

Alinco DJ-MD5

Dual band dual mode DMR/analogue handheld



The Alinco DJ-MD5 dual band DMR/analogue radio features a clear, easy to read colour screen and positive-action pushbuttons.

Introduction

I've been involved with many aspects of amateur radio over the years, but I have never looked at Digital Mobile Radio (DMR) seriously before. I have used Echolink, D-Star and Network Radios though, so how hard could it be? I'll leave you to be the judge on that.

When I was approached to review this radio, I decided it would be a good opportunity to learn about DMR. Thus, it is important to note that this review is written from the perspective of an absolute beginner. If you're already a DMR user then you'll already know most of the pitfalls; likewise, it is very important to note that most of the things I found difficult are nothing to do with the DJ-MD5 itself. The box on page 44 gives an overview of the basics of DMR.

What's in the box?

The DJ-MD5 comes well packed in a stiff brown cardboard box, with separate compartments for the various component parts: body, aerial, belt clip, 1500mAh 7.4V Li-ion battery, charger base and UK PSU. Each item comes in its own plastic bag. There is also a very thin manual; more on that later.

Having a charger base supplied as standard is a bonus in my opinion. The 5V 1000mA switch mode PSU has a coaxial DC plug that connects to the charger base. However, the radio has a Micro-USB socket (like on a phone) so the charger PSU can't be plugged straight into the radio. It doesn't seem possible to charge the battery via the USB socket. You are not supposed to use the radio whilst it is in the charger base, which is a bit odd. In fact, you physically can, but I guess it's not supported.

That said however, the radio having a standard Micro-USB connector is a major bonus as far as I am concerned as it means you don't have to invest in an expensive proprietary cable to communicate with and program the radio.

The antenna has a SMA female connector that screws into the male on the radio body. I had to get a SMA to BNC adapter to connect it to my station antenna, but these are not expensive accessories (and you may well already have one in your collection).

Hardware

The DJ-MD5 is a nice-looking radio. It feels solid in the hand and the buttons have a positive action that give good feedback when you press them. It weighs around 256g, but is not intended to be a shirt pocket radio. Internally, it appears that a die-cast chassis is used so it should be fairly rugged, though it doesn't have an IP rating and the manual contains warnings about not getting the radio wet or dusty. Though not guaranteed weatherproof I'd happily use it outdoors.

The radio is switched on using the volume control and there is a delay of some 8 seconds before the colour LCD screen lights up. Once powered up, the radio listens on two channels simultaneously (this behaviour can be changed), but only one is active for transmitting. The display shows both channels, with the active one displayed using a larger font. The screen is of a good size (4.5cm diagonal) and is readable in all the lighting conditions that I tried.

On the left flank are three buttons: PTT and two programmable function (PF) buttons. Out of the box, pressing the middle PF key



The complete set, comprising the charger PSU, drop-in charger, radio, manual and antenna.

swaps which of the two displayed channels is selected for transmission, whereas pressing the bottom one opens the (digital) squelch. I half-expected the channels to swap over on the display when I changed active channel (like most HF rigs do when swapping VFOs), but they didn't. Instead, the active channel is displayed using a larger font (see photo, left).

On the right flank are the Micro-USB programming socket and 3.5 + 2.5mm sockets for a headset or earpiece (not supplied). All are normally snugly covered by a rubber plug (see photo on front cover).

The battery has charging studs that mate with the desk charger. I'm not sure how well these are protected (eg if the bottom of the radio got wet or plonked down on some steel wool). As with many handheld radios, these studs are connected straight to the battery terminals and are 'live' (+7.4V nominal) all the time. The battery clips on firmly but is very easy to put on and off.

The only challenging aspect of the radio is the belt clip. It took several attempts and a few minutes scrabbling on the floor for lost screws before I had it installed. Unusually, the clip is attached to the battery rather than the body, so if you opt for a second battery you'll need a second belt clip as well.

Briefly, the radio has four selectable output powers from 200mW to 5W, covers 2m and 70cm (plus broadcast FM receive – a nice touch), a VOX and, depending on model, a built-in GPS receiver. RX sensitivity is fine.

Setting up from scratch

As indicated in the box on page 44, the heart of any DMR radio is its 'codeplug'. Unfortunately, the radio I received had a very sparse, early codeplug with only a few random frequency pairs programmed in. Therefore, out of the box the radio did (literally) nothing. Unfortunately, I found the supplied manual

useless. It is 26 pages long, consisting mostly of warnings and disclaimers. Just one page covers the layout and buttons. The two(!) pages that are devoted to operation cover only how to switch the radio on and change channel. There's nothing on programming, nothing on the menu system. Totally inadequate for such a complex radio and a big black mark in my book. At the very least, I'd expect the printed manual to contain a URL to a more detailed manual that could be viewed online or downloaded. *[A much more comprehensive UK Operations Guide that covers programming the radio is now available free from the distributor (Nevada) but was not available when our reviewer started work – Ed].*

From the forums, I managed to find the programming software. Thankfully it's a free download and the radio can be connected using a standard USB cable, so no need to buy a programming cable as you do with some manufacturers. As far as I can see, the radio can only be programmed from a computer. There is very little that can be done from the keypad.

