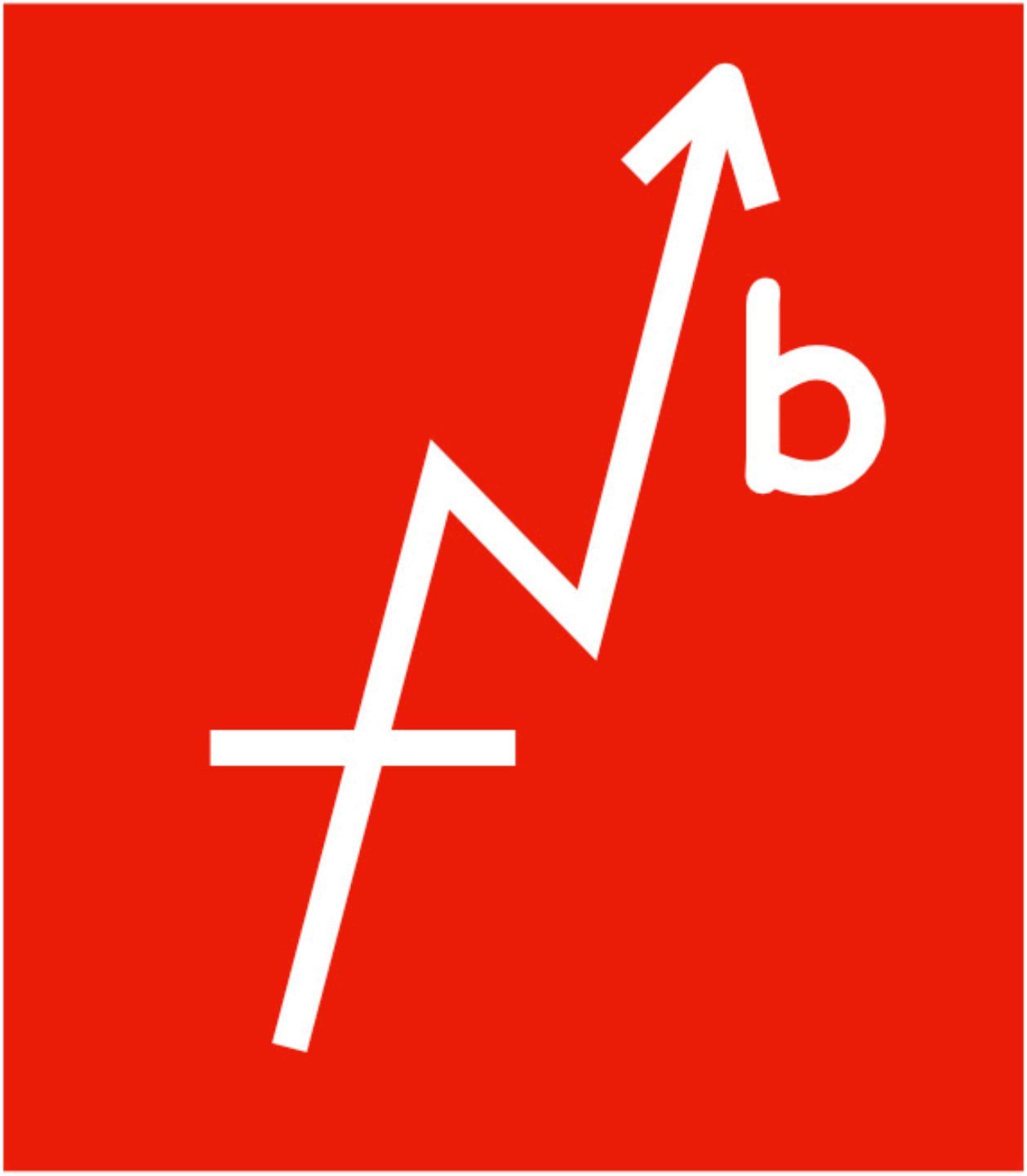
German “Feldfunksprecher” radio telephones of WW 2



A is for - Fuspr.a.1 4
B is for - Feldfu.b 12
C is for - Feldfu.c 27
D is for - KlFuSpr.d 34
E is for - Feldfunksprecher extras 48
F is for - Feldfu.f 59
H is for - Feldfu.h 67

The radio telephone - a small, portable two way radio that can convey a spoken message over a usable distance - had long been a dream for military planners but only became a technical possibility once developments in radio valves, radio circuit design and battery technology came together in the mid 1930’s. A key feature was the use of VHF (nowadays defined as frequencies over 30 Mhz). A physical consequence of using higher frequencies is that the antenna can be shorter, clearly a short antenna is a desirable feature for a radio telephone. At the time however, it was widely believed that VHF behaved quasi-optically, so it would be useless once visual contact was lost.

The German army however saw potential in VHF and experimented in secret with VHF radios for their newly developed tank arm. These experiments proved that VHF did scatter and reflect sufficiently to get around obstacles like buildings and trees and that a low powered VHF radio would have sufficient range of about a kilometre in most tactical circumstances. Around 1936 this led to the first limited production radio telephone used by the German army, the “Funksprecher a”. Although the production of this first radio telephone was refined somewhat before the war, production remained limited and their use was still seen as experimental. It was not until after the initial Blitzkrieg battles of 1939-40 that the urgent tactical need for radio telephones was recognised. This culminated in the more rugged “Feldfunksprechers” b and c in 1941.

The Feldfunksprecher became the standard basic radio used in German units, with four Feldfu.b’s issued to each infantry company. The title page reflects the tactical sign for a Feldfunksprecher radio, an upwards “Blitz” with a score (like in the letter f) with e.g. the letter b to denote the type of Feldfunksprecher.

The name “Feldfunksprecher” echos the name “Feldfernsprecher” of the standard field telephone used by the Wehrmacht, indicating their very similar tactical use as the basic wire and wireless means of communication. As the war progressed, further versions of the Feldfunksprechers were developed, mainly to liaise with armoured vehicle VHF radios; each of these types was given a different letter. For this reason I have structured this document as an A,B,C of Feldfunksprechers, even though not all letters were actually used to denote types. For example, I have slotted the accessories developed for these radios under the “E” for extras, so the document does not necessarily always follows the chronology of the development of the equipment.

The Feldfunksprechers seem to generate an interest with WW2 historians, uniform collectors and re-enactors, as well with the more specialised radio collectors. I have aimed to provide relevant information to all these groups in this document aiming to highlight the development, the many rare accessories, the tactical use and some of the technical features of these radios.

A is for - Fuspr.a.1

The German army had long dreamed of a "Patrouillenfunkgerät" or "Walky-Talky" but the technology only came together in the late 1930's. The new generation of army valves coupled to the successful development of VHF technology meant that a compact radio with a manageable antenna length could be developed. The resulting radio was called the "Funksprecher a", shortly followed by the Funksprecher a.1 (Fuspr.a.1):

Figure1: The Funksprecher a1

The Fusp.a/a1 receiver is based on the superregenerative principle. Valve 1 (SD1A diode) acts as an oscillator/ detector after which the audio signal is passed through valves 2 (RV2P800) and 3 (RL2P2) for amplification. When transmitting, valves 2 and 3 act as microphone amplifiers with Valve 1 acting as oscillator/mixer and power stage:

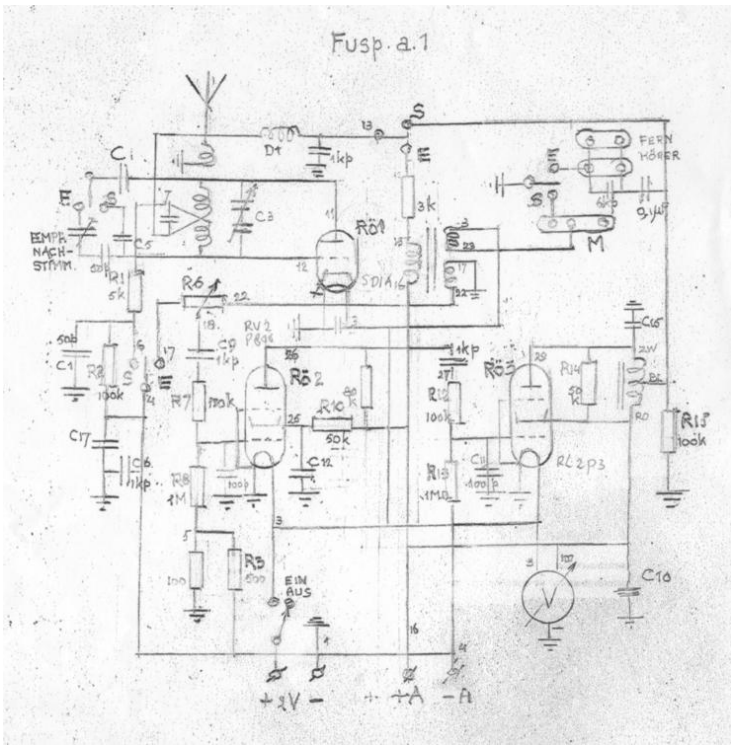


Figure 2: Funiksprecher a1 schematic

The radio electronics are compactly build and only takes up a small part of the radio box. As is still true today, the size of the device is largely determined by the size of the power supply and batteries it needs:

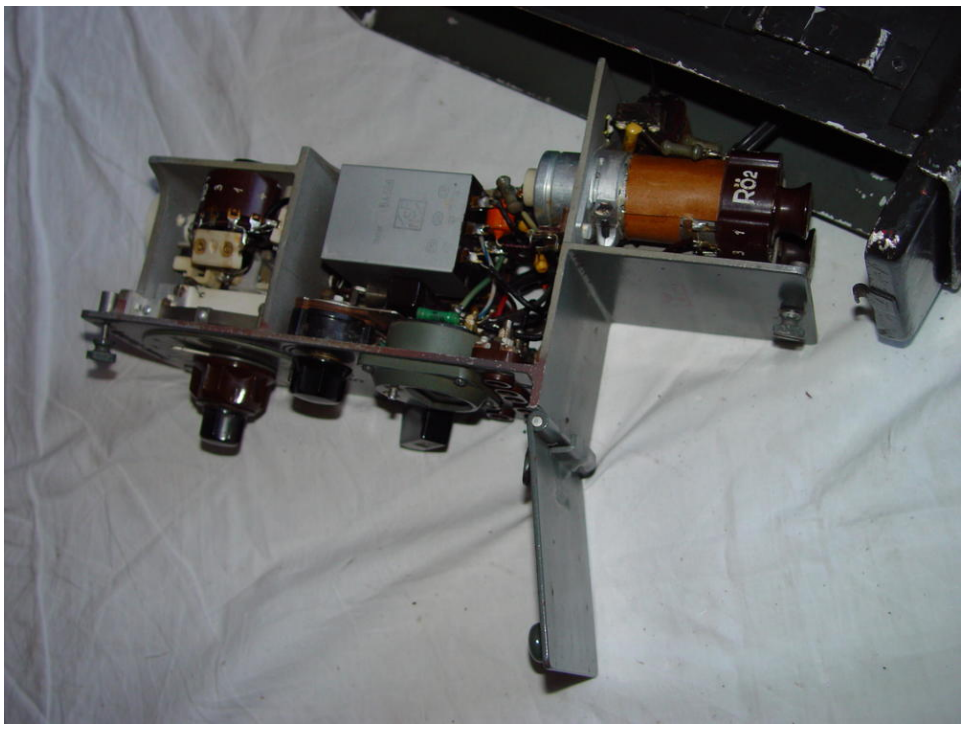


Figure 3: The electronics inside the Funksprecher a1

The early Funksprecher a version had a lever as a Transmit/Receive switch, which could be operated with a cable. This cable mechanism proved troublesome in the field, so with a more conventional Transmit/Receive switch the radio went into series production as the "Funksprecher a1" (Fusp.a.1).

The radio operated from 120 to 156 Mhz, with the frequency scale calibrated in channels (151 to 178); this gave a channel distance of 1.33 Mhz.

Housed in an aluminium box, the radio had a minimum of controls: the frequency control was at the top, with the receiver fine tuning placed coaxially with the main frequency control knob. Under that were the on/volume control and the send/receive switch. A instrument allowed the battery voltages to be checked. Under that were the connection sockets for the headphones and microphone. A small storage section at the bottom allowed the storage of spare valves:

Figure 4: Funksprecher a1 control panel

Housed in an aluminium boxThe radio could be carried on the back using two standard radio straps:

Figure 5: Sideview of the Funksprecher a1 showing the carrying straps

Figure 6: Top view of the Fusp.a1 showing the antenna socket and carrying strap

Figure 7: Backside view showing the brackets for accessories bag

The top of the box contains the hooks for the carrying straps, a carry handle and the antenna socket. The Fuspr.a.1 legend is painted in white on top of the box:

The back of the box has a bracket to attach a bag to hold the accessories. A long webbing belt could be passed through two loops at the bottom of the box, it appears this belt could be used independently of the belt and equipment of the infantry soldier wearing the radio:

Figure 8: Righthand view showing battery compartment

Figure 9: battery compartment

The right panel opens up to reveal the battery compartment:

The bottom compartment held a 2B19 filament battery while the top compartment held the standard 90 Volt Anode battery. Webbing straps are provided to hold the two batteries in place.

The batteries fully take up the available space inside the radio box, so any other accessories have to be stored outside the box.

The 2B19 battery is a half size version of the more common 2B28 battery. The 2B19 supplies 2V filament voltage and has a capacity of 19 Ah.

Figure 10: 2B19 battery

With the right hand side lid closed, a small air vent ensures that any vapours from the 2B19 battery can be dispersed:

Figure 11: battery lid closed

On the left side, the closed lid is marked with E/S (Empfänger / Sender) to indicate which side to find the transceiver:
The front panel hinges open at the bottom to reveal the radio control panel:

The standard Dfh.a and Kmf.b throat mic were used with the set. A small bag for the accessories could be attached to the back of the radio.

Figure 12: Front lid closed

Figure 13: radio with headset and antenna connected

A sectioned antenna plugged into the antenna mount on the top of the box completed the radio.

Here a similar looking section from a Feldfu.b antenna is shown, the antenna would have another two sections of similar length:

By plugging in the headphones, microphone and antenna, the Fuspr.a.1 is ready for use. At this time (1938) the standard Dfh.a and Kmf.b would have been used:

Due to the omission of the cable operated Transmit/Receive switch, operating the radio while carried on the back proved impossible without a second operator walking behind.

The lid for the radio hinges open and can be slid into a compartment under the radio for safe storage:

Figure 14: front lid is first opened….

Figure 15: …and the lid can be slid in a compartment under the radio

The very few period pictures showing the FuSpr.a.1. in use show it carried on the chest instead, so that the operator could operate the transmit-receive switch and other controls. Operations also proved that the aluminium housing was too weak and that the radio was too easily damaged. Battery life was also limited, so when it came to design the successor to the "Fusp.a.1", all these weaknesses were addressed.

This successor is off course the Feldfunksprecher series introduced in 1941. Here are a Fusp.a.1 and a Feldfu.f side by side:

Figure 16: From Funksprecher to Feldfunksprecher

Limited numbers of Fusp.a.1 were used during the Blitzkrieg campaign. We know from a surviving drop container designed to hold six radios that the Fusp.a1 was used by the Fallschirmjäger during the Norwegian campaign.
When the Feldfunksprecher series of radios were introduced in 1941, the Fusp.a.1 was relegated to second line duty. From this time, the Fusp.a.1 was sometimes referred to as the Feldfu.a. Its early manufacture in relatively low numbers make the Fusp.a.1 probably one the rarest of the Feldfunksprecher variants around today.

B is for - Feldfu.b

After the initial Blitzkrieg campaigns, the army decided it wanted a number of improvements made to the Fuspr.a.1. Although the concept was proven, the FuSp.a.1 had a number of weaknesses: The manual switching between receive and transmit, the weak aluminium casing and the short battery life were addressed by a brand-new design using the new 2.4 Volt valves.

