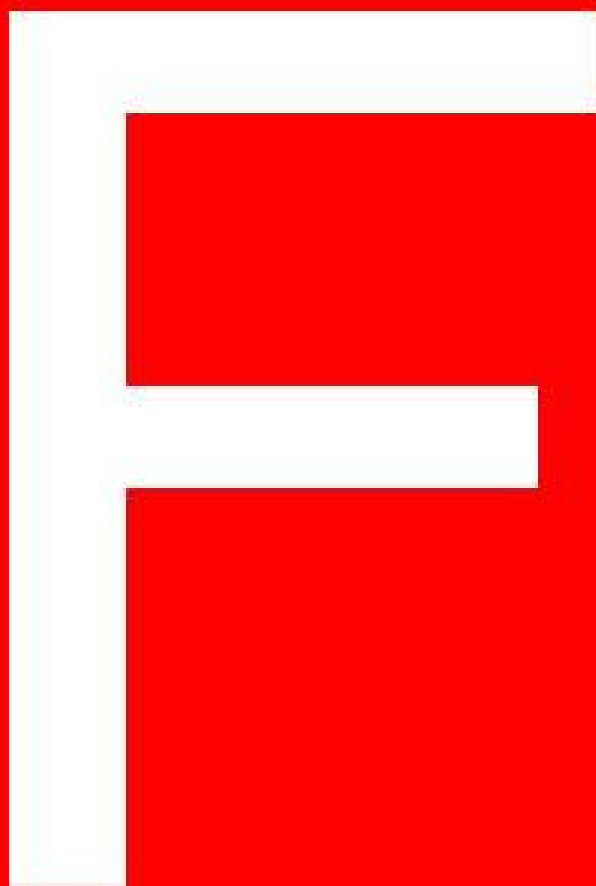


German Field Line Communication equipment of WW 2



Funksammler Publications

Übertrager Telephone Transformer

Development and Description

The section on cable describes that both single and double wire connections could be used, sometimes in a single line. The transfer from single to double cable connection requires an insulation transformer. This transformer was called the “Übertrager” or telephone transformer. It consisted of a wooden box with external connections containing a heavy ring-core transformer. Both primary and secondary windings are executed in two halves with mid point connections. In this way the transformer can act both as an insulation transformer and as a Balance-Unbalance transformer. The dimensions of the transformer are chosen quite large to allow the strong bell currents to be passed through without distortion.

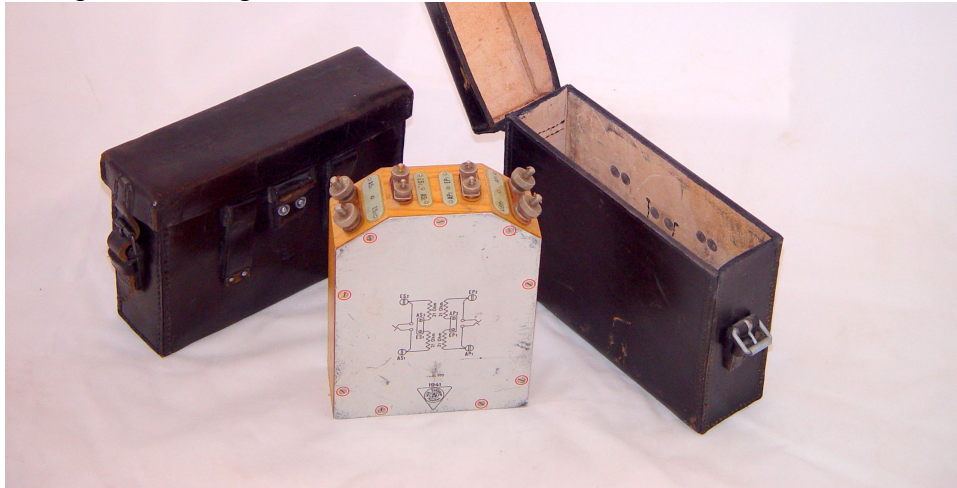


Figure 224: Übertrager with leather carrying case

On the top of the Übertrager are four large and four small screw connectors. Instead of the large screw connectors, two sockets for interconnection cables, placed on the side of the unit, can be used. The smaller connectors have jumpers fitted. When not in use the Übertrager was stored in a leather carrying case.