With the software installed and the radio connected, I was finally able to see the contents of the codeplug. Once the initial sense of panic had subsided, I started to research how I could make the radio do something.

I gather that the usual approach is to take somebody else's codeplug (preferably for the same radio) and modify it to suit your needs *[see later – Ed]*. Eventually, I found a codeplug intended for users in Ohio, so I started with that. I copied the Digital Contact List and Talk Groups from the Ohio codeplug and used the Ohio channels as templates for my local repeaters. Unfortunately, I still couldn't get anything to work, but a fellow member of the Huntingdon Amateur Radio Society, Richard, 2E0FRQ, was able to get some channels

programmed so that I could make progress. Thank you, Richard! I also programmed in my local FM analogue repeater, GB30V.

At last, I had a radio that I received something! Transferring the modified codeplug for the first time took a long time, mainly because of the enormous Digital Contact List. Luckily, you can opt to not transfer this each time.

My location does not permit access to any of the local repeaters using a handheld's rubber duck, but connecting the DJ-MD5 to my station collinear let me open both local repeaters easily.

Audio quality

First impressions were not very favourable. It's a small radio and necessarily has a small loudspeaker, which sounded a bit 'tinny' to my ears. There was plenty of volume though and it was OK on FM. As with all DMR radios, the digital voice mode sounded characteristically 'computerised', almost Dalek-like. This is due to the CODEC used by the DMR system and not a criticism of the DJ-MD5. Using a headset or external speaker removes the 'tinniness'. It's interesting to note that there is a menu option to limit headset volume.

Ease of use

Once programmed, the radio is very simple to use. The channels are grouped into Zones (in my case based on geographical location). You select the Zone via the menu system and then use the rotary control to select channels within that Zone. One useful feature is Receive Group Call Lists. With these, you add a number of channels into a group and then tell the radio to listen on all channels in the group simultaneously. Whenever there is traffic on one of the channels, the squelch opens and the channel is identified on the display. As many channels seem to be silent most of the time, at least you feel you are getting something for your money!

Summary

The DJ-MD5 is a good radio. It feels robust, and fits the hand well (particularly so if you omit the belt clip). The included drop-in charger is a delight to use. The only possible extra bit of hardware that could be added would be a BNC adapter, but these are available cheaply on eBay and elsewhere.

At around £140 (or £160 with the GPS option) it's not a bad price for a decent radio from a well-established manufacturer.

Gareth Howell, M5KVK
gareth.m5kvk@gmail.com



The SMA aerial connector accompanies the channel and volume controls on the top panel.

Final comment on DMR

Setting aside the codeplug problems I experienced, I wasn't very impressed by DMR. It seems to have suffered from the problem of over-subdivision of the DMR community. I guess that the overall design assumed there would be so much simultaneous traffic that it just had to be corralled into Talk Groups covering small localities. The result is the proliferation of many mostly-silent Talk Groups that serve only a small number of amateurs, resulting in isolation and no critical mass. I left the radio connected to the worldwide talk groups and they were silent for most of the day. Not even idents to let you know they are working. I rarely heard anything on the channels I had access to. Even when I put out calls, I seldom had any response. Only on a pre-scheduled DMR net run by HARS did I find any activity, and then it was only three stations.

Contrast this with the approach adopted by the (admittedly 'non-amateur radio') Network Radios, i.e. having a small number of global channels, increased as and when the existing ones get busy.

These observations relate to DMR as a whole rather than the DJ-MD5. Hopefully, somebody will invest some time developing a UK-wide codeplug for this and other radios. There is more than adequate storage space in the codeplug to have all UK repeaters pre-programmed with all the Talk Groups they can access. Until that happens, I think most amateurs will find DMR a steep hill to climb. *(Nevada tells us that since this review was written a UK-specific codeplug has been developed for the DJ-MD5 and is freely available – Ed.)*

Thanks

We'd like to thank Nevada Radio for the loan of the sample Alinco DJ-MD5. Full details are at www.nevadairadio.co.uk or 02392 313 090.

Websearch

- 1) www.radioid.net
- 2) www.dmr-marc.net

What is Digital Mobile Radio?

Digital Mobile Radio (DMR) is a system that allows devices to be connected together and exchange voice and data over digital radio links and the internet. As such, it is very similar in concept to D-Star and the combination of Yaesu System Fusion plus WIREX-X. DMR is defined in a series of open standards defined by the European Telecommunications Standards Institute (ETSI) and is used widely in commercial environments as a replacement for the (older), analogue, private mobile radio (PMR). As with PMR, there are many suppliers of commercial DMR radios.

