

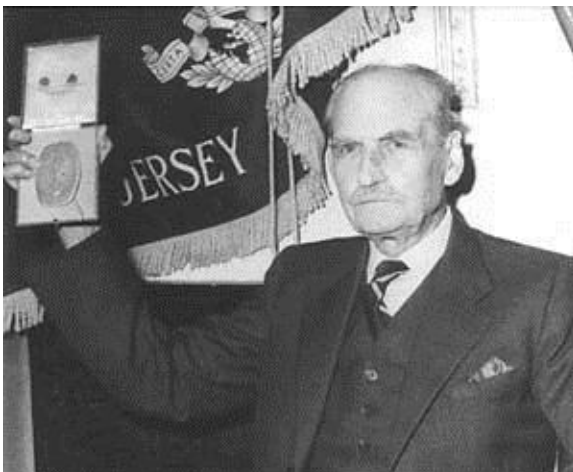
## Smallest Morse Key - Field Telephone Set D.MK.V

By VE3MPG Blog



This small key is part of a WWII Field Telephone Set D.MK.V. As you can see the set is in very fine condition and complete. It came up at a flea market many years ago and I dug it out of storage yesterday to have a good look at it. The original field telephone called the “Fullerphone” was developed during the First Great War by Captain A. C. Fuller.

**From a document by *Louis Meulstee, PA0PCR* - 1915 . . . the British and German armies were densely packed in their trenches, at places only a matter of yards apart. Communication was mainly by telephone and various Morse buzzer telegraph instruments, connected by a single wire and earth return. During mid-1915 the Germans were extraordinarily well informed of Allied plans. Espionage was suspected but an interned British civilian brought back the information that induction from cables led to overhearing.**



Maj. Gen. A.C. Fuller with the Princess Mary Medal.

Experiments carried out within the Allied lines left no doubt of the cause of the leakage. The solution to the overhearing problem came toward the end of 1915 from Captain (later Major General) A.C. Fuller, who invented the Fullerphone, a small direct-current Morse telegraph instrument. In October, Fuller brought two prototypes to 5 Corps in Flanders. His invention was tested on a five-mile loop of cable, part of which ran in the water-filled moat of Ypres with a 10-ohm leak to earth. The prototypes worked well. They were obviously the answer to the problem of overhearing by induction which had brought the British Expeditionary Force almost to a standstill in terms of signals.



### ***Working principle of the Fullerphone***

The Fullerphone is essentially a DC Morse telegraph instrument with high sensitivity. Morse signals can be sent and received by the same instrument, no send-receive switch being used, so "break-in" working is possible. When sending, a very small direct current flows through the line and the receiving instrument. A readable signal is produced with a current of only 0.5 microampere! To make the DC Morse signals audible, Fuller added an interrupter for changing the steady current into an intermittent current, suitable to produce a tone in a pair of headphones. The result is that dots and dashes sent by the key at the far end are received as short and long notes at the receiving end. Fuller completed the circuit by inserting capacitors and LF chokes to keep the current in the line relatively constant.

### *Features of the Fullerphone*

*Fullerphone signals cannot be overheard by induction or earth leakage and can be tapped only by the direct connection of a similar instrument to the line. The Fullerphone can be used simultaneously with a telephone or buzzer telegraph on the line. Working via leaky or very long cables is possible. However, the normal range for reliable communication under field conditions is 25 to 35 miles. Much greater ranges are possible under special conditions (e.g. open-wire lines in the desert) or by putting in a minor circuit change.*

*During 1939 a newly designed Mk IV model went into service. It was more sensitive than its predecessors, with a more easily adjustable buzzer/interrupter, and simpler to use as it carried no telephone set. Small modifications, such as radio-interference suppression of the buzzer and insertion of a crash limiter across the phone jacks to limit line static, were carried out on the Mk IV model.*



Tobruk-1942... A row of Mk.IV Fullerphones in use at an Australian headquarters in the Western Desert

In 1943 a tropicalized version was issued. This Mk V model had a similar circuit but tropicalized components. The Mk VI Fullerphone, the last type built, was completely tropicalized and immersion-proof.



The D.M.K.V was used by British, Canadian and United States forces during the war.



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*Cases arose where a submarine cable circuit was available but the necessary telegraph terminal equipment was found totally destroyed or was not immediately available. To ascertain to what extent Fullerphones could be used on submarine cables of various lengths, trials were carried out in 1943 by Cable & Wireless Ltd. at request of the British War Department. The results exceeded any expectation; ranges of up to 700 miles were obtained with faint but readable Morse signals at a maximum of 20 words per minute.*

So there you have it – a very interesting story about an innovative piece of communications gear developed almost 100 years ago and used in two World Wars.

And that's the rest of the story!