EP2	Eingang Primär 2	Primary input 1
AP1	Ausgang Primär 1	Primary output 1
AP2	Ausgang Primär 2	Primary output 2
EP1	Eingang Primär 1	Primary input 1
AS1	Ausgang Secundär 1	Secondary output 1
ES2	Eingang Secundär 2	Secondary input 2
ES1	Eingang Secundär 1	Secondary input 1
AS2	Ausgang Secundär 2	Secondary output 2

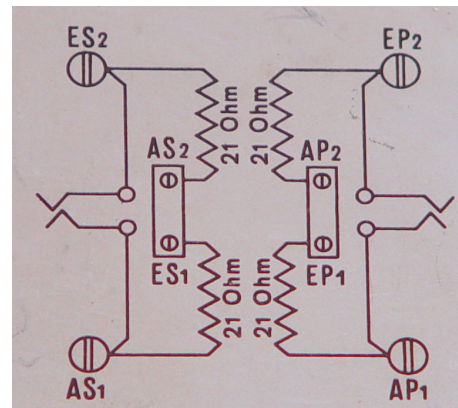


Figure 225: Übertrager schematic

German Field Line Communication Equipment of WW2©

A number of different circuits could be made using the *Übertrager*. As mentioned a one-wire to two-wire transfer could be made:

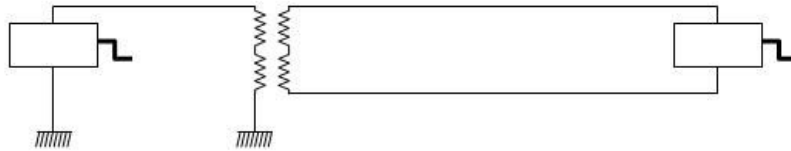


Figure 226: One-wire to two-wire transfer

The *Übertrager* also allowed an additional connection to be made over a two-wire line. In this case the signal from phones “A” will flow as differential mode current through the two wires while the signal from phones “B” will flow as common mode current through the two wires and return via earth. In the properly balanced line, users “A” and “B” can not hear each other. “B” could also be used for telex.

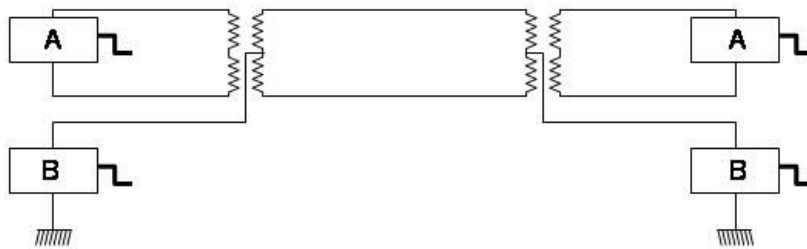


Figure 227: Double use of a two-wire connection

In order to explain this circuit, the currents through the transformer are shown. The differential mode current (Blue) is the only current that creates a magnetic field in the core and is seen at the secondary side of the transformer. The magnetic fields created in the core by the common mode current are in opposite directions and equal each other out. The common mode current (Red) has to flow out via the mid point tab of the transformer.

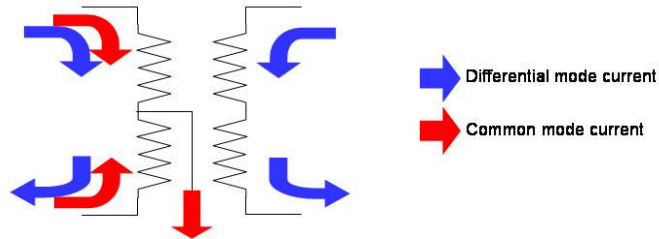


Figure 228: Currents through the *Übertrager*

The same trick can be repeated for four-wire *Schweres Feldfernkabel*:

