

# The Yaesu FT-1000MP Transceiver

BY DOUG DeMAW\*, W1FB

A reviewer of amateur equipment faces a challenge when attempting to describe the performance and countless features of a complex transceiver such as the Yaesu FT-1000MP. In-depth descriptions of the significant highlights would require many CQ pages and this is not practical. I will focus mainly on the features and performance characteristics that make the FT-1000MP a truly unique piece of equipment. I prefer to avoid calling these features "bells and whistles." Rather, let us consider them as practical tools for the operation of the transceiver. Certainly, the FT-1000MP deserves more dignity than comes with the use of catch phrases. A mundane repeat of the narrative in the operating manual will not be used here. Emphasis will be on performance characteristics.

My impression of this transceiver is that it is designed particularly for the dedicated contest and DXer. It should appeal also to the casual type of operator. I would classify this transceiver as "user friendly" compared to some other modern transceivers I have operated. It required roughly four hours of my time to feel comfortable with the many features of the FT-1000MP, even though I may never need to use some of them.

## The FT-1000MP Receiver

The transceiver has what is called a SUB VFO or SUB RECEIVER, which in effect provides two receivers in one box. Concentric AF gain controls permit stereo reception of two receive frequencies at the same time. This is especially useful for working splits, because the operator can listen to the DX station's frequency and his or her own operating frequency to monitor pileups and choose the best moment to call the DX station. Each receive system has its own S-meter and digital frequency display. Different modes and IF bandwidths can be used during simultaneous reception.

The receiver system covers from 100 kHz to 30 MHz. The main receiver has IFs at 70.455 MHz, 8.215 MHz, and 455 kHz. The SUB RECEIVER has IFs at 47.21 MHz and 455 kHz. Whenever I test a multiple-conversion receiver, I want to know how well the manufacturer has suppressed the spurious responses (birdies). A careful check was made of the amateur bands from 160 through 10 meters with the antenna disconnected. I was able to find but nine birdies (1882, 1892, 3586, 3686, 3886, 7127, 7177, 28,170, and 28,835 kHz). Each of them was barely discernible. They did not register on the S-meter. These spurs are not audible with the antenna connected. This is a remarkable piece of design work.

The receiver dynamic range is specified as



The Yaesu FT-1000MP transceiver.

108 dB at 50 kHz signal separation, with the preamplifier (IPO) turned off and the 500 Hz IF filter engaged. Measurement with my test set-up yielded a similar DR number (106 dB). Certainly, this receiver is designed to withstand the onslaught of very strong signals from nearby and afar, within and outside the amateur bands.

The receiver is extremely sensitive on all bands. I was able to discern a 0.1 microvolt signal from my URM-25 generator on all amateur frequencies with the receiver preamp turned on and the attenuator turned off. The FT-1000MP attenuator has steps at 0, 6, 12, and 18 dB. I normally operate with 12 dB of attenuation when the preamp is turned on. Otherwise, the band noise will often hold the S-meter at S5 to S8, depending upon the amateur band I have chosen and the prevailing QRN level.

Notable among the appealing features of the FT-1000MP receiver is the crisp, clean audio output. Although the audio output power is rated at a modest 1.5 watts into a 4 ohm load, there is no noticeable "square waving" (distortion) at high audio levels when using the built-in or accessory SP-8 speaker. I could find no evidence of cross-over distortion (fuzziness) at very low CW signal levels.

The receiver is equipped for the AM, SSB, CW, and FM modes. A squelch circuit is included. It functions in all modes. I measured the squelch sensitivity at approximately 1.8 microvolts for AM, CW, and SSB. For FM, reception is roughly 0.32 microvolt. The main and sub-receivers have independent squelch controls.

Receiver antenna selection is done from the front panel. The operator has the choice of an-

tenna A or B by virtue of a panel switch and separate jacks on the rear of the unit. A third option (RX antenna) can be chosen at the front panel. It is activated during RECEIVE, but the main station antenna (A or B) kicks in during TRANSMIT. This is an excellent feature for those who use Beverage or loop antennas for low-noise reception when chasing DX. Also, the A-B option is beneficial when changing quickly between two selected amateur bands during contests.

AGC selections are OFF, FAST, SLOW, or AUTO. In the latter mode the receiver self-adjusts for the normal AGC characteristic, depending on the selected mode (fast for CW, slow for SSB, etc.). I keep this control set at AUTO.