Rather than an Anode battery, the new radio received a switched power supply (Wechselrichter) to supply the high voltage to the valves. The volume control and receiver fine tuning were fitted to a remote control unit that could be plugged onto the radio or worn on the belt. At the same time, the frequency range of the new models was slightly adjusted, the new "b" model would operate from 90 to 110 MHz. Like before, the frequency dial was calibrated in channels, this time channels 211 to 240. The new radio was called the "Feldfunksprecher b”.

Figure 17: the Feldfunksprecher b (left) and later developments

With that the channel distance about half that of the Fusp.a.1, two Feldfu.b's operating on different networks should be kept at least 20 meters apart and have at least 2 channels separation. To tell the Feldfu.b apart from other models, a red dot was painted on the rear lid and a red feeler shape added to the top of the casing. The antenna was also marked in red to avoid confusion.

The early Feldfu.b's had a 80 cm long two part sectioned antenna: a short antenna rod on the bottom and a longer "whip" section on the top giving it a range of about 1.2 km. In 1943 the two part antenna was replaced with a 72.5 cm long foldable "Bandantenne". The bakelite casing of the Feldfu.b still proved too weak, the rim of the casing and the hinge of the rear lid would easily break so in early 1944 a sturdier casing was introduced and with it the Felfu.b1 model. In late 1944 a final modification was made, the electronic circuit was re-designed to contain one less valve, this simplified model was the Feldfu.b2. The Feldfu.b, b1 and b2 models remained fully compatible with each other.

Figure 18: Feldfu.b, Feldfu.b1 and Feldfu.b2 comparison

From the front angle, the main identification is the the name of the Feldfunksprecher painted on top of the box.

Likewise on the back of the box:

Note the metal two part hinge for the back compartment door introduced with the Feldfu.b1. The b2 reverted back to the one part hinge. The early b-type box on the right shows its typical weakness: the rear lid has broken off at the hinge.

Figure 19: Backside Feldfu.b2, Feldfu.b1 and Feldfu.b comparison

From the top view, some changes to the shape of the bakelite box between the b and the b1/b2 models become apparent. Note the red feeler dots on top of the boxes.

Figure 20: Top view of the Feldfu.b, Feldfu.b1 and Feldfu.b2

Figure 21 shows a comparison of the early two-part antenna and the later foldable antenna:

Figure 21: Early two part antenna (left) and later foldable antenna

The next two photographs aim to highlight the differences between the early b and late b1/b2 boxes:

The early box on the right has a considerably thinner rim than the later box on the left. Also note that on the later models, rubber buffers were added to the box.

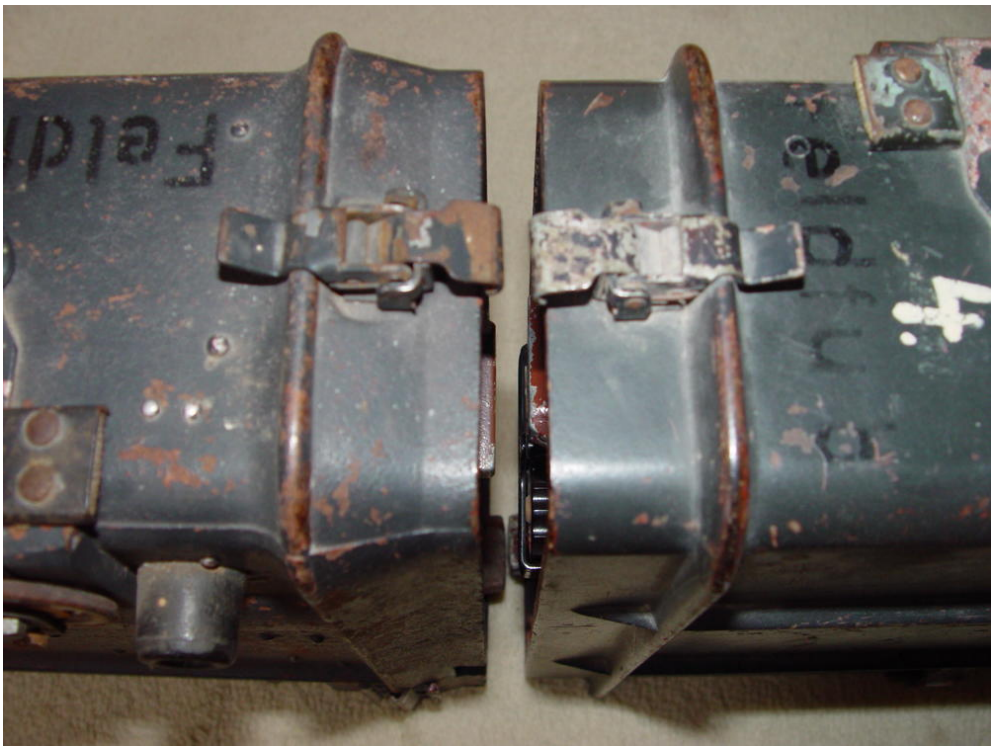


Figure 22: comparison of late and early boxes

Figure 23: early “thin rim” and late “thick rim” boxes

Another view highlights the thin-rim early b model left and the thick-rim b1 model on the right.
The front panels show a slight evolution between the models:

The only other external difference between the b and b1 models is the tag plate for the frequency calibration lock screw (top right of the panel). Internally, the b1 model has some extra fixings to improve the earthing between chassis and front plate.

A number of transitional Feldfu.b1’s survive in old type “thin rim” boxes. Apart from using a thin rim box, the lumbar support has been removed from the accessories list so it is likely that these transitional models were used as limited standard “Bodenständige” radios in fixed defences.

The b2 model appears identical to the b1 apart from the colour change to grey. The back panels show a similar slight evolution (from the left: b2, b1, b)

The early b lid on the right has a simple hinge. The inside of the lid has a plate describing how to fold the antenna and what accessories belong to the radio. The b1 model in the centre no longer has the data plate and a modified hinge design. On the b2 model the hinge design reverted back that of the earlier b, but a metal sliding guide was added to prevent the lid opening too far and breaking off.

Figure 24: evolution of back lids fo the Feldfu.b, Feldfu.b1 and Feldfu.b2

The inside of the detachable front lid contains a plate with the operating instructions for the radio:

Although the operating instructions remained the same, different versions of the heading "Bedienungsanweisung für die Feldfunksprecher b, c, f und h" can be found. Early examples only mention the b and c, while later versions mention the b1 etc. This particular lid would be correct for a 1942/43 Feldfu b, c f or h.

Figure 25: Operating instructions on front lid

Each Feldfunksprecher was supplied with a number of accessories:

Figure 26: Feldfunksprecher accessories

Here the accessories for the Feldfu.b1 are shown: 2,4NC28 battery (2,4 Volt, Nickel Cadmium, 28 Ah); a lumbar support, foldable antenna, Dfh.f headphones and Kmf.c throat microphone and remote control cable.

Figure 27: Feldfunksprecher accessories

The battery was connect to the battery leads of the radio, these were shaped so that they could not be switched between + and -:

Note how the shape of the positive contact prevents it to be connected to the minus side.
The battery slides into the battery compartment and is secured with a webbing strap.

Figure 28: Connecting the battery

Note how on the b1 model, the double hinge allows the rear lid to be folded underneath the radio. Doing this with the the early b lid would cause it to break off.
The rest of the accessories tightly fit into the bottom compartment:

Figure 29: Battery and accessories in their place

To prepare the Feldfunksprecher for operation, the accessories are attached:

Note how the cable from the headphones and microphone are held to the remote control cable with leather loops, this prevents the cables from snagging to other equipment worn by the infantryman.

Figure 30: Feldfunksprecher ready to operate

The Feldfunksprecher would be supported by the standard "Y-straps" of the infantryman with the lumber support held to the belt with leather loops. The infantryman's "A-frame" could be attached to the back of the Feldfunksprecher:

Figure 31: Attaching the infantryman’s equipment to the Feldfunksprecher

A number of manuals and documents were supplied with the Feldfunkspecher:

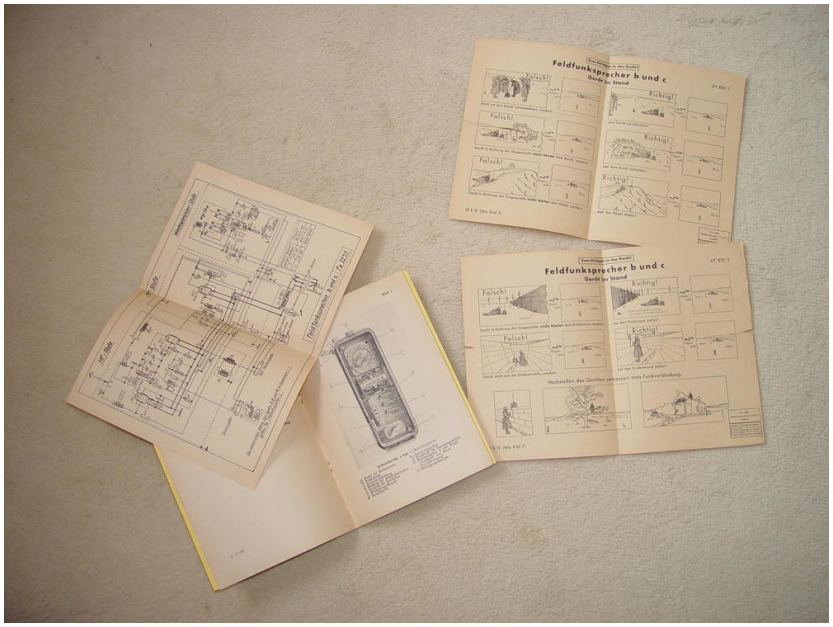


Figure 32: Feldfunksprecher documentation

For those interested in the technology contained in the Feldfunksprecher, here is the circuit diagram:

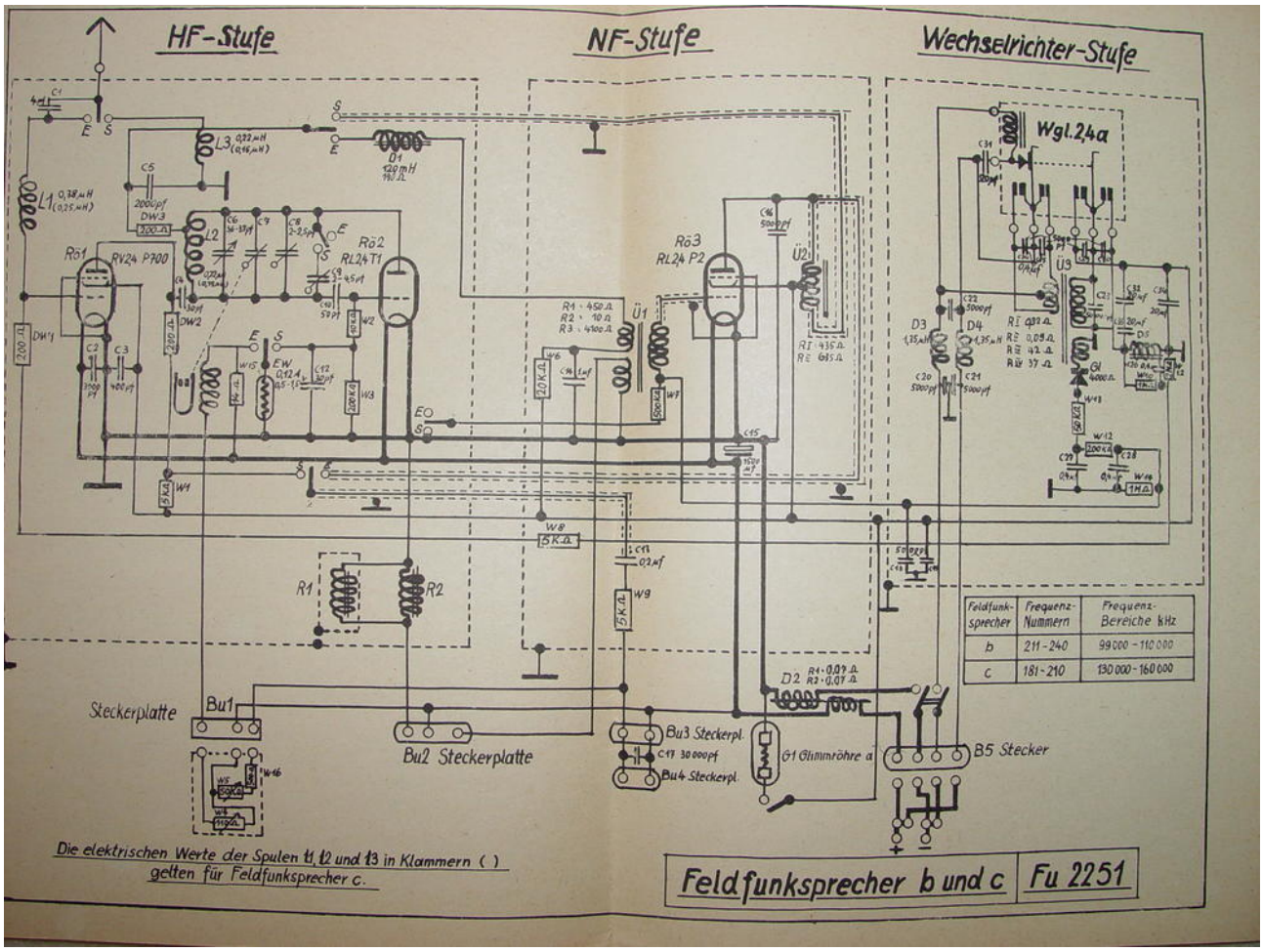


Figure 33: Feldfunksprecher b and c circuit diagram

During reception, valve 1 serves as the HF amplifier stage, valve 2 as the oscillator/detector (superregenerative receiver) and valve 3 as audio amplifier. During transmission, valve 3 serves a microphone amplifier with valve 2 as HF oscillator/power valve while valve 1 acts as a feedback

amplifier. Also note that the receiver fine tuning uses an electromechanical drive to adjust a small capacitor. The supply voltage to this drive is controlled by a voltage regulator (EW = Eisen Wasserstoff Wiederstand = Iron hydrogen resistor) resembling a small lamp. If this resistor is missing or replaced with an ordinary lamp, the remote control drive will burn out. **So never operate a Feldfunksprecher without first checking that the correct voltage regulator is in place!**

In the later b2 model, the audio amplifier valve was omitted:

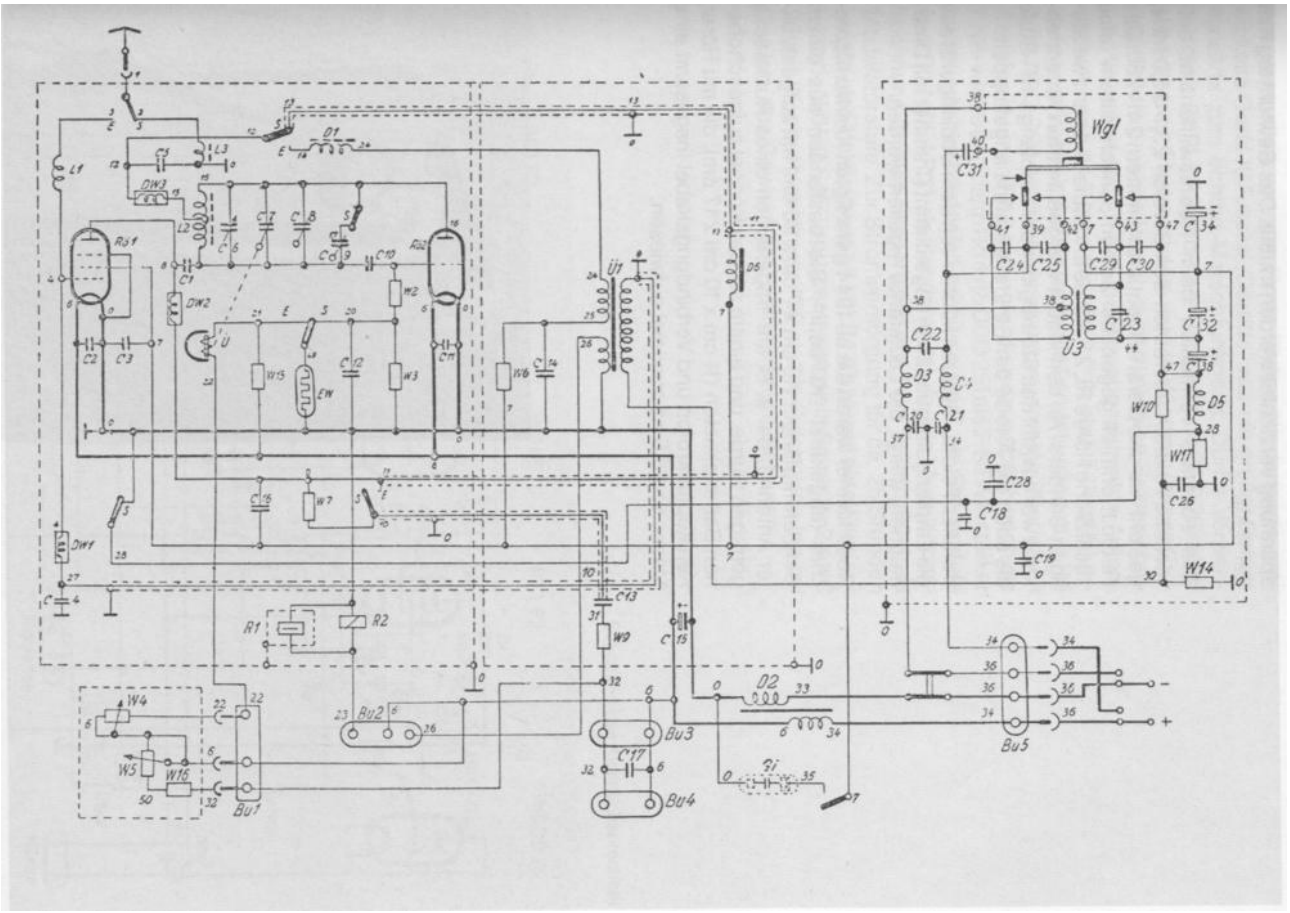


Figure 34: Feldfunksprecher b2 circuit diagram

Due to the omission of the low frequency amplifier stage, the Feldfu.b2 had a slightly reduced range from 1200 to 800 meters. The reduced range was however offset by a much longer battery life (roughly 50% longer) and a slight reduction in manufacturing cost and time.

