

EQUIPMENT REVIEW

Kevin Phillips VK3AUQ
Hereford Road, Mount Evelyn, Vic 3796

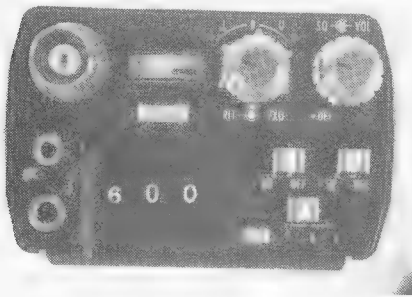
BELCOM LS-202E

The Belcom LS-202E is a compact, synthesised, two metre handheld transceiver featuring both FM and SSB modes of operation. The unit supplied for review was fitted with the optional NP-9 nicad battery pack (10.8 volt), CA-110E AC charger and SH-1 speaker microphone. It also comes as standard with a belt clip, carrying strap and a rubber flex antenna.

There are other multi mode rigs about, but not as a handheld unit, so it should have some appeal to those who do a bit of travelling and have no room for excess luggage. It is fairly small at 179 x 64 x 44 mm including all projections, and weighs about 500 g. Many FM only alternatives are no smaller or lighter.

APPEARANCE

Overall appearance is compact and fairly neat, until you try to use some of the controls. On the front, is a speaker and microphone, all else is blank apart from a label. Left side panel has a PTT lever, high/low power switch, repeater offset switch which can be either 600 kHz up or down, a tone switch which serves no useful purpose in Australia, and a button for lighting up the S meter. This side also contains the charging socket. Moving up to the top panel, there are two pairs of concentric knobs. One pair are the VXO and RIT controls which are only functional on SSB, and the other pair are volume/on off and squelch controls. VXO range is ± 5 kHz, and RIT is ± 1 kHz. There are three slide switches for noise blanker, +5 kHz offset and mode selection. Modes are FM, USB and LSB. Next are the thumbwheel switches for selecting operating frequency in 10 kHz increments. These switches are small and fiddly to use, and would be difficult for anyone with big fingers to select a frequency with any speed. Next are two sockets for remote speaker and microphone. Each socket is a different size, so the two functions cannot be mixed up. A rubber bung fits into these sockets when not in use to keep out dirt and other nasties. Antenna connector is a BNC type. Last item on top is an "S" meter/battery condition meter.



Top view: From left — clockwise. BNC antenna socket, S meter/battery condition meter, RIT/VOX control, volume/on/off and squelch control, three slide switches, frequency selection thumbwheel and remote speaker and microphone sockets.

FREQUENCY RANGE

Frequency coverage is from 144.000 to 147.995 MHz on transmit, but I found that on receive it covered 144.000 to 153.995 MHz, not 140 to 149.995 MHz as I expected. It has an interlock to prevent transmission if MHz is 148 or above. The only exception is if the repeater offset is on, and a frequency less than 600 kHz from a band edge is selected. An example is



say 144.1 MHz selected, but you had last used the rig on the 146.7 MHz repeater. You had turned on the offset to 600 kHz low, so your new frequency is 143.5 MHz (out of band and very naughty). The same can happen at the other end of the band with offset high. The offset doesn't care what mode you selected.

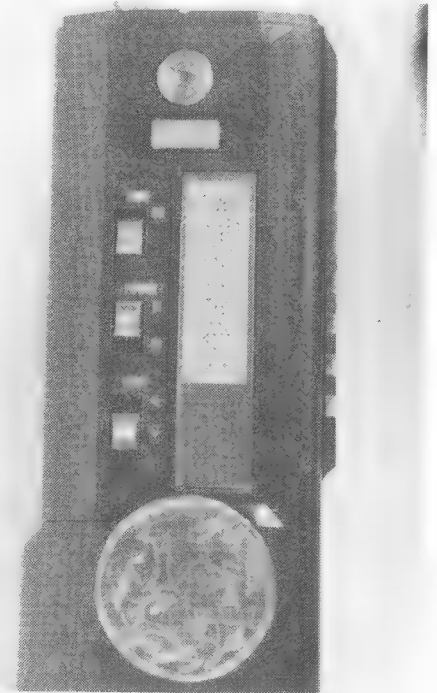
Power output is claimed to be 3.5 watts when run on 10.8 volts, and the test rig ran at 3.8, and drew slightly less current than specified. On low power, it was still 1.7 watts, which is a bit excessive, but drops to a more reasonable 0.7 W when on 9 volts, or 2.7 W on high power. These figures are for the FM mode, and similar results occurred on SSB. It is very easy to drive it to full output on SSB, as mike sensitivity is reasonably high. FM deviation was measured at 5 kHz. I was a little disappointed in spurious response, as a number were just out of specifications. There were a couple either side of the carrier, at 10.695 MHz removed, and they varied in level depending on mode, power and frequency selected. Second and fourth harmonics were a bit high also, but third harmonic was very low. Most transmitters radiate broadband noise in the form of a noise plateau. This rig has a noise plateau of -80 dB on SSB, and -86 dB on FM. All spurious should be able to be improved, and other units may be much lower.

