

## THE YAESU FT-221

It is interesting how fashions change in amateur gear. A year or two ago, FM on the 144 MHz band was all the rage. However, while FM is still well up the list on the popularity poll, it seems that it will soon be overtaken by the new FM-SSB-CW-AM transceivers that are appearing on the market. The first of these combination rigs to arrive on the Australian market is the Yaesu FT-221.

Actually the FT-221 is the first of these transceivers to have full coverage of the two metre band from 144 to 148 MHz. Yaesu previously produced the FT-220 which had similar functions but tuned only to 146 MHz and with a few slight modifications was usable in our FM portion of the band.

The FT-221 covers the two metre band in eight segments of 500 kHz. Insofar as facilities are concerned, the FT-221 has everything that the modern HF SSB transceiver incorporates. Such things as VOX, receive and transmit off set tuning, 100 kHz calibrator, noise blanker, 1 kHz main tuning dial read out, 'S' meter with switchable functions of relative RF output and discriminator (zero centre) indicator.

Naturally the set is fully solid state and uses a total of 60 transistors, 18 FET's, 13 integrated circuits, 1 programmable uni-junction transistor, 115 diodes plus one thyristor and one varistor. Quite a line up. All of this is fitted into a very compact cabinet measuring only 200 mm wide by 125 mm high by 295 mm deep. In terms of comparison this is quite a bit smaller than say an FT-101. However, for its size, it is quite a solid package, weighing 8.5 kg.

Much use is made of plug-in computer type circuit boards in the construction of the FT-221 and this makes it possible for the large number of components to be fitted in in an orderly fashion. The self contained power supply allows for operation from both 240 volts AC and from 12 volts DC. The FT-221 is therefore highly suitable for both base station and mobile operation. Selection of either mode is automatic with the connection of the appropriate power cord.

In addition to the accurate dial, it is possible to crystal lock the transceiver and operate it in a similar way to the switched channel select FM sets. There is, however, one interesting difference and that is that each crystal provides eight operating frequencies, each in the same relative place on each of the eight band segments. In addition to this only one crystal is required to produce both the transmit and receive function.

Apart from the main tuning dial, no other tuning or peaking control is provided or needed to operate the FT-221. Extensive

use of varicap diodes to tune the receiver front end and the transmitter exciter stages keeps the critical circuits on the nose. All of these varicaps are adjusted by a bank of present potentiometers and in effect they act as the trimming controls for the transceiver.

A small downward facing loud speaker is included, as is a 3.5 mm jack for the connection of an external speaker.

A good quality push-to-talk dynamic microphone, fitted with the now standard screw on four pin type connector is supplied as a standard feature. However it seems odd that the headphone jack on the front panel is a 3.5 mm type which does not match up with normal Japanese headphones which are all fitted with either two or three connection ¼ inch plugs. Adaptors can be purchased to mate the ¼ inch plugs with the 3.5 mm socket but one is not supplied with the transceiver.

The transmitter power output is rated at 12 watts PEP on SSB, 14 watts on FM and CW and 2.5 watts on AM. The reason for the seemingly low output on AM is that 2.5 watts of 100% modulated AM is of course 10 watts PEP.

Two band widths are available on receive. For SSB, CW and AM a 2.4 kHz filter with a two to one shape factor is provided. This of course makes the AM receive mode of only limited use and in general better copy of AM can be achieved in the SSB position. However this assumes that the AM in question is free of any FM or other frequency shift.

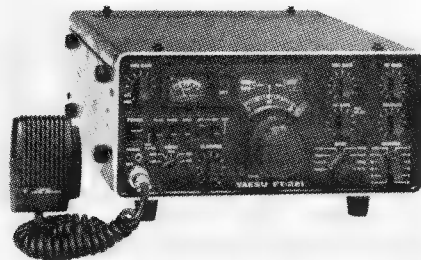
For FM a band pass of 17 kHz with a shape factor of just over two to one at the 60 dB points gives an excellent compromise for this mode.

### THE FT221 ON THE AIR

Getting the FT-221 on the air is a very simple operation. As mentioned earlier no actual tuning up is needed. It is only necessary to select the desired mode, the 500 kHz segment in which to transmit, and then the frequency within that segment on the main tuning dial. Push the button on the microphone, and you are on the air.

It is necessary to recalibrate the main dial for each mode of operation due to the different bandpass filters used. With SSB, there is a 2.5 kHz shift between upper and lower sidebands although it would appear that for the present at least only upper sideband is used on two metres. Pressing the "Calibrate" button locks the dial scale but not the actual dial movement.

So the dial is set to the correct point, the button pressed in and the tuning knob rotated until zero beat is reached in the case of SSB or the discriminator meter reads zero or centre scale on FM. It is of course more important to be spot on fre-



quency on FM due to the channel system used than it is on the so called tunable end of the band. After the appropriate calibration at any one hundred kHz point, the overall calibration remained within  $\pm .5$  kHz throughout the range.

To operate through an FM repeater, the FT-221 provides a 600 kHz shift in either the transmit or receive frequency. Repeater operation is only available on the 146.5 MHz range which of course covers all the local repeater frequencies, however it is a trap to try to work into repeater channel four by selecting the 147.0 MHz range. Reverse repeater operation is also possible, that is to listen on the input frequency and transmit on the output frequency by pushing the repeater switch up to "REV".

Repeater operation is indicated by a front panel warning light.

The "S" tuning meter proved to be rather disappointing. Yaesu seem to have over done their all black styling on the FT-221 and carried it to the face of the meter. To make matters worse, the illumination is provided by a single miniature globe set on the left hand side. If the set is used under conditions of poor external light then the meter is just not readable. It is hard to understand why Yaesu did not retain the meter used in the FT-220 or the currently available FT620B, both of which have clear rear illuminated meters.

While on the subject of illumination, the tuning dial must also come in for some criticism. The main kHz dial is reasonably good but the 100 kHz segment indicators set above this are again unreadable under conditions of poor external light.

The two speed tuning control was very smooth to operate with only a very minimal amount of back lash. Immediately behind the central pointer of the main tuning scale is a red LED which shines through the translucent kiloHertz scale. There does not appear to be any useful purpose served by this but it does add a touch of colour to an otherwise sombre appearance.

VOX operation proved to be rather tricky. As received from the agents the VOX delay was far too short although the delay control was set for the longest possible delay. After some playing with the relay control a suitable delay time was produced but the adjustment appeared critical. The action of the VOX appeared to be similar to that of the FT-101 and certainly does not encourage use of this feature.

Frequency stability of the transceiver was impressive. Tests were made over lengthy periods of time and during extremes

