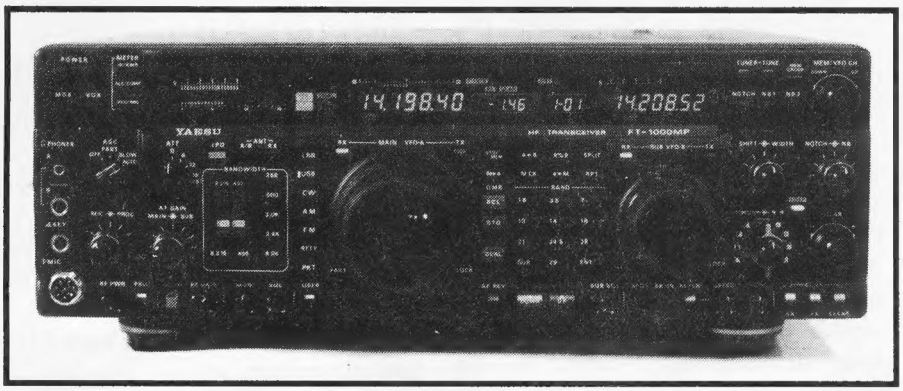
■ Equipment Review

The Yaesu FT-1000MP All Mode HF Transceiver

*Reviewed by Ron Fisher VK3OM**



FT-1000MP

It's not often that a new updated model transceiver is introduced to the market at a price significantly lower than the unit it replaces. Actually, the original FT-1000 will continue in production but it is very unlikely that the Australian distributors Dick Smith Electronics will continue to stock it.

At $4495, the new FT-1000MP is the best value in amateur equipment we have seen for many years. I appreciate that this price will put it beyond the reach of most amateurs but, for the facilities that it offers, it is without doubt the price leader in top shelf transceivers. For the impecunious, just wait a few years and even the new FT-1000MP will become second hand.

The FT-1000MP competes directly with the IC-775DSP and, to a lesser extent, with the Kenwood TS-870. I say this because I believe that Kenwood might soon release a new top line transceiver to replace the aging TS-950SDX, perhaps the TS-960? If this happens, this new model would probably be more competitive against the FT-1000MP than the existing TS-870.

The new FT-1000MP is, of course, a brand new model that is very different in concept and facilities from the old FT-1000. The "MP", Yaesu state, is in memory of their founder, Sako Hasegawa JA1MP. You even get a copy of his QSL card included with your new FT-1000MP.

FT-1000MP Features and Facilities

The FT-1000MP incorporates everything you would expect in a top line transceiver. Let's run through the facilities offered. Firstly, it is fully self-contained with an inbuilt AC power supply. However, it is possible to operate it from a 12 volt DC power source if required. Although not available in Australia at the moment, the FT-1000MP can be purchased overseas less the inbuilt AC supply at a somewhat lower price. I feel that Dick Smith's policy of initially selling the AC version only is the correct way to go.

Naturally, the FT-1000MP sports two receivers that can be used at the same time. Unlike the earlier FT-1000, which could have an optional receiver bandpass filter unit to allow the second receiver to operate with any split compared to the main receiver, the FT-1000MP's second receiver can only operate within the front-end range of the first receiver, usually about one MHz wide. Each receiver can operate with independent mode selection which allows the possibility of diversity reception.

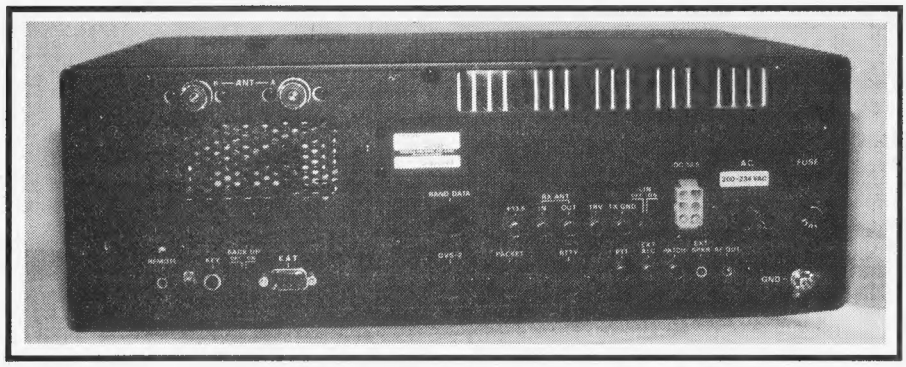
The receivers have independent audio gain controls and each has its own S meter. The received audio can be fed independently to each half of a pair of stereo headphones but there is only one speaker output which gives a mix of both sides. The FT-1000MP will operate on all normally used modes which include USB/LSB, CW, AM, FM, RTTY and Packet and can be remote controlled from your computer.

