

Product Review

RFinder B1 Plus Dual-Band DMR/FM Transceiver/Smartphone

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The RFinder B1 Plus dual-band radio is an advanced and versatile feature-packed communication device that caters to the needs of advanced amateur radio enthusiasts. It is an Android smartphone with an embedded radio frequency (RF) module for 2-meter and 70-centimeter coverage that allows software integration with various ham radio applications found in the Google Play store. The B1 Plus supports digital mobile radio (DMR) digital mode and analog FM narrow and wide capability. See Table 1 for the RFinder B1 Plus specifications.

The previous version of the B1 radio was reviewed in the November 2020 issue of *QST*. The primary hardware differences between the B1 and B1 Plus models are a slightly faster CPU, updated Android OS support for newer versions beyond 8.1, and the ability to charge the radio via the USB-C port. These are small but important enhancements; the main difference is in the new software support that allows the enhanced new features developed in the past few years since the B1 was released.

In this review, I will cover the new software features of the B1 Plus for amateur radio applications only. So, I will not cover the smartphone features like the front and rear camera, Bluetooth functionality, Android OS, etc., which are all standard features on each model.

The advantage of this radio is that not only does it do everything the embedded smartphone does on the cellular and Wi-Fi networks, but it also provides that radio functionality over those networks as well. I found the ability to have this all-in-one functionality to be interesting, as there is no need for complex code plugs, so programming in repeaters and memory banks is very simple.

At first glance there is complexity to this radio, but after breaking down its components and following an update and configuration process, the ability to use the radio becomes easier. In short, there is the Android operating system itself, the RF module, and the World Wide Re-

peater Directory (WWRD), which is a core software requirement.

Build Quality and Ergonomics

The RFinder B1 Plus boasts a sturdy and durable build, making it suitable for outdoor use and harsh environments. The well-designed user interface ensures easy navigation through the various features, making it accessible for both beginners and experienced users. The bright and clear display enhances visibility, even in challenging lighting conditions. The rubberized key caps provide a good level of protection, and there are two push-to-talk (PTT) buttons, one for the RF module and the other for EchoLink and Zello modes.

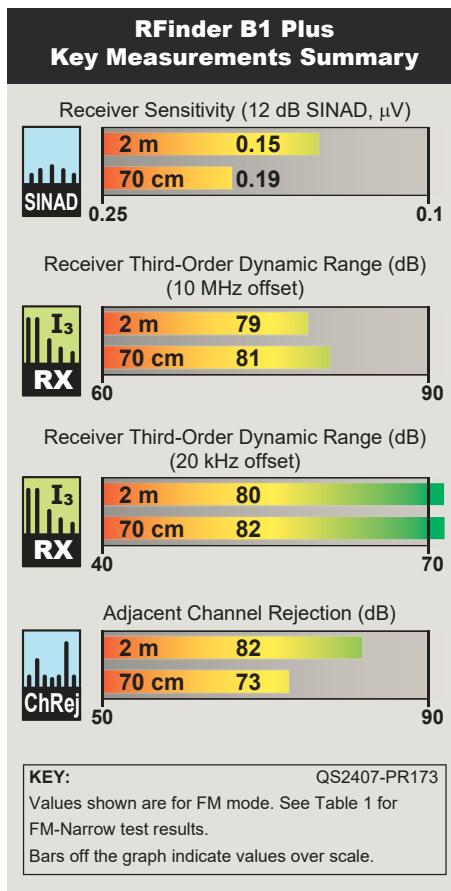
With its IP67 rating, it will operate in wet conditions and survive a dunk into the water. The battery must be installed correctly to maintain its water-sealing ability.

Equipped with a high-capacity 2500 mAh lithium-ion battery, the B1 Plus offers ample battery life for your daily use. During my testing, the radio consistently provided extended usage on a single charge, making it suitable for extended outdoor adventures or emergency situations.



Bottom Line

The RFinder B1 Plus integration of a smartphone and a radio offers more possibilities than a traditional transceiver, and despite its advanced features, the software simplifies the user experience.



Initial Setup

There is a list of requirements on the well-documented www.rfinder.wiki page, but I will cover the basics to give you insight into the process.

First, if you don't have one already, you will need to get a DMR Radio ID from <https://radioid.net>. After connecting to your Wi-Fi network, it's best to update the operating system and the application software. If you plan to use it as a cell phone, you will need to install an activated nano SIM card for the cellular network access (just make sure before you buy the B1 Plus that is supporting your local cell provider mobile frequencies — most of them should).

