

PRODUCT REVIEW

Alinco DJ-G7T Triband Handheld Transceiver

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There are plenty of dual band handheld transceivers on the market, but this transceiver includes 23 cm (1240 MHz) band operation at 1 W, along with the more familiar 2 meter and 70 cm bands at 5 W output. This 23 cm band capability was enough to make me curious and sign up to perform the review. I had never worked this part of the spectrum before, but a quick look at the *ARRL Repeater Directory* suggests heavy usage of the 23 cm band in some areas. I had never worked FM satellites before either. Any handheld radio with 2 meter and 70 cm capability can work the FM satellites, but I was curious about the DJ-G7T's full duplex capability. Once again I was reminded of the vast scope of ham radio in which there is always room for a new adventure.

Out of the Box

When I opened the box, I was pleased to see a drop-in battery charger included, rather than the usual wall charger. After about three hours, the DJ-G7T's 1200 mAh lithium ion (Li-ion) battery was fully charged and ready for testing.

As with any other complicated modern transceiver, thoroughly reading the manual will save a lot of time. Without reading the manual, it took several minutes for me to simply find the POWER switch, an inconspicuous button mounted flush to the left side of the case.

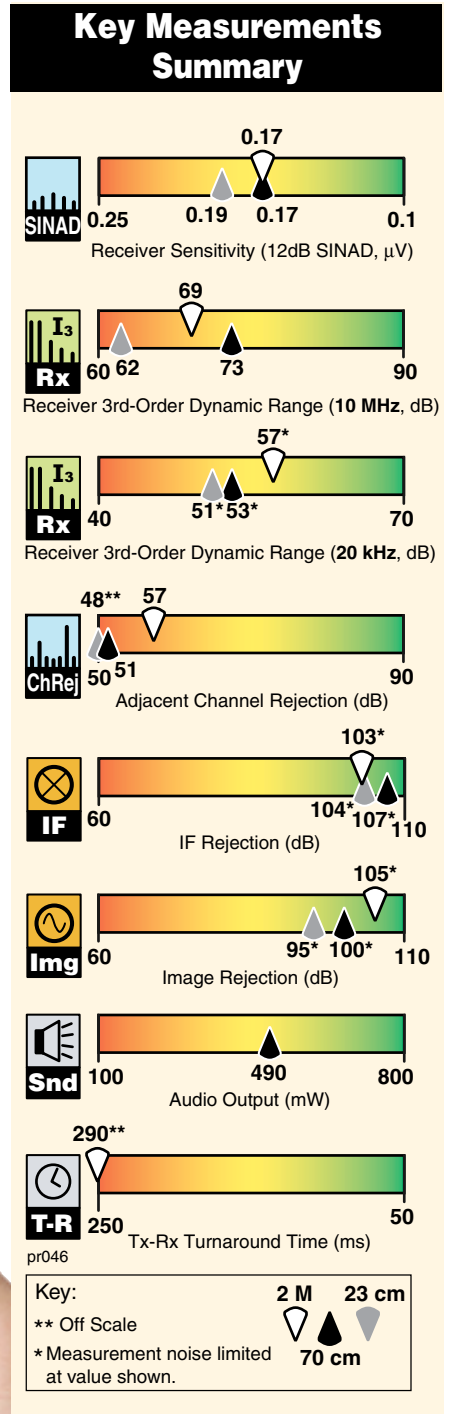
The polycarbonate body felt comfortable in my hand. The overall size and weight would not be a burden even with extended use. The chassis is die-cast metal but not the case, so take some care in handling. Although it wouldn't survive the steam-roller test, the DJ-G7T will survive a splash in a pond, or a severe weather event. It's rated to withstand submersion in 3 feet of water for 30 minutes.

The POWER button must be held down for one second. My large fingers had difficulty keeping enough pressure on the flush mounted button for the required time. Alinco indicates that the high button pressure is intentional to prevent accidental turn-on. The rest of the 19 buttons were manageable.

