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Yaesu FTM-100DR and FT2DR Dual-Band Transceivers

The best of both worlds: analog FM and C4FM digital.

The FTM-100DR and FT2DR transceivers are Yaesu's latest entries in the System Fusion lineup. While they differ in several important ways, both rigs also have a great deal in common. So, rather than reviewing them separately, we decided to review them as a pair. *QST* Editor Steve Ford, WB8IMY, took possession of the FTM-100DR mobile transceiver and Managing Editor Becky Schoenfeld, W1BXY, selected the FT2DR handheld radio.

Major features shared by both transceivers include:

- 2 meter and 70 centimeter transmit and receive
- Extended VHF and UHF receive coverage from 108 – 999 MHz (cellular blocked). The FT2DR goes even further with receive coverage that includes the HF bands and AM broadcast.
- Analog FM or digital C4FM with the ability to automatically detect and select the appropriate mode
- Built-in Global Positioning System (GPS) receivers
- Built-in terminal node controllers (TNCs) with Automatic Packet Reporting System (APRS) functionality
- Digital "Group Monitor" function with position display
- microSD data storage (microSD cards not included)
- Hundreds of memory channels
- Multiple scanning options

Bottom Line

Yaesu's FTM-100DR mobile and FT2DR handheld seamlessly integrate analog FM and C4FM digital voice and data in one package through Yaesu's System Fusion technology.

FTM-100DR Mobile Transceiver

Reviewed by Steve Ford, WB8IMY
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Having no direct experience with System Fusion technology, I was eager to install the FTM-100DR and take it on the road. Setting it up in my automobile was straightforward. At only 5.5 × 1.8 × 6.5 inches, the FTM-100DR fit snugly into a compartment just below the dashboard. Yaesu includes a mobile mounting bracket with the FTM-100DR, but I didn't use it.

If you wish, you can separate the control head from the main body of the radio and place the radio out of sight. Yaesu provides a 10-foot cable for this purpose, and an optional 19-foot cable is available. Unless the body of the radio is very close to where you are sitting, however, you will also need an extension cable to connect the multifunction microphone; there is no provision for connecting the microphone to the control head.

The case is ruggedly constructed with a substantial heatsink and rear-facing fan. The fan is extremely quiet, and the FTM-100DR remained cool even after long chats at the full 50 W output level. (With the press of a front panel button, you can select between 5, 20, and 50 W output.)

The rear panel offers a single SO-239 coaxial antenna connector. If you have a dual-band 2 meter/70 centimeter antenna, an external diplexer isn't necessary. Along the rear panel you'll find an external speaker jack and a multipin data jack. As long as we're mentioning speakers, it is worth noting that the internal speaker is "top firing," which is something to keep in mind when planning the installation of your FTM-100DR.

The display is large and quite bright; the brightness is adjustable. Below the display is a row of buttons for various functions, as well as menu access. The VOLUME control sits prominently on the left while the DIAL knob occupies the right side for VFO control, memory channel selection, and menu navigation.

The primary channel frequency — Band A — is displayed in large numerals and the secondary frequency — Band B — is displayed in smaller numerals above. Although the FTM-100DR is a dual-band transceiver, it *cannot* receive on two bands simultaneously. To switch bands, you must toggle a front panel button, or press the button on the microphone.

The FTM-100DR has a built-in GPS receiver and it seems sensitive. I was able to get a GPS "lock" even indoors. If you're operating in analog FM, the GPS display on the left-hand side shows your heading and speed (see Figure 1). During a digital conversation, it will indicate the position of the other station relative to your location, along with the distance to the other station.