Then, download the RFinder application WWRD from <https://install.rfinder.net> (the ham radio version) — a subscription is required (more on this later). In the application, provision your radio with your DMR Radio ID using the Radio Setup menu, and click **INITIALIZE RADIO**. You can set up your preferred frequencies manually, and your local FM and DMR repeaters using the online programming portal or the WWRD menu for memories. Configure DMR radio over IP (DMRoIP) using the **DMRoIP SETTINGS** menu (see Figure 1). Select the BrandMeister Primary Server (USA is BM 3104), and

Table 1

RFinder B1 Plus, serial number 20220321000042

Manufacturer's Specifications

Frequency coverage: 136 – 174, 400 – 490 MHz.

Modes: FM, FMN, DMR.

Power requirements: 2500 mAh at 7.4 V dc battery.

Receiver

FM sensitivity: Not specified.

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

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

Adjacent-channel rejection: Not specified.

Squelch sensitivity: Not specified.

Transmitter

Power output: 4 W (high), 2 W (low).

Spurious signal and harmonic suppression: Not specified.

Size (height, width, depth): 5.8 × 2.5 × 1.9 inches (including protrusions, without belt clip).

Antenna, 6.5 inches; belt clip, add 0.5 inches to depth.

Weight: 15.2 ounces, with belt clip and antenna.

*Measurement was noise limited at the levels reported.

Note: Squelch settings have very limited range.

Measured in the ARRL Lab

As specified.

As specified.

As specified.

Receiver Dynamic Testing

For 12 dB SINAD:

FM	FMN
146 MHz, 0.15 μV ; 0.14 μV ;	
162 MHz, 0.15 μV ; 0.14 μV ;	
440 MHz, 0.19 μV ; 0.17 μV .	

20/15 kHz offset: (FM, FMN)
146 MHz, 80/82 dB; 440 MHz, 82/82 dB. 10 MHz offset: 146 MHz, 79/80 dB. 440 MHz, 81/81 dB.

146 MHz, 73 dB; 440 MHz, 90 dB.

20/15 kHz offset: (FM/FMN)
146 MHz, 82/71 dB*; 440 MHz, 73/72 dB*.

At threshold, 0.09 μV (min), 0.16 μV (max).

Transmitter Dynamic Testing

For high/low power, 146 MHz, 5.5/1.9 W; 440 MHz, 4.8/2.3 W at 8.7 V dc (full charge).

(High/low power) 146 MHz, 69/57 dB; 440 MHz, >70/>70 dB. Meets FCC requirements.

enter your security password from the BM Self-Care page. Return to the RFinder home screen. **SAVE**, **REBOOT**, and go make QSOs.

I also added the EchoLink, Zello, and HAMRS applications that were available from the Google Play store.

WWRD Subscription

The software is a key requirement and provides worldwide repeater listings and displays the repeaters nearby on a map, and you can add new repeaters. I found the ability to choose a repeater from the list and push it to the radio for instant access very useful. If you are traveling, this feature alone means that wherever you are, the repeaters in your area are available instantly through the subscription plan. This ability to “search and click” is very powerful, and on a road trip allowed me to access local repeaters with ease (see Figure 2).

You can also save memories into the Cloud as a backup, simplifying life after performing any software or ROM



Figure 1 — The RFinder radio application menu.

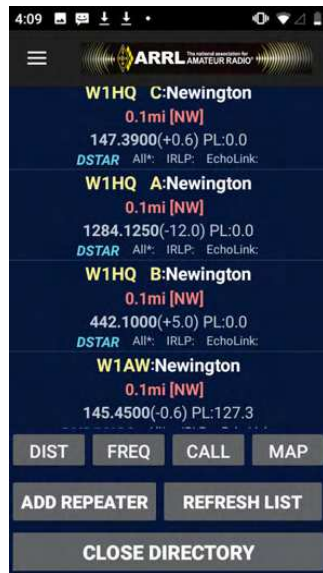


Figure 2 — The World Wide Repeater Directory (WWRD) showing nearby repeaters in the RFinder radio application.

updates. For those who like to perform memory assignment manually, Keypad Front Panel Programming is also supported. The software allows online programming capabilities as well (see Figure 3).

I found the graphical user interface for this software to be intuitive and easy to use. Storing memories and syncing them into the Cloud were seamless. I can always use the refresh list, which will pull all the updated information from its secure Cloud servers. The subscription fee (\$14.99 for 1 year) is a small price to pay for the enhanced capabilities, and covers costs associated with the RFinder Cloud servers.

