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Product Review

AnyTone AT-D868UV Dual-Band DMR/FM Handheld Transceiver

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It's incredible how the number of hams using digital mobile radio (DMR) has grown in the past year. Before you can be active on this mode, you need to get a DMR ID by registering with worldwide coordinator **RadioID.net** (formerly handled by DMR-MARC). Looking back at some videos about DMR on my YouTube channel (**Laboenligne.ca**), here are some numbers for the total DMR IDs (representing individual users) allocated worldwide: November 2017 — 72,530; April 2018 — 92,578 (+27.6%); September 2018 — 107,117 (+15.7%).

A small minority of DMR operators have more than one ID, but even after taking this into account, the growth is still impressive. Interest in DMR has been driven by the availability of low-cost radios available from different manufacturers. It's appealing to newcomers, as well as to experienced hams who decide to try something new.

Growing popularity has encouraged additional DMR-specific repeaters and better networks, at least in my region. For example, I'm currently writing this review from a campground, from the same spot I used last year. Last summer, the only way I could reach my preferred DMR talk group (TG) was with an internet hotspot. Today, I just programmed a new local repeater in my radio, and it is full strength here.

Overview

Out of the box, the package included the AnyTone AT-D868UV radio, a 3,100 mAh lithium-ion battery, a desk charger with an ac adapter, a dual-band plus GPS antenna, a belt clip, a USB programming cable, and a user manual.

This radio is dual band — VHF (136 – 174 MHz) and UHF (400 – 480 MHz) — and operates on analog FM as well as DMR. It is compatible with DMR Tier I and Tier II, so it can be used on the ham radio repeater networks and with any digital hotspots compatible with DMR. The radio can also receive FM broadcast stations between 87.5 and 108 MHz. It has four programmable power levels: 7/5/2.5/1 W.

The 1.77-inch, color TFT display (see Figure 1) has a lot of information. It shows the channel number, time slot, date, and time. There's an indicator for repeater memory, and for each VFO, it displays a channel name with the zone name. You can also select between dual-channel and single-channel display. In VFO mode, you can have automatic repeater offset settings.

The two-pin speaker/mic jack is compatible with Kenwood K1-type units, and it's also used by the programming cable. The hardware is IP-54 water and dust resistant.

The radio supports up to 4,000 memory channels and 160,000 digital contact capability for identifying private calls, along with 10,000 group calls for talk groups (TG). This is very handy because the complete worldwide database has more than 100,000 users. This radio can hold 250 zones, with up to 250 channels per zone. It also supports multiple radio IDs, which can be useful for programming members of a local radio club if multiple radios with the same code plug are used in a pool for public service events.

Customizing the AT-D868UV Using the CPS

With a new DMR radio there is always a learning curve before you can be familiar with its functions, and some features are not available until you check a box in the CPS programming software.

All DMR radios use a *code plug*, which is simply a configuration file that includes memory channels, scan lists, user preferences, menu options, and other settings (VFO mode, repeater auto offset, and so on). Setting up your code plug correctly will make a huge difference in your appreciation of any DMR radio. Keep in mind that to configure a memory channel for DMR, you need to set up a contact, a channel, and assign it to a zone — this is common to all DMR radios.

Bottom Line

The AnyTone AT-D868UV DMR/analog FM dual-band handheld is user-friendly, well supported, and offers features useful for radio amateurs.

Figure 1 — The AnyTone AT-D868UV display.

Over time, I have noticed that DMR radios are becoming more ham radio friendly. The AnyTone AT-D868UV can be configured for manual operation, which is great for ham radio, as we can change frequencies in the field without a PC. You can even build a code plug from the keypad if you are patient. But as with all DMR radios, it is best to set it up using a computer at first (see Figure 2). It's faster, and you can save the configuration file as a backup.