The available receiver IF bandwidths are 250 Hz, 500 Hz, 2.0 kHz, 2.4 kHz, and 6 kHz. The FT-1000MP arrived with filters for 500 Hz, 2.4 kHz, and 6 kHz. Optional filters for other bandwidths may be purchased and installed by the owner. The 500 Hz CW filter is a Collins-Rockwell mechanical type. Filters may be installed for 8.215 MHz and 455 kHz, thereby providing improved skirt selectivity and wide-band noise reduction by virtue of the second or "tail end" filter. I installed the optional pair of 2.0 kHz IF filters to narrow the SSB bandwidth on receive. As is true of all narrow SSB filters, the fidelity is reduced (lows are restricted) somewhat, but not nearly as much as when a 1.8 kHz filter is used. Reception at the 2.0 kHz bandwidth is acceptable with regard to audio-output quality when QRM is present. However, I prefer to use the 2.4 kHz bandwidth for routine operation.

Yaesu has included a wide-range RX/TX

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incremental tuning (CLARIFIER) circuit. In both modes the RIT can be offset by  $\pm 10$  kHz by means of a slow tuning control knob. The offset progression is displayed on a bar-graph type of readout, which shows where zero offset occurs. For many DXing applications the user may prefer to utilize the RIT rather than the separate SUB VFO for transmitting or receiving during split operation.

### More Receiver Features

I should mention that the FT-1000MP has an excellent notch filter. It can be adjusted to null any heterodyne that is within  $\pm 1.2$  kHz of the center of the IF passband. When the EDSP filter is activated, it can be used as a multiple notch filter to seek out and null any number of interfering heterodynes. As new beat notes appear, it finds them and notches them out. I detected minimal degradation of the receiver audio quality while using the EDSP notch feature. The automatic notch circuit works only in the SSB mode.

The transceiver has two noise-blanker choices. One of them is for short-duration pulses. The other is for attenuating long-duration pulses. A noise-blanker threshold control is located on the front panel. It may be adjusted for both NB1 and NB2 operation. The FT-1000MP noise blanker creates the same problems as most other blankers do when the blanking level is increased significantly. Signals become distorted and off-frequency strong signals are heard on the receive frequency, owing to degradation of the receiver dynamic range. I have found the blanker to be very effective in attenuating certain types of line



The Yaesu MD-100A8X desk microphone.

noise in my area. The slower the repetition rate of the noise pulses the more effective the blanker becomes.

The EDSP filter has four noise-reduction positions that are especially helpful for taking the raw edges off noise pulses. I prefer the first position to reduce the annoying effects of loud atmospheric hiss noise that arrives via the

antenna. The greater the EDSP noise reduction level, the more pronounced the reduction of the receiver audio fidelity (not distortion).

IF SHIFT and IF WIDTH are standard features in the transceiver. The width control functions in all modes but FM. This control does not shape both slopes of the IF response at the same time (other receiver width controls do). Rather, the user has the option of pulling in the upper or lower skirt by rotating the WIDTH control left or right to reduce QRM from the upper or lower side of the receive frequency.

The SHIFT control is used to reposition the receiver IF passband with respect to the displayed frequency in all modes other than FM. The passband frequency may be increased or lowered in accordance with the knob setting. The SHIFT control can be used in combination with the WIDTH control to further reduce QRM from signals that are close to the receive frequency. Both of these controls operate in an effective manner with minimal impairment of the audio quality.

### Built-In DSP Circuit

Enhanced Digital Signal Processing (EDSP) is an important state-of-the-art feature of the FT-1000MP. It can be used in both the transmit and receive modes. It operates at audio frequencies. The filter characteristics can be programmed to suit the operator's needs, or the user can use the default settings that exist at the time of purchase.

Four microphone audio responses can be selected by using the menu procedure. This feature enables the operator to tailor the transmit audio for his voice characteristics and/or the response of the microphone. The choices on transmit and receive are bandpass, low pass, high pass, and "mid cut." The latter option allows emphasis on the high and low ends of the audio range.

During receive, all filter responses other than bandpass are preset. The user can program the bandpass characteristics for the low- and high-cutoff limits he prefers. The SSB high-

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side cutoff range is 1000 to 4500 Hz. The SSB low-side range is 100 to 1800 Hz. The CW bandwidth (bandpass mode) can be set for 60, 120, or 240 Hz. The default setting is 240 Hz. The bandwidths are similarly adjustable for the AM and digital operating modes. The filter responses, once programmed by the operator for the various modes, come up automatically when changing the operating modes.

