

# Clandestine Radio

During WW2

# Clandestine

- Adjective:

- Kept secret or done secretly, especially because of illicit activity

- Why are people interested in these sets? Sometimes it is the romance or idea of a Clandestine radio. Sometimes keeping the history alive. But also because these are simple radios, readily built, employing (mostly) available tubes and are possibly the original QRP sets.

# Beginnings

- Beginnings the need for communication and encryption
  - By foot, horseback, homing pigeon, diplomatic pouch, and telegraph
- The new age of wireless
  - Marconi transatlantic communication 1903 led to Wireless telegraphic Act (UK) in 1904. Titanic sinking led to Merchant Shipping Convention Act 1914 (UK)
  - Great interest on part of Navy, in part because it extended communications beyond line of site, and because it could exploit insecurities
  - Lack of interest on part of Army (UK) cumbersome and insecure
- 1914-1918
  - Army (UK) no real need for wireless unless moving significantly (trench warfare), Airforce observation aircraft used wireless (better than dropping messages), Navy continued to improve wireless and (DNI) to develop signals intelligence (Sigint) with direction finding (Hunstation) and decryption (room 40). Battle of Jutland

# Beginnings

- 1914-1918
  - German Army embraced wireless early in the war (expecting rapid movement), 8th Army ordered to monitor Russian communications at Koensberg Aug 1914 in preparation for war and possible jamming. Ended up with Russian Order of Battle (sent in clear) and resultant German victory at Battle of Tannenburg.
- 1919-1939
  - Intelligence services (Security Service, Secret Intelligence Service, GC&CS)
    - underfunded, distrusted by embassies, left to their own devices started to use covert wireless communications
  - Sigint continued in earnest by all parties
    - Rare cooperation between intelligence communities
      - Polish Intelligence/ France/UK on breaking Enigma 1938
      - UK and US operation “Magic” on breaking Code Purple 1942



# World War 2 Changed Everything

- Sigint continued on both sides B-Dienst kept Rommel informed in North Africa, by intercepting US Military Attaché in Cairo. UK setup listening posts (Y service and SRS) all over UK.
- Dunkirk, threat of invasion, and need for secure mobile communications in the UK, became the problem for SIS Section VIII (communications) located at Waddon Hall about one mile from Bletchey, they also handled Ultra dispatches (SCUs). Because Section VIII was responsible for both ends of SIS communications, they also developed and manufactured covert wireless equipment for SIS operatives, including the Mark VII (Paraset)

# Mk III (tinker box) 1940-1943

- Designed by Bob Hornby and improved by Wilf Lilburn, this transmitter was used by SIS out stations, “diplomatic” stations and mobile SCUs. It employed a 6V6/6F6 crystal OSC followed by an 807 final. Power supply was self contained adapting to all known line voltages and used a 5Z3 rectifier. Operated 160/80/40 m band. RF output was about 25-30 Watts. Later versions employed an external power supply. Receiver was usually National HRO senior.



# Mk V Transceiver (1941) La Paracette

It was the first WWII spy radio dropped by parachute into occupied France in 1941. The French nicknamed it Paraset or La Paracette. The Mk V consists of a transmitter, receiver and power supply unit (PSU), mounted together in a wooden frame 430 x 275 x 180 mm. It was commonly supplied in a suitcase and weights no less than 18 kg, which is one of the reasons why it was known as the Agent Killer. Another reason was that the transmitter output was so strong, that it caused interference in nearby broadcast receivers. Additionally, a later version had a simplified receiver that could be detected from some distance. It made the Mk V an easy target for the German direction finders. RF output was 20-25 watts and used 6V6 Xtal Osc and the 832 RF Amp, receiver was regen 1v1 and used three 6SK7 valves.