We purchased the review radio from BridgeCom systems, which markets a variety of VHF/UHF transceivers for hams and offers excellent customer service. When you receive a brand-new DMR transceiver, you should always download the latest firmware and install the matching CPS version. It is available from the dedicated AnyTone support page on the BridgeCom website (see the link under the **SUPPORT** tab). They also offer installation and programming guides, which were very useful for me. Before I could start programming my radio, I had to install the USB driver manually, as my PC didn't detect the AT-D868UV without it. This driver is also available from the BridgeCom support page.

Verify the firmware version installed in the radio by going to the **SETTINGS** menu and looking for the **DEVICE INFO** tab. To upgrade the radio, follow the procedure in the *Programming Guide*. Note that for programming the radio, you just need to connect the cable to a PC and turn the unit on. For the firmware upgrade, you need to follow a special procedure described in the instructions.

After the upgrade is done, open the CPS program, download the configuration from the radio, and save the file for backup. This file is the original configuration from the manufacturer, and it can be useful in case you run into a problem and want to go back to the initial setup. You should do this with any new DMR radio.

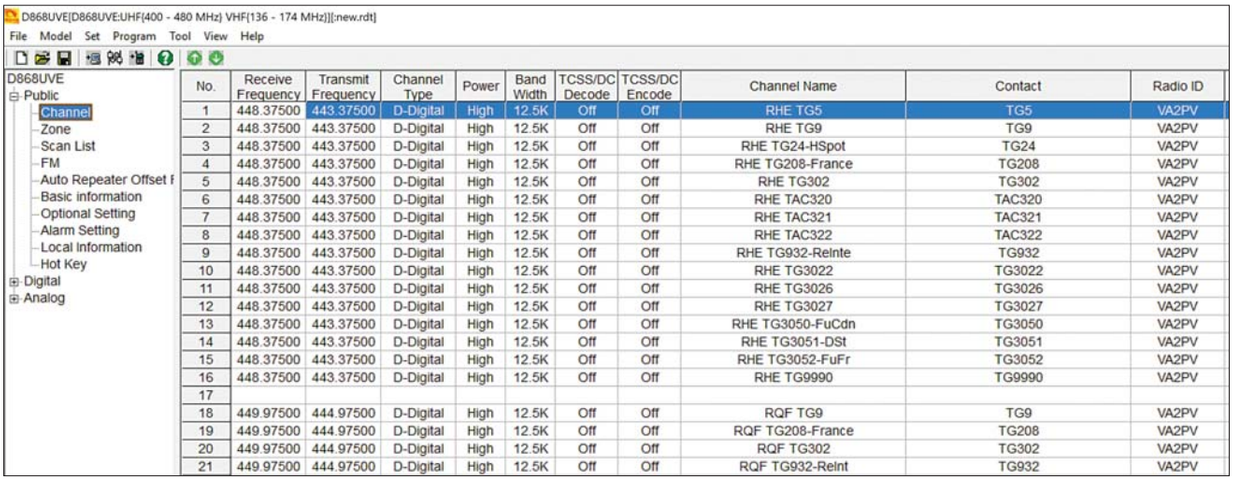
Getting Started

Now you can start building your code plug, but you can save a huge amount of time and effort just by contacting your local club or other hams active on DMR in your area. Sometimes they are able to provide a basic code plug with all the local repeaters with their specific talk group and time slot configuration. In our area, the **www.dmrq.org** organization provides basic code plugs for different radio brands with all the local French talk groups.

If you cannot get a suitable code plug, try to set up one repeater and make some friends on the air. This is the easiest way to get started. DMR itself is not complicated, but the level of customization is high, and most repeaters are configured differently. For example, some talk groups can be available on one repeater but not on another. Fortunately, clubs usually configure all of their repeaters the same way, but there may be modifications.

As noted in the introduction, all hams using DMR have a unique DMR ID associated with their call sign. Because the DMR networks (DMR-MARC, DMRplus, and Brandmeister) use these numbers to allow access, you will only see the ID number on your radio screen when a station is received. You can download the DMR ID database and upload it to the radio, and then you can see the name and call sign of the received station on your radio's screen.