Note: The development of the Feldfu.b2 demonstrates a key difference in the portable radio design philosophies between the German and particularly the US army. The Germans pushed their designs to achieve maximum battery life while the US pushed the levels of technical sophistication (using FM, AFC, squelch circuits etc.). This reflects the differences in the logistical situation faced by the German and US armies; the radio battery supply demands for a US unit were no doubt a multitude of those of a comparable German unit.

The Feldfunksprechers were designed to be used by relatively untrained operators, they were typically carried by a runner staying in shouting distance to the unit commander. In some cases, unit commanders can be seen carrying the Feldfunksprecher themselves. Simple pictorial instructions taught the operator the basic do's and don'ts:

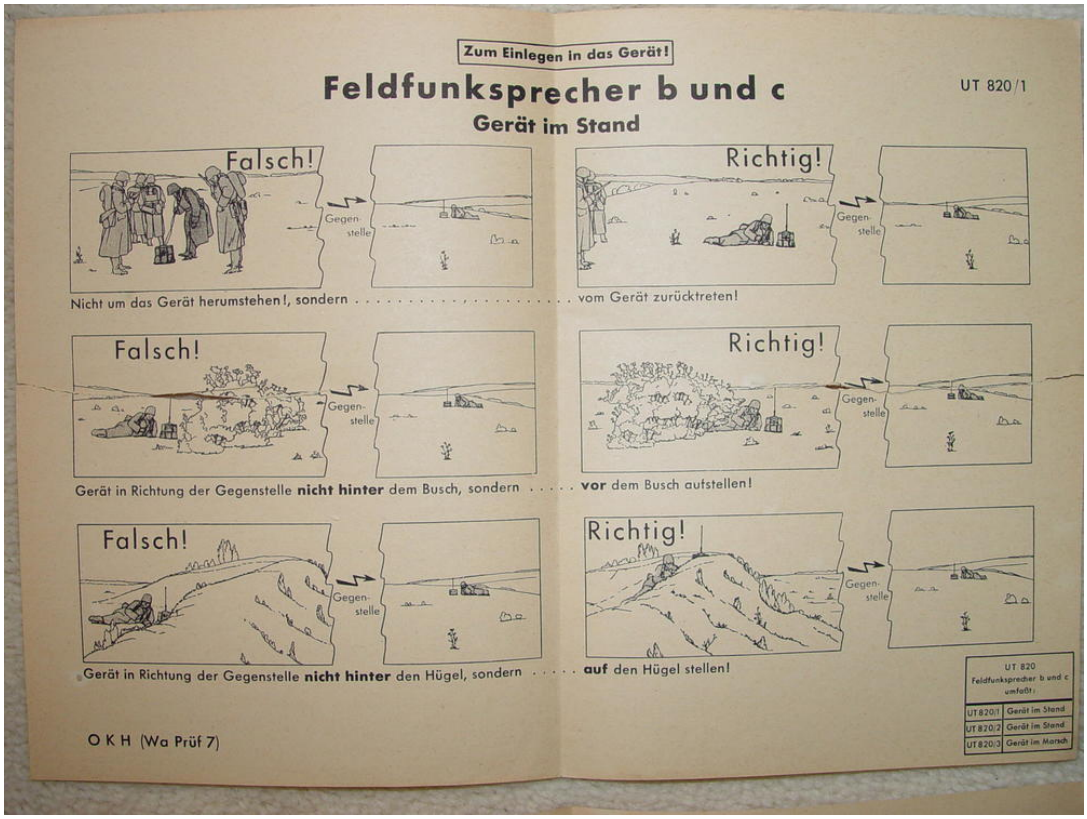


Figure 35: Operating instructions in pictorial form

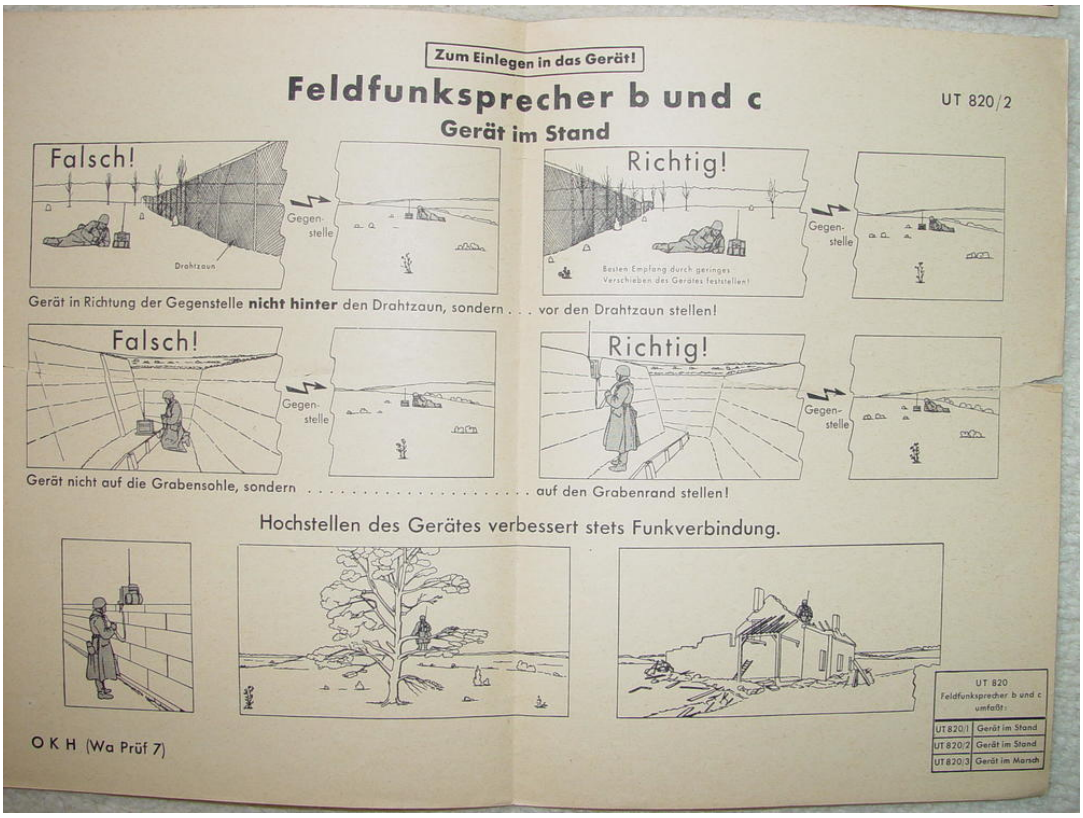


Figure 36: Further operating instruction in pictorial form

The final pictures give an impression of a “Sprechfunker”: an infantryman carrying and operating the Feldfunksprecher:

Figure 37: An impression of an infantryman carrying the Feldfunksprecher b1

He carries all the normal equipment of an infantryman. He has omitted his left hand ammunition pouch to make some space for the remote control of the radio. The switchbox of the throat microphone is clipped to his tunic he can switch between receive and transmit while the remote control on his belt allows him to adjust the volume and fine tune the receiver.

The Feldfunksprecher is attached to the belt and the Y-straps. All the normal infantry equipment can still be carried as normal. Normally the front lid would be fitted to the radio, the Sprechfunker is carrying the lid under his Y-strap until it can be refitted. Note how the remote control cable plugs into the radio:

Figure 38: The Feldfunksprecher attached to the y-straps and belt

The A-frame is strapped to the back of the Feldfunksprecher.

Figure 39: The A-frame is attached to the back of the radio

The infantryman has to be a bit careful shouldering his rifle but it just about fits next to the radio. The infantryman is now ready for his mission

Figure 40: Sprechfunker ready for action

The Feldfu. b is probably the most common of the Feldfunksprecher types found today. This is not surprising as every infantry company had four Feldfu.b's assigned to it. The Company commander could assign the Feldfunksprechers to his individual platoons as he saw fit. In defensive situations the Feldfunksprechers were often use to back up important field telephone lines while during fast moving battles the Feldfunksprechers would become the main means of communication in the Company.

For security the operators would use code words for important commands, terrain features, commander names etc. These code words could be written with pencil on the white pad on the front lid. Some care had to be taken choosing words used, as with a throat microphone some letters like "s" and "f" can not be distinguished. To avoid confusion, a tag with the phonetic alphabet was also attached to the front lid.
As with most radio equipment, finding the radio itself is only the start as the accessories are typically far more difficult to find.

C is for - Feldfu.c

The Feldfunksprecher c was developed in parallel with the Feldfunksprecher b (see here) and was introduced in 1941:

Figure 41: The Feldfunksprecher c

A quick look at the schematic shows that the only electronic differences between the b and c versions are the values of coils L1, L2 and L3:

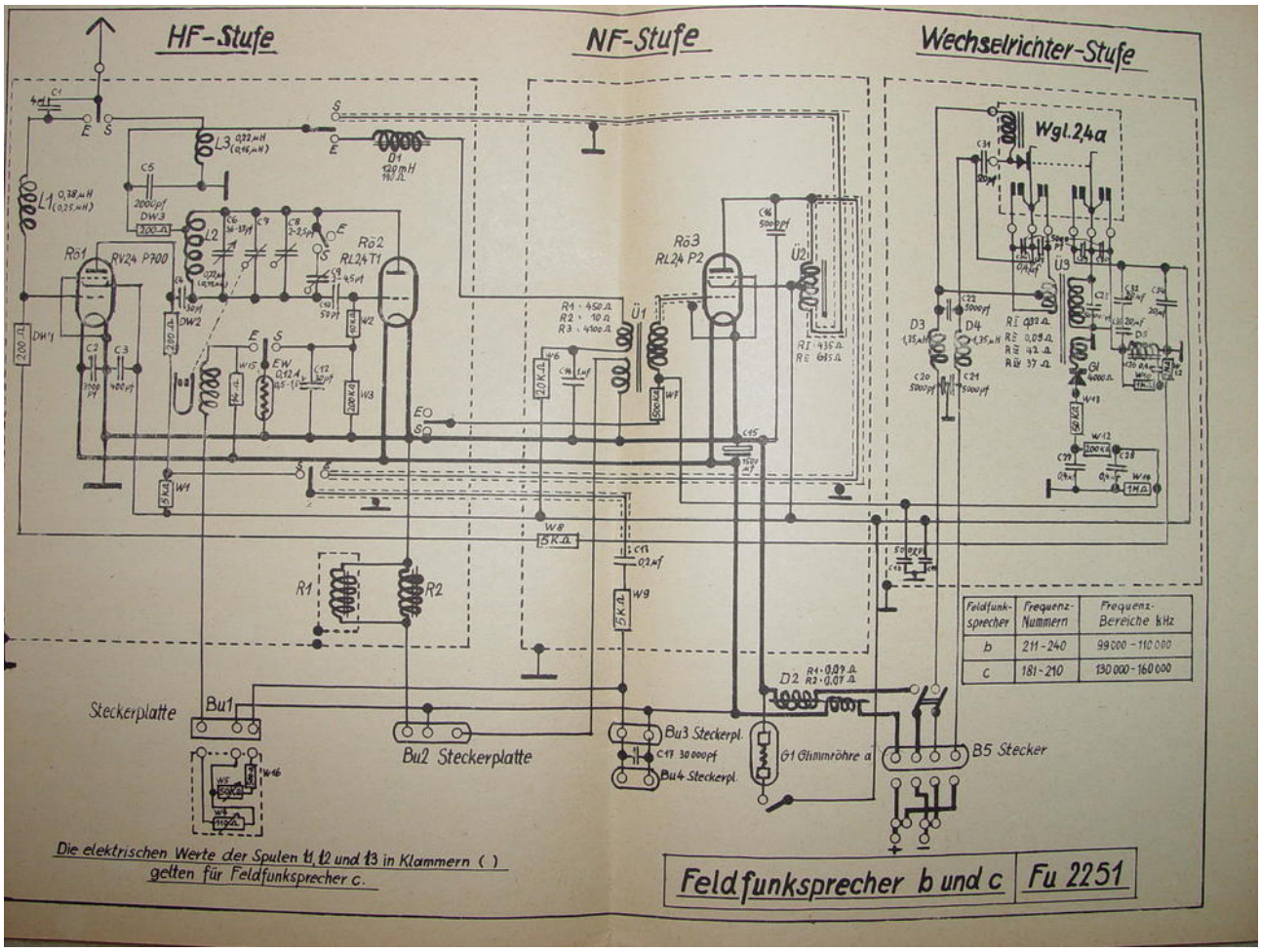


Figure 42: Feldfu.c circuit diagram

With these different coils, the Feldfunkspecher.c (Feldfu.c) operated from 130 to 160 MHz, which partially overlaps with the FuSp.a.1. Despite the overlap, new channel numbers 181 to 210 were assigned to the Feldfu.c.

Note: the "c" channel numbers sit under the "b" channel numbers, despite the frequency being higher; the channel number of both b and c were chosen just above those of the Fusp.a.1 (151-178), making is clear that the new Feldfu.b and c models were never intended to be used together with the FuSp.a.1.

The higher frequency pushed the design limits of the valves, as a result the power output of the Feldfu.c was considerable smaller than that of the "b" model. The range of the Feldfu.c was about 500 meters, less than half that of the "b" model.