RECEIVER

Receiver performance was better than specifications on most counts. Belcom claim better than 25 microvolt for 10 dB S/N, and test result showed 17 dB S/N for FM, and 17 dB SINAD on SSB, where specification is better than 12 dB. At low level signal input, audio output is not very high, but I found it adequate for my needs. The squelch control works on both FM and SSB, and worked fine. Like most receivers, this one has a few spurious responses, and they tuned at a different rate to the main signal except for image responses that tune normally.

The receiver is a conventional superheterodyne type with single conversion for SSB and double

conversion for FM. First IF frequency is 10.695 MHz for both modes, and 455 kHz for FM. The RF amp is a 3SK114 dual gate FET, followed by a bipolar transistor mixer. After the mixer, the signal splits up and goes through a three stage amp for SSB, and then to a balanced demodulator. On FM the signal is mixed with a second local oscillator in an IC, and passes through two filters at 455 kHz, limited and then quadrature detected. A single IC is used for audio amplification.



Left side panel compared to a dollar coin.

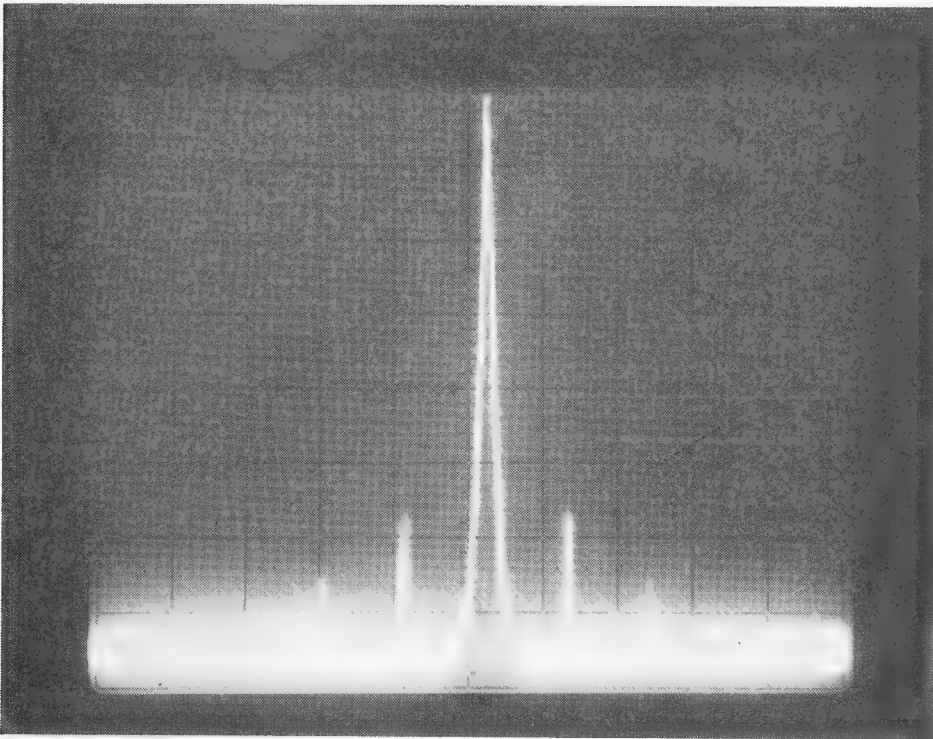
TRANSMITTER

On transmit, the SSB audio and 10.695 MHz carrier signals are fed to an IC balanced modulator, then to a crystal filter (same one as on receive), to eliminate the other sideband. From there it is heterodyned to the final frequency and amplified in several stages. For FM operation, the VCO is modulated, then mixed to final frequency and amplified as before.