The 1½ × ¾ inch green, backlit LCD is easy to read and has several display options. Display icons are intuitive and large enough to see. The keypad is straightforward once you learn the functions. The MAIN button toggles among the three ham bands, while the SUB button toggles through several bands from 530 kHz through 1300 MHz.

The DJ-G7T sports a ¼ inch flexible antenna with an SMA connector. Next to the antenna is a jack for an optional speaker/mic with a heavy duty screw down cover and gasket to keep out the elements when not in use. Most prominent are two sets of concentric knobs (one set for each of the two receivers). The inner knobs are used mainly for tuning the main and sub receivers, while the outer knobs act as VOLUME controls. The default setting has the main receiver on the left and the sub receiver on the right, but this arrangement can be reversed via a menu setting. Along the left side of the case are the POWER switch, a MONITOR button (momentarily opens the squelch) and the PTT switch. The right side of the case features a jack for external 4.5 to 16 V dc input.

The DJ-G7T comes with a wrist strap and belt hook. The belt hook is a cloth loop that separates with



Bottom Line

The DJ-G7T handheld adds 23 cm operation to the usual 2 meter and 70 cm bands. With a wide range receiver and full duplex capability, it offers a lot of value for the money.

a plastic snap-together fastener, making it harder to remove in a hurry. It fits a belt up to 3 inches wide, handy for those 1970s parties. The battery pack on the back has two ¼ inch square metal pads for connecting to the drop-in charger. Be careful not to put the radio in your pocket along with spare change or keys.

Lab Testing

Overall, the radio tested fairly well on the three amateur bands it was designed for. With a wideband receiver in a small package, some design compromises must be made — in particular placement of the IF (intermediate frequency). Many models have the IF above or below the 6 meter band, resulting in poor IF and image rejection in that area. This is also true with the DJ-G7T, where the IF of the sub receiver is within the 6 meter band, so expect images while listening to 6 or 10 meters.

You can listen to the main and sub receivers simultaneously, and even tune them to the same band. I observed up to 6 dB of signal degradation in the sub receiver with both receivers tuned to 2 meters in the dual listening mode. Interestingly, with the main receiver tuned to 2 meters, I noticed about 8 dB of signal degradation with the sub receiver tuned anywhere between 50 and 135.995 MHz. Alinco attributes this to filter characteristics. I didn't observe signal degradation with other main and sub frequency combinations.

The earphone jack has speaker level output, not the lower level normally used for earphones, so you need to be careful about cranking up the volume. The audio was nice and clean even at high listening levels.

I observed the specified transmitter power output with the transceiver running from an external 13.8 V dc supply, but was a bit less than specified on 2 meters with the battery pack. A nice surprise is this transceiver can operate with as little as 4.5 V dc and still put out a usable signal, a plus during emergencies.

On the Air

As previously mentioned, review the manual to understand the use of the various settings and functions. I found the manual that came with our DJ-G7T difficult to understand and follow. Since then, Alinco has revised the manual, and the new version is available for download from their Web site and is shipping with current production units. With the new version (PS0597A, printed on the back cover of the manual), I had no trouble understanding the configuration steps, most of which start by pressing the FUNCTION button and rotating the concentric knobs at the top of the radio.

The DJ-G7T has 1000 regular memory channels that can be organized into banks of 100 channels. One is called a *dual bank*, which stores both main and sub frequencies. The

Table 1
Alinco DJ-G7, serial number M000905

Manufacturer's Specifications

Frequency coverage:
Receive, 0.530-1299.995 MHz,
Cellular blocked;
transmit, 144-147.995,
430-449.995, 1240-1299.995 MHz
FM, NFM.

Power requirements: 4.5-16 V dc; receive,
200 mA; battery save (1:4) average, 56 mA
dual receive, 50 mA single receive;
transmit, 1.6 A @ 144 MHz, 1.8 A @
430 MHz, 0.8 A @ 1240 MHz (high power).†

Receiver

FM sensitivity: 12 dB SINAD, main band,
144/430 MHz ham bands, -15 dBµV;
1200 MHz ham band, -13 dBµV;
Sub band, 30-470 MHz, -15 dBµV;
>470 MHz, -7 dBµV.