Having used an outboard receive-only DSP filter with a different transceiver for some months prior to acquiring the FT-1000MP, I greatly appreciate the convenience of having EDSP as an integral part of the transceiver. The ability to use the filter on transmit is an additional convenience. The EDSP filter operates smoothly and effectively in all of its modes.

## Transmitter Features And Performance

Operating modes for the FT-1000MP transmitter are AM, CW, FM, FSK, and SSB. The user can operate in the RTTY and packet

modes by virtue of the FSK provision. The FSK shift frequencies are 170, 425, and 850 Hz. Maximum FM deviation is  $\pm 2.5$  kHz. Packet shift frequencies are 200 and 1000 Hz.

Power output is adjustable up to 100 watts. On AM, the power output is limited to 25 watts. Although manual power control can be done from the front panel, the user may invoke the menu system to set the output power for a selected maximum level.

The FT-1000MP has excellent spectral purity of the output signal. All harmonics are at least 50 dB below peak power at 100 watts. I live in a rural area where the nearest TV station is 30 miles distant. My reception is by way of a rotatable Yagi. I have experienced zero TVI, even though Channel 13 is 90 miles away. SSB carrier suppression is better than 40 dB below peak power. A check of the unwanted sideband suppression yielded a number of -52 dB.

Although I am unable to observe the slightest suggestion of frequency drift with the transmitter or receiver sections of this transceiver,

two optional master reference oscillator TCXOs are available to those who demand the utmost in high stability for special applications, such as long-term HF packet monitoring under wide variations of temperature. The TCXO-4 provides  $\pm 2.0$  ppm stability from 0 to +50 degrees C, whereas the TCXO-6 is rated at  $\pm 0.5$  ppm over the same temperature spread.

## Speech Processor

Incorrect operation of the FT-1000MP speech processor will result in the same dreadful signal quality that comes from other HF transceivers when the operators fail to use the correct setup or when they insist on using excessive compression. However, I have been able to obtain reports of good signal quality when I followed the set-up instructions in the Yaesu manual. I try to use no more than 5 dB of compression for any application. I generally hold the compression to 3 dB—just enough to give the signal a touch of "presence." Correct processor operation requires setting three controls for the prescribed mic gain, the ALC level, and compression magnitude. Adjustments are made while observing the appropriate bar-graph displays. These selectable readout scales make proper adjustment foolproof. (When all else fails, read the manual!) The built-in transmitter monitor can be used with earphones to check the quality of your SSB signal when adjusting the processor or the microphone frequency response.

## Built-In Keyer

CW operators will be impressed with the FT-1000MP keyer. It may be used in the break-in delay (VOX) or full-QSK modes at the flip of a switch. In the QSK mode it is necessary to use the transceiver "barefoot" if the linear amplifier is not designed or modified for full break in. The keyer can be programmed to operate in the IAMBIC 1, IAMBIC 2, or BUG formats. The dot-dash weighting can also be programmed to suit the user's taste. The default dot-dash ratio is 3:1. Keyer delay may also be changed by using the menu system. The switching time of the CW carrier waveform can be programmed from 0 to 30 milliseconds.

A four-digit number can be programmed for contest work. There are front-panel provisions for matching the CW sidetone to the pitch of the other station's CW note after you have it tuned in.

## Built-In Tuner

The FT-1000MP includes an antenna matching circuit that operates over a range of 20 to 150 ohms (3:1 SWR points). This is not only beneficial when operating directly into an antenna, but when using a linear amplifier; the tuner compensates for the mismatch that may be presented by the amplifier input circuit. After you use the tuner once on your favorite band or frequency, the system recalls the previous settings from the memory during reception whenever you tune to the same part of the band again. There are 39 tuner memory channels.

## Memory Structure

There are memories galore in the FT-1000MP. You have 99 regular memories to work with, plus nine special programmed limit memories and five "quick memory bank" (QMB) memo-

## Amplifiers, ATV Down Converters & Hard to Find Parts

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#### HF Amplifiers

PC board and complete parts list for HF amplifiers described in the Motorola Application Notes and Engineering

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AN 762	(140W)	35W - Model 335A, \$79.95/\$109.95 75W - Model 875A, \$119.95/\$159.95
EB63	(140W)	
AR305	(300W)	440-450 MHz Amplifiers (SSB-FM-ATV)
AN 758	(300W)	
AR313	(300W)	100W - Model KEB 67, \$159.95
EB27A	(300W)	
EB104	(600W)	
AR347	(1000W)	