With the AnyTone AT-D868UV, you can add up to 160,000 IDs, which means the full worldwide database.



No.	Receive Frequency	Transmit Frequency	Channel Type	Power	Band Width	TCSS/DC Decode	TCSS/DC Encode	Channel Name	Contact	Radio ID
1	448.37500	443.37500	D-Digital	High	12.5K	Off	Off	RHE TG5	TG5	VA2PV
2	448.37500	443.37500	D-Digital	High	12.5K	Off	Off	RHE TG9	TG9	VA2PV
3	448.37500	443.37500	D-Digital	High	12.5K	Off	Off	RHE TG24-HSpot	TG24	VA2PV
4	448.37500	443.37500	D-Digital	High	12.5K	Off	Off	RHE TG208-France	TG208	VA2PV
5	448.37500	443.37500	D-Digital	High	12.5K	Off	Off	RHE TG302	TG302	VA2PV
6	448.37500	443.37500	D-Digital	High	12.5K	Off	Off	RHE TAC320	TAC320	VA2PV
7	448.37500	443.37500	D-Digital	High	12.5K	Off	Off	RHE TAC321	TAC321	VA2PV
8	448.37500	443.37500	D-Digital	High	12.5K	Off	Off	RHE TAC322	TAC322	VA2PV
9	448.37500	443.37500	D-Digital	High	12.5K	Off	Off	RHE TG932-Reinte	TG932	VA2PV
10	448.37500	443.37500	D-Digital	High	12.5K	Off	Off	RHE TG3022	TG3022	VA2PV
11	448.37500	443.37500	D-Digital	High	12.5K	Off	Off	RHE TG3026	TG3026	VA2PV
12	448.37500	443.37500	D-Digital	High	12.5K	Off	Off	RHE TG3027	TG3027	VA2PV
13	448.37500	443.37500	D-Digital	High	12.5K	Off	Off	RHE TG3050-FuCdn	TG3050	VA2PV
14	448.37500	443.37500	D-Digital	High	12.5K	Off	Off	RHE TG3051-DSt	TG3051	VA2PV
15	448.37500	443.37500	D-Digital	High	12.5K	Off	Off	RHE TG3052-FuFr	TG3052	VA2PV
16	448.37500	443.37500	D-Digital	High	12.5K	Off	Off	RHE TG9990	TG9990	VA2PV
17										
18	449.97500	444.97500	D-Digital	High	12.5K	Off	Off	RQF TG9	TG9	VA2PV
19	449.97500	444.97500	D-Digital	High	12.5K	Off	Off	RQF TG208-France	TG208	VA2PV
20	449.97500	444.97500	D-Digital	High	12.5K	Off	Off	RQF TG302	TG302	VA2PV
21	449.97500	444.97500	D-Digital	High	12.5K	Off	Off	RQF TG932-Reint	TG932	VA2PV

Figure 2 — Programming the AT-D868UV using CPS software.

