# ABSTRACT OF SUMMARY REPORT ON THE DEVELOPMENT OF A READING MACHINE FOR THE BLIND (July 1973)[a]

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This report describes the progress from July 1, 1972, through June 30, 1973, on the development of personal-type reading machines for the blind sponsored by the Veterans Administration, Prosthetic and Sensory Aids Service (now the Research Center for Prosthetics).

The most advanced personal-type reading machine being developed by Mauch Laboratories (the Cognodictor) provides the blind user with the "spelled-speech" equivalent for each upper- and lower-case letter or ligature scanned by a hand-held optical probe. The first Cognodictor design used the "multiple snapshot" character recognition technique which recognizes most popular type fonts with moderate accuracy (90–95 percent) and speed (80–90 words per minute) by using a special arrangement of 10 CdSe photoconductors to sense letter features. To eliminate the problem of recognition errors due to mis-tracking the line of print by small amounts, the recognition logic and the photocell array were redesigned to use a newly invented "Two-Dimensional Multiple Snapshot process." Several photocell arrays, each containing 52 small CdSe cells and a breadboard of about one-half of the required circuitry were built and tested during 1971–72. During 1972–73, plans were made to develop a new optical probe using a miniature array of 64 self-scanned silicon photodiodes. Specifications for this array were prepared and a sub-contract for the design work and for the production of 20 units was placed. The design of circuitry associated

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with the photocells was nearly completed in the past year. A number of improvements were incorporated which will make the detection of print much more accurate and reliable.

The development of the original hand-held optical probe for the Cognodictor also resulted in a family of direct translation reading aids which are pocket-sized and battery-operated and may be used independently for low-speed reading. These are the Visotactor A and future Digitactor (which may be used for recognition also) and the Visotactor B which are "tactile optophones" with one or more columns of photocells and associated stimulators, and the Visotoner which is a nine-tone self-contained optophone.

Experience with 36 Visotoners built earlier and the results of experiments with stereophonic output displays contributed to the development during 1971–72 of the Stereotoner, a new aural direct translation reading aid which is noteworthy for a stereophonic output, a 10:1 zooming range, a switch which permits normal operation on reversed (light on dark) letters, a very small optical probe, and a compact, lightweight control box which rests on the user's chest held by an adjustable neckstrap. The first Stereotoner prototype was operational at the end of April 1972. It promises to permit easier and faster reading than the Visotoner. Three more Stereotoner prototypes were built during 1972–73. Each successive prototype was more like the production model. A number of improvements were made during the development of the prototypes. Due to its many features and lower cost, the Stereotoner will replace the Visotoner. The first Stereotoners from a production run of 100 units were shipped in March 1973.

The Digitactor is a direct translation reading aid which contains one or more columns of tactile stimulators which will fit and stimulate the underside of one or more fingers on either hand, the same hand which scans the page. In addition, the Digitactor will produce electrical signals suitable for being fed into either a personally owned recognition machine with a spelled-speech output (Cognodictor) or a central library computer with a machine speech output. Several designs for the Digitactor are under consideration, and a Digitactor breadboard prototype will probably be built in the near future.