Of course, the transceiver has digital signal processing (DSP) included. Yaesu call their system "Enhanced Digital Signal Processing" (EDSP). As with other current transceiver designs, the DSP operates at the very low IF frequency of 11 kHz but, as distinct from some others, Yaesu do provide good conventional filters at the higher IFs, including a Collins Mechanical filter at 455 kHz. The history and basic operation of mechanical filters was discussed in last month's review of the Yaesu FT-900.

DSP is available on both receive and transmit. In the receive mode it is used for noise and heterodyne reduction and also for bandpass shaping. In the transmit mode the transmitted response is adjustable over very wide parameters as we will see later.

The FT-1000MP is slightly smaller and much lighter than the FT-1000. The reduction in weight from 25.5 kg down to 15 kg is explained by Yaesu reducing the RF power output of the new transceiver down to a nominal 100 watts as compared to 200 watts for the FT-1000. Also, the power supply is now a switched-mode system as against the transformer type of the FT-1000. Perhaps 100 watts output is more appropriate to today's needs than 200 watts. I would guess that many prospective owners of the FT-1000MP will have a linear amplifier and the 100 watt output is an ideal level for most linears.

It was said, when the original FT-1000 came out, that 200 watts output would eliminate the need for an amplifier. Well,



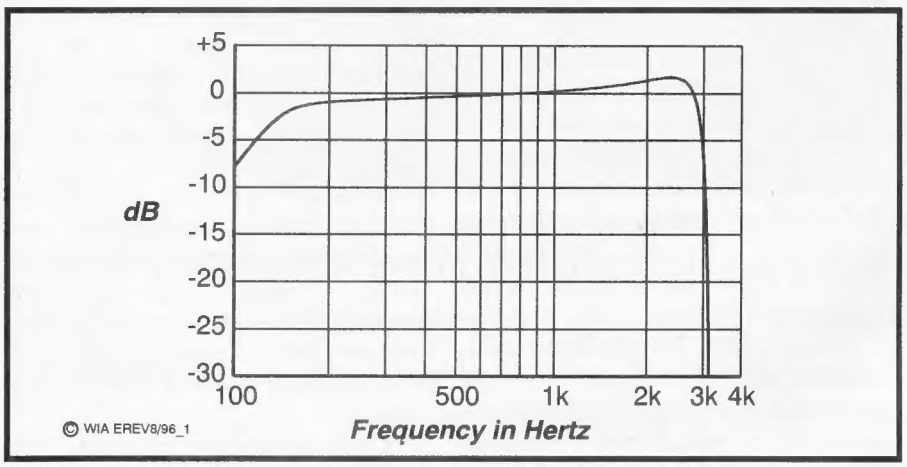
Uncluttered rear panel of the FT-1000MP. Note the two antenna connectors and the CAT input socket.

maybe yes, but try telling the big DXers that one.

The tuning system on the FT-1000MP is one of the most flexible yet encountered on an HF transceiver. Let's look at the variety of methods of getting around the bands that are available to the operator. The two tuning controls are both very smooth to use. The main control knob has a finger hole which will be appreciated by many operators. The tuning rate for each control is selectable over a very wide range. Steps as small as 0.625 Hz and as large as 20 Hz can be selected via the Menu (more about this later). Next is the new "Shuttle Jog Tuning" knob. This is mounted at the rear of the main tuning knob and is spring loaded at the centre point. As the knob is turned to either left or right the tuning starts to scan up or down with the scan speed increasing the further the knob is held over. It's an easy way to zip up and down the band.

Of course, there are all the usual ways to select a particular frequency. To name a few, you have direct access to any amateur band via the "Band" buttons to the right of the main tuning control; you have the "Up/Down" buttons to step up and down the general coverage bands in selectable segments plus, of course, the superb memory facilities; and there is the "VFO CH" control in the top right hand corner for stepping through the bands in small selectable steps. This control is also used to select memory channels when the transceiver is in the memory mode.

