

Equipment Review

Yaesu FT-840 All Mode HF Transceiver

Reviewed by Ron Fisher VK3OM*



The Yaesu FT-840 HF transceiver with MH-1b8 microphone.

The latest low priced entry to the HF amateur radio market is the Yaesu FT-840. At this time I am not sure if it is intended to replace the now ageing FT-747GX or whether Yaesu will be running two low priced transceivers side by side.

Whatever, we will be comparing these two transceivers as they do share a lot in common. The FT-747 appeared on the market in early 1988 and certainly set new standards of simplicity in amateur HF transceivers. Perhaps in some ways the simplicity was over done and maybe it didn't enjoy the popularity it should have. Certainly its low price was (and still is) a very good point in its favour as was the fact that three filters, AM, CW and SSB were included in the price.

However, the tuning ergonomics were perhaps just a bit too odd to make the transceiver a runaway favourite.

The "click stop" main tuning was a real pain which made band scan tuning a slow and laborious job. Having said that, I used one on an expedition to the Gulf of Carpentaria and the Northern Territory two years ago and found its performance as a mobile rig to be first class. Use was mainly confined to several fixed frequencies and the excellent memory system took care of this.

So, what have Yaesu produced to bring the FT-747 up to date? The answer is the FT-840, an up-to-date transceiver with excellent tuning characteristics and 100 multi purpose memories.

Enter the FT-840

The FT-840 is a compact, but not miniature sized, transceiver. It, in fact, matches the size of many of its competitors and is exactly the same size as the old FT-747. The plastic cabinet of the 747 has been replaced with a normal metal type. With this, the weight is also up by 1.2 kg to 4.5 kg, which is still light in comparison with many mobile/portable transceivers.

The full general coverage receiver covers from 100 kHz to 30 MHz, while the transmitter operates on all amateur bands from 160 to 10 metres. Operation is possible on SSB, CW, AM and FM with FM available as an option and wideband AM reception also available as an option. A narrow CW filter is also available if required.

The transmitter has a nominal 100 watt output and a speech processor is included to give the audio a worthwhile boost. The frequency synthesiser now uses two direct digital units driven from a single master oscillator. Hopefully this should overcome the calibration problems of the FT-747 which needed accurate setting of both the master oscillator and the carrier oscillators to ensure spot on frequency read out.

The click stop tuning of the 747 has gone and has been replaced with a very smooth running, weighted control and memory selection is now via two small up/down buttons at the top right hand side of the front panel. RIT now has a separate control at the bottom right of the front panel which replaces the very confusing RIT of the 747.

The speaker on the FT-840 is mounted under the top cover in place of the front panel mounted speaker of the 747. Finally, the DC connector on the rear panel has been changed to a standard six pin plastic type which makes it compatible with most past, and all current model, HF mobile transceivers.

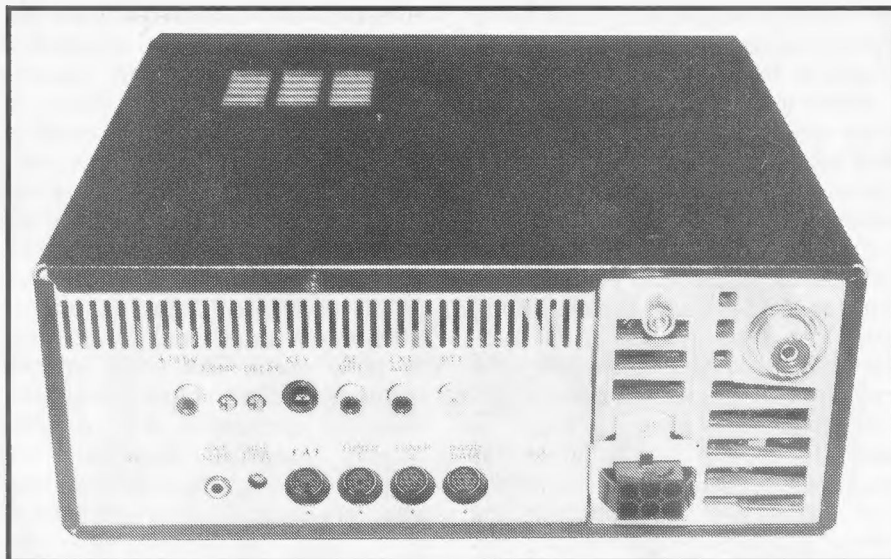
On the Air

Putting the 840 on the air was very easy. All of my power supplies are already fitted with six pin DC connectors for my existing equipment so no rewiring was needed. As usual, the microphone supplied with the rig

is the MH-1b8 and I will have more to say about this later.

