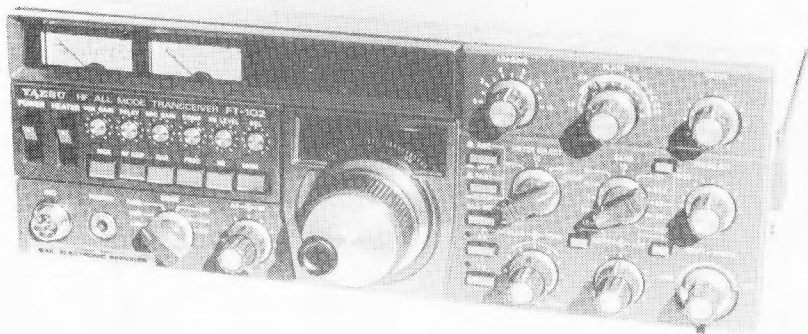


# THE YAESU FT-102 ALL MODE HF TRANSCEIVER



The new Yaesu FT-102 transceiver has been designed to replace the FT101Z/ZD series transceivers.

## EQUIPMENT REVIEW



The Yaesu FT-102 all mode HF transceiver has been produced to replace the FT-101Z/ZD series. After more years than most new amateurs can remember, the 101 has disappeared from the Yaesu catalogue. In addition to this, Stan Roberts of BAIL ELECTRONICS tells me that Yaesu also intends to drop the FT-107 but to continue producing the FT-902. As the new 102 has tube finals, this means that Yaesu have solid state final transceivers at the top and bottom of their range, the FT-ONE and FT-707, and two tube final rigs in the middle. Not only has the FT-102 a tube final, it also uses three tubes in parallel, but more on this later.

First impression of the 102 on unpacking is extremely favourable. The overall appearance is most impressive and the finish faultless. I have always been of the opinion that appearance sells more amateur transceivers than all the technical features put together. On this reasoning the FT-102 should be a winner, but to add to the appeal it has all the technical features that the most scrupulous operator would require.

### THE FT-102 TECHNICAL FEATURES.

Firstly lets look at the physical differences between the 102 and the 101Z series that it replaces. The 102 has a long low look. At 368mm it is 23mm wider than the 101Z and at the same time it is only 129mm high or 28mm lower. Depth of the 102 is 17mm less and the overall weight at 15kg is the same. The two side by side panel meters em-

phasize the long low appearance. The dual meter set up is perhaps derived from the FT-ONE and certainly a great idea. To my knowledge the only other transceivers to feature dual metering were the old Drake TR-4 series.

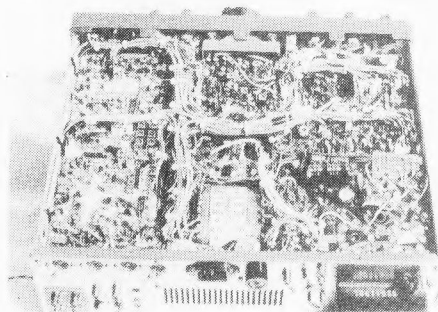
It seems that Yaesu have designed the 102 with several factors in mind. The first and to my mind the most important is an exceptionally clean transmitted signal. The purpose of the three 6146's in the final is not to produce 50% more output than the two 6146 transceivers, but to give about the same power with lower intermodulation distortion.

Intermodulation distortion is perhaps better known as splatter which is often a problem from strong local signals with you trying to copy a weaker signal say 10kHz up the band. In the past a typical figure claimed by amateur equipment manufacturers was -31 dB for third order distortion, although the basis for this figure was usually not quoted. The new FT-102 claims better than -40dB at an output of 100W PEP. Tune up instructions tell how this may be achieved, although quite a bit more power can be obtained as we shall later see. The second design factor is to produce a clean received signal with a high immunity to front end overload and a wide dynamic range. A choice of several optional filters for CW and AM reception combined with a shift/width control and peak/notch filter complete a most comprehensive picture.

The FT-102 is an amateur band transceiver only and does not include a general coverage receive facility. In fact it could possibly be described as a conventional design if we consider how far conventional has come over the last few years. A standard VFO is used as the basis of the tuning

system and not a synthesizer as in the FT-ONE. The transceiver is powered from AC mains only, with no provision for 12V DC operation.

Some of the small operating aids included in the 102, not already mentioned, are as follows: Treble and bass tone controls for the transmit audio to improve quality for those of us who don't have a DX voice. Top cut tone control for receive audio. Transmit audio monitor to check response balance when adjusting microphone tone controls and speech processor. This feature is also handy when replaying taped transmissions of other stations.