The display on the FT-1000MP is, without doubt, the most comprehensive ever seen on an amateur transceiver. Let's look at what it will tell you. As mentioned earlier, there is a separate S meter for each receiver. The main receiver S meter is also used to display several transmitter functions which include power output, ALC, SWR, speech compression, microphone input level, final amplifier collector current and DC voltage. The frequency and mode of each receiver is shown with the frequency displayed to 10 Hz resolution. The RIT and XIT also have 10 Hz resolution and you can offset to +/- 9.99 kHz.



Graph 1 – FT-1000MP transmit response, power output 20 W at 1 kHz, no compression, measured at 14.2 MHz.

FT-1000MP On The Air

The first thing that strikes you at switch-on is the display. Our review transceiver had the display illumination selected to high and it really looked like a cross between Luna Park and Las Vegas. Unfortunately, the whole display could be seen clearly, even the parts you didn't want to see. Rather confusing to say the least. With the illumination switched to low, (you only have two choices) things were much better, although I later noted that the brightness took a minute or so to come up to full intensity after initial switch-on.

Listening to the receiver before connecting the antenna I was astounded at the low internal noise level. At normal listening level the background noise was almost inaudible. There is a choice of two antenna inputs plus the option of a separate receiver antenna. This could be very useful for 160 metre operators who prefer, perhaps, a loop antenna for low noise and directional reception.

I soon found that the FT-1000MP is a complicated transceiver to drive and a full study of the instruction manual is very necessary if you want to make full use of the facilities available. The crux of this is mastering the menu system. There are eighty different functions that can be set to suit your own requirements. I've already mentioned one, the display illumination. Probably the main functions you will be looking for are the tuning step settings and the DSP parameters. You will need to keep your instruction book handy when starting out on this.

There is a lift-out sheet which gives all the menu settings on it with room to add your own notes. The trouble is that the display tells you what is happening, but in its own particular hieroglyphics. Without the manual you might find it difficult to work out where you are. You might find it difficult even with the manual in front of you! Most of the 80 menu items are either set-and-forget, or simply left on the default setting; but you will have fun going through them.

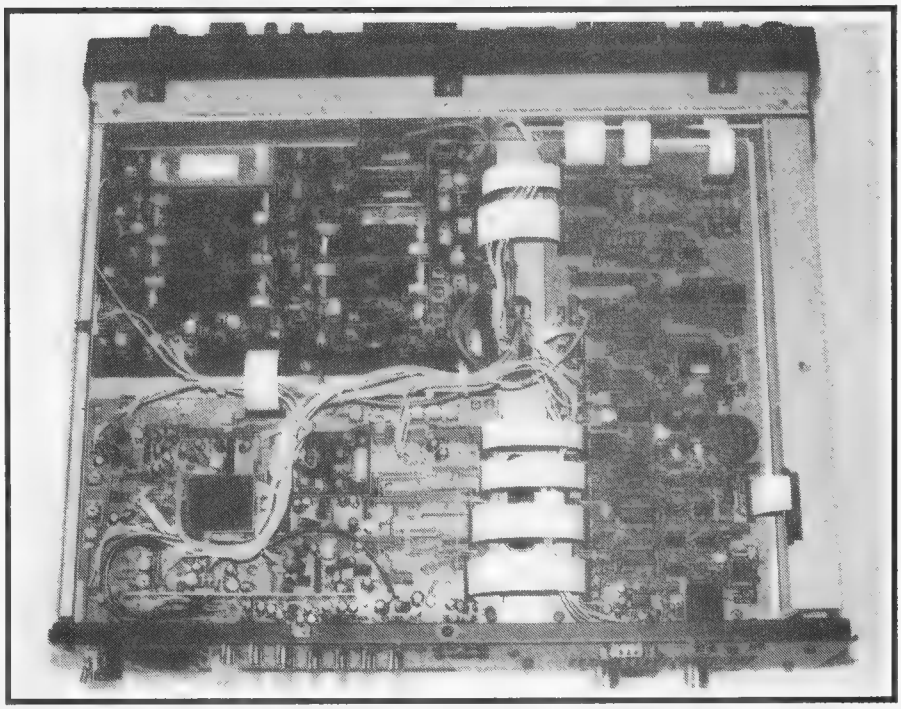
The first thing I changed was the

tuning speed and I set this to the slowest setting of 0.625 Hz per step. This gives an actual tuning rate of just over 300 Hz per knob revolution. Now this is perhaps too slow for normal tuning around, but a push of the "Fast" button speeds this up to about 3 kHz per revolution, an ideal combination for me. The tuning controls are very smooth but I would prefer a bit less tension in the centring spring of the Shuttle Jog tuning control.