# MK VII also known as a Paraset (1942-44)

- Short range successor to MkV (there was no MK VI) . Transmitter was a crystal controlled 6V6 receiver was regen employing two 6SK7 valves frequency range was 3.4 to 7.6 Mc/s Power output was around 5 Watts. Employed an external Power supply that adapted to various mains voltages and another power supply for 6 VDC. Original set was housed in a wooden box later ones in a hinged Cadmium metal box (cash box version)



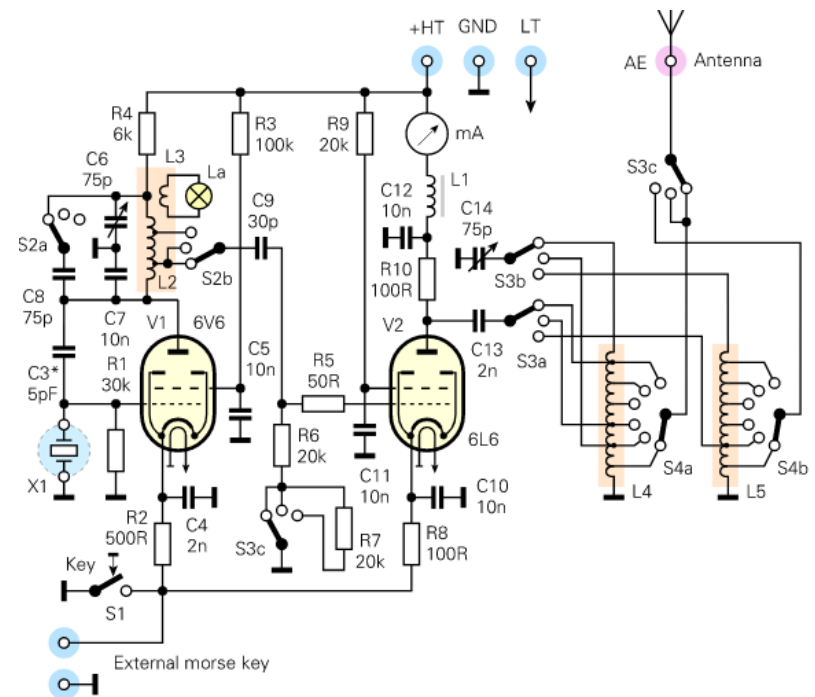
# Other sets from Whaddon Hall

- MK IX: No photos survive, an “ascension” FM set (30-37 Mc/s) used from ground to air 25 watts output, only set to use FM (see S-phone) used 815 Or 832 double tetrode rectifier 5Z3 (1943).
- MK X; No photos exist higher power using 813 PA around 150 Watts RF, used on some clandestine naval vessels and SCU9 stations (1944)
- MK 33: Higher output Mk III used 807 in PA about 50 W output



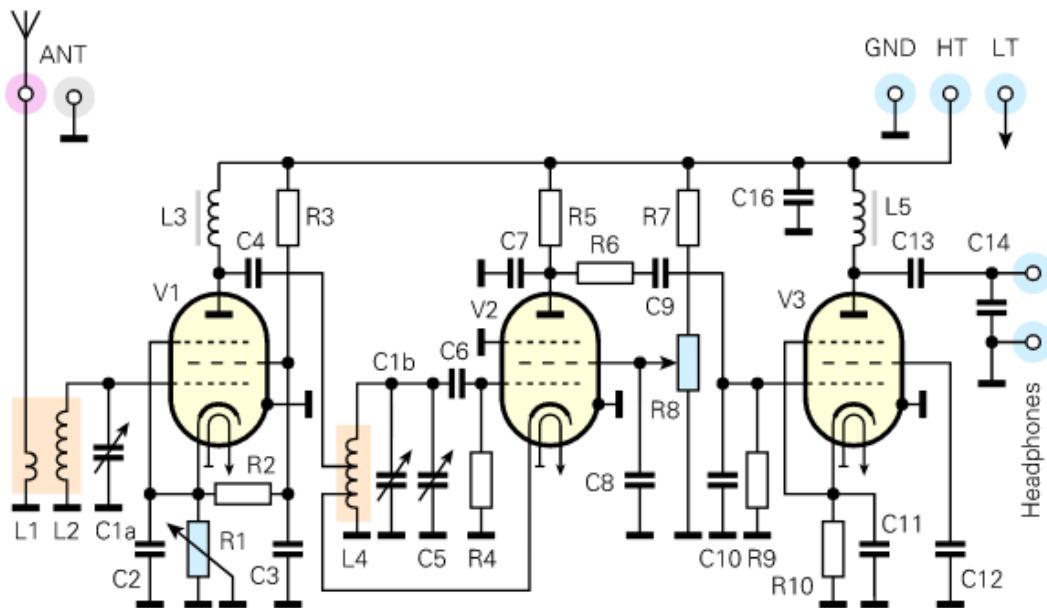
# MK XV

- Housed in two wooden cases, it covered 3.5 MC to 16 MC. The transmitter used the newly developed U.S. metal tubes, using the 6F6 as an oscillator and the 6L6 as a power amplifier. The transmitter had an output of 15 - 20 watts.



