

R-300 RECEIVER

PREMIUM AMATEUR RADIO VERSION



- COVERS THE ENTIRE 222-224.990 MHZ BAND IN 10 KHZ STEPS

- SUPER SELECTIVE 8 POLE SSB CRYSTAL FILTER FOR USE IN HIGHLY CONGESTED RF ENVIRONMENTS

- .5 PPM TCXO FOR SUPERIOR FREQUENCY STABILITY

Operating Manual



COMMUNICATIONS SPECIALISTS, INC.
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Introduction by Gordon West

SIMPLE HAM RADIO LICENSING

WB6NOA



It is easy to obtain your Amateur Radio entry level Technician Class license.

The licensed amateur radio operator, nicknamed a “ham”, has unrestricted full privileges on all VHF and UHF bands. These unrestricted privileges include the popular 6 meter band for Radio Control (R/C) operation, plus the 222 MHz band for HIGH POWER R/C, rocket, pet, and hidden "T" transmitters.

Simple ham radio licensing puts you at 1 FULL WATT on R/C 6 meter channels with nearly unrestricted power levels on 222 MHz R/C channels.

The Communications Specialists, Inc. 222 MHz transmitters are designed for licensed ham radio operation on vacant interstitial “channels” throughout the 222 MHz – 225 MHz ham band. The 25 millisecond pulse won’t usually be detected by ham operators using conventional FM (Frequency Modulated) mobile or handheld transceivers. Your sensitive Communications Specialists receiver employs SSB (Single Sideband) filtering so narrow that the receiver won’t pick up voice ham radio transmissions either!

Recent FCC rulemaking has simplified the entry level ham radio test. **MORSE CODE HAS BEEN ELIMINATED FOR ALL LEVELS OF HAM RADIO EXAMINATION.** The multiple choice exam has been rewritten to a grade school level. All examination questions, plus the correct multiple choice answers, are published in my Technician Class book, word for word! The test is only 35 Q&A’s with 74% pass requirement. Study time with my book is approximately 20 days, and you take the exam from 3 accredited, local volunteer ham examiners. The FCC issues your license about 7 days later.

To order my book and/or my software and CD audio courses, simply call, toll free, 1-800-669-9594. If you want to learn more about ham radio or my ham classes, see www.gordonwestradioschool.com, or call me with your questions at 1-714-549-5000. Tell them Gordon West and Communications Specialists, want you on the air as a licensed Technician Class ham radio operator. Complete the course, earn your license, and go LONG RANGE with Communications Specialists products.

HOW THE SYSTEM WORKS

A miniature transmitter is installed in an R/C plane, rocket, pet collar, or any other item. It also may be hidden for "T" hunting. It transmits either a low or high power, pulsed, radio frequency signal in the 222-225 MHz Amateur Band. This signal is picked up by a folding directional antenna (that rivals a yagi in performance) attached to a very sensitive handheld receiver. As the antenna is pointed towards the transmitter, the signal becomes louder in the receiver. This allows you to "home-in" or DF (direction find) the transmitted signal and locate it. This is the same system biologists use to track wild animals and can be used anywhere in the world. A system is comprised of a R-300 receiver, which can be shared for club use, and up to 128 transmitters operating simultaneously without interference. Locate the transmitter day or night in the least possible time and avoid unnecessary intrusions into backyards or private property. The range is over 5 miles on the ground and over 50 miles in the air with Communications Specialists' High Power transmitters and up to 1 mile with Communications Specialists' Low Power transmitters. The transmitters are sold separately. The R-300 is a TCXO controlled, synthesized PLL design, that will not drift in frequency under any temperature extremes.

A partial list of compatible Communications Specialists transmitters is shown below. All are TCXO controlled, synthesized PLL designs. They all operate on any one of 128 channels in the 222-225 MHz Amateur Band.

