

Product Review

Yaesu FT-818ND HF, VHF, and UHF Transceiver

Reviewed by Sean Kutzko, KX9X
kx9x@yahoo.com

In the world of QRP (low power) transceivers, the Yaesu FT-817 set the bar exceptionally high, delivering an all-in-one radio for the enthusiastic QRP operator. Introduced in 2000, the FT-817 is an all-mode HF, VHF, and UHF radio in a 5 × 7 inch package that weighs just over 3 pounds, including battery pack and microphone. Exceptionally portable and flexible, many high-power operators bought one to have “just in case,” and discovered a ton of fun in a tiny little package. A few years later, the FT-817ND added 60-meter coverage and a 1,400 mAh rechargeable battery.

The next evolution of this classic radio, the FT-818ND, demonstrates the enduring quality of the original. The FT-818ND provides 6 W of output power with an external 13.8 V dc power source. A TCXO-9 high-stability oscillator is built in (this was an option for the FT-817), and the supplied 9.6 V NiMH rechargeable battery pack increases to 1,900 mAh. Also included are a hand microphone, a battery charger, a battery case for eight AA-size alkaline cells, a flexible antenna for the 50, 144, and 430 MHz bands, and a dc power cable. We ordered the optional YF-122C 500 Hz CW filter for the review radio.

Overview

Small and versatile, the FT-818ND is physically identical to its predecessor. It will transmit on all amateur bands from 1.8 MHz through 440 MHz (excluding 222 MHz), including



60 meters and the Alaska Emergency Channel of 5167.5 kHz. It is a true all-mode radio, supporting AM, FM, SSB, CW, and digital modes. The general coverage receiver will tune 100 kHz – 56 MHz, 76 – 154 MHz, and 420 – 470 MHz.

The initial feeling from some hams might be that this is a compromise radio. While it's not going to have the receiver performance of the multi-thousand-dollar transceivers on the market today, this radio offers very good sensitivity and selectivity for the money and offers any radio amateur an incredible amount of options.

If you enjoy taking a handheld radio with you on business trips or vacation, the FT-818ND offers infinitely more capability for not much more

size and weight. If you want to connect with locals on the 2-meter or 70-centimeter repeater, it will do that. If you want to go hilltopping during the next VHF/UHF contest, you can. If you want to take part in the next big 6-meter opening, run FT8 from your hotel room, hand out a rare grid square or two on the FM and SSB satellites, or simply monitor the short-wave bands, local FM radio, or aircraft near the airport, the FT-818ND has you covered.

Few radios on the market today offer so much to try in a single, exceptionally portable package. The FT-818ND has all the capabilities that you would expect in a modern HF transceiver: dual VFOs, split operation, RIT, RF attenuator, internal CW keyer, two data ports (one for an external antenna tuner, the other for controlling an interface for your favorite data mode, such as RTTY, PSK, or FT8), 200 memory channels, and two antenna inputs (an SO-239 UHF connector on the rear of the unit, and a BNC on the front).

Bottom Line

Taking over for the popular FT-817, Yaesu's FT-818ND offers portable operators a wide range of bands and modes to choose from.



Figure 1 — The author set up the FT-818ND transceiver, along with a Palm portable paddle and inverted-V antenna, to operate in the 2018 Skeeter Hunt QRP Contest from Stratton Brook State Park in Simsbury, Connecticut.

Menus

As with many modern transceivers, the FT-818ND's features and adjustments are handled by menus. The primary menu is accessed by holding down the **F** button above the main tuning knob for about a second, which allows you to make 57 different adjustments, ranging from the internal CW keyer's speed to the tuning rate for the main VFO and the baud rate for CAT control. As with other small radios that are menu driven, it can be a bit tough at first to navigate your way around, especially if you have very large hands, as I do. The LCD screen is very easy to read, and it didn't take me long to get used to the mechanics of navigating the menu system. The lower left has a multi-purpose **SEL** knob that tunes at a faster rate than the main tuning knob, as well as navigates through the selections of the main menu.

