CONVERTING THE ICOM ICB1050 CB TRANSCEIVER TO TEN-METRES FM

H. ALLISON, G3XSE

OF all the legal FM CB transceivers available in this country it seems fitting that one of the easiest to convert to amateur use should be the one bearing the well-respected *Icom* name. Having used the FT-220 two-metre rig on Ten *via* the excellent *Microwave Modules* transverter I became interesed in something smaller to use mobile.

Amateurs who have used the legal FM CB system — (hang your heads in shame!) may be interested to know that on ten metres your nominal four watts will go much further. This is due to many factors. For starters there is much less traffic on the frequency so a weak signal is not so likely to be stamped on by anyone else; secondly there are no aerial restrictions; and thirdly, by-and-large amateurs are gentlemen. Thus, mobile-to-mobile, range on Ten can be twenty miles or so, mobile-to-base up to fifty; and all the foregoing under 'dead band' conditions. When it is open, 28 MHz FM simplex can go right round the world on milliwatts. As a bonus there are ten-metre repeaters in the States accessible both on ten and two metres. In good conditions it is possible to work somebody hand-portable in the Bronx who is on two whilst you are driving in the U.K., and all with only a few watts!

Where is 28 MHz FM?

The action is centred around 29.6 MHz, the calling channel. The repeaters have their outputs *up* from this channel, with the inputs 100 kHz lower. Channel spacing is 10 kHz, and deviation normally 5 kHz.

How to Get Going

Interested? Now for the good news. You can join in the fun for, at the most, £30; you may be lucky and get away with less. What you need is an Icom ICB1050 FM CB set. Put on your false beard and dark glasses, plus trilby hat, turn up your collar, look round to make sure nobody is about to recognise you — and sneak into your local CB shop. Do *not* be fobbed off with anything less than a real, live, genuine Icom ICB1050 (the only known possible alternative at the moment being the *SMC* 'Oscar' (new range) equipment. Get out the handbook and check that it has *(a)* three crystals and *(b)* that delightful Motorola chip, the MC145106. If in luck pay up, and wipe your feet on the way out, making sure you are not seen leaving with a CB set in your hand.

Circuit Description

What you have bought is a double-conversion superhet (10.695 MHz/455 kHz) and single heterodyne FM transmitter. The block diagram is helpful, though much improved if you draw in the feed from the VCO to the 16 MHz mixer, which seems to be missing.

To help explain what is happening, let us consider a transmission on CB channel 40, 27.99125 MHz, which we will call 27.991 MHz; let us also assume that the VCO is on frequency, that is 10.240 MHz *low* of the required frequency, or 17.751 MHz. This is mixed with the 'Tx' crystal of 19.961 MHz, to give 0.790 MHz. Since the synthesizer runs in 10 kHz steps this is equivalent to a binary count of 79, which is 1001111. If you run a 'scope or *Avo* along the programmable divider inputs of the MC145106 chip you will find, surprise, binary 79. Note, pin 17 is the least significant digit, pin 9 (permanently grounded) the most significant digit. The actual binary count goes from 40, which is channel one, to 79 which is channel 40. *Warning:* do not listen to the CB frequencies if checking this out; it could destroy your sanity.

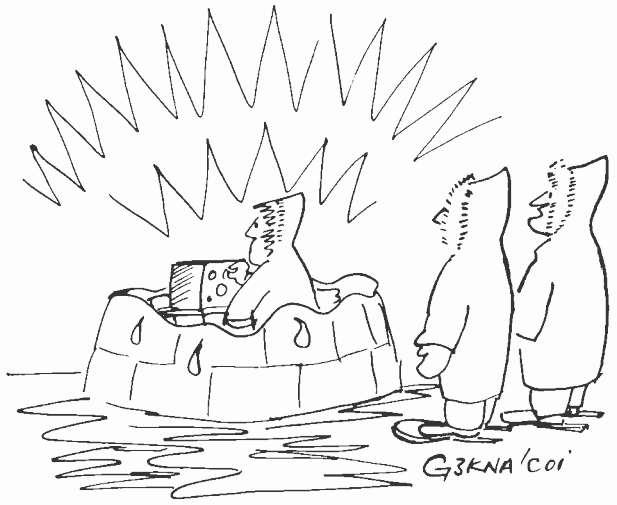
If the program ran high enough, 29.6 MHz would be a count of (29.6 — 10.240 — 16.961) divided by 10 kHz, *i.e.* 239.9, known as 240, and we're going to be 1 kHz out; this is binary 0111100000. Channel 25 of the legal CB is 001000000; thus if we 'hold up' pins 10, 11 and 12 *via* a 10K resistor, we are on 29.6 MHz — sneaky, eh? Connect up your aerial and 12 volts, and turn on the shack HF rig; tune the latter to 29.6 MHz. Link pins 10-11-12 and then from them, *via* a 10K resistor, to pin 1 of the MC145106. Whilst holding the Transmit button down, unscrew the core of T202, the VCO, until a signal is heard on 29.6 MHz. Now tweak the Tx strip for maximum output; T209, T301, T303, T307, about four watts. On receive, tweak T101 and T102.

Now the bad news; the Icom will now transmit and receive up from 29.6 MHz, but not down; this is due to a wrong count from the channel select switch. To deal with this problem, unsolder the green lead from pin 13 and discard, unsolder the violet lead from pin 13 and transfer to pin 11, The rig will now step down in 10 kHz steps to channel 9, which is 29.440 MHz. Ignore channels 1 to 9; channel 35 is the band edge. The slight count error can be eradicated with CT202 on Tx and CT201 on receive.

Results

Super! A pre-amp will help, as will a linear, but, barefoot, within an hour of modification and with only a vertical dipole, contacts had been made across town, across Russia, and across to U.S.A. On all sets modified, RV303, the deviation control, can be set to maximum, *i.e.* fully clockwise. Repeater working can be effected either by winding down ten notches from the repeater output frequency when transmitting, or you can switch in a 16.861 MHz crystal for repeater working in place of the 16.961 MHz fitted, a feat easily accomplished by the use of the Hi-Lo switch.

Editorial footnote: any CB-er who might feel a bit uptight at G3XSE's remarks on CB should be aware that they are at least a little tongue-in-cheek: G3XSE is himself a practising CB-er!



". . . told him he should have a fan on that linear. . . ."

Jaybeam Catalogue

Jaybeam's new "Amateur Radio Antennas" catalogue is now published and contains technical details, including VSWR graphs, of their entire range of amateur antennas. The catalogue is available from most Jaybeam stockists, or direct from Jaybeam Ltd., Dept. AM/CAT, Kettering Road North, Northampton NN3 1EZ, the envelope marked "SWM/1" and containing a medium-sized *s.a.e.* with a 12½p stamp.