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Key Measurements Summary

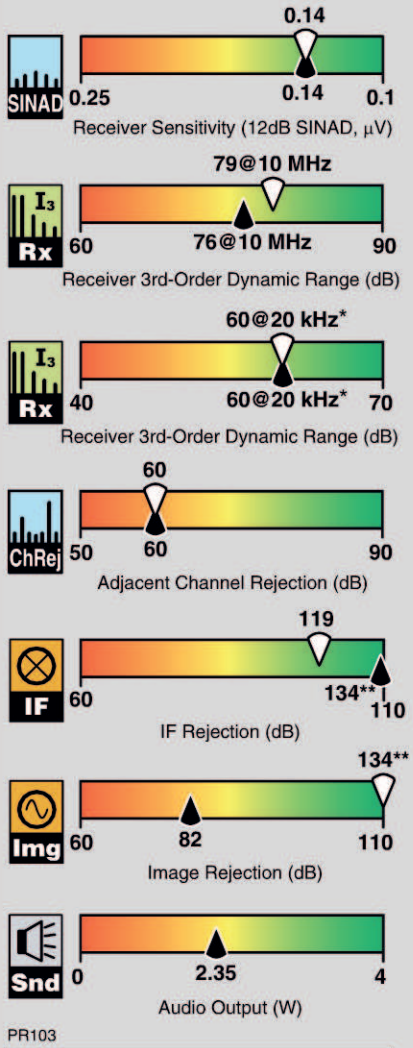

Table 1
Yaesu FTM-100DR, serial number 5G020092

Manufacturer's Specifications	Measured in ARRL Lab
Frequency coverage: Receive, 108 – 999.990 MHz (cellular blocked); transmit, 144 – 148, 430 – 450 MHz.	Receive: 108 – 729.490, 750 – 823.990, 849 – 868.990, 894.010 – 911.990, 943.510 – 956.980, 988 – 999.990 MHz. Transmit: as specified.
Modes: FM, FM-N, C4FM digital voice, data, AM.	As specified (AM is receive only, FM-N is transmit only).
Power requirements: Receive: 0.5 A; transmit, 11 A (144 MHz), 12 A (430 MHz) at 13.8 V dc ±15%.	At 13.8 V dc: Receive, 910 mA (max audio, max lights, no signal); 368 mA (standby, max lights); 269 mA (standby, lights off); 5 mA (power off). Transmit (hi/med/low): 146 MHz, 8.7/4.7/2.6 A; 440 MHz, 9.4/5.8/3.1 A.
Receiver	**Receiver Dynamic Testing†**
Sensitivity: FM (12 dB SINAD), 0.2 µV (137 – 150 and 420 – 520 MHz), 0.25 µV (150 – 174, 222 – 300 and 336 – 420 MHz), 0.3 µV (174 – 222 MHz), 0.8 µV (300 – 336 and 900 – 999.99 MHz), 0.4 µV (800 – 900 MHz). AM (10 dB S+N), ≤0.8 µV (118 – 137 MHz).	FM (12 dB SINAD): 0.14 µV (146 MHz), 0.15 µV (162 MHz), 0.56 µV (223 MHz), 0.14 µV (440 MHz), 0.18 µV (902 MHz). AM (10 dB S+N/N): 0.54 µV (120 MHz), 0.41 µV (144.4 MHz), 0.49 µV (432 MHz).
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset: 146 and 440 MHz, 60 dB*. 10 MHz offset: 146 MHz, 79 dB; 440 MHz, 76 dB.
FM two-tone, second-order IMD dynamic range: Not specified.	146 MHz, 84 dB; 440 MHz, 100 dB.
Adjacent-channel rejection: Not specified.	20 kHz offset: 146 and 440 MHz, 60 dB.
Spurious response: Not specified.	IF rejection: 146 MHz, 119 dB; 440 MHz, >134 dB. Image rejection: 146 MHz, >134 dB, 440 MHz, 82 dB.
Squelch sensitivity: Not specified.	At threshold: 146 MHz, 0.11 µV (0.29 µV max); 440 MHz, 0.1 µV (0.27 µV max).
S-meter sensitivity: Not specified.	Full scale indication: 6.3 µV (146/440 MHz).
Audio output: 3 W at 10% THD into 8 Ω (internal speaker).	2.35 W at 10% THD into 8 Ω. THD @ 1 V_{RMS},1.35% (external speaker jack).
Transmitter	**Transmitter Dynamic Testing**
Power output: 50, 20, 5 W (hi, med, low).	Hi/med/low: 146 MHz, 49/21/6.0 W; 440 MHz, 48/21/4.9 W.
RF output at minimum operating voltage: Not specified.	At 11.7 V dc: 144 MHz, 44/20/5.9 W; 440 MHz, 48/21/4.8 W.
Spurious signal and harmonic suppression: ≥60 dB.	146 MHz, >80 dB; 440 MHz, >80 dB. Meets FCC requirements.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S-9 signal: 316 ms.
Receive-transmit turnaround time (tx delay): Not specified.	70 ms.