Externally, there is very little to differentiate the Feldfu.b and c models:

Figure 43: Feldfu.b and c models side by side

Apart from the type plate and the frequency dial numbers, the two radios are identical. A few small differences become apparent if top of the boxes are observed:

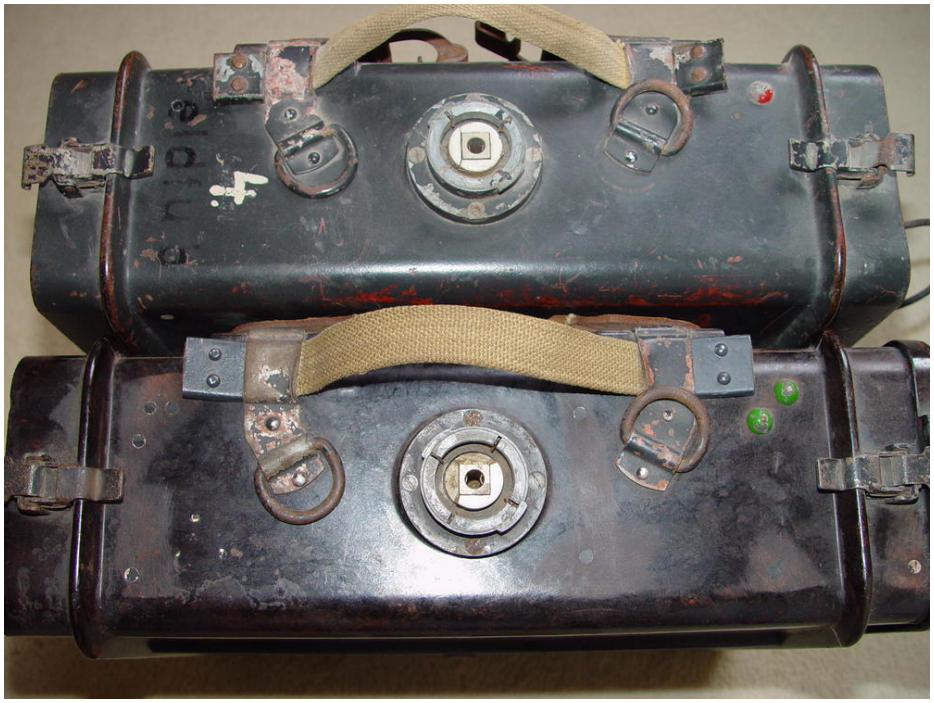


Figure 44: Feldfu.b and c models top view compared

The Feldfu.c box would have been painted with the "Feldfu.c legend like on the Feldfu.b; unfortunately most of the paintwork has disappeared from the external box of the Feldfu.c. What does remain however are the feeler shapes. Whereas the Feldfu.b has a single red dot, the Feldfu.c has two green dots. (the feeler shapes allow the two radios to be recognised by touch in the dark).

A Wider view shows that the green colour coding was also used for the antenna:

Figure 45: Colour coding on the antennas of the Feldfu.b and c

Because the Frequency of the Feldfu.c was higher, the antenna length could be shorter, the next two pictures show the differences between the Feldfu.b and Feldfu.c antenna:

The Feldfu.c has a two part antenna, with a shorter bottom rod and a whip top section. The two sections were kept together with a short leather retaining strap. The green code would furthermore be used to paint a green dot on the rear cover of the radio.

Figure 46: Feldfu.b and c antenna lengths

Figure 47: Close up view of the Feldfu.c two part antenna

Like on the early Feldfu.b, the early type of rear lid (with a simple hinge and storage compartment legend) was used:

Figure 48: Feldfu.c rear lid

Production of the Feldfu.c was relatively short-lived, so all Feldfu.c's have the early thin rim boxes:

We have some evidence of a foldable antenna for the Feldfu.c as well. It is likely that production of the Feldfu.c was halted somewhere in 1942 before the new antenna was introduced in 1943, so the new foldable antennas were probably used as replacement items.

Figure 49: Feldfu.c “thin rim” housing

Like all Feldfu models, the Feldfu.c came with a full set of accessories:

Figure 50: Feldfu.c accessories

Note that the above photograph shows the later foldable antenna of the Feldfu.b, the other accessories are identical.

Likewise the Feldfu.c had provisions to attach the A-frame to the back of the radio (identical to to the Feldfu.b setup shown below):

Figure 51: Feldfu with A-frame attached

The early discontinuation of the Feldfu.c shows that it was not deemed a great success, probably due to it's limited range of 500 meters.

Although I have not uncovered any hard evidence, it is thought that the Feldfu.c model was developed for the Sturmpioniere. During the Blitzkrieg campaign these troops played an important role in cracking the Maginot line and other defensive positions of the Western allies. Fighting in a relatively compact operational area the limited range of the Feldfu.c would be less of a handicap, while the close proximity of supporting infantry units required a separate frequency band to avoid overcrowding of the radio waves. The tactical requirements however evolved rapidly; by the time of operation Barbarossa in 1941 the short range would have rendered the Feldfu.c pretty much useless. It is likely that soon after its introduction the Feldfu.c, like the Fusp.a.1 before it, was relegated to second line duty.
Due to the limited production run, the Feldfu.c is considerably rarer than the Feldfu.b.

D is for - KlFuSpr.d

Although some post-war articles and books have invented a "Feldfunksprecher d" model, there never was a "d" version of the Feldfunksprecher. Instead the "d" was associated with a late war development called the "Kleinfunksprecher d". The “Dorette" -as it became known- was the latest in radio miniaturisation brought about by technological advances. The name "Dorette" (as in "small Dora") referred to the Torn.fu.d2 "Dora" radio, the standard portable radio set used by the infantry. The Kleinfunksprecher d operated on the same frequency band as the Torn.Fu.d2 (33.8 - 38 MHz) and could easily be integrated in existing infantry radio networks. The frequency range of he Dorette was slightly extended to partly include those of the Feldfunksprecher f (27.2 - 33.3 MHz) and the FU5 tank radio set (30.2 - 33.4 MHz) to allow infantry-tank cooperation. Thus the Dorette's frequency range was set at 32 to 38 MHz.

Figure 52: Two KlfuSpr.d “Dorettes” on top of their storage box

The design of the Dorette appears to be inspired by some of the latest allied radios. The packaging and method of wearing the radio was probably inspired by the British 38 set while the use of multi-circuit valves is more typical of US designs. The use of dry cell batteries was also quite common in allied radios, but fairly unique in German radio design.

The circuitry of the Dorette roughly follows that of the Feldunksprecher h with only one of the two RL1P2 HF valves in use while receiving or transmitting. The designers added a clever trick in the receiver: after passing the HF signal from the antenna through valve three the LF signal from the oscillator/detector passes through the same valve for a second time. This so called reflex circuit essentially adds a amplifier stage without having to add an extra valve:

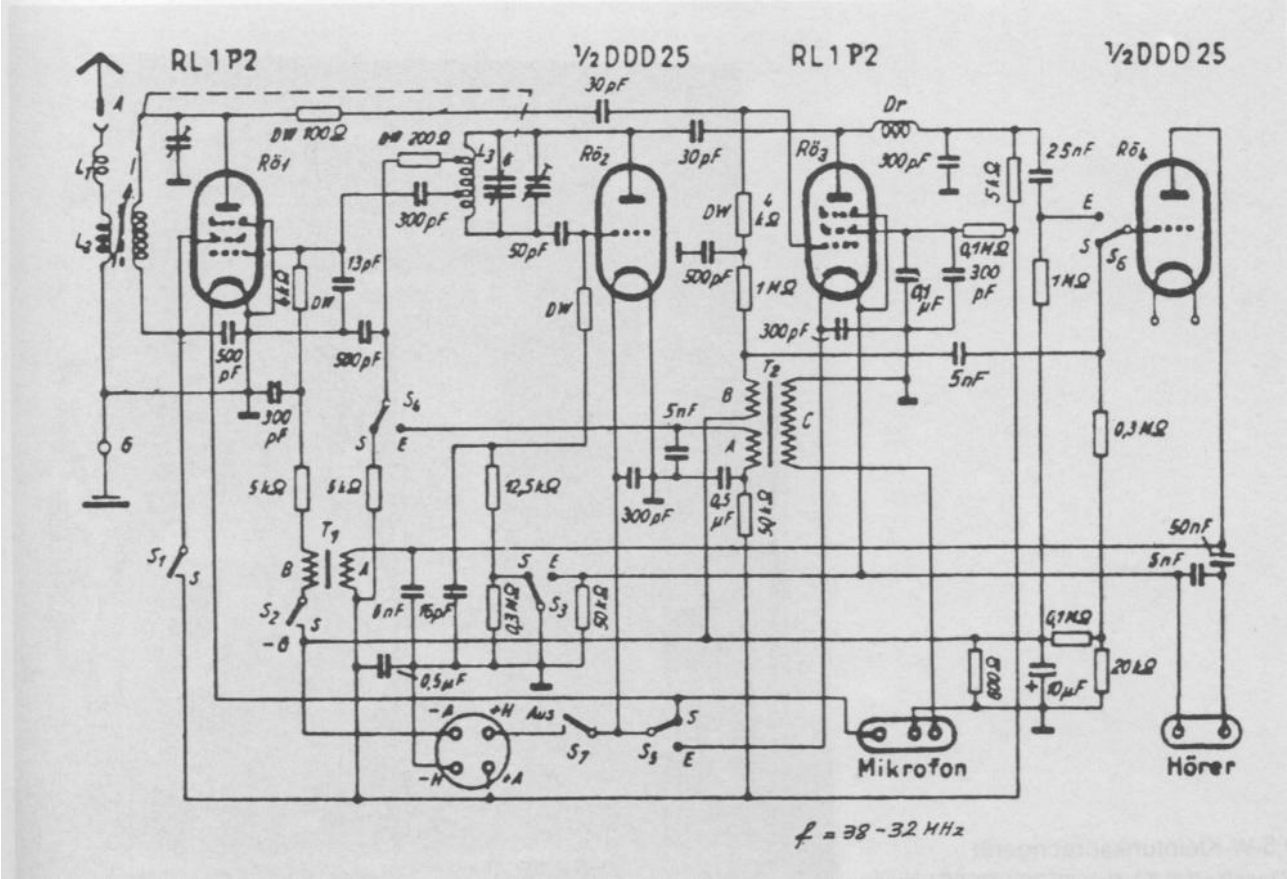


Figure 53: KlFuSpr.d circuit diagram

Note that the switch box of the microphone was not used to switch between receive and transmit, this was purely done with the main switch on the Dorette itself.
It was the use of dry cell battery technology that allowed the small size of the Dorette. The Dorette used dry cell zinc-air batteries (Luftsauerstoffbatterien). These produced a nominal 1.4 Volts per cell. The filament battery (L.S. 1.4) has its cells in parallel while the Anode battery (L.S.150 bp) had its cells in series to produce 150 Volt. The batteries were wrapped in an air tight packaging, once out of their airtight packaging, the batteries had a four week lifespan. In operation, the batteries had a lifespan of approximately 25 hours.

The Dorette was supplied in a wooden box "Transportkasten a" which held the radio, battery case, Dfh.f and Kmf.c headset, antenna and batteries in separate compartments:

Figure 54: The KlFuSpr.d storage box

The two airtight-packed batteries were stored separately and were only to be opened immediately before use:

Figure 55: Close up of the storage compartment for the batteries

The radio itself is a triumph of minimalistic design. The front panel contains sockets for the power supply, Dfh.f headphone and Kmf.c throat microphone. A main switch (off, receive, transmit) and the frequency tuning knob complete the panel:
The front side of the radio contains the frequency dial and the used instructions:

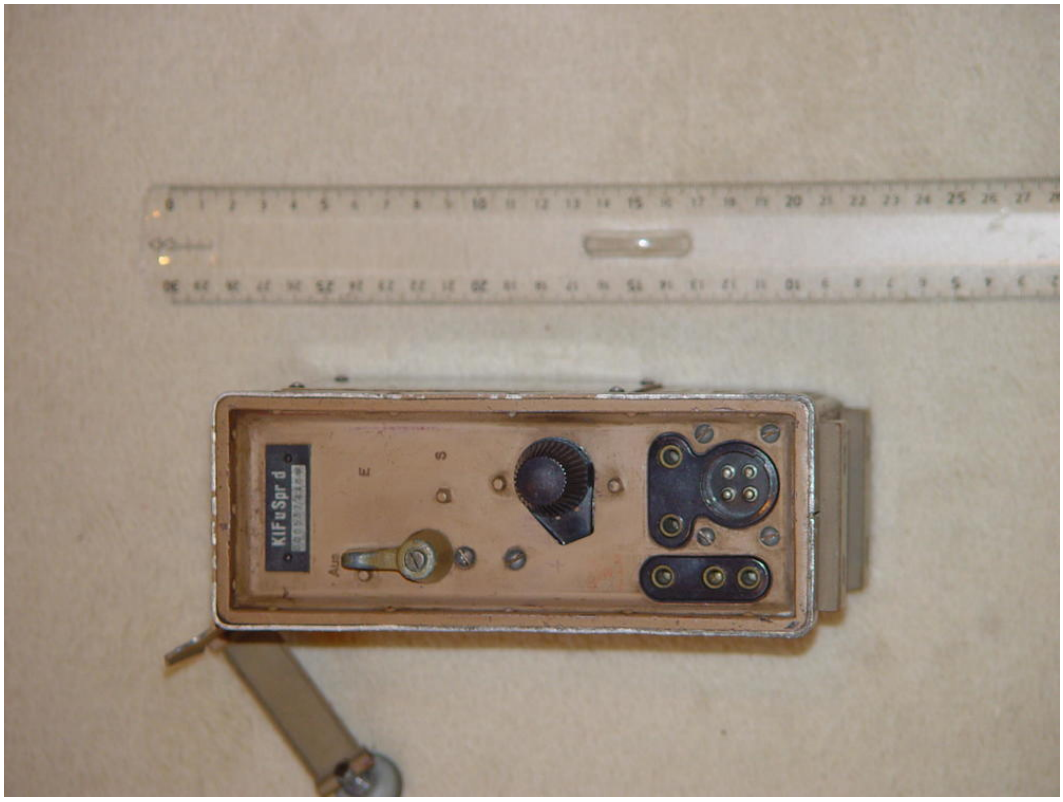


Figure 56: Front view of the KlFuSpr.d radio unit

Note: The photograph shows the radio tuned to 32.8 MHz, which would allow it to communicate with the FU5 tank set or the Feldfu. f. The higher frequencies are calibrated in the same channel numbers as the Torn.Fu.d2.

Figure 57: KlFuSpr.d side view of the instruction panel

The back of the radio shows the range of the radio (2-4 km, depending on topography):

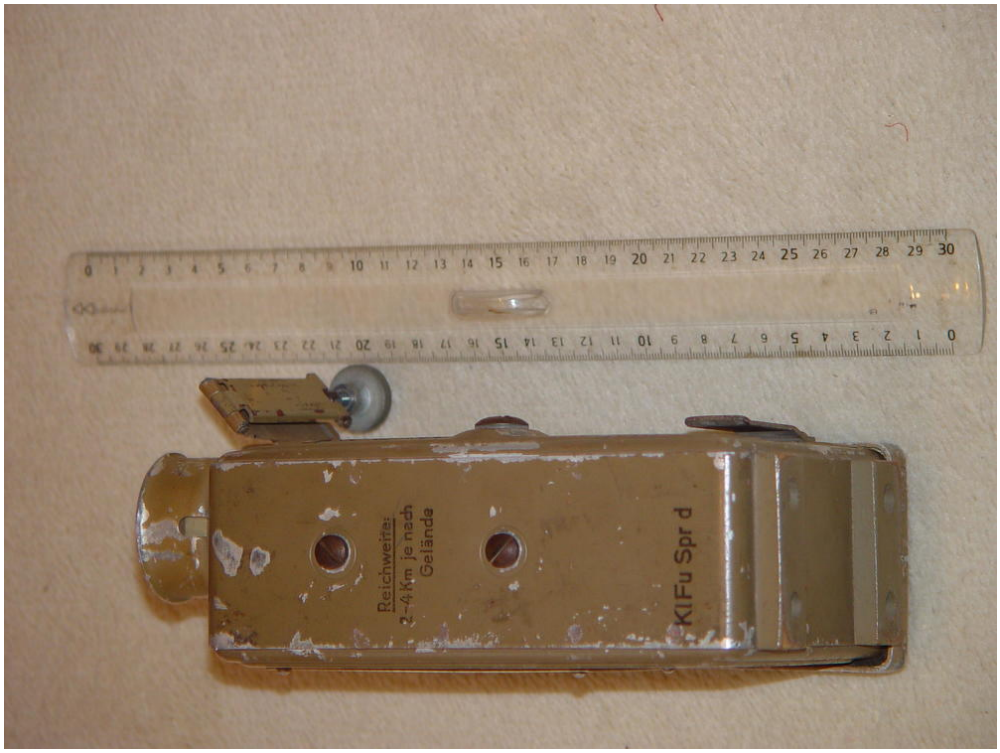


Figure 58: KlFuSpr.d back view

The carrying side shows the brackets used to attach the radio to the standard Y-straps of the soldier; the top clamp was clamped around the Y-strap while the bottom bracket slide behind the strap to keep the radio upright.