# MK XV Receiver

- The separate receiver was a 1V1 regenerative set with an RF amplifier to reduce RFI.





# MK XVI

Slight Variation on MK XV





# MK XXI

- MK XXI: Battery powered TX/RX 1v1 receiver using 3 x 1T4. TX uses 1s4 LO and 3A4 PA power out .75 watt



# Other radios developed for use by Allied forces

- To make life interesting for the Secret services, SOE, was created in 1940, along with MI9 and others. SOE particularly resented relying on SIS communications (SIS thought them to be irregulars and outright amateur) so set off developing their own equipment. Similarly, other Allied nations developed their own equipment

## Type 3 MK 11 set (1942-43)



Manufactured by the Radio Communication Department of the SOE at Stonebridge Park. The transmitter was crystal controlled and used an EL32 for the MO and a 6L6 for the PA, it covered 3 to 16 Mc/s in 7 bands. The receiver covered 3.1 to 15.2 Mc/s using two tubes, a 7Q7 and 7R7. The Power supply could accommodate all possible mains voltages as well as 6 V DC



# Type A Mark III (1944)



Manufactured by the Marconi Company in the UK in 1944, close towards the end of WWII. It was intended for clandestine operations on occupied territory, by agents, special forces and resistance units. The transceiver came as a replacement for the rather bulky Type 3 Mk.II (B2) Operating between 3 and 9 Mc/s, RX was superhet using 7Q7 and two 7H7 valves (IF 1.2 Mc/s) TX had a max. of 5 W and used 7H7 and 7C5 valves. PS could use all mains voltages and 6V DC

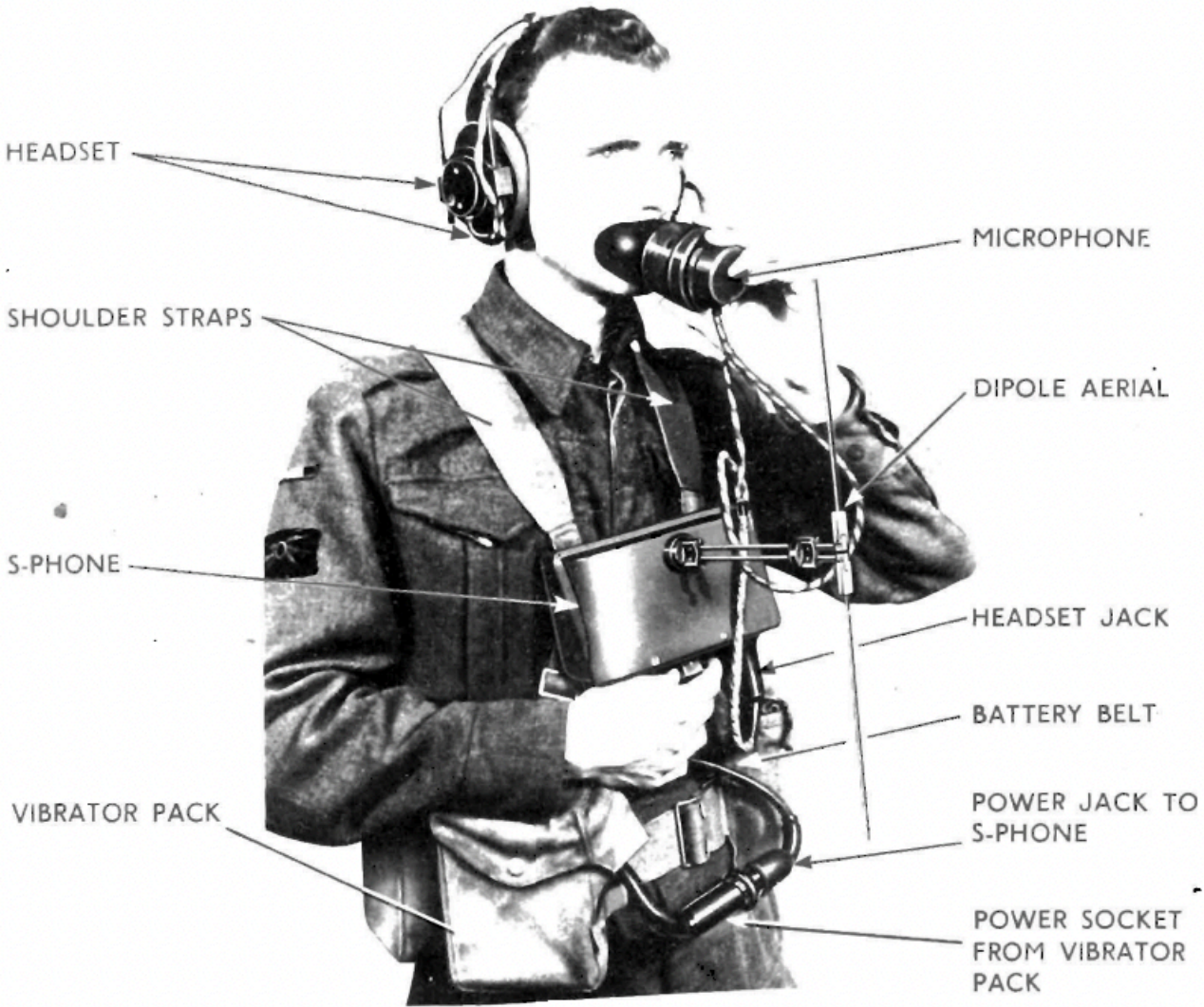
# S Phone (UHF duplex ground to air)



