

REVIEW: SMC OSCAR 2'



For some years the top end of the 10m band has been used for NBFM by an ever increasing number of amateurs. Many countries, including the US and Germany have 10m repeaters with inputs between 29.51 and 29.59MHz, and outputs 100kHz higher. Fortunately, many rigs have an FM facility, and their owners have soon found that 10m FM can be quite a lot of fun. When the band is open, signal strengths from many US stations and repeaters into the UK have been well up to fully quieting, and it has been possible to have QSOs with the US with only 4W into a half wave vertical. Far too many CB rigs were imported for the potential market, and so there are thousands of very cheap CB rigs around, and while it is relatively simple to convert them for 10m FM, a few companies are supplying converted rigs which are 'ready to go'. I thought it might be interesting to look at the SMC Oscar 2 - CBM 272 as converted, but first of all let's have a look at the band itself.

It is recommended that the FM mode be used only between 29,500 and 29,690. SMC point out in their instructions that whilst their rig operates in 10kHz channels from 29.31 to 29.70 (channels 1 to 40) channels 14 (29.440) to 19 (29.490) should be avoided, as they are in the satellite band.

When the band is open, band noise can be at least 10dB higher than it is when there is no skip propagation, and so ground wave signals which might easily be receivable during the late evening may be receivable only with great difficulty during the day, so you would find that you might be working DX during the day time and locals in the evening. As there are relatively few active stations in the UK on 10m FM as compared with CB, you don't have the continual racket present on CB, and so even in the middle of the day it is normal to work 15 miles or so with just 4 watts and a vertical antenna, while at night time your range will extend to around 30 miles, or much further if you

Angus McKenzie examines a ready- modified CB rig

are using high power up to 100W at the antenna, with the antenna as high up as you can get it. Most local working is vertically polarised, whereas for DX beams of course are far more effective as the polarisation always gets twisted anyway on the first skip. Unfortunately, I have had to endure some dreadful interference from other people's thermostats and other electrical devices, and home computers have a nasty habit of radiating much rubbish, which I really thing the Department of Trade and Industry should do something about as soon as possible. There has already been much legislation about this in some other countries. In effect this all means that the noticeable band noise is bouncing up and down by anything up to 20dB, and most band users are experiencing this problem if they live close to many other houses and flats, and this should be borne in mind when making the decision to try 10m FM.

Another annoyance is that whilst 29.6MHz is the general simplex calling frequency, just below this at around 29.59MHz is a signal frequently heard during the day which knocks out at least two channels, including the calling channel. Very recently, when I first tested the Oscar 2 on air, I heard this terrible buzzy modulation, which obliterated the calling channel, which sometimes changed to a strange sweeping sound, and having spent ages turning off and on every computer and microprocessor controlled piece of test equipment in the lab, I realised that it was coming in on skip propagation. Eventually, many angry amateurs asked others in Africa and SE Europe to attempt to DF the noise, which seems to be coming from somewhere to the immediate East of the Middle East, and it is suspected that it

might be coming from somewhere near the Afganistan border. The signal is so strong as to make the calling frequency unusable for many hours a day, the intruder apparently messing up the band very frequently.

It is most certainly worth while considering 10m FM as an alternative to 2m for local working. FM boosters designed for CB (*naughty!* - Ed) are now very cheap indeed. These can very easily be tweaked to peak up on 29.6MHz, and I have heard of many costing around £15 to £20 which can give between 25 and 50W, which helps a lot.

I have looked at quite a number of CB rigs in the last two years for professional reasons, and a few general comments may be worthwhile. I have noted RF sensitivities for 12dB SINAD from around 0.11uV to 0.3uV. The selectivity of most of them is very good indeed as they have to meet Ministry approval, but the RFIM performance can be anything from fairly poor to diabolical. The better ones are usually no better than the worst 2m ones, but for ground wave propagation this will not be too serious since the density of stations is so much less than on CB. Both transmit and received quality is severely restricted in HF response, nearly all CB rigs giving the characteristic 'Wellington boot' sound. This is quite simply mainly due to the stringent Ministry spec, and in practice it would probably be reasonable to modify the transmit audio low pass filter so that it cuts above a slightly higher frequency without causing too much splash. I suggest that many stations in the adjacent channel, and since there are so few channels, it would not be a bad idea to reduce deviation to an absolute maximum of around 3.5kHz, filtering the audio at a frequency considerably lower than this. We all have to remember that the 10kHz channel spacing is a very narrow one indeed, which therefore restricts both the maximum audio transmit frequency and its deviation. A

number of rigs have very bad spurious and strange mixing products, despite usually having good harmonic filtering. Remember that the third harmonic comes into the low end of Band 2, so if you are using an amplifier, I strongly recommend that it should be followed by a very good low pass filter. Several amateurs have had problems with 'boots' which can jam out Radio 2 at 89.1MHz in the South East, for example. We will all have to be careful as otherwise we might get descended upon by the DTI!

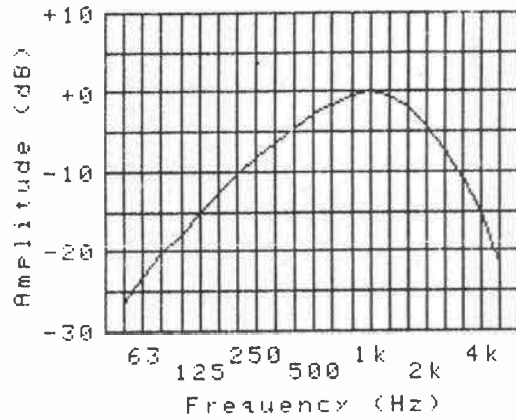
The Oscar 2 seems to have a fairly poor sensitivity of 0.25uV for 12dB SINAD, and whilst this is perfectly satisfactory when the band is open, it is rather on the edge when band noise is very quiet. To put matters into perspective, the IC740 with preamp switched in is around 0.14uV. The poorer or lower gain your antenna, the less band noise it will pick up, and therefore the greater the receive sensitivity has to be for the received band noise to be the limiting factor.

