



## Ben Nock G4BXD's Valve & Vintage

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# Russian Equipment on 70MHz

Proudly wearing his shiny new Curator's badge – it's Ben Nock G4BXD from the Military Wireless Museum in Kidderminster, Worcestershire who is 'on duty' at the counter of *PW's* vintage 'shop' this month!

A big "Hello" once again from **The Military Wireless Museum** in Kidderminster and I welcome you to my turn manning the *PW Valve & Vintage (V&V)* 'shop'! Things have been moving along quite nicely, numerous visitors have already been welcomed and I have received some encouraging comments on the collection to date.

More work is needed though, an extension to the display area is planned and better display shelving needs to be created. So, in the meantime, let's get on with this month's column!

### Russians & The 70MHz Band

Following on from my May 2012 column and the 70MHz (4m) band theme, I've been experimenting with the Russian man-pack, the R-159, which has a tuning range of 30 to 76MHz. Unlike

many military very high frequency (v.h.f.) radios that only have 25kHz steps the R-159, see **Fig. 1**, allows tuning in 1kHz steps so the rig can tune those odd frequencies on the 50MHz (6m) band – the 51.51MHz frequency for example.

On the 4m band the calling frequency for frequency modulated (f.m.) transceivers is 70.450MHz with channels either 12.5 or 25kHz either side. Having had the radio monitoring the calling frequency for a while using just its own whip antenna I knew it was capable of receiving quite well. I managed to find a suitable plastic dipole fixing centre and fitted it with two lengths of aluminium rod to make a half-wave dipole on 70.45MHz. This was then mounted at about 6m above ground level (a.g.l. on one of the

antenna poles I have on site here.

The R-159's manual states that it has an output of 10W – but despite this I'm getting just 8W indicated on my power meter even with a full 13V on the set. Nevertheless, with just the 8W I have managed numerous contacts with good reports on the audio from the Russian set's original carbon microphone. I've also managed to work several Summits On The Air (SOTA) portable stations as far away as south Wales and the Pennine mountain range!

The only modification I have carried out to the R-159 is to alter a spare headset I had and bring the received audio out to a loudspeaker because wearing the headphones was quite tiring on my ears! Incidentally, there's no volume control on the set, although it might have some form of automatic



Fig. 1: The tuning controls of the R-159 transceiver.

level circuitry though and the audio to the speaker is never excessive even on the strongest of signals.

While playing with the TRC-552, which I mentioned last time, that I had noticed the two small plastic screw covers visible above the two knobs in Fig. 4 of that article (p65 of the May 2012 *PW*). Unscrewing them, I found a switch in the left-hand side and a single slotted shaft in the other.

The four-position switch selects between 25 and 50kHz deviation on transmit and receive either with, or without the tone squelch operating. But adjusting the single slotted shaft both on transmit or receive has no noticeable effect so I'm still non the wiser as to its function.

As most 4m f.m. users are running ex-PMR radios there has been quite a bit of surprise when I tell the other station in the QSO that I'm using a Russian made military man-pack. In fact, the activity on 4m and the opening up of the band to quite a few other countries has given me thoughts about constructing a small beam, perhaps a 3-element Yagi type, that should increase my range and allow me to explore the band further.

### The British R-103 Receiver

I'm titling this section as the 'British R-103' as there's also a Canadian made R-103 receiver obtainable on the surplus market. During the time we were moving the collection I found I had two of these cute little receivers – but each had slight differences. The Reception Set R103, **Fig. 2**, is a small short wave receiver designed for – amongst other uses – as a monitoring receiver in the British Army's non-combat vehicles such as staff cars.

The fairly basic single conversion receiver design appears to date from the start or slightly before the outbreak of the Second World War. The receiver covers the frequency range 1.7 - 7.5MHz in two switched bands and is tuned by the widely used (at the time) 'Muirhead' type drive to which is attached a directly calibrated engraved tuning dial. The radio was powered from a separate 12V vibrator supply, the power supply box also housed the loudspeaker for the set.

