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# The B2 Spy Set

**Tony Smith G4FAI** describes the B2 Spy Set, its use, its users, and the dangers they faced in clandestine operations.

**T**he B2 spy set, or Type 3 Mk.II, to use its official designation, was one of a series of SOE (Special Operations Executive) clandestine sets designed in 1942 by **Captain John I. Brown G3EUR** at SOE Station IX, The Frythe, near Welwyn, Hertfordshire. It was the best-known of all the sets used for clandestine operations in WW2.

When used by agents and resistance groups operating in occupied territory, it was normally carried in a suitcase with all necessary accessories. When used by military personnel operating in the field with partisan groups, etc, it was packed in two watertight containers, dropped by parachute, and then carried as backpacks.

### Danger from Detection

The function of a clandestine wireless operator was to keep in contact with a Home Station in Britain; to receive instructions, to send information on enemy activities, and to arrange parachute drops or landings of other agents, or supplies, as required.

In a transmission to a Home Station, using a B2 or other clandestine set, operators, having

sent a message, would have had to wait for an hour or more for a reply confirming that the message had been received and understood.

They were advised to limit transmission on a given frequency to no more than five minutes, but complicated coding and decoding procedures sometimes meant that messages were quite lengthy and had to be transmitted over longer periods of time.

During these transmissions, according to **Pierre Lorain**, in *Secret Warfare, the Arms and Techniques of the Resistance* (1984), German DF (direction finding) stations in France were monitoring all frequencies up to 30Mc/s; and when an unauthorised or suspicious signal was detected they were able, by triangulation, to identify an area, roughly 10 miles long on each side, within which the suspect station was operating.

### Disappear into the Night

Local units were alerted, and detector vans often disguised to resemble civilian vehicles, were dispatched to each corner of the identified triangle to obtain a more precise location of the target transmitter.

If the triangle could be reduced to a much smaller, identifiable area, armed foot patrols, with portable radio-detection equipment, could identify an individual building and find the illicit station, often with fatal consequences for its operator if captured.

Apart from limiting transmission time, operators were also advised to use a battery supply whenever possible as use of a mains supply could be a factor in their detection.

Once a suspect transmitter was located in a particular area, a tracking team sometimes cut off the mains electricity supply to that location. If the monitored transmissions suddenly stopped, the team knew they were getting near to the transmitter. A sudden cut

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in power also provided a warning to operators that the enemy were not far away. If they were wise, they would pack up their radio and disappear into the night before the Gestapo found them.

### QUG

According to **Prof. Juliette Pattinson**, writing in *Secret War* (2001), operators sensing trouble sent QUG to their Home Station, meaning “*breaking off transmission. I am in imminent danger.*” It has not been possible to find any other reference to the use of this signal but, as Prof. Pattinson interviewed many surviving members of the SOE for her book, there seems to be no reason to doubt it.

In the official Q-code, QUG means “*I am forced to land immediately*” and use of this by an agent in danger seems to be a reasonable adaptation of the original meaning in the absence of any specific code for the purpose.

The time taken from the detection of a suspect signal to the dispatch of vehicles to the approximate area of transmission, as described, was about 14 minutes. By early 1944, according to Pierre Lorain, the Germans had developed an automated DF system that would have enabled a transmitter to be located within a circle of a half-mile radius, after simply hearing an agent’s three-second acknowledgement sent to the Home Station.

The operation of clandestine radio transmitters was fraught with danger due not only to the success of the enemy’s DF operations but also betrayal by Nazi collaborators, unexpected security checks or simple errors. Although there were exceptions, the overall result was that the average life of a clandestine wireless operator was only about six weeks.

### Home Stations

The SOE Home Stations in the UK were manned by men and women of the Royal Corps of Signals, the FANY, and the Women’s Services. FANY, the First Aid Nursing Yeomanry, was founded in 1907 as a small unit of nurses on horseback providing a link between the battlefield and field hospitals. In the Great War its members drove ambulances and ran field hospitals. In WW2, some 4,000 of them served with the SOE and ATS (Auxiliary Territorial Service) in Communications, Signals and Cipher departments.

