196 wiring diagram of video and trigger switching circuits, 206 Receiving antenna, installation of, 84 Receiving equipment, facsimile, 282 Recorder sets, facsimile AN/UXH-2, 289-295 RD-92A/UR, 286-289 **Record of Practical Factors**, 6 Records, technical, 35-42 current ship's maintenance project, 36 electronic equipment history card, NavShips 536, 35 equipage stock card and custody record, 40-42 equipment failure and performance records, 37 - 40

miscellaneous, 42 Record of Field Changes, NavShips 537, 37 ship electronics installation record, Nav-Ships 4110, 42 Regular overhaul, electronic equipment, 318 Repair and alteration, 318, 319 Repair Record Card, NavShips 529, 37 Repeaters, radar, 64 Resistance bridge, 101 measurement, 100 methods of, 113 R-f cables, installation of, 78-80 R-f plumbing, 166 Rotary switches, 180, 198 pileup, 180 SA-243/SSA and SA-247/SSA-front panels, 198 selector, 180 RT-272A/SPS-10D receiver-transmitter radar, 299 Safety precautions, 9-16 accidental energizing, 13 antennas, 13 common safety features in electronic equipment, 11 electron tubes, 14 general precautions, 10 grounding of equipments and components, 12 maintenance procedures, 322 painting electronic equipment, 15 personal protection, 9 safety rules to remember, 15 solvents, 15 Salt water flooding, contamination by, 324 Sanding brushes, 327 SB-1203/UG communication patching panel, 270 Search radars, installation of, 66 Sector beacons, installation of, 58 Securing switches, 13 Sensitivity measurements, 107 Shipboard Antenna Details, NavShips 900-121, 34 Ship Electronics Installation Record, NavShips 4110, 42 Shock, electric, safety precautions, 10 Shorting stick, 10, 11 Signal generator, 98 Signal tracers, 359 Silicon crystal diodes, 335 Single sideband (SSB) communication systems, installation of, 44 Soldering techniques, 375 Sonar equipment, Navy model letters used in, 26

Spaghetti sleeving, 28 Spectrum analysis, 150 Steel wool, 347 Stuffing tubes, 77 Surgical equipment, use in servicing electronic equipment, 322 hemostats, 322 needles, 322 Switchboard systems, 185-188 Switches, 177-184 knife, 178 lever pileup, 178 push, 177 rotary pileup, 180 rotary selector, 180 securing of, 13 telephone type jacks, 181 thermostatic, 178-180 toggle, 177 wafer lever, 178 Switching and fusing designations, 27 Switching-control servosystem, 200-202 Synchroscope AN/USM-24, 138-145 Tacan, installation of, 59 Tactical Air Navigation (TACAN), installation of equipment, 59 Tags, cable, installation of, 75 Technical availability, 318 Technical records, 35-42 current ship's maintenance project, 36 electronic equipment history card, NavShips 536, 35 equipage stock card and custody record, 40-42 equipment failure and performance records, 37 - 40miscellaneous, 42 Record of Field Changes, NavShips 537, 37 ship electronics installation record, Nav-Ships 4110, 42 Telephone type jacks, 181 illustration of, 184 Teletype equipment, adjustments on, 254-273 communication patching panel SB-1203/UG, 270 converter-comparator groups, 256-270 AN/URA-8B, 256-265 AN/URA-17, 265-270 Frequency-shift Keyer KY-75/SRT, 255 Transmitter Teletype Control Unit C-1004A/ SG, 270-273 Teletype Terminal Equipment AN/UCC-1, installation of, 52

Terminal designations, 26-29 Test equipment, application of, 98-127 measurements, types of, 99 capacitance, 102-104 current, voltage, and resistance, 99 field intensity, 107 frequency, 107 inductance, 104-106 in radio frequency circuits, 110-125 interference, 107 in transistor circuits, 125-127 power, 106 radar performance, 108-110 resistance, 100-102 sensitivity, 107 representative equipment, 98 Test equipment, use of, 128-176 Echo Box TS-275/UP, 145-160 frequency calibration, 147 illustration, 146 methods of connecting, 147 power output, 152 frequency-power meter TS-230B/AP, 160-165 Oscilloscope OS-8B/U, 128-140 as a measuring device, 133-135 block diagram of, 129 controls, 128-130 distortion, 132 Lissajous figures, 135-137 modulation measurements, 137, 138 signal tracing, 133 stray pickup, 132 radar, 165-176 performance figure, 174-176 Test Set AN/UPM-56, 165-169 Test Set AN/UPM-99, 169-174 Synchroscope AN/USM-24, 138-145 Testing, 332-339 collector leakage current test, 338 crystal diodes, 334 electron tubes, 332-334 transistors, 337-339 Test setup for receiver sensitivity measurements, 344 Thermistor bridge wattmeter, 167 Thermostatic switches, 178-180 Time interval waveforms, 121 Timing circuits, installation of, 72 Toggle switches, 177 Tone converter AN/SGC-1A, 266-270 Tools, maintenance of, 320-322 Training courses, 7 Training films, 8, 381

Transceiver TT-41B/TXC-1B, 273-278 Transistorized training aids, 380 Transistors, 357-364 and diode designation system, 360 lead identification, 360 servicing of, 363 specifications, 360 testing of, 337-339 tester, 98 transistor heat dissipators, 361 Transmission lines and antennas, maintenance of, 328-332 Transmitter Teletype Control Unit C-1004A/ SG, 270-273 Transmitting antennas and transmission lines, installation of, 84 Trigger and video switching, 202 TS-230B/AP frequency-power meter, 160-165 TS-275/UP echo box, 145-160 connecting to radar, 147 frequency calibration, 147 illustration of, 146 power output, 152 ringtime measurements, 149 spectrum analysis, 150-152 TT-41B/TXC-1B transceiver, 273-278 T-217A/GR radio transmitter, 237-241

Tubes electron, testing of, 332 tester, 98 stuffing, installation of, 77 Tweezers, use in servicing electronic equipment, 322 Two-resistor variation method of measuring antenna resistance, 112 UHF antennas, installation of, 82 VHF antennas, installation of, 82 VHF-UHF multicouplers, 85 Video and trigger switching circuits, 206 Voltages, induced, 13 Voltmeters, electronic, 98 Wafer lever switches, 178 Wattmeter, use in testing power, 135 Wavemeters, 114 Whip antennas, installation of, 81 Wire antennas, installation of, 81 Wiring color code for electronic equipment, 29 Wiring diagrams, 25 Workbenches, grounding of, 13

ZM-11/U bridge, 100