

## **THE VMARS EQUIPMENT DIRECTORY – PART 1**

This is the start of an ambitious project: to try and make a useful guide to “collectible equipment” – of all types, military, commercial and amateur. This will be a series of articles, giving basic technical details, and a picture to help identify examples of a wide variety of equipment. Plainly this is going to take a while, and I have kicked the ball off, by looking at a few well known military sets. To ensure that we cover equipment of all types, periods and countries, **I will be dependent on input from you, the members.**

I thus warmly welcome contributions – please don't feel constrained to follow my format slavishly, but do try and provide a picture of the equipment, and please keep the length to about half a side of A4. If you are about to embark on something well known (e.g. the CR100 Rx), please contact me first to ensure that no-one else “has bagged that one” – then we can avoid frustration and duplication of effort.

*Richard Hankins, G7RVI*

### **Wireless Set No.19**

**Type:** 2 set transceiver: 'A' set: HF, 'B' set: VHF. Also intercom amp for tank crews.

**Frequency range:** A-set: Mk.I: 2.5 – 6.25MHz  
Mk.II & III: 2 – 8 MHz. B-set: 229 – 241MHz

**Modes:** A-set: AM R/T, MCW, CW. B-set: AM R/T.

**Tx output:** A-set: R/T 1-3W; CW 3-5W. B-set: 0.4W.

**Aerials:** A-set: vertical 8 – 16' rods; long wires. B-set used a  $\lambda/2$  rod, fed by coax cable an integral number of half-wavelengths long.

**Power supply:** 12V DC, 4 to 11A depending on Mk and mode. From lead-acid battery, charged by separate generator or vehicle generator.

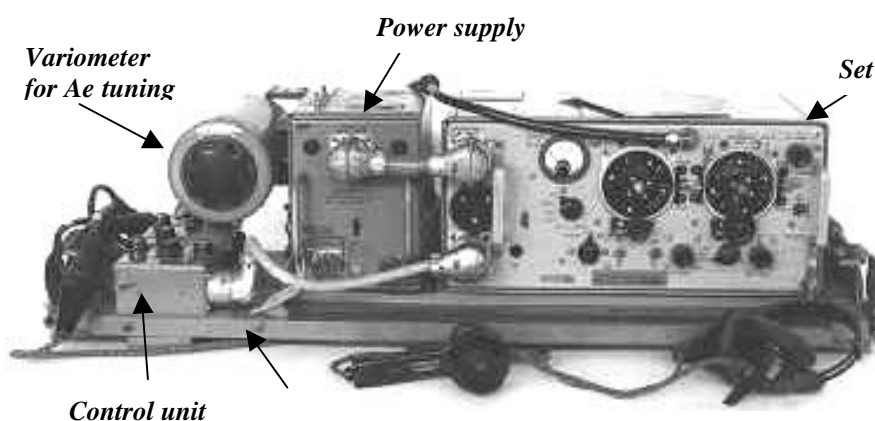
**Further info:** Wireless for the Warrior Vol.2.

**Major components:** set containing A-set, B-set (if fitted) and IC amp, power supply unit, variometer for aerial tuning, control unit for connecting headset/mic, carrier.

**Circuitry:** The A-set uses 9 valves. The Rx is a standard single conversion superhet, with a 455KHz IF. The Tx uses a mixer system based on the Rx LO to ensure Tx and Rx are on the same frequency. The PA uses a control grid-modulated 807.

The B-set has 4 valves. The RF valve is an oscillator on Tx, and a super-regen detector on Rx, with a separate quench oscillator.

**Variants:** Lots! Apart from the three Mk. nos, some sets had the B-set removed during 1950s reconditioning, and there is a major Canadian variant, which has front panel markings in both



English and Russian, as well as rarer ones from elsewhere. The Amplifier RF No.2, using 2/4 807s in parallel, turned the set into a WS19HP, which gave it a welcome range boost, with about 10-14W output on R/T. There are about 15 different control units, and many variants of these too.

**Usage:** introduced in 1941, and used widely by the Allies in WWII, and afterwards for many years. Typically mounted in tanks, other AFVs, jeeps, etc, but also used as ground stations, and in aircraft.

**Notes:** This is *the* classic military HF Tx/Rx, used by generations of amateurs after WWII. This is more due to samples being available in vast numbers at relatively low prices, rather than any great technical merit. It is still fairly common, though much beloved by the military vehicle fraternity. Watch out for examples butchered by previous owners!