There are also three function keys on the front panel of the radio, labeled **A**, **B**, and **C**. These are accessed by pressing the **F** button momentarily. While the main menu controls settings that you may not adjust very often, the function keys allow access to several options you will use more frequently, such as A/B VFO selection, engaging split operation, repeater operation (complete with automatic offset), and other common features. You can also select the

parameters that the digital meter on the front panel will monitor: SWR, power output, or ALC level. It's an effective presentation of the common options most operators will encounter.

Out of the Box — Easy FM Operation

Getting on the air is relatively painless. Straight out of the box, I attached the flexible rubber antenna (included) to the BNC connector on the front of the radio, turned on the power, selected the 2-meter band and the FM mode with the buttons on the top of the case, and tuned to the output frequency of the local repeater using the **SEL** knob and the main tuning dial.

I then pressed the orange **F** key on the front of the radio to enter the main menu, navigated to setting 7, and selected **FRONT** for my antenna input. I then went to option 42 and confirmed the 600 kHz repeater offset, and then entered the correct CTCSS access tone for my repeater in option 48. I held the **F** button in for a second to exit the menu display.

Next, I pressed the **F** key momentarily to enter the function key display. Spinning the **SEL** knob again, an option for **RPT**, or repeater mode, appeared under the **A** button. I pressed **A** until the “—” sign was

displayed, telling me the proper offset had been chosen. I then momentarily pressed **F** again, pressed the **C** button, and then chose **TON**, and a small **T** appeared on the front LCD screen, telling me that the proper tone had been turned on. I hit the repeater with my first transmission. I was on the air in 15 minutes.

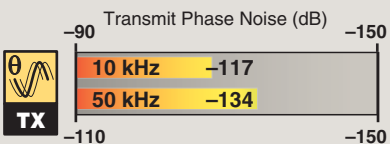
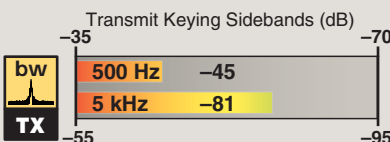
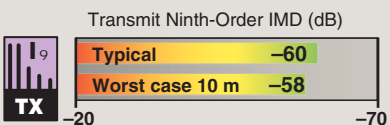
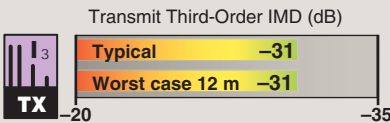
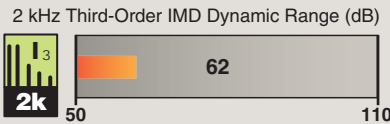
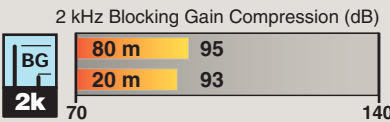
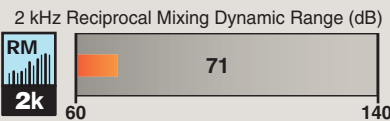
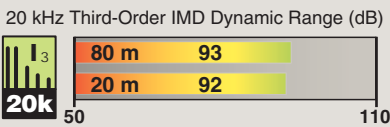
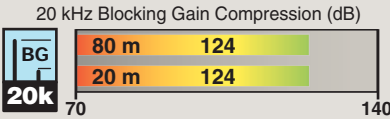
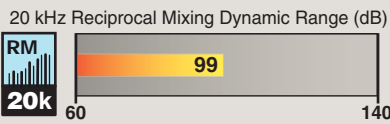
HF Operation

