

Product Review

Alinco DJ-MD5TGP DMR and Analog FM Handheld Transceiver

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With the proliferation of inexpensive digital hotspots on the market, and an increasing number of DMR repeaters across the world, perhaps you're tempted to take the plunge into this interesting digital mode. Or maybe you already have a monoband UHF DMR radio and want a dual bander, one that can handle your 2-meter and 70-centimeter analog needs, too. This radio may be just the ticket.

If you're not familiar with DMR, see the sidebar, "DMR 101 — An Introduction," for more information.

Introduction

Alinco makes a nice selection of well-made radios for the ham bands, including VHF, UHF, and dual-band analog FM handhelds and mobile transceivers, and even a pair of entry-level HF transceivers (their DX-SR8T was my first HF radio). In addition, Alinco makes several DMR radios, including a mobile radio. The DJ-MD5 is the latest offering.

The radio comes in two versions: the DJ-MD5T, the basic version, and the DJ-MD5TGP, the version we tested, which is the same radio with the addition of a GPS receiver (see the sidebar, "GPS and DMR," for more information). With the exception of GPS, the features and operation described here apply to both models. Both radios are dual banders, covering the 136 to 174 and 400 to 480 MHz bands. The radio comes

with a 1,700 mAh lithium-ion battery pack, a charging cradle and ac power cable, and a standard compact flexible antenna, as well as a belt clip and a USB programming cable. (If you lose or damage your cable, there's good news — the programming interface is a simple micro-USB connection. It programs just fine with a typical micro-USB cable I picked up for something else.)

Maximum power output is the typical 5 W, and lower power settings of 2.5, 1, and 0.2 W are also available. I particularly like to have available low-power settings in a radio, as using low power greatly reduces battery consumption and interference if using a low-powered hotspot.

The DJ-MD5TGP supports DMR Tier I and Tier II, 10,000 talk groups, 4,000 channels, 250 zones (up to 250 channels per zone), and 250 scan lists.

Physical Description

The DJ-MD5TGP feels quite small in the hand, but is thicker than many other radios I have used. Compared to the TYT MD-380 DMR monoband handheld I reviewed in the November 2017 issue of *QST*, this radio is quite a bit shorter but of similar thickness, measuring 2.3 × 4.5 × 1.5 inches, and it weighs about 9 ounces with battery and antenna. It somehow feels substantial without actually being all that large, probably because of the thickness.

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The radio features a 1.8-inch color display that, while small, is very clear and easy to read, even in quite bright light, and it features a clear, easy-to-read font (see Figure 1). A two-line "hello" screen appears at power-up, which can be configured during radio programming. (I use this to display my call sign, DMR ID number, and a numeric date to remind me of when I last programmed the handheld.) The antenna port is reverse SMA



Bottom Line

The Alinco DJ-MD5TGP represents an excellent value for a dual-band DMR/analog FM handheld, despite a couple of minor ergonomic flaws.



Figure 1 — The DJ-MD5TGP screen with the radio programmed for use with the author's Pi-Star hotspot.

(unlike most Japanese handhelds and like most Chinese ones), and I swapped out the stubby flexible antenna (mounted on the radio in the photo) for a longer, higher-gain Signal Stuff Signal Stick antenna.

Also on the top are the tuning knob (which has click stops but travels freely in either direction, instead of having fixed stops at either end), as well as the volume knob. The volume knob doubles as the power switch, with a click-stop **OFF** setting at the far counterclockwise end, in the manner of older analog equipment. The knobs are soft in use, although they do the job. I had some difficulty when I turned on the radio and tried to set a low volume level. It seems hard to find an acceptable volume level without going past it and coming back. The TYT's controls are far surer. Of note, better than the TYT, is the ability to actually set a low volume. (The TYT fades away to nothing far too abruptly at a not-very-low volume.) Last on the top is a two-color red/green transmit/receive LED.

The left side of the DJ-MD5TGP features the standard push-to-talk (PTT) button as well as two dual-function programmable keys that can be configured to various functions with either a short or a long press. This flexibility is nice, and the range of programming options provided for the buttons is excellent.