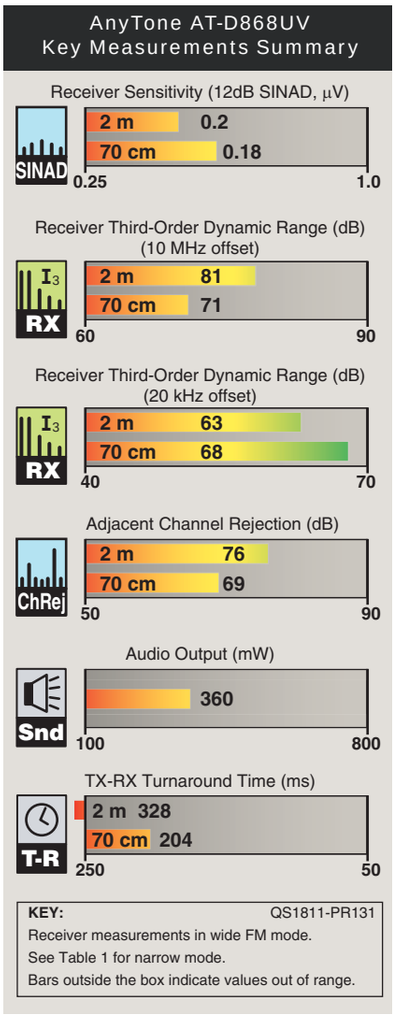


Table 1
AnyTone AT-D868UV, serial number 11501173170108

Manufacturer's Specifications	Measured in ARRL Lab
Frequency coverage: 136 – 174, 400 – 480 MHz.	As specified.
Modes: DMR, analog FM.	As specified.
Power requirements: 7.4 V dc, ±20% (3,100 mAh battery supplied).	Receive: 187 mA (max volume, max backlight); 173 mA (max volume, min backlight); standby, GPS off, backlight off, battery save on, 65 mA. Transmit: 146 MHz, 1.58 A (high), 0.68 A (low); 440 MHz, 1.51 A (high), 0.75 A (low). Power off, <1 mA.
Receiver	**Receiver Dynamic Testing**
Sensitivity: For 12 dB SINAD, <0.25 µV (wide, 25 kHz); <0.35 µV (narrow, 12.5 kHz).	FM, for 12 dB SINAD: 146 MHz, 0.20 µV (wide); 0.16 µV (narrow). 440 MHz, 0.18 µV (wide); 0.17 µV (narrow).
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset: 146 MHz, 63 dB. 440 MHz, 68 dB. 10 MHz offset: 146 MHz, 81 dB. 440 MHz, 71 dB.
FM two-tone, second-order IMD dynamic range: Not specified.	146 MHz, 91 dB; 440 MHz, 101 dB.
Adjacent-channel rejection: ≥70 dB (wide, 25 kHz), ≥60 dB (narrow, 12.5 kHz).	20 kHz offset: 146 MHz, 76 dB (wide), 81 dB (narrow). 440 MHz, 69 dB (wide), 74 dB (narrow).
Squelch sensitivity: Not specified.	At threshold: 146 MHz, 0.2 µV (min), 0.3 µV (max); 440 MHz, 0.18 µV (min), 0.48 µV (max).
S-meter sensitivity: Not specified.	For four bars, 146 MHz, 0.32 µV; 440 MHz, 0.61 µV.
Audio output: 1,000 mW into 16 Ω.	360 mW at 7.5% THD into 16 Ω. THD at 1 V_{RMS}, 2.8%.
Transmitter	**Transmitter Dynamic Testing**
Power output: Up to 7 W.	146 MHz, 5.0 W (high), 0.6 W (low); 440 MHz, 4.7 W (high), 0.7 W (low) at 8.15 V dc (full charge).
Spurious signal and harmonic suppression: suppression: ≥57 dB	>70 dB; meets FCC requirements.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S-9 signal: 146 MHz, 328 ms; 440 MHz, 204 ms.
Receive-transmit turnaround time ("TX delay"): 146 MHz, 20 ms; 440 MHz, 24 ms. Not specified.	
Size (height, width, depth): 5.0 × 2.5 × 1.7 inches (including protrusions). Belt clip, add 0.2 inches to depth. Antenna length: 6.1 inches. Weight: 11.2 ounces (including battery and antenna).	

Go to **www.amateurradio.digital** for the latest file for DMR radios, including this one. Click on **DIGITAL CONTACTS WIZARD**, select the radio, and click **NEXT**. If you want the full database, just click on the **STEP 3** tab, and click **DOWNLOAD**. To upload the file to your radio, in the CPS program, select **TOOLS**, then **IMPORT**, and click on **DIGITAL CONTACT LIST**. Select the file you downloaded, and click **IMPORT**. Remember that, to upload the contact list at the same time as your code plug, you have to select that option when you write the data into the radio (see Figure 3).