The receiver is a seven-valve conventional single conversion superhet, consisting of a single radio frequency (r.f.) amplifier, a mixer/local oscillator, two intermediate frequency (i.f.) amplifier stages, a detector/automatic gain control (a.g.c.) and audio pre-amplifier, an audio output stage, and a beat frequency oscillator (b.f.o.) stage.

The two examples of the R-103 I



Fig. 2: The two R-103 receivers, note the 'magic eye' tuning indicator on the lower set.



Fig. 3: The Polish OP3 receiver and battery box.

have are serial number 1890 made by PR&T C. and 1018 made by MRO Ltd. They differ in that the PR&T version had had the b.f.o. removed and a tuning indicator fitted. I'm assuming the need to monitor Morse code signals was found to be unnecessary in a staff car role – hence the set's updating.

### Polish Resistance

A very recent addition to the clandestine side of the collection here at the museum – is a very small receiver that was designed by and used by members of the Polish resistance working in England during the occupation of their country by the Germans. There's a great deal of information on the web about the Polish theatre of operations – but I think a basic overview would be helpful to V&V readers.

For example, in Poland during the German occupation it was forbidden

for civilians to have any radio receiver. Therefore, there was a need therefore for a small clandestine receiver in particular when the 'VI' Bureau of the Polish General Staff operating in London wanted to send coded messages to the resistance or 'Home Army' through the broadcasting station *Wawer*, a transmitter operating in the UK and beaming towards Poland.

The requirement was met by the Receiver OP3 designed and produced by the Polish Military Workshops in Stanmore, North West London. The receiver, **Fig. 3**, is a four-valved single conversion superhet design tuning 500kHz to 1.5MHz and 2 to 12MHz in three bands all told. It can receive standard 'phone traffic as well as Morse code signals, a small switch when operated caused the i.f. stage to self oscillate.

The set plugs into a separate battery



box containing a 1.5 and 60V dry battery. Low impedance headphones would have been supplied with the set along with a length of insulated wire to act as the antenna.

On the side of the receiver case is an instruction plate giving directions in Polish – specifically for operators unfamiliar with radio operation. Instructions include: Connect aerial (approx. eight metre length) to socket A, ground to Z, headphones to T. Insert plug in battery box. Set switch ZAKR (band switch) onto wanted band, 500kHz to 1.5MHz, 2 - 5 MHz or 5 - 12MHz. (There are three ranges on the tuning dial visible through the curved lens on the set, **Fig. 4**). Tuning is done using the knob marked 'STR'



Fig. 4: The three tuning scales.



Fig. 6: The four valves and the b.f.o. switch (the two contacts and the metal shaft to the right of the centre valve).

combination. The four valves and the i.f. transformers are shown in **Fig. 6**, the small push-switch for Morse reception is visible just below the blue resistor.

The Polish AP4, AP5 and BP5 sets were also wonders of design and miniaturisation, the BP5 transmitter

or Strojenie (Polish for "Tuning"). Telephony: push button GR home, adjust strength of reception with knob SILA (volume). Telegraphy: pull button GR. To shut the receiver down remove plug from battery box.

As can be seen from the internal view of the set, **Fig. 5**, the Polish workshops and designers did an excellent job of miniaturisation at a time when components were so big. Indeed, the workshops produced some of the most miniature and clever designs of the war – including the AP7 unit.

The AP7 unit which was two boxes, each the same size as the OP3, creating a 3W transmitter-receiver

was capable of producing up to 50W of output. **Louis Meulstee's** great work, *Wireless for the Warrior* Volume 4 gives great detail of these sets and is worth a read for those interested in the subject.

### And Finally!

Well readers, that's about it for my latest stint at the V&V 'shop'. I hope you have enjoyed the selection I have bought you and there are more pictures at [www.militarywirelessmuseum.co.uk](http://www.militarywirelessmuseum.co.uk) and more pictures of the progress in the museum layout in the 'Museum status' page. As always I can be contacted at [ben@radiomuseum.plus.com](mailto:ben@radiomuseum.plus.com) Cheerio for now!