Most commercial (professional) DMR radios are designed for minimal interaction by the operator: they are push-to-talk black boxes, perhaps with a few switchable pre-defined channels. The growing number of DMR radios produced for the amateur market adapt this philosophy by adding analogue voice capability, more comprehensive displays and (some) programmability, but otherwise they are still black boxes (albeit with a colour display).

At the physical level, DMR uses time division multiple access (TDMA) to divide the 4kHz baseband signal into two Time Slots: TS1 and TS2. The repeater treats each Time Slot as a separate 'Virtual' repeater, so each physical repeater is actually two; though only one can be in use at a time.

Each Time Slot is usually connected logically to a Talk Group. In principle, the Time Slot could be connected to any one of the 160,000 IDs or 1000 Talk Groups, allowing (eg) GB3PY TS1 to be connected to a Talk Group serving a group of repeaters in Washington, DC. In practice, each Time Slot defaults to a preset Talk Group; though the user can override this temporarily if they wish. A Time Slot also uses a particular "color". This is analogous to analogue Digital Code Squelch (DCS) and serves the same purpose: preventing activation of multiple repeaters.

Importantly, each potential user (radio amateur) has to register on the DMR network before they can use it. This can be done at [1], where the user is allocated one of the 160,000 Digital Contact IDs.

Zones are used to group the channels into logical sets: usually by locality, so that all channels in an area are grouped into a single zone, but it's up to the person programming the radio.

Many amateurs are familiar with programming analogue radios with repeater details. You enter the name, input and output frequency, CTCSS information and so on. A similar principle applies in DMR except there are a lot more variables – and they all have to be programmed before the radio will do anything whatsoever. This information – known as a "codeplug" even though it isn't any sort of physical plug – is a set of rules that defines what a radio will actually do. Just to make life interesting, codeplugs are usually manufacturer- (and even model-) specific and even a codeplug from an identical radio will normally require at least some tailoring to make it "yours". Amongst other things, the codeplug contains:

- Channels that define a combination of Repeater, Time Slot, color and either a Talk Group or another Digital Contact. The DJ-MD5 supports up to 4000 Channels.
- Zones into which the channels are grouped for convenience (up to 250, each with up to 160 Channels)
- Digital Contact IDs – a directory of individual radio stations (radio amateurs) registered on the DMR network (up to 160,000 – see [1] for the current list of IDs)
- Talk Groups – meeting places where groups of users can talk to each other (the DMR equivalent of analogue repeater 'nets' or D-Star 'conferences'). There can be up to 1000 of these.

Most Talk Groups are intended for country or regional use (eg one covering East Anglia), but a few are defined for world-wide use. A list of current Talk Groups is at [2].

The DMR infrastructure comprises a global network of digital repeaters, connected to each other over the internet. My local DMR repeaters are GB7PY (Cambridge) and GB7PY (Royston). Just like analogue repeaters, each operates on a frequency pair. Unlike their analogue equivalents though, by choosing the right Talk Group a user of GB7PY could communicate with a DMR-equipped radio amateur in just about any country or region of the world. But the Talk Group has to be 'in' the Codeplug or you won't see it.

ID	Reverse	Transmit	Channel	Power	Brand	TCRS01	TCRS02	Channel Name
1	435 52500	435 52500	A-Analog	high	25K	Off	Off	Channel 1
2	436 30500	436 30500	D-Digital	high	25K	Off	Off	Channel 2
3	437 57000	437 57000	A-D T.L.A.	high	25K	Off	Off	Channel 3
4	438 87000	438 87000	Dw-T1 D	high	25K	Off	Off	Channel 4
5	144 52000	144 52000	A-Analog	high	25K	Off	Off	Channel 5
6	146 32000	146 32000	D-Digital	high	25K	Off	Off	Channel 6
7	147 57000	147 57000	A-D T.L.A.	high	25K	Off	Off	Channel 7
8	148 87000	148 87000	Dw-T1 D	high	25K	Off	Off	Channel 8
9	439 17000	439 17000	D-Digital	high	12.5K	Off	Off	GB7PY-01-MARC-001
10	439 17000	439 17000	D-Digital	high	12.5K	Off	Off	GB7PY-01-UK-001
11	439 17000	439 17000	D-Digital	high	12.5K	Off	Off	GB7PY-01-USA-001
12	439 17000	439 17000	D-Digital	high	12.5K	Off	Off	GB7PY-01-001
13	439 80000	439 80000	D-Digital	high	12.5K	Off	Off	GB7PY-02-UK-001
14	439 80000	439 80000	D-Digital	high	12.5K	Off	Off	GB7PY-02-USA-001
15	439 80000	439 80000	D-Digital	high	12.5K	Off	Off	GB7PY-02-001
16	439 80000	439 80000	D-Digital	high	12.5K	Off	Off	GB7PY-02-East-001
17	100001-100000							
18	100001-100000							
19	100001-100000							
20	100001-100000							
21	100001-100000							
22	100001-100000							
23	100001-100000							
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50	100001-100000							

Editing the codeplug is done via a spreadsheet-like user interface.