Size (height, width, depth): Control head, 1.9 × 5.6 × 1.7 inches; control head and chassis, 1.9 × 5.6 × 7.5 inches (including protrusions). Weight: Control head and microphone, 0.6 lbs; chassis, 2.1 lbs.

Price: FTM-100DR, $400; BH-2A Bluetooth headset, $90; BU-2 Bluetooth adapter, $90; CD-40 charging cradle for BH-2A, $25; PA-46B ac adapter for CD-40, $19.

†Receiver A and B measured identically. DV not tested; C4FM FDMA signal generator was not available.

*Measurement was noise limited at the value indicated.

Getting on the Air

The FTM-100DR manual is well written and quite informative. Considering the complexity of this transceiver, I strongly recommend spending plenty of time with the manual before you reach for the POWER button.

When you apply power for the first time, you'll be prompted to enter your call sign. You do this with DIAL knob rotations and button presses. It takes a minute or two, but only needs to be done once. If you ever need to change the call sign, you can do so in the menu system.

Of course, I was eager to make a C4FM digital contact as soon as the FTM-100DR was up and running. At the time this review was written, there were only two Yaesu System Fusion repeaters in Connecticut, but I suspect that may change in the future. The impetus behind the relatively rapid spread of System Fusion is that the Yaesu

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Figure 1 — During analog FM operation, the GPS display on the left-hand side shows your heading and speed.

DR-1 dual-band repeaters have the ability to automatically recognize whether an incoming signal is analog FM or C4FM digital, and respond accordingly. As a result, some amateurs are replacing their analog FM repeaters with DR-1s — even if they have only a few System Fusion-equipped hams in their vicinities. The analog FM users continue operating the repeaters as they always have (most won't even notice the change), yet owners of System Fusion transceivers can also enjoy digital conversations through these same repeaters (although not at the same times). It is a "win-win" situation for both the analog and digital users in the repeater's coverage area.

As with the System Fusion repeaters, the FTM-100DR also has the ability to respond automatically to the modulation format of the received signal with its Automatic Mode Select feature. When Automatic Mode Select is enabled, you see a "DN" symbol with a line above it. If someone calls using analog FM, you'll hear it the same as you would any other analog FM signal (the DN symbol will switch to "FM" with a line above). But if someone calls using one of the three System Fusion digital modes (DN: voice-data, VW: wide digital voice only, or DW: wide-data-only), the FTM-100DR will respond automatically by switching to the appropriate mode and decoding the signal.

You can also choose to skip Automatic Mode Select entirely and select your operating mode manually. I usually left the rig in Automatic Mode Select, and I suspect most FTM-100DR users do the same. During the few times I locked it into continuous analog FM, I found the buzzing digital signals on the System Fusion repeaters annoying. Besides, I wanted to eavesdrop on what the C4FM guys were saying without fumbling for the DX (mode) button! (Some repeaters are using tone squelch so that analog users won't hear the digital noise.