To test its capability as a portable QRP radio in August 2018, I took the FT-818ND with a fully charged 1,900 mAh internal battery to a local state park. I'd also brought a multi-band dipole and a lightweight CW paddle, with plans to participate in the New Jersey QRP Club's Skeeter Hunt QRP contest (see Figure 1). My dipole was about 20 feet in the air at the apex, in an inverted-V configuration. My entire station weighed about 6 pounds. Voltage from the battery was stable; starting at 9.5 V, my beginning transmit power was about 2.5 W. Operating contest-style with lots of CQing, the internal battery lasted for my entire 4-hour operation. I made 18 contacts with other portable QRP stations in those 4 hours under terrible band conditions, including contacts with stations in Texas, Florida, and Kansas. Contest operators who are used to working two or three stations a minute may not find that rate exciting, but of course it's not a fair comparison.

Even with the bands in terrible shape, I found the FT-818ND's functions, such as the RIT and RF gain, to be excellent aids in pulling out some rather weak signals, which is the norm in field QRP operating. With a 12 V battery, maximum power out goes up to 5 W; 6 W is attainable with a 13.8 V supply. Again, it doesn't have the same receiver performance as the top-of-the-line home radios, but that's not the FT-818ND's target market.

An issue for the portable QRP operator is the FT-818ND's relatively high

Yaesu FT-818ND – HF
Key Measurements Summary



KEY: QS1901-PR133
Measurements with receiver preamp off.
Bars off the graph indicate values over scale.

Table 1
Yaesu FT-818ND, serial number 8G910887

Manufacturer's Specifications

Frequency coverage: Receive, 0.1 – 30, 50 – 54, 76 – 154, 420 – 470 MHz.
Transmit: 160 – 6 meters, 2 meters, 70 centimeters (amateur bands only).

Power requirements: With SBR-32MH battery pack (9.6 V dc): Receive, 450 mA (250 mA squelched). Transmit, 2.4 A (HF – 2 meters) and 2.7 A (430 MHz). Operable voltage range, 8 – 16 V dc.

Modes of operation: SSB, CW, AM, FM, data.

Measured in the ARRL Lab

Receive: 0.1 – 56, 76 – 108 (WFM), 108 – 154, 420 – 470 MHz.
Transmit: as specified, with five 60 m channels. 70 cm is 430 – 450 MHz.

At 9.6 V dc: Receive, 380 mA (SSB, backlights on, max. volume, no signal); 520 mA (FM, backlights on, max. volume); 343 mA (FM, squelched, no signal). Transmit (High/Low3/Low2/Low1): 2.2/2.0/1.6/0.12 A.

As specified.

Receiver

CW sensitivity, 0.25 μ V (1.8 – 30 MHz), 0.2 μ V (50 – 54 MHz), 0.125 μ V (144 and 430 MHz).

Noise figure: Not specified.

AM sensitivity, for 10 dB S+N/N, 0.25 μ V (1.8 – 30 MHz), 1.0 μ V (50 – 54 MHz), 0.5 μ V (144 and 430 MHz).

FM sensitivity, for 12 dB SINAD, 0.5 μ V (28 – 30 MHz), 0.32 μ V (50 – 54 MHz), 0.20 μ V (144 and 430 MHz).

Blocking gain compression dynamic range: Not specified.

Reciprocal mixing dynamic range: Not specified.

ARRL Lab two-tone IMD testing

Second-order intercept point: Not specified.

FM adjacent channel rejection: Not specified.

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

Receiver Dynamic Testing

Noise floor (MDS), 500 Hz filter:

| Preamp | Off | On |
|-----------|------------------|----------|
| 0.137 MHz | -100 dBm | -92 dBm |
| 0.475 MHz | -116 dBm | -121 dBm |
| 3.5 MHz | -127 dBm | -135 dBm |
| 14 MHz | -130 dBm | -138 dBm |
| 50 MHz | -137 dBm | -144 dBm |
| 144 MHz | n/a [†] | -144 dBm |
| 432 MHz | n/a [†] | -143 dBm |

Preamp off/on: 14 MHz, 17/9 dB; 50 MHz; 10/3 dB. Preamp on: 144 MHz, 3 dB; 432 MHz, 4 dB.