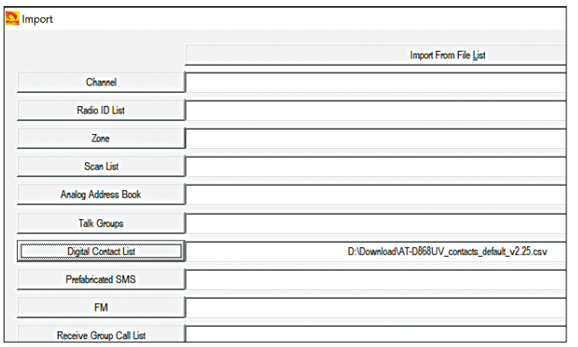


Figure 3 — Importing a digital contact list.

Operation on the Air

The AT-D868UV is a high-quality build, and I like the way it feels in my

hand. It's a little bit bulky with the 3,100 mAh battery, but a full charge lasts up to 35 hours if you're not transmitting too much.

It can monitor any frequency on VHF or UHF on both VFOs (V/V, U/U), in digital or analog (FM), but it can only receive one signal at a time (either in digital or FM). There's a very useful feature called **DIGI MONITOR**. When that's off, you will only hear the programmed talk group of the set memory, but you can set it to hear any talk group on the selected time slot, or even better, any talk group on any time slot on that frequency.

The first few days I used this feature, every time I wanted to call a station I heard, I couldn't make contact, as I was transmitting on the wrong talk group. When this happens, look carefully at the radio screen — it shows the actual talk group in use. Knowing this, you can use this feature to monitor a local DMR repeater and learn the available talk groups, or at least the most popular one. To make a contact, be sure to turn this feature off and configure a correct talk group, otherwise it won't go through and can be very confusing.

There's something else worth mentioning. When you are receiving a signal with this radio, you can still go into the menu system. That's not the case with some DMR radios — thumbs up for this feature!

This radio performed very well in digital mode. It's perfect for my camping operation, as I can use the full transmit power to reach distant repeaters for quite a long time, thanks to the high-capacity battery. This is fun, as I have access to all the repeater talk groups I want to use without setting up an internet hotspot. I had multiple contacts from the camping site, and I had good comments on my transmitted audio. I was very satisfied with the received audio as well.

See our review of the AnyTone AT-D868UV Handheld Transceiver by Pascal Villeneuve, VA2PV, at https://youtu.be/ghoSvfEfpcM.

In analog FM mode, it's also very good, and it compares well to other dual-band radios that I use. I like the fact that I can set up this radio with auto offset for repeaters. This is very helpful in VFO mode. I listened to the FM broadcast band, and as expected, this is not a hi-fi audio receiver, but it did the job.

Conclusion

The AnyTone AT-D868UV is a very complete DMR/analog FM dual-band (VHF/UHF) portable radio. It is well suited for Amateur Radio use, and for a DMR radio, it is quite user-friendly. I like that the display provides very useful information. I like that the radio allows the manual configuration without a computer for field operations, and I especially like that I can access the menu while a signal is received. The **DIGITAL MONITOR** function is great, as I can monitor all the traffic on a repeater, so I don't miss any opportunity to chat with my friends.

I highly recommend this unit for beginners or experienced DMR users, as well as public service groups.

Manufacturer: Qixiang Electron Science & Technology Co. Ltd., Fujian, China; **www.anytone.net**. Available from several US suppliers, including BridgeCom Systems, Inc., 102 NE State Route 92 Hwy, Ste. C, Smithville, MO 64089; **www.bridgecomsystems.com**. Price: $178.99 with GPS and programming cable. Extra 3,100 mAh battery, $30. BCS-200 speaker/mic, $30.