I enjoyed C4FM chats in both the DN and VW digital modes, both in simplex and through the local System Fusion repeater. There was a noticeable improvement in audio quality in the VW mode, but in DN mode you have the benefit of sharing location information. Whenever someone transmitted, I would see their call sign in the display, along with the compass heading to their position and the distance. This function is particularly neat when you are using the Group Monitor to show all the designated group stations within range and their relative positions. The manual doesn't describe this function in detail, but instead directs you to download the *GM Function Instruction Manual* from Yaesu.

When operating digital, you can also send text messages. Without a keyboard, however, this is a very tedious process. That's why Yaesu pre-loaded the FTM-100DR with a number of "routine messages" (including a few Q signals) that you can send with the push of a button. You can add your own routine messages to the list so long as each one is no more than 80 characters in length.

While operating digital, you can also send low-resolution images. However, while the FT2DR can display images, the FTM-100DR cannot. To send images, you'd need the optional Yaesu MH-85A11U microphone with its integrated camera. You also need a microSD memory card (not included).

Speaking of the memory card, with a microSD card installed, you can log your GPS data automatically and then display it on another computer. This can be useful in applications where it is helpful to analyze the route a vehicle or individual has taken. In addition, you can use the memory card to "clone" the settings of your radio to other compatible Yaesu transceivers.

Programming the FTM-100DR and FT2DR

You don't need software to program either of these transceivers, but it certainly comes in handy. The ability to display rig settings and memory contents on a computer monitor and modify them with mouse clicks seems to be the standard approach for most transceivers these days. The FTM-100DR and FT2DR are no exceptions, and Yaesu includes USB cables to connect the radios to your computer. However, Yaesu does not provide programming software. You can purchase compatible software from

Figure 2 — The BU-2 Bluetooth adapter installed in the FTM-100DR. You must remove the top of the FTM-100DR case to plug it in.

RT Systems (**www.rtsystemsinc.com**), or experiment with the free open-source *CHIRP* software at **chirp.danplanet.com/projects/chirp**.

Hands-Free Bluetooth

For the FTM-100DR portion of the review, we purchased the optional BH-2A wireless Bluetooth microphone, the BU-2 Bluetooth adapter, the CD-40 charger cradle, and the PA-46B ac adapter. (They all must be purchased separately.)

The BU-2 adapter is essentially a tiny Bluetooth transceiver. You must remove the top of the FTM-100DR case to plug it in, but this took all of 10 minutes (see Figure 2). With the BU-2 installed, you have to access the transceiver menu system to "pair" the BU-2 with the BH-2A microphone. This is also an easy procedure and you only have to do it once.

With the BH-2A activated, you enjoy hands-free transmitting and receiving. A single press on the earpiece button toggles between transmit and receive. There is also a convenient VOX function if you want to keep both hands on the wheel at all times.

I received good audio reports with the BH-2A. According to the reports, fidelity was excellent and background noise was minimal. At one point I got out of the car and took a stroll to see how far I could get before I lost communication with the FTM-100DR. The average seemed to be about 30 feet.

APRS

When it comes to using the FTM-100DR with the Automatic Packet Reporting

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Figure 3 — When the FTM-100DR's TNC decodes an APRS beacon, the text and transmitting station's compass heading and distance are displayed.

System (APRS), the instruction manual can be somewhat confusing. On page 77, there is a very brief description of the "APRS Function," but since the FTM-100DR makes 1200 and 9600 baud data signals available at the rear panel for an external packet radio Terminal Node Controller (TNC), I assumed that I needed an external TNC to use this function.

Not so! The FTM-100DR has a built-in TNC that is dedicated to APRS. To get the full details, you have to download the *APRS Instruction Manual* from Yaesu. At more than 30 Mbytes, it is a large 82-page document with copious amounts of information. Fortunately, I was able to find the basic setup instructions quickly.

The first step is to place the FTM-100DR in analog FM mode, tune to 144.39 MHz and then access the menu system to enter your APRS call sign (mine was WB8IMY-5 during the review). You also use menus to select an icon to represent your station, and then select the digipeating path. I also set up the FTM-100DR for "smart" beaconing so that it would only transmit at specific intervals.