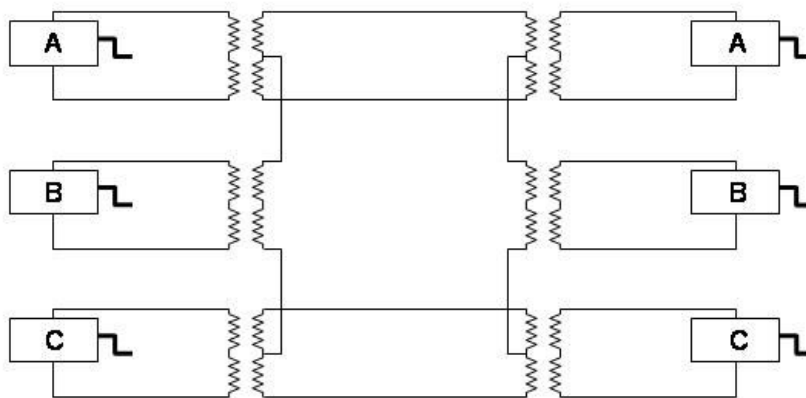
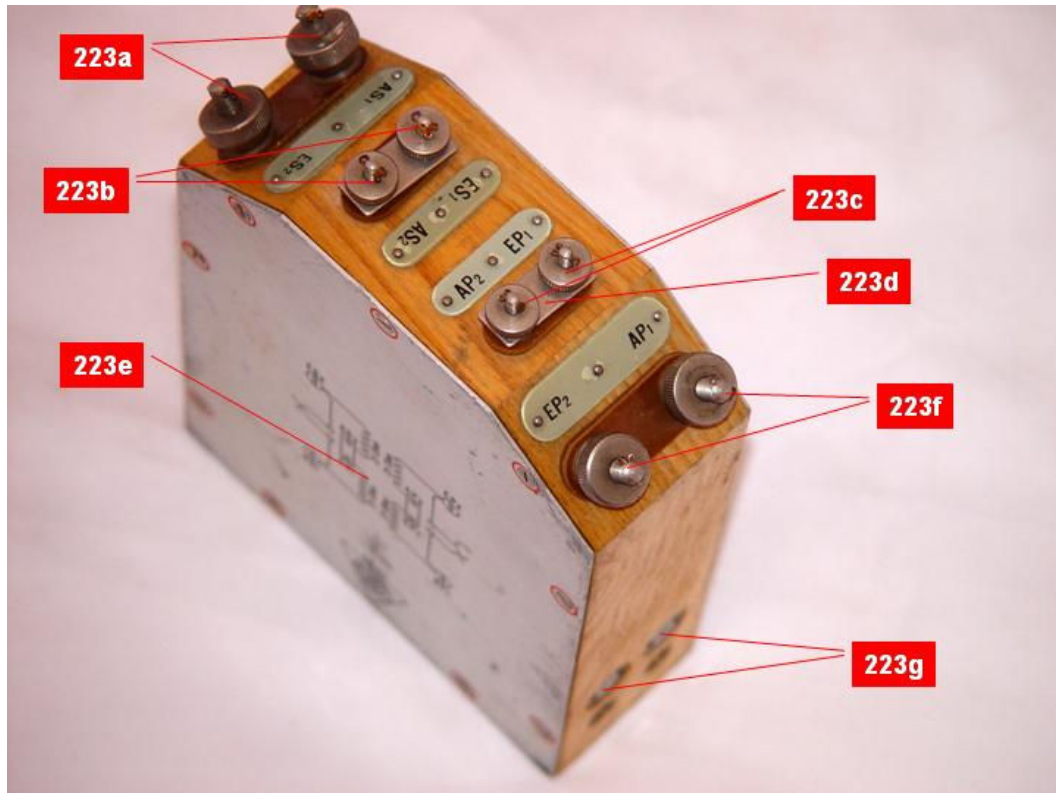


Figure 229: Triple use of a four-wire connection

In this way, for example two phone lines and a telex connection could be established using a single *Schweres Feldfernkabel*.