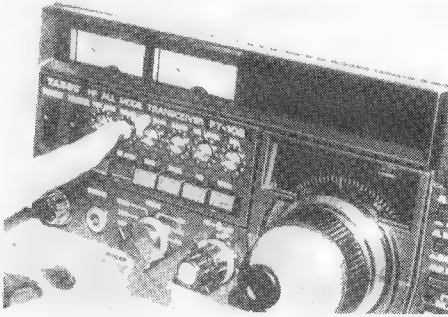


Under chassis view — the optional AM/FM unit is installed behind tuning knob.

An optional feature on the 102 is an AM/FM board which allows transmission and reception of narrow band FM and transmission of Double Sideband AM. A

front panel squelch control is a standard feature on the 102, but of course only operates when the optional FM board is added.

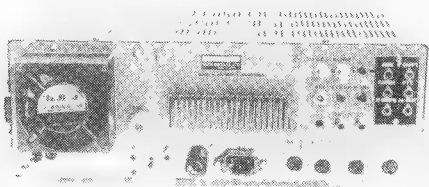
The list of optional filters includes a narrow SSB with 1.8kHz band-pass. Four filters for CW give band widths of 600, 500, 300 and 270Hz.



The six pre-set controls pop out with light finger pressure for easy adjustment.

### THE FT-102 ON THE AIR.

I must admit that this is the part of checking out new gear that I most enjoy. The 102 impresses right from the start. The knobs and controls have the right feel about them, they are well spaced out and all of the rear controls of the concentric pairs have levers extending from them for one finger operation. The six preset controls however take the prize for ingenuity. When not required for use they sit flush with the front panel. A light touch with your finger tip releases them and they pop out about 15mm, for easy use. When they are not required anymore push in and they lock back into place. Very neat!!



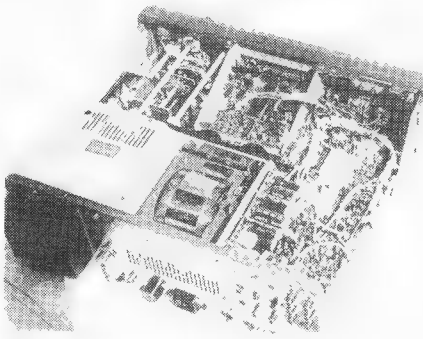
Rear panel — all connectors are easily accessible.

Getting the FT-102 operating is a quick and simple procedure. The AC power connector is one of the new three pin appliance plugs. These are very much more satisfactory than the old practise of using multi-pin, Jones type connectors.

Initial impression on switch on is excellent. The meters are brightly and clearly illuminated, the digital display is large and bright. The tuning knob has a firm but smooth feel and rotates at 18kHz per turn.

Flipping the mode switch through its various functions illuminates the excellent mode indicator next to the digital display. These are a series of small LED displays that show USB, LSB, CW-W, CW-N, AM or FM. Receive audio sounded clean and even with the built-in speaker it was of good quality. The action of the shift/width control was a little difficult to sort out (I should have read the instruction book first) but once mastered worked fairly well. In actual fact I don't think it worked as well as the shift/width

function on the FT-ONE. See the test section of this report for further comment.



Top cover removed. Digital display unit top centre.

For those of us used to valve output transmitters, tune up is quick and easy however again it pays to read Yaesu's recommendations for maximum plate current if you want to maintain a clean signal. A unique facility on the 102 is the ALC 'peak hold'. By depressing the appropriate button the ALC meter will hold up at its peak reading for about one second. This then gives a very clear indication of any over-drive condition, which is particularly important when the processor is in use. It was also noticed that correct loading of the final is important as it is possible to get spurious output on some bands with light loading. The speech processor works well and by setting the second meter at 'COMP', both compression and ALC can be monitored simultaneously. Quality reports using a Yaesu MH-1B8 microphone were excellent.

### NOISE BLANKER

With things like the infamous Woodpecker around, noise blanker operation has become an important facility to many amateurs who believed they didn't need one. In short the FT-102 blanker is just not up to the job of stopping the Russian menace. With the blanker control well advanced, it is possible to get a two or three 'S' point reduction, but at the same time the distortion produced on the wanted signal takes the readability back to where it was before.

In contrast, blanker action on noises found around the home environment was excellent. With just a touch of blanker gain, most electrical hash disappeared and no discernable cross-modulation was produced.