First thing noted on initial switch-on was the very clear LCD readout which now displays frequency to 10 Hz. The main tuning control is nicely weighted and very smooth to use, a distinct difference from the FT-747. Modes are selected with four buttons to the left of the tuning control. Each of these has at least two positions selected in sequence. The SSB button selects either USB or LSB while the CW button selects either wide or narrow selectivity providing, of course, the optional narrow CW filter is installed.

The same applies to the AM button but the other way around. The button selects either normal or narrow selectivity but, unless the normal AM filter is installed, you only get narrow (2.2 kHz) bandwidth. The FM button selects the FM mode provided that the optional FM board is installed. If it is you can then select positive or negative off-set for repeater operation with sub-audible tone or simplex operation. The fifth and bottom button



Rear panel of the FT-840.

is for locking the tuning control. It does not lock mode selection or the RIT. Yaesu have paid special attention to the tuning system of the FT-840. Let's run through the facilities that are offered. The standard tuning rate is in 10 Hz steps but four different tuning knob rates can be selected. A small

slide switch, accessible through a hole in the bottom plate, allows selection of either a 5 or 10 kHz per knob revolution rate. Then, with the "fast" button selected, the tuning rate goes up to 100 Hz steps which gives either 50 kHz or 100 kHz per knob revolution depending on the position

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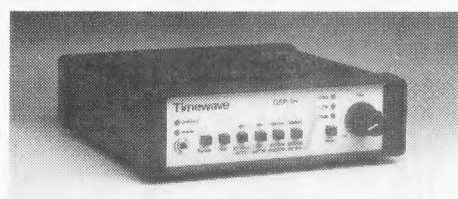
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of the above slide switch. I must admit that I preferred the 5 kHz rate, but the choice is there for you to choose.

When it comes to band selection, there are again several very flexible methods. Either amateur band or general coverage switching is available via the "Band" up/down buttons. With "Ham" selected, the transceiver steps from one amateur band to the next with the previously used frequency coming up on each band. With "Gen" selected, the transceiver steps up and down in 100 kHz segments but, if "Fast" is selected at the same time, this increases to 1 MHz segments. I noted that with "Fast" selected in the "Ham" mode nothing extra happens, the rig still selects amateur bands in normal sequence.

Overall, the tuning and band change system used in the FT-840 is amongst the best that I have ever used in a basic, low cost transceiver.

The FT-840 has a total of one hundred memory channels. The first ninety can store frequency, mode, wide/narrow IF selection for CW and AM modes, clarifier on/off and split frequency status. The ten "P" memories store upper and lower frequency limits for programmed band scanning. In addition, they also store all of the information that can be stored into memories one to ninety.

Both the metering and the meter itself have been greatly improved. The meter is at least 50% larger than the one in the FT-747 and is very clearly calibrated and brightly illuminated. On transmit, both power output and ALC can be monitored in sequence via the meter switch at the top left of the front panel. Unfortunately, there is no SWR reading which would be very handy for mobile and portable use.

Tuning around, I was impressed with the very smooth tuning and the quick and easy band changing system. The RIT (there is no XIT) has a wide or narrow range of ± 1.25 or 2.5 kHz which are selectable with one of the power-up functions. I found the ± 1.25 kHz to be about right. With RIT selected an indicator shows on the main display and the main frequency readout shifts, but there is no separate RIT frequency readout.

As seems to be the fashion, several

functions can be preset with the power-up function. These include CW mode BFO offset, scan resume mode, either 5 second delay or squelch operation, and normal or reverse sideband for CW reception. Unfortunately, this latter function can only be accessed by switching the transceiver power off first. Other power-up functions are covered clearly in the instruction manual.

Received audio quality was rated as fairly good. The small internal speaker lacked high frequency response compared with a good quality external speaker. AM reception through the side-band filter was very poor. If you want a bit of broadcast entertainment when the bands are dead then the optional 6 kHz bandwidth filter would be essential. The CW enthusiast would equally need the 500 Hz filter.

