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Non-visual Computer Peripherals

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Introduction

Non-visual computer peripherals have been developed for:

- (i) braille production
- (ii) information retrieval systems
- (iii) outputs for reading machines
- (iv) blind programmers

This survey of devices in production, or under development, is based on replies to a questionnaire circulated in May 1974; the main features of these devices are summarised in Table 1.

A selected bibliography on the use of computers by the visually impaired, but excluding papers on speech synthesis and the employment and training of blind programmers, is at the end of the report.

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Table 1. Summary of the main features of the devices.

Device	Speech-like	Tactual soft copy	Braille paper tape	Braille page	Speed chars/sec
1 ARTS	+				
2 Anderson				+	3.3
3 Boiten			+		
4 Boldt					
5 Boldt					
6 Brown			+		10
7 Charlesworth		+			
8 Gee				+	10
9 Grunwald		+			
10 Haskins	+				
11 Heginbotham				+	60
12 de Jong				+	200
13 Kruger		+			
14 Loeber				+	16
15 Longini	+				
16 MIT				+	16
17 Myers				+	
18 PAL				+	10
19 Rahimi	+				
20 Rubenstein				+	10
21 Schonherr		+			30
22 Spanjersberg				+	7
23 Tagg				+	8
24 Telesensory		+			
25 Thiel			+		12
26 TNO				+	4
27 Trask				+	8192
28 BD-3			+		15
29 LED-120				+	15
30 LED				+	120
31 Wienberger			+		
32 Zawistowski			+		12
33 IBM				+	250

1. Developer American Systems, Inc.
123 Water Street
Watertown, Massachusetts, 02172, U.S.A.
- Status Commercially available as part of the ARTS system.
- Description Compiled speech output delivered over telephone lines. ASI speech and teleprocessing system Nucleus 3000 V/L with central processor and 8192 x 16 bit core memory, ASI 16-line multiplexer with receiver data sets or modems and speech storage disc capable of containing up to 500 seconds of speech definable as more than 2000 English spoken words.
- Price \$66,700
- Information Dr. K. R. Ingham, June 1974.
2. Developers G. B. Anderson and D. W. Rogers
Lawrence Radiation Laboratory
University of California
Livermore, California, U.S.A.
- Status Unknown
- Description New print head for Model 33 teletype. Speed one third that of the normal teletype.
- Information Research Bulletin, No. 22, Dec. 1970, pp 111-117.
3. Developer Prof. Ir. R. G. Boiten
Laboratorium voor Werktuigkundige
meet-en Regeltechniek Technische Hogeschool
Stevinweg 1
Delft, The Netherlands.
- Status Experimental prototype.
- Description Braille printer, powered by electric motor, which prints on Kraft paper tape moving from right to left.
- Information Research Bulletin, No. 26, June 1973, page 219.
4. Developer Professor Dr. Werner Boldt,
Pädagogische Hochschule Ruhr
Dept. of Educ. and Rehab. of the Visually Handicapped
46 Dortmund
Kreuzstr. 155
West Germany.

4. Developer Professor Dr. Werner Boldt (continued)
- Status Commercially available.
- Description Electronically-controlled system for programmed learning of the blind. Audio and braille output freely combined. Braille and multiple choice input according to the character of the program. Braille input electrically evaluated as well as multiple choice input. Branched programs - branching controlled by the input modes. All information (audio, braille, memory, coding) stored on magnetic tape (cassette type). During stop periods use as electronic braille-writer, with program cassette or additional material useful for most school subjects.
- Price circa \$2,800
- Information Prof. Dr. W. Boldt, May 1974.
5. Developer Professor Dr. Werner Boldt
Pedagogische Hochschule Ruhr
Dept. for Educ. and Rehab. of the Visually Handicapped
46 Dortmund
Kreuzstr. 155
West Germany.
- Status Prototype development
- Description "Braillex" enables the blind user to reach prestored information with relatively short access. Information (verbal or braille) is stored and coded on magnetic tape cassettes. Verbal and braille output (for control) is possible. The information wanted is "called" by braille input and discriminated electronically. Examples: information from dictionaries, storing and use of private archives (telephone numbers, scientific notes, etc.), recalling of special parts in literature (pages, chapters, code words).
- Information Prof. Dr. W. Boldt, May 1974.
6. Developers V. Brown and E. Stuckey
Teletype Corporation
Little Rock, Arkansas, U.S.A.
in collaboration with:
E. Knoch
Arkansas Enterprises for the Blind, Inc.
2811 Fair Park Boulevard
Little Rock, Arkansas 72204, U.S.A.
- Status One prototype built.

6. Developers V. Brown and E. Stuckey (continued)
- Description The device, which produces braille at 100 words per minute, is in parallel with a standard model 32 or 33 printer so there is keyboard input, print output and braille output simultaneously. The unit consists of a modified punch which punches two rows of three dots each or two rows of four dots each, depending on the need, instead of the 8 bit ASCII.
- Price The original price of duplicating this unit in quantity was estimated to be \$1600.00. However, with the modern LSI circuits available, it is felt that this device could be duplicated for under \$600.00.
- Information E. Knoch, June, 1974.
7. Developer D. V. Charlesworth
Clarke and Smith Industries, Ltd.
Melbourne House
Wallington, Surrey, England
- Status Prototype built, general availability mid 1976.
- Description 12,24, or 72 character 6 point braille display with solenoid operated dots module and computer terminal/information retrieval unit. Fresh lines of information are obtained by pressing button at end of line.
- Price £300 - £1600 depending on application.
- Information D. V. Charlesworth, May 1974.
8. Developer Dr. M. J. Gee
Scientific Systems Group
Office of Computing Activities
University of Dayton
Dayton, Ohio, 45409, U.S.A.
- Status Prototype
- Description A paper embosser which employs an ASR 33 terminal, and produces a configuration of seven dots arranged in an expanded braille cell, with the addition of a seventh position below position six
- Information Association for Computing Machinery
Newsletter for Blind Computer Programmers
4th Issue, Vol, 2, No. 1, page 5.