Many were posted to SOE Home Station 53a at Grendon Underwood, Buckinghamshire, where they monitored, received and acknowledged messages from agents in the field who were using B2 and other sets.

Some of them, including 11 wireless operators, went into the field. Of the 50 women agents parachuted into occupied



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Europe, 39 were FANYs, of whom 13 were captured and executed by the Gestapo. More information about their invaluable contribution to the war effort can be found at: [www.fany.org.uk/history](http://www.fany.org.uk/history)

### Security Lapse

Security was all important but eventually grew lax. To avoid the need for repetition,

all messages received were recorded. ‘Fingerprinting’, a comparison of pre-recorded operator’s Morse sending styles, or ‘fists’, with the styles of the recorded messages received, was used to verify that the sending operator was not an enemy substitute.

A further precaution was the inclusion of security checks in the messages sent by the operators, or the sending of deliberate errors,

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**Photo 1:** FANY operators at a Home Station.  
**Photo 2:** Complete B2 set in a suitcase.  
**Photo 3:** B2 set in two watertight containers.  
 Used by military personnel working with partisan groups, etc. **Photo 4:** Installation of a clandestine aerial to avoid visual detection. From **B2 Operating Instructions**. **Photo 5:** Miniature Morse key used with the B2 set. (Photo, courtesy John Snell GORDO, morsemad.com) **Photo 6:** B2 Operating Instructions included with the set.

if they had been captured and were being compelled to send false messages under duress.

Later in the war, Home Station staff were instructed to ignore any errors on the assumption that the messages were being sent by the operators under pressure in conditions of great danger, and that it was inevitable that some errors might be made in their keying. This led to occasions when it was not noticed that a captured operator was trying to warn the Home Station that a resistance network had been infiltrated.

### Operation Englandspiel

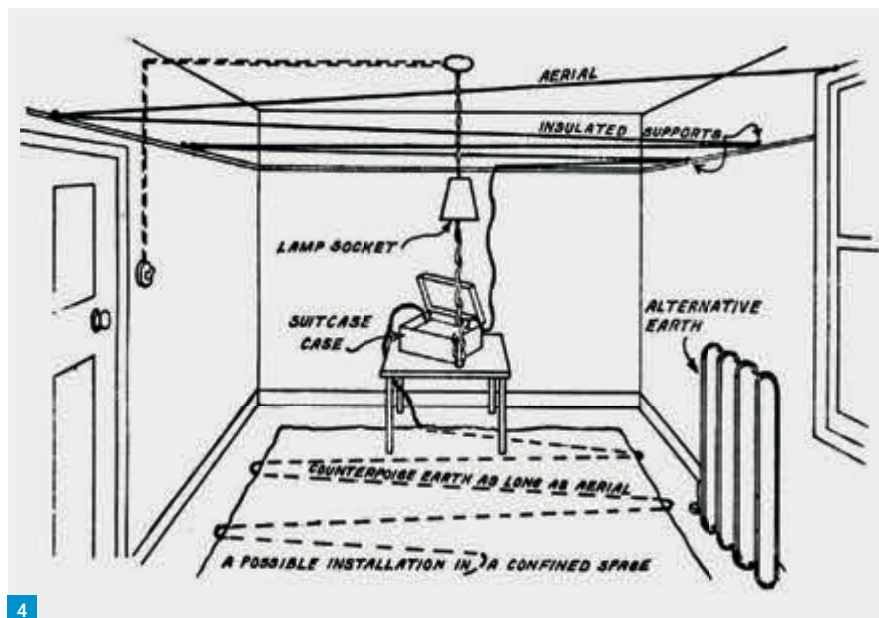
In March 1942 the German counter-espionage service achieved its greatest success, and the SOE its greatest setback. For the next two years, in an operation called Englandspiel (England game), the Germans controlled the entire Dutch SOE network. They operated a dozen W/T links back to the UK, deceiving the SOE into sending additional agents, weapons and supplies to Holland, to be captured by German welcoming parties.