### ACCESSORIES FOR THE FT-102.

With the release of the 102, Yaesu have also released a full range of matching accessories. Several microphones are available including both desk and hand-held types. Some of these have scan buttons for use with the optional external scanning VFO type FV-102DM. The matching antenna coupler FC-102 has the capability of handling the output of the FL-2100Z linear. It also incorporates a watt meter with 20/200 and 1200 watt scales plus a peak hold feature to enable peak power readings.

Two external speakers are offered both having built in audio filters and one with a phone-patch coupler.

None of these accessories apart from a

hand-held microphone were supplied for test with the FT-102.

### THE FT-102 ON TEST

The following equipment was used to produce the figures that are quoted. Drake W4 watt meter. Heath SB610 monitor-scope. Daven audio power output meter. AWA F242A noise and distortion meter. AWA G230A low distortion audio oscillator.

### FREQUENCY STABILITY

As the FT-102 uses a PLL system, stability checked at one point will be the same as for any other. The VNG standard on 7.5MHz was used. From a cold start at 20°C the transceiver shifted 300 Hz over the first 20 minutes, the next ten minutes it drifted a further 100Hz and over the next one hour a further 300 Hz. While drift of this amount would go unnoticed in normal operation and is in fact within the specifications, it is more than one would expect from a state of the art transceiver.

### POWER OUTPUT

Power output was measured with full drive under CW conditions. The transmitter will operate on all bands including the new WARC bands.

1.8	150 watts	18.0	125 watts
3.5	170 watts	21.0	115 watts
7.0	160 watts	24.5	110 watts
10.1	135 watts	28.0	110 watts
14.0	135 watts		

PEP output as checked on the monitor scope was essentially the same with an excellent pattern. It was also noted that power output on SSB as indicated on the power meter (not peak reading) was higher than many other transceivers for the same peak output. Many comments from stations worked also indicated excellent talk power in relation to signal strength.

### RECEIVER TESTS.

Receiver residual noise -62dBm. An excellent figure, you won't be worried with hum or hiss in your headphones.

The receiver output was terminated in 8 ohms. Maximum output 2.25 W at about 20% distortion. At 1.5W distortion was 5% and at 1 W it had dropped to 2.5%. Audio distortion did not decrease below 2.5% at lower output levels and it is suspected that most of the distortion was being produced in the product detector. The audio for this test was a 1kHz tone produced by using the crystal calibrator.

The receiver tone control fully operational reduced a 3kHz beat note by 10dB, and a 2kHz beat note by 7dB. Lower frequencies were unaffected. On a listening test the tone control was quite useful and certainly took the edge off noise and interference.

Both the notch and peak filters worked well. A heterodyne of any audible frequency could be reduced from an indicated S9 to S0 on the meter. The peak control only operates when in the CW mode and even with the SSB filter was able to give a single signal effect. No doubt with the optional CW filters installed, quality of CW reception would be of a high order.

