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Product Review

Yaesu FT3DR Dual-Band Analog and Digital Handheld Transceiver

Bottom Line

Yaesu's FT3DR handheld seamlessly integrates analog FM and C4FM digital voice and data in one package through Yaesu's System Fusion technology. The color touchscreen and standard Bluetooth features are nice upgrades from the FT2DR.

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Yaesu's FT3DR handheld transceiver transmits on the 2-meter and 70-centimeter amateur bands using the Yaesu System Fusion (C4FM) digital modes as well as standard analog FM. Its A band wideband receiver covers most of 500 kHz to 999.995 MHz in 11 bands. The B band receives 108 to 580 MHz in six bands.

The receiver also comes with preset memory channels — 10 for NOAA Weather Radio broadcasts, 57 for VHF marine radio, and 89 for international shortwave broadcasts. A GPS receiver and Automatic Packet Reporting System (APRS) functionality are built in.

With the supplied battery pack or a 13.8 V dc external supply and E-DC-6 cable, power output ranges from 300 mW to 5 W in four steps. With the optional FBA-39 alkaline battery case, the power output is about 0.9 W on **LOW2** and about 0.3 W on **LOW1**.

The radio is supplied with the SBR-14LI 7.2 V, 2,200 mAh rechargeable lithium-ion battery pack, a SAD-25B battery charger, a flexible antenna, a belt clip, a USB cable, and a battery pack protective cap (if you choose to not attach the battery clip). Also included is an *Operating Manual* for the radio and instructions for the battery. Additional manuals covering specific features are available for free download from the Yaesu website. Yaesu offers optional accessories, including speaker/microphones, battery packs and chargers, and power and data cables.

Features

The FT3DR has a long list of features in common with its predecessor, the FT2DR. The most notable changes are an improved color display and Bluetooth capabilities.

The FT3DR has a full-color, 320 × 240 pixel high-resolution LCD touchscreen (see Figure 1). It is slightly smaller than the monochrome display on the FT2DR, but I found it more readable in all lighting conditions, even outside on a sunny day.

In the dual-band receive mode, the selected frequency is displayed in a larger font than the frequency of the unselected band. The size of the displayed frequencies reverses when the other band is selected, making it easier to see which band is currently in use.

In the digital modes, the FT3DR displays both the TX and RX numbers used in the Group Monitor functions, whereas the FT2DR only displays the TX number. The display also has the usual indicators for volume, signal strength, VFO/memory mode, FM/digital modes, GPS and Bluetooth signal status, and battery level. There is also an indicator to show if a microSD card is inserted.

The FT3DR has built-in Bluetooth functionality. I tested the review unit with both the optional Yaesu SSM-BT10 Bluetooth headset and a BlueParrott B250-XT Bluetooth headset. (Note that Yaesu does not guarantee that any third-party products will be compatible with their transceivers.) Both headsets paired easily with the FT3DR and performed well. Once paired to a Bluetooth headset, the transmitter in the FT3DR is keyed by pressing the headset multifunction button (or whatever it is called on your particular headset). The radio will remain in transmit mode until you press the multifunction button again. This is a slight departure from the traditional push-and-release PTT button found on hand microphones, and it took a little getting used to.

If you turn on the VOX function in the FT3DR, you can operate totally hands-free through the headset. The radio has high and low settings for VOX gain, and an adjustment for the transmit/receive delay time between 0.5 and 3.0 seconds. Yaesu also offers an optional SSM-63A VOX wired headset in addition to the Bluetooth version.

The list of standard features continues with the AMS (Automatic Mode Select) function, which automatically selects analog FM and C4FM digital modes, based on the signal received from the other station. The DG-ID (Digital Group ID) and GM (Group Monitor) features enable you to automatically locate and communicate with other stations within range if they have a matching DG-ID number. Also DP-ID (Digital Personal ID) features are included. (More on these topics later.) Additional features include:

- Simultaneous reception of two separate frequencies on different bands or on the same band.
- Water-resistant design.
- Memory tags of up to 16 alphanumeric characters.
- Band scope that displays up to 79 channels.
- Continuous Tone Coded Squelch System (CTCSS), Digital Coded Squelch (DCS), and Enhanced Paging and Code Squelch (EPCS) functions.
- Support for WIRES-X internet connections and WIRES-X portable digital node functions.
- Compatible with microSD memory cards for transferring settings and memory contents between the radio and optional programming software.
- Recording of transmitted and received audio on the microSD card for playback on the FT3DR or another device.
- Snapshot function with the optional MH-85A11U camera/microphone.

