Below is a rough translation of "Hell távirók hosszúhullámú rádiórendszeren", pp. 387-388 in "XX. Század 1926-1950" ["20th century 1926-1950"], Chapter 6 (pp. 317-414) of "A magyar vasúti távközlés rendhagyó krónikája" ["Unusual chronicle of Hungarian railway telecommunications 1846-2000"], János Pap, 2019, 940 pp. Source: bgok.hu. This translation is a Google translation, optimized by Frank Dörenberg, November 2021, ©.

Hell telegraphy on the longwave radio system

Siemens & Halske's 150 characters/minute Hell telegraphs, a fast pulse transmitter with a speed of 150 beats per minute, have been installed on the long-wave radio system.

The typical mode of the network is telegraphy, but - if necessary - a telephone conversation can be made over a long-wave radio connection. Invitations, acknowledgments, and short-term messages are partly hand-sent with Morse signals, but most telegrams can be handled with a 150-character/minute Hell telegraph. The transmission speed is determined by Siemens' speed of 300 characters per minute. It can be increased with fast-Hell system equipment. However, pre-punched tapes must be used for this high-speed, as even the best-trained radio telegraphers, including György Papp, who has won national awards, have not been able to send this fast.

The Siemens-Hell telegraph works with 7x7 = 49 pixels. I.e., each letter, number or sign, i.e., character, is placed in a rectangle that is divided into 7x7 bands, both horizontally and vertically, see Figure 3. As contiguous text also includes spacing between letters, the first and last columns of each rectangle do not contain pixels.

Figure 3 shows the letters F. The black fields correspond to current pulses and the white fields to absence of current pulses. The elements of the font image are scanned vertically, from the bottom to the top, moving from left to right, resulting in the lower part of the figure. This string – different for each character - is generated by a notched disc that allows the output of the power outage pulses and the Siemens-Hell system to emit current pulses through the contacts. Each character has a separate disk and contact. The disk for the letter E is shown in Figure 4.

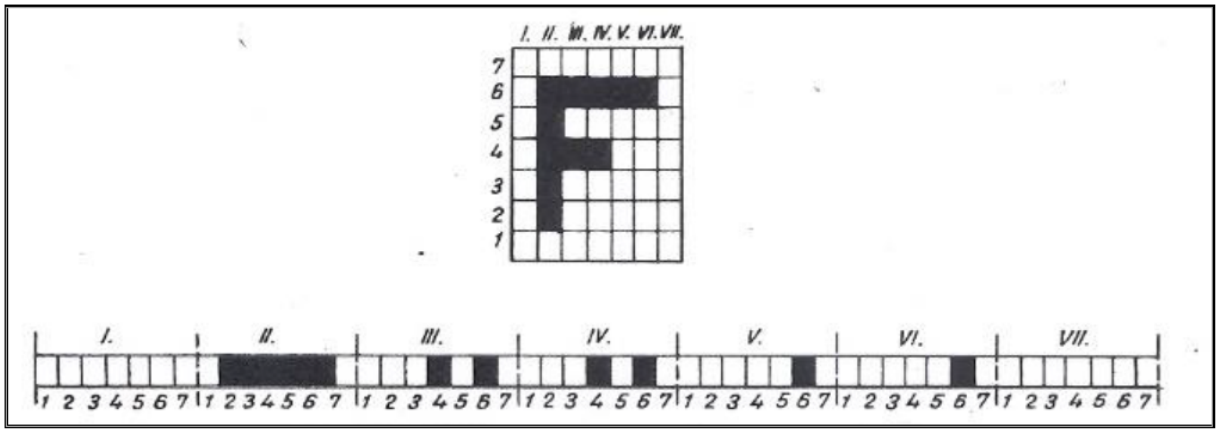


Figure 3: Font transmission [*Kul*]

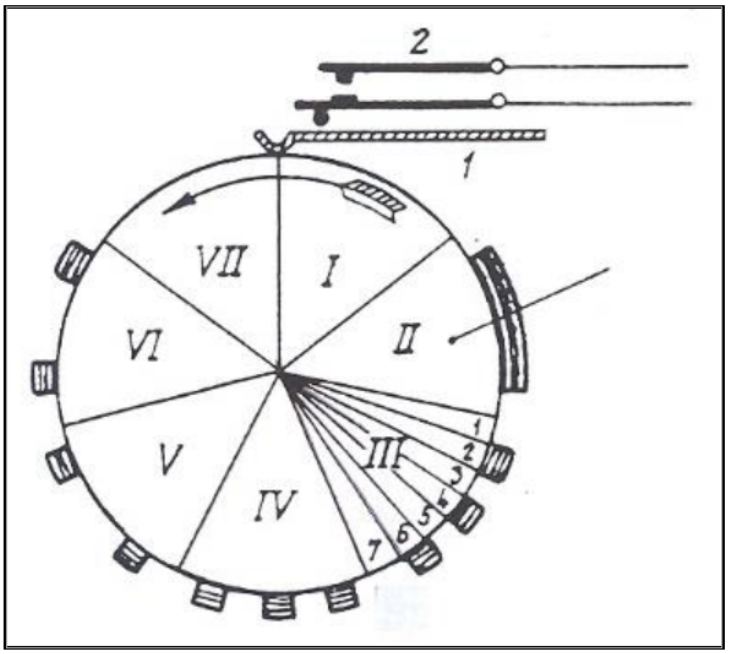
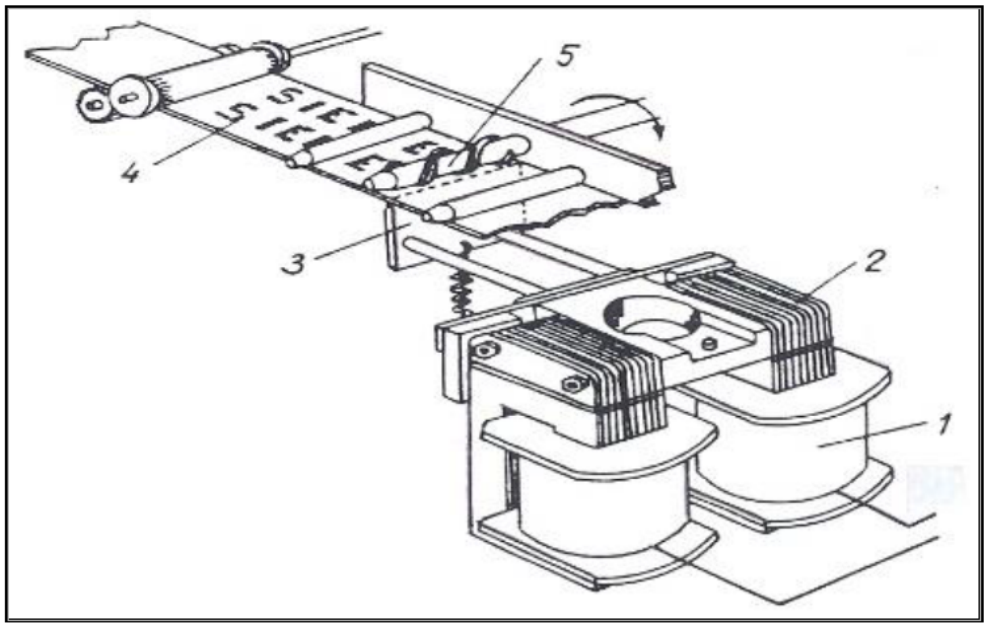