The S-phone was a two-way full-duplex UHF radio system, developed in 1942 in the UK, for use by the Special Operations Executive (SOE) during WWII. It was used by resistance groups and SIS agents operating behind enemy lines, for communication with intelligence officers in airplanes, flying close to the occupied territory at high altitude. The S-Phone consisted of a ground unit and a matching airborne unit. The ground unit is also known as Type 13, Mk II, Mk III or Mk IV

Ground radio TX operated at 337 Mc/s Airborne TX at 380 Mc/s antenna was very directional. Power output was between 0.1 to 0.2 Watts It used two RL18 valves in the transmitter and an RL18, XV5, and XP valve in the super regen receiver

# S Phone as worn (from manual)





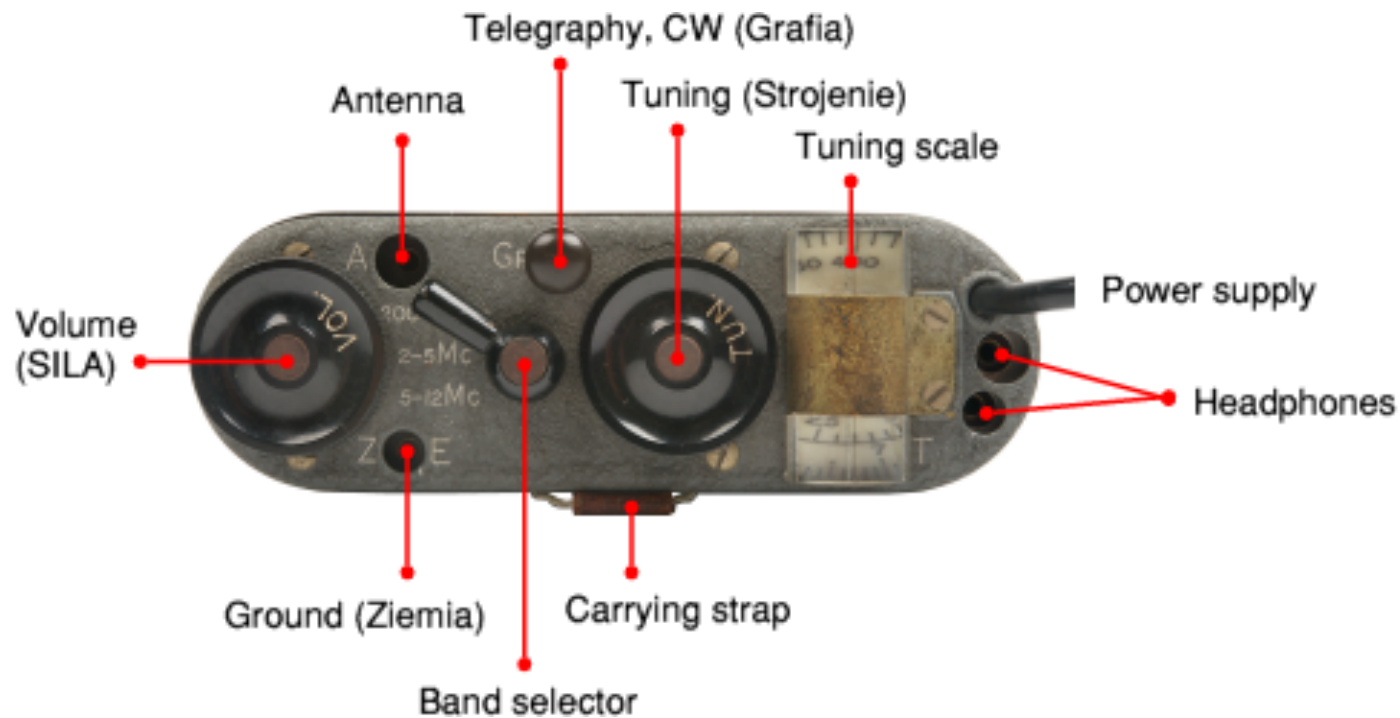
# BP-3 Polish spy radio set



Developed during WWII by Tadeusz Heftman of the Polish Military Wireless Unit (Polski Wojskowy Warsztat Radiowy) in Stanmore (UK)

Operated from 2-8 Mc/s with an output of 50 W CW, a later BP-5 employed an AM modulator. RX was superhet using 6K8 6Sk7 6SQ7 and 6SC7 TX used 6V6 and 629, also used by SOE it was considered better than UK counterparts

