HISTORY OF TELETYPEWRITER DEVELOPMENT

R. A. Nelson

K. M. Lovitt, Editor

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Teletype Corporation
5555 West Touhy Avenue
Skokie, Illinois

ABSTRACT

The success of the modern teletypewriter began with Howard L. Krum's conception of the start-stop method of synchronization for permutation code telegraph systems. The purpose of this paper is to provide a brief historical account of events which led to that achievement and of those which ensued.

Four areas of development will be covered:

(1) The contributions of Sterling Morton, Charles L. Krum and Howard L. Krum.
(2) The contributions of E. E. Kleinschmidt.
(3) The contributions of AT&T and Western Electric.
(4) The contributions of L. M. Potts

HISTORY OF TELETYPEWRITER DEVELOPMENT

Area I. In 1902 a young electrical engineer named Frank Pearne solicited financial support from Joy Morton, head of the Morton Salt interests. Pearne had been experimenting with a printing telegraph system and needed sponsorship to continue his work. Morton discussed the matter with his friend, Charles L. Krum, a distinguished mechanical engineer and vice president of the Western Cold Storage Company (which was operated by Joy's brother, Mark Morton). The verdict for Pearne was favorable, and he was given laboratory space in the attic of the Western Cold Storage Company.

After about a year of unsuccessful experimenting, Pearne lost interest and decided to enter the teaching field. Charles Krum continued the work and by 1906 had developed a promising model. In that year his son, Howard, a newly graduated electrical engineer, plunged into the work alongside his father. The fruit of these early efforts was a typebar

page printer (Patent No. 888,335; filed August 22, 1903; issued May 19, 1908) and a typewheel printing telegraph machine (Patent No. 862,402; filed August 6, 1904; issued August 6, 1907). Neither of these machines used a permutation code.

They experimented with transmitters as well, applications filed in 1904 and 1906 maturing into Patents No. 929,602 and No. 929,603. These patents covered modes of transmission which depended both on alternation of polarity and change in current level.

By 1908 the Krums were able to test an experimental printer on an actual telegraph line. The typing portion of this machine was a modified Oliver typewriter mounted on a desk with the necessary relays, contacts, magnets, and interconnecting wires (Patent No. 1,137,146; filed February 4, 1909; issued April 27, 1915). As a result of the successful test of this printer, Charles and Howard Krum continued their experiments with a view to developing a direct keyboard typewheel printer.

They sought most of all to discover a way of synchronizing transmitting and receiving units so that they would stay "in step." It was Howard Krum who worked out the start-stop method of synchronization (Patent No. 1,286,351; filed May 31, 1910; issued December 3, 1918). This achievement, which more than anything else put printing telegraphy on a practical basis, was first embodied (for commercial purposes) in the "Green Code" Printer, a typewheel page printer (Patent No. 1,232,045; filed November 28, 1909;issued July 3, 1917).

The transmitters first used by the Krums were of the continuously-moving-tape variety. (A stepped tape feed, they maintained, would have reduced transmission speed.) In order to permit sequential sensing, the rows of code holes were arranged in a slightly oblique pattern (with respect to tape edges). This method of transmission is more fully elaborated in Krum Patents No. 1,326,456, No. 1,360,231, and No. 1,366,812.

Keyboard-controlled cam-type start-stop permutation code transmitters were developed by Charles and Howard Krum in about 1919. Such a device is the transmitter component of the Morkrum 11-Type tape printer (Krum Patent No. 1,635,486). This kind of transmitter employs a single contact to open or close the signal line.

In about 1924 the Morkrum Company introduced the No. 12-Type tape printer (H. L. Krum Patent No. 1,665,594). On December 23, 1924, Howard Krum and Sterling Morton (son of Joy Morton) filed an application on the 14-Type type-bar tape printer which matured into Patent No. 1,745,633. [1]

Area II. It appears that the early efforts of E. E. Kleinschmidt were directed toward development of facsimile printing apparatus and automatic Morse code equipment. He patented first a Morse keyboard transmitter (Patent No. 964,372; filed February 7, 1095; issued January 11, 1910) and later a Morse keyboard perforator (Patents No.