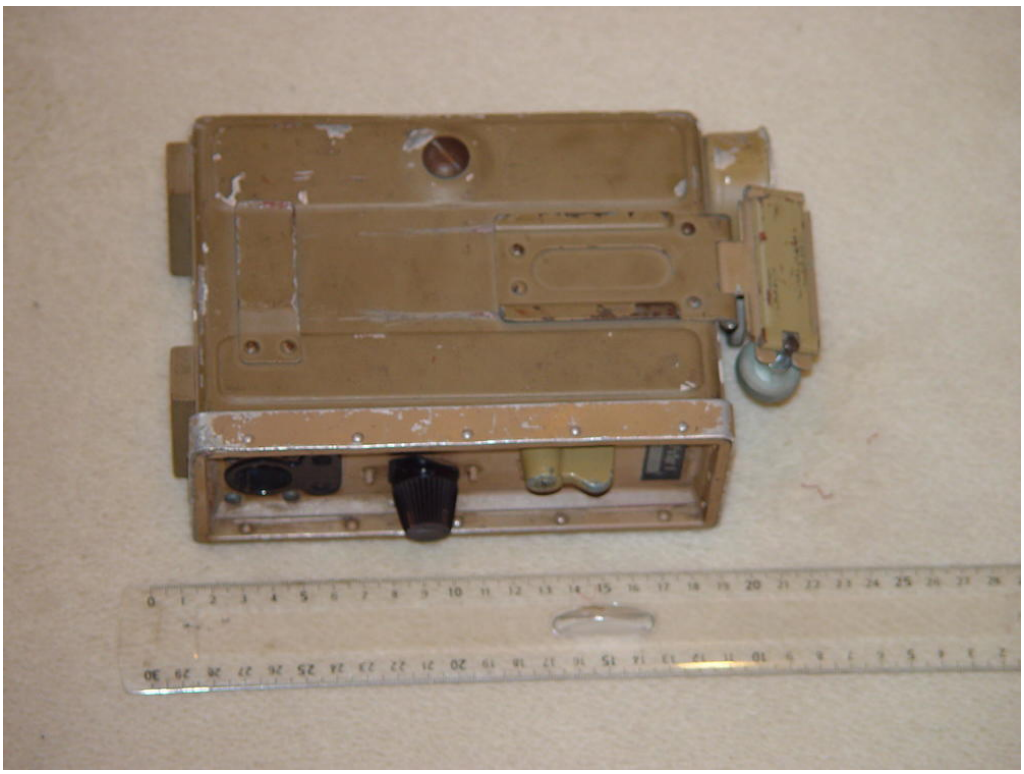


Figure 59: KlFuSpr.d side view with lug and clamp to attach to Y-strap

Note: It is interesting to note the different shades of tan used in late war production, components of this example were painted in at least three different colours.

The battery box (Batteriekasten A) contained the two Zinc-Air batteries. A leather strap allowed it to be hung on the belt of the soldier, or it could be configured as a carrying handle:

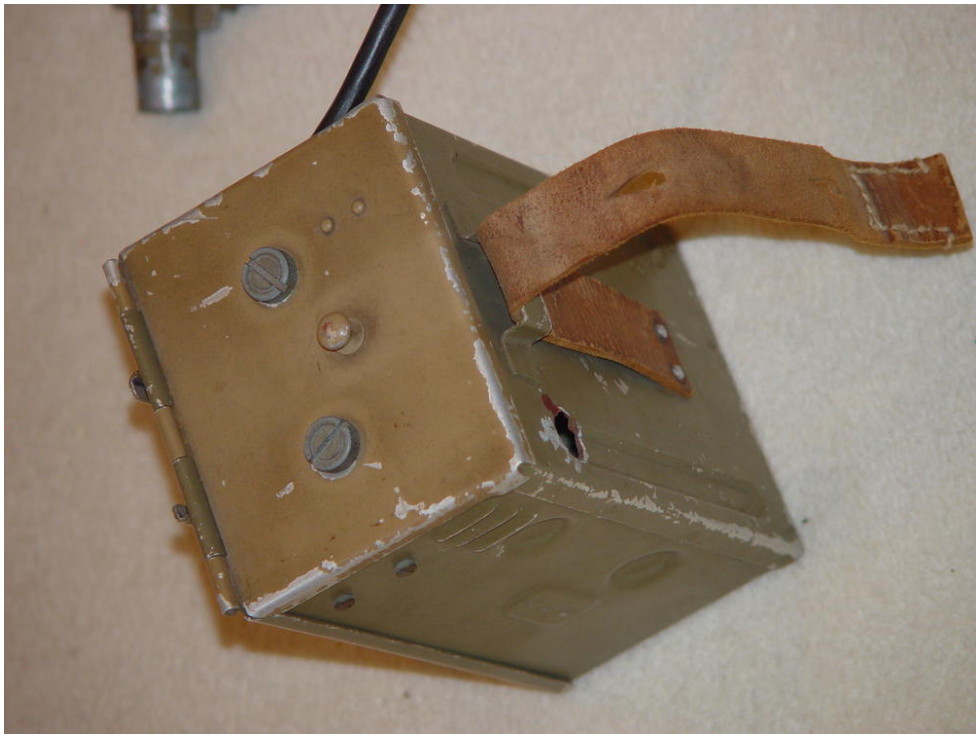


Figure 60: KlFuSpr.d Battery box

On the rear, the battery box has a bracket that allows it to be attached to the radio itself:

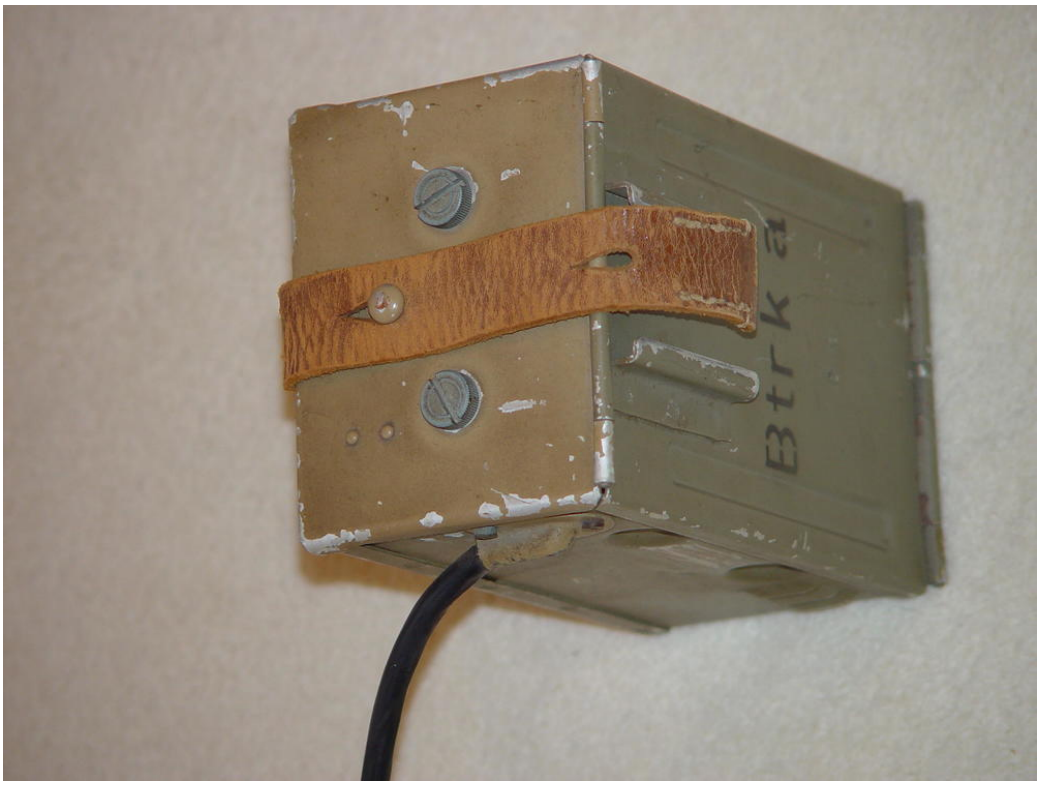


Figure 61: KlFuSpr.d Battery box

Note: again notice how the box is made from components finished in different shades of tan.

The dorette as a static radio station, complete with antenna, Dfh.f headset and Kmf.c throat microphone. The battery box is attached to the radio while the leather strap of the battery box is used as a carrying handle:

Figure 62: Complete KlFuSpr.d radio station

The Dorette uses a fairly long pliable "Bandantenne":

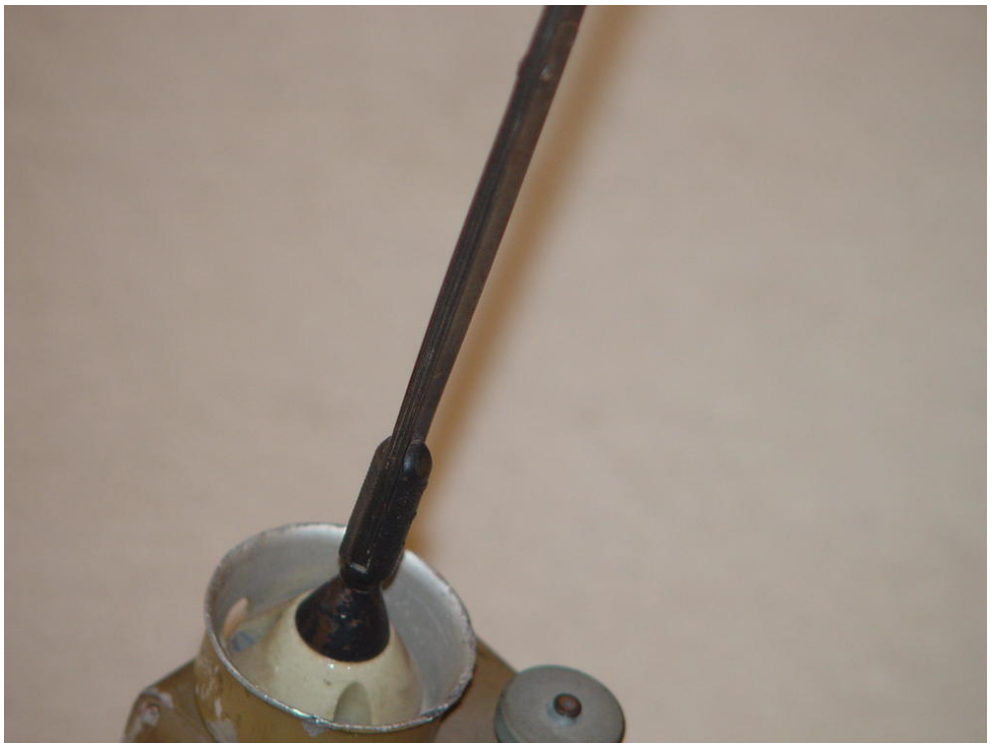


Figure 63: the antenna plugged into the antenna socket

The correct antenna for the Dorette is 1.6 meters long and is clearly marked so on the base:

Figure 64: the 1.6 meter long “Bandantenne” for the KlFuSpr.d

Alternative to the complete station shown in Figure 60, battery box and radio could be split and worn attached to the standard infantry equipment belt and y-straps as in this impression of a late war infantryman:

Figure 65: The KlFuSpr.d clipped to the infantryman’s Y-straps

The battery box is attached to the belt near where the entrenching tool is normally worn:

Figure 66: KlFuSpr.d complete setup with battery box worn on the belt

The Dorette was introduced in December 1944. The first production run was painted in dark grey paint. Documentation exists that proves that the first 300 Dorettes were shipped out in mid December. Further detective work has revealed that these radios were air-shipped into the Kurland pocket, as a number of this first batch of radios have surfaced in the Baltic.

The production line had to be moved twice after it had been bombed out. The later production runs were all finished in ordnance tan.

So far, very little evidence has emerged of operational use of the Dorette on any other fronts. No period photographs have yet surfaced showing the Dorette in use. There are some hints that the hastily developed batteries curtailed the operational use of the Dorette. It is rumoured that most batteries were empty or failed soon after the radio reached the troops. The

battery's required optimal temperature of +20 Celcius would also have been a problem during the winter of '44 -'45, it was recommended to wear the battery box under the overcoat during cold weather. Perhaps this is the reason why most Dorette's were found after the war languishing in stores, they were simply defective and not fit for issue.

An instruction leaflet was delivered with each boxed set detailing the basic preparations for operation:

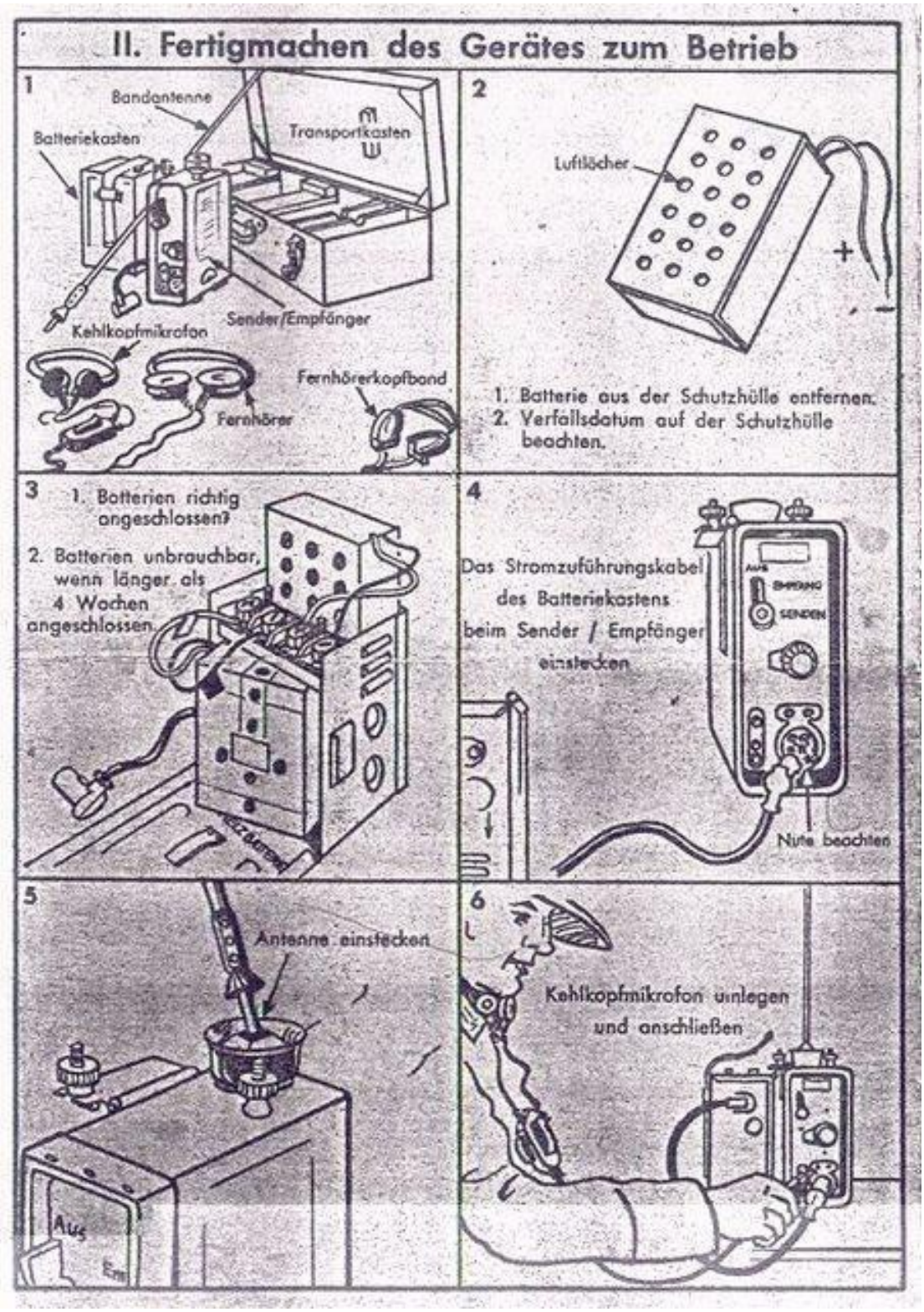


Figure 67: instruction on how the prepare the radio

Figure 68: Instruction on how to prepare and wear the radio

Note: the first pictorial diagram shows that a "Fernhörerkopfband" was delivered with the Dorette. So far no complete Dorette boxes have been found with a headband in place so it is unclear of this accessory was actually supplied.