The results were impressive. When the FTM-100DR's TNC decoded an APRS beacon, I heard a beep and saw the text on the display, along with the transmitting station's compass heading and distance relative to my location as shown in Figure 3. Whenever my FTM-100DR transmitted a beacon and detected that it had been relayed by a digipeater, I heard a series of three descending tones.

Table 2
Yaesu FT2DR, serial number 5H030512

Manufacturer's Specifications	Measured in ARRL Lab
Frequency coverage: Receiver A, 0.5 – 76, 108 – 137 MHz (AM), 137 – 999 MHz (FM, cellular blocked); 76 – 108 MHz (WFM); Receiver B, 108 – 137 MHz (AM), 137 – 580 MHz (FM). Transmit, 144 – 148, 430 – 450 MHz.	Receive and transmit, as specified.
Modes: FM, C4FM digital voice, data; AM and WFM (receive only).	As specified.
Power requirements: Receive, 120 mA (mono band receive), 180 mA (dual band receive), 50 mA (standby, battery saver on), GPS on, additional 20 mA, Digital mode, additional 20 mA. Transmit, 1.6 A (5 W, 144 MHz), 1.8 A (5 W, 430 MHz) at 7.4 V dc.†	Battery power, at 8.4 V dc (full charge): Receive: 333 mA (max volume, lights on, mono band receive); 385 mA (max, vol lights on, dual band receive); 293 mA (mono band receive, max vol, lights off); 48 mA (standby, battery saver on). GPS on, additional 22 mA. Digital mode, additional 24 mA. Transmit (Hi/L3/L2/L1): 146 MHz, 1.58/1.11/0.77/0.41 A. 440 MHz, 1.79/1.34/0.86/0.48 A. External power, 13.8 V dc: Receive: 514 mA (max vol, lights on, mono band receive), 543 mA (max vol, dual band receive, lights on). Transmit (Hi/L3/L2/L1): 146 MHz, 0.91/0.68/0.44/0.24 A 440 MHz, 1.13/0.83/0.53/0.41 A. Draws <1 mA with power off.
Receiver	**Receiver Dynamic Testing***
Sensitivity: AM (10 dB SN): 3 µV (0.5 – 30 MHz), 1.5 µV (108 – 137 MHz). WFM: 1.5 µV (76 – 108 MHz). FM: 0.35 µV (30 – 54 MHz), 1 µV (54 – 76 MHz), 0.2 µV (137 – 140, 150 – 174 and 350 – 400 MHz), 0.16 µV (140 – 150 MHz), 1 µV (174 – 222 MHz), 0.5 µV (300 – 350 MHz), 0.18 µV (400 – 470 MHz), 1.5 µV (470 – 540 MHz and 800 – 999 MHz), 3 µV (540 – 800 MHz).	Receiver A: AM (10 dB S+N/N): 0.39 µV (1 MHz), 0.88 µV (3.8 MHz), 0.94 µV (15 MHz), 0.83 µV (29 MHz), 0.57 µV (50.4 and 120 MHz). WFM (12 dB SINAD): 1.1 µV (100 MHz). FM (12 dB SINAD): 0.19 µV (52 MHz), 0.16 µV (146 MHz), 0.18 µV (162.4MHz), 0.36 µV (222 MHz), 0.14 µV (440 MHz), 0.84 µV (902 MHz). Receiver B: AM (10 dB S+N/N): 0.62 µV (120 MHz). FM (12 dB SINAD): 0.16 µV (146 MHz), 0.19 µV (162.4 MHz), 0.46 µV (223 MHz), 0.13 µV (440 MHz).
FM two-tone, third-order IMD dynamic range: Not specified.	Receiver A: 20 kHz offset: 58 dB (52 MHz), 61 dB (146 MHz), 63 dB (222 MHz), 57 dB (440 MHz), 53 dB (902 MHz). 10 MHz offset: 74 dB (52 MHz), 75 dB (146 MHz), 63 dB (222 MHz), 57 dB (440 MHz); 65 dB (902 MHz). Receiver B: 20 kHz offset: 62 dB (146 MHz), 63 dB (222 MHz), 57 dB (440 MHz). 10 MHz offset: 69 dB (146 MHz), 72 dB (222 MHz), 56 dB (440 MHz).
FM two-tone, second-order IMD dynamic range: Not specified.	Receiver A: 53 dB (52 MHz), 94 dB (146 MHz), 55 dB (222 MHz),83 dB (440 MHz), 66 dB (902 MHz). Receiver B: 93 dB (146 MHz), 54 dB (222 MHz), 84 dB (440 MHz).