54 SOE agents were captured and 50 were executed. Other losses included 400 members of the Dutch underground, arrested or killed, twelve RAF aircraft and 84 aircrew.

It ended in April 1944 when the Germans closed their operation, sending a mocking message in plain language, addressed by name to the head, and his predecessor, of Section N of the SOE (which was responsible for Dutch operations) saying, "We are aware that you have been doing business in the Netherlands for some time now without our help. Since we have been your representative for a long time, we find this very unfair. But that does not rule out that, if you decide to come and visit us on a large scale, we will prepare you the same welcoming reception as your agents".

### With the Partisans

The Balkan Air Force (BAF) was an Allied air group, operating mainly over Yugoslavia from June 1944 until July 1945, in support of partisans fighting the occupying German forces. The Balkan Air Terminal Service (BATS) was formed by the BAF to plan and co-ordinate supply dropping to the partisans.



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BATS teams parachuted or flew into Yugoslavia to set up and maintain remote landing strips for aircraft flying in supplies, flying out wounded partisans, or transporting SOE and OSS (US Office of Strategic Services) operatives.

**Len Key MBE G0FQX**, writing in *Morsum Magnificat* (MM) in 1989, described his experiences using the B2 set as a member of a BATS party in 1944.

His team comprised an officer, a sergeant, two wireless operators (including Len) and a medical officer. Their radio equipment was not the usual B2 field set but the suitcase version, with a petrol driven generator, and batteries. The original miniature key was used throughout the entire operation.

The generator ran almost continuously to keep the batteries charged as the B2 was in constant use. It was operated to schedule several times a day and transmitted many special reports as required.

Len described it as the ideal equipment for the operation. When asked to change frequency by his Base station, this could be done in a matter of minutes. The set was lightweight and could be packed away quickly when the group were under attack and had to move. It was robust, and the padding inside the suitcase absorbed any shocks from heavy handling.

### Indo-China

The B2 was also used in later theatres of war. **Francisco Marinesco F6EQC** served in the French Army in Indo-China, now Vietnam, from 1947 to 1959. He recalled that the wireless networks he worked with used mainly B2 sets. Despite some limitations – no break-in or audible sidetone – the sets worked for years

practically without maintenance, handling dozens of messages a day. He said that in many ways it was just like working a small homebrew amateur radio station of that time.

### Miniature Morse Key

The miniature key provided with the B2 set was produced by the Multitone Electric Company Ltd for various SOE sets designed by Captain John Brown G3EUR. Writing in *MM* in 1987, John wrote: "A flex-pigtail was added soon after first production to reduce 'key-bounce' caused by cathode current passing through the hinge-screw. The key's main merit was that it could be fitted into the cramped spares-box."

"It was not popular with the users who knew what a good key should be, and many preferred the extra size and weight of Army/RAF keys. It speaks volumes for those heroes who used the key under stressful conditions, in various countries around the world, that many thousands of groups of five-letter cipher were sent and successfully decoded."

Today, examples of this key are difficult to find. They are popular with collectors although they may not be fully aware of the uses they were put to and the dangers experienced by those who used them.

### Post-War Release of B2 Sets

In 1947, a limited number of surplus B2 sets were made available for members to purchase through the Radio Society of Great Britain (RSGB). Articles were published in the society's *Bulletin* on how to modify them in various ways for amateur use, including conversion to AM working and bandspreading. In 1948, *Short Wave Magazine* published modifications for topband use, commenting,

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## Valve and Vintage

*"There seems to be no limit to the versatility of the B2."*

Some of the sets occasionally appear on the market today, modified or unmodified, and fetch high prices, sometimes in the several thousand-pound range. In a BBC *Antiques Roadshow* (July 2021), a B2 found in a metal toolbox in an old barn, was valued at ten to fifteen thousand pounds.