WFM sensitivity: 76-470 MHz, -6 dBµV;
>470 MHz, -3 dBµV.

AM sensitivity: 10 dB S/N, <50 MHz, -1 dBµV;
>50 MHz, -6 dBµV.

Two-tone, third-order IMD dynamic range:
Not specified.

Two-tone, second-order IMD dynamic range:
Not specified.

Measured in ARRL Lab

Receive: Main band, 136-169.995, 400-
469.995, 1240-1299.995 MHz FM, NFM.
Sub band, 0.530-59.745 MHz FM, NFM,
AM; 59.750-107.995 MHz WFM; 108-
475.495 MHz FM, NFM, AM; 475.5-
805.995 MHz WFM; 806-823.995 MHz,
850-868.995, 895-959.995 MHz FM,
NFM, AM; 960-1239.995 MHz WFM;
1240-1299.995 MHz FM, NFM, AM.
Transmit, as specified.

Receive (max volume, no signal, lights
on) dual receive, 248 mA; battery save,
as specified.

Transmit (high, med, low 2, low 1):
146 MHz: 1.44, 0.95, 0.73, 0.55 A;
440 MHz: 1.55, 1.03, 0.84, 0.55 A;
1294 MHz: 0.75 A (high), 0.6 A (low).

Receiver Dynamic Testing

Main band, for 12 dB SINAD: 146 MHz,
0.17 µV; 440 MHz, 0.17 µV; 1294 MHz,
0.19 µV. Sub band: 29 MHz, 0.16 µV;
50 MHz, 0.16 µV; 146 MHz, 0.17 µV;
222 MHz, 0.6 µV; 440 MHz, 0.17 µV;
902 MHz, 0.62 µV; 1294 MHz 0.29 µV.

100 MHz, 0.58 µV; 500 MHz, 0.52 µV;
1000 MHz, 0.71 µV.

10 dB S+N/N, 1-kHz tone, 30% modulation:
Sub band, 1 MHz, 0.53 µV;
3.8 MHz, 0.47 µV; 14 MHz, 0.4 µV;
50.4 MHz, 1.3 µV; 120 MHz, 0.68 µV;
145 MHz, 0.36 µV; 222 MHz, 1.0 µV;
440 MHz, 0.39 µV; 902 MHz, 1.0 µV;
1250 MHz, 0.44 µV.

20 kHz offset*, Main band:
146 MHz, 57 dB; 440 MHz, 53 dB;
1294 MHz, 51 dB. Sub band: 29 MHz,
59 dB; 52 MHz, 63 dB; 146 MHz, 57 dB;
222 MHz, 56 dB; 440 MHz, 53 dB;
902 and 1294 MHz, 51 dB.

10 MHz offset: Main band:
146 MHz, 69 dB; 440 MHz, 73 dB;
1294 MHz, 62 dB. Sub band: 29 and
52 MHz, 56 dB; 146 MHz, 65 dB;
222 MHz, 71 dB; 440 MHz, 64 dB;
902 MHz, 67 dB; 1294 MHz, 83 dB.

Main band: 146 MHz, 84 dB; 440 MHz,
88 dB; 1294 MHz, 90 dB. Sub band:
29 MHz, 55 dB; 52 MHz, 74 dB; 146 MHz,
82 dB; 222 MHz, 48 dB; 440 MHz, 88 dB;
902 MHz, 94 dB; 1294 MHz, 80 dB.

radio offers a variety of scanning modes.

With testing complete, W1AW Station Manager Joe Carcia, NJ1Q, set up to work me on 1294.5 MHz (national simplex calling frequency) at lunch time. Joe helped me adjust the DJ-G7T's microphone gain, easily set by pressing FUNCTION and then MIC and then selecting one of four levels with a rotary knob. Joe gave me a good audio report and found that level 3 worked best for me, as I like to speak a foot away from handhelds. The receive audio from the 1¾ by ¾ inch speaker grill sounded good as well.