RFinder B1 Plus Features

DMR is a digital radio standard that enhances voice communication with improved clarity and additional

features. The RFinder B1 Plus supports DMR, providing users with access to a broader network of digital repeaters. The dual-band capability further ensures compatibility with a worldwide range of DMR frequencies, making the radio suitable for both local and international DMR networks. The memory for contact talk groups and channels is unlimited. The admit tones and volume boost features are also available for configuration, and the ability to not have to know DMR programming simplifies the process to get on the air quickly.

DMRoIP

The RFinder B1 Plus is now fully capable of DMRoIP, which means that even without a DMR repeater, you will be able to connect to your favorite DMR network using the cell phone (data plans required) or Wi-Fi internet connection. This means that you will always have access to your favorite DMR networks without a repeater in sight with or without a hotspot (see Figure 4). Additionally, DMRoIP NetRoam (a specialized feature that allows your device to roam from network to network while using DMRoIP) provides auto-reconnects if the call is dropped on the network during a cellular tower or Wi-Fi handoff. The Brand-Meister talk groups and the TGIF Network are also supported.

Multi-RX for DMR

This allows multiple DMR talk groups to be listened to by the B1 Plus. This is similar to dual watch.



Figure 4 — Using the DMRoIP feature on the RFinder B1 Plus.

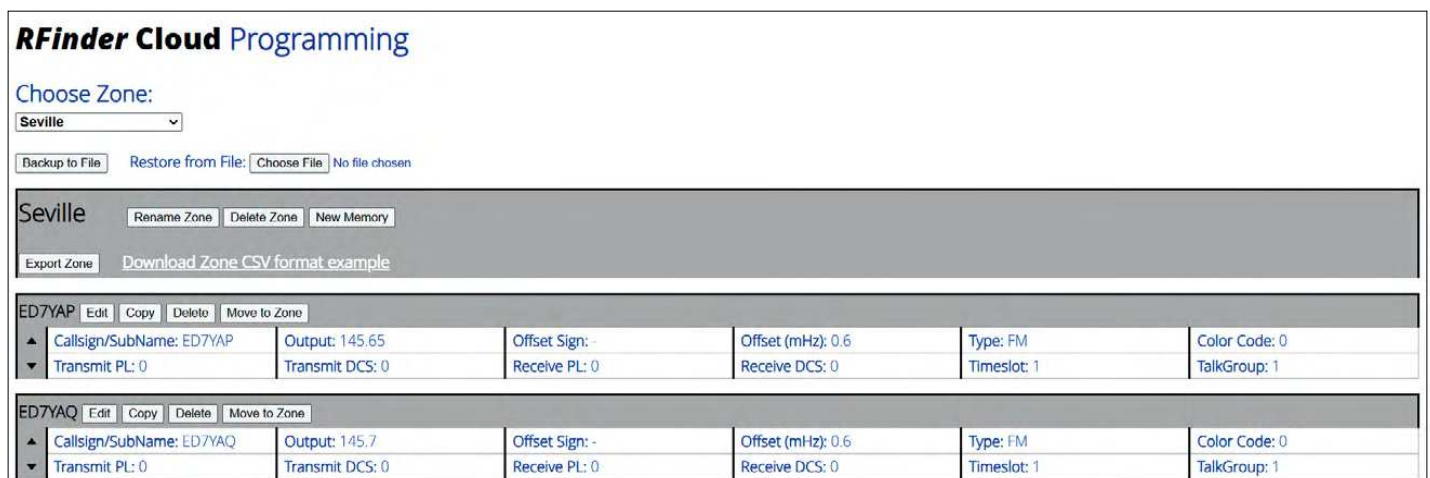


Figure 3 — The RFinder online programming tool.

Promiscuous Mode for DMR

This allows you to monitor all the activity on a particular DMR repeater, no matter what time slot a talk group is in or what color code a repeater might use.

BrandMeister DMR Support

DMR users can enjoy access to thousands of BrandMeister talk groups and have the database updated by the RFinder team. I was able to get on the BayNet talk group 31075 directly with a quick lookup, without the need for a hotspot.

DMR Last Call

The ability to use the Last Call feature is also useful to see who is on the talk groups in a list format.

RFinder Network

This network is unique and exclusive to RFinder users, allowing personal calling, a video conference room, and a map of nearby user network locations. This is an interesting feature that brings voice over IP (VoIP) and social media-style communication capability to members of this community. The Community Messaging Board is secure using a secure message PIN.

An interesting feature is RFinder on the Air. It shows me who is available on the network in real time with details and the ability to communicate with them (see Figure 5). If I click on their call sign, it does an <https://qrz.com> lookup with FCC database information. Click again for a view of the user's QRZ web page.