The choice of selectivity options on the FT-1000MP is amazing. The shift/width controls do an excellent job. They are somewhat different in action from the SSB slope tuning on Kenwood transceivers but the overall effect is much the same. Normal setting is with both control pointers vertical. The width control increases selectivity at either the high or the low end of the selectivity curve depending on which way you turn the knob. The shift control will then place the resultant band-width selected just where you want it in the overall bandpass. Very handy to reduce QRM on either the high or low side of the signal.

The DSP contour control can also select various selectivity options. Through the menu system the operator can select the high and low cut-off frequencies. These work very well, but they are not readily changed. If you decide a different cut-off frequency is needed, you have to go back into the menu and then make your change. By the time you have done this it might be too late.

The FT-1000MP comes complete with a high quality 500 Hz CW filter which can be backed up with an optional "Collins" mechanical filter. The EDSP filtering can be also programmed to give excellent CW selectivity. To back all this up there is an excellent tunable notch filter which can reduce a heterodyne by up to 30 dB. The tunable notch can be used in any mode of reception. If this won't remove interference then it's over to the EDSP. Here there are three options. Firstly, for SSB reception the automatic notch filter will take out multiple heterodynes like magic. Unfortunately, you cannot use this for CW or digital modes as it would probably remove the signal you want in addition to the one you don't want.



Bottom view of the FT-1000MP with the case removed. The Collins 455 kHz SSB filter is in the top left hand corner of the chassis.

There are four positions of noise reduction. I have to admit that for SSB reception I could not find a situation where there was any improvement in readability using any of them. However, I am "cursed" with a very quiet location which makes evaluation of noise reduction systems difficult. I found the normal FT-1000MP noise blanker to be very effective. It has a selectable wide and narrow setting and is adjustable for level but, like many noise blankers, adjustment of the level control is critical to avoid cross modulation and other undesirable effects on the received signal. The two buttons that control the blanker and button for the notch filter have small green LED indicators built-in to indicate when they are selected. There are no cross modulation problems with the DSP noise reduction in use.

The AGC is controlled by a four position switch selecting either AGC off, fast, slow and auto. The auto position selects the appropriate delay times to suit the mode selected. A very handy feature if you like mode hopping.

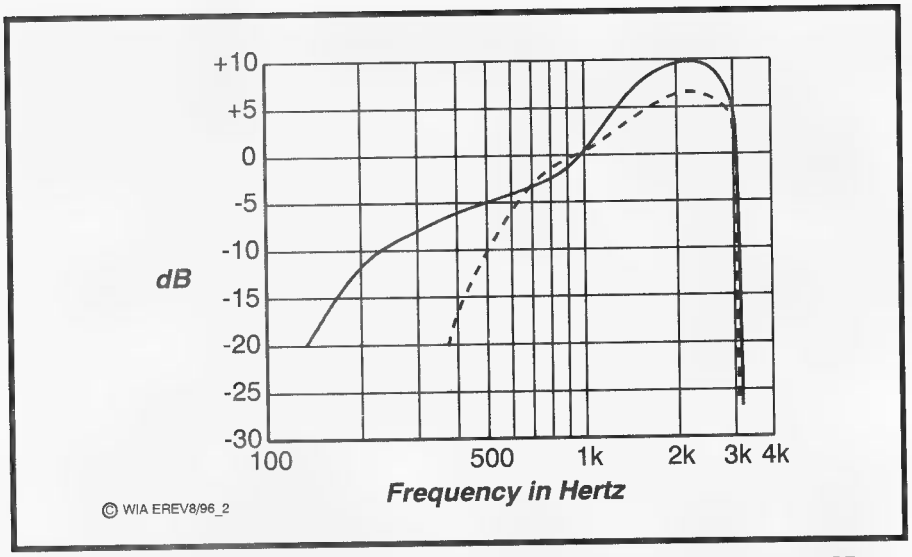
FT-1000MP On Test

There were a few things I wanted to test on the FT-1000MP, in particular the audio frequency response on SSB transmit with the EDSP selected. The results were quite amazing as we shall later see. However, first off the transmit power output on each band was checked with the following results. Current drain was not measured as a separate item this time as I felt it unlikely that many owners would use the transceiver from a separate supply.