GPS and DMR

I enjoy experimenting with the Amateur Packet Reporting System (APRS). It was originally a system that allowed telemetry packets to be transmitted via packet radio, and has since evolved to add gating of telemetry to the internet (see aprs.fi, for example) as well as a text message service. Done the traditional way, APRS is digital data transmitted by FM, and it works quite well.

DMR also supports APRS, but instead of the packets being transmitted in FM, they're sent in the same digital format used by DMR audio communication. The BrandMeister network, one of the infrastructure networks for DMR on Amateur Radio, supports gating this DMR APRS data to the internet, in the same way an iGate would for traditional FM APRS.

One significant advantage of APRS on DMR is that it can be handled in single-VFO radios. Essentially, APRS data is sent using a different talk group than voice data, so it interacts simultaneously with voice talk, whereas analog radios performing APRS need to have two VFOs to support simultaneous voice and APRS. (Voice and APRS still cannot be sent simultaneously, but this is still a considerable improvement.)

For those who want to get this configured, here are some tips:

- Use the "SelfCare" option at BrandMeister's website (under the Services tab) to enable APRS data.
- The Alinco transmits APRS data as a Hytera DMR radio would (not a Motorola). This is set on BrandMeister's website.
- The radio must be configured to allow APRS, which requires that the GPS receiver be turned on and a contact be added using a specific talk group/ID.
- The talk group/ID used for digital data is your country's DMR code plus 999. For example, in the United States, it is 310999 and in Canada, 302999.

Unfortunately, I can't be as complimentary about the PTT button operation. It has a short amount of throw and, despite being only about an inch long, it needs an accurate press in the center to properly engage the transmitter. (The button on my TYT, by comparison, which is of a similar size, has a nice audible click when it's pressed, and tolerates off-center pressing and still works.) This caused me some grief initially when using the radio to control a net, but it can be worked around. Still, PTT operation could be improved.

The front buttons are a lot more satisfactory — green and red control buttons are on the ends of the top row (with up and down buttons in between), along with three rows of numeric, #, and * buttons. This radio, like many, features the popular 123*4560789# layout, but I still prefer the older 123 456 789 *0# layout that seems more intuitive to telephone

users. The DJ-MD5TGP has a noticeable space between the four control buttons and the top row of numeric buttons, which makes identifying the desired row by feel much easier.

The battery clip pulls up to release the battery, and does so easily — and the battery engages surely with a noticeable click to give you confidence that it's locked in place. Because of the radio's thickness, the transceiver is actually happy to stand vertically on a flat surface.

Radio Programming

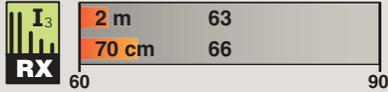
Because this radio is designed for commercial use, programming software is a necessity. Alinco provides free Windows programming software, which is available from the US distributor's website. For the latest version, see the **DOWNLOADS** tab on the DJ-MD5TGP page at remtronix.com. The software works well and is reasonably intuitive (as DMR pro-

Alinco DJ-MD5TGP
Key Measurements Summary

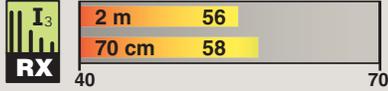
Receiver Sensitivity (12dB SINAD, μV)



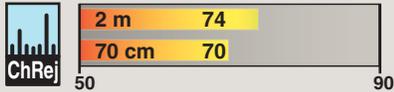
Receiver Third-Order Dynamic Range (dB)
(10 MHz offset)



Receiver Third-Order Dynamic Range (dB)
(20 kHz offset)



Adjacent Channel Rejection (dB)



Audio Output (mW)



TX-RX Turnaround Time (ms)



KEY: QS1912-PR139
Receiver measurements in analog FM mode.
Bars off the graph indicate values over scale.

programming software goes; if you've never played with DMR, understand that there is a significant learning curve).

