

**Equipment History File**

**Wireless Sets No. 19 (British Army 1941)**



**“One of the Wireless Sets which won the war”**

**1. Application:**

Wireless Sets No. 19 (WS19) was a mobile transmitter-receiver designed by Pye Ltd in Cambridge to provide radio communications for Armoured Fighting Vehicles (AFV) in the British Army. Military radio equipment like this was called ‘wireless’ because the transmitters and receivers were not connected by wires. The design was quickly adapted for use in a wide range of other vehicles; wireless trucks, jeeps, ground stations and even aircraft. Versions of the equipment design were also used by Australian, Canadian, Italian and Russian forces, and the equipment was manufactured in the UK, Australia, USA and Canada.

WS19 enabled the British AFV to communicate both with headquarters and one-another while in battle, thus partly emulating the successful German concept of fast moving mechanised warfare. The in-service life was from 1941 to 1960 and it was replaced by Wireless Set C12 and C13.

**2. Description:**

Each WS19 radio unit contains three separate systems. The ‘A set’ was a High Frequency (HF) radio transmitter-receiver for communications up to 50 miles. The ‘B set’ was Very High Frequency (VHF) transmitter-receiver for short-range line-of-sight communications up to 1 mile. A separate audio amplifier was provided for intercommunications between members of the crew.

In addition, WS19 was designed for both local control by the wireless operator, plus remote control by each member of the AFV crew. A system of remote control boxes was distributed around the vehicle with a microphone/headphone assembly provided for each member of crew. Quick release “snatch plugs” enabled the crewmembers to disconnect and evacuate the vehicle at speed if it was damaged by enemy fire.

The WS19 equipment was constructed on a robust steel chassis to withstand the vibration found in tanks and armoured cars, and used a separate rotary motor-generator power supply unit to provide the voltages necessary to operate the thermionic valves. A separate aerial tuning unit was used to match the transmitter output to the 12-foot aerial rod mounted on the turret or roof of the vehicle.