PT-1B Low power (1mW) for R/C planes and "T" hunting
AT-2B High power (50 mW) for rockets, R/C planes, and "T" hunting
AT-2A High power (long life 123A battery)
CT Low power pet collar for cats
DT Low power pet collar for small dogs
PT-1D Low power pet collar for large dogs (long life 123A battery)
PT-1H Low power heavy duty pet collar
PT-1 Low power hanging transmitter for kids or walk-aways

MODEL R-300 RECEIVER SPECIFICATIONS

- Frequency coverage: 222.000 to 224.990MHz in 10kHz steps (covers all 128 transmitter channels)
- Fine tuning: + or - 500Hz from channel center
- Extremely good MDS sensitivity: -150dBm
- Selectivity: 70dB down @ 4kHz, 80dB down @ 10kHz
- IF filtering: 10.7MHz 8 pole SSB crystal filter, 455kHz 8 pole ceramic filter
- Front end: Dual MOSFET with 6 helical resonators, high side injection eliminates interference from CH 11 television transmitters
- Mode of operation: SSB/CW
- Frequency stability: PLL controlled by .5 PPM TCXO
- Attenuator: 3 step (0dB, -30dB, -60dB)
- Antenna jack: standard BNC female
- Headphone jack: standard 3.5mm mono
- Loud, great sounding audio for in vehicle use
- Powered by standard, easy to change, 9v alkaline battery
- Housed in a rugged aluminum case
- Supplied with FA-3 high gain (+5dB) Moxon, highly directional folding antenna for easy to use one handed operation
- Weight with FA-3 directional antenna is 31 ounces
- Size: 6.3" x 3.5" x 2.7" without antenna, FA-3 directional antenna is 20.25" x 10.5", folded footprint is 11.25" x 4.5"
- Full 1 year warranty
- Fast same day shipping
- Easy website ordering
- Can be shared for club use
- Price: \$299.95 including battery, FA-3 folding antenna, carrying case, and 1/4" headphone adapter

R-300 RECEIVER CONTROLS



1. ANTENNA JACK

2. METER

3. RANGE SWITCH

4. ON-OFF-BATTERY TEST SWITCH

5. VOLUME CONTROL

6. TUNE CONTROL

7. CHANNEL SELECTOR



8. BATTERY COMPARTMENT

9. HEADPHONE JACK

1. ANTENNA JACK

The antenna jack accommodates the coaxial cable with BNC plug from the supplied FA-3 folding directional antenna. To install the BNC plug, grasp it in one hand and the receiver in the other, push the BNC plug into the receiver antenna jack while turning the knurled nut clockwise until it locks into place. Twist the knurled nut counterclockwise until it stops and gently pull the BNC plug straight out to remove it.

2. METER

The meter on the R-300 has two uses. The first is to measure the relative strength of the incoming signal from your transmitter. Use the **VOLUME CONTROL** to set the meter around mid scale. Use the changes in upward meter movement in addition to listening to the transmitter's pulsed signal to determine when the signal is the strongest. The meter is also used to measure battery condition when the **ON-OFF-BATTERY TEST SWITCH** is in the **BATTERY** position. The battery indication box on the bottom part of the meter scale will indicate the battery voltage remaining. A six (6) on the meter is six (6) volts remaining (almost totally discharged battery). A nine (9) on the meter indicates nine (9) volts remaining (a good battery). Replace the battery when the needle falls into the bottom of the battery indication box.

3. RANGE SWITCH

The RANGE SWITCH is a three (3) position switch used to attenuate (lower) the signal coming from the antenna to the receiver so it is not overloaded by a strong signal. In LONG, there is no attenuation, so the receiver is listening with full sensitivity. In the MED (or medium) position, approximately 30dB of attenuation is inserted between the antenna and receiver. In CLOSE another 30dB of attenuation is inserted for a total of 60dB. To DF your transmitter, always start in the LONG position to make sure it can be heard. If you are able to hear it, change the switch position to MED and see if it can still be heard. If it can not, go back to LONG, adjust the VOLUME CONTROL so the meter indicates around mid scale and turn around in a full circle pointing the antenna away from you in order to find the strongest pulsed signal strength. The strongest signal strength will be the direction where the transmitter is located. Walk in that direction until you can move to the MED position and still hear the signal. Continue to walk in the direction of the strongest signal until you can move to the CLOSE position. When you can hear the transmitter in the CLOSE position with the antenna pointing towards the strongest signal, you should be close enough to see it.

4. ON-OFF-BATTERY TEST SWITCH

In the OFF position, no battery current is drawn. This is how the switch should be left when the R-300 is not in use. When switched to the ON position, the R-300 is active and drawing current from the battery. In the BATTERY position, the condition of the battery under load is tested and the results are available on the METER.

5. VOLUME CONTROL

The VOLUME CONTROL is used to raise or lower the audio level to the speaker and meter circuit. Adjust it to suit your own preference. Note that it is easier to DF a signal that falls around mid scale on the METER than one banging against the upper meter stop.