Once programmed, it is possible to manually add frequencies and configurations, but this job is far more easily done with the software. Many radio clubs offer *code plugs*, which are pre-programmed blocks of DMR repeaters that you can insert into the programming software. If your area has DMR repeaters, check to see if a pre-programmed code plug is available. Even if you have no local repeaters and want to operate the radio via a hotspot (which is what I do), you will still want a code plug to use as a programming template. (I used my

Table 1
Alinco DJ-MD5TGP, serial number A001517

Manufacturer's Specifications	Measured in ARRL Lab
Frequency coverage: 136 – 174; 400 – 480 MHz; 76 – 108 MHz WFM (receive only).	As specified. Tested in the amateur bands only.
Modes: DMR Tier 1 and Tier 2; analog FM.	As specified.
Power requirements: 7.4 V dc.*	Receive: 173 mA (max. volume and backlight. Standby: 94 mA (minimum backlight); or 109 mA with GPS on. Transmit (turbo/high/medium/low): 146 MHz, 1.54/1.1/0.66/0.375 A 440 MHz, 1.47/0.897/0.606/0.360 A Off: <1 mA.
Receiver	Receiver Dynamic Testing
Sensitivity: Digital, 0.3 μV (5% BER), 0.7 μV (BER 1%). FM, not specified.	FM, for 12 dB SINAD: 146 MHz, 0.17 μV ; 440 MHz, 0.16 μV .
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset: 146 MHz, 56 dB, 440 MHz, 58 dB. 10 MHz offset: 146 MHz, 63 dB, 440 MHz, 66 dB.
FM two-tone, second-order IMD dynamic range: Not specified.	146 MHz, 83 dB; 440 MHz, 98 dB.
Adjacent-channel rejection: Not specified.	20 kHz offset: 146 MHz, 74 dB; 440 MHz, 70 dB.
Squelch sensitivity: Not specified.	At threshold: 146 MHz, 0.14 μV (min.), 0.23 μV (max.); 440 MHz, 0.15 μV (min), 0.40 μV (max).
S-meter sensitivity: Not specified.	For 4 out of 4 bars: 146 MHz, 0.42 μV , 440 MHz, 0.26 μV .
Audio output power: 1 W into 16 Ω with <5% distortion typical.	For 8 Ω load: 317 mW at 3% THD.
Transmitter	Transmitter Dynamic Testing
Power output: 5/2.5/1/0.2 W (power settings turbo/high/medium/low).	At 8.4 V dc (full charge): 146 MHz, 5.7/2.4 W/1/0.25 W 440 MHz, 4.6/2.1/0.8/0.2 W. At 6.7 V dc (1 battery bar): 146 MHz, 4.7/2.2/0.7/0.2 W 440 MHz, 3.5/1.7/0.9/0.2 W.
Spurious signal and harmonic suppression: Not specified.	>70 dB. Meets FCC requirements.
Receive to transmit turnaround time: Not specified.	To full RF power output, 146 MHz, 21 ms; 440 MHz, 22 ms.
Transmit to receive turnaround time: Not specified.	To 50% audio, squelch on, S-9 signal: 146 MHz, 254 ms; 440 MHz, 202 ms.
Size (height, width, depth): 4.5 x 2.3 x 1.5 inches (including protrusions). Antenna length: 7 inches. Weight: 8.8 ounces (including battery and antenna).	
*1,700 mAh, 7.4 V Li-ion battery (EBP-88) and drop-in charger supplied. Replacement EBP-88, \$40. EBP-87 1,500 mAh, 7.4 V Li-ion battery, \$35.	

MD-380 code plug as a starting point for the Alinco.) Remember that you will need a DMR ID to use this mode. If you don't already have a DMR ID, amateurs in North and South America, Oceania, and Asia can get their ID at www.radioid.net.