Another section describes the frequency band and the possible connections with other radios that could be made.

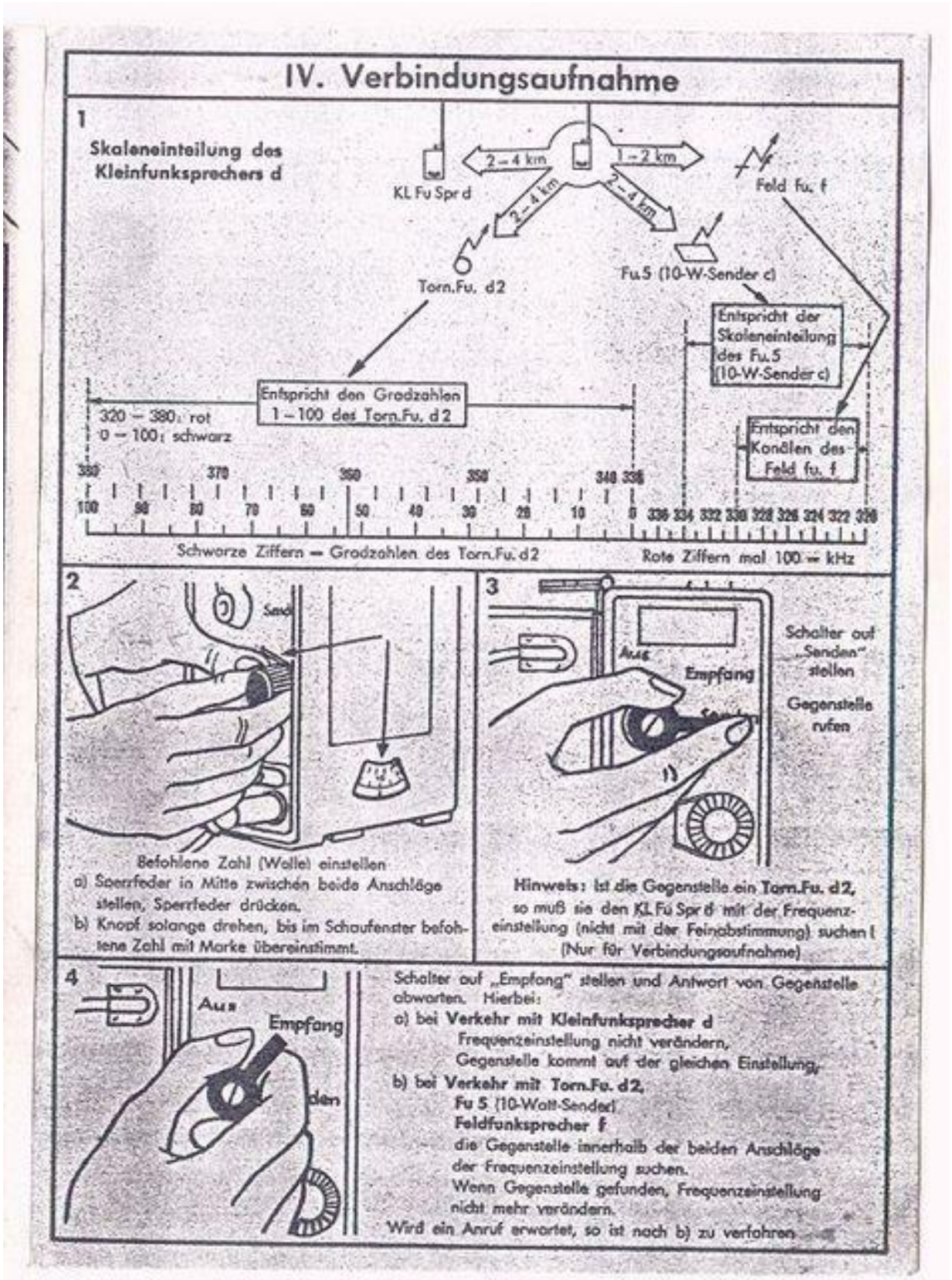


Figure 69: Instructions for tuning and operating the radio

Further sections describe how the range could be increased by pointing the antenna or using a wire antenna. The final section gives some examples of how the radio traffic should be conducted including code names:

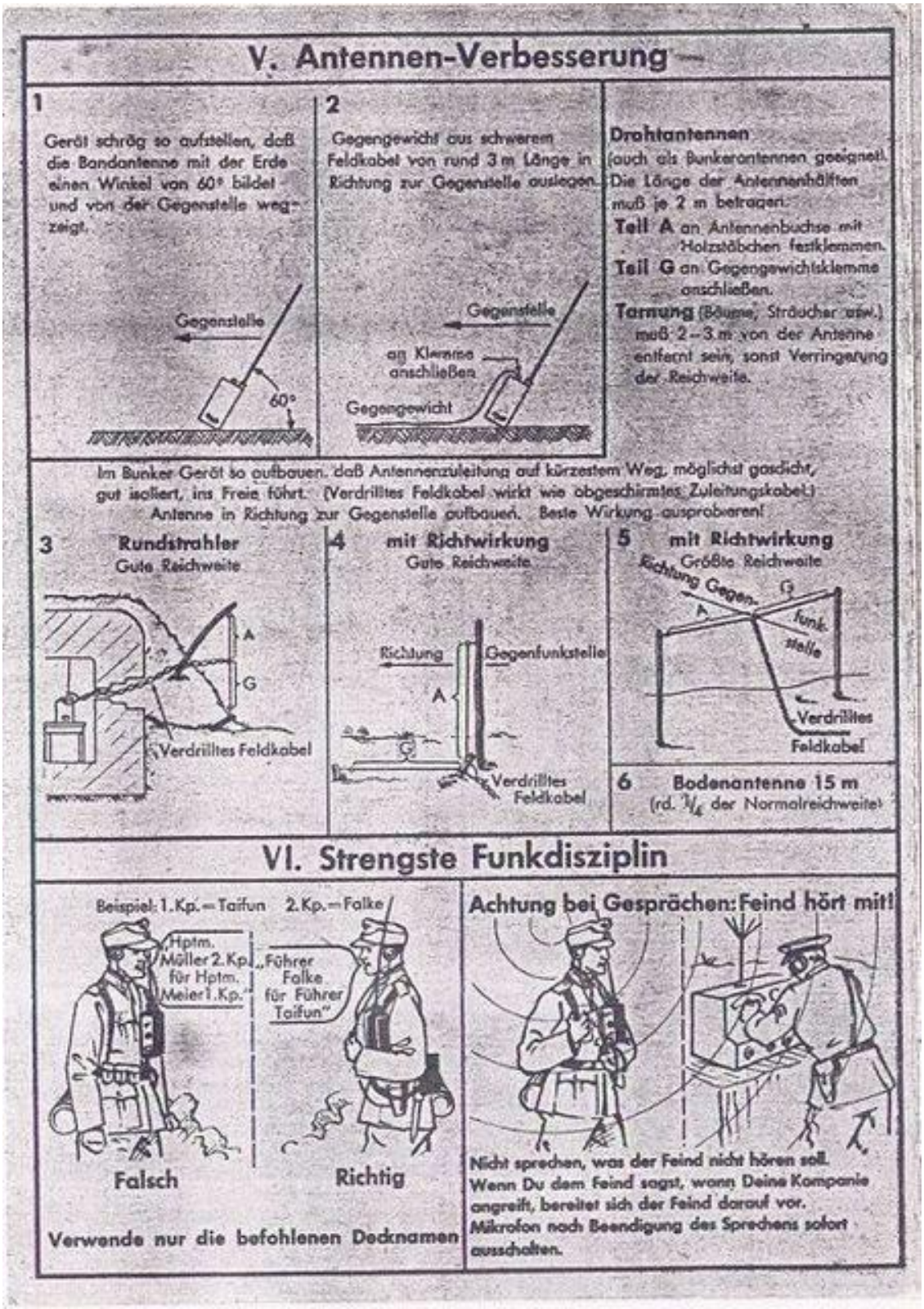


Figure 70: Instruction for antenna design and radio discipline

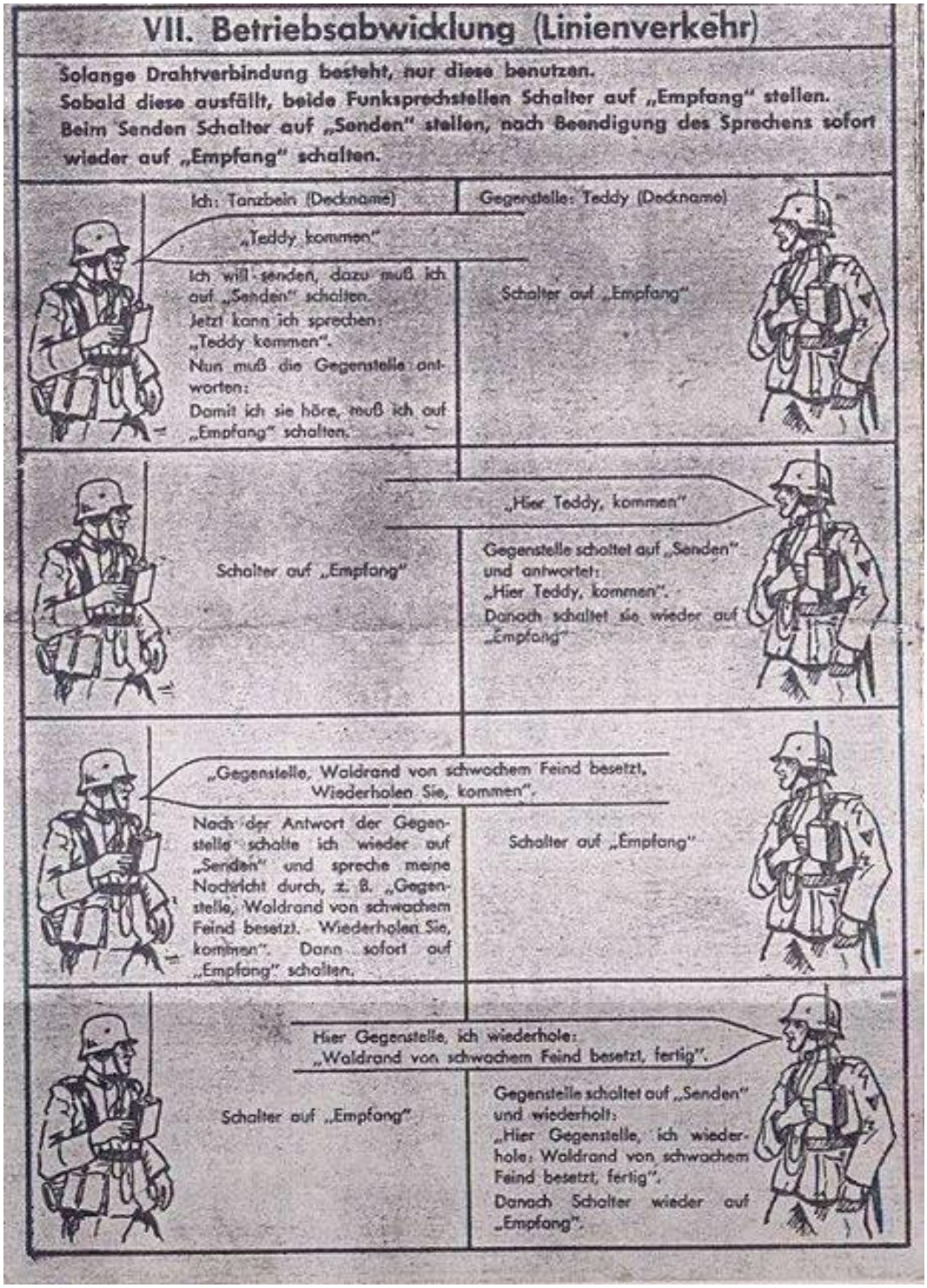


Figure 71: Instructions on radio discipline

Most surviving Dorettes today were recovered from stores after the war and were sold to companies and organisations as a cheap radio telephone. One 1950's French advertisement sells them as "Parachutist radios", starting the unfounded myth that the Dorette was created for Fallschirmjäger troops. In fact the only officially documented attribution found to date assigns the Dorette to bicycle troops.

The Dorette is one of the most common German radio types that can be found today. As usual, accessories are significantly harder to find than the radio itself. Battery box command higher prices than the radio itself and the correct antenna is virtually impossible to find. If you are very lucky, you may find a complete boxed set, very few of which may even contain the remains of the original batteries.

E is for - Feldfunksprecher extras

Since there is no "e" type of the Feldunksprechers, this is an opportune place to discuss some of the auxiliary equipment used with the Feldfunksprechers. The first is the "Frequenzprüfer f", a crystal calibrator used to calibrate the Feldfu.b and c models. The second is the "Handladesatz a", a manual generator used to recharge the 2.4 NC 28 batteries. The final is the Trb NC 28, a box designed to carry a spare 2,4 NC 28 battery.
The Frequenzprüfer f (Fprüf.f) came in the same bakelite box as the Feldfunksprechers so it could be carried to the frontline units if required.

Figure 72: Frequenzprüfer.f crystal calibrator

The top of the Fprüf.f was devoid of an antenna connection and had three round feeler shapes painted yellow. This allowed it to be distinguished in the dark from the Feldfu.b (one dot) and Feldfu.c (two dots)

Figure 73: Top view of the Frequenzprüfer.f

The yellow theme was carrying over to the rear lid, which had a yellow circle painted on it to provide easy visual recognition:

Figure 74: Rear lid showing the remains of legend and yellow dot

The front panel held the frequency calibration unit at the top. There was no internal battery, so a battery cable allows the calibrator to be connected to a 2.4 NC 28 battery placed next to the unit. A calibration screwdriver on the bottom section completes the front panel:

Figure 75: Frequenzprüfer.f front panel

The Frequenzprüfer was a essentially a first line maintenance kit carrying spares and tools to test the Feldfunkprecher b and c models. Most of the space inside the box was reserved for spare valves and other bits of test equipment. The top compartment held a "Tasche (Fu) c" with spare valves, iron-hydrogen resistors, voltage indicator lamps, spare remote control units and test dummy load. The bottom compartment held a "Tasche (Fu) d" with spare vibrator units, Dfh.f, Kmf.c, test cable and microphone elements. The two small bottom compartments were for two spare antennas (one Feldfu b and one Feldfu c) and two spare remote control cables.

