

NON-VISUAL ALPHANUMERIC DISPLAYS

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Future research on non-visual displays for the visually handicapped must be towards identifying the parameters which optimise man-machine communication. This can be studied simultaneously from a theoretical standpoint as well as by more practical techniques. One approach is to evaluate scientifically the displays which are currently available as production models or prototypes.

The main features of these displays are summarised in Table 1; this information is based on replies to a questionnaire distributed in August 1973.

TABLE 1. A SUMMARY OF THE MAIN FEATURES OF THE DISPLAYS

Number	Output mode					Output			Application			state of development		Approximate cost
	Tactual	Audio	Parallel	Serial	Number of characters	Numerals only	Alphanumerics	Any shape	Output for electronic calculators etc.	Reading machines	Active graphical displays	Prototype available	Commercially available	
1	+					+			+			+		
2	+		+		12,75 or 72		+			+		+		£300
3		+		+	12	+			+			+		£250
4	+			+	10	+			+			+		
5	+		+			+			+			+		\$1100 for 10 digits
6	+		+		7	+			+			+		\$1600
7	+			+			+			+		+		\$65
8	+				7	+			+			+		
9		+						+			+	+		
10	+						+			+		+		
11	+			+	8	+			+			+		
12	+	+		+	4	+			+			+		1500 Sw. Crs.
13		+		+				+		+			+	\$1020
14	+		+		6		+		+	+		+		
15	+		+		3	+			+			+		
16		+						+			+	+		
17		+						+			+	+		
18	+			+				+		+		+		\$3450
19	+		+		12	+			+				+	Skr. 8000

1. Developer : American Foundation for the Blind, 15 West 16th Street, New York 1011, U.S.A.
Application : Output for electronic calculators etc.
State of development : A prototype has been produced but a new version with braille output is being developed.
Description : Tactile display using binary coded decimal.
2. Developer : Clarke and Smith Research Ltd., Melbourne House, Melbourne Road, Wallington, Surrey, England.
Application : Braille output device.
State of development : General availability September 1975.
Description : A 12, 25 or 72 character 6 dot braille display with bit serial input and solenoid activated dots.
Price : Circa £300 for 25 character display.
3. Developer : Dr. A.J. Croft and D.T. Smith, The Clarendon Laboratory, Department of Physics, University of Oxford, Parks Road, Oxford OX1 3PU, England.
Application : Output for electronic calculators etc.
State of development : A dozen are being built for further evaluation.
Description : Serial audio output with two tones - short tone is a single unit and a long tone is five units. It has been made on five printed circuit boards as an integral part of a calculator.
Price : Circa £250
4. Developer : K. Cummins, School of Engineering, University of California, 401 Verano Place, Irvine, California 92664, U.S.A.
Application : Output for electronic calculators etc.
Description : The working prototype consists of two units - the tactile output device and the main calculator unit. The output device has a 10 digit capability but displays one digit at a time; a rotary switch selects the digit to be displayed. After the output is read for each digit, the pins are reset by hand.
5. Developer : G.F. Dalrymple, Sensory Aids Evaluation and Development Center, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139, U.S.A.
Application : Braille analogue of 'Nixie' tube or 7 segment numeric display.
State of development : Building 10 dual cell numeric only modules for further evaluation.

- Description : The braille display (4 dots in the prototype) is composed of modules each containing two cells. These modules can be stacked to form a line of braille of any desired length. Each pin is connected by a lever to a solenoid; these levers are arranged in layers to prevent mechanical interference. The head can also contain a latch arrangement for holding the braille pattern without expending power in the main solenoids.
- Price : Display and drive electronics are estimated at \$100 per unit plus \$200 for each two digits i.e. a 4 digit display is approximately \$500 or a 10 digit display \$1100.
6. Developer : The Electro Physics Company, 9303 North Major Avenue, Morton Grove, Illinois 60053, U.S.A.
- Application : Output for electronic calculators etc.
- State of development : In limited production.
- Description : A binary coded decimal display with 7 digit capability. Each cell consists of 4 solenoid-operated pins.
- Price : Circa \$1600.
7. Developer : W.A.N. Ellis, Tudor Lodge Cottage, Fairmile Park Road, Cobham, Surrey, England.
- Application : Braille display as an output for digitally stored information.
- State of development : First prototype produced. General availability in 1975.
- Description : Serial output to 6 dot braille cell operated by solenoids. The user can set the output rate.
- Price : \$65.
8. Developer : Elm Systems Inc., Arlington Heights, Illinois, U.S.A.
- Application : Output for electronic calculators etc.
- State of development : One-off.
- Description : A binary coded decimal display with 7 digit capability. Each cell consists of 4 solenoid-operated pins.
9. Developer : Dr. R.M. Fish, 1507 West Acre Road, Joliet, Illinois 60435, U.S.A.
- Application : A mobility aid when used in conjunction with a television camera. A non-visual equivalent to the cathode ray oscilloscope.
- State of development : Prototype built.