This rig doesn't offer any frills such as scanning or memory facilities. If you want to tune around the band it must be done with the thumbwheel switches. On SSB that can be fairly hard, as to tune a segment of the band, you have to use a combination of thumbwheel switches, 5 kHz offset slide switch and VXO control. That can be somewhat frustrating, so I would suggest you tried leaving it on 144.1 MHz most of the time if you want to use SSB. That way you can establish a QSO on the calling frequency and then shift to another mutually agreeable frequency. On FM it is easier to tune around as most frequencies in use are about 50 kHz apart, but it is still easier to leave it on your favourite repeater.

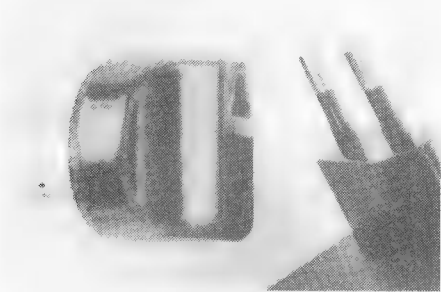
ANTENNA

The rubber ducky antenna supplied worked as well as any other I have tried, and put in adequate signals



The LS-202E at 146MHz — high power.

to several repeaters from the Box Hill area, and also from Mt Evelyn. I much prefer to use a real antenna on my rigs though. With the optional SH-1 speaker/microphone, the little rig can be hung on a belt with the belt clip, and only a light weight extra need be held. It's much easier to carry that way.



Power Plugs.

POWER

Now for power supplies. Belcom claim that maximum DC supply voltage is 12 volts. As such it should never be operated directly from a car battery or catastrophic rig failure may result. It runs on a nominal 9 volts, or for higher power operation 10.8 volts. The optional CA-110E AC charger supplied for the review was rated at 220 volts AC input, and had a non standard plug on it. As it is a plug pack type of supply, it needs an adaptor to fit it to Australian AC outlets. The charger tends to run a little warm, so it may have a limited life when run on 240 volts. The rig may be used while being charged.

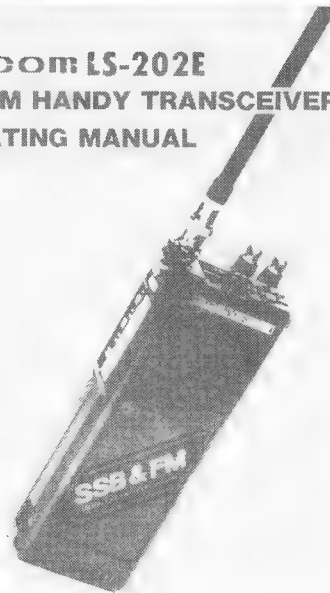
OPERATIONAL BOOK

The instruction book seemed to say all that was necessary for normal use, except for the instructions that came with the SH-1 which were in Japanese, but operation is so simple as to not need interpretation.

CONCLUSIONS

This rig would seem to fit the bill for someone who wants a light weight multi mode two metre hand held, and doesn't mind not having scanning or memory functions like some of the FM only opposition. It does have shortcomings in its operation due to its type of

Belcom LS-202E SSB&FM HANDY TRANSCEIVER OPERATING MANUAL



frequency selection, but it can be very useful even so. It would be very useful for a traveller who likes to use both SSB and FM, but cannot find room for the larger multi mode rigs. Power and receiver sensitivity are adequate for most needs. I would suggest you try one and make up your own mind.

THE WORLD CLASS COMPACT MOBILE



When the engineers at ICOM designed the IC-47A, they knew you would have almost no room to mount it. Take a good look at the dashboard in your car. ICOM have packed a processor controlled, 25 watt UHF mobile into just 58 cubic inches. Think about it, your IC-22S is 87 cubic inches and it doesn't rank in the same class. The 47A offers 32 CTCSS frequencies, scanning, memories, even a speech synthesizer to aid blind operators.

**SUPPORT THE
ADVERTISERS
WHO SUPPORT
YOUR MAGAZINE**

 **ICOM**
The World System

Look for the Dealer list in this magazine
or phone ICOM on (03) 51 2284

IC003