My First FM Satellite QSO

With full duplex capability, this transceiver appears to be well suited for FM

repeater satellites such as AO-27 and AO-51. The dual bank memory is perfect for satellite work because several frequency pairs are necessary to compensate for the Doppler shift that occurs during a pass.

On a late November afternoon, I checked the AMSAT Web site and found an AO-27 pass only minutes away. I hurriedly entered the frequency combinations necessary and soon heard a QSO taking place — noisy, with lots of fading. Clearly, a better antenna was in order at my end.

I got an Arrow dual band Yagi designed for portable use and was ready for another pass. With headphones on, I could clearly zero in on AO-27. After listening to a few passes to observe the routine, I aimed the

Manufacturer's Specifications

Adjacent-channel rejection: Not specified.

Spurious response: VHF, 60 dB; UHF, 50 dB.

Squelch sensitivity: Not specified.

Audio output: 400 mW at 10% THD into 8 Ω.

Transmitter

Power output with 13.8 V dc: 144/430 MHz (high/med/low 2/low 1), 5 / 2 / 1 / 0.3 W. 1294 MHz (high/low), 1 / 0.3 W. With EPB-73 battery: 144 MHz (high / med / low 2 / low 1), 5 / 2 / 0.8 / 0.3 W; 430 MHz, 4.5 / 2 / 0.8 / 0.3 W; 1240 MHz, 1 / 0.3 W.

Spurious signal and harmonic suppression: 60 dB or better.

Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.

Receive-transmit turnaround time ("tx delay"): Not specified.

Size (height, width, depth): 4.5 × 2.4 × 1.2 inches; weight, 10.6 ounces with flexible antenna.

Price: DJ-G7T, \$330; EMS-62 speaker/mic, \$55; ERW-7 PC interface USB cable, \$55; EDS-10 plug adapter cable, \$15.

[†]EBP-73 battery pack (7.4 V, 1200 mAh Li-ion) and EDC-173T charging stand supplied. Available options: Replacement EBP-73, \$70; EDH-35 battery case (4 AA cells; TX power limited), \$25; EDC-36 cigarette lighter cable with filter, \$35.

*Measurement was noise limited.

**Measurements made in single receiver mode. Total output power, full volume, dual receive is 600 mW at 20% THD.

antenna where I thought the bird might be and called a quick CQ. I received a prompt reply, but in the excitement I fumbled the other station's call sign and asked for a repeat. Memories of my first contact years ago flashed through my head. The other operator kindly repeated his call while I stumbled to find a pen... *oh no...* no pen! I blew it! Unlike the operator, the radio clearly did its job. Using headphones and a suitable antenna, the DJ-G7T with its full duplex capability works well with FM satellites.

Satellite operation gave me a chance to observe the full duplex function. While transmitting with high power at

Measured in ARRL Lab

Main band, 20 kHz offset: 146 MHz, 57 dB; 440 MHz, 51 dB; 1294 MHz, 48 dB. Sub band: 29 MHz, 56 dB; 52 MHz, 65 dB; 146 MHz, 56 dB, 440 MHz, 51 dB, 902 MHz, 49 dB, 1294 MHz, 48 dB.

IF rejection, Main band: 146 MHz, 103 dB, 440 MHz, 107 dB; 1294 MHz, 104 dB. Sub band, 29 MHz, 22 dB, 50 MHz, 26 dB, 146 MHz, 83 dB; 222 MHz, 87 dB; 440 MHz, 110 dB; 902 MHz, 92 dB; 1294 MHz, 97 dB.

Image rejection, Main band: 146 MHz, 105 dB*; 440 MHz, 100 dB*; 1294 MHz, 95 dB*. Sub band: 29 MHz, 67 dB; 50 MHz, 1 dB; 146 MHz, 105 dB*; 222 MHz, 27 dB, 440 MHz, 92 dB*; 902 MHz, 95 dB, 1294 MHz, 94 dB*.