10 dB (S+N)/N, 1 kHz tone, 30% modulation, 6 kHz BW:

| Preamp | Off | On |
|-----------|------------------|--------------|
| 3.88 MHz | 2.69 μ V | 1.10 μ V |
| 29.0 MHz | 1.90 μ V | 0.84 μ V |
| 50.4 MHz | 1.08 μ V | 0.50 μ V |
| 144.4 MHz | n/a [†] | 0.56 μ V |

For 12 dB SINAD, 3 kHz deviation, 15 kHz BW:

| Preamp | Off | On |
|---------|------------------|--------------|
| 29 MHz | 0.56 μ V | 0.22 μ V |
| 52 MHz | 0.28 μ V | 0.15 μ V |
| 146 MHz | n/a [†] | 0.18 μ V |
| 440 MHz | n/a [†] | 0.16 μ V |

Blocking gain compression dynamic range, 500 Hz BW:

| | 20 kHz offset | 5/2 kHz offset |
|---------|---------------|----------------|
| | Preamp off/on | Preamp off |
| 3.5 MHz | 124/126 dB | 99/95 dB |
| 14 MHz | 124/122 dB | 93/93 dB |
| 50 MHz | 125/122 dB | 100/99 dB |
| | Preamp on | Preamp on |
| 144 MHz | 120 dB | 90/89 dB |
| 432 MHz | 120 dB | 90/89 dB |

14 MHz, 20/5/2 kHz offset: 99/82/71 dB.

See Table 2.

Preamp off/on: 14 MHz, +89/+89 dBm; 21 MHz, +85/+83 dBm; 50 MHz, +59/+27 dBm. Preamp on: 144 MHz, +77 dBm; 432 MHz, +59 dBm.

Preamp on, FM, 20 kHz offset: 29 MHz, 71 dB; 52 MHz, 65 dB; 144 MHz, 72 dB; 440 MHz, 67 dB.
FM narrow, 10 kHz offset: 29 MHz, 55 dB, 52 MHz, 55 dB, 144 MHz, 56 dB, 440 MHz, 56 dB.

Preamp on, 20 kHz offset: 29 MHz, 71 dB;* 52 MHz, 65 dB;* 144 MHz, 72 dB;* 432 MHz, 67 dB.*

Preamp on, 10 MHz offset: 29 MHz, 104 dB; 52 MHz, 81 dB; 144 MHz, 96 dB; 440 MHz, 85 dB.

Manufacturer's Specifications

S-meter sensitivity: Not specified.

Squelch sensitivity: Preamp on, 2.5 μV (1.8 – 30 MHz), 1.0 μV (50 – 54 MHz), 0.5 μV (144 and 430 MHz).

Receiver audio output: 1 W into 8 Ω at 10% THD.

Receive processing delay time: Not specified.
IF/audio response: Not specified.

Spurious and image rejection: Image rejection, ≥ 70 dB (1.8 – 50 MHz), ≥ 60 dB (144 and 430 MHz).

Transmitter

Power output: 6 W (SSB/CW/FM); 2 W (AM carrier).

RF output at minimum specified operating voltage: Not specified.

Spurious-signal and harmonic: suppression 1.8 – 29.7 MHz, -50 dB; 50/144/430 MHz, -60 dB.

Third-order intermodulation distortion (IMD) products: Not specified.

CW keyer speed range: Not specified.

CW keying characteristics: Not specified.

Transmit-receive turnaround time (PTT release to 50% audio output): Not specified.

Receive-transmit turnaround time (TX delay): Not specified.

Transmit phase noise: Not specified.

Size (height, width, depth, incl. protrusions): 1.5 \times 5.6 \times 7.5 inches. Weight, 2.1 lbs.

Second-order intercept points were determined using S-5 reference.

[†]The preamp is always enabled on the 144 and 430 MHz bands.