Figure 76: Storage compartments for spares

Figure 77: Rear lid showing the contents

The inside of the rear lid contains a list of it's contents (not in such good condition in this example):

The frequency tester itself contained a crystal oscillator that generates a very accurate frequency on 26 Mhz. It was to be placed one meter away from the Feldfunksprecher being tested and both units were switched on to warm up. The small amount of HF energy radiated by the battery cable would be enough to reach Feldfunksprecher:

Figure 78: Frequenzprüfer set up for operation

The Feldfunksprecher had to be tuned to the red channel (233 for the Feldfu.b and 203 for the Feldfu.c) with the receiver fine tuning set to the central position (so that the red dot is visible through the hole of the remote control unit). The Feldfu.b would pick up the fourth harmonic at 104 MHz while the Feldfu.c would use the sixth harmonic at 156 MHz.

Figure 79: FuSprech.b Tuned to the Calibration channel indicated in red

After warming up for about ten minutes the static noise in the headphones of the Feldfunksprecher was checked. If a loud static could be heard, the tuning screwdriver was used to open the calibration opening (by turning the little screw on the top right of the Feldfunksprecher front panel) after which the trimmer behind the calibration opening could be reached with the screwdriver. The trimmer was now turned left and right until the static noise was at it's minimum.

The Fprüf.f could only be used to calibrate the receiver of the Feldfunksprecher, to test the transmitter a second calibrated Feldfunksprecher would be required. Typically this would not be required as the transmitter largely uses the same oscillating circuit as the receiver.
For transmitter testing, first the power output of the transmitter could be checked however using the "Senderprüfer a", a small dummyload fitted to the antenna socket of the Feldfunksprecher

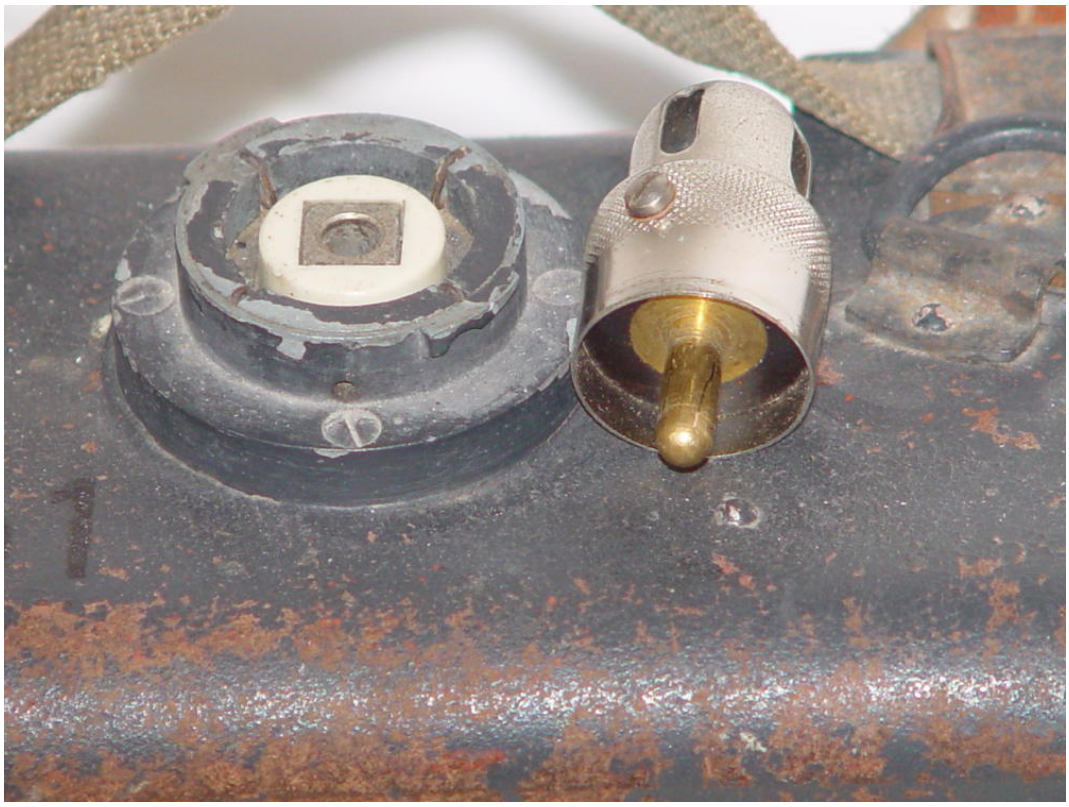


Figure 80: Senderprüfer a for testing the transmitter

The "Senderprüfer a" should light up when the transmit button is pushed on the switchbox of the Kmf.c. Talking into the microphone should show a small variation in the strength of the light.

Figure 81: Senderprüfer a mounted on the Feldfu.b1

Because the transmitter calibration could not be done with the Feldfunksprecher fitted in its case, a "Prüfkabel" was used so that the Feldfunksprecher could be operated outside it's box:

Figure 82: Prüfkabel to operate the Feldfunksprecher outside its box

With the "Prüfkabel" fitted, all the calibration controls inside the transceiver could be reached:

Note that the antenna is no longer connected in this configuration but the short antenna contacts on the internal unit would radiate enough energy to be picked up by a second Feldfunksprecher placed some meters away. Both Feldfunksprechers would be adjusted to the red calibration channel with the receiver fine tuning set to the central position. The transmitter switch on the Feldfunksprecher under test would be pressed and the signal would be checked on the second Feldfunksprecher. If the strongest signal should be achieved well within the range of the receiver fine tuning control. If this was not the case, the transmitter calibration trimmer (C9 in the schematic) had to be adjusted. With these tests and calibrations done, the Feldfunksprecher would be once again ready for operation.

Figure 83: Feldfunksprecher removed from its housing to calibrate transmitter

Similar frequency calibrators were developed for the Feldfu.f and h radios, these were the FPrüf.h and k respectively. In deviation from the calibration method described above, the FPrüf.h and k were used to calibrate the transmitter directly. For this reason they were provided with an additional headphone jack.

A second auxiliary unit required to keep the Feldfunksprechers operational would be the "Handlasesatz a" (HLS a), a hand operated battery charger. Again the bakelite housing of the Feldfunksprechers was used to house the charger so that it could easily to carried in the field to wherever the Feldfunksprechers were used:

Figure 84: HandLadeSatz.a (HLS.a)

The bakelite housing the the HLS.a was left unpainted, strangely the inside of the housing did receive a coat of paint. The front panel contains the generator at the top and a battery tester plus connections at the bottom.

Figure 85: HLS.a front panel

The back of the HLS.a contains a storage space for up to two 2.4 NC 28 batteries, hand crank, loading cable, test cable and tree anchor:

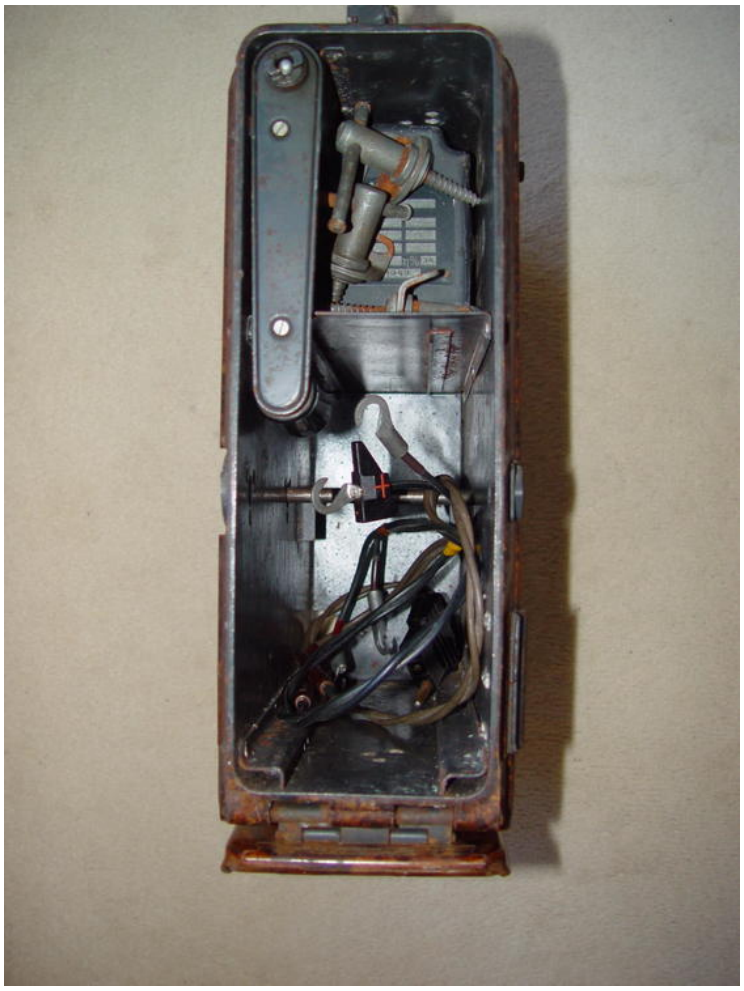


Figure 86: HLS.a storage compartment

The top of the box shows a small window under a cover. The HLS.a legend is painted in blue paint and a blue elongated feeler shape tells the HLS/a apart from all other versions:

The small window allows the speed indicator of the generator to be observed. A mirror inside the protective lid could be adjusted so that the indicator can be obverse while cranking the handle. This allows the user to keep the generator turning at the right speed for loading the batteries:

Figure 87: Speed indicator window

The back of the panel shows a chained pin which can be secured in one of two holes. This allows either one or two 2.4 NC 28 batteries to be locked in place inside the box:

Figure 88: Securing a battery inside the HLS.a

The accessories and cables are shown separately, the strap of the tree anchor is missing here. The metal brackets could be screwed into a tree so that the HLS.a could be securely tied to the tree at a convenient height.

Figure 89: HLS.a accessories

The 2.4 NC 28 could be tested with the test cable and the battery tester:

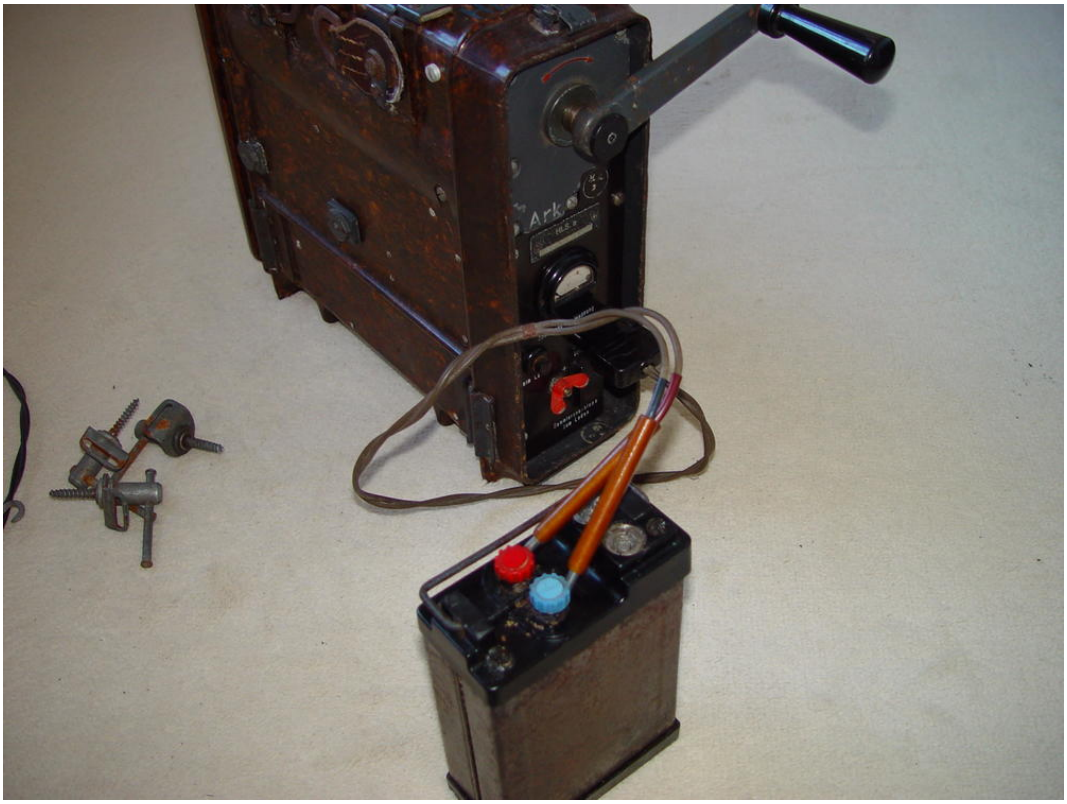


Figure 90: Testing the battery with the test cable

If the battery required charging, it would be connected to the charging cable. If the battery was connected via the charging cable, it could also be tested by pushing the test button on the battery tester. With the crank handle fitted to the generator, the HLS.a is ready for charging:
Charging the battery with the HLS.a was a lengthy business. The HLS.a could supply a maximum loading current of 4 A, meaning that a full charge of a 2,4 NC 28 battery would take seven hours!

Figure 91: connecting the battery with the charging cable

Normally, the battery under charge was placed inside the HLS.a, the charging cable was fed through a hole on the right bottom to the interior of the charger. The battery would be secured using the pin on the side:

I can imagine that "charging duty" was not very popular with the soldiers. It is likely that turns were taken to operate the HLS.a. This also explains why the tree anchor was such an essential accessory, as he HLS.a had to be fixed in the most comfortable position for the lengthy charging process. It would probably have been a 24/7 job to keep a Company's four Feldfunksprechers up to charge....

Figure 92: HLS.a top view

Another late war accessory developed to extend the autonomy of the Feldfunksprechers was the Trb NC 28 (Trageblech NC 28) battery case for an extra 2.4 NC 28 battery. The 2,4 NC 28 battery fits snugly into the box:

Figure 93: Trb NC 28 with spare battery fitted

The Trb NC 28 was designed to fit against the back of the Feldfunksprecher; it was supposed to be connected by some leather straps and hooks to the D-rings of the Feldfunksprecher.

However no Trb NC 28 has ever been found with the original straps attached, all boxes found today appear to be unfinished products recovered from factory stores (and judging from the writing on their lids, used postwar as storage containers for nuts and bolts etc.)

Figure 94: How the Trb NC 28 fits agains the Fusprech.

HLS.a can still be found regularly, most are in mint condition and 1943 and 44 dated. Since there is no mention of the HLS.a in earlier Feldfunksprecher manuals it is likely that it was only introduced late in the war. Most HLS.a's found today seem to have been unissued examples recovered from stores.
the Fprüf.f is a different story and is extremely rare. It is likely that a Division's Nachrichtenabteilung only had one or two Fprüf.f's to maintain the Division's stock of Feldfu.b's and c's. Given the high cost of Feldfunksprecher accessories today, it is going to be a challenge to restock a Fprüf.f with all its spares. Only one example of a fully complete Fprüf.f complete with the Taschen (Fu) c and d exists to my knowledge.

F is for - Feldfu.f

The Feldfunksprecher f was developed to meet the need of the Panzergrenadiere to have a portable radio that would put them in direct communication with the tanks they were supporting. The FU5 set in the tanks (Ukw.E.e + 10 W.S.c) operated from 27 to 33 MHz, a much lower frequency than the previous b and c versions. The capacitors and coils in the oscillating circuit were redesigned to adapt to the new frequency, the Feldfu.f covered a range from 28 to 33 Mhz. The longer wavelength of 10 m required a much longer antenna, the ideal length of 2.5 meters was halved again by using a lengthening coil in the antenna circuit. The Feldfu.f used a 1.20 meter long strip antenna.
As before the Feldfu.f followed the now familiar design of the front panel to the side of the radio housed in a bakelite box:

All the controls were identical to the other Feldfunksprecher models with the frequency dial at the top, the removable remote control with volume and receiver fine tuning controls in the centre and the battery charge checker on the left of the headset sockets and finally the on/off switch at the bottom.

Figure 95: Feldfunksprecher f

Unlike other Feldfunksprecher models, the frequency scale of the "f" is calibrated directly in MHz:

Figure 96: Frequency dial of the Funksprecher f

280 stands for 28 MHz while 330 stands for 33 MHz. A calibration channel is marked in red at 32 MHz. Whereas the tuning control of the b and c models clicks in place of the separate channels, the control of the "f" model is continuous. Note the slightly different frequency control indicator used on the Feldfu.f.