# OP-3 Polish clandestine receiver

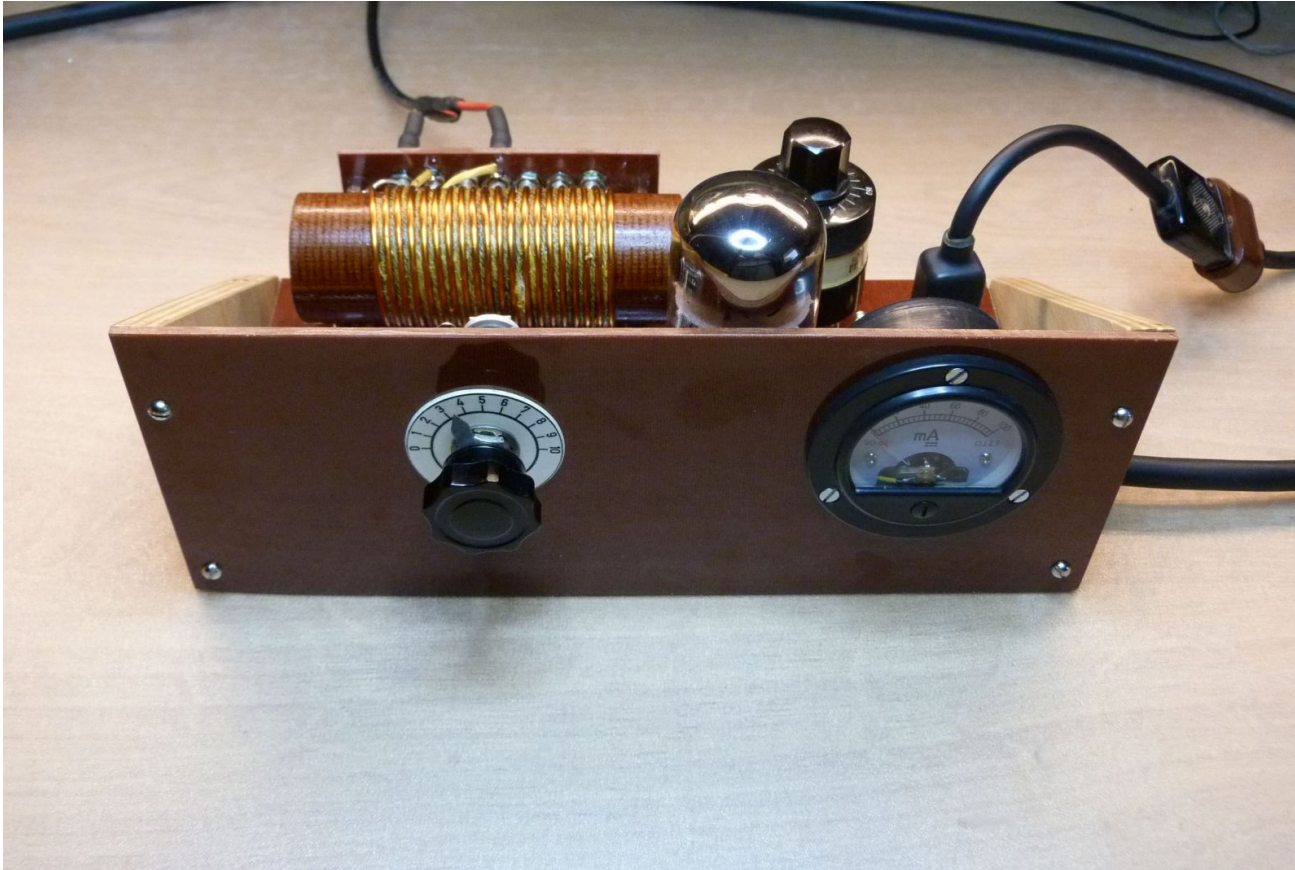


This was a portable clandestine receiver, developed and built during WW-II by the Polish Military Wireless Unit (Polski Wojskowy Warsztat Radiowy) in Stanmore (UK). The receiver was introduced in 1943 and was intended for the reception of the BBC and Polish Radio Broadcasts from London. It is also known as Type 30/1 and was sometimes used as backup for clandestine radio sets.

Although the receiver is valve-based, it measures only 4 x 12.5 x 17.5 cm and weights just under 1 kg. It is housed in grey metal 'slip-on' case with rounded sides. A similar case is used for the high and low voltage batteries.