WIRES-X

Both the FTM-100DR and the FT2DR support Yaesu's Wide-coverage Internet Repeater Enhancement System, or *WIRES-X*. WIRES-X is a network that uses the Internet to link audio and data from compatible repeaters and simplex nodes. WIRES-X is similar in function to EchoLink, IRLP, and AllStar Link in that it uses the Internet to exchange audio between users in distant locations.

WIRES-X is popular in Japan, but initial-ly there were few active users in the United States. With the advent of System Fusion, however, WIRES-X activity in the US has increased significantly with more than 600 active nodes at the time this review was written. WIRES-X effectively links System Fusion digital

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Manufacturer's Specifications	Measured in ARRL Lab
Adjacent-channel rejection: Not specified.	Receiver A: 20 kHz offset: 59 dB (52 MHz), 62 dB (146 MHz), 63 dB (222 MHz), 58 dB (440 MHz), 53 dB (902 MHz). Receiver B: 20 kHz offset: 65 dB (146 and 222 MHz), 53 dB (440 MHz).
Spurious response: Not specified.	IF rejection: Receiver A: 4 dB (52 MHz), 118 dB (146 MHz), 97 dB; (222 MHz), 129 dB (440 MHz), 101 dB (902 MHz). Receiver B: 106 dB (146 MHz), 94 dB (222 MHz), 113 dB (440 MHz). Image rejection: Receiver A: 85 dB (52 MHz), 87 dB (146 MHz), 50 dB (222 MHz), 47 dB (440 MHz), 0 dB (902 MHz). Receiver B: 65 dB (146 MHz), 42 dB (222 MHz), 51 dB (440 MHz).
Squelch sensitivity: Not specified.	At threshold: Receiver A: 146 MHz, 0.15 µV (min), 0.36 µV (max); 440 MHz, 0.14 µV (min), 0.31 µV (max). Receiver B: 146 MHz, 0.18 µV (min), 0.41 µV (max); 440 MHz, 0.13 µV (min), 0.28 µV (max).
S-meter sensitivity: Not specified.	S-9 indication: Receiver A: 7.58 µV (146 MHz), 2.95 µV (440 MHz). Receiver B: 6.52 µV (146 MHz), 3.27 µV (440 MHz).
Audio output at 10% THD, 700 mW (internal speaker), 300 mW with 8 Ω load (external speaker) at 7.4 V dc.	10% THD with 8 Ω load (ext speaker, 8.2 V dc): Receiver A, 452 mW; Receiver B, 384 mW. THD at 1 V_{RMS} with 8 Ω load: Receiver A, 2.8%; Receiver B. 0.9%.
Transmitter	**Transmitter Dynamic Testing**
Power output: 5.0 W at 7.2 V dc or external dc.	Battery power or external 13.8 V dc, Hi/L3/L2/L1: 146 MHz, 5.1/2.6/1.1/0.17 W 440 MHz, 3.6/1.9/0.6/0.08 W
Spurious signal and harmonic suppression: ≥60 dB (Hi/L3), ≥50 dB (L2/L1).	As specified, meets FCC requirements.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S-9 signal, Receiver A & B, 146 MHz, 310 ms; 440 MHz,130 ms.
Receive-transmit turnaround time (tx delay): Not specified.	Receiver A & B, 146 MHz, 16 ms, 440 MHz, 17 ms.