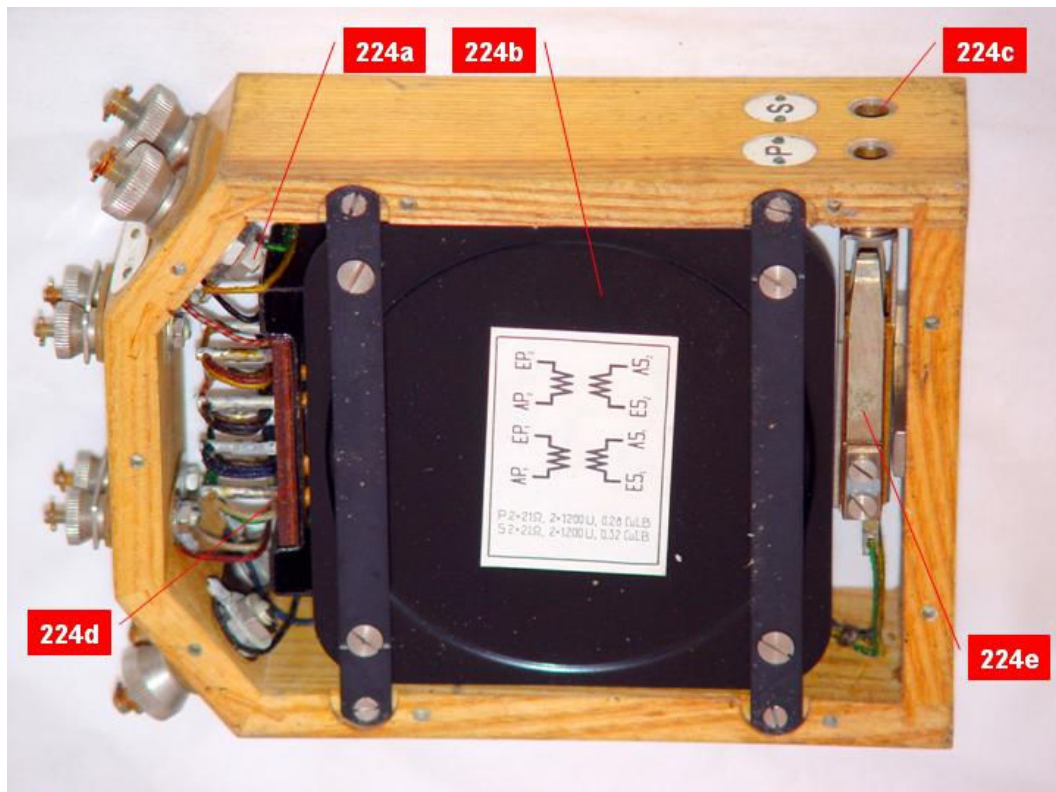
Construction

Figure 230: Übertrager outside view



- | | | |
|--|--|--|
| 223a Secondary winding connection screws | 223c Primary mid point connection screws | 223e Primary winding connection screws |
| 223b Secondary mid point connection screws | 223d Mid point Jumper | 223f Interconnection cable sockets |

Figure 231: Übertrager inside view



- | | |
|------------------------------------|--------------------------------------|
| 224a Internal connection points | 224d Transformer connection board |
| 224b Transformer housing | 224e Interconnection socket contacts |
| 224c Interconnection cable sockets | |

Operation

There are many different ways to use the *Übertrager*, so first it needs to be established what exactly has to be achieved. The most common uses are:

- 1) Transfer from two-wire to one-wire line
- 2) Solving imbalance caused by leakage in a two-wire line
- 3) Crossing an area of high common mode interference (eg near high voltage lines)
- 4) Creation of two channels on a two-wire line
- 5) Creation of three-channels on a four wire line

Once the use has been established, the appropriate connections can be developed. For example to achieve 1) Transfer from two-wire to one-wire line:

- Place the *Übertrager* so that it is protected from rain and dirt at the transfer point between the two- and one-wire connections
- Ensure both jumpers of the mid point tabs are closed
- Connect the single wire line to connection AP1
- Connect the earth pin to connection to EP2
- Connect the first wire from the two-wire connection to AS1
- Connect the second wire from the two-wire connection to ES2

In some cases the interconnection cable can be used to connect the *Übertrager* directly to a FF 33 field telephone. For example to achieve 2) Solving imbalance caused by leakage in a two-wire line, on each end of the line -:

- Place an *Übertrager* near the field telephone
- Place the interconnection cord into the socket of the FF 33 and in the “P” interconnection cable socket of the *Übertrager*
- Connect the wires from the two-wire connection to the AS1 and ES2 terminals



Figure 232: *Übertrager* connected directly to a FF 33 field telephone