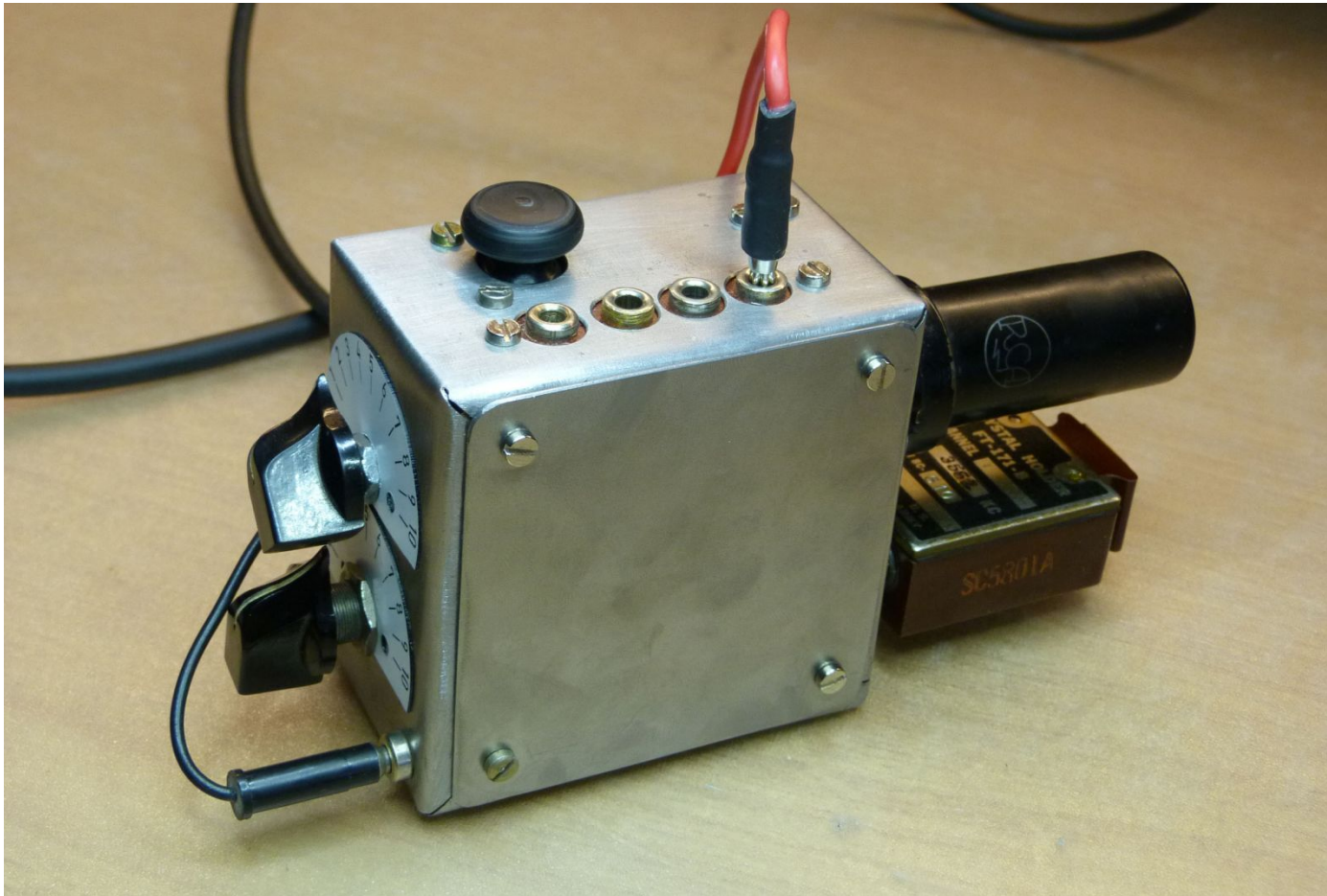
# Czechoslovakian NK-1 transmitter



The Czechoslovakian partisans, exiled in Great Britain, were mostly parachuted to their homeland. a radio set was dropped on a separate parachute, as it was too heavy to carry it on the agent's body. Should the radio set get damaged or lost they needed a "plan B".

The radio operator carried a set of parts and an instruction manual to build his own spare transmitter on a piece of breadboard. It is a very flexible design, as the coils are plug-in (80m, 40m) and a number of taps provide a very flexible antenna matching.

# The OK1AU transmitter (replica)



Jan Budík was a radio engineer in Prague/Czechoslovakia. When the conflict with Germany became obvious, Jan was asked to design a very small clandestine transmitter for the government

This little box is extremely well designed, as it provides a built in key, flexible antenna-match and a good tone. You can also design it as an adapter transmitter, using the final tube of a broadcast radio and the voltages present in the radio.

# RBZ Receiver (1943)



The US was rather late to the game, this was a miniature tube receiver (1T4 RF, 1R5 OSC/MIX, 1T4 IF, 1S5 det, and 1L4 AF. Covered 2-5.8 Mc/s later extended to 13 Mc/s, used in D day landings and some raids, mostly dropped behind lines for Resistance to listen to BBC.

# Axis covert radios

- The UK wasn't the only one running spies and covert radios, most of these radios were seized/used by the UK Security service as part of Operation XX.



# Radione R3/RS20M: (original) A German WW2 set used by spies and other special commands.





# S88: (replica) Transmitter



A spy transmitter of the "Abwehr", the military secret service of the Germans in WW2. Used for the wartime spy activities called "Hummer Süd" and "Hummer Nord" (lobster north and south) in preparation of "Operation Seelöwe" (operation sealion)

# SE88 and SE85 (replica) Transmitter and Receiver



Wulf Schmidt, a double-agent known mainly with his alias "TATE" used this set. The TATE radio is the only set known when the Abwehr combined the transmitter S88 with KL2 tube (2W) and the wartime German Abwehr standard receiver as a special version using 3x KF4 battery tubes instead of the usual 3x CF7.