Band	Power output
1.8 MHz	110 watts
3.6 MHz	105 watts
7.1 MHz	105 watts
10.1 MHz	102 watts
14.2 MHz	100 watts
18.1 MHz	100 watts
1.1 MHz	100 watts
24.5 MHz	100 watts
28.5 MHz	97 watts
29.5 MHz	97 watts.

Power output was measured in the CW mode. PEP output when using SSB was about 5% higher when measured on an oscilloscope. FM power output on 29.5 MHz was essentially the same as the CW output. AM power output should be limited to 25 watts to allow 100% modulation. With the power control at minimum the average power output on all modes was about one watt which should please the QRP operators.

Next on the list was a test to estimate transmitter intermodulation distortion.



Graph 2 – FT-1000MP transmit response, power output 10 W at 1 kHz, EDSP selected, measured at 14.2 MHz. Continuous line is EDSP 1; the broken line is EDSP 2.

One thing to take into account with the FT-1000MP is that the transmitter final stage runs with twelve volts rather than the higher voltage of some other top-line transceivers. The FT-1000, for instance, runs its final amplifier at 30 volts which will produce somewhat lower intermod distortion than the average 12 volt powered transceiver. My test showed intermod distortion on 14.2 MHz of -22 dB relative to just over 100 watts output. This is about average for a 12 volt powered transceiver but well below the figure obtained for the TS-870S a few months ago.

Finally, power output was checked through the automatic antenna tuner. With a simulated 3:1 SWR the loss on 14 MHz measured about seven watts.

The most interesting parts of the transmitter tests were the overall audio response with and without the EDSP. The response without the EDSP requires little comment except to note its smooth wide characteristic. The instruction book gives very little indication on what to expect when you select one of the four EDSP settings via the menu. They state that you can compensate for any voice or microphone. There must be some funny microphones and voices out there. A quick look at the curves will tell the story. On-air tests showed that most preferred the EDSP switched out but a few thought that position one of the EDSP could add a bit of bite to the audio under poor conditions. Take your pick. Incidentally, I later noted that Yaesu publish response curves for the transmit EDSP in their advertising brochure for the FT-1000MP but not in the instruction book. I wonder why?

My on-air tests were carried out using the supplied MH-31B8 hand microphone. This is the same type as supplied with the FT-900 except that this one is fitted with a standard eight pin metal connector in place of the plastic telephone type. Again I found that listeners usually preferred that the tone switch on the back of the microphone be set to position two. I was unable to test any other microphones with the FT-1000MP but I would have liked to try out the matching, elegant looking desk microphone type MD-100A8X.

Finally I checked the carrier and sideband suppression. Carrier suppression is rated as better than -40 dB. I estimate that our review transceiver was in excess of -50 dB. Sideband suppression measurement was limited by the intermodulation distortion but it appeared to meet the specified -50 dB without too much trouble.

Receiver Tests

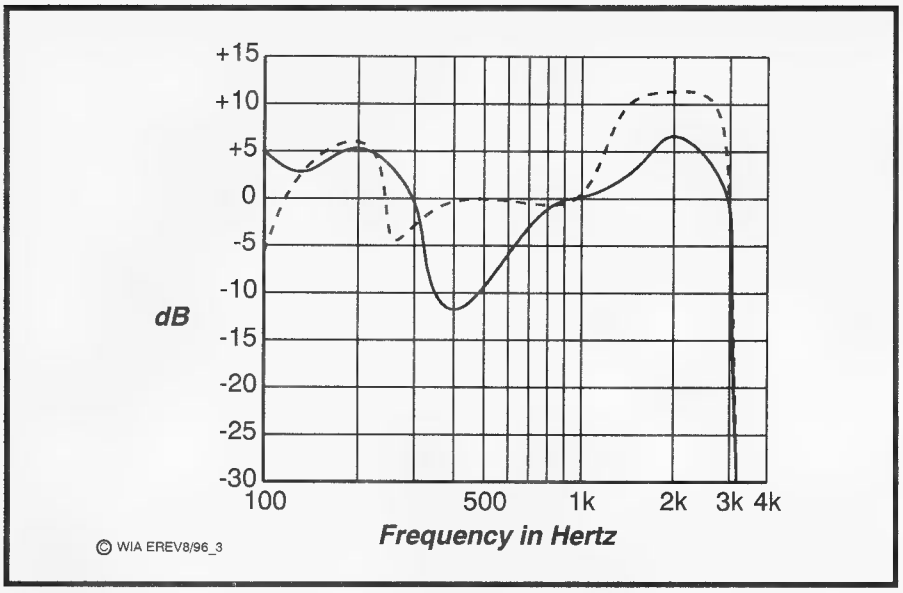
As usual the first receiver test was to check the S meter calibration. It seems that the days of moving coil meters in amateur transceivers is just about over. Like it or not, it seems we are stuck with bargraph metering. No doubt, they do have their advantages. In the case of the FT-1000MP you can monitor at least three different functions at the same time but perhaps not with the accuracy of an analogue meter. Within the limits of reading the FT-1000MP S meter here is what I found. Measurements were taken at 14.2 MHz with the attenuator off and the preamplifier on.