6. TUNE CONTROL

The TUNE CONTROL is used to fine tune the receiver over a 1 kHz total range (500 Hz to 1500 Hz high of the exact frequency selected by the channel selector). This allows you to adjust the frequency of the received audio tone within limits. The narrow tuning limit also guarantees the transmitter will be heard, no matter where the TUNE CONTROL is set.

7. CHANNEL SELECTOR

The channel selector is a three (3) position push wheel switch. Just enter the 3 digit channel number of the transmitter you wish to hear. To advance to a higher channel, simply push the + button located under the switch window. To go to a lower channel, push the - button located over the switch window. The R-300 covers 222.000 to 224.990MHz in 10kHz steps. If you would like to enter frequency, instead of channel numbers, the first digit corresponds to MHz, the second digit corresponds to 100 kHz, and the last digit corresponds to 10 kHz. Some examples follow:

222.090 MHz displays as 209 (channel 209)

222.550 MHz displays as 255 (channel 255)

222.980 MHz displays as 298 (not a valid channel, but quite hearable)

223.170 MHz displays as 317 (channel 317)

223.370 MHz displays as 337 (channel 337)

223.900 MHz displays as 390 (not a valid channel, but quite hearable)

224.190 MHz displays as 419 (channel 419)

224.410 MHz displays as 441 (channel 441)

224.860 MHz displays as 486 (not a valid channel, but quite hearable)

PLEASE NOTE: IF THE FIRST DIGIT IS ANY NUMBER OTHER THAN 2, 3, or 4, THE RECEIVER WILL BE MUTED AND NO AUDIO WILL BE HEARD FROM THE SPEAKER.

8. BATTERY COMPARTMENT

The BATTERY COMPARTMENT on the bottom of the R-300 houses the 9 volt alkaline battery in a pull-out drawer. To open the drawer, place one of your fingernails in the slot on the bottom edge of the drawer and lift up with your finger until the drawer snaps upward. Then pull the drawer out. **DO NOT REMOVE THE TWO SCREWS HOLDING IN THE BATTERY COMPARTMENT!** With the drawer in your hand, pop up the battery and replace it, if discharged, with a new alkaline battery. Be sure to note the proper battery polarity when placing the battery back in the drawer. If you force the battery in with reversed polarity, the R-300 will not work but will not be damaged. Simply remove the battery drawer and flip the battery over.

Battery life at moderate volume levels is approximately ten (10) hours. To conserve battery life, turn the R-300 off when not in use. Keeping a spare battery in your pocket, carrying case pocket, or vehicle is a good idea.

9. HEADPHONE JACK

A standard 3.5 mm (1/8") mono headphone plug can be inserted into this jack for use in noisy environments. If a stereo headphone is plugged in, audio will normally only be heard in one ear. When a plug is inserted into the jack, the internal speaker in the R-300 is disconnected.

USING THE R-300 TO FIND YOUR TRANSMITTER

As soon as you install a battery in your transmitter, make sure it is operating properly by listening to it with your R-300 set to the proper channel. This will insure that the battery was properly installed and that it is functioning. When you want to locate it, follow the directions below.

1. Momentarily put the ON-OFF-BATTERY TEST SWITCH on the R-300 in the BATTERY TEST position to make sure the battery tests O.K. on the meter.
2. Extend the elements of the FA-3 directional antenna. Turn the ON-OFF-BATTERY TEST SWITCH to ON and set the VOLUME CONTROL to a comfortable listening level.
3. Dial in the CHANNEL SELECTOR to the channel of your transmitter. You should be able to hear the pulses from it with the RANGE SWITCH in the LONG position. If you can not, hold the R-300 level in your hand, use vertical antenna polarity to start with and turn around in a full circle and see if you hear it. If you can not, try horizontal antenna polarity and try again.

Horizontal Polarity



Vertical Polarity



4. If you still do not hear the transmitter, you will have to change location to get closer to it. Try getting the antenna higher by standing on a truck bed, second story balcony, or nearby hill. Use a vehicle to get closer. Have the passenger, not the driver, hold the R-300 while pointing the antenna out the window until the transmitter is heard. Range will be shorter with the antenna inside the vehicle, so stop now and then, get outside, and turn around in a full circle to increase it. If you are in hilly terrain, drive as high as possible, get outside the vehicle, and turn around in a full circle until the transmitter is heard. Some vehicles generate considerable interference even with the key off. Get outside the vehicle if this is a problem.