*Measurement was noise limited at the value indicated.

Measured in the ARRL Lab

S-9 signal, preamp off/on, 14 MHz, 188/50.1 μV ; 50 MHz, 149/37.1 μV .
Preamp on: 144 MHz, 28.8 μV ; 432 MHz, 35.4 μV .

At threshold, preamp on: FM, 29 MHz, 0.16 μV ; 50 MHz, 0.1 μV ; 144 MHz, 0.1 μV ; 432 MHz, 0.08 μV .
HF, 1.58 μV .

As specified. THD at 1 V_{RMS} , 4%.

7 ms.

Range at -6 dB points:
CW (500 Hz BW): 390 – 970 Hz;
Equivalent rectangular BW: 584 Hz;
USB (2.4 kHz BW): 117 – 3062 Hz;
LSB (2.4 kHz BW): 117 – 3060 Hz;
AM (6 kHz BW): 185 – 3640 Hz.

First IF rejection, preamp off:
14 MHz, 103 dB; 50 MHz, 84 dB.
Preamp on: 144 MHz, 106 dB;
432 MHz, 125 dB. Image rejection:
14 MHz, 79 dB; 50 MHz, 68 dB.
Preamp on: 144 MHz, 120 dB;
432 MHz, 38 dB.

Transmitter Dynamic Testing

At 13.8 V dc, High/Low3/Low2/Low1:
CW, SSB, FM — HF, 5.8/4.8/2.4/
0.9 W; 50 MHz, 5.2/4.3/2.1/0.8 W;
144 MHz, 5.4/4.6/2.2/1.0 W;
432 MHz, 5.0/4.1/2.2/1.0 W.
AM — HF, 1.8/1.5/0.9/0.5 W;
50 MHz, 1.6/1.3/0.8/0.5 W; 144 and
432 MHz, 1.6/1.2/0.7/0.5 W.

At 8 V dc (High/Low3/Low2/Low1):
14 MHz, 5.4/4.5/2.3/0.9 W;
50 MHz, 3.0/3.0/2.0/0.8 W;
144 MHz, 3.1/3.1/2.3/1.0 W;
432 MHz, 3.7/3.7/2.3/1.0 W.

HF, 43 dB (worst case 5.3 MHz),
59 dB typical; 50 MHz, 63 dB;
144 MHz, 70 dB, 440 MHz, >70 dB.
Meets FCC requirements.

3rd/5th/7th/9th order, 6 W PEP:
 $-31/-43/-53/-60$ dB (HF, typical);
 $-31/-43/-50/-58$ dB (worst case, 80 m),
 $-31/-44/-48/-54$ dB (50 MHz);
 $-30/-40/-46/-55$ dB (144 MHz);
 $-30/-42/-52/-56$ dB (432 MHz).

8 to 50 WPM, iambic mode B.

See Figures 2 and 3.

S-9 signal, AGC fast, 37 ms.

SSB, 25 ms; FM, 15 ms (typical).

See Figure 4.

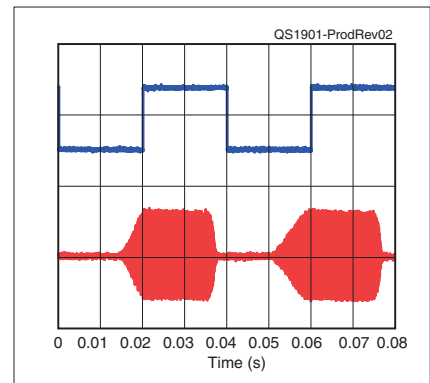


Figure 2 — CW keying waveform for the Yaesu FT-818ND, showing the first two dits in full-break-in (QSK) mode using external keying. Equivalent keying speed is 60 WPM. The upper trace is the actual key closure; the lower trace is the RF envelope. (Note that the first key closure starts at the left edge of the figure.) Horizontal divisions are 10 ms. The transceiver was being operated at 6 W output on the 14 MHz band.