Originally the property of **Sgt F.L. Church, Royal Signals, G3CUW**, it appeared to have been set up as an amateur station. G3CUW was last listed in amateur callbooks in the late 1960s/early 1970s so the set had probably been sealed in its box, and preserved in good condition for around 50 years. It caused a sensation and attracted widespread press coverage. A BBC clip featuring the valuation can be seen at:

<https://tinyurl.com/59rv66ru>

### Memorials

Those who are privileged to own B2 sets, or other clandestine sets from the same era, should be aware that they are not just WW2 curios. They are surviving artefacts, memorials to the incredibly brave operators who risked or lost their lives as a direct result of operating them in the deadly environment of enemy occupied Europe and elsewhere.

The Commonwealth War Graves Commission has made a short film about the B2 as part of an educational pack about **Noor Inayat-Khan**, the first woman wireless operator to be parachuted into occupied France during WW2.

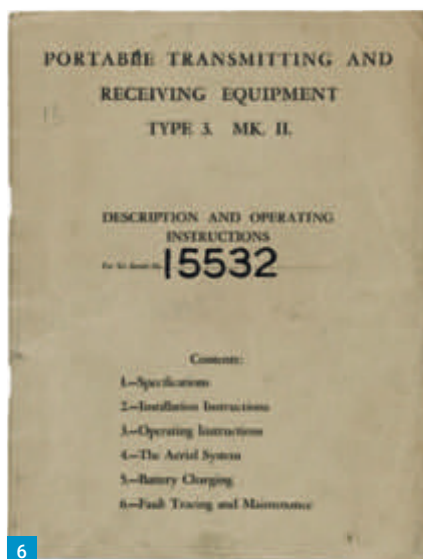
Close-ups of the set show its various features in fine detail; and **John Ellerton G3NCN** at the RSGB National Radio Centre, Bletchley Park, describes how it was used and how it was operated. The film can be seen at: [www.youtube.co/watch?v=U3Z2UJmltSU](http://www.youtube.co/watch?v=U3Z2UJmltSU)

### B2 Specification

- Transmitter: Crystal controlled. CW (Morse) only, with plug-in tank coils, covering 3.0 to 16.0Mc/s, which were reversible to obtain the highest possible efficiency in transmission.
- Range: up to 1,000 miles or more.
- Power Output: 15-20 watts, depending on frequency used.
- Receiver: Four-valve, seven-stage superhet, IF 470 kHz, covering 3.1-15.5Mc/s in three bands.
- Tuning: 50-1 slow motion vernier dial, graduated 0-150.
- Audio output: 50mW to 120Ω headphones.
- Power Supply: Combination power pack. For AC operation a mains supply of 97-140V or 190-250V was required. For DC operation, a 6V car battery of the highest



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capacity obtainable was required to provide a current of up to 10A when transmitting. When packed in the military containers, two 6V batteries were included with a hand generator for charging the batteries.

- Weights: Fully equipped suitcase set, 34lbs (14.7kg). Fully equipped set in two watertight containers, 47lbs (21.32 kg).
- Spares Box: Containing 60ft of aerial wire; 10ft of earth wire; miniature Morse key; headset; fuses; four spare valves; screwdriver; two brass pins to convert mains plug to Continental wiring; ES/BC adaptor; four tank coils for the transmitter covering 3-5.5, 4.5-7.5, 6.5-10.0, and 9.0-16.00Mc/s; and four crystals for designated transmitting frequencies.
- Maker/Date: SOE Station VIIa, located at Bontex Knitting Mills, Beresford Avenue, Stonebridge Park, North-West London, 1942.
- Comprehensive instructions included with the set provided information and advice on operating; maintenance; fault-finding; receiver alignment; suitable aerial systems for various situations and locations; how to confirm that available mains supplies were suitable for the equipment; and instructions on the care and charging of batteries. **PW**

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