5. When you hear the transmitter, note its direction, and head towards it. As the pulsing signal gets stronger, change the RANGE SWITCH to the MED position. Raise or lower the VOLUME CONTROL to keep the meter indication around mid scale.

6. Recheck for proper direction and continue. When you get close to the transmitter, you can change the RANGE SWITCH to the CLOSE position and generally walk towards the strongest signal until you find it.

7. It is a VERY good idea to try a few dry runs having someone else hide the transmitter with you finding it using the above method.

ANTENNA

Each R-300 receiver is supplied with an FA-3 antenna. It is a high gain, directional, antenna that attaches directly to the receiver and connects to the antenna jack. The antenna elements must be fully extended as shown in Figure A to find the direction of your transmitter. The elements lock into place when unfolded. To collapse the antenna elements, slide the numbered buttons in as you gently fold in the elements as shown in Figure B.

The directional FA-3 antenna comes with two interchangeable pistol grip handles. You can choose to use the grip color you like, or you can use the receiver without a grip. The grip slides into the bracket beneath the antenna and will lock into place with a small click. To remove the grip, depress the grip release button slightly and slide the grip free.



A carrying case is included as well. The case has a left and right side belt loop so it can be attached to a belt and worn while searching for your transmitter, or used to protect the receiver and antenna during storage. There is a small pocket on the case for storing spare 9 volt batteries.

Figure A

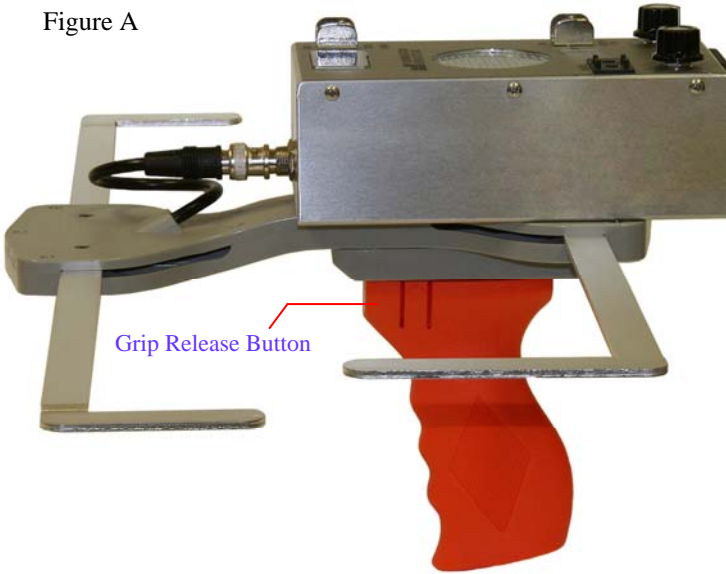


Figure B

To collapse the antenna elements, slide the numbered buttons starting with position 1 as you gently fold in the elements. Repeat for positions 2 through 4. When opening the antenna it does not matter which order the elements are unfolded.



CHANNEL TO FREQUENCY LIST (MHz)