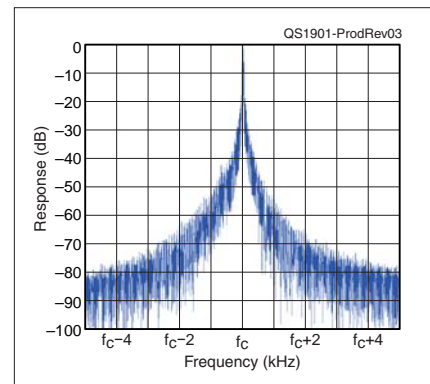


Figure 3 — Spectral display of the Yaesu FT-818ND transmitter during keying sideband testing. Equivalent keying speed is 60 WPM using external keying. Spectrum analyzer resolution bandwidth is 10 Hz, and the sweep time is 30 seconds. The transmitter was being operated at 6 W PEP output on the 14 MHz band, and this plot shows the transmitter output ± 5 kHz from the carrier. The reference level is 0 dBc, and the vertical scale is in dB.

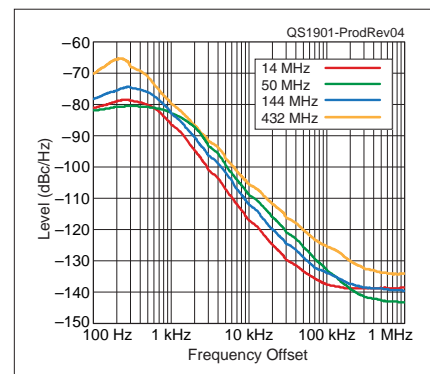


Figure 4 — Spectral display of the Yaesu FT-818ND transmitter output during phase-noise testing. Power output is 6 W on the 14 MHz band (red trace), 50 MHz band (green trace), 144 MHz (blue trace), and 432 MHz (yellow trace) bands. The carrier, off the left edge of the plot, is not shown. This plot shows composite transmitted noise 100 Hz to 1 MHz from the carrier. The reference level is -60 dBc/Hz, and the vertical scale is 10 dB per division.

Table 2
Yaesu FT-818ND, serial number 8G910887

| ARRL Lab Two-Tone IMD Testing (500 Hz filter) | | | | |
|---|---------|---------------------|----------------------|--------|
| Band/Preamp | Spacing | Measured IMD Level | Measured Input Level | IMD DR |
| 3.5 MHz/off | 20 kHz | -127 dBm -97 dBm | -34 dBm -25 dBm | 93 dB |
| 14 MHz/off | 20 kHz | -130 dBm -97 dBm | -38 dBm -27 dBm | 92 dB |
| 14 MHz/on | 20 kHz | -138 dBm -97 dBm | -47 dBm -35 dBm | 91 dB |
| 14 MHz/off | 5 kHz | -130 dBm -97 dBm | -62 dBm -48 dBm | 68 dB |
| 14 MHz/off | 2 kHz | -130 dBm -97 dBm | -68 dBm -54 dBm | 62 dB |
| 50 MHz/off | 20 kHz | -137 dBm -97 dBm | -43 dBm -31 dBm | 94 dB |
| 144 MHz/on | 20 kHz | -144 dBm -97 dBm | -54 dBm -41 dBm | 90 dB |
| 432 MHz/on | 20 kHz | -143 dBm -97 dBm | -47 dBm -34 dBm | 96 dB |