Automatic Packet Reporting System-Internet Service (APRS-IS)

APRS-IS is the common name given to the internet-based network that interconnects various APRS radio networks throughout the world. APRS-IS is maintained and operated by volunteer amateur radio operators to provide worldwide capabilities to the amateur radio APRS RF networks. It's a simple on/off command in the settings. You can view and track your APRS data at <https://aprs.fi/callsign-ssid>.



Figure 5 — The RFinder on the Air feature, showing who is available on the network in real time.

I saved the URL on the main screen of the radio for easy access.

SKYWARN Mode

You can submit weather reports to the local SKYWARN location. I could not find any SKYWARN repeaters in my area to try this out.

RFinder Cloud Programming

Your radio memories are also stored on the RFinder Cloud servers. You can also upload to your radio various specialty frequencies like Marine, Railroad, Survivalist, NOAA, GMRS, MURS, etc., very easily. This is a huge time-saver. I uploaded 10 special zones as they were called within 2 minutes — all saved to my radio and backed up in the Cloud.

Propagation Conditions

One of the drop-down menu items brings up the current HF propagation information. I do a lot of POTA, and having the ability to bring it up within the application is handy.

Call Sign Lookup

This menu item is standalone and interfaces with <https://qrz.com>. If a personal call is enabled for the user, I can point and click and make that personal call very easily using the RFinder Network tabs.

Zello Integration

Zello, a PTT app that operates over the internet, enables users (ham and non-ham) to connect globally. The B1 Plus seamlessly integrates with Zello, and the radio has a second PTT (POC) button for Zello.

Satellite Feature

One of the standout features of the RFinder B1 Plus is its ability to communicate via satellites. This functionality allows users to connect with satellites in orbit, expanding the radio's range beyond traditional terrestrial communication. The intuitive interface simplifies the process of selecting and tracking satellites, making it accessible even for those new to satellite communication. The dual-band capability enhances flexibility, allowing users to work with different satellite frequencies effortlessly. I was extremely pleased with how easy it was to manage this and be able to point and click into communication readiness. The menu allows visibility of a large list of satellites.

Accessing AllStar Nodes with RFinder

In the past, you could use an AllStar hotspot and access with the RFinder B1 on analog FM mode, but now it's much easier. You can install the DVSwitch Mobile 2.x app directly to your B1 Plus and access the network without the need for a hotspot.

If IAX is enabled on the AllStar node for remote access, DVSwitch Mobile will work; if the node is connected to Hamshack Hotline, there are lots of VoIP apps you could use — lots of possibilities. It all depends on the AllStar node and how it's configured. I have noticed there are more and more Android ham apps available, and they can be loaded into the B1 Plus for use.

DroidStar Support

This open-source software connects to M17, Fusion (YSF/FCS), DMR, P25, NXDN, D-STAR (REF/XRF/DCS) reflectors, and AllStar nodes (as an IAX2 client) over UDP. The application is supported on Android (as well as other operating systems), but I did not end up setting it up or testing it.

EchoLink

If you have EchoLink installed on your RFinder B1/B1 Plus radio, you can use RFinder to access an EchoLink pathway. When looking through the Repeater List, if you see a number next to EchoLink, this indicates that there is an EchoLink node registered with that repeater. To access that node, select the repeater from the Repeater List. Click on the EchoLink node number. This will launch the EchoLink application and connect you to that node.

GPS Functionality

One standout feature of the RFinder B1 Plus is its built-in GPS that integrates seamlessly with the radio, providing real-time location information. This is particularly useful for outdoor activities, emergency situations, and navigation. This is also used by the RFinder Network and APRS-IS.

Programming and Software

Programming the B1 Plus is straightforward, thanks to user-friendly WWRD software. The radio supports the importing of DMR contact lists and other configuration parameters, streamlining the setup process. Regular firmware updates from the manufacturer ensure that the radio stays up to date with the latest features and improvements. Programming the radio from the web interface is very simple. You can access the online portal from any device, with no need to download any software. Log in at <http://web.rfinder.net> and click on **GET REPEATER LIST** to see local repeaters. To manage memories of the B1 Plus, click on the **MANAGE RFINDER ANDROID RADIO MEMORIES** icon. There are some export profiles like .csv and CHIRP. I noticed that you need to click on **GET REPEATER LIST** to pull the data out of the RFinder Cloud servers whenever making location changes if you are building travel repeater lists.

On the Air

The radio's dual-band capability allows for a wide range of communication options. The B1 Plus consistently delivers clear and crisp audio, ensuring reliable communication. The power output is sufficient for most communication needs, providing reliable coverage over moderate distances. I really like the high-output speaker in noisy environments.