At threshold: 146 MHz, 0.11 μV; 440 MHz, 0.13 μV; 1294 MHz, 0.13 μV.

Maximum squelch: 0.45 μV, typical.

Maximum volume 490 mW at 8.8% THD; 1.5% THD at 1 V_{RMS}**

Transmitter Dynamic Testing

With 13.8 V dc: 146 MHz, 5 / 2 / 1 / 0.4 W; 440 MHz, 5.4 / 1.8 / 1.1 / 0.6 W; 1294 MHz, 1.2 / 0.6 W. With EPB-73 battery @ 8.4 V dc: 146 MHz, 4 / 1.9 / 1.0 / 0.4 W; 440 MHz, 3.8 / 1.8 / 1.1 / 0.6 W; 1294 MHz, 1.2 / 0.6 W. Power output at 4.5 V dc: 1.3 W maximum.

146 MHz, >70 dBc; 440 MHz, 66 dBc; 1294 MHz, 53 dBc (<25 μW).

Squelch on, S9 signal, 290 ms (typical).

Squelch on: 146 MHz, 57 ms; 440 MHz, 47 ms; 1294 MHz, 138 ms.

145.850 MHz on the main band and receiving simultaneously around 435.795 MHz on the sub band, I heard only slight interference with the squelch open. Transmitting with the sub receiver squelch open is not a good operating technique, since the roar of an open squelch will be transmitted along with your voice. Headphones will prevent echoing and feedback during transmission. If you must use the speaker, the sub band audio can be set to mute during transmit.

Other Features

Listening to the sub band receiver is entertaining. With the internal bar antenna, local AM broadcast stations are heard fairly

well. FM broadcast performance is adequate using the supplied antenna. An external antenna brings the DJ-G7T to life! Tuning across the shortwave bands, the receiver overloaded at times with my inverted-L antenna. Not to worry: there are four attenuator settings available.

The DJ-G7T can be set up as a cross band repeater. This feature can be useful for temporary operation in an emergency situation, but you must avoid causing harmful interference to other stations. Carefully choose a frequency pair and review the FCC rules before operating in repeater mode.

Other interesting features of the DJ-G7T are a band scope that indicates nearby activity, a bug detector that allows you to find hidden transmitters, and a transmitter detecting function. This last feature is intended for radio foxhunts. Speaker audio is disabled and instead the 'G7T sounds an occasional beep, with the beep sounding at shorter intervals as the hunter closes in. The adjustable attenuator is put to use at close range, and before you know it, you've caught the fox.

Clearly, this is a fun radio to use. I did find some issues that I hope will be corrected by updated firmware. At the top of my list is the automatic repeater shift, which turns off for the five channels between 145.11 and 145.19 MHz. There are locally coordinated FM repeaters in this range and I had to disable the auto shift function and manually enter the minus offset for this part of the band. Furthermore, in sections of the band where auto shift functioned as expected, I was unable to change the repeater shift manually — prohibiting me from going to simplex mode if needed.

I also found that while programming memories, the repeater shift was not stored in memory from the VFO with the auto repeater shift on. I ended up leaving the auto shift function off most of the time and used the FUNCTION and MAIN buttons (continued pressing of MAIN toggles the repeater offset from + to - to simplex).

Cloning software is available via a free download from Alinco's Web site, as are firmware updates. You will need the optional EDS-10 plug adapter cable and ERW-4C (serial) or ERW-7 (USB) cable for connection to your PC.

The DJ-G7T is an affordable three band handheld that is well suited for talking across town, listening to a wide range of frequencies, or working the FM satellites. Operation on 23 cm is a big plus if you have an active repeater in your area.

Manufacturer: Alinco Inc, Yodoyabashi Dai-Bldg 13F, 4-4-9 Koraihashi, Chuo-ku, Osaka 541-0043, Japan; www.alinco.com. *US distributor:* GRE America, 425 Harbor Blvd, Belmont, CA 94002; tel 650-591-1400; e-mail alinco-sales@greamerica.com; www.allinco.com/usa.html.