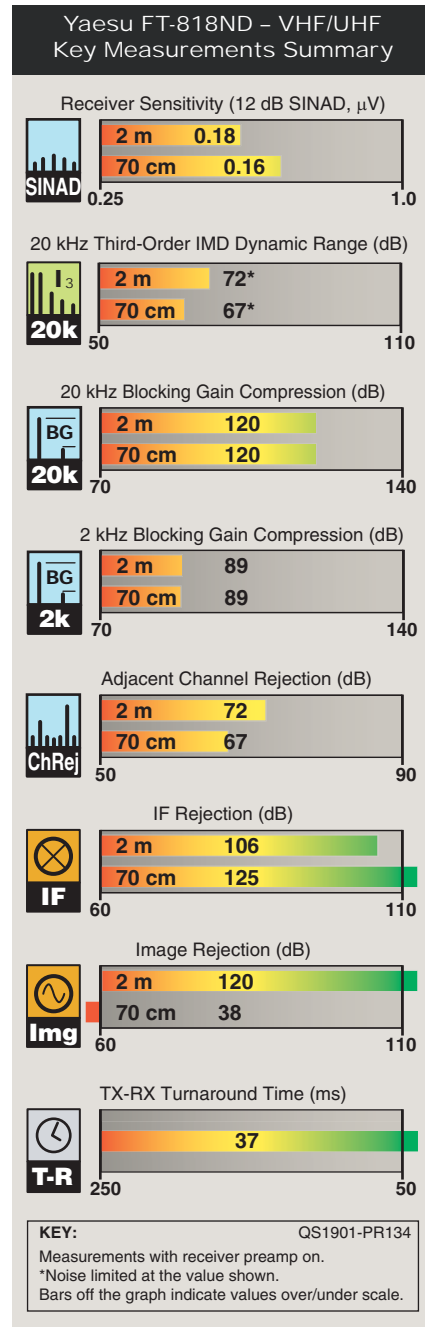
current consumption. With about 400 mA current draw on receive, and 2.2 A used on transmit at full RF power output, the FT-818ND is not one of the more efficient field QRP radios in terms of power consumption. What it lacks in current efficiency, the FT-818ND makes up for in diversity.

Working the Satellites

Satellite operation with the FT-818ND is incredibly straightforward. With split VFOs and CTCSS access tones, it's easy to get on the satellite bandwagon. Multiple FM satellites are active now, with more on the way. There are even digital satellites and the International Space Station (ISS) to play with; all of these can be accessed using a single FT-818ND. Having a second radio to hear yourself through the satellite's downlink in real time as you transmit — known as full-duplex operation — is preferable when working satellites, but a single FT-818ND is capable of making contacts in half-duplex mode.

I was able to make several FM satellite contacts with my FT-818ND and an Arrow dual-band Yagi for 2 meters and 70 centimeters through the veteran SO-50 satellite, as well as on two of the newest FM satellites, AO-91 and AO-92, which are part of AMSAT's Fox project. Wanting to see how much could be done with only the items that come in the box, I attempted to make two-way contacts through the FM satellites using the radio and the enclosed extended flexible VHF/HF antenna. While I was able to hear the downlink signal of some of the satellites, I was unable to make a contact using the stock antenna — that did not come as a surprise. I was also able to hear packets via the ISS digipeater using the stock flexible antenna. I was able to make contacts when I switched to my Arrow Yagi pointed toward the satellite.

Satellite operation isn't limited to FM, either. By utilizing the FT-818ND's split-operation capability and setting one VFO to 2 meters and the other to 70 centimeters, I was able to make



several contacts via the FO-29 SSB/CW satellite. It takes some practice to pull off manually adjusting for Doppler shift on the receive VFO without being able to hear your own transmitted signal, but it's certainly possible.

Lab Notes: Yaesu FT-818ND

Bob Allison, WB1GCM, Assistant Laboratory Manager

The FT-818ND is based on the very successful FT-817, a physically identical, 5 W HF, VHF, and UHF transceiver that we reviewed in the April 2001 issue of *QST*. It's intended for portable use, with portable antennas, without the need for a high receiver dynamic range. At close spacing of 2 kHz, the two-tone, third-order IMD dynamic range is 62 dB, which is considered low for contesting, but quite adequate for portable operation. Receiver sensitivity is a bit better than we measured for the FT-817, a desirable improvement for operation with portable antennas away from manmade noise sources. Users should be satisfied with the receiver, provided they are not attached to a lofty, high-gain antenna during popular HF operating events.