I used several “brand new” sets in the early 70s, on the Cadet Force nets operating on 5330KHz. Despite low power, poor modulation, etc, they worked extremely well, offering reliable coverage from the UK south coast to Yorkshire on a simple dipole – some 300 miles!

### **Station Radio type C11/R210**

**Type:** HF Tx/Rx system with intercom amp for vehicle crews.

**Frequency range:** 2 – 16 MHz in 3 bands.

**Modes:** AM R/T, CW, FSK.

**Tx output:** HP: 45W; LP: 3-10W

**Aerials:** vertical 8 – 16' rods; long wires, dipoles.

**Power supply:** a) 'SUTR 24V': 24 volt DC input, 22A send, 6A receive, from lead-acid batteries. b) 'SUR No.30': 100 – 240 V AC input for ground stations.

**Major components:** C11 Tx, R210 Rx, power supply, ATU No.7, J1 control box.

**Circuitry:** C11 Tx uses 14 valves. On AM, high level anode and screen modulation is used. The R210 Rx is 15-valve, single conversion superhet with a 460 KHz IF.

**Variants:** the C11SSB/R210M added a USB mode with discrete 1KHz steps. Using early semiconductors and plug-in cards, it is well known for unreliability.

**Usage:** introduced in the 1960's, as a replacement for the WS No.52, in ground and vehicle stations.

**Notes:** This is highly usable HF transceiver, with good stable VFOs in both Tx and Rx. Indeed the sets are beautifully made, and a pleasure to work on (unlike the WS19!) as they incorporate hinged chassis to improve access. The Tx has enough power to make AM reasonable on 80m, though the R210 IF bandwidth is perhaps somewhat wide for modern conditions. The R210 does have an excellent "film scale" type frequency display, allowing good tuning repeatability. Both Tx and Rx have crystal calibrators built in.

### **Rx type R209 Mk.II**

**Type:** HF communications receiver.

**Frequency range:** 1 – 20 MHz in 4 bands.

**Modes:** CW, AM R/T, FM R/T.

**Selectivity:** 4-6kHz at -6dB, 13kHz at -40dB

**Image rejection:** 80dB at 1MHz, 20dB at 20MHz

**Stability:** 200Hz/MHz in first 60 mins from power on.  $\pm 50$ Hz/MHz per °C temperature rise.

**Audio output:** 50mW to built-in speaker, plus sockets for 2 sets of 150 $\Omega$  headphones.

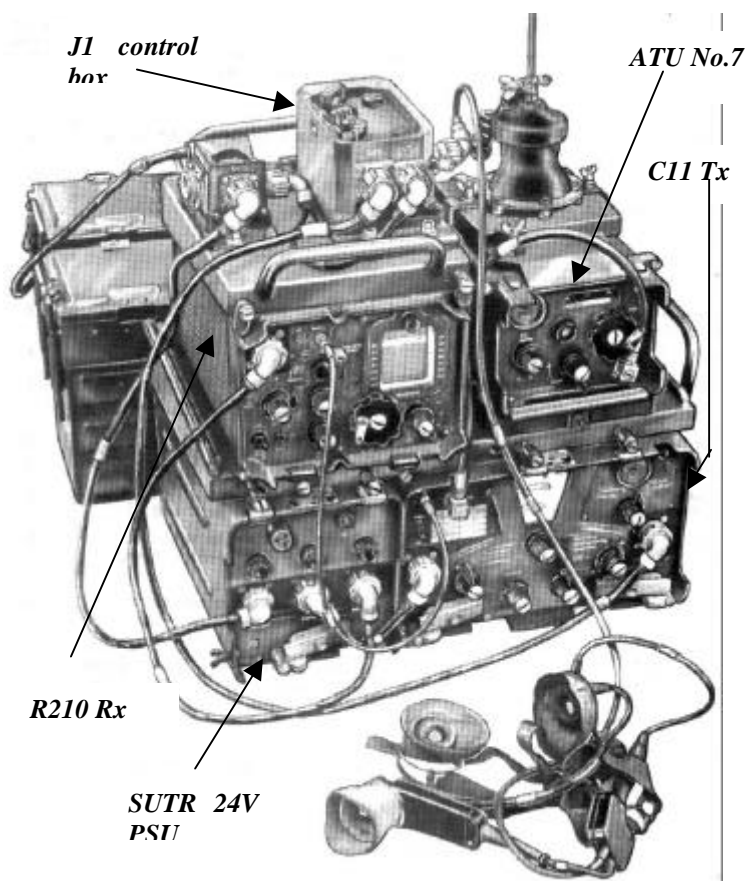
**Power supply:** 12V DC, at approx. 1.5A.