Size (height, width, depth): 5.2 × 2.6 × 1.2 inches (including protrusions). Antenna length: 6.9 inches. Weight: 10.9 oz (with battery and antenna).

Price: $550.

†SBR-14Li 7.4 V, 2200 mAh Li-ion battery and SAD-14B wall charger supplied. Available options: extra SBR-14Li battery, $90; FNB-101LI 7.4 V, 1100 mAh Li-ion battery, $60; CD-41 drop-in charger cradle, $40; FBA-39 battery case for 3 AA cells, $35; SDD-13 cigarette lighter dc power cable with filter, $25.

*DV not tested; C4FM FDMA signal generator was not available.

users by displaying call signs and locations of available stations as well as offering "chat room" access and more. Of course, WIRES-X continues to support analog users.

We were unable to test the WIRES-X functionality because we did not have a WIRES-X compatible repeater or other node nearby. You can see the latest list at **www.yaesu.com/jp/en/wires-x/index.php**.

FT2DR Handheld Transceiver

Reviewed by Becky Schoenfeld, W1BXY
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The FT2DR is a compact handheld, only a little larger (though a bit heavier) than a deck of cards. It has relatively few pushbuttons because its good-sized screen is actually a touchscreen. The unit seems solidly made, to stand up to use in the field. The box contains the radio itself, an antenna (SMA connector), a 170-page manual, a Yaesu SAD-14B ac adapter, a belt clip, a hand strap, a USB cable, and an SBR-14LI Li-ion battery pack.

The Walkaround

The radio is topped off with the antenna, a TX/BUSY light, and a volume knob that has a tuning collar around it.

The left-hand side of the radio has four buttons — from the bottom up, they are the power button (which has a key lock feature), the squelch button (for setting the squelch level), the MONI/T-CALL button (for opening the squelch to monitor), and the push-to-talk switch.

The front of the radio has seven buttons: BACK (which handily takes you one screen back when you're using the touchscreen), DISP (which toggles you back and forth between the frequency display, and the "Backtrack Display," aka the radio's internal GPS function — more on this later), BAND (which allows you to cycle

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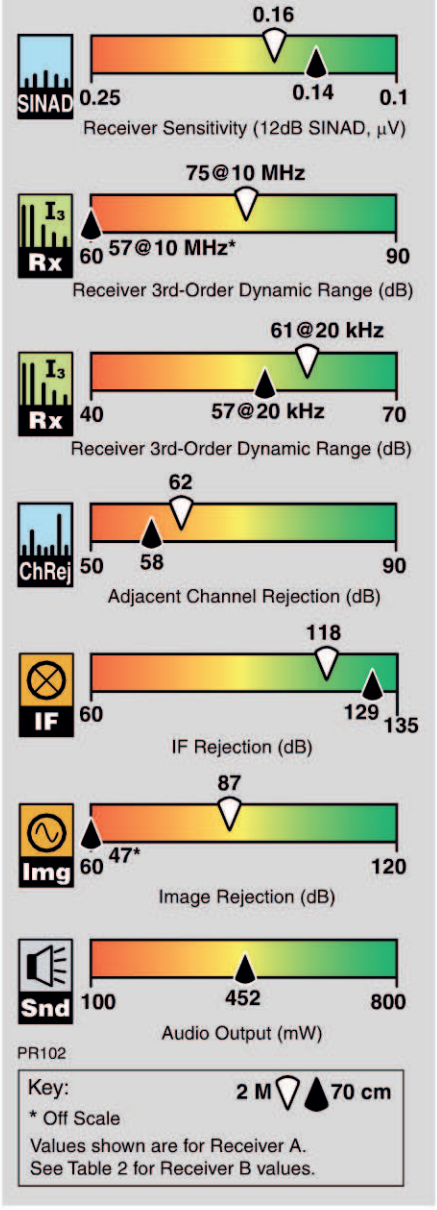
Key Measurements Summary