Reading	Voltage
S1	2.5 µV
S3	3.1 µV
S5	5.0 µV
S7	6.3 µV
S9	20.0 µV
S9+20 dB	250 µV
S9+40 dB	3.1 mV
S9+60 dB	0.035 volt.

The S meter reading for S9 varied somewhat from band to band. The lower bands required more input, the higher bands less. 160 metres required 70 µV for S9, while 10 metres only required 10 µV. As seems to be the standard these days, the front end attenuator gives 6, 12 and 18 dB loss. Again I ask manufacturers to consider adding an extra position to give 24 dB attenuation which I feel is necessary for meaningful antenna gain measurements. I wonder how many amateurs use their attenuators for this purpose anyway?

Received frequency response for SSB was essentially the same as the transmit response (see Graph 1). It is certainly very flat and smooth which shows up as excellent receive audio quality. Frequency response for AM reception was also very acceptable.

Although the top response is a little restricted, the general sound on AM is very good. I should also mention that the quality from the internal speaker is very much better than average. Receiver audio output was checked into a four ohm load as specified and was taken from the external 3.5 mm speaker output socket. Maximum audio power output was 3.9 watts at 30% distortion. At the specified output of 1.5 watts the distortion had dropped to only 1%, considerably better than the 10% quoted in the specifications. At 200 milliwatts this had reduced to an excellent 0.6% distortion. For comparison, the old FT-101B has around 8% distortion at the



Graph 3 – FT-1000MP transmit response, power output 10 W at 1 kHz, EDSP selected, measured at 14.2 MHz. Continuous line is EDSP 3; the broken line is EDSP 4.

same power level. Things have come a long way over the years.

Receiver sensitivity was measured at 14.2 MHz with the preamp in. The specified sensitivity for SSB and CW is 0.25 µV for 10 dB signal to noise ratio. I measured 12 dB s/n at 0.25 µV, just a shade better than the specification. Signals of less than 0.1 µV were clearly detectable even with strong local signals close by.

FT-1000MP Instruction Manual

The FT-1000MP instruction manual is, overall, an excellent publication. It contains all the information you will ever need in sorting out the operation of the transceiver. In particular, the section on the operation of the menu system is very well done. A separate lift-out sheet which you can keep on the desk for reference gives all the menu information. Very handy. Again, like the FT-900 instruction manual, I would like to see a better quality cover to give the book better durability.

Now to my usual grouch about instruction books, the lack of technical information. The strange thing is that a good part of this information is available in the elaborate advertising brochure which you can obtain free from your local distributor. As most of the information is already set up, why not include it in the instruction manual?

FT-1000MP Conclusion

Perhaps you can tell from the above that I am enthusiastic about the FT-1000MP. The price alone makes it a superb buy and the features that it offers could cost you at least 50% more in some other transceivers. It has almost everything. Well, almost. There is one thing missing. Strangely, there is no voice frequency read-out. Bad luck if you are sight impaired. Actually, come to think of it, the original FT-1000 didn't have provision for one either.

Another small niggle is the lack of a separate speaker output for each receiver. If I was fortunate enough to be able to purchase an FT-1000MP, I think I would like to have a speaker on each side for each receiver. Separate outputs are available for head phones, why not speakers? However, I have no hesitation in giving the FT-1000MP my highest recommendation. My thanks to Dick Smith Electronics for the loan of our review transceiver.

The FT-1000MP is currently priced at $4495. A range of matching accessories is also available. Contact your nearest Dick Smith store.

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