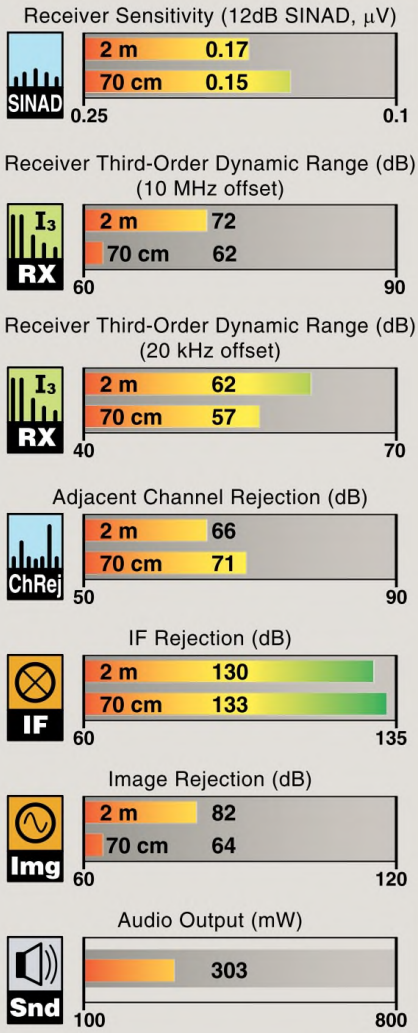
Knobs and Switches

In both the FT3DR and its predecessor, the FT2DR, there are two main knobs on the top of the unit. The **DIAL** knob is used to change the frequency or select a memory channel. The **VOL** knob is used to adjust the audio volume level. These are the default settings, but the knob functions can be swapped by changing a setting in the **CONFIG** menu.

The squelch level can be set by changing a setting in the **SIGNALING** menu, but it's quicker to use the **SQL** button on the left side of the radio. In the FT2DR, pressing the **SQL** button causes the main display to disappear completely, and you are taken directly to the **SIGNALING** menu to adjust the squelch level with

Figure 1 — The FT3DR color touchscreen is easy to read under various conditions.

Yaesu FT3DR Key Measurements Summary



KEY: QS2003-PR143

Values shown are for Receiver B. See Table 1 and expanded test results at **www.arrl.org/qst_in_depth** for additional measurements.

Bars off the graph indicate values over/under scale.

Table 1
Yaesu FT3DR, serial number 9J030005

Additional ARRL Lab measurements are available at **www.arrl.org/qst_in_depth**.

Manufacturer's Specifications	Measured in the ARRL Lab
Frequency coverage: Receiver A, 0.5 – 999.995 MHz (cellular blocked); Receiver B, 108 – 580 MHz. Transmit: 144 – 148 and 430 – 450 MHz.	Receive and transmit, as specified. (824 – 849, 869 – 894, 940 – 965.1, and 985 – 999.995 MHz blocked).
Modes: FM, Data, C4FM; AM and WFM (receive only).	Receiver A, 0.52 – 50.5, 108 – 137, and 300 – 336 MHz are AM only. 76 – 108 MHz is WFM only. 50.5 – 75.995, 174 – 300, 336 – 420, 470 – 824, 849 – 869, 894 – 940, and 965.1 – 985 MHz are FM only.
Power requirements, 7.2 V dc battery power: Receive, 140 mA (mono band receive), 170 mA (dual band receive), 67 mA, standby (battery saver on). GPS on, additional 18 mA. Digital mode, additional 6 mA. Transmit, 1.6 A (5 W, 144 MHz),1.9 A (5 W, 430 MHz). Auto power off, 990 µA.†	Battery power, at 8.3 V (full charge): Receive, 410 mA (mono or dual-band receive, max volume, backlight on), 87 mA standby, battery saver on). GPS on, add 18 mA. Digital mode, add 16 mA. Transmit (Hi/L3/L2/L1): 146 MHz, 1.34/0.94/0.61/0.45 A 440 MHz, 1.79/1.16/0.73/0.53 A Power off: <1 mA.
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 MHz), 0.16 µV (140 – 150 MHz), 0.2 µV (150 – 174 MHz), 1 µV (174 – 222 MHz), 0.5 µV (222 – 350 MHz), 0.2 µV (350 – 400 MHz), 0.18 µV (400 – 470 MHz), 1.5 µV (470 – 580 MHz), 3 µV (580 – 800 MHz), 1.5 µV (800 – 999 MHz).	Receiver A: AM, 10 dB S+N/N, 0.54 µV (1 MHz), 1.49 µV (3.8 MHz), 1.53 µV (15 MHz), 1.26 µV (29 MHz), 0.67 µV (50.4 MHz) 0.71 µV (120 MHz). WFM, 12 dB SINAD, 1.41 µV (100 MHz). FM, 12 dB SINAD, 0.18 µV (52 MHz), 0.17 µV (146 MHz), 0.21 µV (162.4 MHz), 0.24 µV (222 MHz), 0.13 µV (440 MHz), 0.64 µV, (902 MHz). Receiver B: AM 10 dB S+N/N, 0.61 µV (120 MHz). FM, 12 dB SINAD, 0.17 µV (146 MHz), 0.16 µV (162.4 MHz), 0.20 µV (223 MHz), 0.15 µV (440 MHz).
Adjacent-channel rejection: Not specified.	20 kHz offset: Receiver A, 68 dB (146 MHz), 69 dB (440 MHz). Receiver B, 66 dB (146 MHz), 71 dB (440 MHz)
Spurious response: Not specified.	IF rejection, Receiver A: 90 dB (146 MHz), 130 dB (440 MHz). Receiver B: 130 dB (146 MHz), >133 dB (440 MHz). Image rejection, Receiver A: 82 dB (146 MHz), 64 dB (440 MHz). Receiver B: 78 dB (146 MHz), 61 dB (440 MHz).
Squelch sensitivity: Not specified.	At threshold, ≈0.12 – 0.26 µV.
S-meter sensitivity: Not specified.	S-9 indication, Receiver A: 2.26 µV (146 MHz), 2.19 µV (440 MHz). Receiver B: 2.60 µV (146 MHz), 2.06 µV (440 MHz).
Audio output: at 10% THD, 300 mW with 8 Ω load at 7.4 V dc (external speaker).	303 mW, total (either Receiver A or B, or both).
Transmitter	**Transmitter Dynamic Testing**
Power output (Hi/L3/L2/L1): 5.0/2.5/1.0/0.3 W at 13.8 V dc external input.	Battery power, 8.3 V dc (full charge): 146 MHz: 4.8/2.3/0.8/0.32 W 440 MHz: 4.7/2.3/0.79/0.28 W External 13.8 V dc input: 146 MHz: 5.2/2.5/0.96/0.33 W 440 MHz: 5.0/2.7/0.79/0.28 W At minimum battery voltage (5.5 V dc): 146 MHz, 2.8/2.2/0.96/0.45 W 440 MHz, 2.4/2.0/0.86/0.39 W
Spurious signal and harmonic suppression: ≥60 dB (Hi/L3), ≥50 dB (L2/L1).	As specified. Meets FCC requirements.