### ATV Down Converters (Kit or Wired and Tested)

Model ATV-3 (420-450) (Ga AS - FET)	\$49.95/\$69.95
Model ATV-4 (902-926) (GaAS - FET)	\$59.95/\$79.95

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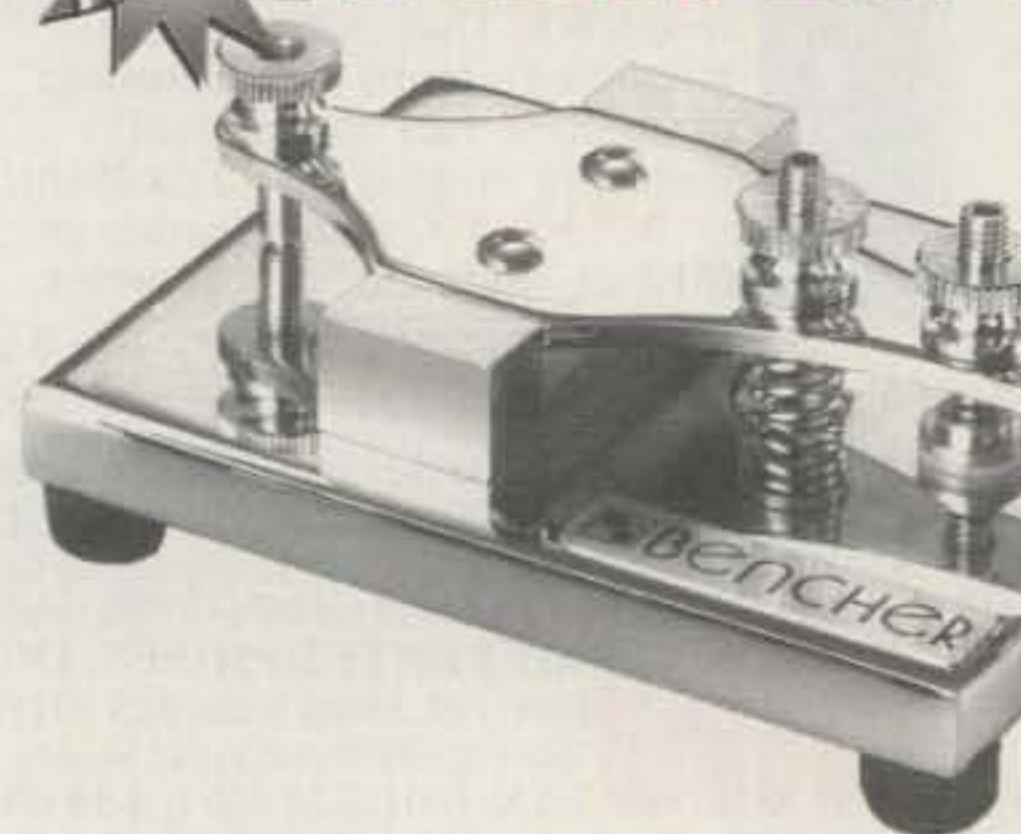
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### Data Sheets From our Website

To receive data quickly on paging with the KPC-9612, version level on the KPC-3 or KAM Plus, or product data sheets, browse our INTERNET webpage: [www.kantronics.com](http://www.kantronics.com). E-mail forms are available at the site too. New to the web? Then reach our page with your browser by clicking on FILE, clicking on OPEN LOCATION, typing in [www.kantronics.com](http://www.kantronics.com), and hitting return. If your browser program supports file downloads, you can retrieve numerous application articles too. Or, just check in to see "what's new."

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ries. The 99 memories can be arranged in five individual groups if you wish to program the system in that manner. The lithium memory-back-up battery has an expected life span of five years. Each stored frequency retains the parameters you select for that frequency, such as the filter bandwidth and the AM, USB, LSB, or CW mode.

The memory system has countless other operating features that are described in the manual. Each stored frequency, when recalled, allows the operator to tune above or below the memory frequency (as when using the VFO) without the stored frequency being disrupted. The memory system allows you to copy from VFO A or VFO B. All 99 memory channels may be scanned, and you can program for the scanning rate you prefer. Memory status, along with all other significant transceiver functions, is displayed brightly in the 1 1/4" x 10 1/2" readout window on the front panel of the FT-1000MP.