1,045,855, No. 1,085,984, and No. 1,085,985). (The latter became known as the Wheatstone Perforator.)

In 1916 Kleinschmidt filed an application for a type-bar page printer (Patent No. 1,448,750 issued March 20, 1923). This printer utilized Baudot code but was not start-stop. It was intended for use on multiplex circuits, and its printing was controlled from a local segment on a receiving distributor of the sunflower type. Later, around 1919, Kleinschmidt appeared to be concerned chiefly with development of multiplex transmitters for use with this printer (Kleinschmidt Patent No. 1,460,357).

It seems that Kleinschmidt first became interested in modern start-stop permutation code telegraph systems when H. L. Krum's basic start-stop patent was issued in December 1918. Shortly after that Kleinschmidt filed an application entitled "Method of and Apparatus for Operating Printing Telegraphs" (Patent No. 1,463,136; filed May 1, 1919; issued July 24, 1923). The system described therein employed the start-stop principle with a modified version of his earlier multiplex distributor. That patent, accordingly, was dominated by the Krum start-stop patent. The conflict of patent rights between the Morkrum Company and the Kleinschmidt Electric Company eventually led to a merger of the two interests.

Shortly after the new Morkrum-Kleinschmidt Corporation (later called the Teletype Corporation) had been established, Sterling Morton, Howard Krum, and E. E. Kleinschmidt filed an application covering the commercial form of the well-known 15-Type page printer (Patent No. 1,9904,164). [2]

Area III. Teletype entered the Bell System in 1930. From this point on, advances in the Teletype product can be considered the result of the pooled efforts of the AT&T Company, the Western Electric Company, and the Teletype Corporation. Teletype Corporation, of course, holder of the basic patents and expert in the art, was the chief contributor.

Although it appears from the report of R. E. Pierce, dated December 24, 1934, that the Bell System was active in the development of telegraph printers and transmitters as early as the year 1909, a review of the patents issued to Bell reveals no significant contribution to modern teletypewriter development (using start-stop permutation code) until the introduction in 1920 of the 10-A teletypewriter (Pfannenstiehl Patents No. 1,374,606, No. 1,399,933, No. 1,426,768, No. 1,623,809, and No. 1,661,012).

The 10-A teletypewriter was the first embodiment of such basic design features of the 15-Type printer as stationary platen, moving type basket, and selector vane assembly, but the majority of improvements incorporated in the 15-Type were proprietary to the Teletype Corporation.

Area IV. The earliest contribution of Dr. L. M. Potts to the start-stop method of synchronization appears to have been set forth in a patent application filed November 18, 1911, covering a reed-type start-stop selector (Patent No. 1,151,216).

In 1914, Dr. Potts filed an application for a single magnet page printer which used an eight-unit code (Patent No. 1,229,202; issued June 5, 1917).

In 1915, Dr. Potts filed an application covering another single magnet page printer, this one using the start-stop permutation code (Patent No. 1,370,669; assigned to AT&T March 8, 1921).

Potts Patents No. 1,517,381 and No. 1,570,923 were also assigned to AT&T.

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[1] For anyone who is old enough to have seen a Western Union Telegram where the typing is on narrow gum-backed tape that is moistened and stuck to a telegram blank, this is the machine that produces that kind of printing. The same mechanism is the basis of a typing reperforator, a machine which punches received signals into a tape for retransmission and also types on the tape so an operator can read it.

[2] This is the machine used until the 1960s or so by the news wire services. Some radio stations still use a recording of the sound of one of these machines as background during news broadcasts.

From: Jim Haynes haynes@cats.UCSC.EDU
Subject: History of Teletypewriter Development
Date: 17 Nov 91 08:34:46 GMT
Organization: University of California, Santa Cruz
haynes@cats.ucsc.edu haynes@cats.bitnet