**Circuitry:** 11-valve, single conversion superhet with a 460 kHz IF. HT from an internal vibrator. There is a noise limiter, and audio filter on CW.

**Variants:** The Mk.I has a 6V DC input and internal circuit differences. The Mk.III runs on 12/24V DC, or 115/220V AC mains.

**Usage:** introduced in the early 1950's for general purpose use. Used in large mobile installations with the WS No.53 Tx.

**Notes:** this receiver has the advantage of being relatively small and light, and this makes it useful for field trips. The FM facility only really works well on the Mk.I set – it remains in the Mk.II but needs strong signals. It is unfortunately common to find the sets butchered by having the DC input or headphone socket swapped for something else: the correct plugs are available for those who search.



### **Rx type AR-88D**

**Type:** HF communications receiver.

**Frequency range:** 535kHz – 32MHz in 6 bands.

**Modes:** CW, AM R/T.

**Sensitivity:** for 20dB S/N:  $8\mu\text{V}$  at 1MHz,  $4.5\mu\text{V}$  at 4.3MHz,  $7\mu\text{V}$  at 16MHz,  $7\mu\text{V}$  at 28MHz.

**Selectivity:** 5 settings: -3dB bandwidths 15kHz, 9kHz, 3.4kHz, 1.6kHz, 400Hz.

**Image rejection:** 120dB at 1MHz, 60dB at 16MHz, 46dB at 28MHz.

**Audio output:** 2.5W into a  $2.5\Omega$  external speaker, plus  $600\Omega$  o/p.

**Power supply:** 100 – 260V AC mains. Also available is an external 6V DC vibrator pack.

**Size & weight:** 19.3"(w)x19.3"(d)x11"(h); ~100lbs

**Circuitry:** 14-valve, single conversion superhet with three tracking tuned circuits in front of the mixer. 455kHz IF with variable selectivity and crystal filter. Noise limiter.

**Variants:** The AR-88LF covers 73 – 550kHz and 1.5 - 30.5MHz, with an IF of 735kHz.

**Usage:** produced in 1940 by RCA and widely used during WWII by the Allied Forces.

**Notes:** this very fine classic receiver is still widely available at reasonable cost. "Battleship" construction provides excellent stability, and a beautifully smooth tuning action. Performance is excellent at the lower frequencies, and still reasonable at the top end. Renovation articles abound – see for instance, SWM Aug '93, and RB No.20, Christmas '92. If the magic of using old valved sets has not yet grabbed you, then try an AR-88D in good electrical and mechanical condition! Every vintage radio shack should have one!



### **Wireless Set No.88**

**Type:** VHF man-portable transceiver.

**Frequency range:** 4 crystal controlled channels. Type A: 40.2MHz, 40.9MHz, 41.4MHz, 42.15MHz. Type B: 38.01MHz, 38.6MHz, 39.3MHz, 39.7MHz.

**Modes:** FM R/T, 15kHz peak deviation.

**Tx power:** 250mW

**Rx sensitivity:**  $1.8\mu\text{V}$  for 20dB quieting.

**Rx selectivity:** -6dB bandwidth 20 – 30kHz.

**Rx image rejection:** 47dB

**Aerials:** 4' whip on set, 11' rod on remote aerial base.

**Power supply:** 90V and 1.5V dry battery.

**Circuitry:** Rx is a single conversion superhet, with an IF of 3MHz, and xtal controlled local oscillator. The Tx uses a free-running oscillator, with the Rx providing an AFC loop to correct frequency errors.

**Variants:** The WS88AFV allowed use in a noisy vehicle, with a separate vibrator power pack and audio amplifier.

**Usage:** introduced in 1947 as a manpack for ground troops.

**Notes:** one of the first manpacks to use VHF and FM. A really practical design, rugged and simple to operate (not even a volume control!), with set and battery mounted in web pouches on the signaller's belt. Fairly easy to find good examples, but not easy to legally use them these days: conversion to 6m is difficult, conversion to 10m is apparently easier (see PW, Feb '86). The deviation is high, IF bandwidth wide and sensitivity poor, so range is not good – but still a fun set to use. I used one frequently in the CCF – even "tandem mobile".