| CH# | 222MHz | CH# | 223MHz | CH# | 224MHz |
|-----|---------|-----|---------|-----|---------|
| 207 | 222.070 | 301 | 223.010 | 401 | 224.010 |
| 209 | 222.090 | 309 | 223.090 | 403 | 224.030 |
| 211 | 222.110 | 311 | 223.110 | 405 | 224.050 |
| 213 | 222.130 | 313 | 223.130 | 407 | 224.070 |
| 215 | 222.150 | 315 | 223.150 | 409 | 224.090 |
| 217 | 222.170 | 317 | 223.170 | 411 | 224.110 |
| 219 | 222.190 | 319 | 223.190 | 413 | 224.130 |
| 221 | 222.210 | 321 | 223.210 | 415 | 224.150 |
| 223 | 222.230 | 323 | 223.230 | 417 | 224.170 |
| 225 | 222.250 | 325 | 223.250 | 419 | 224.190 |
| 227 | 222.270 | 327 | 223.270 | 421 | 224.210 |
| 229 | 222.290 | 329 | 223.290 | 423 | 224.230 |
| 231 | 222.310 | 331 | 223.310 | 425 | 224.250 |
| 233 | 222.330 | 333 | 223.330 | 427 | 224.270 |
| 235 | 222.350 | 335 | 223.350 | 429 | 224.290 |
| 237 | 222.370 | 337 | 223.370 | 431 | 224.310 |
| 239 | 222.390 | 339 | 223.390 | 433 | 224.330 |
| 241 | 222.410 | 341 | 223.410 | 435 | 224.350 |
| 243 | 222.430 | 343 | 223.430 | 437 | 224.370 |
| 245 | 222.450 | 345 | 223.450 | 439 | 224.390 |
| 247 | 222.470 | 347 | 223.470 | 441 | 224.410 |
| 249 | 222.490 | 349 | 223.490 | 443 | 224.430 |
| 251 | 222.510 | 351 | 223.510 | 445 | 224.450 |
| 253 | 222.530 | 353 | 223.530 | 447 | 224.470 |
| 255 | 222.550 | 355 | 223.550 | 449 | 224.490 |
| 257 | 222.570 | 377 | 223.770 | 451 | 224.510 |
| 259 | 222.590 | 379 | 223.790 | 453 | 224.530 |
| 261 | 222.610 | 381 | 223.810 | 455 | 224.550 |
| 263 | 222.630 | 383 | 223.830 | 457 | 224.570 |
| 265 | 222.650 | 387 | 223.870 | 459 | 224.590 |
| 267 | 222.670 | 389 | 223.890 | 461 | 224.610 |
| 269 | 222.690 | 391 | 223.910 | 469 | 224.690 |
| 271 | 222.710 | 393 | 223.930 | 471 | 224.710 |
| 273 | 222.730 | 397 | 223.970 | 473 | 224.730 |
| 275 | 222.750 | 399 | 223.990 | 475 | 224.750 |
| 277 | 222.770 | | | 477 | 224.770 |
| 279 | 222.790 | | | 479 | 224.790 |
| 281 | 222.810 | | | 481 | 224.810 |
| 283 | 222.830 | | | 483 | 224.830 |
| 285 | 222.850 | | | 485 | 224.850 |
| 287 | 222.870 | | | 487 | 224.870 |
| 289 | 222.890 | | | 489 | 224.890 |
| 291 | 222.910 | | | 491 | 224.910 |
| 293 | 222.930 | | | 493 | 224.930 |
| 295 | 222.950 | | | 495 | 224.950 |
| 297 | 222.970 | | | 497 | 224.970 |
| 299 | 222.990 | | | | |

SPECIAL TRANSMITTER FREQUENCIES AVAILABLE

Any frequency from 222.000 to 224.9975 MHz in 2.5 kHz steps is available for any type of Amateur Radio use. Same day delivery, CW ID, and no increase in cost is standard.

ORDERING

Order using VISA, MasterCard, Discover, PayPal, check, or money order by toll-free phone, FAX, mail, web or E-mail.

FAST SAME DAY SHIPPING



R-300 RECEIVER \$299.95

Model R-300 includes battery, FA-3 antenna, and FA-3-C carrying case.

STANDARD ACCESSORIES:

FA-3 Spare high gain,
directional antenna
\$59.95



FA-3-C Spare receiver/antenna case
\$10.00



OPTIONAL ACCESSORIES:

RA-13 Monaural headphone,
comfortable, well padded, coiled
cord, mono 3.5 mm plug, and
separate level control for each ear.
\$36.95



QA-8 Monaural headphone adaptor,
1/4" female to 3.5 mm male \$9.95



FCC COMPLIANCE INFORMATION

The R-300 complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference including interference that may cause undesired operation. Changes or modifications not expressly approved by Communications Specialists, Inc. could void the user's authority to operate the equipment.

ABOUT US

Communications Specialists, Inc. has been building quality electronic products that the amateur radio, land mobile, wildlife telemetry, aviation, R/C, and pet industries have come to rely on for over 40 years. At our Orange California factory, we utilize the latest in surface mount assembly technology to assure consistent quality throughout our entire product line. All our products are made in the USA.

WARRANTY

The R-300 is warranted to be free of defects in materials and workmanship for a period of one (1) year from the date of purchase. If you need to take advantage of our warranty, please follow these steps:

1. Securely package the R-300.
2. Include a note as to the nature of the problem.
3. Include your shipping address and a daytime phone number or E-Mail address.
4. Ship to:



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