The memory system allows operating conveniences for keyer control during contests. For example, the keyer offers six CW message memories. You can store a four-digit contest QSO number that automatically increments/decrements after each call. You can include your callsign (up to 20 characters) and four user messages (each holds up to 50 characters). There is a CQ memory that stores up to 20 characters, such as "CQ CQ CQ de W1FB K." There are other keyer memory functions that are especially useful for contesting.

### Menu System

Menu selection and performance settings are accomplished easily by consulting the menu data pages in the instruction manual. You can program 79 transceiver settings with the FT-1000MP menu system. This is done by pressing the FAST and ENTER buttons at the same time, then rotating the MEM/VFO channel knob and observing the memory display letters and numbers as they appear in the readout window. The knob is turned until the desired function, per the menu listings, appears in the display window. Some of the settings operate as on/off switches for changing the functions. Others are adjusted by the operator to obtain specific operating characteristics. I find this system easy to comprehend and use.

### Computer Control

The Computer Aided Transceiver (CAT) provision allows you to control the frequency, VFO, memory, and other settings by means of a personal computer. The transceiver contains a built-in level converter that allows a direct connection from the CAT jack to the serial port of your computer. The instruction manual contains many pages of detailed information about how to use your computer to control the FT-1000MP.

### Physical Description

I could shorten this report by saying the Yaesu FT-1000MP is a fairly large and attractive black box. Actually, it measures (HWD) 5"H x 16"W x 13 1/2"D (135 x 410 x 347 mm). The weight is 33 pounds (15 kg). The cabinet is black, and the control labels are light gray or off-white color. The display window has readouts that are green, orange, red, and yellow. The front legs of the transceiver are adjustable to per-

mit level or tilted access to the front panel.

I was happy to note that front-panel headphone access has 3.5 mm and standard 1/4 inch jacks in parallel to accommodate both types of phone plugs. Also, there are key jacks on the front and rear panels of the unit. I prefer large transceivers for home-station use (even though the FT-1000MP can be used for mobile operation), owing to my large hands and aging eyes. The FT-1000MP doesn't "walk about" on the desk when it is bumped or when the switches are pushed.

### Accessories

You may want to purchase the matching MD-100A8X 600 ohm desk mic (\$139) to use with your FT-1000MP. It is color-coordinated and styled to match the transceiver. This mic has switches under the base that permit insertion of a filter which has high boost and low-cut provisions. A spring-loaded up-down scanning ring is located atop the mic for changing the operating frequency and switching between the memories. Although I have an exceptionally bassy voice, all of the amateurs who know me have reported excellent quality from the MD-100 and FT-1000MP.

The user may also purchase the matching SP-8 loudspeaker (\$179). It measures 5 1/4"H x 8"W x 12"D. Switches are located on the front of the SP-8 to allow engaging the built-in passive audio filter. This filter can be adjusted for specific bandpass responses. Included is a switch that allows the speaker to be shared by two receivers. Audio quality from the SP-8 is excellent with or without the filter switched in. Yaesu can also provide a set of YH-77STA lightweight stereo headphones (\$55).

Contesters should be interested in the optional DVS-2 digital voice recorder accessory (\$329). It may be used as a continuous receiver recorder for instant pushbutton playback. The DVS-2 can be used also as a microphone audio recorder for multiple on-the-air playback ("CQ contest," etc.). All data are stored electronically. There are no moving parts.

Also available are the TCXO-4 (\$119) and TCXO-6 (\$249) master reference oscillators.

### Subjective Closing Remarks

Although I try to remain entirely objective when preparing a product review, I must break stride and say that despite having reviewed more than 100 pieces of amateur gear over the years, I am unable to report finding even a picky fault with the FT-1000MP. I've always maintained that nothing in this world is perfect, and that there has to be something negative about each piece of amateur equipment. I definitely struck out this time, at least with respect to my personal expectations for a transceiver.

If there is a shortcoming, it may be that Yaesu does not offer blind amateurs a "talker" that can be interfaced with its equipment. The FT-1000MP is no exception. W8QLR, KE8BW, and some other blind ham friends would like to buy FT-1000MPs, but cannot justify the purchase without having a "digital talker" to aid in setup and operation. Perhaps some day Yaesu will make that important accessory available. I give the FT-1000MP an A-1 rating.

The manufacturer is Yaesu USA, 17210 Edwards Rd., Cerritos, CA 90703 (310-404-2700). Price class is \$3300 without built-in power supply (\$3600 with power supply). ■