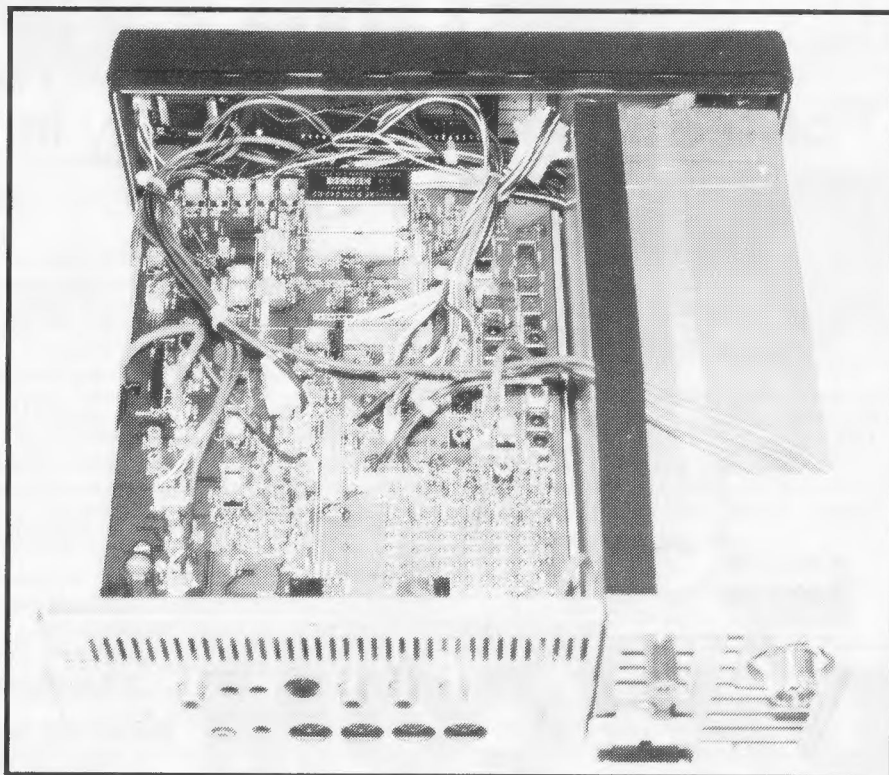
Transmitted audio quality was reported as very good with the processor adding a definite bite to the signal. The compression level is adjustable via a recessed control on the rear panel and you will need to set this up with a critical listener for best overall results. I found that the compression was not excessive with the control set about half way.

No VOX is included in the FT-840 but I guess most operators will not miss this. It's most unusual to hear amateurs using VOX these days. Reports indicated that the signal was very clean so long as the ALC reading on the meter was not exceeded.

The CW operator should be very happy with the FT-840 on transmit. CW uses a semi break-in system with the return to receive delay being adjustable via a rear panel recessed control. The 840 does not have a full break in (QSK) system, however, you can get close to it with minimum delay selected. The CW transmitted signal was reported as being very clean. The power output can be adjusted down to QRP level at about 4 watts. Several pages of the manual are devoted to computer control of the transceiver. I was unable to check this facility but there is plenty of information if you wish to try this facility.

The Yaesu MH-1b8 microphone

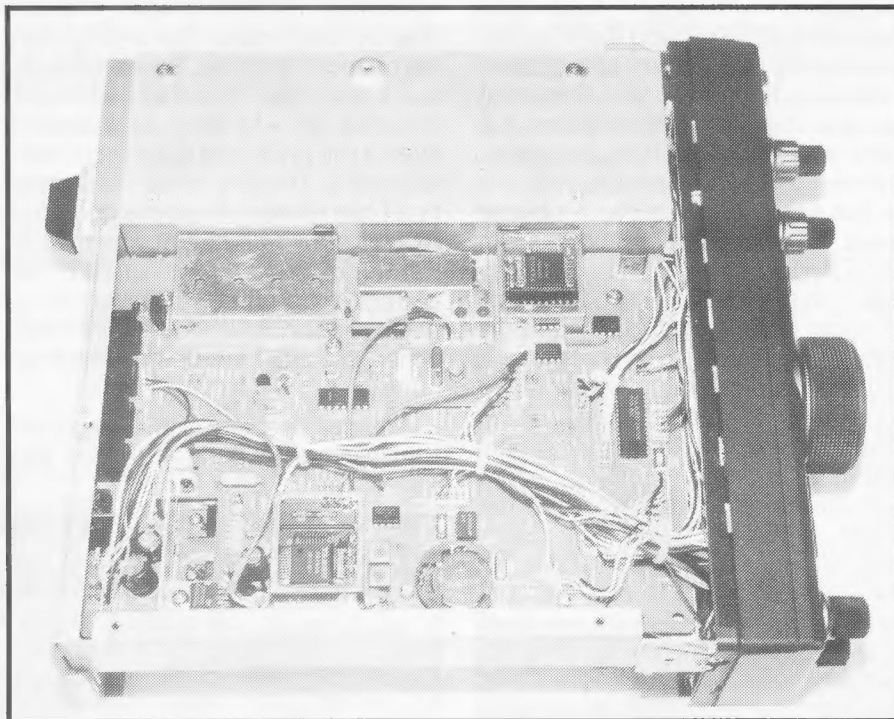
Microphones supplied with amateur transceivers these days are not all the same so I feel that a few words are in order to describe this one. It is supplied with all Yaesu HF