Size (height, width, depth): 4.7 × 2.7 × 1.1 inches (including protrusions). Antenna length: 7 inches. Weight: 10 ounces (with battery and antenna).

†SBR-14LI 7.2 V, 2,200 mAh Li-ion battery supplied. Replacement SB-14LI, $80. FNB-101LI 7.4 V, 1,100 mAh Li-ion battery, $53. FBA-39 AA-cell holder, $32. CD-41 rapid charger cradle, $38.

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

the **DIAL** knob. In the FT3DR, pressing the **SQL** button leaves the main display present, but the **VOL** slider changes to a **SQL** slider and the squelch level is adjusted with the **VOL** knob. Pressing the **SQL** button again returns the **SQL** slider to a **VOL** slider.

Also on the left side of the unit is an ample PTT button and a **MONI** button. Pressing and holding the **MONI** button opens the squelch to listen for weak signals. The right side of the unit has the microSD memory card slot, a **DATA TERMINAL** jack, a **MIC/SP** jack, and an **EXT DC IN** jack.

Communication Modes

The FT3DR communicates in the same analog and digital modes as the FT2DR. Standard analog FM mode is indicated by the **FM** icon. In the V/D (voice/data) mode, voice and data are transmitted simultaneously. This is the standard Yaesu System Fusion digital mode and is indicated by the **DN** icon. The Voice FR (voice full-rate) mode uses the entire 12.5 kHz bandwidth for high-quality voice communications, and is indicated by the **VW** icon. The DW (data full-rate) mode for high-speed data communication is automatic with image data reception and is indicated by a **DW** icon. It is not a user selectable function.

There is also a receive-only AM mode, which is automatically selected in the 520 kHz to 50.5 MHz range to listen to the AM broadcast band, shortwave broadcasts, and other services. AM reception is also available from 108 to 137 MHz, (including the popular aircraft band) and 300 to 335.9 MHz. Wideband FM reception includes the FM broadcast band.

The quality of the received audio is good on all bands, but especially good in the C4FM modes. I thought there was plenty of audio from the internal speaker, even when operating outdoors on a windy day or in a moving vehicle.

Memory Channels and Scanning

The transceiver includes 900 memory channels for storing operating frequencies and other parameters, 99 skip-search memory channels, 50 sets of programmable memory scan channel pairs (to set lower and upper scanning limits), and 11 home channels (one per band) that can be reprogrammed by the user. The memory channels can be broken down into 24 memory banks with up to 100 memory channels in each bank. Also included are the preset memory channels mentioned earlier for NOAA Weather Radio and other services.