You can use the same software to program analog FM simplex and

repeater channels as well. All the standard analog repeater settings can be configured (including CTCSS and DCS), and I'd recommend you fully program all the channels you use regularly. I've segregated my analog programming into a separate zone, so it can be ignored while I'm doing DMR work and vice versa, but there's no

DMR — An Introduction

Digital Mobile Radio, or DMR, has been extremely popular in commercial radio circles for some time, and is becoming more popular among hams. John S. Burningham, W2XAB, wrote a good article discussing DMR; you can find it in the October 2015 issue of *QST*.¹

DMR does have a steeper learning curve than the Japan Amateur Radio League's D-STAR digital platform (originally only supported by Icom but now also by Kenwood) or Yaesu's System Fusion (C4FM) effort. Compared to C4FM and D-STAR, there are relatively few DMR repeaters around, but they are becoming more common. However, if you lack a repeater within radio range, digital hotspots will let you set up a short-range simplex system that you can run in your home, RV, or hotel room. (These solutions support C4FM, D-STAR, and a third mode, P25, and some a fourth, NXDN, so they give you future options for experimentation, too.)

DMR, like the other digital modes, has *talk groups* that allow many hams to speak to each other from different repeaters or simplex nodes. Even if you have no local users to talk to, you'll be able to find other DMR users who can share your enthusiasm. There are several different networks of talk groups that you can use, but BrandMeister is a good one with which to start. Talk Group 91 (TG 91), a worldwide talk group, has a lot of activity even in the middle of the North American night.

¹J. Burningham, W2XAB, "Introduction to Digital Mobile Radio (DMR)," *QST* Oct. 2015, pp. 30 – 35.

reason why you can't intermix digital and analog channels in the radio.

You can select the zone you want, once the radio's programmed, through the menus (it's very quick once you're used to it), and then select a channel within the zone using the knob on the top. The knob wraps around from one end to the other, so you need to pay attention to the screen to see where in the programming zone you are. Using meaningful text labels on your channels will be a big help, and the display allows reasonably long labels to aid in this.

Operation

The DJ-MD5TGP sounds really good on the air. Analog FM signals sound rich and full, and digital audio sounds richer than it does on my TYT. I also find it less tiring to the ear. While I haven't used DMR in a mobile setting,

I suspect the clearer audio would be a lot easier to hear with the higher noise level while driving. The microphone seems to be good, too; hams on the other end were all quite satisfied with my audio.

While the headset jacks are the standard Kenwood type, I found that my Heil HTH-K headset doesn't quite interface properly. It can't quite seat all the way into the jacks. I am not sure if this is an isolated issue.

In my TYT review, I commented about the clunky software, and the same applies here. DMR radios are simply not as fast and easy to program as radios for other analog or digital modes, such as D-STAR or System Fusion. It takes some time and effort to understand how the programming works. Once you are familiar with the process, the programming is reason-

ably straightforward. Uploading your own code plug to the radio is a quick and easy procedure, so you can test the programming and update it pretty quickly again if you need to do so. (And you likely will.)

One feature I liked (compared to the TYT) was the ease of switching between DMR ID numbers. If you have multiple hams in your household, or live in a country where multiple call signs are permitted, you can toggle between ID numbers/call signs on the keypad quite easily once they're programmed via the programming software.

Final Thoughts

I'm enjoying DMR again thanks to this radio, and combined with one of the new Pi-Star-based MMDVM Raspberry Pi Zero-based hotspots and my phone's Wi-Fi tethering, I think this could be a really good travel companion. Of course, it can be a great amount of fun at home as well. It's also a convenient radio to use for your local DMR and analog repeaters in your area. I'm not sure it's a perfect substitute for a handheld designed for the analog bands, because selecting simplex frequencies will require some planning, but with its ability to serve both your DMR needs and your routine FM ones, I can see this being a take-anywhere radio for some operators. The display is clear and sharp, the audio is loud and good, and the price is a tremendous value for what comes in the box.

Manufacturer: Alinco, Osaka, Japan; www.alinco.com. Distributed in the US by REMTronix, Lathrop, California; remtronix.com and available from a number of Amateur Radio dealers. Price: DJ-MD5T (no GPS), \$150; DJ-MD5TGP (with GPS), \$170.