The FT-840 with the top cover removed.

transceivers and has, in fact, been around for a few years. The manual shows a response curve which shows the effect of the "tone" switch on the back. Tests showed that most contacts preferred the switch in the No 1 position that is the maximum bass response.

This microphone is larger and slightly heavier than other hand microphones. The PTT switch tends to be a bit "clunky" in its action. The button actuates a slide switch where others use a micro switch for smoother action. After banging an MH-1b8 around the Northern Territory a couple of years ago, I found that the metal grill became loose and actually fell out. Also, being metal, it became scratched very easily with the paint flaking off. Also, for some strange reason, the MH-1b8 is not usable on Yaesu VHF transceivers. The microphone will work but the UP/DWN wiring is not compatible and so nothing happens. Very odd.



The FT-840 with the bottom cover removed.

On Test

I carried out the usual series of tests on the FT-840 starting with transmitter power output and current drain for both transmit and receive. Power output is variable on all modes via the "RF PWR" control. A Yaesu FP-707 power supply was used for all tests.

Power output in CW mode

Band Power Out

160	110 watts
80	110 watts
40	106 watts
30	105 watts
20	100 watts
18	100 watts
15	100 watts
13	99 watts
10	95 watts

Power on all modes can be reduced to four watts on all bands. In the AM mode power output is about 25 watts maximum and can be reduced to about 2.5 watts. To achieve 100% modulation this output is spot on. No tests were carried out in the AM mode apart from the above power output checks. PEP output in the SSB mode was essentially the same as the CW power in the above tests. The power calibration on the meter was very close to the actual measured output.

Current drain on receive was 1.3 amps with low audio output peaking to 1.5 amps at maximum audio output. Current drain on transmit with maximum CW output on 20 metres was 19 amps and, with minimum power out (4 watts), it was 5 amps. On SSB the peak current drain would be about the same as above but the average drain would probably be about 2/3rds of the peak current.

Yaesu specify the transmitter IMD as -25 dB for 100 watts PEP output at 14.2 MHz. This appears to be a very realistic figure and our tests agreed with this. It's interesting to note that Yaesu include transmit IMD in their specification where other manufacturers do not. Thanks Yaesu for your honesty.

Receiver Tests

Firstly the "S" meter calibration was measured.

"S" Reading Voltage Input.

1	1.4 μ V
2	1.8 μ V
3	2.5 μ V
4	3.4 μ V
5	4.8 μ V
6	7.0 μ V
7	10.0 μ V
8	15.0 μ V
9	25.0 μ V

+ 20 dB	88.0 μ V
+ 40 dB	1000 μ V
+ 60 dB	.03 v

There is no preamp switching on the FT-840 but the attenuator provides 12 dB attenuation. Measurement indicated this to be spot-on with the specification. The signal input to produce "S" 9 on each band was checked.

1.8 MHz	16 μ V	18.1 MHz	19 μ V
3.6 MHz	17 μ V	21.2 MHz	25 μ V
7.1 MHz	17 μ V	24.5 MHz	17 μ V
10.1 MHz	23 μ V	28.5 MHz	17 μ V
14.2 MHz	25 μ V		

Yaesu specify receiver sensitivity for SSB and CW in the range of 1.8 to 30 MHz as 0.25 μ V for 10 dB S/N. My measurements indicated a slight improvement on this with 12 dB S/N. Sensitivity was not checked below 1.8 MHz but it appeared to be quite adequate. No measurements were made in the FM mode as the optional FM unit was not provided in our review transceiver.

The only IF filter included in the FT-840 was the standard SSB filter with a -6dB band width of 2.2 kHz and a -60dB width of 5 kHz. It appears that the filter is similar to the one used in the older FT-747 as the specification is the same. Again our tests confirmed Yaesu's figures.