through the various bands this radio functions on), a stylized "X" key that puts the radio into WIRES-X mode which, as Steve Ford has already described, allows contact with other users, regardless of distance, via the Internet (the manual for WIRES-X operation is available on Yaesu's website), GM (which puts the radio into Group Monitor mode — more on this later as well), A/B (which toggles between operating bands; holding the key down allows for switching between dual band and mono band receive modes), and V/M (which toggles between VFO and memory modes).

The right-hand side of the radio has four ports, all of which are well-sealed against splashes and debris. EXT/DC IN accepts an external power supply in the form of a cigarette lighter plug or an external power cable. You can also charge the radio's battery by connecting a battery charger (PA-48 or SAD-14B) to this port. MIC/SP accepts a speaker or earpiece microphone. The DATA terminal allows for connecting the FT2DR to another FT2DR for cloning, to a computer for firmware updates, to an external GPS, or to an optional MH-85A11U camera-equipped microphone — yes, you can take and transmit photos with this radio. The MICRO SD port accepts microSD and microSDHD memory cards of 2, 4, 8, 16, or 32 GB, and formatting or backing up the memory cards is easily done via a few taps of the touchscreen.

While we're on the subject of the touchscreen, it's a really nice feature and tool. The screen is a good size, as are any tappable buttons on the screen. Activating something via the touchscreen requires a pretty solid press (the touchscreen's sensitivity is not adjustable), so it's unlikely that an accidental flick or swipe is going to change your settings. Getting into the radio's multitude of menus is as easy as holding down the DISP button and tapping the desired menu on the touchscreen. Some choices within the menus are made by turning the volume knob, while others are made via the touchscreen. Either way, making selections is simple, which is a good thing, because this radio offers a lot.

Bands, Modes, Bells, and Whistles

Though the FT2DR is billed as a 2 meter/70 centimeter radio, you can listen on the AM and FM broadcast bands, the shortwave bands, the avionics bands, and more. At the risk of pointing out the obvious, shortwave reception is rather poor using the stock flexible antenna. When I connected the FT2DR to a full-sized antenna using an SMA adapter, reception improved considerably.

Unlike the FTM-100DR, the FT2DR *is* capable of simultaneous dual-band reception. The radio offers four communication modes: V/D (simultaneous voice and data), Voice FR (transmission of voice at "full rate" — the complete 12.5 kHz bandwidth), Data FR (data transmission at "full rate" — again, 12.5 kHz), and Analog FM. The radio can do APRS tracking, and also function as an APRS beacon.

Figure 4 — Receiving a C4FM digital transmission from ARRL Headquarters station W1HQ on VFO A. The FT2DR was originally in analog FM mode, but it instantly switched to digital when it detected W1HQ's digital signal. Notice the DN symbol at the upper right.

The "Backtrack" function, mentioned earlier, allows you to set a starting point and tracks your distance and general orientation from that starting point as you move away from it. This feature could be helpful in orienting yourself while on the move during a public service deployment or even a casual hike. The radio also has its own internal GPS, which enables you to see the general location of the people you're contacting.

Also on the subject of location, the radio's Group Monitor function will automatically locate other transceivers operating within communication range on your frequency. You can set the function to display any stations (up to 24) that are within range, or you can set your own group of "friends" and the radio will display members of the group who are in range — including their call signs or other identifiers that can be programmed in.

The radio's Automatic Repeater Shift function simplifies repeater operation, in that all you need to do is tune to your local C4FM repeater and the radio will set the necessary offset and tone. This function can be turned off, in the event that you want or need to adjust those settings manually.

Like the FTM-100DR, the FT2DR will automatically select analog or C4FM digital communication. I found this to be an ex-

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