# EVALUATION AND ON AIR TEST OF YAESU FT-102

Serial No. 2G010576

CATEGORY	RATING	COMMENTS
<b>APPEARANCE</b>		
Packaging	****	Transceiver plastic wrapped. Foam inserts in double carton.
Size	****	Similar volume & same weight as previous model.
Weight	****	As above
External Finish	*****	Clean styling. Excellent quality knobs and fittings
Construction Quality	****	Very well put together
<b>FRONT PANEL</b>		
Location of controls	****	All very accessible. No crowding.
Size of knobs	*****	Best seen for some time. All concentric controls have levers.
Labelling	****	Very clear labelling on all controls.
Meter	*****	Two meters, both clear and well illuminated
VFO knob action	****	Smooth action
Dial readout		
Analogue	****	1 kHz readout. Clearly illuminated
Digital	****	Bright, fairly large. Spot on accuracy
Status Indicators	****	Operating mode indication. LED on/off indicators for other functions.
<b>REAR PANEL</b>		
<b>RECEIVER OPERATION</b>		
VFO stability	**	See test section of text
Digital dial accuracy	****	Within $\pm 50$ Hz at all times
Analogue dial accuracy	***	Within 1.5kHz over 500kHz
Memories	NA	No memory facility included.
Sensitivity	****	Listening and comparative tests show high sensitivity.
RFAttenuator	***	RF amp. switchable to improve dynamic range.
Selectivity	****	Standard SSB filter v. good plus wide range of opt. filters.
Shift/width	**	See test section of text.
Notch filter	****	Produces deep null
Peak filter	****	Tunable to give sharp peak at any required beat note.
Spurious responses	****	Only audible with antenna off.
'S' meter	****	Smooth action. Realistic response.
AGC performance	****	Smooth action. No pumping or distortion
Signal handling	****	No trace of overload found at any time.
Clarifier	***	Selectable for transmit, receiver or both.
<b>NOISE BLANKER</b>		
Line noise	****	Coped well with most types of domestic noise.
Auto ignition	****	Most effective
Woodpecker	**	Some reduction in level of certain types of pulses
Effect on signal	***	OK so long as blanking control not advanced too much.
<b>QUALITY OF RECEIVED AUDIO</b>		
Internal speaker	***	Better than average for built in speakers.
External speaker	NA	Available as option. Not available for test
Headphone output	****	Matched into standard stereo phones very well. Low internal hum & noise produced very comfortable listening.
Cooling fan noise	**	A little higher than expected
Tone control	***	A very handy addition
<b>TRANSMIT OPERATION</b>		
CW & PEP output		See test section of text
Audio response	*****	Adjust mic. tone controls to suit all situations.
Audio sensitivity	****	Plenty of gain available
ALC action	****	No flat topping observed on scope even when driven hard
Compressor	****	Effective and easy to set up and monitor
Metering	*****	ALC monitoring at all times plus either of HV, IC, PO & comp.level.
Relay noise	****	Unobtrusive
VOX operation	****	Smooth. Control setting did not drift. Gain & delay controls on front panel.
Cooling	****	Three final tubes ran cool at all times.

**RATING CODE**

Poor \* Satisfactory \*\* Good \*\*\* Very Good \*\*\*\* Excellent \*\*\*\*\*

★ Our review transceiver was from BAIL ELECTRONICS of 38 Faithful Street, Wangaratta, Victoria, to whom all enquiries should be directed.

## TRANSMIT MICROPHONE TONE CONTROLS

By using the FT 102's monitor system we were able to measure the effect of these controls. It was checked at 300Hz where the response could be reduced to 15dB. At 3kHz the output was reduced to -6dB. In on air use it was found that the action of the bass control produced the greatest effect, particularly when a fair degree of processing was used. Perhaps the only control missing on the 102 is a bypass switch to revert to flat transmit audio response from the front panel.

Unfortunately an RF generator was not available at the time these tests were conducted. We were unable to measure the actual receive sensitivity or dynamic range. However side by side comparison was made with a receiver that had previously been checked as having a dynamic range of 86dB. All tests indicated that the 102 was at least equal to this and there was no reason to doubt the published specification of 90dB or better.

The internal speaker is mounted in to the top cover of the receiver. It is a 10cm diameter unit and produced quite acceptable quality with no rattles or vibrations even at high audio levels.

The action of the shift/width control did not seem as effective as the one recently checked on the FT-ONE. The band width could not be reduced lower than a top cut off of 1.8kHz. With the normal SSB filter this did give a worthwhile increase in selectivity but did not approach the 500Hz as specified.

## INSTRUCTION BOOK

I have always given Yaesu top marks for their instruction books and this one is no exception. It is in fact not one but two volumes, the second being a sixteen page parts list. The fifty six pages of the main book are crammed with information. Sections include: *General description, specifications, description of front and rear panel controls, switches and connectors, interconnection of the FT-102 with ancillary gear, transmitter installation and microphone information, transceiver operation including use of shift/width controls, circuit description of the receiver section, transmitter section and common circuits.* This section is very well written and contains essential information for the new owner.

Eleven pages are devoted to maintenance and alignment with clear photographs showing all points of adjustment. Circuits cover several pages plus two large lift outs. Perhaps the only thing not provided are circuit board layouts. In addition to all of this, I hear that a full scale workshop manual will soon be available as an optional extra.

## CONCLUSION

There is not doubt that the FT-102 has a lot to offer the keen operator who does not require a general coverage receive facility. (and many of us don't). As long as you take careful note of the tune-up facilities, the clean transmitted signal will keep you on friendly terms with your close amateur friends. all the transceiver controls have the feel of excellent engineering and most functions operate as they should. The FT-102 is highly recommended.

## ZEDD EXPLAINS MEANING OF LIFE TO THE BOYS

Some of the boys were sitting around the club shack the other day, warming their feet on the power supply for the TS-120 and talking about late wintry bluster and how it would likely affect DX come summer, when WHANG! (not to be confused with Wang, the computer people), the door flies open, and into the shack with a few late snowflakes and some of last year's Johnson grass comes the great Q.R. Zedd himself.