Operators using SSB and CW on the 70-centimeter band in a spectrally dense environment, such as a mountaintop with multiple radio services, may hear images from those services, because the image rejection for the review radio measured only 38 dB on that band. Audio quality is acceptable, though the total harmonic distortion (THD) at a normal listening level is a bit high at 4%.

The S-meter calibration of the review FT-818ND was not too useful. With a -89 dBm signal, the S-meter read S-1. Increasing the input signal just 5 dB to -84 dBm, the reading jumped to S-8. The S-meter then became very stingy, refusing to budge up to S-9 until the signal at the antenna jack rose another 20 dB to -64 dBm. A calibration of S-9 with an input of -73 dBm and a change of 6 dB per S-unit are considered standard.

The transmitter has a reasonable keying waveform, with a resulting reasonable CW sideband bandwidth. Compared to current designs, transmit phase noise is on the high side out to 3 kHz away from the carrier. The ARRL Lab does not recommend using this transceiver with an RF amplifier. With a maximum power of 6 W and use of a portable antenna, the transmitted signal phase noise should be reasonable except perhaps for stations nearby.

When I incorporated one of my FT-817s with the FT-818ND, I had a full-duplex satellite station that fits in a small camera bag. Contacts via several SSB satellites were accomplished easily using the Arrow Yagi once again.

Digital Modes

For digital modes, portable operators can easily connect the FT-818ND to a portable decoder, a small laptop, a tablet, or even a smartphone with any number of interfaces that add minimal extra weight to the portable station. I added PSK using an interface found on eBay for \$30 and an app for my iPad for \$3. Apps are available for Android as well.

You can set the FT-818ND's default digital mode in menu #26: RTTY, PSK31 (USB or LSB), and two user-defined digital settings, which will accommodate FT8, or any other digital mode. Once the default mode is set, simply choose **DIG** as your operating mode using the toggle buttons on top of the chassis, and you're ready to go. Toggle your pre-selected digital mode by simply returning to menu option 26.

Yaesu offers an optional SCU-17 USB interface unit for computer control of the transceiver and for digital mode operation. They also offer the CT-39A cable that connects to the six-pin mini-DIN **DATA** jack to interface with external digital communications devices.

The World Above 50 MHz

Amateurs wishing to explore the VHF/UHF bands have plenty of options with the FT-818ND, with the three most popular bands above 10 meters already under the hood. With both ARRL and CQ offering QRP Portable or Hilltopper categories in their VHF+ contests, an FT-818ND and portable Yagi antennas make for a very capable, lightweight station. A 6-meter dipole, coupled with an Arrow 2-meter/70-centimeter antenna atop a 13-foot painter's pole, will transport easily up to a high-altitude operating spot. From there, you can participate in VHF/UHF contests or hand out contacts for several operating awards programs that allow VHF contacts, such as ARRL's VHF/UHF Century Club (VUCC) or Summits on the Air (SOTA).

A World of Possibilities

With so much territory to cover within Amateur Radio, having maximum flexibility in a single radio is a real advantage. The FT-818ND is a welcome addition to any station. It offers all modes and 13 bands, all in a bulletproof case and with reasonable weight, at an appealing price. Use it as a VHF/utility radio, the nucleus of a lightweight go-kit, or the perfect traveling companion for the radio amateur with interests across the spectrum. The recipe has been slightly tweaked based on the ingredients available today, but the basic appeal of the Yaesu FT-818ND is that little modification was needed to make it better.

Manufacturer: Yaesu USA, 6125 Phyllis Dr., Cypress, CA 90630; www.yaesu.com. Price: FT-818ND, \$800; YF-122C 500 Hz CW filter, \$170.