PRESENTATION OF
A NEW HIGH SPEED PAPER TAPE READER
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Abstract.

A high speed paper tape reader with a maximum speed of 1000 characters per second is described. Relevant principles of construction as well as operating characteristics are given in some detail.

A new high speed paper tape reader has been developed by Facit Electronics, Solna, Sweden. Designated the PE 1000, it operates at up to 1000 characters per second. The reader can be stopped between every character. Thus speed can be varied arbitrarily throughout the entire 0–1000 character per second range. A selector switch can be set for operation at a maximum speed of 500 characters per second. The Facit PE 1000 can read 5, 6, 7 and 8-channel paper tape punched in accordance with international standards.

As developmental work progressed, special priority was assigned several features vital to an all-round paper tape reader. Top speed is not the only factor contributing to effective reading speed; acceleration plays a significant role as well. Moreover, reader design must permit tapes to be inserted rapidly, especially when many short tapes are to be read. Conversion among 5, 6, 7 and 8 channel tapes must be accomplished quickly. Tapes of different thickness, different grades of paper and tapes which deviate from specified standards for width and hole dimensions must be read.

Reading is dielectric. The tape passes a reading head comprising 9 electrodes, one for each channel including the feedhole channel. A single main electrode is located on the opposite side of the tape. Each of the nine electrodes in combination with the main electrode creates a capacitor, the capacitance of which changes when a hole passes by. Thus, information punched into the tape can be read by sensing the variations in capacitance. This reading principle was used successfully for years on the Facit Electronics ETR 500 paper tape reader which operated at a maximum rate of 500 characters per second.

Fig. 1 illustrates PE 1000 operating principles. Every electrode A
Inserting paper tape increases the capacity thus destroying the balance of the circuit. The resulting signal is amplified by the amplifiers. When a paper tape runs past the reading head an amplitude-modulated, high-frequency signal is obtained. After amplification the signal is sent to a detector. Voltage obtained after the detector contains information as to whether tape contains a hole or no hole.

Amplifiers are resistance coupled and designed with high negative feedback to assure excellent thermal stability. Initial adjustment of the paper tape reader is accomplished by altering the negative feedback, thus adjusting amplification. The detector, which rectifies the amplified voltages, is of the voltage doubler type. Its coupling, too, has good thermal stability. A Schmitt trigger follows the detector. It operates as a pulse-forming network. The hysteresis inherent in the Schmitt-trigger prevents it from reacting to the ripple in the rectified signal.

Tape is fed by a continually rotating capstan (C) against which it is pressed by pinch roller (E). The pinch roller is operated via feed solenoid (D) and its armature. As the pinch roller presses tape against the capstan, brake solenoid (G) with its armature (F) is released simultaneously, allowing tape to be fed. This cycle occurs in opposite sequence when tape is to be braked; the brake solenoid is energized as pressure on the