"Howdy, boys," says Zedd, turning down the volume on the TR7 he has attached to his Elton John tee shirt with velcro tape, "how's DX?"

Well, at that, naturally nobody said a word, because having the great Q.R. Zedd ask you how DX is, is a little like having Bill Banowski ask you if you have any good ideas for raising money. W5MCN sort of looked off in the general direction of the 2-metre rig, and W5SQJ got so flustered he spat his Juicy Fruit instead of his chewing tobacco into his plastic cup, but other than that there was silence and obvious deep respect. WA5MLT, joining club members for his semi-annual visit, cleared his throat: WA5RPP, intrepid club reporter, leaped to his Big Chief tablet; N5DWN opened her portable filing cabinet to get out her latest 312QSL cards. But no one spoke.

Suddenly and without warning, Zedd, pricking his ears, leaped to the club 120, advanced the AF gain, and thumbed the keyer. A burst of CW at about 80 WPM boiled into the ether. Zedd listened to what sounded like QRN and possibly a berserk Cuisinart to the rest of us, nodded, sent a couple of R's, a 73, an SK and his call sign, and leaned back from the rig.

"My pal Rhandi in VU-land," Zedd explained. "I waited to make sure no one else in the room wanted to work him, but I didn't want him calling CQ indefinitely. I hope nobody minds."

"No one else heard him," said AF5X, "except the two real CW operators on the premises, Q.R. — you and me."

"Well," said Zedd modestly, stuffing shag tobacco and shredded DXCC stickers into his ancient clay pipe, "that only illustrates what I have often tried to tell novice DXers — you know, guys with fewer than 350 countries. Half of working the rarer ones is in good listening. Listen, listen, listen! And don't talk so dadblamed much. If I have said it once I have said it a thousand times, you shouldn't talk all the time, you should listen. Even if you are not going for DX but only engaging in casual conversation, in my opinion it is only good manners to keep your mouth shut and your ears open. Remember the old saying, little pitchers have big ears, and that goes for the great ones like Johnny Said, too. Silence is golden. You show me a man who talks too much and I will show you a loser. It's like I was telling Tondelayo the other evening, any fool can get in there and talk a person's leg off, but it

is a mark of greatness to be succinct and still make the contacts. Are there any questions so far?"

"Q.R.," said W5OU, who had just arrived, "I think all of us would truly appreciate it if you would tell us what you think lies ahead for amateur radio."

"Yes," said KC5CU, "and while you are at it, if you could tell us the meaning of life, some of us younger boys would sincerely appreciate that, too."

"What I think lies ahead for amateur radio is a decline in the sunspot cycle and a rise in the cost of equipment," Zedd said briskly. "As to the meaning of life, I will tell you a little story that I think illustrates my view on this matter."

"It was in 1969, I think," Zedd resumed, "when I made my one-man Dx-pedition to Africa, that I learned the meaning of life. I landed in Kenya about 2 a.m. on a beastly hot day, don't you know, and immediately began setting up my tent, antenna farm, and so on, working single-handed except for the meagre help offered by 29 native beaters, three technicians from RCA and the crew I had hired from the Yasma Foundation. Well, as you can imagine, we were all pretty tired by the time we were ready to start operating about four hours later, and everyone went off to bed except me. I jumped right onto seventy-five and gave my name a couple of times, along with my call, and got a right nice pileup going.

"I was working 'em right along just as dawn came, and I heard a small sound beside me. Yelling for everybody to QRX (which is DXer's lingo for 'Everybody else shut up and let the 4s call incessantly by themselves for a while'), I turned and stared straight into the eyes of a huge male lion. At about the same time, he let out a blood-curdling roar, showed me about 300 sharp teeth, and enveloped me in the nastiest cast of zebra-breath it has ever been my misfortune to encounter.

"Obviously Mr. Lion was hungry, and obviously he figured I was going to be his next meal. I had to think fast. So what I did was shove the microphone into his face.

"Well, boys, you may not believe it, but Mr. Lion took one look at the microphone, let out another terrible shriek, and turned and ran out of there just as fast as he could go.

"And we never saw him again."

"Just about the worst case of mike fright I ever saw for myself."

Zedd sighed and puffed his latakia. "Which led me to the insight I have since carried close to my heart about the meaning of life for any DXer. And that is this. When in doubt, grab for the mike; and never be concerned about lion."

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