The Oscar's selectivity is very good, around 56dB at 10kHz adjacent channel, and 59dB alternate channel. RFIM was poor, only 36uV of each of two carriers spaced at 50/100kHz off channel, with the 100kHz one modulated, giving a 12dB SINAD product on channel. This would just not be tolerable at all on 2m of course. The S-meter had a reasonable performance with S1 being around 1uV, S3 being at 4uV, S5 at 8uV, and S9 at 22uV, for example, the meter being a moving coil type, rather than lemons and cherries! The receiver audio response is shown in the chart, and at least some HF gets through! The audio output power is ample, even for mobile use, and the quality is quite acceptable up to 2.5kHz deviation, but above this distortion increases very rapidly from 5% to 15% at around 3kHz deviation.

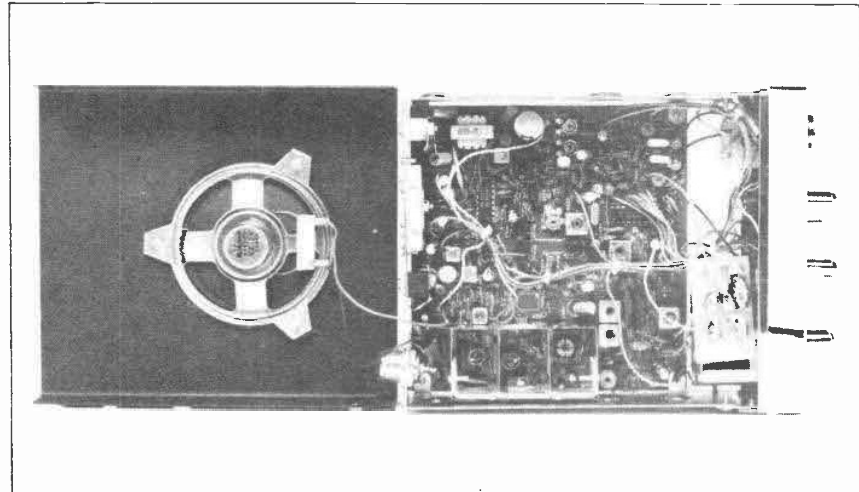
Front panel

Front panel controls are very simple indeed, 40 channels being provided together with a squelch control which worked satisfactorily, and a receiver audio gain control. The high/low switch becomes the repeater shift selector, which is useful. On the back panel is just an SO239 aerial socket, the 13V input, and a 3.5mm jack socket, for extension speaker. A microphone is supplied, together with a mobile mount, and instructions with circuit diagram.

The receiver was well on channel as was the transmitter, and SMC decided that the cheapest way for them to modify the rig was to change the crystals, and tweak up the rig. Many amateurs though have found it more appropriate to reprogram the EPROM, thus enabling some additional functions, although this would be awkward unless you have a good knowledge of these. The output power measured 3.9W across the band from a 13.8V DC supply. Harmonics were well below -60dB, but we did notice one spurious at around +500kHz at -40dB. Transmit quality was adequate,



Receive audio frequency response



but not too good, and mic gain, as supplied, was a little low, although deviation was around 2.5kHz. Many considered this deviation too low, but personally I think it's about right, taking all into account. I have had a lot of fun with the rig, which was very reliable, and obtained good contacts up to around 30 miles distance. At its price of just under £50 it seems quite a reasonable buy, but you should consider modifying one of the better CB rigs yourself, which would cost you much less. Unfortunately, relatively few CB rigs are worth having, and some of them would require a considerable amount of work for conversion. It is rather a pity that SMC could not convert their much better Oscar 1 rig, which performed well on CB. It must be a matter of economics here. There are already several hundred amateurs in the South East equipped for 10m FM, and numbers are increasing every week. Many have converted their own old CB rigs for the band very successfully, so why not either buy one or convert one, and have a go on 10m FM? Many have also installed a rig in the car for mobile, and it's worth while using a good mobile antenna, which can of course be far more effective than the regulation CB ones!

Having discussed a number of conversion problems with other amateurs on 10m, I thought a few alignment hints might be useful. Almost everyone peaks up the RF input correctly, and has a good attempt at tweaking the PA. Many forget

though that the range of the local oscillator goes up by nearly 2MHz, and it is advisable to tweak the tuned circuit which passes the LO to the mixer for 19MHz rather than the CB LO frequency some 10% lower. This should not only increase gain slightly, but it should improve RFIM performance considerably, as well as decreasing the throughput of any spurious; this should improve the transmitter as well as the receiver. The mixer RF input, and output of the RF preamp should be peaked for maximum S-meter reading, but the RF input tuning from the antenna relay should be peaked for best SINAD from either a signal generator, or from an attenuated aerial signal (to reduce band noise as well as a strong and co-operative signal on the band!) When the front end is tweaked, the correct position may not necessarily be maximum S meter reading, this applying only to the antenna input adjustment. Microphone preamp gain should be increased, but I suggest deviation should hardly be adjusted at all.

Thanet, the importers of Icom amateur radio equipment, wish it to be made clear that Icom Japan, has no connection with Icom in Taiwan who make CB rigs which are fairly easily converted. This was a surprise to me, as it was to many Icom CB converted rig owners!

I would like to thank SMC for loaning the Oscar 2 for review, and the many stations who have given me most useful reports on 10m FM.