# SE88/5 in an inconspicuous suitcase



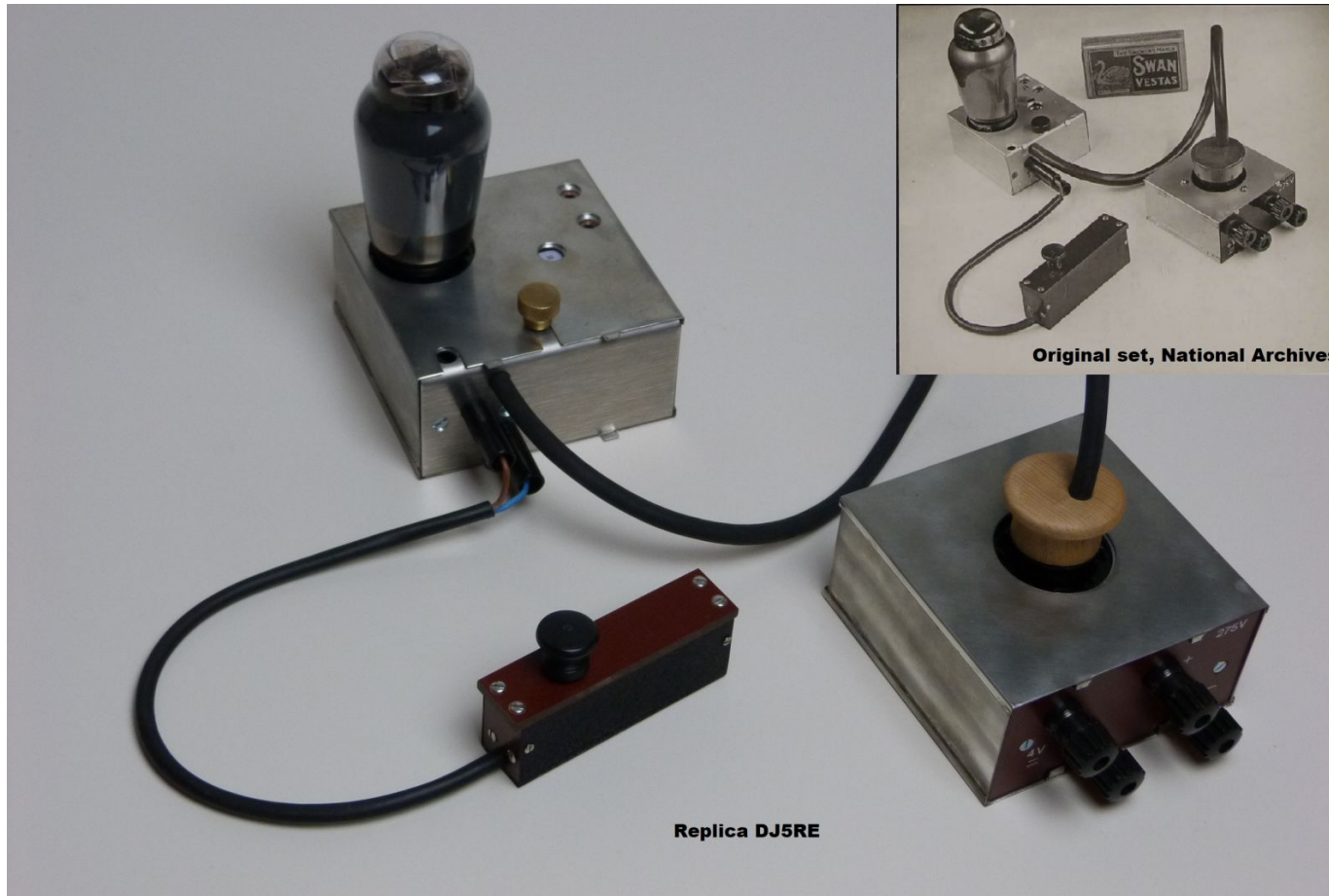


# SE85/14 (replica) transmitter and receiver



German Abwehr spy set from WW2. Transmitter crystal controlled using AL5 tube and built in mains supply. Receiver E75, regenerative 1-V-1 with 3x CF7 and PSU GLE85. The transmitter is able to double the crystal frequency

# German WW2 Adapter-Transmitter: (replica)



This tiny box tried to solve the bulkiness of spy radios. The principle is simple: All you needed was a normal domestic radio with a known final tube for the audio of the radio, unplug the final tube, insert the adapter plug instead and put the tube into the adapter. All voltages were obtained from the radio, the AF tube is now used in a RF power oscillator.

This unit with the AL4, producing about 3W RF power. If you could not find the right radio, there was another box with 4mm screw-connectors. So you could buy dry-cells to run the transmitter. The transmitter was not crystal controlled but used a VFO with a small knurled knob for finetuning.

# RRN-3: Italian spy receiver



Employed: 3x EF6 tubes regenerative design: preamp, detector and AF stage (1-V-1) 6,0-14,4 MHz Magnifier lens scale. RRN-3 plus the transmitter TRN-3 forms the set RN-3, the Italian version of the German SE 85/14.

# References

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