Chapter 1

INTRODUCTION

1.1. Historical Background

Teleprinters are fast superseding other equipments in printing telegraph systems. They are also finding applications in the developing art of data processing and automation. The teletypewriter exchanges are proving very useful. specially among business concerns in big industrial cities. In fact, the teleprinter technique can be successfully employed in many applications for transmitting information by suitable coding.

Although Samuel F.B.Morse invented his telegraph in 1844, and commercial telegrams were transmitted using printing telegraph machines as early as 1851, it was in 1858 that a sound beginning was made in printing telegraphy, when Wheatstone designed his automatic transmitter for sending, and a high speed tape recording instrument for reception. The Wheatstone system was further improved and supplemented by the Creed system | 1 | In the Creed system the receiving perforator reproduces a perforated tape identical in all respects to the tape fed into the transmitter. This perforated tape is then fed into an automatic printer which prints the message on a paper tape. This tape after passing through a gumming devi

is pasted on the standard telegraph blanks.

While Wheatstone and Creed systems used the Morse code, the Murray Automatic system used the five unit code. In this system the message was printed in the page form. Thus it was ready for delivery immediately after reception and the gumming process was eliminated.

The Siemens and Halske high speed system showed a further development in that the intermediate process of perforating the tape in the receiving station was eliminated. The message was printed directly on a tape. This system also used five unit code. The perforations on the tape in this system were transverse, that is, across the tape unlike the Murray system where it was longitudinal, that is, along the tape. Consequently the transmitting mechanism used a rotating distributor as a means for securing the proper sequences of signals. Thus the Siemens and Halske system can appropriately be called the fore-runner of the present day teleprinters, differing, in principle, only in the method of synchronization. All these high speed systems however can achieve a speed of about 160 words per minute. A major improvement in increasing the speed of operation was achieved, when in 1875, Emile Baudot, a Frenchman, invented the multiplex system, and when later in 1910, A.C. Booth of British Services adopted it for duplex operation. A six channel Baudot multiplex system has carried messages at a

speed of 360 words per minute [1]. However, in order to avoid errors in transmission in a Baudot multiplex system, it is necessary that the speed of distributors be very accurately maintained. It has been shown [2] that in order to receive signals correctly on a two channel multiplex system for a period of 15 minutes at a speed of 60 words per minute per channel, the receiving distributor speed would have to be held accurate within ± .002 per cent. Consequently an elaborate method of synchronization derived from very accurate timing sources such as tuning forks is to be made. This difficulty was surrmounted, when in 1910, H.L. Krum invented the start-stop method of synchronization and applied it to printing telegraphy [3]. As a result of this invention a new line of machines known as teleprinters or teletypewriters made their apprearance. Gradually this machine proved superior and the Baudot multiplex system ultimately gave way to teleprinters and frequency division multiplex, that is, the carrier systems.

1.2. Components of a teleprinter.

Like the Baudot multiplex system, the teleprinter also uses the five unit code for its operation. The essential difference of a teleprinter from a Baudot multiplex is in the method of synchronization. In teleprinter each code train, consisting of five elements,

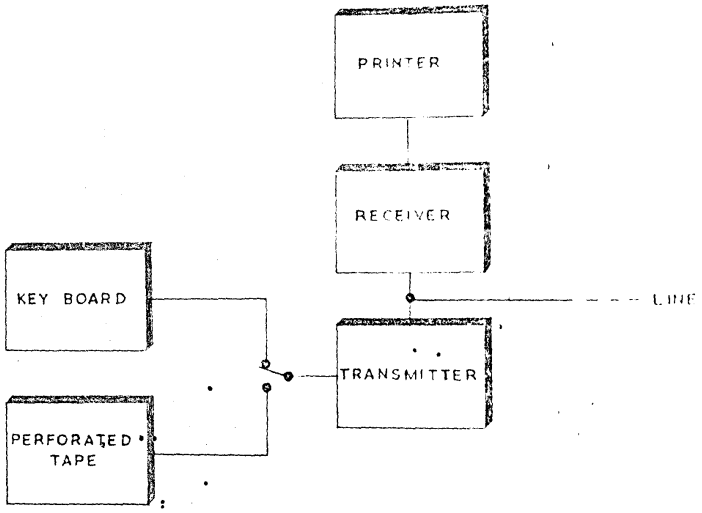

FIG. 1. BLOCK DIAGRAM OF A TELEPRINTER

is prceded by a start signal and followed by a stop signal. Normally the receiver cam shaft is at rest. When it receives the start signal it starts rotating. During this revolution it identifies the five code elements, and is finally brought to rest by the stop signal. Thus the receiver cam shaft is started and stoped for each character. Hence the name start-stop telegraphy is attributed to teleprinters. Any difference of speed between the transmitting and receiving cam shaft can not, therefore, be cumulative, and the usual practice is to maintain the speed of each distributor within ± .75 per cent, although a much larger variation may be tolerated without causing errors except when it occurs simultaneously with an abnromally large line distortion. Hence the motors can be simply synchronous motors or centrifugally governed motors. The start signal is usually a space pulse of the same duration as the code pulses, and the stop pulse is a mark pulse of 1.5 times the duration of a code pulse. The essential components of a teleprinter are shown in Fig. 1.

1.2. Necessity of a Distributor .

The transmitter transmits the code elements one after another, whereas at the input of transmitter,