Typical interconnection diagram for WS19 in a 5-man tank

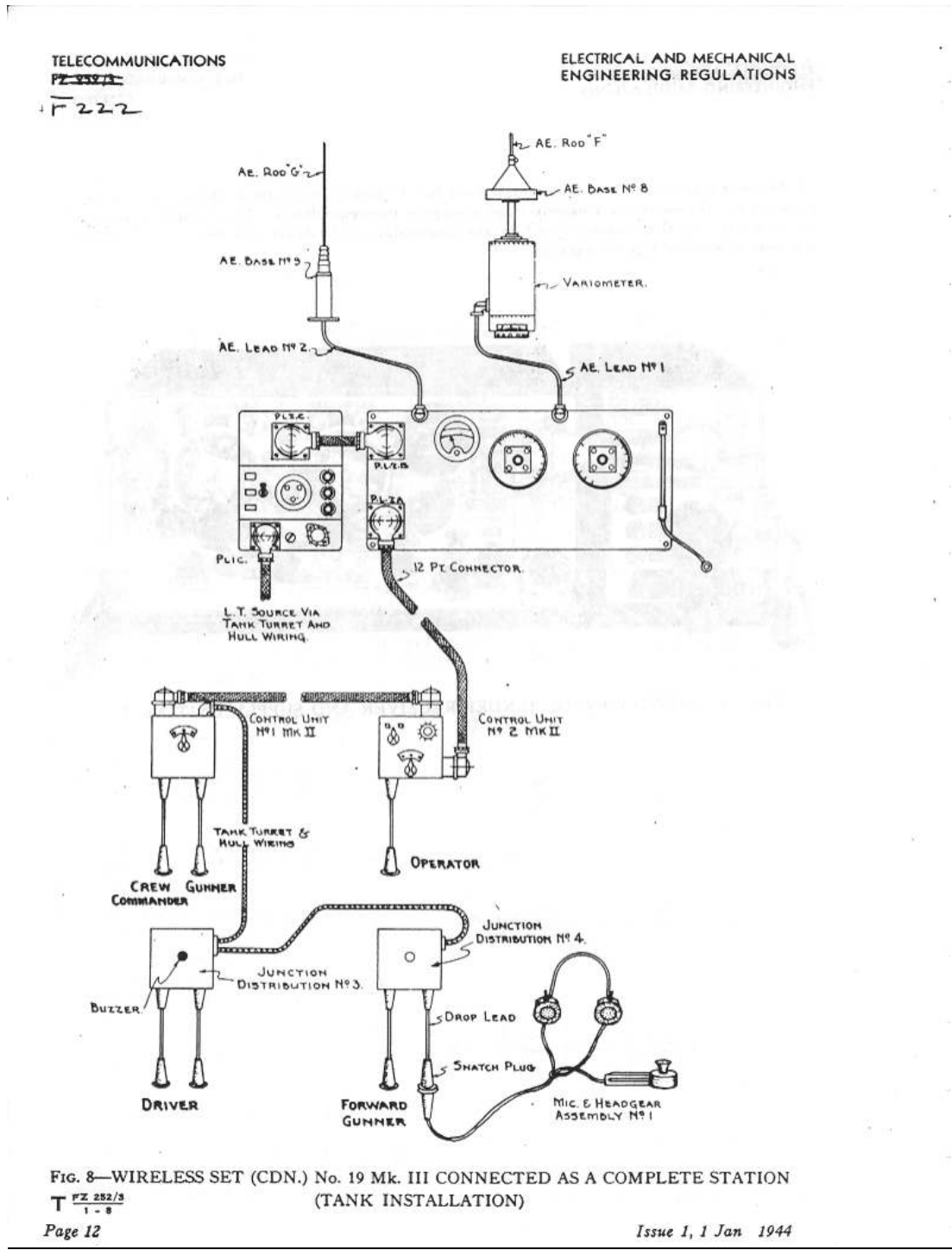


FIG. 8—WIRELESS SET (CDN.) No. 19 Mk. III CONNECTED AS A COMPLETE STATION (TANK INSTALLATION)

T PZ 282/3  
1-8

Each vehicle crew member had a headset and microphone connected to the WS19 for intercommunication between the crew and wireless communications to other army units.

### **3. The History of the 19 Set**

The Royal Signals history records that the British Army began the Second World War with wireless communications facilities which were both inadequate in performance and insufficient in quantity. The Army also made a fundamental error in assuming that frequencies above 30MHz would be unsuitable for tactical communications use, unlike Germany and the USA.

A specification for new wireless equipment for use in AFV was issued in 1937 but was not progressed with any urgency until the early part of WW2, following initial experience of combat against the well-equipped Germans. In 1940 a design by Pye of Cambridge was adopted with urgency and rushed into production, although at the time it did not meet the full specification.

Although designed specifically for use in tanks and armoured cars, the WS19 was found to be sufficiently versatile and robust that it was quickly installed in a wide variety of other vehicles. Pye could only supply a finite quantity of sets and so three other British manufacturers; Ekco, Philips Mitcham Works and AGI were used to boost production.

In late 1941, to further increase supply of WS19 and make the equipment available for use by other Allied forces, production began in Canada by Northern Electric, Canadian Marconi and RCA Victor. Later, the equipment was also manufactured in the USA by Zenith, RCA and Philco. Many of these USA manufactured equipments had the front panel labelled in English and Russian for supply to Russia under the Lend-Lease scheme.

### **4 Technical Specifications**

Frequency range:	A set - MkI: 2.5 - 6.25 MegaHertz (MHz), MkII & III: 2 - 8 MHz B set - 229 - 241MHz
Modulation modes:	A set: Amplitude Modulation (AM) for speech, Continuous Wave (CW) and Modulated Continuous Wave (MCW) for Morse code transmission. B-set: AM speech only
Approx Power output:	A-set: AM & MCW 1-3 Watts (W); CW 3-5W, B-set: 0.4W
Number of valves	15 thermionic valves (termed tubes in the USA)
Size/weight:	WS19 17.5x8.5x12.5 inches – 40lbs Power Supply Unit 6x8.5x12.5 inches – 25lbs Aerial Variometer 10x5 inches cylinder – 5lbs
Power Supply:	12 Volt (V) or 24V lead-acid batteries driving rotary motor-generators, which provide 275V at 120 milliAmps (mA) for the receiver and 500V at 50mA for the transmitter.
Antenna System:	A set: 8-16ft vertical rod or horizontal long-wire B set: 25 inch vertical rod (½ wave)

### **5. References & Sources of Further Information**

1. Electrical and Mechanical Engineering Regulations F252/3 Issue 1, War Office, 25 Jan 1943
2. Meulstee L. (1998) Wireless for the Warrior Volume 2, Dorset; G C Arnold & Partners
3. Nalder R.F.H. (1953) The History of British Army Signals in the Second World War, London; Royal Signals Institution
4. Duxford Radio Society, [www.duxfordradiosociety.org](http://www.duxfordradiosociety.org)
5. Pye Telecom History Group, [www.pyetelecomhistory.org](http://www.pyetelecomhistory.org)