I found the B1 Plus ability to be supported by the RFinder WWRD application to be extremely useful. It means I have no need to do web lookup for repeaters, write them down on a sheet of paper, and then program my radio with them. I can just take advantage of the database and integration to build my memories and frequency lists. Being able to store them in the Cloud was also useful. By going online, I can use my larger PC screen to easily navigate, update, and sort or add new frequencies. Many users use their home PC to look up contacts on <https://qrz.com>, and now that functionality is in your radio. I also used the online portal (<https://web.rfinder.net>) to add channels and save memory banks. This means I can add some new channels to the radio using my iPad, and the next day add or modify any channels using my PC with a larger monitor. I can do this on the fly and out in the field as well.

As a traveler, you can easily find local repeaters on the application map, click, push to the radio, and instantly access the repeater. This is such a powerful feature because the complexity for DMR programming is more than an analog FM repeater, but the WWRD integration makes it easy. Can you imagine landing in a new city, turning the radio off Airplane mode, connecting to the cellular data network, and having local repeaters available to you with a few swipes and clicks? You also have the capability to do a manual location override. This allows you to tell the radio to bypass the real-time GPS data and set a new location. I am planning for a DXpedition to Spain. I was able to reset the location for Seville, and it shows the five local repeater details as well as a map view. If I click on **SET PARAMETERS**, it pushes the repeater details to the radio and I can PTT and start chatting without any time wasted. This is very powerful because I cannot tell you how many times I am in a new city, and locals offer up channels of interest or find a new DMR repeater that I have no information on. The last thing I want to do is go back to the hotel and spend an hour programming a radio. I can do this quickly and easily using several different programming methods.

I was also impressed with the Satellite feature (see Figure 6). I was at the car wash, somewhat bored, and I texted my wife to say I would be home in 15 minutes.

I opened the RFinder application and found the ISS in the database. The map and pass details showed a possible good elevation pass within 7 minutes on the countdown timer. As I drove home, I was able to hear some of the traffic on the ISS. The ability to have all this information available demonstrates the power of smartphone and radio integration into one unit. The application also manages the Doppler shift and changes frequency along with the pass. Of course, I found listening to the ISS enjoyable and easy. I am looking forward to adding the external antenna and making contacts through the satellites.

I am a longtime D-STAR user and hang out on a few reflectors but also use DMR and Fusion. I always found the code plugs for DMR and even BrandMeister to be somewhat complicated due to the need for specific configuration information relating to color codes, time slots, and talk group assignments. RFinder makes it easy. I just need to find the local repeater using WWRD, push it to the radio, and make contacts. If I don't have the information, such as a new DMR repeater being deployed in Toronto, I can use the Promiscuous mode to get the information. Then I save it to memory in the zone of my choice, and I am programmed and ready to go. If I want to use a specific talk group found on BrandMeister, that is just as easy as a lookup and push to the radio.



Figure 6 — The RFinder showing the ISS satellite pass.

I had a lot of fun calling my contacts via Zello or listening in to faraway repeaters using EchoLink. I think one of the best ways to explain my experience is that by the integration with the smartphone, the ability to communicate is unprecedented. I have many times been on my radio and looking up or responding to things on my smartphone. Combining these in one device can be very interesting in improving the ability to communicate across multiple modes.

Conclusion

The RFinder B1 Plus dual-band radio is a reliable, advanced, feature-rich communication tool that caters to the diverse needs of advanced radio enthusiasts. Its durable build, intuitive user interface, GPS functionality, and excellent battery life make it an asset for those who demand versatility and performance from their communication equipment. Whether used for regular radio operations, emergency communications, or outdoor adventures,

the RFinder B1 Plus proves to be a dependable and versatile companion. Overall, it's a solid investment for those seeking a high-quality dual-band radio with advanced digital radio features.

Manufacturer: RFinder, 455 Sunrise Hwy., West Islip, NY 11795, www.rfinder.net and www.androiddmr.com.
Price: \$1150 for the 4 GB of RAM version with 64 GB of storage, and \$1250 for the 6 GB of RAM version with 128 GB of storage.

N2EME RX-In RX-Out 0 – 450 MHz 100 W SDR Switch

Reviewed by Phil Salas, AD5X
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The availability of inexpensive software-defined radios (SDRs) has made them popular additions to many ham stations. Not only can they add spectrum and waterfall displays to your older transceivers, but these SDRs also often cover frequencies well above normal transceiver ranges. The trick, of course, is knowing how to tie the SDR in with your existing transceiver. Enter the N2EME SDR Switch products from www.sdrswitch.com.