Figure 4. The disk for the letter E [*RM*]

The printer part consists of a printer magnet and a printing spindle, see Figure 5. The incoming pulse train is evaluated by the receiver magnet. When a current pulse arrives, the magnet pulls on its anchor and strikes the paper tape (item 4) with the sharp-edged hammer (item 3) on the double-threaded thread (item 5). The thread is constantly wetted by ink-soaked felt roller, so that at the moment of their contact, it paints a line.

When a no-current pulse occurs, the magnet is not energized, and the spindle thread is not in contact with the paper. As the paper moves constantly, the marks tilt slightly to the right.



1 printer magnet; 2 iron core; 3 paper guides; 4 paper strips; 5 printer spindle threads;

Figure 5. Operation of the Siemens-Hell receiver [*RM*]

An unreadable character may occur if the motor speed of the transmitter and receiver is not phase-correct. Synchronous operation can be obtained with a speed regulator that is mounted on the drive motor, which may not yet guarantee phase accuracy. For this reason, the spindle has a double screw thread, whereby the marks appear on two sufficiently consecutive lines on a sufficiently wide strip of paper.

As a result, even in the case of an incorrect phase, one of the two lines is always readable, because a character that is truncated due to distortion, appears in its entirety in the other line, see the figure below. Fortunately for the receiver, the printer produces readable characters even in the case of weak and disturbed signals, see Figure 6.

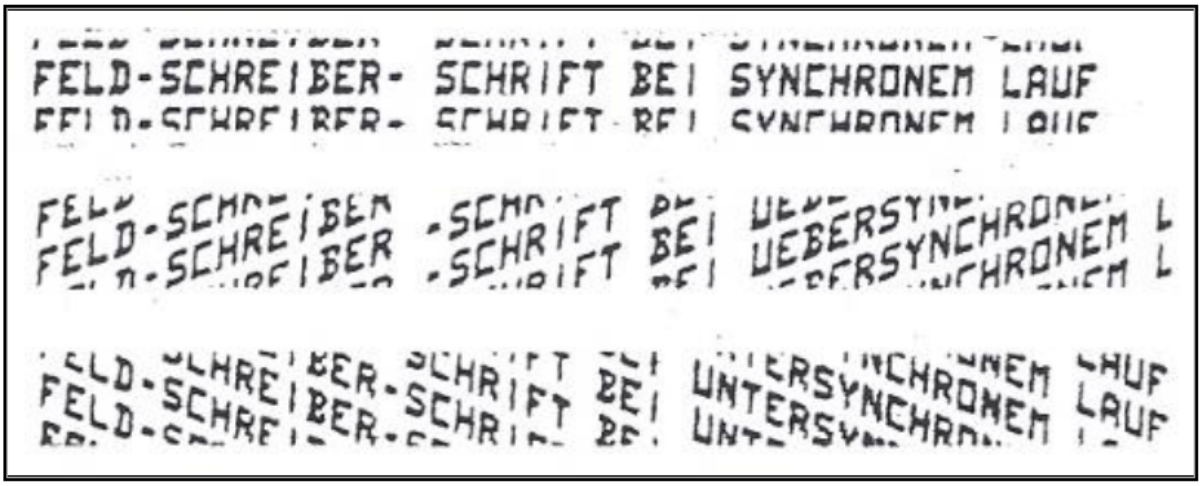


Figure 6. Effect of synchronism on the printing quality [*RM*]

The disadvantages of the Hell system are the performance of 150 characters / minute, the continuous running of the tape, the rhythmic transmission required due to the synchronous operation, because the writing on the tape is usually not suitable for direct delivery due to the distortion. In this case, the received text must be transcribed into legible handwriting or by typewriter.

Most of MÁV's [FD: *Magyar Államvasutak = Hungarian State Railways*] telegrams of traffic, commercial and administrative nature are already transmitted on the long-wave radio network, even at those installed. The two designers were praised by the railway management.

[*RM*] [*SZT*]