Receiver audio power output was measured at both 4 and 8 ohms load impedance. Maximum power at 8 ohms was 1.2 watts and 1.8 watts at 4 ohms. The specification shows 1.5 watts at 4 ohms for 10% distortion. My measurements came up with 6% for the same figure, a slightly better result. For mobile operation this is a bit on the low side and, in fact, slightly less than the FT-747 which I found to be badly lacking audio output in my camper van a couple of years ago. If you use an external speaker, make sure it is 4 ohms impedance to produce the maximum acoustic output.

Another thing noted was that the action of the IF shift was rather unbalanced. No doubt there is an internal adjustment to put this right and the problem should be fixed under warranty. The outcome of this was that interference rejection was better on one sideband compared to the other.

Instruction Manual

There is no doubt that Yaesu manuals are the best produced in the industry. The quality of printing and presentation is top class. However, that's not to say that the contents could not be better. Up until a few years ago Yaesu manuals had some technical content. Unfortunately, this has all but disappeared. From an operating instruction point of view though, I give it 10 out of 10.

A full circuit diagram is provided, but there are no photos showing adjustment points. Clear diagrams show how to install the optional CW and AM filters which plug in and do not require soldering or removal of circuit boards. Another new innovation described in the manual is the replacement of the lithium battery. In the early years this was definitely a "return to the service department job". No longer so. But tell me, when did you last hear of a lithium battery that needed replacing? They seem to last a very long time.

Conclusions

No doubt about it, Yaesu have put a lot of thought into the design of the FT-840. Maybe they are even reading a few equipment reviews and are

taking note of what is said. Would I change anything on the 840 if I had the chance? Well, no, I don't think so, but I feel that Yaesu should have included an AM filter as standard even if the price had to be increased to cover it. The only other transceiver that I can remember where good AM reception was an option was the old Kenwood TS-430. From there on all general coverage transceivers have had reasonable AM reception although some have been better than others.

Another problem with Yaesu HF transceivers in general is that you

cannot buy a matching Yaesu power supply. I have seen photos of the FP-800 which matches both the 840 and 890 transceivers. It looks most attractive and seems to be available everywhere but here in Australia. I am sure this is costing Yaesu sales here. If the others can do it, why not Yaesu?

Retail price of the FT-840 is \$1895 and overall this represents excellent value. Our review FT-840 was supplied to us by Dick Smith Electronics to whom all enquiries should be directed.

**24 Sugarloaf Road, Beaconsfield Upper, VIC 3808*

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QSP News

New Federal Office Postal Address

After fifteen years, PO Box 300 Caulfield South is no longer the postal address for mail for the Federal Office and *Amateur Radio* magazine. A new post office has opened only a few doors along from the Federal Office and, as from 3 May 1994, the new postal address for the Federal Office is: **PO Box 2175 Caulfield Junction VIC 3161**

Stop Press

Last year in June, adventurer Dick Smith and balloonist John Wallington successfully crossed the Australian continent from west to east in a Roziere combined helium-hot air balloon.

This year, following their example, Steven Griffin, a Brisbane balloonist, will try to do the same, but with a difference. Steven will attempt the balloon crossing **alone** from west to east. He will use the balloon and gondola of his predecessors loaned to him by Dick Smith. The flight will take off from Carnarvon, WA in the early days of June 1994 depending on favourable wind conditions.

The gondola will have most of the equipment used last year, but due to budgetary restrictions, Steven's attempt will not be a very elaborate one. The shortwave

radio is still in the gondola, but Steven's qualifications enabled him to obtain only a combined radio amateur licence with privileges only on the 80, 15 and 10 metre amateur bands.

There will not be an organised amateur radio net to follow his flight due to poor propagation and the limitations of band use imposed by the licence. The callsign to be used will be VK4JAW/aeronautical mobile. Steven will use amateur radio only in emergency or when his commercial communication equipment proves inadequate.

All radio amateurs are kindly asked to keep a listening watch during the month of June on 3605 kHz, 21155 kHz and 28620 kHz, and give assistance if required. We all wish Steven good luck.

Stephen Pall VK2PS

Slow Morse Beacon

The North East Radio Club in Adelaide has produced a Morse Code Training Beacon for two metres on 144.975 MHz signing VK5RCW. It has a continuous output of 10 watts. It takes 80 minutes to cycle from 5 WPM to 12 WPM in 10 minute steps, with 8 pm local CST one of the starting points at 5 WPM. This allows you to organise your time for the speed you need. Signal reports would be appreciated to PO Box 36, Modbury North SA 5092.