The radio supports a number of scanning modes, including various options for scanning selected VFO frequencies or memory channels. Details on the scanning modes can be found in the *Operating Manual* and *Advanced Manual*, which are available for download from the Yaesu website.

GPS and APRS Functions

The FT3DR is equipped with a standard Global Positioning System (GPS) receiver. The GPS display screen shows a circular display of the satellites captured with their azimuths and elevations, as well as a bar graph showing relative signal strength and satellite number. Also displayed is your latitude and longitude (within a tolerance of several meters), your current altitude and speed, and the date and time.

When an APRS signal is received from another station, the direction, distance, speed, and other information from the other station is shown on the transceiver display. APRS can only be set up on the B band. More information on APRS operation with the FT3DR is available from the *APRS Manual* available for download from Yaesu's website.

Group Monitor Function

To use the Group Monitor (GM) function in Yaesu System Fusion, each radio (and each DR-2X System Fusion repeater) is set for a two-digit Digital Group ID (DG-ID) number. Separate TX and RX numbers can be programmed. This feature allows only group members who have set their radios to the same DG-ID numbers to communicate. This feature can be expanded in a multi-repeater system to allow selective access to individual repeaters in the system. The GM function monitors the frequency for any other stations with the GM function turned on (or operating in the V/D mode) within communication range. If the DG-ID number is set to **00**, then communication with all radios can take place. If the DG-ID number is set to anything but **00**, the GM function will check for partner stations set to the same DG-ID numbers.

There is also a screen for automatic position locating (APL), which indicates the positions of the group members, centered on your location. The position, distance, and direction of travel for up to four stations can be displayed. GM functions can be used to send messages and images to your group members.

Every C4FM digital transmission includes the individual ID information (radio ID) of each transceiver. With the Digital Personal ID (DP-ID) feature enabled, the speaker audio opens only when a C4FM signal is set to the same DP-ID.

WIRES-X Function

WIRES-X (Wide-coverage Internet Repeater Enhancement System) is an internet-based system that allows you to communicate with stations worldwide. Just contact a local WIRES-X node station, and select from the multitude of "rooms" to talk to whoever is present in that room. When connected to a WIRES-X node station, the node name, room name, call sign of the other station, distance, and direction are all displayed on the radio screen.

The FT3DR can also be set up as a WIRES-X portable digital node by connecting your radio to a computer and running the required software. The optional HRI-200 internet interface is not needed, and no fixed or dynamic global IP address is required. There is a large amount of information available from the Yaesu website about these interesting modes.

Final Thoughts

The FT3DR has something for everyone. It is easy enough to program and use for a first-time venture into the world of Yaesu System Fusion digital communication, but it also has enough advanced features to keep an experienced veteran interested for a long time. Of course, it's a very fine analog FM radio as well.

Special thanks to Steve Paradis, KB1RRR; Ron Lavoie, KC1CWN, and Rick Castrogiovanni, N1JGR, for their valuable assistance with the on-the-air testing done in preparation of this review.

Manufacturer: Yaesu USA, 6125 Phyllis Dr., Cypress, CA 90630; **www.yaesu.com**. Price: FT3DR, $390.

MFJ-1234 *RigPi* Station Server

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The MFJ-1234 *RigPi* Station Server is a standalone, mini PC based on the popular Raspberry Pi. It's also a web server, a bidirectional audio server, an audio interface, an electronic keyer, and an amateur station computer. It is advertised as a computer system that controls your station and handles on-the-air activities, and it allows multiple users and radios to interact simultaneously using any internet browser.

You can operate your transceiver remotely over your home network or from anywhere via the internet. You can operate digital modes, such as FT8 and RTTY, using preinstalled software, and then log your contacts and upload them to your Logbook of The World (LoTW) account. You can browse the internet, send and receive emails, or look up call signs online.

MFJ packaged the hardware and software in one box to get the most out of the excellent Raspberry Pi software called *RigPi*. This combination makes it possible for almost any computer-controllable radio to be operated remotely using any web browser on any mobile phone, tablet, laptop, or desktop computer.

With the MFJ-1234, you can control more than 200 radios and 30 rotators supported by the Hamlib library. You can update the software when new radios and rotators are added, and you can customize CAT (computer-aided transceiver) radio control commands for your transceiver.

Bottom Line

The MFJ-1234 *RigPi* Station Server offers a complete remote station solution and also works as a station computer. Although it is easiest to set up with newer transceivers that have CAT and audio features available over a single USB connection, it can be used with older radios with separate connections as well.

The Software Packages

The *RigPi* Station Server was first demonstrated by Howard Nurse, W6HN (the *RigPi* software author), at the MFJ booth at the 2019 Dayton Hamvention. The *RigPi* software is open source and can be modified. When you buy the MFJ-1234, all the needed software is installed and just a few settings are required to be operational.