When looking at the casing of the Feldfu.f, a few differences with the other models emerge. The first is the angled antenna base to deal with the significantly longer antenna length. The longer antenna could no longer be folded to be stored inside the bakelite housing, so a separate antenna bag was required, supported from to the D-rings on the housing.

Figure 97: Funksprech f overview

Note that most Feldfu.f's were supplied in the later "thick rim" box introduced at the start of 1944 although some early production "f"'s used the "thin rim" box. Unlike the Feldfu.b, whose name was changed to Feldfu.b1 with the introduction of the new box, the name of the Feldfu.f was not changed. In late 1944 the Feldfu.f did follow the change to the two-valve design of the Feldfu.b2, this version became know as the Feldfu.f1.
A white angle feeler shape is apparent on the top of the box and as usual the Feldfu.f legend is painted on top of the box.

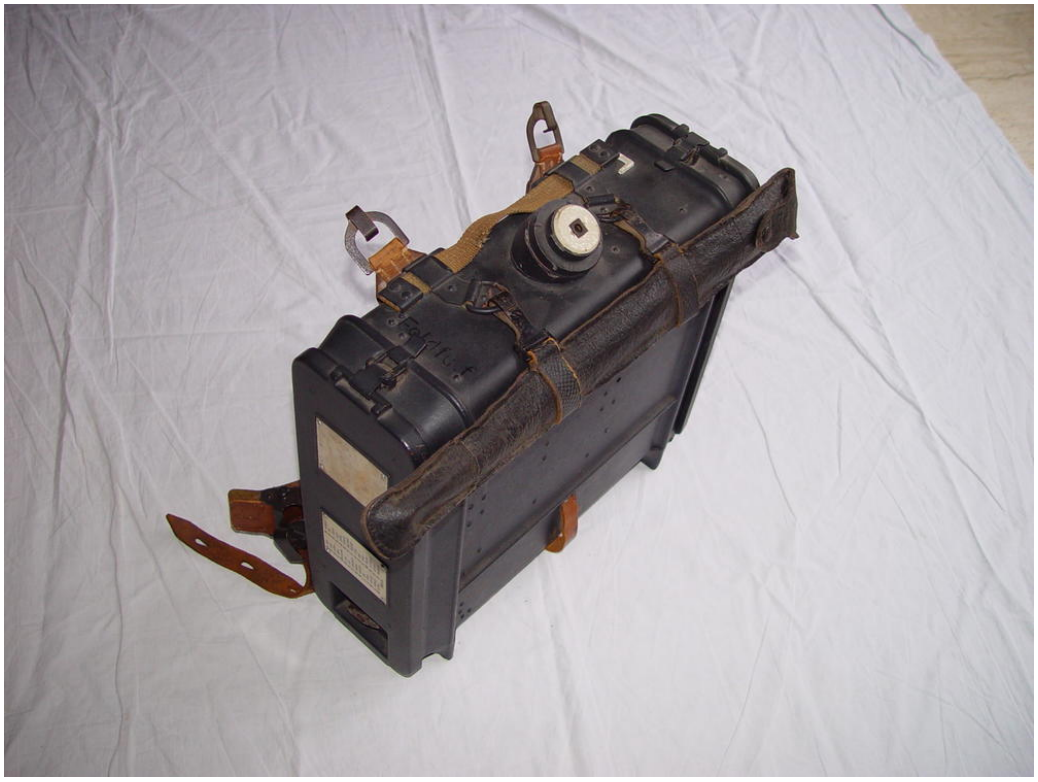


Figure 98: Funksprecher f overview

The white identification theme continues on the back lid, a white circle and the Feldfu.f legend are painted on the back lid. Note the two part hinge of the rear lid also introduced on the Feldfu.b1 model.

Figure 99: Funksprecher f overview

Figure 100: Funksprecher f overview

The rear of the radio shows of the "thick rim" design clearly, with the rubber buffers connected to the housing. These buffers protected the radio when carried in a special support frame in armoured halftracks. The D-rings would carry the antenna bag or in operation could support the A-frame, which was further secured with the leather strap on the bottom.

Figure 101: Funksprecher f overview

A closer look at the antenna shows the 1.20 meter "Bandantenne" and carrying bag. The antenna bag is made out of thin "Ersatz" leather and holds the antenna folded in three. A small press stud closes the bag at one end. Two loops with carbine hooks are sewn to the bag to suspend the bag from the Feldfunksprecher casing:

Figure 102: the 1.2 metre “Bandantenne” and its carrying bag

A close up reveals the length stamped onto the antenna. Note that the antenna does not have the metal hooks used on the shorter Feldfu antennas to fold it. Also note that the white colour coding is not used on the antenna. The same antenna was shared with the Feldfu.h model which used an orange colour coding.

Figure 103: Closeups of the antenna markings and bag.

Apart from the antenna, all the accessories are as per the other Feldfunksprechers: the Rückenstütze lumbar support, battery, remote control cable, Dfh.f and Kmf.c could be packed into the back of the casing when required:

Figure 104: Accessories for the Funksprecher f

Also the "Sturmgepack" A-frame could be attached to the back of the radio. If the A-frame was worn, the antenna bag could no longer be attached. When the radio was in operation this was not a problem, as the empty antenna bag could be folded and stored inside the radio:

Figure 105: Funksprecher f with attached A-frame

Figure 106: Panzergrenadier Sprechfunker impression

The following pictures show an impression of a Panzergrenadier NCO with the Feldfunksprecher f. Usually the Feldfunksprechers were carried by a messenger, but in some cases officers or NCO's chose to wear the radio themselves:

As usual the cables of the headphones and throat microphone are clipped to the remote control cable and pass along the belt. Because there is no space on the belt due to the MP40 pouches, the NCO has fixed the remote control to his Y-straps,

Note how the angled antenna is kept well away from the wearer's helmet. Even if the Panzergrenadier lies down, the angle of the antenna will allow communication to continue:

The Feldfunksprecher f was introduced relatively late in the war compared to the other models. There is some evidence that the Feldfu.f was first used during the Kursk offensive (July-August 1943), most Feldfu.f's found today are 1944 (thick rim) production models. The Feldfu.f was part of the radio installation of the Panzer and Panzergrenadier command halftracks and would allow the commanders to stay in contact when outside their vehicles.

When introduced, the Feldfunksprecher f would have had a major impact on infantry-tank cooperation; at last the Panzergrenadiere could act as the eye and ears of the Panzer crews, and the Panzers could provide the heavy support to the Panzergrenadiere when required.
Feldfunksprecher f's are a relatively rare find today with the antenna and antenna bag proving hard to find accessories.

Figure 106: Sprechfunker front view

Figure 107/108: side and rear view of the Panzergrenadier Sprechfunker

H is for - Feldfu.h

The final variant of the Feldfunksprehers is the Feldfu.h model. The "h" was developed to give the infantry a means to communicate directly with the supporting Sturmgeschütze using the FU16 radio:

Figure 109: Funksprecher h

The FU16 (Ukw.E.h + 10 W.S.h) operated from 23.1 to 24.9 MHz, so significantly below other Feldfunksprecher models. This required a change to the values of the capacitors and inductors in the oscillating circuit as well as in the antenna circuit. Since a 1.20 meter antenna was used (which is short in relation to the quarter wavelength of over 3 meters), the transmitter needed a bit more power; it uses as power valve (RL2.4P2) used instead of the customary amplification valve (RV2.4P700) used in the other Feldfunksprecher version. Curiously the two high frequency valves are switched at the filament, meaning that there must have been a short delay between receiving and transmitting to allow the valve to heat up:

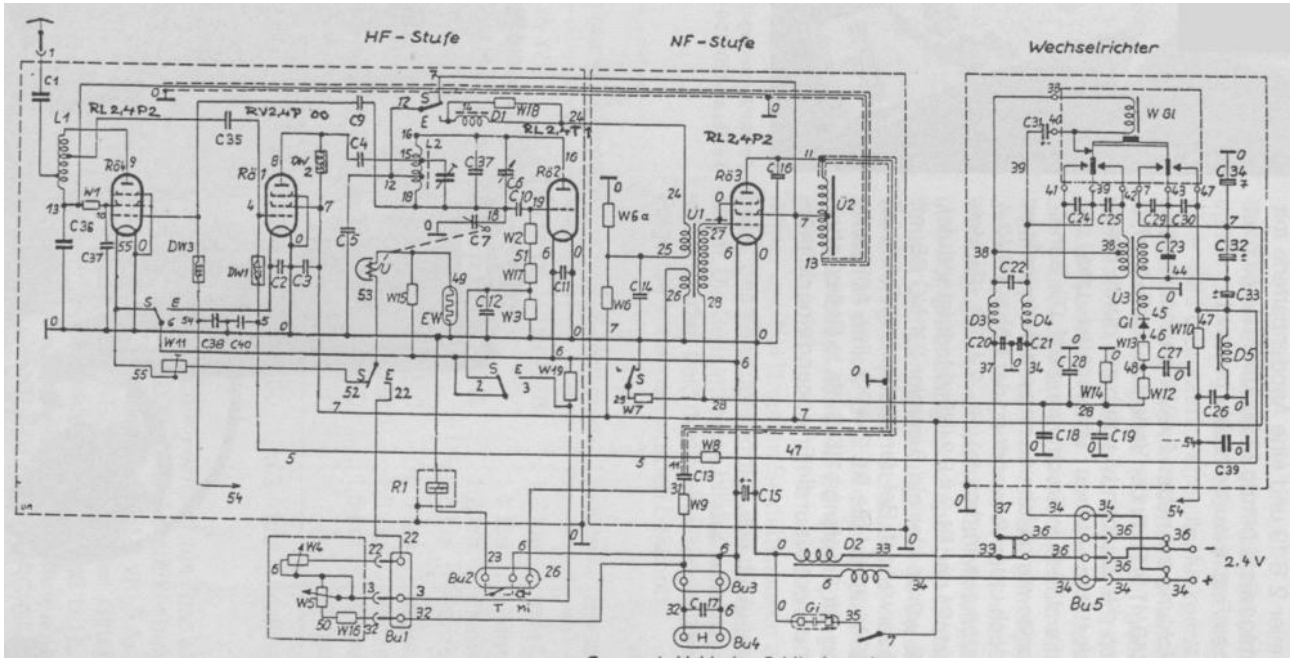


Figure 110: Fusprech h circuit diagram

The Feldfunksprecher.h was likely designed as a successor to the Torn.Fu.h model, a portable radio of earlier design:

Figure 111: Torn.Fu.ha radio

The Feldfu.h follows the now familiar concept of the control panel on the left side of the bakelite casing:

Figure 112: Feldfu.h front panel

All the familiar controls are identical to the other Feldfunksprecher types except for the frequency dial, which is calibrated in channels:

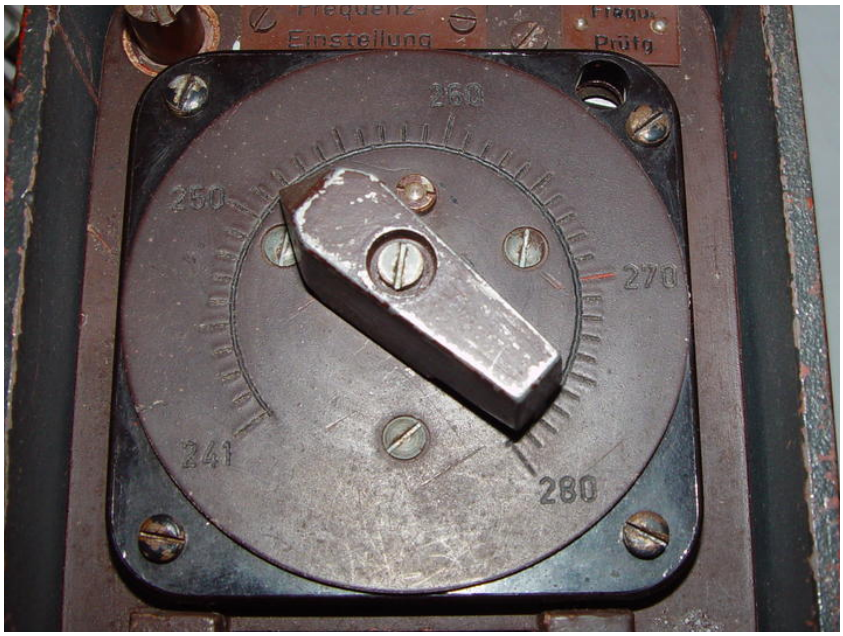


Figure 113: Frequency channels on the Feldfu.h

The Feldfu.h uses the same channel numbers as the FU16 set used in the Sturmgeschütze and the Torn.Fu.h(a) radios, channels run from 241 to 280 covering 23.1 to 24.9 MHz. A calibration channel is marked in red at channel 270. The frequency control does not snap into the channels like on the Feldfu.b and c models, so the radio can be exactly adjusted to the frequency used by the Sturmgeschütze.
The longer 1.20 meter antenna could no longer be stored inside the housing of the radio, so a special carrying bag was used that could be strapped to the top of the housing. Also in relation to the longer antenna, the antenna mount is fitted at an angle:

Figure 114: Feldfu.h overview

The top of the radio reveals the Feldfu.h legend painted on the box and a orange "H" shaped feeler shape:

Figure 115: Feldfu.h top view

Note that most Feldfu.h's pre-date the change to the "thick-rim" casing at the start of 1944. It is likely that the Feldfu.h pre-dated the Feldfu.f and that the infantry-tank radio concept was pioneered by the "h" model. In their original concept, the Sturmgeschütze provided close artillery support to the infantry. The Sturmgeschütze were only fitted with a full two-way radio installation from the "Ausf. E" version from late 1941 onward, so it is likely that the Feldfu.h was introduced around this time as well.
The Feldfu.h legend and a orange circle is painted on the back lid, making it easily distinguishable from the other models:

Figure 116: Feldfu.h side and back view

Like all the Feldfunksprechers, the Feldfu.h was supplied with a Lumbar support, 2.4NC28 battery, antenna, Dfh.f headphones and Kmf.c throat microphone and a remote control cable:

Figure 117: Fusprech.h accessories

Because the Feldfunkersprecher h shares the same antenna with the Feldfu.f, the colour coding was not used on the antenna, the greater length would have been enough to easily distinguish it from the Feldfu.b and c antennas:

Figure 118: Feldfu.h 1.2 metre “Bandantenne” and carrying bag

Like all other Feldfunksprecher models, the radio could be worn in combination with the standard infantry equipment, with a a possibility to suspend the A-frame of the "Sturmgepäck" on the back.

My impression of a Feldfunksprecher.h in use however depicts a Stug officer, who has descended his command vehicle (Sd.Kfz.253) to direct his "Sturmgeschütze" on foot:

Figure 119: Stug forward observer with Fusprech.h

The officer has donned some Y-straps to be able to carry the radio. He has grabbed the MP38 stored in his Sd.Kfz.253 to augment his service pistol for personal defence.

Figure 120: Fusprech.f used by the Stug forward observer

The empty antenna bag has been left strapped to the radio:

the remote control unit of the Feldfunk.h is strapped to his belt while he has clipped the control box of the throat microphone to his tunic:

Figure 121: Back view of the forward observer

Figure 122: Feldfu.h in wear

The Feldu.h is one of the rarer variants of the Feldfunksprecher family. There are no Feldfu.h1 or h2 models, indicating that they were no longer produced by the start of 1944. Those found today tend to be in very good unused condition indicating that a few may have survived in Wehrmacht stores at the end of the war.
The role of the Sturmgeschütze changes towards the end, they were more and more used as anti tank ambush hunters or as a surrogate for tanks in the Panzer divisions. In these changed roles the Sturmgeschütze would have been fitted with the FU5 radio sets, so the Feldfu.h would no longer have a relevance in these units. By the end of the war, most Feldfu.h's were probably replaced with Feldfu.f's, with the remaining "h" models kept in stores.

Figure 123: The Stug forward observer ready for action