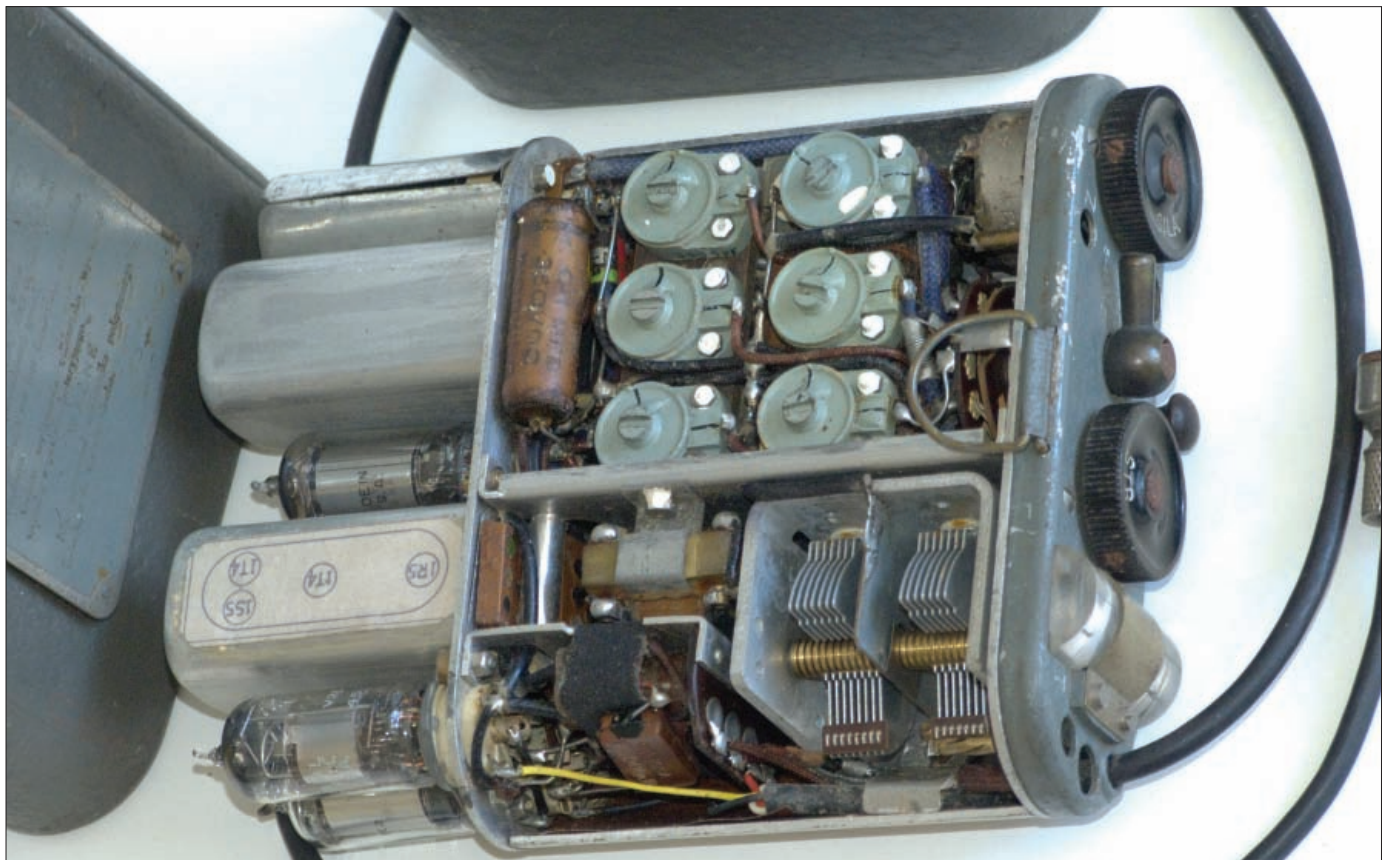


Fig. 5: Inside the OP3, "Compact or what?" asks Ben G4BXD.